[DESCRIPTION]

[Title of Invention] NOVEL SUBSTITUTED CONDENSED RING COMPOUND

[Technical Field]

[0001]

The present invention relates to a substituted condensed compound that is useful as a medicament or a pharmaceutically acceptable salt thereof. More specifically, the present invention relates to a pharmaceutical composition comprising a novel substituted condensed ring compound or a pharmaceutically acceptable salt thereof, or a medicament comprising the substituted condensed ring compound or a pharmaceutically acceptable salt thereof (therapeutic agent, prophylactic agent, etc.).

[Background Art]

[0002]

Since the discovery of penicillin, antimicrobial agents have taken an important role in the treatment of infections.

[0003]

In particular, β-lactam agents (e.g., penicillin antimicrobial agents, cephalosporin antimicrobial agents, and carbapenem antimicrobial agents) are agents that are most commonly used in the treatment of bacterial infections in view of their potent sterilizing capacity and high degree of safety. However, with increased use of β-lactam agents, emergence and prevalence of pathogenic bacteria that have acquired resistance to β-lactam agents have become a global problem. Examples of the mechanism of acquiring resistance of such pathogens include production of β-lactamase, structural change in the target molecule of a β-lactam agent, reduced drug permeation into microbial cells, elevated drug discharge, and the like. In particular, production of β-lactamase, which degrades and inactivates β-lactam agents, is one of the most influential in the maintenance of efficacy of β-lactam agents. Various bacteria are involved in the evolution of β-lactamase that

antagonizes the efficacy of various β-lactam agents. β-lactamases can be classified into 4 classes based on their amino acid sequences, i.e., Ambler classes A, B, C, and D. Since class A, C, and D enzymes have a serine residue at the center of enzymatic activity, they are known as serine-β-lactamases. Since class B enzymes do not have a serine residue at the center of enzymatic activity but have zinc metal ion (Zn^{2+}), they are known as metallo-β-lactamases (zinc-β-lactamases).

[0004]

It has been already confirmed that concomitant use of an agent for inhibiting β-lactamase and a β-lactam agent is effective for solving the problem of resistance acquisition due to production of β-lactamase. It is known that commercially available agents for inhibiting β-lactamase, clavulanic acid, sulbactam, and tazobactam primarily inhibit class A β–lactamases excluding KPC (Klebsiella pneumoniae Carbapenemase), and avibactam inhibits class A β-lactamases (including KPC), class C β-lactamases, and some class D β-lactamases including OXA-48 (Non Patent Literature 1). However, these existing agents for inhibiting β-lactamase cannot effectively and broadly inhibit all β-lactamases produced by various bacteria. For example, such inhibiting agents do not exert an effect on class B metallo-β lactamases. Recently, β-lactamases called ESBLs (Extended Spectrum β-Lactamases) that can degrade more substrates (β-lactam agent) compared to conventional β-lactamases were isolated, which have led to a problem as a new resistant bacteria, especially as a causative bacteria for hospital-acquired infections in the US and Europe. In addition, emergence and prevalence of metallo-β-lactamas producing bacteria is becoming a problem in Japan. In view of such a circumstance, it is very important to address β-lactamase producing bacteria including ESBLs and metallo-β-lactamase for the prophylaxis of hospital-acquired infections. Furthermore, pathogenic bacteria evolve quickly, such that emergence of new β-lactamase resistant

bacteria is very likely. Accordingly, as a solution to such problems or as a safeguard against such issues to be addressed, there is a demand for the development of a novel agent for inhibiting β-lactamase that has a different structure from existing agents for inhibiting β-lactamse, whereby a broader β-lactamase inhibitory action or metallo-β-lactamase inhibitory action is expected.

[0005]

Recently, boronic acid derivatives with β-lactamase inhibitory action have been reported in Patent Literatures 1 to 13 and the like. Patent Literature 10 discloses a structure formed by fusing a saturated cycloalkyl ring or the like to a ring comprising boronic acid. These Patent Literatures do not disclose a structure related to the novel substituted condensed ring compounds encompassed by the present invention, i.e., a boronic acid compound group having a non-aryl heterocycle (preferably a nitrogen-containing non-aryl heterocycle, and more preferably an azetidine ring) structure having a specific substitution mode on a side chain at a specific position (wherein the specific substitution mode is, for example, a mode having a specific substitution on the non-aryl heterocycle via an alkylene group or a mode having a specific substituent on the non-aryl heterocycle via an oxo substituent (-C(=O)-, -S(=O)-, $-S(=O)_2-$, or the like) and a structure formed by fusing a cyclopropane ring to a ring comprising boronic acid as a combination.

[Citation List]

[Patent Literature]

[0006]

[PTL 1] WO 2014/107535

[PTL 2] WO 2014/107536

[PTL 3] WO 2015/179308

[PTL 4] WO 2016/003929

[PTL 5] WO 2016/149393

[PTL 6] WO 2014/089365
[PTL 7] WO 2014/110442
[PTL 8] WO 2014/151958
[PTL 9] WO 2015/191907
[PTL 10] WO 2018/005662
[PTL 11] WO 2018/199291
[PTL 12] WO 2019/009369
[PTL 13] WO 2019/009370

[Non Patent Literature]

[0007]

[NPL 1] Buynak. JD. Expert Opinion on Therapeutic Patents, 2013, 23(11), 1469-1481.

[Summary of Invention]

[Solution to Problem]

[0008]

The present invention provides a novel compound having excellent β-lactamase inhibitory action and provides a prophylactic or therapeutic agent that is useful for a bacterial infection, alone or in concomitant use with a β-lactam agent. Specifically, the present invention provides a prophylactic or therapeutic agent that is useful for therapy, by concomitant use with a β-lactam agent, of a disease such as sepsis, febrile neutropenia, bacterial meningitis, bacterial endocarditis, otitis media, sinusitis, pneumonia, lung abscess, empyema, secondary infection of a chronic respiratory disease, pharyngolaryngitis, tonsillitis, osteomyelitis, arthritis, peritonitis, intraperitoneal abscess, cholecystitis, cholangitis, liver abscess, deep skin infection, lymphangitis/lymphadenitis, secondary infection of trauma, burn injury, surgical wound, or the like, urinary tract infection, genital infection, eye infection, or odontogenic infection.

[0009]

More specifically, the inventors completed the present invention by finding that a compound represented by formula (1a), (1b), or (11) described below or a pharmaceutically acceptable salt thereof (also referred to as the "compound of the invention" hereinafter) has excellent β-lactamase inhibitory action.

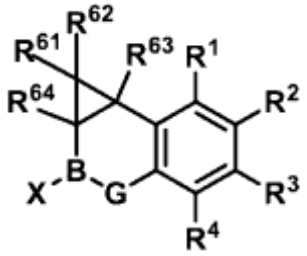
[0010]

Specifically, the present invention is the following.

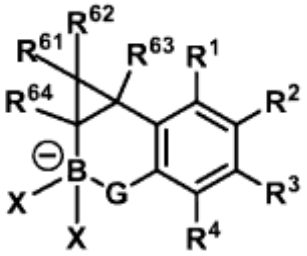
[Item 1]

A compound represented by formula (1a) or (1b):

[Chemical Formula 1]



(1a)



(1b)

or a pharmaceutically acceptable salt thereof

wherein

G is an oxygen atom, a sulfur atom, or $-NR^{a1}-$,

X is a hydroxyl group, an optionally substituted alkoxy group, or $-NR^{a2}R^{b1}$,

R^{a1}, R^{a2}, and R^{b1} are the same or different, each independently a hydrogen atom, a hydroxyl group, an optionally substituted hydrocarbyl group, or an optionally substituted heterohydrocarbyl group,

wherein R^{a2} and R^{b1} together may form an optionally substituted nitrogen-containing non-aryl heterocycle,

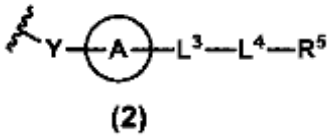
L^1 is a single bond, an oxygen atom, a sulfur atom, -SO-, $-SO_2-$, an optionally substituted hydrocarbylene group, or an optionally substituted heterohydrocarbylene group,

L^2 is a single bond or an optionally substituted hydrocarbylene group,

Z is a hydrogen atom, a hydroxyl group, an optionally substituted hydrocarbyl group, or an optionally substituted heterohydrocarbyl group,

one of R^1, R^2, and R^3 is represented by formula (2):

[Chemical Formula 2]



(2)

wherein

Y is an oxygen atom, a sulfur atom, or $-NR^j-$, and R^j is a hydrogen atom, a hydroxyl group, or an optionally substituted hydrocarbyl group,

ring A is an optionally substituted non-aryl heterocycle,

L^3 is an oxygen atom, a sulfur atom, an optionally substituted hydrocarbylene group, an optionally substituted heterohydrocarbylene group, optionally substituted -NH-, optionally substituted $-NH-SO_2-$, $-S(=O)-$, or $-S(=O)_2-$,

L^4 is a single bond, an optionally substituted hydrocarbylene group, an optionally substituted heterohydrocarbylene group, or $-C(=N-OR^{h1})-$,

R^{h1} is

1) a hydrogen atom,
2) a C_{1-6} alkyl group,
3) a C_{3-10} alicyclic group,
4) C_{6-10} aryl,
5) 5- or 6-membered heteroaryl, or
6) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 2) to 6) is optionally substituted),

R^5 is a hydrogen atom, a hydroxyl group, an optionally substituted hydrocarbyl group, an optionally substituted heterohydrocarbyl group, optionally substituted -NHOH, a sulfo group (sulfonic acid group), optionally substituted $-SO_2H$, optionally substituted $-SO_2-NH_2$, optionally substituted -

$S(=O)(=NH)H$, optionally substituted $-NH-SO_2-H$, optionally substituted $-NH-SO_2-NH_2$, optionally substituted $-N=S(=O)H_2$, or optionally substituted $-NH_2$,

the remaining two (without the structure of formula (2) among R^1, R^2, and R^3) are the same or different, each independently a hydrogen atom, halogen, a hydroxyl group, an optionally substituted hydrocarbyl group, or an optionally substituted heterohydrocarbyl group,

R^4 is

1) $-C(=O)R^8$,

2) $-SO_2-L^6-R^8$,

(wherein R^8 in 1) and 2) is a hydroxyl group, an optionally substituted hydrocarbyl group, or an optionally substituted heterohydrocarbyl group, and L^6 is a single bond or an optionally substituted hydrocarbylene group),

3) $-NR^{a4}R^{b3}$,

4) $-B(OR^{m1})_2$,

5) $-PO(OR^{m1})(OR^{m2})$,

6) optionally substituted heteroaryl,

7) an optionally substituted non-aryl heterocycle, or

8) a bioisostere of one of 1) to 7),

(wherein the formulas of 1), 2), 4), 5), and 6) include a carboxylic acid isostere, and 8) may include them in duplicates),

R^{a4} and R^{b3} are the same or different, each independently having the same definition as R^{a1}, R^{a2}, and R^{b1}, wherein a combination of R^{a4} and R^{b3}, when attached to the same nitrogen atom, together may form an optionally substituted nitrogen-containing non-aryl heterocycle,

R^{m1} is a hydrogen atom or an optionally substituted hydrocarbyl group,

wherein if R^{m1} is attached to a boron atom via an oxygen atom, two R^{m1}, as alkylene, together with the boron atom and two oxygen

atoms, may form a non-aryl heterocycle (wherein an alkylene moiety is optionally substituted in the non-aryl heterocycle),

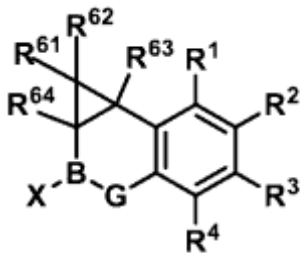
R^{m2} is a hydrogen atom or an optionally substituted hydrocarbyl group, and

R^{61}, R^{62}, R^{63}, and R^{64} are each independently a hydrogen atom, halogen, an optionally substituted alkyl group, or $-L^1-L^2-Z$.

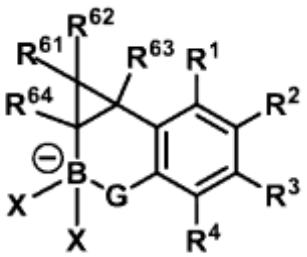
[Item 2]

A compound represented by formula (1a) or (1b):

[Chemical Formula 3]



(1a)



(1b)

or a pharmaceutically acceptable salt thereof

wherein

G is an oxygen atom, a sulfur atom, or $-NR^{a1}-$,

X is a hydroxyl group, an optionally substituted alkoxy group, or $-NR^{a2}R^{b1}$,

R^{a1}, R^{a2}, and R^{b1} are the same or different, each independently a hydrogen atom, a hydroxyl group, an optionally substituted hydrocarbyl group, or an optionally substituted heterohydrocarbyl group,

wherein R^{a2} and R^{b1} together may form an optionally substituted nitrogen-containing non-aryl heterocycle,

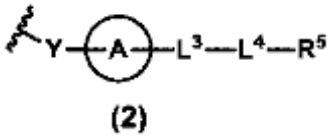
L^1 is a single bond, an oxygen atom, a sulfur atom, -SO-, $-SO_2-$, an optionally substituted hydrocarbylene group, or an optionally substituted heterohydrocarbylene group,

L^2 is a single bond or an optionally substituted hydrocarbylene group,

Z is a hydrogen atom, a hydroxyl group, an optionally substituted hydrocarbyl group, or an optionally substituted heterohydrocarbyl group,

one of R^1, R^2, and R^3 is represented by formula (2):

[Chemical Formula 4]



(2)

wherein

Y is an oxygen atom, a sulfur atom, or $-NR^j-$, and R^j is a hydrogen atom, a hydroxyl group, or an optionally substituted hydrocarbyl group,

ring A is an optionally substituted non-aryl heterocycle,

L^3 is an oxygen atom, a sulfur atom, an optionally substituted hydrocarbylene group, an optionally substituted heterohydrocarbylene group, $-S(=O)-$, or $-S(=O)_2-$,

L^4 is a single bond, an optionally substituted hydrocarbylene group, or $-C(=N-OR^{h1})-$,

R^{h1} is

1) a hydrogen atom,

2) a C_{1-6} alkyl group,

3) a C_{3-10} alicyclic group,

4) C_{6-10} aryl,

5) 5- or 6-membered heteroaryl, or

6) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 2) to 6) is optionally substituted),

R^5 is a hydrogen atom, a hydroxyl group, an optionally substituted hydrocarbyl group, or an optionally substituted heterohydrocarbyl group,

the remaining two (without the structure of formula (2) among R^1, R^2, and R^3) are the same or different, each independently a hydrogen atom, halogen, a hydroxyl group, an optionally

substituted hydrocarbyl group, or an optionally substituted heterohydrocarbyl group,

R^4 is

1) $-C(=O)R^8$,

2) $-SO_2-L^6-R^8$,

(wherein R^8 in 1) and 2) is a hydroxyl group, an optionally substituted hydrocarbyl group, or an optionally substituted heterohydrocarbyl group, and L^6 is a single bond or an optionally substituted hydrocarbylene,

3) $-NR^{a4}R^{b3}$,

4) $-B(OR^{m1})_2$,

5) $-PO(OR^{m1})(OR^{m2})$,

6) optionally substituted heteroaryl,

7) an optionally substituted non-aryl heterocycle, or

8) a bioisostere of one of 1) to 7),

(wherein the formulas of 1), 2), 4), 5), and 6) include a carboxylic acid isostere, and 8) may include them in duplicates),

R^{a4} and R^{b3} are the same or different, each independently having the same definition as R^{a1}, R^{a2}, and R^{b1}, wherein a combination of R^{a4} and R^{b3}, when attached to the same nitrogen atom, together may form an optionally substituted nitrogen-containing non-aryl heterocycle,

R^{m1} is a hydrogen atom or an optionally substituted hydrocarbyl group,

wherein if R^{m1} is attached to a boron atom via an oxygen atom, two R^{m1}, as alkylene, together with the boron atom and two oxygen atoms, may form a non-aryl heterocycle (wherein an alkylene moiety is optionally substituted in the non-aryl heterocycle),

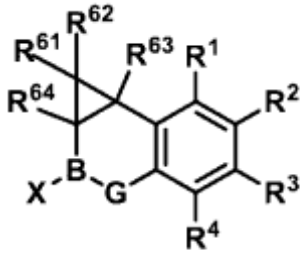
R^{m2} is a hydrogen atom or an optionally substituted hydrocarbyl group, and

R^{61}, R^{62}, R^{63}, and R^{64} are each independently a hydrogen atom, halogen, an optionally substituted alkyl group, or $-L^1-L^2-Z$.

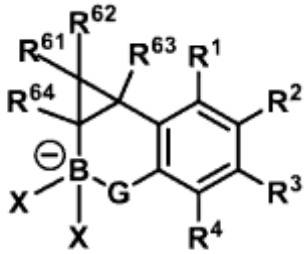
[Item 3]

The compound or the pharmaceutically acceptable salt thereof according to item 1 or 2, represented by formula (1a) or (1b):

[Chemical Formula 5]



(1a)



(1b)

wherein

G is an oxygen atom, a sulfur atom, or $-NR^{a1}-$,

X is a hydroxyl group, an optionally substituted C_{1-6} alkoxy group, or $-NR^{a2}R^{b1}$,

R^{a1}, R^{a2}, and R^{b1} are the same or different, each independently

1) a hydrogen atom,

2) a C_{1-6} alkyl group,

3) a C_{3-10} alicyclic group,

4) C_{6-10} aryl,

5) 5- or 6-membered heteroaryl,

6) a 4- to 10-membered non-aryl heterocycle,

7) a C_{1-6} alkylcarbonyl group,

8) a C_{3-10} alicyclic carbonyl group,

9) a C_{6-10} arylcarbonyl group,

10) a 5- or 6-membered heteroarylcarbonyl group,

11) a C_{1-6} alkylsulfonyl group,

12) a C_{3-10} alicyclic sulfonyl group,

13) a C_{6-10} arylsulfonyl group,

14) a 5- or 6-membered heteroarylsulfonyl group, or

15) $-OR^{c1}$,

(wherein each substituent from 2) to 14) is optionally substituted),

wherein R^{a2} and R^{b1} together may form an optionally substituted 4- to 10-membered nitrogen-containing non-aryl heterocycle,

R^{c1} is

1) a hydrogen atom,
2) a C_{1-6} alkyl group,
3) a C_{3-10} alicyclic group,
4) C_{6-10} aryl,
5) 5- or 6-membered heteroaryl, or
6) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 2) to 6) is optionally substituted),

L^1 is a single bond, an oxygen atom, a sulfur atom, -SO-, -SO_2-, -NR^{d1}-, -$NR^{d1}C(=O)$-, or -$NR^{d1}SO_2$-,

L^2 is a single bond or an optionally substituted C_{1-6} alkylene group,

Z is

1) a hydrogen atom,
2) a hydroxyl group,
3) a cyano group,
4) a carboxyl group,
5) a C_{3-10} alicyclic group,
6) C_{6-10} aryl,
7) 5- or 6-membered heteroaryl,
8) a 4- to 10-membered non-aryl heterocycle,
9) a C_{1-6} alkoxy group,
10) a C_{3-10} alicyclic oxy group,
11) a C_{6-10} aryloxy group,
12) a 5- or 6-membered heteroaryloxy group,
13) a 4- to 10-membered non-aryl heterocyclyl oxy group,
14) a C_{1-6} alkylthio group,
15) a C_{3-10} alicyclic thio group,
16) a C_{6-10} arylthio group,
17) a 5- or 6-membered heteroarylthio group,

18) a 4- to 10-membered non-aryl heterocyclyl thio group,

(wherein each substituent from 5) to 18) is optionally substituted),

19) $-SO_2-NR^{e1}R^{f1}$,

20) $-NR^{e1}-C(=O)OR^{f1}$,

21) $-NR^{g1}-C(=O)NR^{e1}R^{f1}$,

22) $-NR^{e1}-C(=S)R^{f1}$,

23) $-NR^{e1}-C(=S)OR^{f1}$,

24) $-NR^{g1}-C(=S)NR^{e1}R^{f1}$,

25) $-NR^{g1}-CR^{e1}(=NR^{f1})$,

26) $-NR^{g1}-CR^{e1}(=N-OR^{f1})$,

27) $-NR^{h1}-C(=NR^{g1})NR^{e1}R^{f1}$,

28) $-NR^{h1}-C(=N-OR^{g1})NR^{e1}R^{f1}$,

29) $-NR^{i1}-C(=NR^{h1})NR^{g1}-NR^{e1}R^{f1}$,

30) $-NR^{i1}-C(=N-OR^{h1})NR^{g1}-NR^{e1}R^{f1}$,

31) $-NR^{e1}-SO_2-R^{f1}$,

32) $-NR^{g1}-SO_2-NR^{e1}R^{f1}$,

33) $-C(=O)OR^{e1}$,

34) $-C(=S)OR^{e1}$,

35) $-C(=S)NR^{e1}R^{f1}$,

36) $-C(=S)NR^{e1}OR^{f1}$,

37) $-C(=S)NR^{g1}-NR^{e1}R^{f1}$,

38) $-C(=NR^{e1})R^{f1}$,

39) $-C(=N-OR^{e1})R^{f1}$,

40) $-C(=NR^{h1})NR^{g1}-NR^{e1}R^{f1}$,

41) $-C(=N-OR^{h1})NR^{g1}-NR^{e1}R^{f1}$,

42) $-NR^{e1}R^{f1}$,

43) $-NR^{g1}-NR^{e1}R^{f1}$,

44) $-NR^{e1}OR^{f1}$,

45) $-NR^{e1}-C(=O)R^{f1}$,

46) $-C(=O)NR^{e1}R^{f1}$,

47) $-C(=O)NR^{e1}OR^{f1}$,

48) $-C(=O)NR^{g1}-NR^{e1}R^{f1}$,

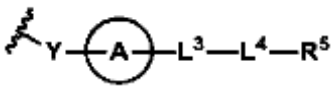
49) $-C(=O)R^{e1}$,

50) $-C(=NR^{g1})NR^{e1}R^{f1}$, or

51) $-C(=N-OR^{h1})NR^{e1}R^{f1}$,

one of R^1, R^2, and R^3 is a group represented by formula (2):

[Chemical Formula 6]



(2)

wherein

Y is an oxygen atom, a sulfur atom, or $-NR^j-$,

ring A is an optionally substituted 4- to 20-membered non-aryl heterocycle,

L^3 is

1) an oxygen atom,

2) a sulfur atom,

3) $-NR^{d2}-$,

4) $-NR^{d2}C(=O)-$,

5) $-NR^{d2}SO_2-$,

6) a C_{1-6} alkylene group,

7) a C_{3-10} cycloalkylene group,

8) a 4- to 10-membered non-aryl heterocyclylene group,

(wherein each substituent from 6) to 8) is optionally substituted),

9) $-C(=O)-$,

10) $-S(=O)-$, or

11) $-S(=O)_2-$,

L^4 is

1) a single bond,

2) a C_{1-6} alkylene group,

3) a C_{3-10} cycloalkylene group,

4) a C_{6-10} arylene group,

5) a 5- or 6-membered heteroarylene group,

6) a 4- to 10-membered non-aryl heterocyclylene group,

(wherein each substituent from 2) to 6) is optionally substituted), or

7) $-C(=N-OR^{h1})-$,

R^5 is

1) a hydrogen atom,

2) a C_{1-6} alkyl group,

3) a C_{3-10} alicyclic group,

4) a 4- to 10-membered non-aryl heterocycle,

5) C_{6-10} aryl,

6) 5- to 10-membered heteroaryl,

7) a C_{1-6} alkylthio group,

(wherein each substituent from 2) to 7) is optionally substituted, and if two substituents further substituted with the substituent of 1), 2), or 3) are each substituted on adjacent atoms within a ring, the two substituents together may further form a condensed ring structure),

8) $-NR^{e1}OH$,

9) a carboxyl group (-C(=O)OH)

10) a carboxylic acid isostere (wherein the carboxylic acid isostere comprises an ester group-$C(=O)OR^{20a}$),

11) a sulfo group (sulfonic acid group),

12) $-SO_2R^{e1}$,

13) $-SO_2-NR^{e1}R^{f1}$,

14) $-S(=O)(=NR^{f1})R^{e1}$,

15) $-NR^{e1}-C(=O)R^{f1}$,

16) $-NR^{e1}-C(=O)OR^{f1}$,

17) $-NR^{g1}-C(=O)NR^{e1}R^{f1}$,

18) $-NR^{e1}-SO_2-R^{f1}$,

19) $-NR^{g1}-SO_2-NR^{e1}R^{f1}$,

20) $-N=S(=O)R^{e1}R^{f1}$,

21) $-C(=O)NR^{50}R^{51}$, or

22) $-NR^{e1}R^{f1}$ (wherein if R^5 is the substituent of 22), $-L^3-L^4-R^5$ is not $-(CH_2)_{1-4}NR^{e1}R^{f1}$ (wherein R^{e1} and R^{f1} are a hydrogen atom,

optionally substituted C_{1-4} alkyl, an optionally substituted C_{3-7} alicyclic group, an optionally substituted 4- to 10-membered non-aryl heterocyclic group, optionally substituted C_{6-10} aryl, or optionally substituted 5- to 10-membered heteroaryl)),

R^{20a} is

1) a C_{1-6} alkyl group,

2) a C_{3-10} alicyclic group,

3) C_{6-10} aryl,

4) 5- or 6-membered heteroaryl, or

5) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 1) to 5) is optionally substituted),

R^{50} represents

1) a hydrogen atom,

2) a C_{1-6} alkyl group,

3) a hydroxyl group,

4) a C_{1-6} alkoxy group,

5) a C_{3-6} cycloalkoxy group,

6) a C_{3-6} alicyclic group,

7) a 4- to 6-membered non-aryl heterocycle,

8) C_{6-10} aryl,

9) 5- to 10-membered heteroaryl

10) 4- to 6-membered non-aryl heterocyclyl oxy,

11) C_{6-10} aryloxy,

12) 5- to 10-membered heteroaryloxy,

13) a C_{1-6} alkylsulfonyl group,

14) a C_{3-6} cycloalkoxysulfonyl group, or

15) a 4- to 6-membered non-aryl heterocyclyl sulfonyl group,

(wherein each substituent of 2) and 4) to 15) is optionally substituted),

R^{51} represents

1) a hydrogen atom,

2) a C_{1-6} alkyl group,

3) a C_{3-6} alicyclic group,

4) a 4- to 6-membered non-aryl heterocycle,

5) C_{6-10} aryl, or

6) 5- to 10-membered heteroaryl,

(wherein each substituent from 2) to 6) is optionally substituted), or

R^{50} and R^{51} together may form optionally substituted 4- to 7-membered nitrogen-containing non-aryl heterocycle,

the remaining two (without the structure of formula (2) among R^1, R^2, and R^3) are the same or different, each independently a hydrogen atom, a halogen atom, an optionally substituted C_{1-6} alkyl group, an optionally substituted C_{1-6} alkoxy group, an optionally substituted C_{1-6} alkylthio group, optionally substituted 5- or 6-membered heteroaryl, or $-NR^{a3}R^{b2}$,

R^{d1}, R^{d2}, R^{e1}, R^{f1}, R^{g1}, R^{h1}, R^{i1}, and R^j are the same or different, each independently

1) a hydrogen atom,

2) a C_{1-6} alkyl group,

3) a C_{3-10} alicyclic group,

4) C_{6-10} aryl,

5) 5- or 6-membered heteroaryl, or

6) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 2) to 6) is optionally substituted),

a combination of R^{e1} and R^{f1}, when attached to the same nitrogen atom, together may form an optionally substituted 4- to 10-membered nitrogen-containing non-aryl heterocycle,

R^4 is

1) $-C(=O)R^8$,

2) $-SO_2-L^6-R^8$,

(wherein R^8 in 1) and 2) is $-NR^{a5}R^{b4}$, $-NR^{a5}-L^7-B(OR^{m1})_2$, $-OR^{m1}$, or an optionally substituted C_{1-6} alkyl group, and L^6 is a single bond or $-NR^{a6}-$),

3) $-NR^{a4}R^{b3}$,

4) $-B(OR^{m1})_2$,

5) $-PO(OR^{m1})(OR^{m2})$,

6) optionally substituted 5-membered heteroaryl,

7) an optionally substituted 5-membered non-aryl heterocycle, or

8) a bioisostere of one of 1) to 7),

(wherein the formulas of 2), 4), 5), and 6) include a carboxylic acid isostere, and 8) may include them in duplicates),

R^{a3}, R^{a4}, R^{a5}, R^{a6}, R^{b2}, R^{b3}, and R^{b4} are the same or different, each independently having the same definition as R^{a1}, R^{a2}, and R^{b1}, wherein a combination of R^{a3} and R^{b2}, R^{a4} and R^{b3}, or R^{a5} and R^{b4}, when attached to the same nitrogen atom, together may form an optionally substituted 4- to 10-membered nitrogen-containing non-aryl heterocycle,

R^{m1} is

1) a hydrogen atom,

2) a C_{1-6} alkyl group,

3) a C_{3-10} alicyclic group,

4) C_{6-10} aryl,

5) 5- or 6-membered heteroaryl, or

6) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 2) to 6) is optionally substituted),

wherein if R^{m1} is attached to a boron atom via an oxygen atom, two R^{m1}, as C_{2-4} alkylene, together with the boron atom and two oxygen atoms, may form a 5- to 7-membered non-aryl heterocycle (wherein an alkylene moiety is optionally substituted in the non-aryl heterocycle),

R^{m2} is a hydrogen atom, an optionally substituted C_{1-6} alkyl group, or an optionally substituted C_{3-10} alicyclic group,

L^7 is an optionally substituted C_{1-3} alkylene group,

R^{61}, R^{62}, and R^{63} are each independently a hydrogen atom, halogen, or an optionally substituted C_{1-6} alkyl group, and

R^{64} is a hydrogen atom, halogen, an optionally substituted C_{1-6} alkyl group, or $-L^1-L^2-Z$.

[Item 4]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 3, wherein L^3 is

1) a C_{1-6} alkylene group,

2) a C_{3-10} cycloalkylene group, or

3) a 4- to 10-membered non-aryl heterocyclylene group,

(wherein each substituent from 1) to 3) is optionally substituted), and

L^4 is a single bond or an optionally substituted C_{1-5} alkylene group.

[Item 5]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 4, wherein

L^3 is an optionally substituted C_{1-4} alkylene group, and

L^4 is a single bond or an optionally substituted C_{1-3} alkylene group.

[Item 6]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 5, wherein

L^3 is $-(CR^{30}R^{31})_{n1}-$,

R^{30} and R^{31} are each independently, or if there are multiple instances of each of them, all of them independently represent

1) a hydrogen atom,

2) $-NR^{a7}R^{a8}$,

3) a C_{1-4} alkyl group,

4) C_{6-10} aryl,

5) 5- to 10-membered heteroaryl,

6) a C_{3-6} alicyclic group,

7) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 3) to 7) is optionally substituted), or

8) $-OR^{c2}$, or

R^{30} and R^{31}, together with the carbon atom to which they are attached, form a C_{3-6} alicyclic group or a 4- to 6-membered non-aryl heterocycle,

R^{a7} and R^{a8} are the same or different, each independently

1) a hydrogen atom,
2) a C_{1-6} alkyl group,
3) a C_{3-10} alicyclic group,
4) C_{6-10} aryl,
5) 5- or 6-membered heteroaryl,
6) a 4- to 10-membered non-aryl heterocycle,
7) a C_{1-6} alkylcarbonyl group,
8) a C_{3-10} alicyclic carbonyl group,
9) a C_{6-10} arylcarbonyl group,
10) a 5- or 6-membered heteroarylcarbonyl group,
11) a C_{1-6} alkylsulfonyl group,
12) a C_{3-10} alicyclic sulfonyl group,
13) a C_{6-10} arylsulfonyl group,
14) a 5- or 6-membered heteroarylsulfonyl group, or
15) $-OR^{c3}$,

(wherein each substituent from 2) to 14) is optionally substituted),

wherein R^{a7} and R^{a8} together may form an optionally substituted 4- to 10-membered nitrogen-containing non-aryl heterocycle,

R^{c2} and R^{c3} are each independently

1) a hydrogen atom,
2) a C_{1-6} alkyl group,
3) a C_{3-10} alicyclic group,
4) C_{6-10} aryl,
5) 5- or 6-membered heteroaryl, or
6) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 2) to 6) is optionally substituted),

n1 is an integer 1, 2, 3, or 4,

L^4 is $-(CR^{40}R^{41})_{n2}-$,

R^{40} and R^{41} each independently, or if there are multiple instances of each of them, all of them independently represent

1) a hydrogen atom,

2) $-NR^{a9}R^{a10}$,

3) a C_{1-4} alkyl group,

4) C_{6-10} aryl,

5) 5- to 10-membered heteroaryl,

6) a C_{3-6} alicyclic group

7) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 3) to 7) is optionally substituted), or

8) $-OR^{c4}$, or

R^{40} and R^{41}, together with the carbon atom to which they are attached, form a C_{3-6} alicyclic group or a 4- to 6-membered non-aryl heterocycle,

R^{a9} and R^{a10} are the same or different, each independently

1) a hydrogen atom,

2) a C_{1-6} alkyl group,

3) a C_{3-10} alicyclic group,

4) C_{6-10} aryl,

5) 5- or 6-membered heteroaryl,

6) a 4- to 10-membered non-aryl heterocycle,

7) a C_{1-6} alkylcarbonyl group,

8) a C_{3-10} alicyclic carbonyl group,

9) a C_{6-10} arylcarbonyl group,

10) a 5- or 6-membered heteroarylcarbonyl group,

11) a C_{1-6} alkylsulfonyl group,

12) a C_{3-10} alicyclic sulfonyl group,

13) a C_{6-10} arylsulfonyl group,

14) a 5- or 6-membered heteroarylsulfonyl group,

(wherein each substituent from 2) to 14) is optionally substituted), or

15) $-OR^{c5}$,

wherein R^{a9} and R^{a10} together may form an optionally substituted 4- to 10-membered nitrogen-containing non-aryl heterocycle,

R^{c4} and R^{c5} are each independently defined the same as R^{c2} and R^{c3}, and

n2 is an integer 0 (i.e., when L^4 is a single bond), 1, 2, or 3.

[Item 7]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 6, wherein

$-L^3-L^4-$ is an optionally substituted C_{1-2} alkylene group.

[Item 8]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 7, wherein $-L^3-L^4-$ is a C_{1-2} alkylene group optionally substituted with a C_{1-3} alkyl group, an amino group, or a hydroxymethyl group, or a plurality of the same or different groups thereamong (wherein two C_{1-3} alkyl groups, when attached to the same carbon atom, together with the carbon atom to which they are attached, may form a C_{3-6} alicyclic group).

[Item 9]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 8, wherein

R^5 is

1) a C_{3-10} alicyclic group,

2) C_{6-10} aryl,

3) 5- to 10-membered heteroaryl,

4) a C_{1-6} alkylthio group,

(wherein each substituent from 1) to 4) is optionally substituted, and if two substituents further substituted with the substituent of 2) or 3) are each substituted on adjacent atoms within a ring, the two substituents together may further form a condensed ring structure),

5) $-NR^{e1}OH$,

6) $-C(=O)NR^{50}R^{51}$,

7) $-SO_2-NR^{e1}R^{f1}$,

8) $-NR^{e1}-SO_2-R^{f1}$,

9) $-C(=O)OR^{20}$, or

10) $-NR^{e1}R^{f1}$ (wherein if R^5 is the substituent of 10), L^3 and/or L^4 is a C_{1-6} alkylene group that is necessarily substituted with one or more groups other than a hydrogen atom (wherein L^3 or L^4, together with said substituent, may form a C_{3-10} alicyclic group or a 4- to 10-membered non-aryl heterocycle)), and

R^{20} is

1) a hydrogen atom,

2) a C_{1-6} alkyl group,

3) a C_{3-10} alicyclic group,

4) C_{6-10} aryl,

5) 5- or 6-membered heteroaryl, or

6) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 2) to 6) is optionally substituted).

[Item 10]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 9, wherein

R^5 is

1) C_{6-10} aryl,

2) 5- to 10-membered heteroaryl,

3) $-C(=O)NR^{50}R^{51}$,

4) $-C(=O)OR^{20}$, or

5) $-NR^{e1}R^{f1}$ (wherein if R^5 is the substituent of 5), L^3 and/or L^4 is a C_{1-6} alkylene group that is necessarily substituted with one or more groups other than a hydrogen atom, and together with said substituent forms at least one C_{3-10} alicyclic group or 4- to 10-membered non-aryl heterocycle)

(wherein each substituent from 1) to 2) is optionally substituted, and any two groups thereof, when each is attached to adjacent

atoms within a ring, together may further form a condensed ring structure).

[Item 11]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 10, wherein $Z\text{-}L^2\text{-}L^1$ is an optionally substituted $C_{1\text{-}6}$ alkylthio group.

[Item 12]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 11, wherein R^{61}, R^{62}, R^{63}, and R^{64} are each independently a hydrogen atom, a fluorine atom, or a $C_{1\text{-}3}$ alkyl group optionally substituted with a fluorine atom.

[Item 13]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 12, wherein R^{61}, R^{62}, R^{63}, and R^{64} are each independently a hydrogen atom or a fluorine atom.

[Item 14]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 13, wherein G is an oxygen atom.

[Item 15]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 14, wherein X is a hydroxyl group or an optionally substituted $C_{1\text{-}6}$ alkoxy group.

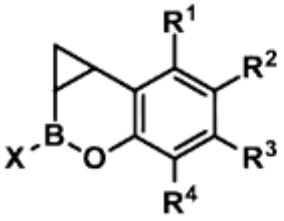
[Item 16]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 15, wherein X is a hydroxyl group.

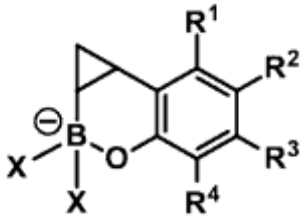
[Item 17]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 16, wherein the compounds of formulas (1a) and (1b) are represented by formulas (3a) and (3b), respectively:

[Chemical Formula 7]



(3a)



(3b)

wherein X, R^1, R^2, and R^3 are defined the same as any one of items 1 to 16, and

R^4 is selected from the group consisting of

1) $-C(=O)OR^{m1}$ (wherein R^{m1} is a hydrogen atom, a C_{1-6} alkyl group, a C_{3-10} alicyclic group, C_{6-10} aryl, 5- or 6-membered heteroaryl, or a 4- to 10-membered non-aryl heterocycle, wherein the C_{1-6} alkyl group, the C_{3-10} alicyclic group, the C_{6-10} aryl, the 5- or 6-membered heteroaryl, and the 4- to 10-membered non-aryl heterocycle are each optionally substituted), and

2) a bioisostere of 1).

[Item 18]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 17, wherein R^4 is

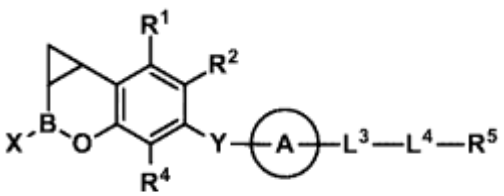
1) $-C(=O)OH$ (i.e., a carboxyl group), or

2) a carboxylic acid isostere.

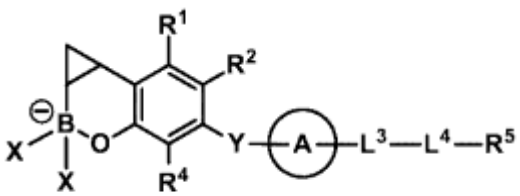
[Item 19]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 18, wherein the compounds of formulas (1a) and (1b) or the compounds of formulas (3a) and (3b) are represented by formulas (4a) and (4b), respectively:

[Chemical Formula 8]



(4a)



(4b)

wherein X, R^4, Y, ring A, L^3, L^4, and R^5 are defined the same as any one of items 1 to 18, and

R^1 and R^2 are the same or different, each independently a hydrogen atom, a halogen atom, a C_{1-6} alkyl group, a C_{1-6} alkoxy group, or a C_{1-6} alkylthio group (wherein the C_{1-6} alkyl group, C_{1-6} alkoxy group, and C_{1-6} alkylthio group are optionally substituted).

[Item 20]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 19, wherein ring A is an optionally substituted 4- to 10-membered non-aryl heterocycle.

[Item 21]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 20, wherein ring A is an optionally substituted 4- to 7-membered non-aryl heterocycle.

[Item 22]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 21, wherein Y is an oxygen atom or a sulfur atom.

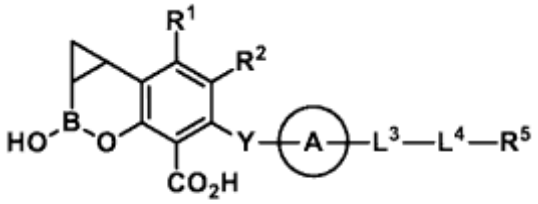
[Item 23]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 22, wherein Y is an oxygen atom.

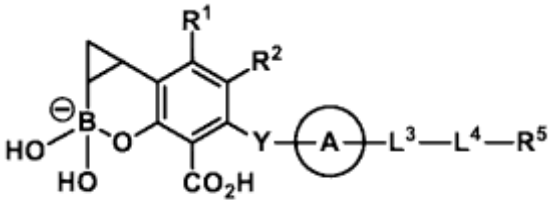
[Item 24]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 23, wherein the compounds of formulas (1a) and (1b), the compounds of formulas (3a) and (3b), or the compounds of formulas (4a) and (4b) are represented by formulas (5a) and (5b), respectively:

[Chemical Formula 9]



(5a)



(5b)

wherein R^1, R^2, Y, L^3, L^4, and R^5 are defined the same as any one of items 1 to 23, and ring A is an optionally substituted 4- to 6-membered nitrogen-containing non-aryl heterocycle.

[Item 25]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 3 and 11 to 24, wherein L^3 is -C(=O)- or $-S(=O)_2-$.

[Item 26]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 3 and 11 to 25, wherein L^3 is -C(=O)-.

[Item 27]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 3 and 11 to 26, wherein L^4 is a single bond, $-C(=N-OR^{h1})-$, or an optionally substituted C_{1-6} alkylene group, wherein R^{h1} is an optionally substituted C_{1-6} alkyl group.

[Item 28]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 27, wherein R^1 and R^2 are the same or different, each independently selected from the group consisting of

1) a hydrogen atom,
2) a halogen atom,
3) a C_{1-6} alkyl group,
4) a C_{1-6} alkoxy group, and
5) a C_{1-6} alkylthio group,

(wherein each substituent from 3) to 5) is optionally substituted).

[Item 29]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 28, wherein R^1 and R^2 are the same or different, each independently selected from the group consisting of

1) a hydrogen atom,

2) a halogen atom,

3) a C_{1-6} alkyl group,

4) a C_{1-6} alkoxy group, and

5) a C_{1-6} alkylthio group,

(wherein each substituent from 3) to 5) is optionally substituted with a halogen atom).

[Item 30]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 29, wherein R^1 and R^2 are the same or different, each independently selected from the group consisting of

1) a hydrogen atom,

2) a halogen atom, and

3) a C_{1-6} alkyl group optionally substituted with a halogen atom.

[Item 31]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 30, wherein R^1 and R^2 are the same or different, each independently selected from the group consisting of

1) a hydrogen atom,

2) a fluorine atom, and

3) a C_{1-3} alkyl group optionally substituted with a fluorine atom.

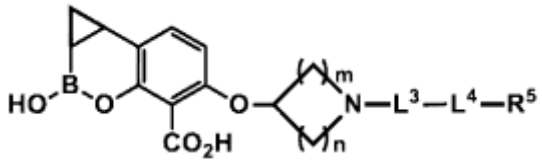
[Item 32]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 31, wherein R^1 and R^2 are both hydrogen atoms.

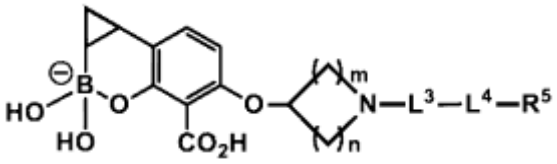
[Item 33]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 32, wherein the compounds of formulas (1a) and (1b), the compounds of formulas (3a) and (3b), the compounds of formulas (4a) and (4b), or the compounds of formulas (5a) and (5b) are represented by formulas (6a) and (6b), respectively:

[Chemical Formula 10]



(6a)



(6b)

wherein

L^3, L^4, and R^5 are defined the same as any one of items 1 to 32,

m is an integer 1, 2, or 3,

n is an integer 1, 2, or 3, and

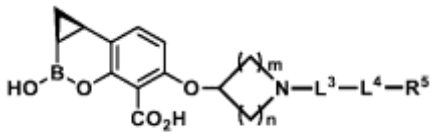
m + n is 2, 3, or 4.

[Item 34]

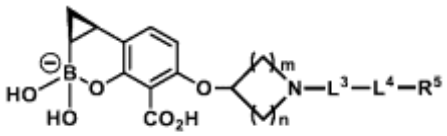
The compound or the pharmaceutically acceptable salt thereof according to item 33, wherein the compounds of formulas (6a) and (6b) are enantiomers represented by

formulas (7a) and (7b):

[Chemical Formula 11]



(7a)

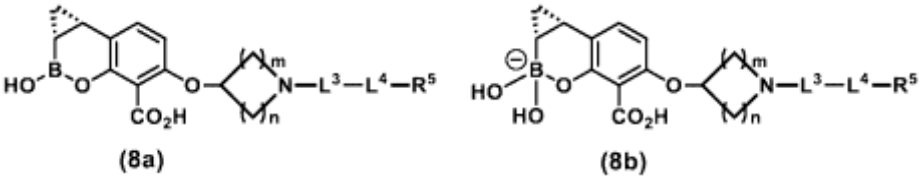


(7b)

or

formulas (8a) and (8b):

[Chemical Formula 12]



(8a) (8b)

, respectively

wherein

L^3, L^4, and R^5 are defined the same as any one of items 1 to 33, and

m and n are defined the same as item 33.

[Item 35]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 34, wherein m is 1 or 2, n is 1 or 2, and m + n is 2 or 3.

[Item 36]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 35, wherein m is 1, and n is 1.

[Item 37]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 6, 9 to 24, and 28 to 36, wherein

L^3 is $-(CR^{30}R^{31})_{n1}-$ or 4- to 10-membered non-aryl heterocyclylene,

R^{30} and R^{31} each independently, or if there are multiple instances of each of them, all of them independently represent

1) a hydrogen atom,

2) an optionally substituted C_{1-4} alkyl group, or

3) optionally substituted C_{6-10} aryl,

n1 is 1, 2, or 3,

L^4 is a single bond or $-(CR^{40}R^{41})_{n2}-$,

R^{40} and R^{41} each independently, or if there are multiple instances of each of them, all of them independently represent

1) a hydrogen atom,

2) $-NR^{a9}R^{a10}$,

3) an optionally substituted C_{1-4} alkyl group, or

4) $-OR^{c4}$ or

R^{40} and R^{41}, together with the carbon atom to which they are attached, form a C_{3-6} alicyclic group or a 4- to 6-membered non-aryl heterocycle,

R^{a9}, R^{a10}, and R^{c4} are the same or different, each independently

1) a hydrogen atom,

2) an optionally substituted C_{1-6} alkyl group, or

3) an optionally substituted C_{3-10} alicyclic group,

wherein R^{a9} and R^{a10} together may form an optionally substituted 4- to 10-membered nitrogen-containing non-aryl heterocycle, and

n2 is 0, 1, or 2.

[Item 38]

The compound or the pharmaceutically acceptable salt thereof according to item 37, wherein n1 is 1 or 2, and n2 is 0 or 1.

[Item 39]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 6, 9 to 24, and 28 to 38, wherein

L^3 is $-CR^{30}R^{31}-$ or 4- to 10-membered non-aryl heterocyclylene,

R^{30} and R^{31} each independently represent,

1) a hydrogen atom,

2) a C_{1-4} alkyl group (wherein the group is optionally substituted with halogen, $-NR^{a11}R^{a12}$, or $-OR^{c6}$), or

3) C_6 aryl (wherein the group is optionally substituted with halogen, $-NR^{a13}R^{a14}$, $-OR^{c7}$, or a C_{1-3} alkyl group (wherein the group is optionally substituted with halogen, $-NR^{a15}R^{a16}$, or $-OR^{c8}$)),

L^4 is a single bond or $-(CR^{40}R^{41})_{n2}-$,

R^{40} and R^{41} each independently represent,

1) a hydrogen atom,

2) $-NR^{a9}R^{a10}$,

3) a C_{1-4} alkyl group (wherein the group is optionally substituted with halogen, $-NR^{a17}R^{a18}$, or $-OR^{c9}$), or

4) $-OR^{c4}$, or

R^{40} and R^{41}, together with the carbon atom to which they are attached, form a C_{3-6} alicyclic group,

R^{a9}, R^{a10}, R^{a11}, R^{a12}, R^{a13}, R^{a14}, R^{a15}, R^{a16}, R^{a17}, R^{a18}, R^{c4}, R^{c6}, R^{c7}, R^{c8}, and R^{c9} are the same or different, each independently representing

1) a hydrogen atom, or

2) a C_{1-4} alkyl group (wherein the group is optionally substituted with halogen, $-NR^{a19}R^{a20}$, or $-OR^{c10}$),

R^{a19}, R^{a20}, and R^{c10} are the same or different, each independently representing

1) a hydrogen atom, or

2) a C_{1-4} alkyl group (wherein the group is optionally substituted with halogen),

wherein each combination of R^{a9} and R^{a10}, R^{a11} and R^{a12}, R^{a13} and R^{a14}, R^{a15} and R^{a16}, R^{a17} and R^{a18}, or R^{a19} and R^{a20} together may form an optionally substituted 4- to 7-membered nitrogen-containing non-aryl heterocycle, and

n2 is 0 or 1.

[Item 40]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 6, 9 to 24, and 28 to 39, wherein

L^3 is $-CH_2-$, $-CH(CH_2NH_2)-$, or $-CH(CH_2OH)-$, and

L^4 is a single bond, $-CH_2-$, $-CH(NH_2)-$, $-CMe(NH_2)-$, $-CEt(NH_2)-$, $-C(iso\text{-}Pr)(NH_2)-$, $-CH(CH_2NH_2)-$, $-CH(OH)-$, $-CH(CH_2OH)-$, $-C(CH_2OH)_2-$, or

[Chemical Formula 13]



.

[Item 41]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 6, 9 to 24, and 28 to 39, wherein L^3 is 4- to 10-membered non-aryl heterocyclylene.

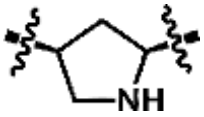
[Item 42]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 6, 9 to 24, 28 to 39, and 41, wherein L^3 is 5-membered non-aryl heterocyclylene.

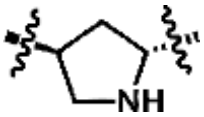
[Item 43]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 6, 9 to 24, 28 to 39, and 41 to 42, wherein L^3 is

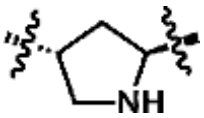
[Chemical Formula 14]



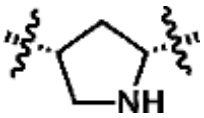
[Chemical Formula 15]



[Chemical Formula 16]

 or

[Chemical Formula 17]

 .

[Item 44]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 6, 9 to 24, 28 to 39, and 41 to 43, wherein L^4 is a single bond.

[Item 45]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 24 and 28 to 40, wherein R^5 is

1) C_{6-10} aryl, or

2) 5- to 10-membered heteroaryl,

(wherein each substituent from 1) to 2) is optionally substituted, and if two substituents further substituted with the substituent of 1) or 2) are each substituted on adjacent atoms within a ring, the two substituents together may further form a condensed ring structure).

[Item 46]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 24 and 28 to 45, wherein

R^5 is C_6 aryl (i.e., phenyl) or 5-membered, 6-membered, 9-membered, or 10-membered heteroaryl,

each group of R^5 is optionally substituted with each of R^{6a} or R^{6b} at all chemically substitutable positions on a carbon atom or a nitrogen atom within a ring thereof,

wherein R^{6a}, which are substituents on the carbon atom, if there are multiple instances on the same ring, are all independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) a cyano group,

4) halogen,

5) a C_{1-4} alkyl group,

6) a C_{3-10} alicyclic group,

7) a C_{1-4} alkoxy group,

8) a C_{3-10} alicyclic oxy group,

9) a C_{6-10} aryloxy group,

10) a 5- or 6-membered heteroaryloxy group,

11) a 4- to 10-membered non-aryl heterocyclyl oxy group,

(wherein each substituent from 5) and 11) is optionally substituted),

12) $-SO_2-NR^{e2}R^{f2}$,

13) $-NR^{g2}-CR^{e2}(=NR^{f2})$,

14) $-NR^{g2}-CR^{e2}(=N-OR^{f2})$,

15) $-NR^{h2}-C(=NR^{g2})NR^{e2}R^{f2}$,

16) $-NR^{h2}-C(=N-OR^{g2})NR^{e2}R^{f2}$,

17) $-NR^{i2}-C(=NR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

18) $-NR^{i2}-C(=N-OR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

19) $-C(=NR^{e2})R^{f2}$,

20) $-C(=N-OR^{e2})R^{f2}$,

21) $-C(=NR^{h2})-NR^{e2}R^{f2}$,

22) $-C(=NR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

23) $-C(=N-OR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

24) $-NR^{e2}R^{f2}$,

25) $-NR^{g2}-NR^{e2}R^{f2}$,

26) $-NR^{e2}OR^{f2}$,

27) $-NR^{e2}-C(=O)R^{f2}$,

28) $-C(=O)NR^{e2}R^{f2}$,

29) $-C(=O)NR^{e2}OR^{f2}$,

30) $-C(=O)NR^{g2}-NR^{e2}R^{f2}$,

31) $-C(=O)R^{e2}$,

32) $-C(=O)OR^{e2}$, and

33) $-C(=N-OR^{h2})NR^{e2}R^{f2}$,

R^{6b}, which are substituents on the nitrogen atom, if there are multiple instances on the same ring, are all independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) a C_{1-4} alkyl group
(wherein the alkyl group is optionally substituted),

4) a C_{3-10} alicyclic group
(wherein the alicyclic group is optionally substituted),

5) $-C(=NR^{e2})R^{f2}$,

6) $-C(=N-OR^{e2})R^{f2}$,

7) $-SO_2-NR^{e2}R^{f2}$,

8) $-C(=NR^{h2})-NR^{e2}R^{f2}$,

9) $-C(=NR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

10) $-C(=N-OR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

11) $-C(=O)NR^{e2}R^{f2}$,

12) $-C(=O)NR^{e2}OR^{f2}$,

13) $-C(=O)NR^{g2}-NR^{e2}R^{f2}$,

14) $-C(=O)R^{e2}$, and

15) $-C(=N-OR^{h2})NR^{e2}R^{f2}$, or

if a combination of two R^{6a} or R^{6a} and R^{6b} are each substituted on adjacent atoms within a ring, the two substituents together may form an optionally substituted 5- to 6-membered heteroaryl ring or an optionally substituted 5- to 7-membered non-aryl heterocycle, which further fuses to an attachment moiety between the adjacent atoms within the ring,

R^{e2}, R^{f2}, R^{g2}, R^{h2}, and R^{i2} are the same or different, each independently

1) a hydrogen atom,

2) a C_{1-6} alkyl group,

3) a C_{3-10} alicyclic group,

4) C_{6-10} aryl,

5) 5- or 6-membered heteroaryl, or

6) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 2) to 6) is optionally substituted), and

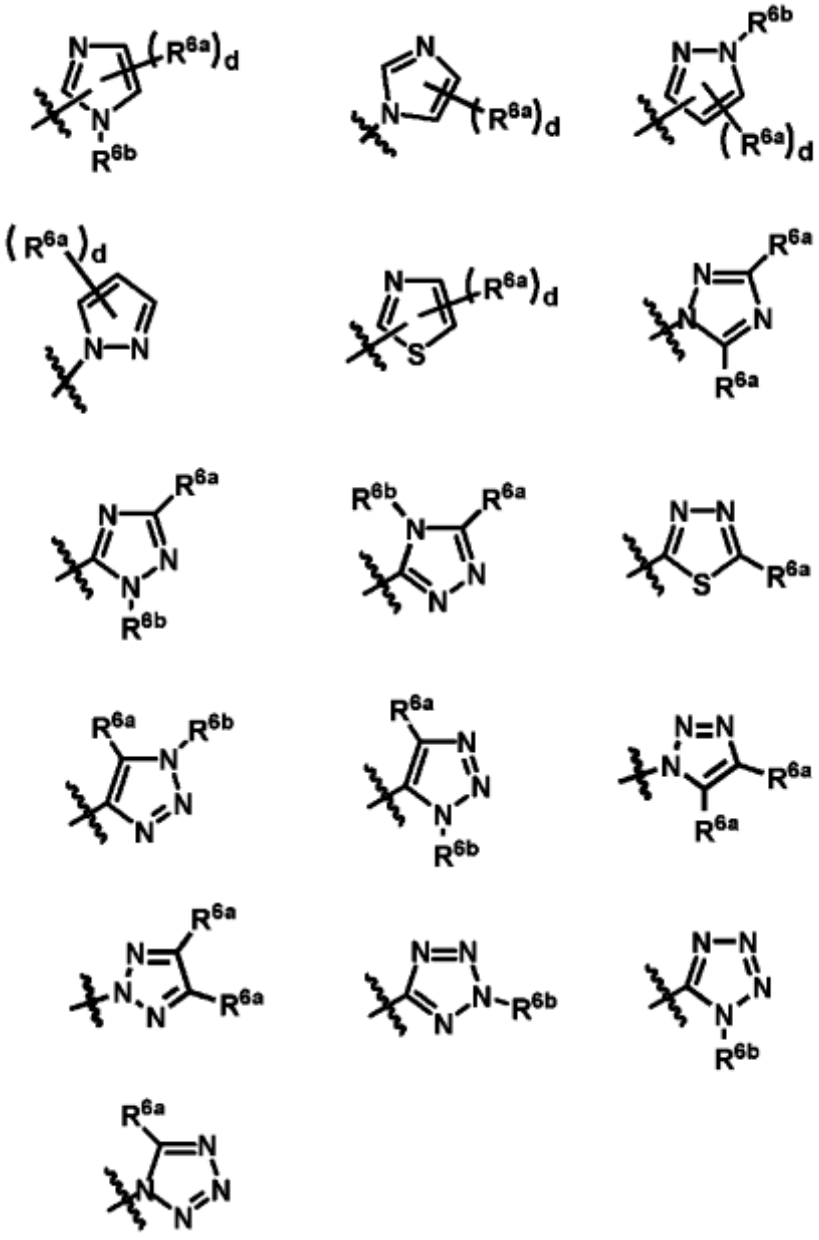
a combination of R^{e2} and R^{f2}, when attached to the same nitrogen atom, together may form an optionally substituted 4- to 10-membered nitrogen-containing non-aryl heterocycle.

[Item 47]

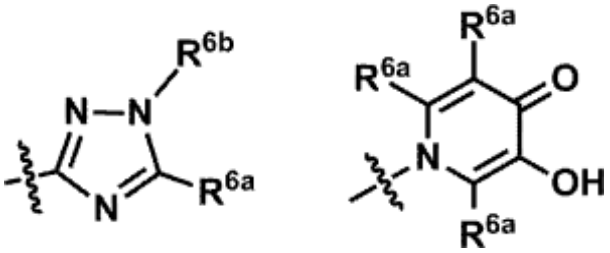
The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 24 and 28 to 46, wherein

R^5 is C_6 aryl or 5-membered, 6-membered, 9-membered, or 10-membered heteroaryl selected from the group consisting of

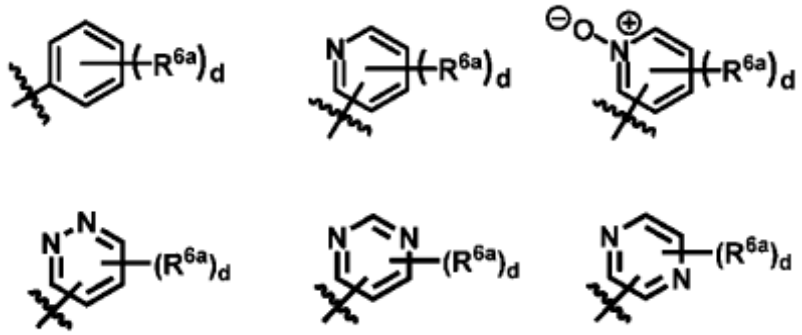
[Chemical Formula 18]



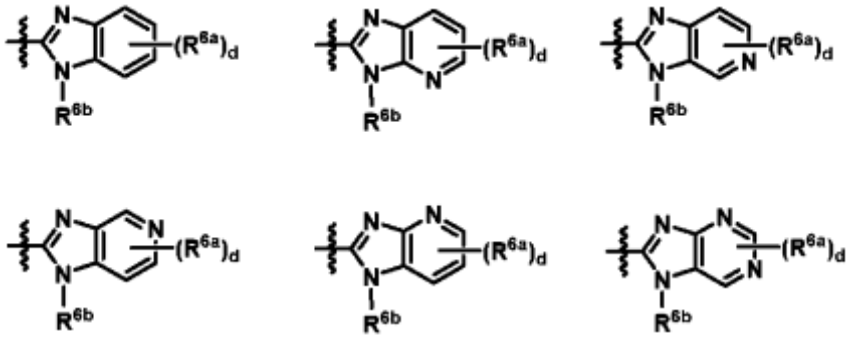
[Chemical Formula 19]

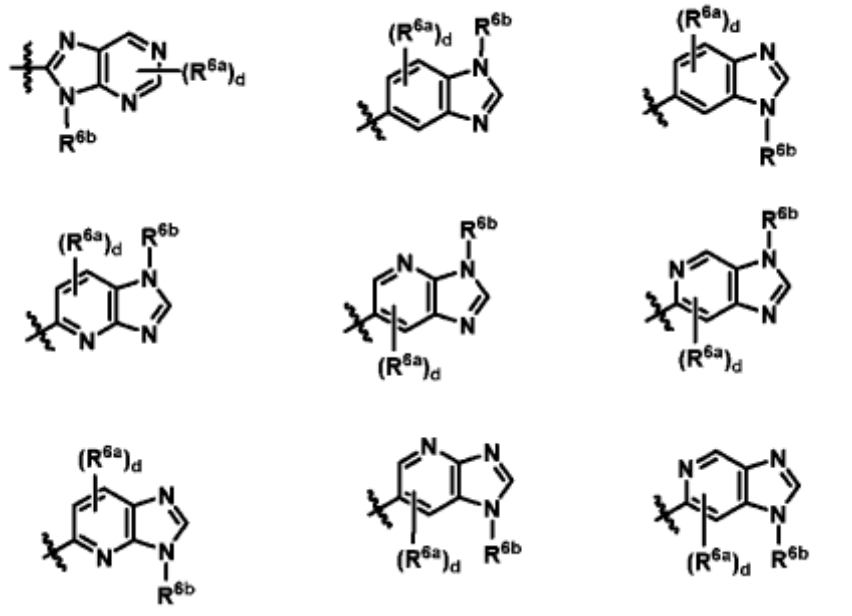


[Chemical Formula 20]

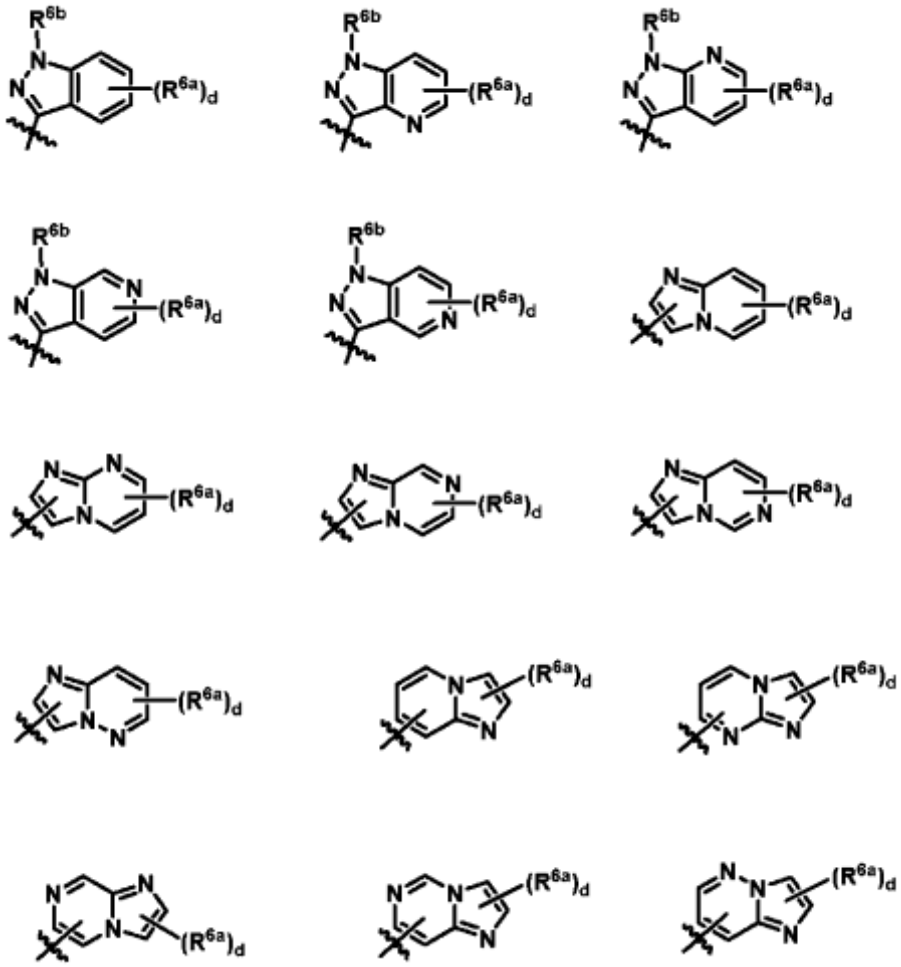


[Chemical Formula 21]

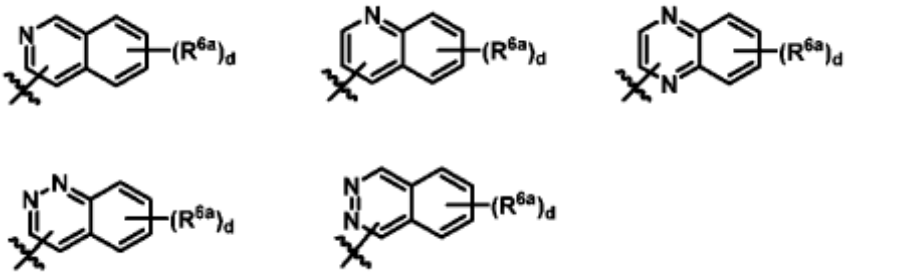




[Chemical Formula 22]



[Chemical Formula 23]



,

d is the number of chemically substitutable positions on a ring of each group by R^{6a}, and

each R^{6a} and each R^{6b} are defined the same as item 46.

[Item 48]

The compound or the pharmaceutically acceptable salt thereof according to item 46 or 47, wherein

R^{6a}, if there are multiple instances on the same ring, are all independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) halogen,

4) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted with $NR^{e2}R^{f2}$, $-C(=O)OR^{f2}$, $-C(=O)NR^{e2}R^{f2}$, $-C(=O)NR^{e2}(OR^{f2})$, or a hydroxyl group),

5) a C_{1-4} alkoxy group

6) $-NR^{e2}R^{f2}$,

7) $-C(=O)NR^{e2}R^{f2}$, and

8) $-C(=O)OR^{e2}$, and

each of R^{6b}, if there are multiple instances on the same ring, are all independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group, and

3) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted with $NR^{e2}R^{f2}$, $-C(=O)OR^{f2}$, $-C(=O)NR^{e2}R^{f2}$, $-C(=O)NR^{e2}(OR^{f2})$, or a hydroxyl group).

[Item 49]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 24 and 28 to 48, wherein R^{e2} and R^{f2} are the same or different, each independently a hydrogen atom, an optionally substituted C_{1-6} alkyl group, or an optionally substituted C_{3-10} alicyclic group.

[Item 50]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 24 and 28 to 49, wherein R^{e2} and R^{f2} are the same or different, each independently a hydrogen atom or an optionally substituted C_{1-6} alkyl group.

[Item 51]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 24 and 28 to 50, wherein R^{e2} and R^{f2} are hydrogen atoms.

[Item 52]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 46 to 51, wherein R^{6a} is $-NR^{e2}R^{f2}$, and one of R^{e2} and R^{f2} is a hydrogen atom and the other is a C_{1-4} alkyl group (wherein the alkyl group is optionally substituted with an amino group or a hydroxyl group).

[Item 53]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 24 and 28 to 44, wherein R^5 is $-C(=O)NR^{50}R^{51}$.

[Item 54]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 24, 28 to 40, and 53, wherein

R^{50} represents

1) a hydrogen atom,
2) an optionally substituted C_{1-4} alkyl group,
3) a hydroxyl group,
4) an optionally substituted C_{1-4} alkoxy group, or
5) an optionally substituted C_{1-6} alkylsulfonyl group,

R^{51} represents

1) a hydrogen atom, or
2) an optionally substituted C_{1-4} alkyl group, or

R^{50} and R^{51} together may form a 4- to 6-membered nitrogen-containing non-aryl heterocycle.

[Item 55]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 24, 28 to 40, and 53 to 54, wherein

R^{50} represents

1) a hydrogen atom,

2) a C_{1-4} alkyl group (wherein the group is optionally substituted with halogen, a C_{3-6} alicyclic group, $-NR^{a21}R^{a22}$, or $-OR^{c11}$),

3) a hydroxyl group,

4) a C_{1-4} alkoxy group (wherein the group is optionally substituted with halogen, a C_{3-6} alicyclic group, $-NR^{a23}R^{a24}$, or $-OR^{c12}$), or

5) a C_{1-4} alkylsulfonyl group (wherein the group is optionally substituted with halogen, a C_{3-6} alicyclic group, $-NR^{a21}R^{a22}$, or $-OR^{c11}$),

R^{a21}, R^{a22}, R^{a23}, R^{a24}, R^{c11}, and R^{c12} are the same or different, each independently representing

1) a hydrogen atom, or

2) a C_{1-4} alkyl group (wherein the group is optionally substituted with halogen),

wherein each combination of R^{a21} and R^{a22} or R^{a23} and R^{a24} together may form an optionally substituted 4- to 7-membered nitrogen-containing non-aryl heterocycle, and

R^{51} is a hydrogen atom or C_{1-4} alkyl (wherein the group is optionally substituted with halogen).

[Item 56]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 24, 28 to 40, and 53 to 55, wherein

R^{50} represents

1) a hydrogen atom,

2) a C_{1-4} alkyl group (wherein the group is optionally substituted with a cyclopropyl group, $-NH_2$, -NHMe, $-C(=O)NH_2$, $-C(=O)NHMe$, $-C(=O)NMe_2$, or a -hydroxyl group),

3) a hydroxyl group,

4) a C_{1-4} alkoxy group (wherein the group is optionally substituted with a cyclopropyl group, $-NH_2$, -NHMe, or a -hydroxyl group), or

5) a C_{1-4} alkylsulfonyl group, and

R^{51} is a hydrogen atom.

[Item 57]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 24 and 28 to 40, wherein R^5 is $-C(=O)OR^{20}$.

[Item 58]

The compound or the pharmaceutically acceptable salt thereof according to item 57, wherein R^{20} is

1) a hydrogen atom, or

2) an optionally substituted C_{1-4} alkyl group.

[Item 59]

The compound or the pharmaceutically acceptable salt thereof according to item 56 or 58, wherein

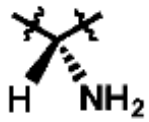
L^3 is $-CH_2-$, and

L^4 is a single bond, $-CH(NH_2)-$, or $-CMe(NH_2)-$.

[Item 60]

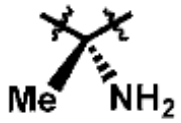
The compound or the pharmaceutically acceptable salt thereof according to item 59, wherein L^4 is

[Chemical Formula 24]



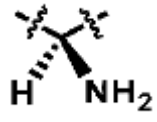
,

[Chemical Formula 25]



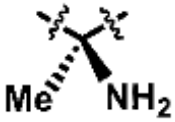
,

[Chemical Formula 26]



, or

[Chemical Formula 27]

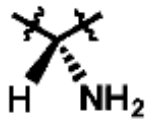


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[Item 61]

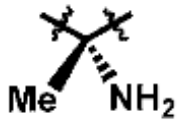
The compound or the pharmaceutically acceptable salt thereof according to item 59 or 60, wherein L^4 is

[Chemical Formula 28]



or

[Chemical Formula 29]



.

[Item 62]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 57 to 61, wherein R^{20} is a hydrogen atom.

[Item 63]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 24 and 28 to 40, wherein

R^5 is $-NR^{e1}R^{f1}$,

L^3 is $-CH_2-$,

L^4 is $-CR^{40}R^{41}-$, and

R^{40} and R^{41} are each independently a C_{1-4} alkyl group substituted with a hydroxyl group, or together with the carbon atom to which they are attached, form a C_{3-6} alicyclic group.

[Item 64]

The compound or the pharmaceutically acceptable salt thereof according to item 63, wherein

R^{e1} and R^{f1} are the same or different, each independently

1) a hydrogen atom, or

2) an optionally substituted C_{1-3} alkyl group, and

L^4 is

[Chemical Formula 30]



.

[Item 65]

The compound or the pharmaceutically acceptable salt thereof according to item 63, wherein

R^{e1} and R^{f1} are the same or different, each independently

1) a hydrogen atom, or

2) an optionally substituted C_{1-3} alkyl group, and

L^4 is a C_{1-4} alkylene group substituted with a hydroxyl group.

[Item 66]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 3 and 11 to 36, wherein L^4 is a single bond, or a C_{1-6} alkylene group optionally substituted with $-NR^{21}R^{22}$ or $=NOR^{23}$, wherein R^{21}, R^{22}, and R^{23} are each independently a hydrogen atom, an optionally substituted C_{1-6} alkyl group, or an optionally substituted 4- to 10-membered non-aryl heterocyclyl carbonyl group.

[Item 67]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 3, 11 to 36, and 66, wherein L^4 is a single bond, $-CH_2-$, $-CH(NH_2)-$, $-CMe(NH_2)-$, $-CH(NHMe)-$, $-CD(NH_2)-$(wherein D represents a heavy hydrogen atom), $-CH_2CH_2-$, or $-CH(NH_2)-CH_2-$, wherein if an amino group is present in L^4, carbon that attaches to the amino group attaches to L^3.

[Item 68]

The compound or the pharmaceutically acceptable salt thereof according to item 67, wherein

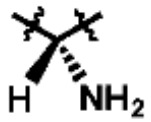
L^3 is $-C(=O)-$, and

L^4 is a single bond, $-CH_2-$, $-CH(NH_2)-$, $-CMe(NH_2)-$, or $-CH(NH_2)-CH_2-$.

[Item 69]

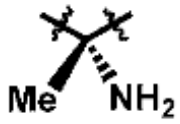
The compound or the pharmaceutically acceptable salt thereof according to item 68, wherein L^4 is one of the following isomeric structures:

[Chemical Formula 31]



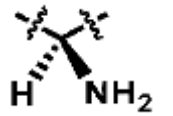
,

[Chemical Formula 32]



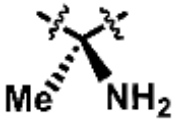
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[Chemical Formula 33]



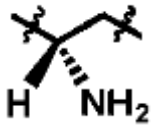
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[Chemical Formula 34]



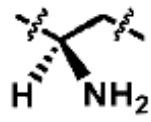
,

[Chemical Formula 35]



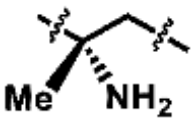
,

[Chemical Formula 36]



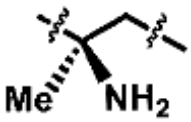
,

[Chemical Formula 37]



, or

[Chemical Formula 38]

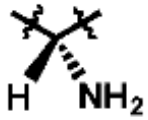


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[Item 70]

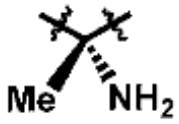
The compound or the pharmaceutically acceptable salt thereof according to item 68 or 69, wherein L^4 is

[Chemical Formula 39]



or

[Chemical Formula 40]

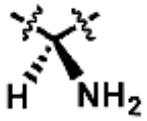


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[Item 71]

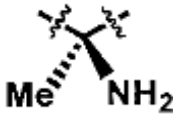
The compound or the pharmaceutically acceptable salt thereof according to item 68 or 69, wherein L^4 is

[Chemical Formula 41]



or

[Chemical Formula 42]

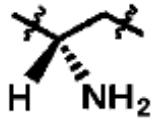


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[Item 72]

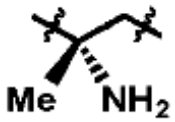
The compound or the pharmaceutically acceptable salt thereof according to item 68 or 69, wherein L^4 is

[Chemical Formula 43]



or

[Chemical Formula 44]

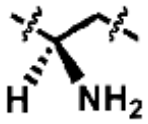


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[Item 73]

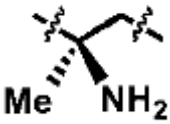
The compound or the pharmaceutically acceptable salt thereof according to item 68 or 69, wherein L^4 is

[Chemical Formula 45]



or

[Chemical Formula 46]



.

[Item 74]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 3, 11 to 36, and 66 to 73, wherein R^5 is a hydrogen atom, an optionally substituted C_{1-6} alkyl group, an optionally substituted C_{3-10} alicyclic group, an optionally substituted 4- to 10-membered non-aryl heterocycle, optionally substituted C_{6-10} aryl, optionally substituted 5- or 6-membered heteroaryl, an optionally substituted C_{1-6} alkylthio group, or $-NR^{e1}OH$, wherein R^{e1} is a hydrogen atom or an optionally substituted C_{1-6} alkyl group.

[Item 75]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 3, 11 to 36, and 66 to 74, wherein R^5 is optionally substituted 5- or 6-membered heteroaryl or optionally substituted C_{6-10} aryl.

[Item 76]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 3, 11 to 36, and 66 to 75, wherein R^5 is optionally substituted 5- or 6-membered heteroaryl.

[Item 77]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 3, 11 to 36, and 66 to 76, wherein R^5 is an optionally substituted C_{4-10} alicyclic group or an optionally substituted 4- to 10-membered non-aryl heterocycle.

[Item 78]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 3, 11 to 36, and 66 to 74, wherein L^4 is a single bond and R^5 is $-NR^{e1}OH$, wherein R^{e1} is a hydrogen atom or an optionally substituted C_{1-6} alkyl group.

[Item 79]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 3 and 11 to 36, wherein

L^4 is

1) $-(CH_2)_p-CR^{10}(NHR^{11})-$,

2) $-(CH_2)_q-CR^{12}R^{13}-$, or

3) $-(CH_2)_p-CR^{10}(NHR^{11})-(CH_2)_q-CR^{12}R^{13}-$ (wherein p and q are independently 0 or 1),

R^{10} is

1) a hydrogen atom,

2) a carboxyl group, or

3) $-C(=O)NR^{10a}R^{10b}$,

R^{11} is

1) a hydrogen atom,

2) $-C(=O)R^{11a}$, or

3) an optionally substituted 5- or 6-membered non-aryl heterocyclyl carbonyl group,

wherein if R^{10} is $-C(=O)NR^{10a}R^{10b}$, R^{10b} and R^{11} together may form $-CH_2CH_2-$,

R^{12} is

1) a hydrogen atom, or

2) an optionally substituted C_{1-4} alkyl group,

R^{13} is

1) a hydrogen atom,

2) a hydroxyl group

3) an optionally substituted C_{1-4} alkyl group

4) a sulfanyl group,

5) a carboxyl group,

6) an optionally substituted C_{1-4} alkylthio group,

7) $-NR^{13a}R^{13b}$,

8) $-NR^{13a}-C(=O)R^{13b}$,

9) an optionally substituted 5- or 6-membered non-aryl heterocyclyl carbonylamino group,

10) $-NR^{13a}-C(=O)NR^{13b}R^{13c}$,

11) $-C(=O)NR^{13a}R^{13b}$,

12) $-C(=O)NR^{13a}OR^{13b}$,

13) $-S(=O)_2-R^{13a}$,

14) $-S(=O)_2-NR^{13a}R^{13b}$,

15) $-C(=O)NR^{13a}-S(=O)_2-R^{13b}$, or

16) $-C(=O)NR^{13a}-S(=O)_2-NR^{13b}R^{13c}$, and

R^{10a}, R^{10b}, R^{11a}, R^{13a}, R^{13b}, and R^{13c} are each independently a hydrogen atom or an optionally substituted C_{1-4} alkyl group.

[Item 80]

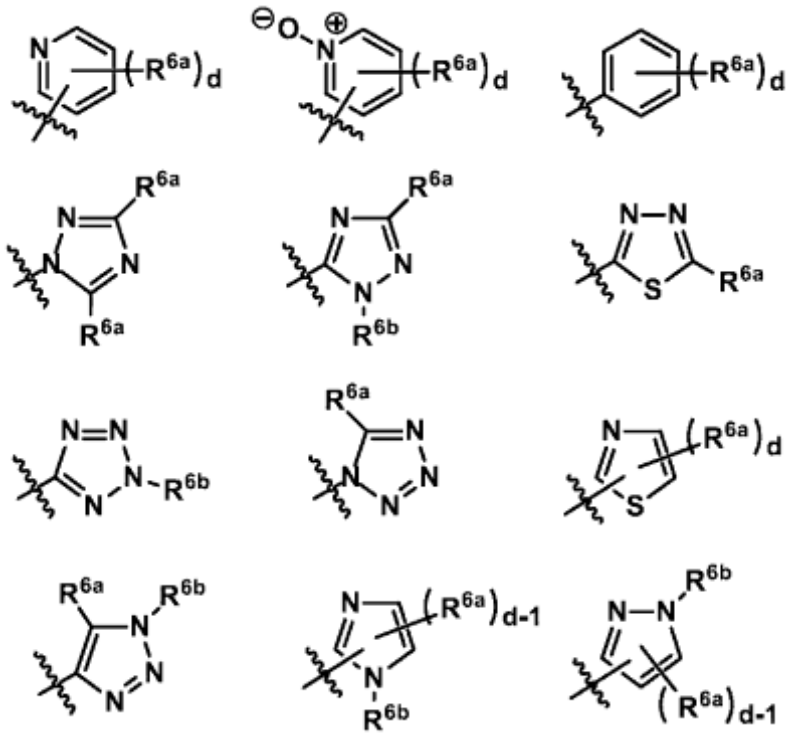
The compound or the pharmaceutically acceptable salt thereof according to item 79, wherein R^5 is a hydrogen atom or an optionally substituted C_{1-4} alkyl group.

[Item 81]

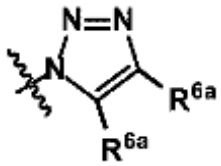
The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 3, 11 to 36, and 66 to 76, wherein

R^5 is selected from the group consisting of

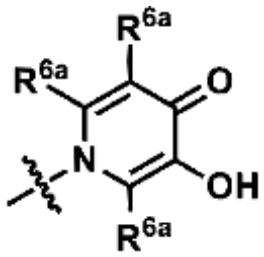
[Chemical Formula 47]



[Chemical Formula 48]



[Chemical Formula 49]



,

subscript d is the number of substitutable positions on a ring of R^5,

each R^{6a} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) a cyano group,

4) a nitro group,

5) halogen,

6) a C_{1-4} alkyl group,

7) a C_{3-10} alicyclic group,

8) a C_{1-4} alkoxy group,

9) a C_{3-10} alicyclic oxy group,

10) a C_{6-10} aryloxy group,

11) a 5- or 6-membered heteroaryloxy group,

12) a 4- to 10-membered non-aryl heterocyclyl oxy group,

(wherein each substituent from 6) to 12) is optionally substituted),

13) $-SO_2-NR^{e2}R^{f2}$,

14) $-NR^{g2}-CR^{e2}(=NR^{f2})$,

15) $-NR^{g2}-CR^{e2}(=N-OR^{f2})$,

16) $-NR^{h2}-C(=NR^{g2})NR^{e2}R^{f2}$,

17) $-NR^{h2}-C(=N-OR^{g2})NR^{e2}R^{f2}$,

18) $-NR^{i2}-C(=NR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

19) $-NR^{i2}-C(=N-OR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

20) $-C(=NR^{e2})R^{f2}$,

21) $-C(=N-OR^{e2})R^{f2}$,

22) $-C(=NR^{h2})-NR^{e2}R^{f2}$,

23) $-C(=NR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

24) $-C(=N-OR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

25) $-NR^{e2}R^{f2}$,

26) $-NR^{g2}-NR^{e2}R^{f2}$,

27) $-NR^{e2}OR^{f2}$,

28) $-NR^{e2}-C(=O)R^{f2}$,

29) $-C(=O)NR^{e2}R^{f2}$,

30) $-C(=O)NR^{e2}OR^{f2}$,

31) $-C(=O)NR^{g2}-NR^{e2}R^{f2}$,

32) $-C(=O)R^{e2}$,

33) $-C(=O)OR^{e2}$, and

34) $-C(=N-OR^{h2})NR^{e2}R^{f2}$, and

each R^{6b} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted),

4) a C_{3-10} alicyclic group

(wherein the alicyclic group is optionally substituted),

5) $-C(=NR^{e2})R^{f2}$,

6) $-C(=N-OR^{e2})R^{f2}$,

7) $-SO_2-NR^{e2}R^{f2}$,

8) $-C(=NR^{h2})-NR^{e2}R^{f2}$,

9) $-C(=NR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

10) $-C(=N-OR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

11) $-C(=O)NR^{e2}R^{f2}$,

12) $-C(=O)NR^{e2}OR^{f2}$,

13) $-C(=O)NR^{g2}-NR^{e2}R^{f2}$,

14) $-C(=O)R^{e2}$, and

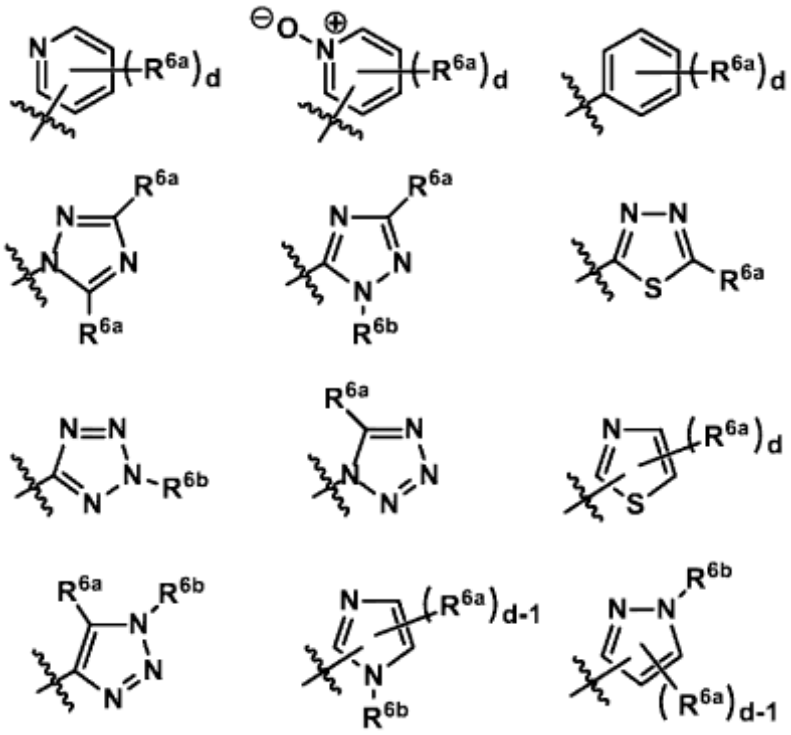
15) $-C(=N—OR^{h2})NR^{e2}R^{f2}$.

[Item 82]

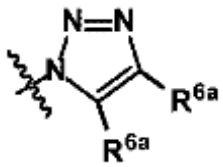
The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 3, 11 to 36, 66 to 76, and 81, wherein

R^5 is 5- or 6-membered aryl or heteroaryl selected from the group consisting of

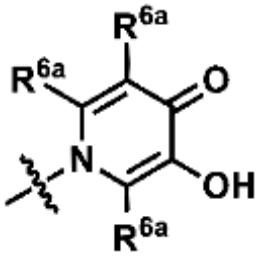
[Chemical Formula 50]



[Chemical Formula 51]



[Chemical Formula 52]



,

subscript d is the number of substitutable positions on a ring of R^5,

each R^{6a} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) halogen,

4) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted with $NR^{e2}R^{f2}$, a 5- or 6-membered non-aryl heterocycle, $-C(=O)OR^{f2}$, or a hydroxyl group),

5) a C_{1-4} alkoxy group

6) $-NR^{e2}R^{f2}$, and

7) $-C(=O)OR^{e2}$, and

each R^{6b} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group, and

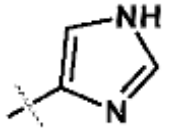
3) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted with $NR^{e2}R^{f2}$, $-C(=O)NR^{e2}R^{f2}$, $-C(=O)OR^{f2}$, or a hydroxyl group).

[Item 83]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 3, 11 to 36, 66 to 76, and 81 to 82, wherein R^5 is

[Chemical Formula 53]



.

[Item 84]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 3, 11 to 36, 66 to 76, and 81 to 82, wherein R^{e2} and R^{f2} are the same or different, each independently a hydrogen atom, an optionally substituted C_{1-6} alkyl group, or an optionally substituted C_{3-10} alicyclic group.

[Item 85]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 3, 11 to 36, 66 to 76, 81 to 82, and 84, wherein R^{e2} and R^{f2} are the same or different, each independently a hydrogen atom or an optionally substituted C_{1-6} alkyl group.

[Item 86]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 3, 11 to 36, 66 to 76, 81 to 82, and 84 to 85, wherein R^{e2} and R^{f2} are hydrogen atoms.

[Item 87]

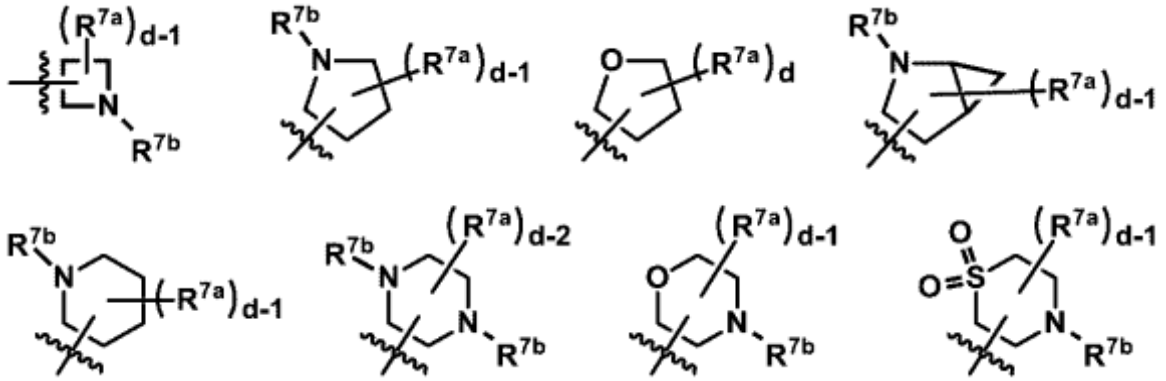
The compound or the pharmaceutically acceptable salt thereof according to any one of items 81 to 82 and 84 to 85, wherein R^{6a} is $-NR^{e2}R^{f2}$, and one of R^{e2} and R^{f2} is a hydrogen atom and the other is a C_{1-4} alkyl group (wherein the alkyl group is optionally substituted with an amino group or a hydroxyl group).

[Item 88]

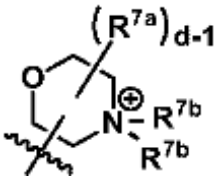
The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 3, 11 to 36, 66 to 74, and 77, wherein

R^5 is a 4- to 6-membered non-aryl heterocycle selected from the group consisting of

[Chemical Formula 54]



[Chemical Formula 55]



,

subscript d is the number of substitutable positions on a ring of R^5,

each R^{7a} is independently selected from the group consisting of

1) a hydrogen atom,
2) a hydroxyl group,
3) a cyano group,
4) halogen,
5) a C_{1-4} alkyl group,
6) a C_{3-10} alicyclic group,
7) a C_{1-4} alkoxy group,
8) a C_{3-10} alicyclic oxy group,
9) a C_{6-10} aryloxy group,
10) a 5- or 6-membered heteroaryloxy group,
11) a 4- to 10-membered non-aryl heterocyclyl oxy group,
(wherein each substituent from 5) and 11) is optionally substituted),
12) $-SO_2-NR^{e3}R^{f3}$,
13) $-NR^{g2}-CR^{e3}(=NR^{f3})$,
14) $-NR^{g2}-CR^{e3}(=N-OR^{f3})$,
15) $-NR^{h2}-C(=NR^{g2})NR^{e3}R^{f3}$,
16) $-NR^{h2}-C(=N-OR^{g2})NR^{e3}R^{f3}$,
17) $-NR^{i2}-C(=NR^{h2})NR^{g2}-NR^{e3}R^{f3}$,
18) $-NR^{i2}-C(=N-OR^{h2})NR^{g2}-NR^{e3}R^{f3}$,
19) $-C(=NR^{e3})R^{f3}$,
20) $-C(=N-OR^{e3})R^{f3}$,
21) $-C(=NR^{h2})-NR^{e3}R^{f3}$,
22) $-C(=NR^{h2})NR^{g2}-NR^{e3}R^{f3}$,
23) $-C(=N-OR^{h2})NR^{g2}-NR^{e3}R^{f3}$,
24) $-NR^{e3}R^{f3}$,
25) $-NR^{g2}-NR^{e3}R^{f3}$,
26) $-NR^{e3}OR^{f3}$,
27) $-NR^{e3}-C(=O)R^{f3}$,
28) $-C(=O)NR^{e3}R^{f3}$,
29) $-C(=O)NR^{e3}OR^{f3}$,
30) $-C(=O)NR^{g2}-NR^{e3}R^{f3}$,
31) $-C(=O)R^{e3}$,

32) $-C(=O)OR^{e3}$, and

33) $-C(=N-OR^{h2})NR^{e3}R^{f3}$,

each R^{7b} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted),

4) a C_{3-10} alicyclic group

(wherein the alicyclic group is optionally substituted),

5) $-C(=NR^{e3})R^{f3}$,

6) $-C(=N-OR^{e3})R^{f3}$,

7) $-SO_2-NR^{e3}R^{f3}$,

8) $-C(=NR^{h2})-NR^{e3}R^{f3}$,

9) $-C(=NR^{h2})NR^{g2}-NR^{e3}R^{f3}$,

10) $-C(=N-OR^{h2})NR^{g2}-NR^{e3}R^{f3}$,

11) $-C(=O)NR^{e3}R^{f3}$,

12) $-C(=O)NR^{e3}OR^{f3}$,

13) $-C(=O)NR^{g2}-NR^{e3}R^{f3}$,

14) $-C(=O)R^{e3}$, and

15) $-C(=N-OR^{h2})NR^{e3}R^{f3}$, and

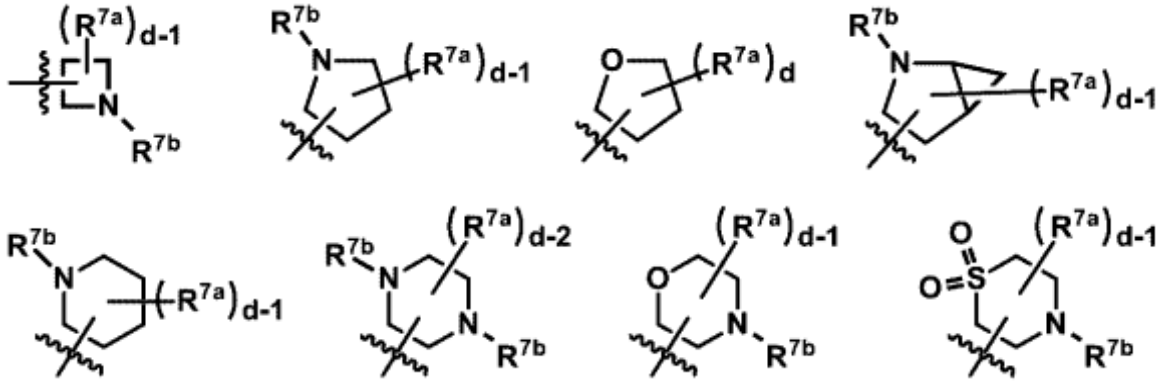
R^{e3}, R^{f3}, R^{g2}, R^{h2}, and R^{i2} are defined the same as R^{e2}, R^{f2}, R^{g2}, R^{h2}, and R^{i2} according to item 3.

[Item 89]

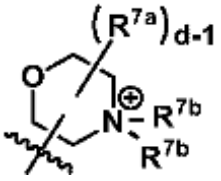
The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 3, 11 to 36, 66 to 74, 77, and 88, wherein

R^5 is a 4- to 6-membered non-aryl heterocycle selected from the group consisting of

[Chemical Formula 56]



[Chemical Formula 57]



,

subscript d is the number of substitutable positions on a ring of R^5,

each R^{7a} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) halogen,

4) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted with $NR^{e3}R^{f3}$, a 5- or 6-membered non-aryl heterocycle, $-C(=O)OR^{f3}$, or a hydroxyl group),

5) a C_{1-4} alkoxy group

6) $-NR^{e3}R^{f3}$,

7) $-C(=O)OR^{e3}$,

8) C_{6-10} aryl, and

9) $-C(=O)NR^{e3}R^{f3}$,

each R^{7b} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group, and

3) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted with $NR^{e3}R^{f3}$, $-C(=O)OR^{f3}$, or a hydroxyl group), and

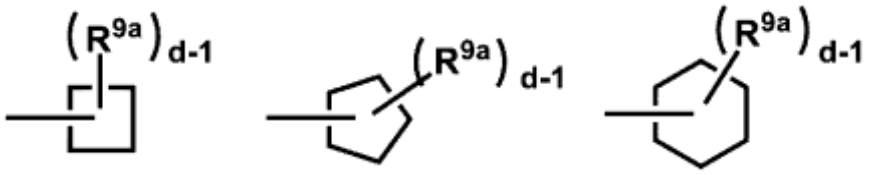
R^{e3} and R^{f3} are defined the same as R^{e2} and R^{f2} according to any of items 84 to 86.

[Item 90]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 3, 11 to 36, 66 to 74, and 77, wherein

R^5 is C_{4-6} cycloalkyl selected from the group consisting of

[Chemical Formula 58]



,

subscript d is the number of substitutable positions on a ring of R^5,

each R^{9a} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) a cyano group,

4) halogen,

5) a C_{1-4} alkyl group,

6) a C_{3-10} alicyclic group,

7) a C_{1-4} alkoxy group,

8) a C_{3-10} alicyclic oxy group,

9) a C_{6-10} aryloxy group,

10) a 5- or 6-membered heteroaryloxy group,

11) a 4- to 10-membered non-aryl heterocyclyl oxy group,

(wherein each substituent from 5) and 11) is optionally substituted),

12) $-SO_2-NR^{e3}R^{f3}$,

13) $-NR^{g2}-CR^{e3}(=NR^{f3})$,

14) $-NR^{g2}-CR^{e3}(=N-OR^{f3})$,

15) $-NR^{h2}-C(=NR^{g2})NR^{e3}R^{f3}$,

16) $-NR^{h2}-C(=N-OR^{g2})NR^{e3}R^{f3}$,

17) $-NR^{i2}-C(=NR^{h2})NR^{g2}-NR^{e3}R^{f3}$,

18) $-NR^{i2}-C(=N-OR^{h2})NR^{g2}-NR^{e3}R^{f3}$,

19) $-C(=NR^{e3})R^{f3}$,

20) $-C(=N-OR^{e3})R^{f3}$,

21) $-C(=NR^{h2})-NR^{e3}R^{f3}$,

22) $-C(=NR^{h2})NR^{g2}-NR^{e3}R^{f3}$,

23) $-C(=N-OR^{h2})NR^{g2}-NR^{e3}R^{f3}$,

24) $-NR^{e3}R^{f3}$,

25) $-NR^{g2}-NR^{e3}R^{f3}$,

26) $-NR^{e3}OR^{f3}$,

27) $-NR^{e3}-C(=O)R^{f3}$,

28) $-C(=O)NR^{e3}R^{f3}$,

29) $-C(=O)NR^{e3}OR^{f3}$,

30) $-C(=O)NR^{g2}-NR^{e3}R^{f3}$,

31) $-C(=O)R^{e3}$,

32) $-C(=O)OR^{e3}$, and

33) $-C(=N-OR^{h2})NR^{e3}R^{f3}$, and

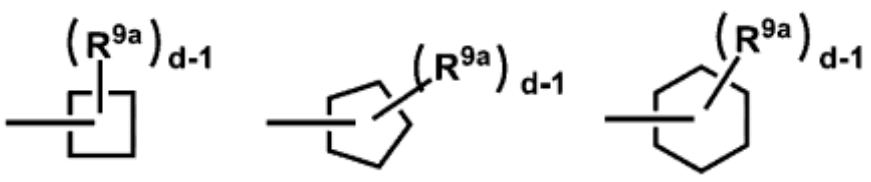
R^{e3}, R^{f3}, R^{g2}, R^{h2}, and R^{i2} are defined the same as R^{e2} and R^{f2} according to item 3.

[Item 91]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 3, 11 to 36, 66 to 74, 77, and 90, wherein

R^5 is C_{4-6} cycloalkyl selected from the group consisting of

[Chemical Formula 59]



,

subscript d is the number of substitutable positions on a ring of R^5,

each R^{9a} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) halogen,

4) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted with $NR^{e3}R^{f3}$, a 5- or 6-membered non-aryl heterocycle, $-C(=O)OR^{f3}$, or a hydroxyl group),

5) a C_{1-4} alkoxy group

6) $-NR^{e3}R^{f3}$,

7) $-C(=O)OR^{e3}$,

8) C_{6-10} aryl, and

9) $-C(=O)NR^{e3}R^{f3}$, and

R^{e3} and R^{f3} are defined the same as R^{e2} and R^{f2} according to any of items 75 to 77.

[Item 92]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 3, 11 to 36, and 79 to 80, wherein

L^4 is $-CH(NH_2)-CHR^{13}-$, wherein carbon that attaches to the NH_2 attaches to L^3,

R^5 is a hydrogen atom, and

R^{13} is

1) $-NH-C(=O)CH_3$,

2) $-NH-C(=O)NH_2$,

3) $-NH-C(=O)CH(NH_2)-CH_2C(=O)NH_2$,

4) $-NH-C(=O)CH_2-NH_2$,

5) $-NH-C(=O)CH(NH_2)-CH_2OH$, or

6) a pyrrolidin-2-ylcarbonylamino group.

[Item 93]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 3, 11 to 36, and 79 to 80, wherein L^4 is $-CH(NH_2)-CR^{12}R^{13}-$, wherein carbon that attaches to the NH_2 attaches to L^3,

R^5 is a hydrogen atom or methyl,

R^{12} is a hydrogen atom or methyl, and

R^{13} is a benzylthio group or a sulfanyl group.

[Item 94]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 3, 11 to 36, and 79 to 80, wherein

L^4 is $-CH(NH_2)-(CH_2)_q-CHR^{13}-$, wherein q is 0 or 1, and carbon that attaches to the NH_2 attaches to L^3,

R^5 is a hydrogen atom, and

R^{13} is

1) a carboxyl group,
2) $-C(=O)NH_2$,
3) $-C(=O)NH(CH_3)$,
4) $-C(=O)N(CH_3)_2$,
5) $-C(=O)NH-(CH_2)_2-OH$,
6) $-C(=O)NH-(CH_2)_2-NH_2$,
7) $-C(=O)NH-S(=O)_2-CH_3$,
8) $-C(=O)NHOH$,
9) $-S(=O)_2-NH_2$,
10) $-S(=O)_2-CH_3$, or
11) a hydroxyl group.

[Item 95]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 3, 11 to 36, and 79 to 80, wherein

L^4 is $-CH(NHR^{11})-CH_2-$, wherein carbon that attaches to the NHR^{11} attaches to L^3,

R^5 is hydrogen, and

R^{11} is

1) $-C(=O)CH(NH_2)-CH_2C(=O)NH_2$,

2) $-C(=O)CH_2-NH_2$,

3) $-C(=O)CH(CH_3)-NH_2$,

4) $-C(=O)CH(NH_2)-CH_2OH$, or

5) pyrrolidin-2-ylcarbonyl.

[Item 96]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 3, 11 to 36, and 79 to 80, wherein

L^4 is $-CH(NHR^{11})-CH(COOH)-$, wherein carbon that attaches to the NHR^{11} attaches to L^3,

R^5 is hydrogen, and

R^{11} is

1) $-C(=O)CH(NH_2)-CH_2C(=O)NH_2$,

2) $-C(=O)CH_2-NH_2$,

3) $-C(=O)CH(CH_3)-NH_2$,

4) $-C(=O)CH(NH_2)-CH_2OH$, or

5) pyrrolidin-2-ylcarbonyl.

[Item 97]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 3, 11 to 36, and 79 to 80, wherein

L^4 is $-CHR^{13}-$ or $-CH_2-CHR^{13}-$,

R^5 is hydrogen, and

R^{13} is $-C(=O)NH_2$ or $-C(=O)NHOH$.

[Item 98]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 3, 11 to 36, and 79 to 80, wherein

L^4 is $-CH_2-CR^{10}(NH_2)-$, wherein the CH_2 group attaches to L^3,

R^5 is hydrogen, and

R^{10} is a carboxy group or $-C(=O)NH_2$.

[Item 99]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 3, 11 to 36, and 79 to 80, wherein

L^4 is $-(CH_2)_p-CR^{10}(NHR^{11})-(CH_2)_q-CHR^{13}-$ or $-CHR^{13}-(CH_2)_q-CR^{10}(NHR^{11})-(CH_2)_p-$, wherein q is 0 or 1,

R^5 is hydrogen,

(1) if L^4 is $-CHR^{13}-(CH_2)_q-CR^{10}(NHR^{11})-(CH_2)_p-$,

carbon of the $-CHR^{13}-$ group attaches to L^3,

p is 0,

R^{10} is a hydrogen atom, a carboxyl group, or $-C(=O)NHR^{10b}$,

R^{11} is a hydrogen atom,

R^{10b} is a hydrogen atom,

wherein if R^{10} is $-C(=O)NHR^{10b}$, R^{10b} and R^{11} together may form $-CH_2CH_2-$, and

R^{13} is a hydrogen atom,

(2) if L^4 is $-(CH_2)_p-CR^{10}(NHR^{11})-(CH_2)_q-CHR^{13}-$,

carbon of the $-(CH_2)_p-$ group attaches to L^3,

p is 1,

R^{10} and R^{11} are both hydrogen atoms,

R^{13} is a carboxyl group or $-C(=O)NR^{13a}R^{13b}$, and

R^{13a} and R^{13b} are each independently a hydrogen atom or an optionally substituted C_{1-4} alkyl group.

[Item 100]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 3, 11 to 36, and 79 to 80, wherein

L^4 is $-CR^{12}(NH_2)-$,

R^{12} is a hydrogen atom or a methyl group, and

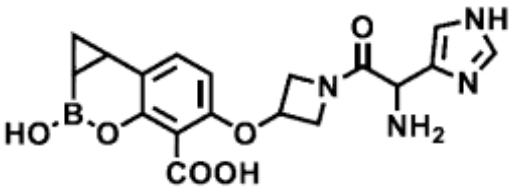
R^5 is a C_{1-4} alkyl group optionally substituted with a hydroxyl group.

[Item 101]

The compound or the pharmaceutically acceptable salt thereof according to item 1 or 2, selected from the group consisting of the compounds represented by the following names or structural formulas:

5-({1-[amino(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

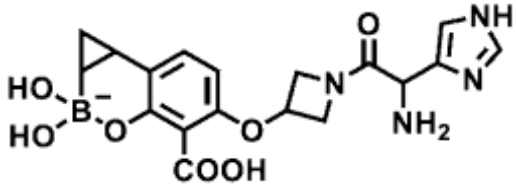
[Chemical Formula 60]



,

9-[1-[2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

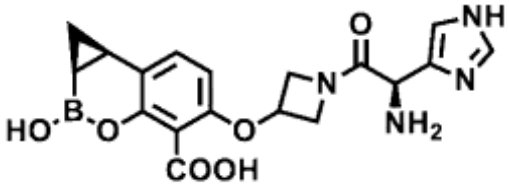
[Chemical Formula 61]



,

(1aS,7bR)-5-({1-[(2R)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

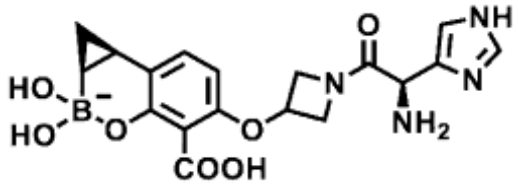
[Chemical Formula 62]



,

(2R,4S)-9-[1-[(2R)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

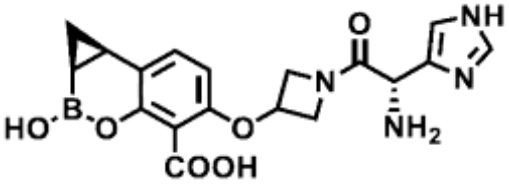
[Chemical Formula 63]



,

(1aS,7bR)-5-({1-[(2S)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

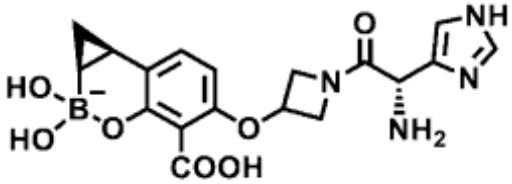
[Chemical Formula 64]



,

(2R,4S)-9-[1-[(2S)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

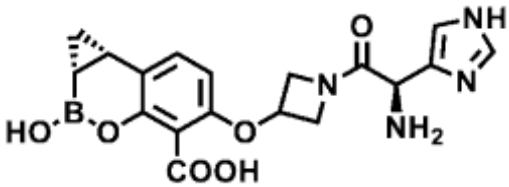
[Chemical Formula 65]



,

(1aR,7bS)-5-({1-[(2R)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

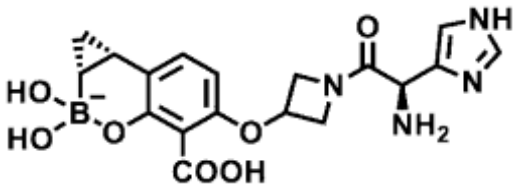
[Chemical Formula 66]



,

(2S,4R)-9-[1-[(2R)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

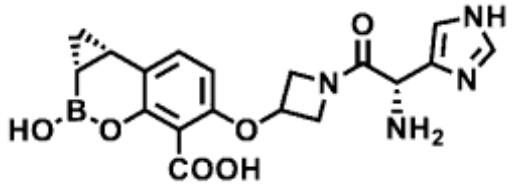
[Chemical Formula 67]



,

(1aR,7bS)-5-({1-[(2S)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

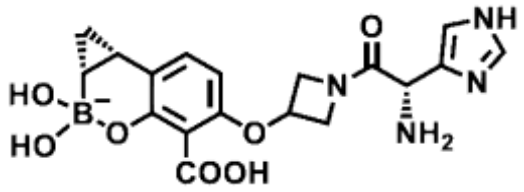
[Chemical Formula 68]



,

(2S,4R)-9-[1-[(2S)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

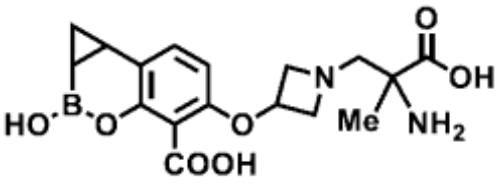
[Chemical Formula 69]



,

5-({1-(2-amino-2-carboxypropyl)azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

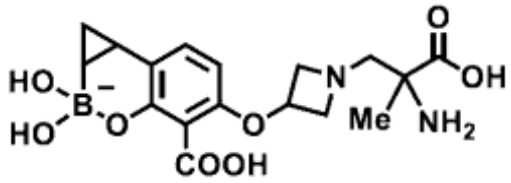
[Chemical Formula 70]



,

9-[1-(propyl 2-amino-2-carboxylate)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

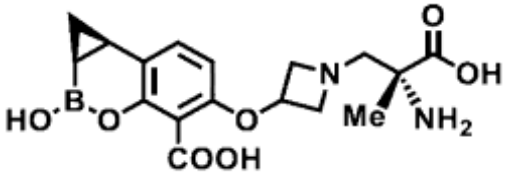
[Chemical Formula 71]



,

(1aS,7bR)-5-({1-[(2R)-2-amino-2-carboxypropyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

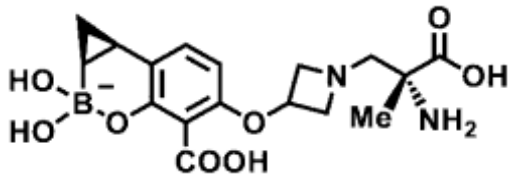
[Chemical Formula 72]



,

(2R,4S)-9-[1-[propyl (2R)-2-amino-2-carboxylate]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

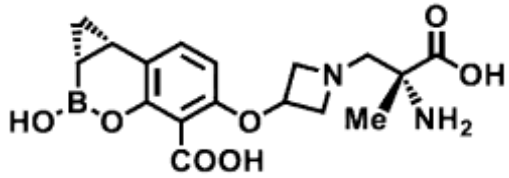
[Chemical Formula 73]



,

(1aR,7bS)-5-({1-[(2R)-2-amino-2-carboxypropyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

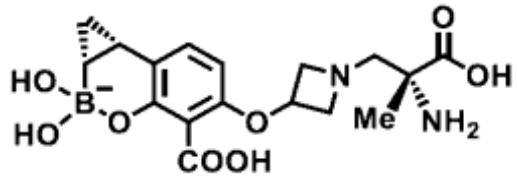
[Chemical Formula 74]



,

(2S,4R)-9-[1-[propyl (2R)-2-amino-2-carboxylate]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

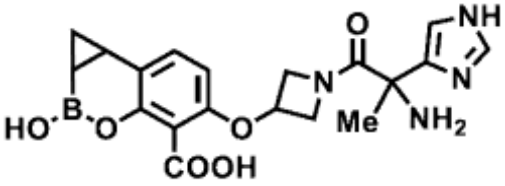
[Chemical Formula 75]



,

5-({1-[2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

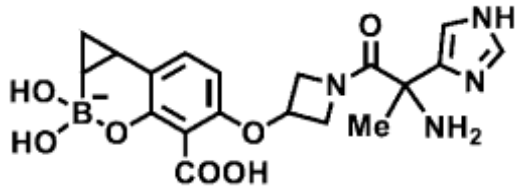
[Chemical Formula 76]



,

9-[1-[2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

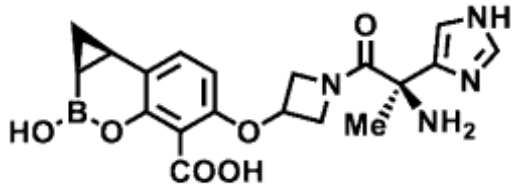
[Chemical Formula 77]



,

(1aS,7bR)-5-({1-[(2R)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

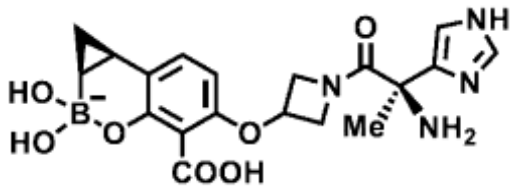
[Chemical Formula 78]



,

(2R,4S)-9-[1-[(2R)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

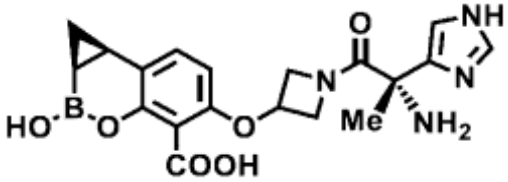
[Chemical Formula 79]



,

(1aS,7bR)-5-({1-[(2S)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

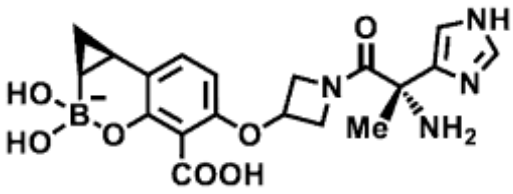
[Chemical Formula 80]



,

(2R,4S)-9-[1-[(2S)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

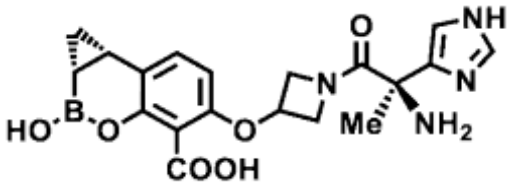
[Chemical Formula 81]



,

(1aR,7bS)-5-({1-[(2R)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

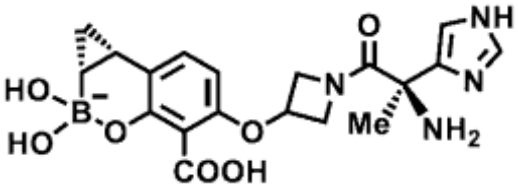
[Chemical Formula 82]



,

(2S,4R)-9-[1-[(2R)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

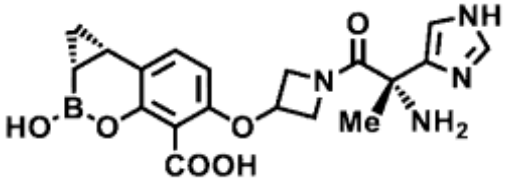
[Chemical Formula 83]



,

(1aR,7bS)-5-({1-[(2S)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

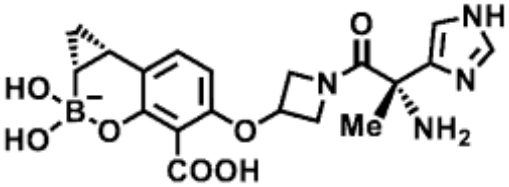
[Chemical Formula 84]



, and

(2S,4R)-9-[1-[(2S)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

[Chemical Formula 85]



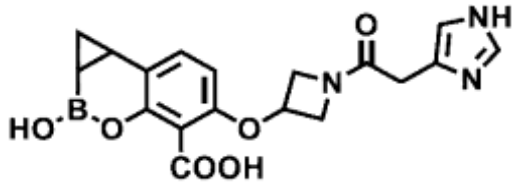
.

[Item 102]

The compound or the pharmaceutically acceptable salt thereof according to item 1 or 2, selected from the group consisting of the compounds represented by the following names or structural formulas:

2-hydroxy-5-({1-[(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

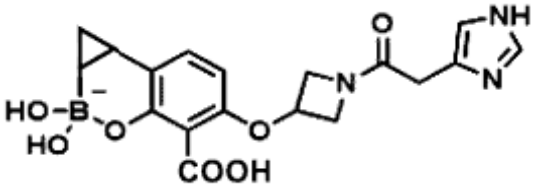
[Chemical Formula 86]



,

5,5-dihydroxy-9-{1-[(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

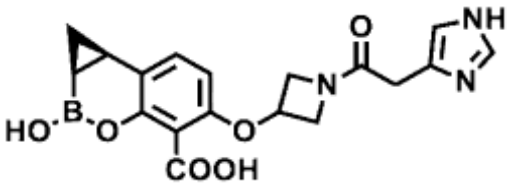
[Chemical Formula 87]



,

(1aS,7bR)-2-hydroxy-5-({1-[(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

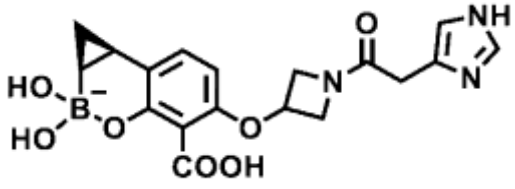
[Chemical Formula 88]



,

(2R,4S)-5,5-dihydroxy-9-{1-[(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

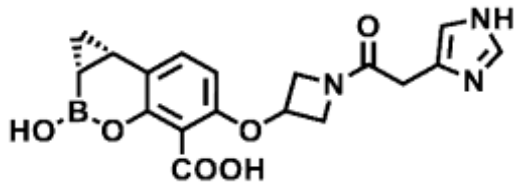
[Chemical Formula 89]



,

(1aR,7bS)-2-hydroxy-5-({1-[(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

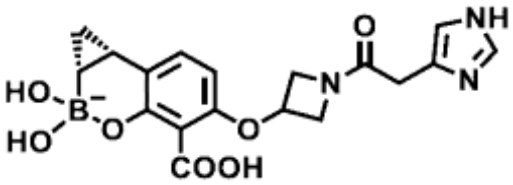
[Chemical Formula 90]



,

(2S,4R)-5,5-dihydroxy-9-{1-[(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

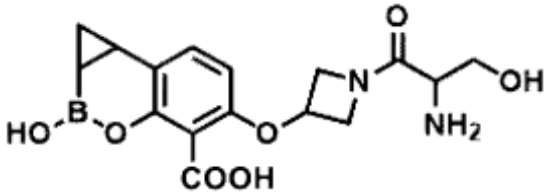
[Chemical Formula 91]



,

2-hydroxy-5-[(1-serylazetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

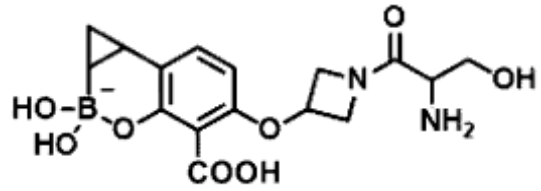
[Chemical Formula 92]



,

5,5-dihydroxy-9-(1-serylazetidin-3-yl)oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

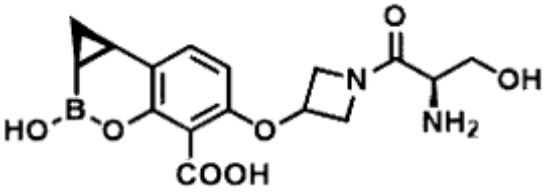
[Chemical Formula 93]



,

(1aS,7bR)-2-hydroxy-5-[(1-D-serylazetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

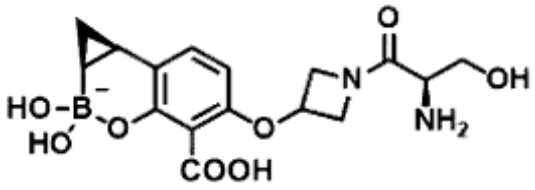
[Chemical Formula 94]



,

(2R,4S)-5,5-dihydroxy-9-(1-D-serylazetidin-3-yl)oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

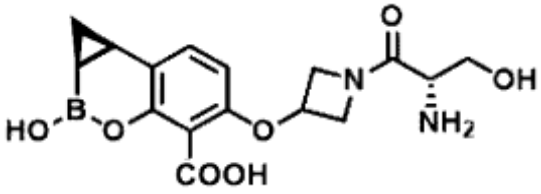
[Chemical Formula 95]



,

(1aS,7bR)-2-hydroxy-5-[(1-L-serylazetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

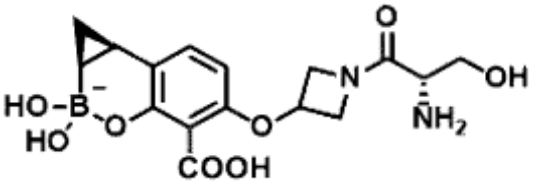
[Chemical Formula 96]



,

(2R,4S)-5,5-dihydroxy-9-(1-L-serylazetidin-3-yl)oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

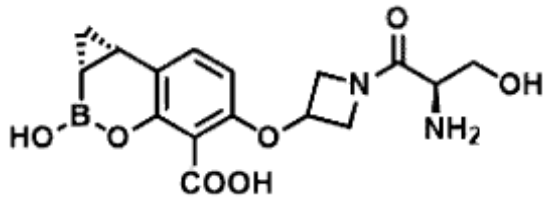
[Chemical Formula 97]



,

(1aR,7bS)-2-hydroxy-5-[(1-D-serylazetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

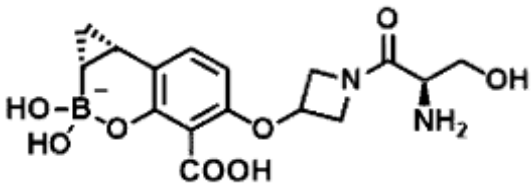
[Chemical Formula 98]



,

(2S,4R)-5,5-dihydroxy-9-(1-D-serylazetidin-3-yl)oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

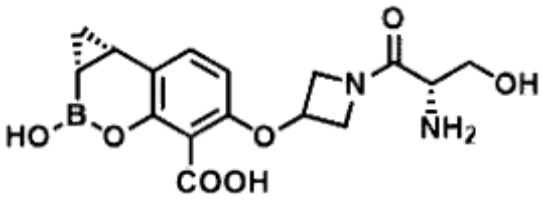
[Chemical Formula 99]



,

(1aR,7bS)-2-hydroxy-5-[(1-L-serylazetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

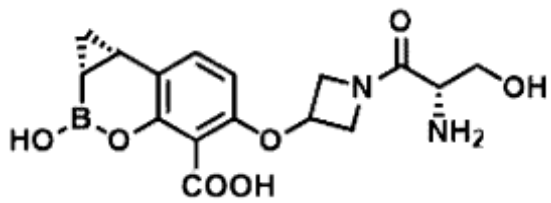
[Chemical Formula 100]



,

(2S,4R)-5,5-dihydroxy-9-(1-L-serylazetidin-3-yl)oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

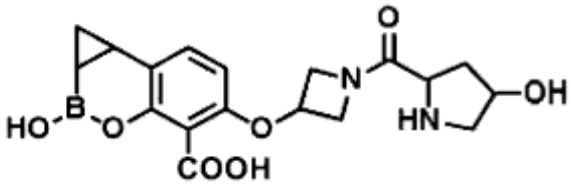
[Chemical Formula 101]



,

2-hydroxy-5-({1-[4-hydroxy-prolyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

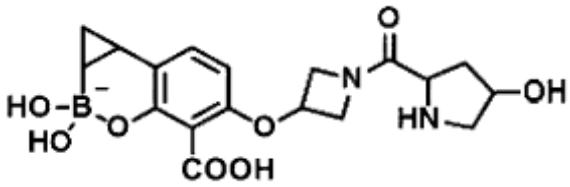
[Chemical Formula 102]



,

5,5-dihydroxy-9-{1-[4-hydroxy-prolyl]azetidin-3-yl}oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

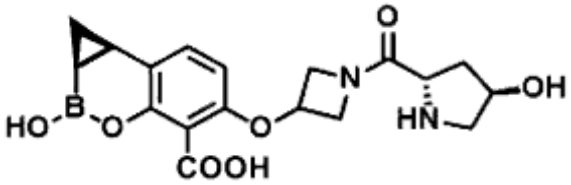
[Chemical Formula 103]



,

(1aS,7bR)-2-hydroxy-5-({1-[(4R)-4-hydroxy-L-prolyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

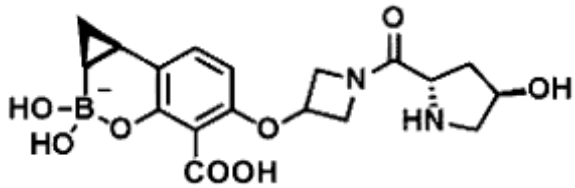
[Chemical Formula 104]



,

(2R,4S)-5,5-dihydroxy-9-{1-[(4R)-4-hydroxy-L-prolyl]azetidin-3-yl}oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

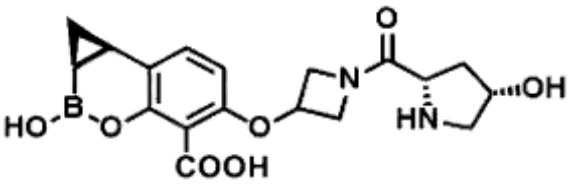
[Chemical Formula 105]



,

(1aS,7bR)-2-hydroxy-5-({1-[(4S)-4-hydroxy-L-prolyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

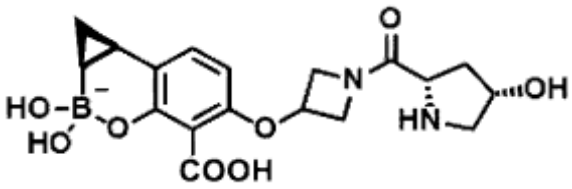
[Chemical Formula 106]



,

(2R,4S)-5,5-dihydroxy-9-{1-[(4S)-4-hydroxy-L-prolyl]azetidin-3-yl}oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

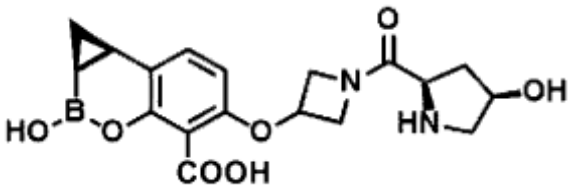
[Chemical Formula 107]



,

(1aS,7bR)-2-hydroxy-5-({1-[(4R)-4-hydroxy-D-prolyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

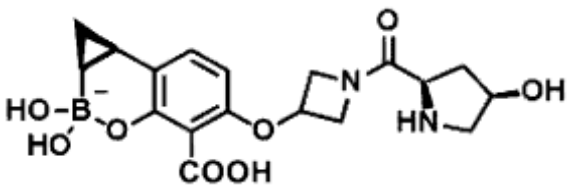
[Chemical Formula 108]



,

(2R,4S)-5,5-dihydroxy-9-{1-[(4R)-4-hydroxy-D-prolyl]azetidin-3-yl}oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

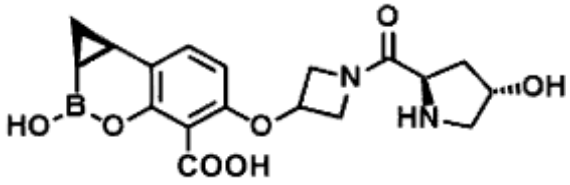
[Chemical Formula 109]



,

(1aS,7bR)-2-hydroxy-5-({1-[(4S)-4-hydroxy-D-prolyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

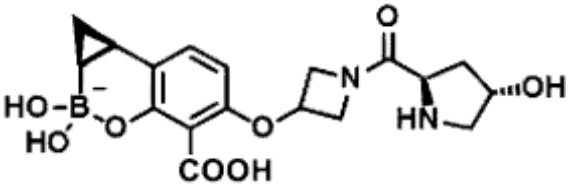
[Chemical Formula 110]



,

(2R,4S)-5,5-dihydroxy-9-{1-[(4S)-4-hydroxy-D-prolyl]azetidin-3-yl}oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

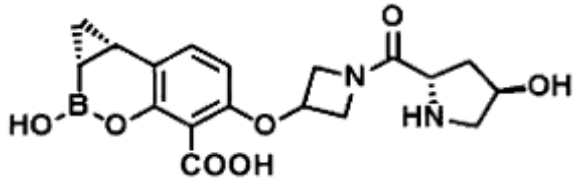
[Chemical Formula 111]



,

(1aR,7bS)-2-hydroxy-5-({1-[(4R)-4-hydroxy-L-prolyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

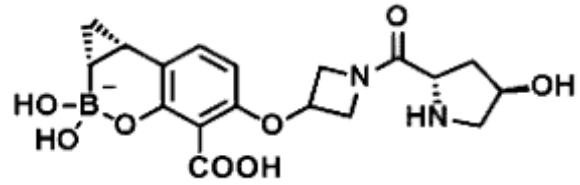
[Chemical Formula 112]



,

(2S,4R)-5,5-dihydroxy-9-{1-[(4R)-4-hydroxy-L-prolyl]azetidin-3-yl}oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

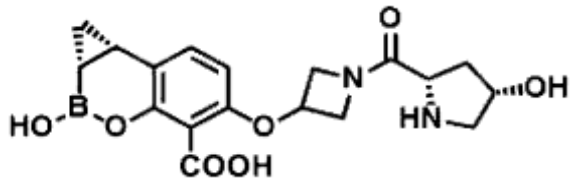
[Chemical Formula 113]



,

(1aR,7bS)-2-hydroxy-5-({1-[(4S)-4-hydroxy-L-prolyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

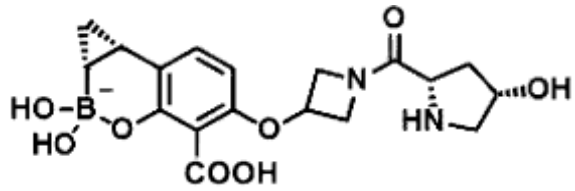
[Chemical Formula 114]



,

(2S,4R)-5,5-dihydroxy-9-{1-[(4S)-4-hydroxy-L-prolyl]azetidin-3-yl}oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

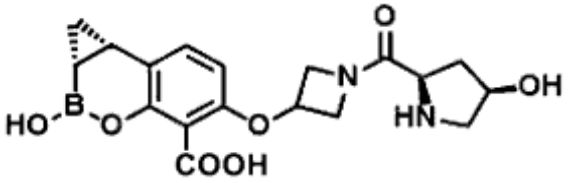
[Chemical Formula 115]



,

(1aS,7bR)-2-hydroxy-5-({1-[(4R)-4-hydroxy-D-prolyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

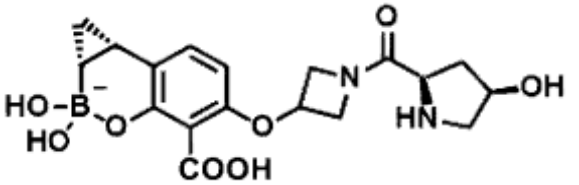
[Chemical Formula 116]



,

(2S,4R)-5,5-dihydroxy-9-{1-[(4R)-4-hydroxy-D-prolyl]azetidin-3-yl}oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

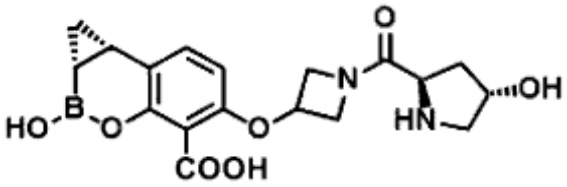
[Chemical Formula 117]



,

(1aR,7bS)-2-hydroxy-5-({1-[(4S)-4-hydroxy-D-prolyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

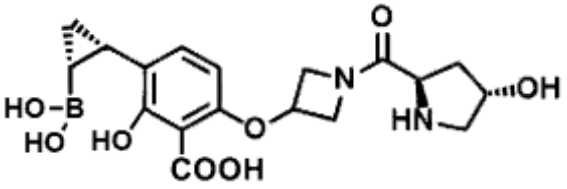
[Chemical Formula 118]



,

(2S,4R)-5,5-dihydroxy-9-{1-[(4S)-4-hydroxy-D-prolyl]azetidin-3-yl}oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

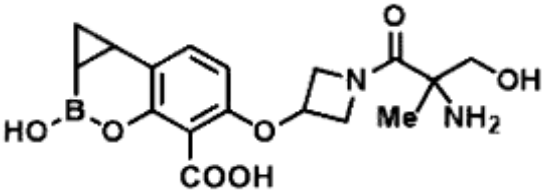
[Chemical Formula 119]



,

2-hydroxy-5-{[1-(2-methyl-seryl)azetidin-3-yl]oxy}-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

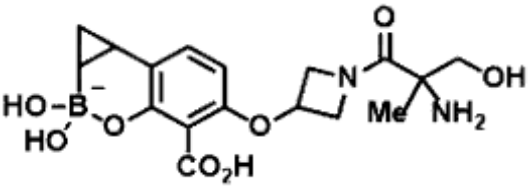
[Chemical Formula 120]



,

5,5-dihydroxy-9-[1-(2-methyl-seryl)azetidin-3-yl]oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

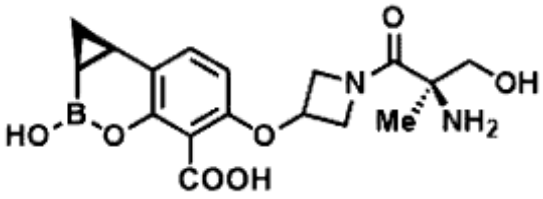
[Chemical Formula 121]



,

(1aS,7bR)-2-hydroxy-5-{[1-(2-methyl-D-seryl)azetidin-3-yl]oxy}-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

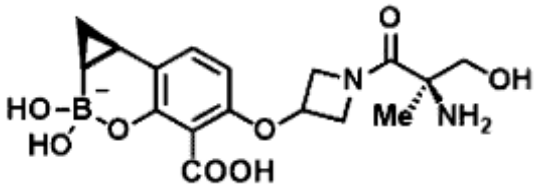
[Chemical Formula 122]



,

(2R,4S)-5,5-dihydroxy-9-[1-(2-methyl-D-seryl)azetidin-3-yl]oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

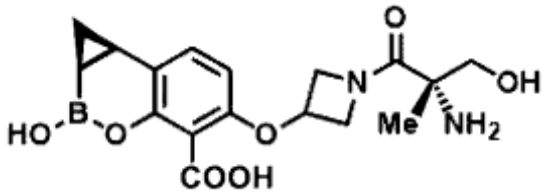
[Chemical Formula 123]



,

(1aS,7bR)-2-hydroxy-5-{[1-(2-methyl-L-seryl)azetidin-3-yl]oxy}-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

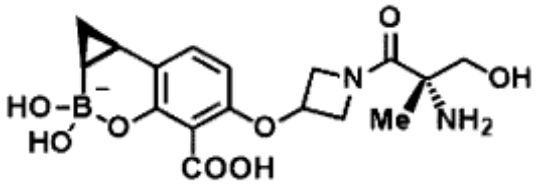
[Chemical Formula 124]



,

(2R,4S)-5,5-dihydroxy-9-[1-(2-methyl-L-seryl)azetidin-3-yl]oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

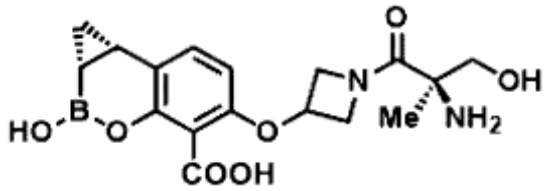
[Chemical Formula 125]



,

(1aR,7bS)-2-hydroxy-5-{[1-(2-methyl-D-seryl)azetidin-3-yl]oxy}-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

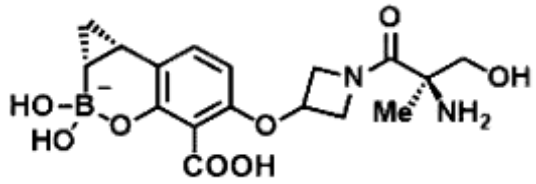
[Chemical Formula 126]



,

(2S,4R)-5,5-dihydroxy-9-[1-(2-methyl-D-seryl)azetidin-3-yl]oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

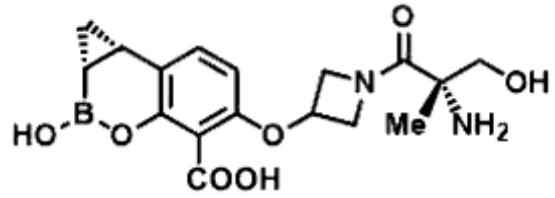
[Chemical Formula 127]



,

(1aR,7bS)-2-hydroxy-5-{[1-(2-methyl-L-seryl)azetidin-3-yl]oxy}-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

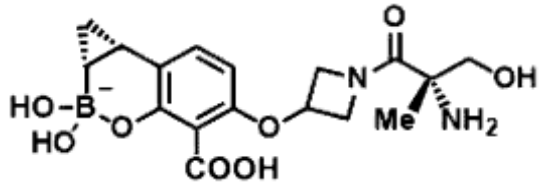
[Chemical Formula 128]



,

(2S,4R)-5,5-dihydroxy-9-[1-(2-methyl-L-seryl)azetidin-3-yl]oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

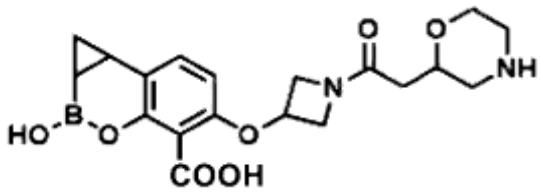
[Chemical Formula 129]



,

2-hydroxy-5-[(1-{[morpholin-2-yl]acetyl}azetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

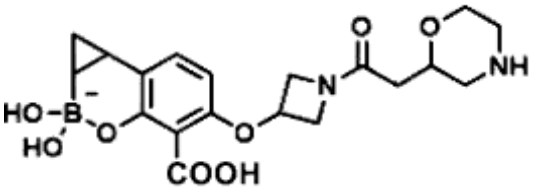
[Chemical Formula 130]



,

5,5-dihydroxy-9-(1-{[morpholin-2-yl]acetyl}azetidin-3-yl)oxy-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid

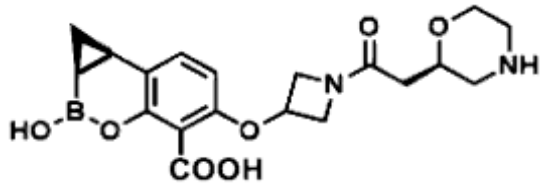
[Chemical Formula 131]



,

(1aS,7bR)-2-hydroxy-5-[(1-{[(2R)-morpholin-2-yl]acetyl}azetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

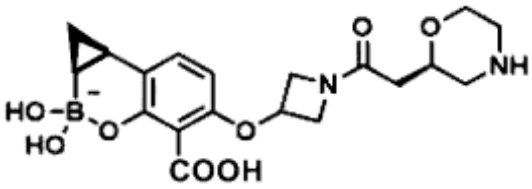
[Chemical Formula 132]



,

(2R,4S)-5,5-dihydroxy-9-(1-{[(2R)-morpholin-2-yl]acetyl}azetidin-3-yl)oxy-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid

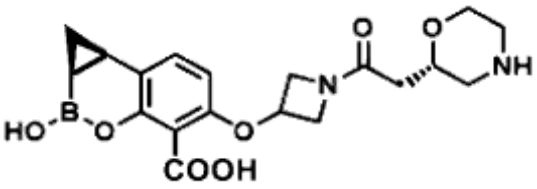
[Chemical Formula 133]



,

(1aS,7bR)-2-hydroxy-5-[(1-{[(2S)-morpholin-2-yl]acetyl}azetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

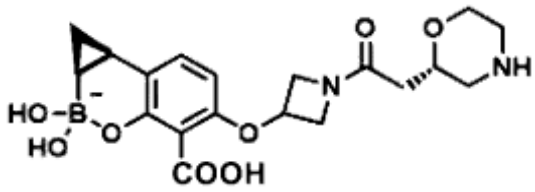
[Chemical Formula 134]



,

(2S,4R)-5,5-dihydroxy-9-(1-{[(2R)-morpholin-2-yl]acetyl}azetidin-3-yl)oxy-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

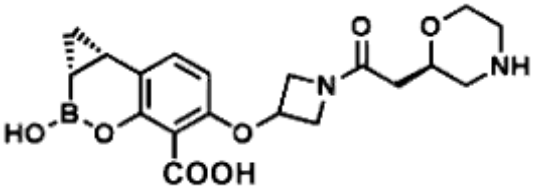
[Chemical Formula 135]



,

(1aR,7bS)-2-hydroxy-5-[(1-{[(2R)-morpholin-2-yl]acetyl}azetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

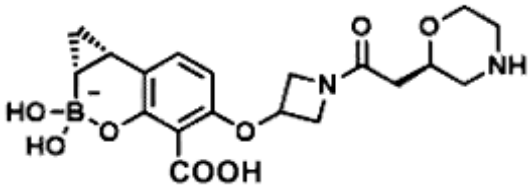
[Chemical Formula 136]



,

(2S,4R)-5,5-dihydroxy-9-(1-{[(2R)-morpholin-2-yl]acetyl}azetidin-3-yl)oxy-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

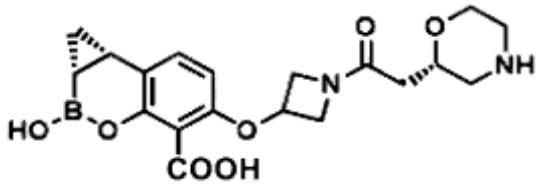
[Chemical Formula 137]



,

(1aR,7bS)-2-hydroxy-5-[(1-{[(2S)-morpholin-2-yl]acetyl}azetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

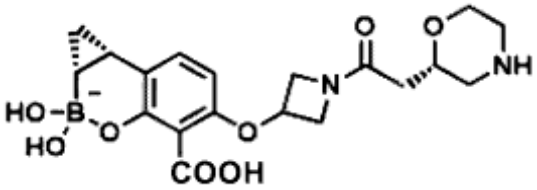
[Chemical Formula 138]



,

(2S,4R)-5,5-dihydroxy-9-(1-{[(2S)-morpholin-2-yl]acetyl}azetidin-3-yl)oxy-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

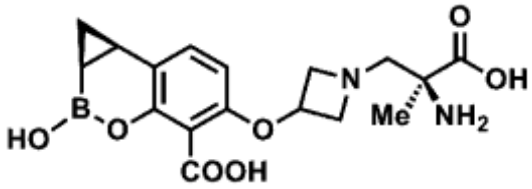
[Chemical Formula 139]



,

(1aS,7bR)-5-({1-[(2S)-2-amino-2-carboxypropyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

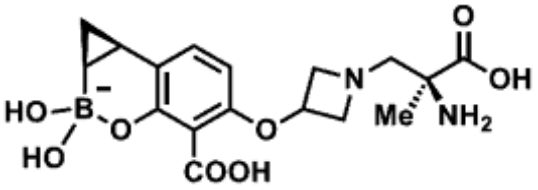
[Chemical Formula 140]



,

(2R,4S)-9-[1-[propyl (2S)-2-amino-2-carboxylate]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

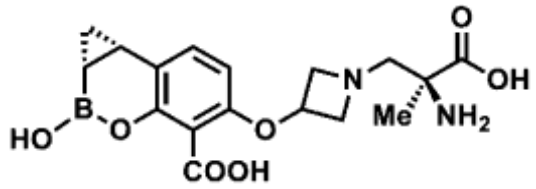
[Chemical Formula 141]



,

(1aR,7bS)-5-({1-[(2S)-2-amino-2-carboxypropyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

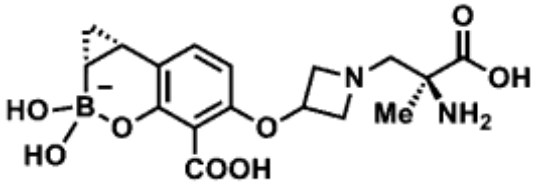
[Chemical Formula 142]



,

(2S,4R)-9-[1-[propyl (2S)-2-amino-2-carboxylate]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

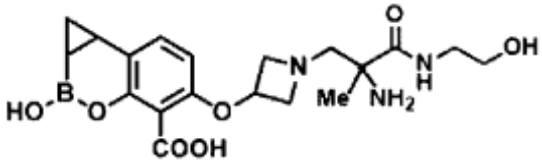
[Chemical Formula 143]



,

5-({1-[2-amino-2-carboxypropyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

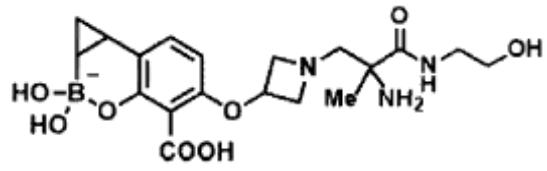
[Chemical Formula 144]



,

9-(1-{2-amino-3-[(2-hydroxyethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

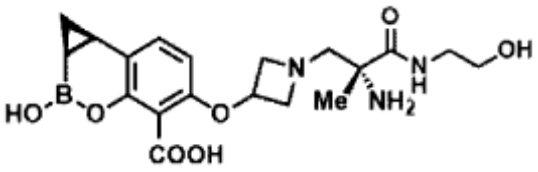
[Chemical Formula 145]



,

(1aS,7bR)-5-[(1-{(2R)-2-amino-3-[(2-hydroxyethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

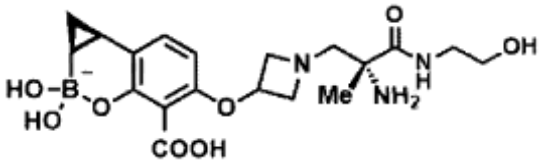
[Chemical Formula 146]



,

(2R,4S)-9-(1-{(2R)-2-amino-3-[(2-hydroxyethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

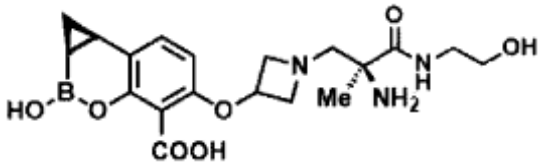
[Chemical Formula 147]



,

(1aS,7bR)-5-[(1-{(2S)-2-amino-3-[(2-hydroxyethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

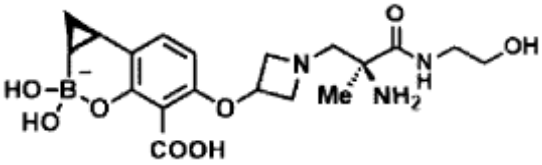
[Chemical Formula 148]



,

(2R,4S)-9-(1-{(2S)-2-amino-3-[(2-hydroxyethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

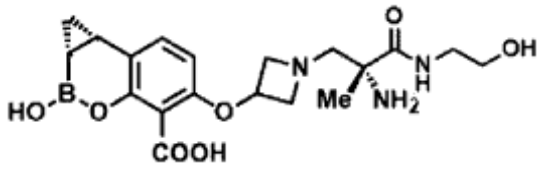
[Chemical Formula 149]



,

(1aR,7bS)-5-[(1-{(2R)-2-amino-3-[(2-hydroxyethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

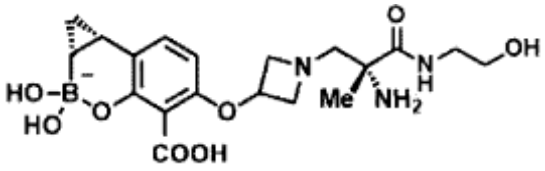
[Chemical Formula 150]



,

(2S,4R)-9-(1-{(2R)-2-amino-3-[(2-hydroxyethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

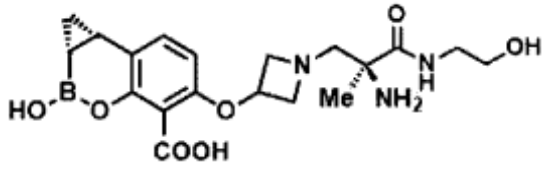
[Chemical Formula 151]



,

(1aR,7bS)-5-[(1-{(2S)-2-amino-3-[(2-hydroxyethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

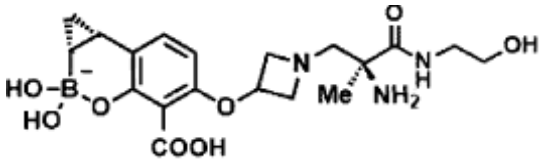
[Chemical Formula 152]



,

(2S,4R)-9-(1-{(2S)-2-amino-3-[(2-hydroxyethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

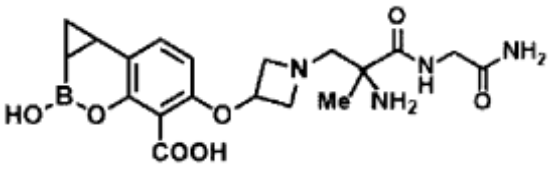
[Chemical Formula 153]



,

5-[(1-{2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

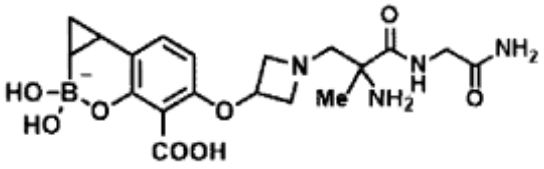
[Chemical Formula 154]



,

9-(1-{2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

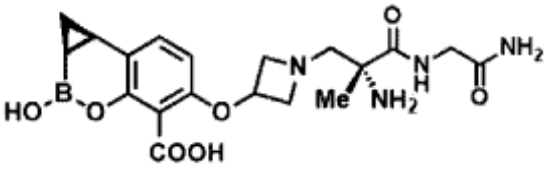
[Chemical Formula 155]



,

(1aS,7bR)-5-[(1-{(2R)-2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

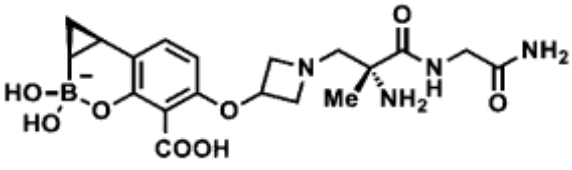
[Chemical Formula 156]



,

(2R,4S)-9-(1-{(2R)-2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

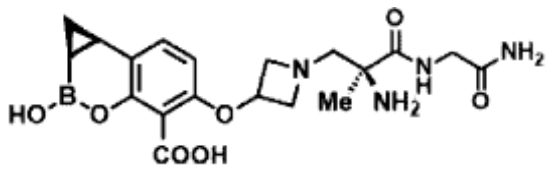
[Chemical Formula 157]



,

(1aS,7bR)-5-[(1-{(2S)-2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

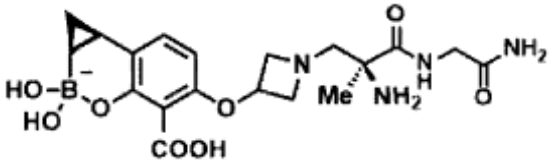
[Chemical Formula 158]



,

(2R,4S)-9-(1-{(2S)-2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

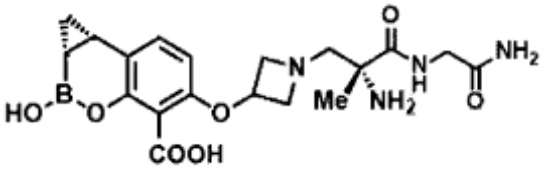
[Chemical Formula 159]



,

(1aR,7bS)-5-[(1-{(2R)-2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

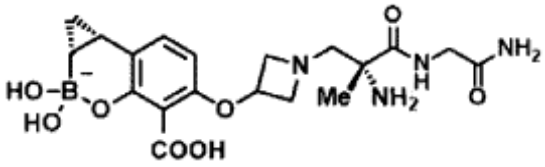
[Chemical Formula 160]



,

(2S,4R)-9-(1-{(2R)-2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

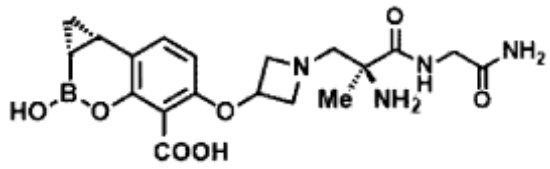
[Chemical Formula 161]



,

(1aR,7bS)-5-[(1-{(2S)-2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

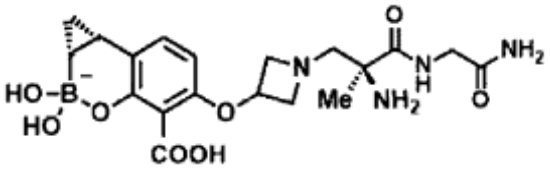
[Chemical Formula 162]



,

(2S,4R)-9-(1-{(2S)-2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

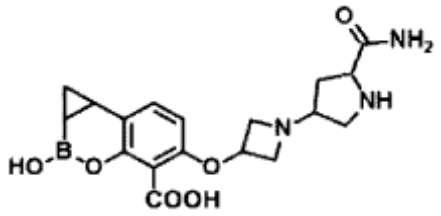
[Chemical Formula 163]



,

5-({1-[5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

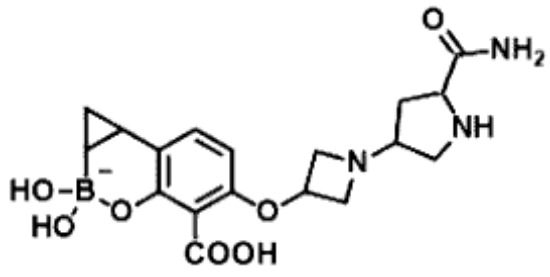
[Chemical Formula 164]



,

9-{1-[5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

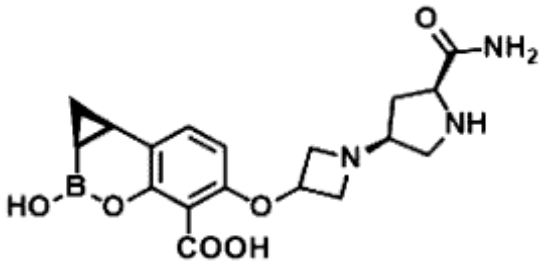
[Chemical Formula 165]



,

(1aS,7bR)-5-({1-[(3S,5S)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

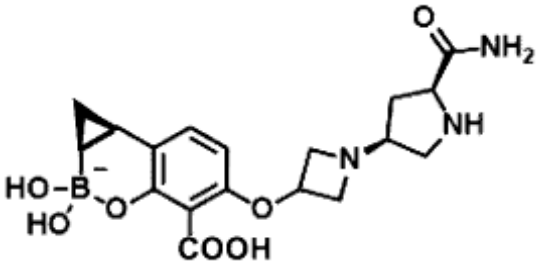
[Chemical Formula 166]



,

(2R,4S)-9-{1-[(3S,5S)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

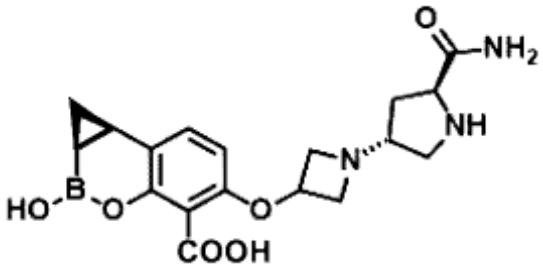
[Chemical Formula 167]



,

(1aS,7bR)-5-({1-[(3R,5S)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

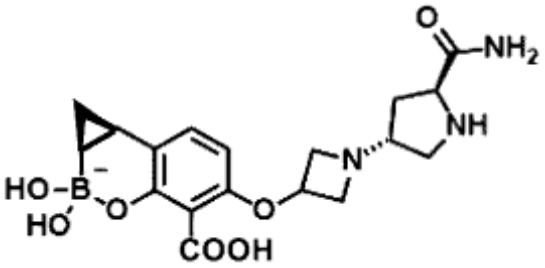
[Chemical Formula 168]



,

(2R,4S)-9-{1-[(3R,5S)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

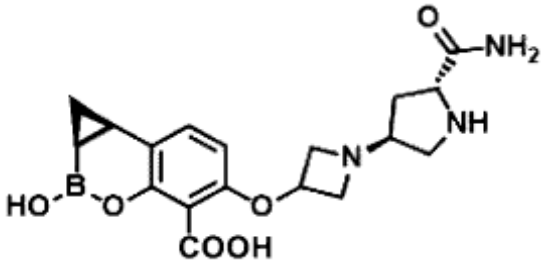
[Chemical Formula 169]



,

(1aS,7bR)-5-({1-[(3S,5R)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

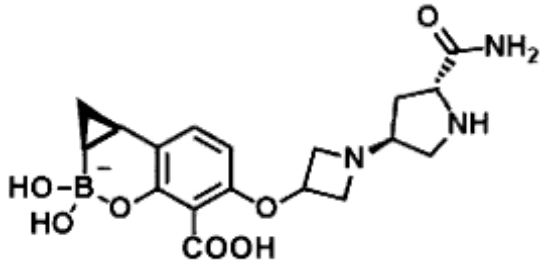
[Chemical Formula 170]



,

(2R,4S)-9-{1-[(3S,5R)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

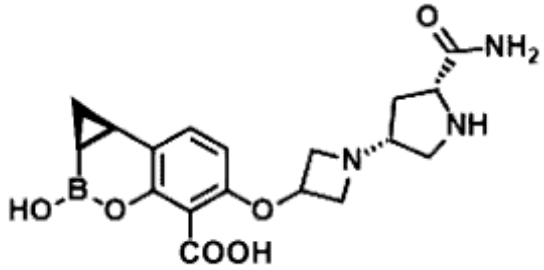
[Chemical Formula 171]



,

(1aS,7bR)-5-({1-[(3R,5R)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

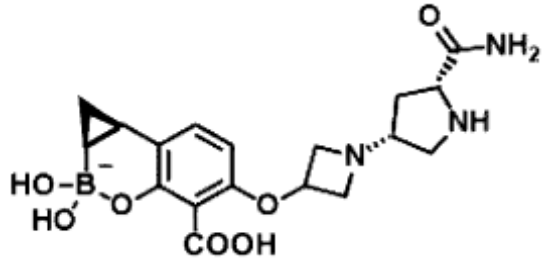
[Chemical Formula 172]



,

(2R,4S)-9-{1-[(3R,5R)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylate

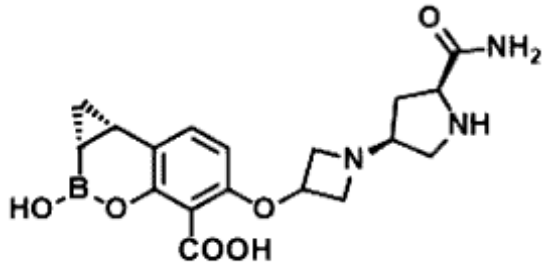
[Chemical Formula 173]



,

(1aR,7bS)-5-({1-[(3S,5S)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

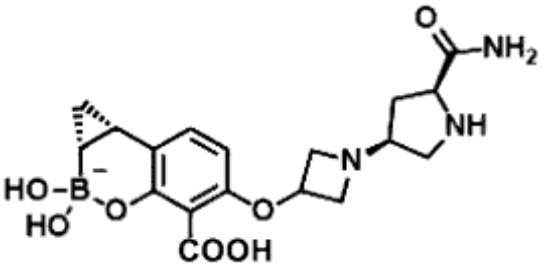
[Chemical Formula 174]



,

(2S,4R)-9-{1-[(3S,5S)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylate

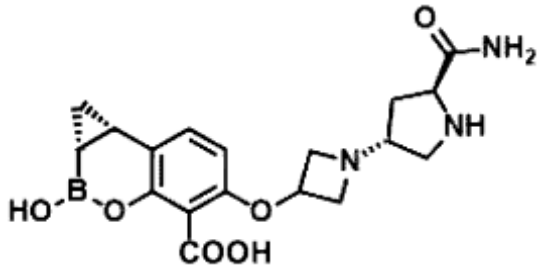
[Chemical Formula 175]



,

(1aR,7bS)-5-({1-[(3R,5S)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

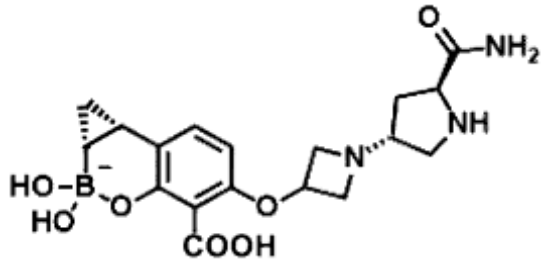
[Chemical Formula 176]



,

(2S,4R)-9-{1-[(3R,5S)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

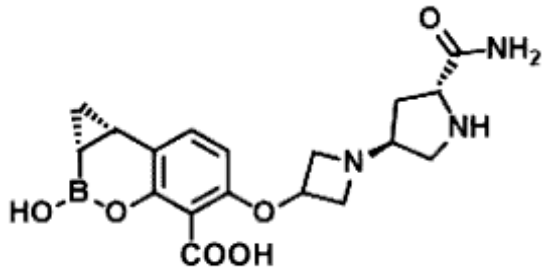
[Chemical Formula 177]



,

(1aR,7bS)-5-({1-[(3S,5R)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

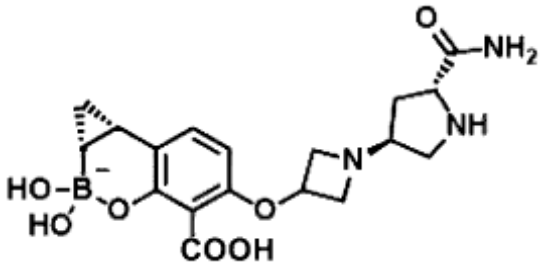
[Chemical Formula 178]



,

(2S,4R)-9-{1-[(3S,5R)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

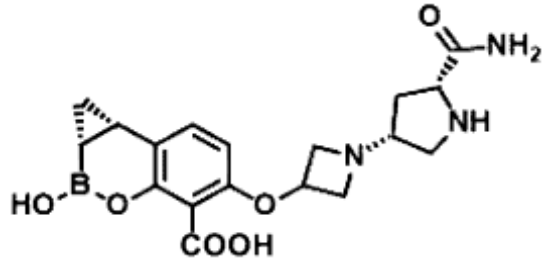
[Chemical Formula 179]



,

(1aR,7bS)-5-({1-[(3R,5R)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

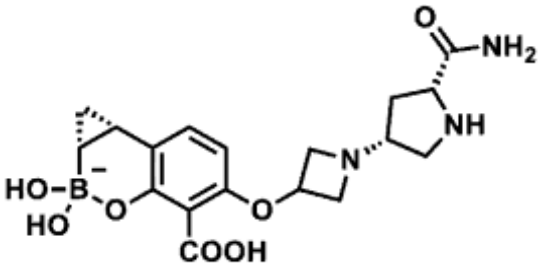
[Chemical Formula 180]



,

(2S,4R)-9-{1-[(3R,5R)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

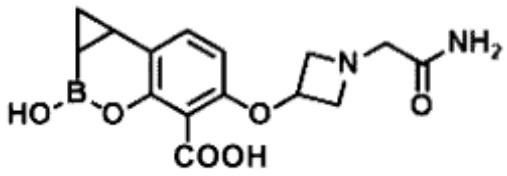
[Chemical Formula 181]



,

5-{[1-(2-amino-2-oxoethyl)azetidin-3-yl]oxy}-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

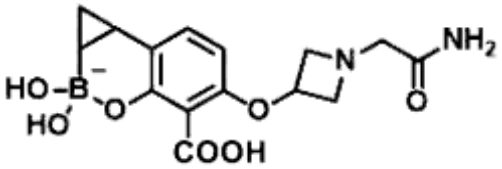
[Chemical Formula 182]



,

9-[1-(2-amino-2-oxoethyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

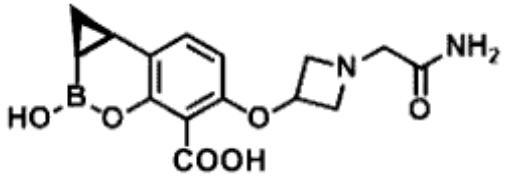
[Chemical Formula 183]



,

(1aS,7bR)-5-{[1-(2-amino-2-oxoethyl)azetidin-3-yl]oxy}-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

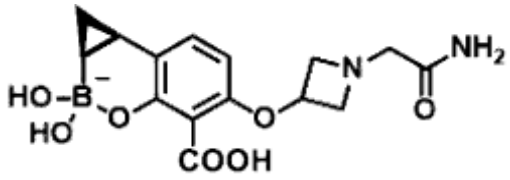
[Chemical Formula 184]



,

(2R,4S)-9-[1-(2-amino-2-oxoethyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

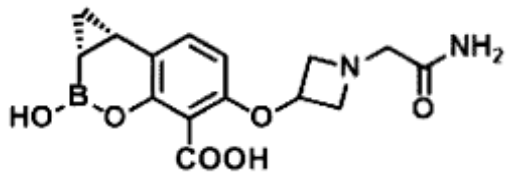
[Chemical Formula 185]



,

(1aR,7bS)-5-{[1-(2-amino-2-oxoethyl)azetidin-3-yl]oxy}-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

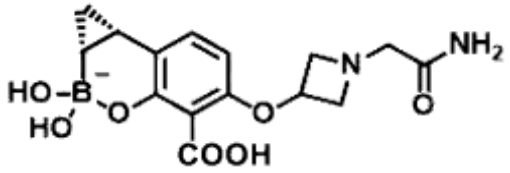
[Chemical Formula 186]



,

(2S,4R)-9-[1-(2-amino-2-oxoethyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

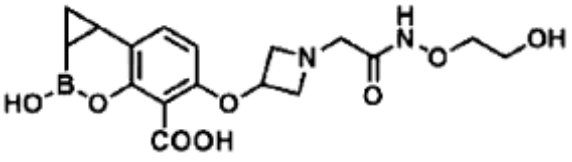
[Chemical Formula 187]



,

2-hydroxy-5-[(1-{2-[(2-hydroxyethoxy)amino]-2-oxoethyl}azetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

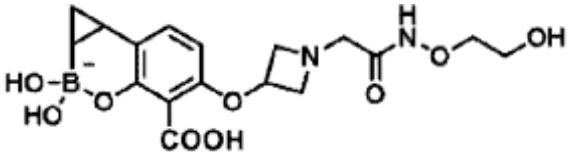
[Chemical Formula 188]



,

5,5-dihydroxy-9-(1-{2-[(2-hydroxyethoxy)amino]-2-oxoethyl}azetidin-3-yl)oxy-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

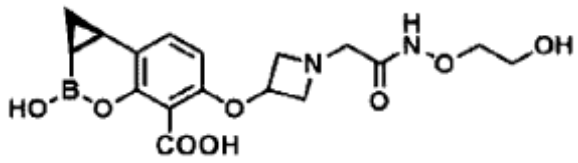
[Chemical Formula 189]



,

(1aS,7bR)-2-hydroxy-5-[(1-{2-[(2-hydroxyethoxy)amino]-2-oxoethyl}azetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

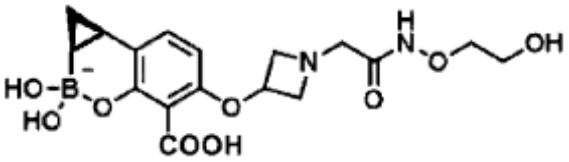
[Chemical Formula 190]



,

(2R,4S)-5,5-dihydroxy-9-(1-{2-[(2-hydroxyethoxy)amino]-2-oxoethyl}azetidin-3-yl)oxy-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

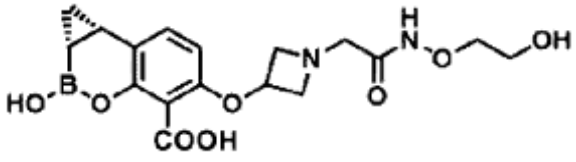
[Chemical Formula 191]



,

(1aR,7bS)-2-hydroxy-5-[(1-{2-[(2-hydroxyethoxy)amino]-2-oxoethyl}azetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

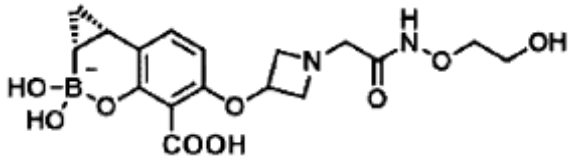
[Chemical Formula 192]



,

(2S,4R)-5,5-dihydroxy-9-(1-{2-[(2-hydroxyethoxy)amino]-2-oxoethyl}azetidin-3-yl)oxy-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

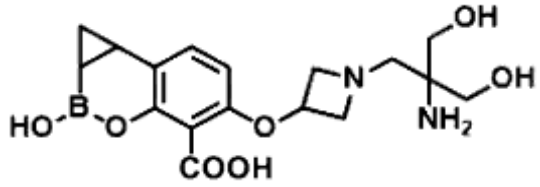
[Chemical Formula 193]



,

5-({1-[2-amino-3-hydroxy-2-(hydroxymethyl)propyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

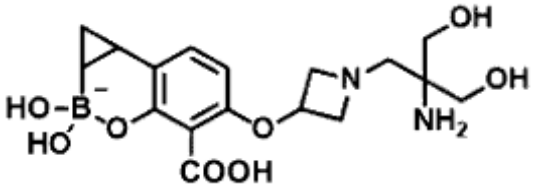
[Chemical Formula 194]



,

9-{1-[2-amino-3-hydroxy-2-(hydroxymethyl)propyl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

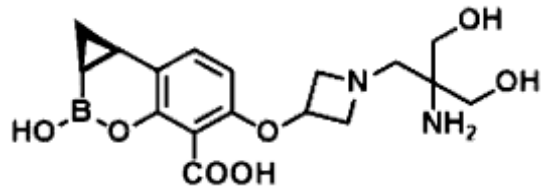
[Chemical Formula 195]



,

(1aS,7bR)-5-({1-[2-amino-3-hydroxy-2-(hydroxymethyl)propyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

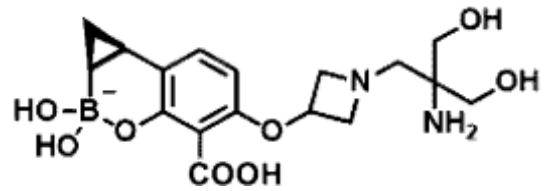
[Chemical Formula 196]



,

(2R,4S)-9-{1-[2-amino-3-hydroxy-2-(hydroxymethyl)propyl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

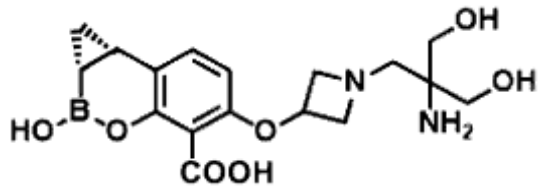
[Chemical Formula 197]



,

(1aR,7bS)-5-({1-[2-amino-3-hydroxy-2-(hydroxymethyl)propyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

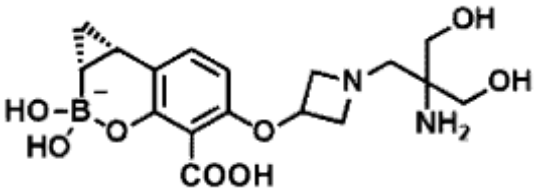
[Chemical Formula 198]



,

(2S,4R)-9-{1-[2-amino-3-hydroxy-2-(hydroxymethyl)propyl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

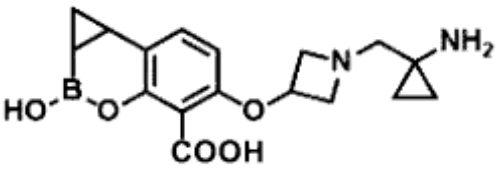
[Chemical Formula 199]



,

5-({1-[(1-aminocyclopropyl)methyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

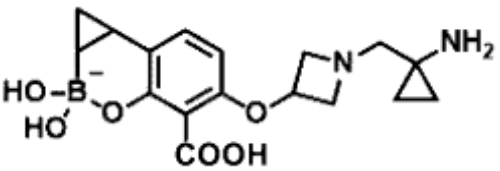
[Chemical Formula 200]



,

9-{1-[(1-aminocyclopropyl)methyl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

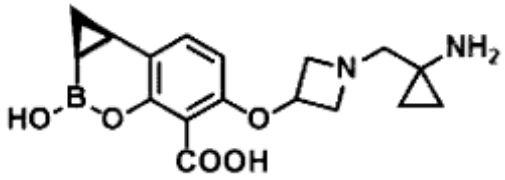
[Chemical Formula 201]



,

(1aS,7bR)-5-({1-[(1-aminocyclopropyl)methyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

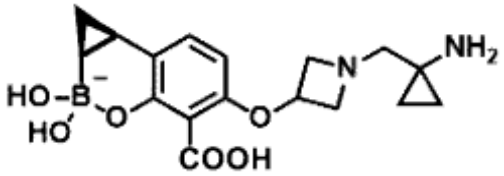
[Chemical Formula 202]



,

(2R,4S)-9-{1-[(1-aminocyclopropyl)methyl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

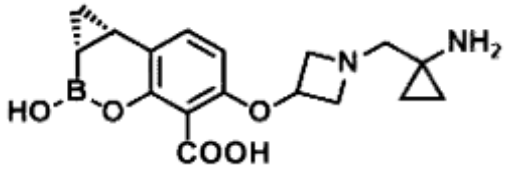
[Chemical Formula 203]



,

(1aR,7bS)-5-({1-[(1-aminocyclopropyl)methyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

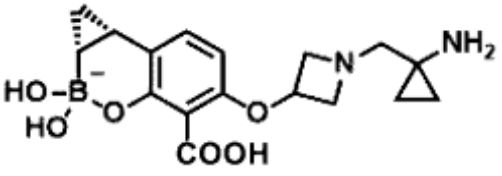
[Chemical Formula 204]



,

(2S,4R)-9-{1-[(1-aminocyclopropyl)methyl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

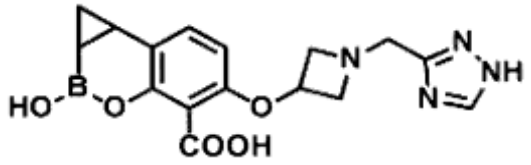
[Chemical Formula 205]



,

2-hydroxy-5-({1-[(1H-1,2,4-triazol-3-yl)methyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

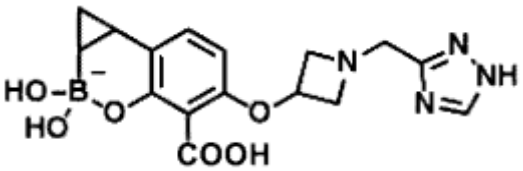
[Chemical Formula 206]



,

5,5-dihydroxy-9-{1-[(1H-1,2,4-triazol-3-yl)methyl]azetidin-3-yl}oxy-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

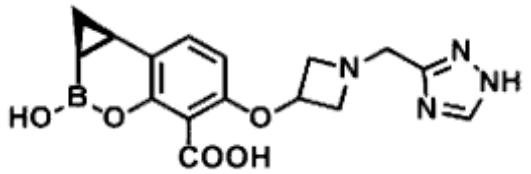
[Chemical Formula 207]



,

(1aS,7bR)-2-hydroxy-5-({1-[(1H-1,2,4-triazol-3-yl)methyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

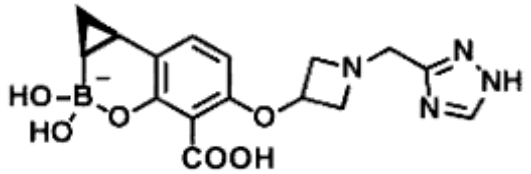
[Chemical Formula 208]



,

(2R,4S)-5,5-dihydroxy-9-{1-[(1H-1,2,4-triazol-3-yl)methyl]azetidin-3-yl}oxy-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

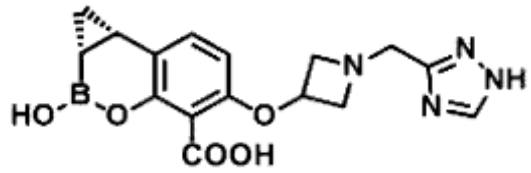
[Chemical Formula 209]



,

(1aR,7bS)-2-hydroxy-5-({1-[(1H-1,2,4-triazol-3-yl)methyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

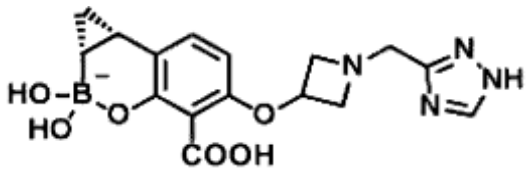
[Chemical Formula 210]



,

(2S,4R)-5,5-dihydroxy-9-{1-[(1H-1,2,4-triazol-3-yl)methyl]azetidin-3-yl}oxy-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

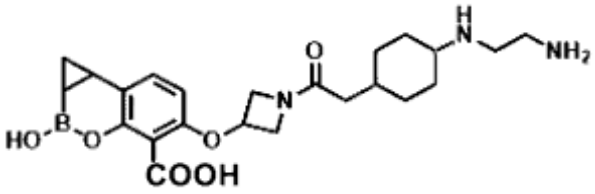
[Chemical Formula 211]



,

5-{[1-({4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

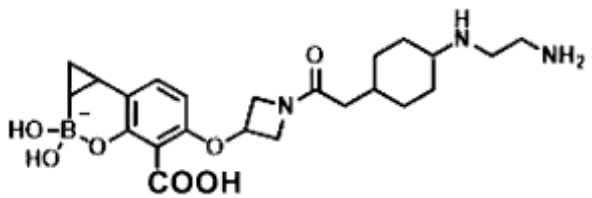
[Chemical Formula 212]



,

9-[1-({4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

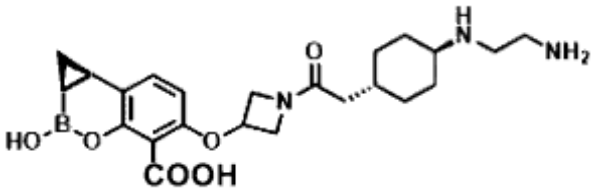
[Chemical Formula 213]



,

(1aS,7bR)-5-{[1-({(1r,4r)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

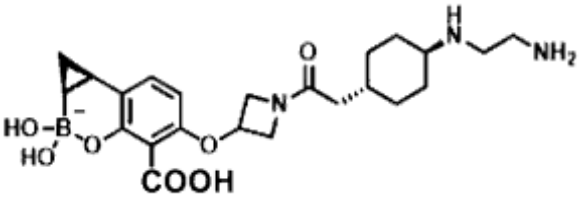
[Chemical Formula 214]



,

(2R,4S)-9-[1-({(1r,4r)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

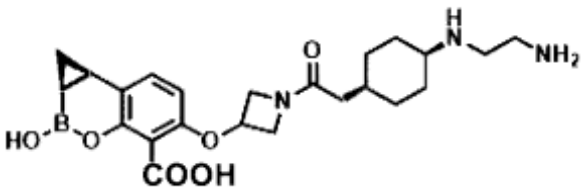
[Chemical Formula 215]



,

(1aS,7bR)-5-{[1-({(1s,4r)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

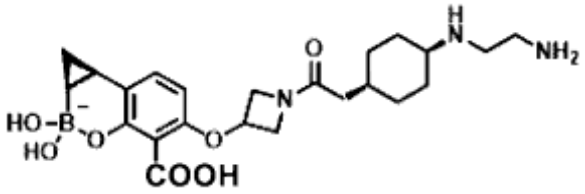
[Chemical Formula 216]



,

(2R,4S)-9-[1-({(1s,4r)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

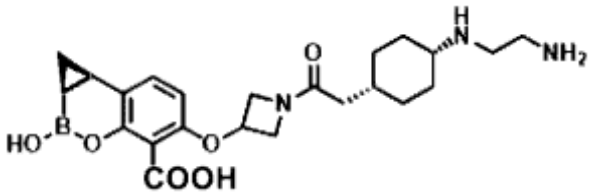
[Chemical Formula 217]



,

(1aS,7bR)-5-{[1-({(1r,4s)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

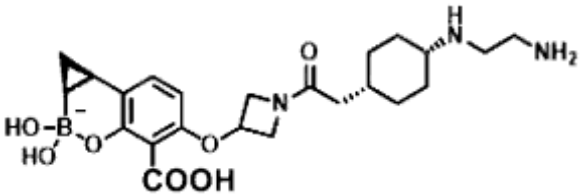
[Chemical Formula 218]



,

(2R,4S)-9-[1-({(1r,4s)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

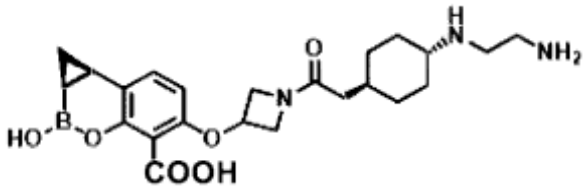
[Chemical Formula 219]



,

(1aS,7bR)-5-{[1-({(1s,4s)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

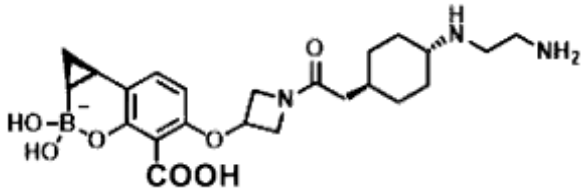
[Chemical Formula 220]



,

(2R,4S)-9-[1-({(1s,4s)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

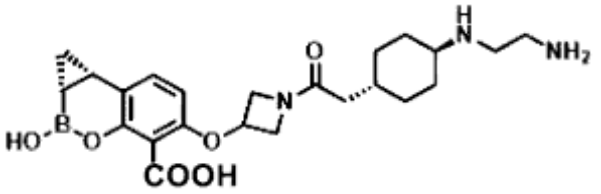
[Chemical Formula 221]



,

(1aR,7bS)-5-{[1-({(1r,4r)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

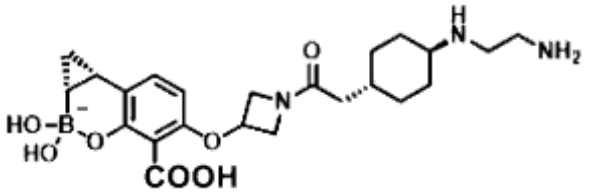
[Chemical Formula 222]



,

(2S,4R)-9-[1-({(1r,4r)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

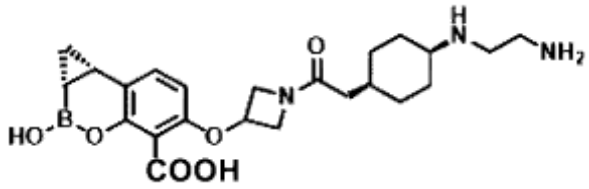
[Chemical Formula 223]



,

(1aR,7bS)-5-{[1-({(1s,4r)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

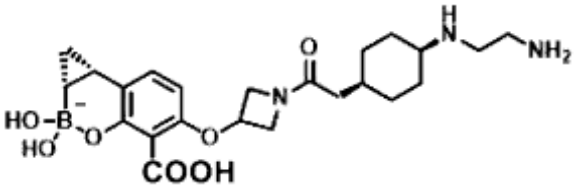
[Chemical Formula 224]



,

(2S,4R)-9-[1-({(1s,4r)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

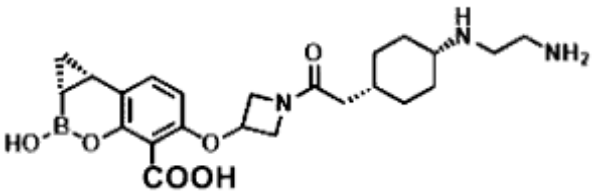
[Chemical Formula 225]



,

(1aR,7bS)-5-{[1-({(1r,4s)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

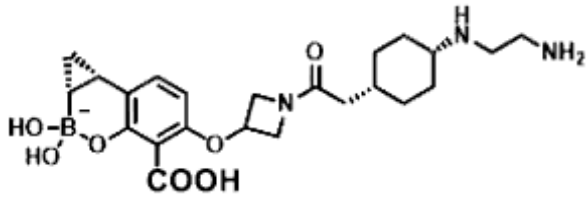
[Chemical Formula 226]



,

(2S,4R)-9-[1-({(1r,4s)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

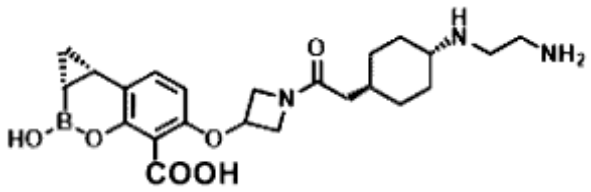
[Chemical Formula 227]



,

(1aR,7bS)-5-{[1-({(1s,4s)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

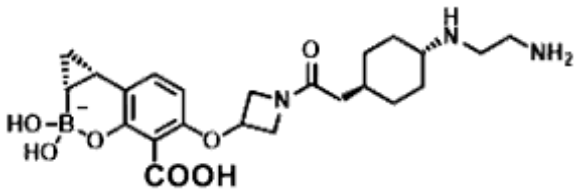
[Chemical Formula 228]



,

(2S,4R)-9-[1-({(1s,4s)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

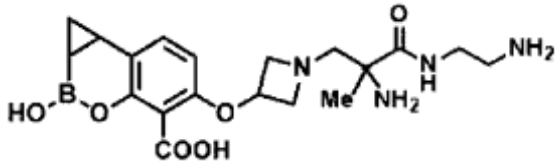
[Chemical Formula 229]



,

5-[(1-{2-amino-3-[(2-aminoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

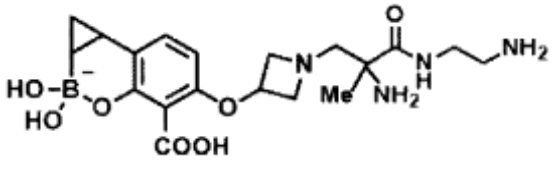
[Chemical Formula 230]



,

9-(1-{2-amino-3-[(2-aminoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

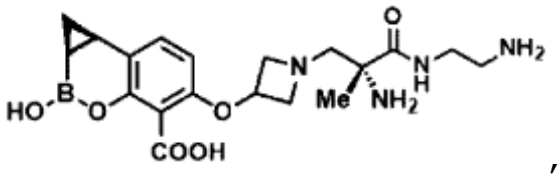
[Chemical Formula 231]



,

(1aS,7bR)-5-[(1-{(2R)-2-amino-3-[(2-aminoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

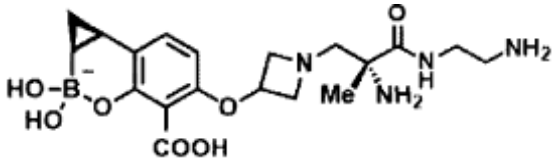
[Chemical Formula 232]



,

(2R,4S)-9-(1-{(2R)-2-amino-3-[(2-aminoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

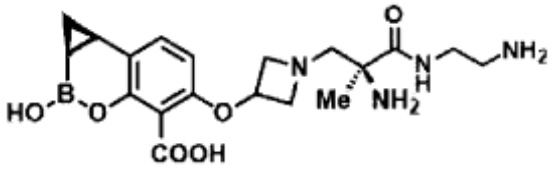
[Chemical Formula 233]



,

(1aS,7bR)-5-[(1-{(2S)-2-amino-3-[(2-aminoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

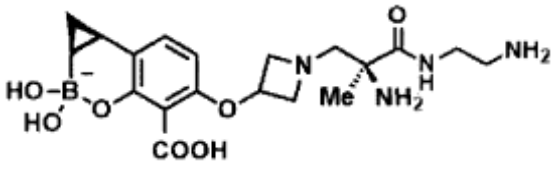
[Chemical Formula 234]



,

(2R,4S)-9-(1-{(2S)-2-amino-3-[(2-aminoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

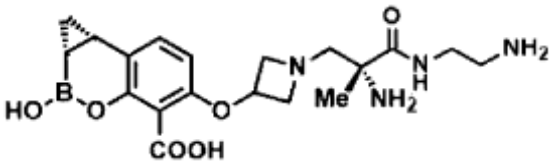
[Chemical Formula 235]



,

(1aR,7bS)-5-[(1-{(2R)-2-amino-3-[(2-aminoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

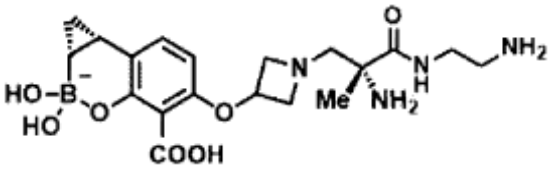
[Chemical Formula 236]



,

(2S,4R)-9-(1-{(2R)-2-amino-3-[(2-aminoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

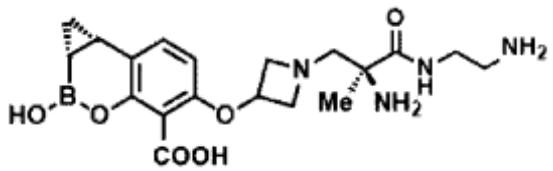
[Chemical Formula 237]



,

(1aR,7bS)-5-[(1-{(2S)-2-amino-3-[(2-aminoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

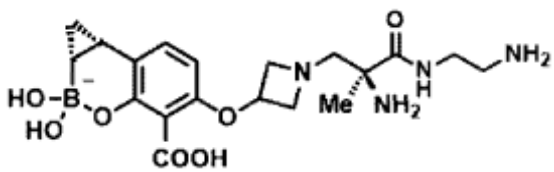
[Chemical Formula 238]



,

(2S,4R)-9-(1-{(2S)-2-amino-3-[(2-aminoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

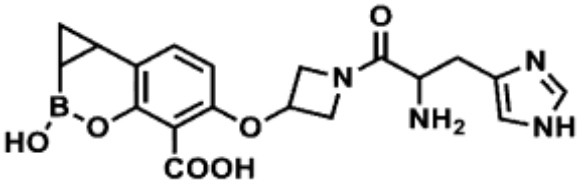
[Chemical Formula 239]



,

5-[(1-histidylazetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

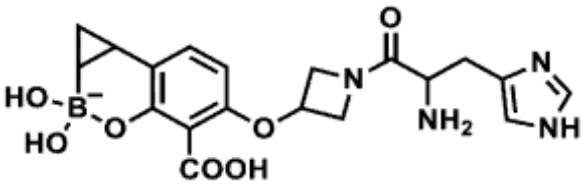
[Chemical Formula 240]



,

9-(1-histidylazetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

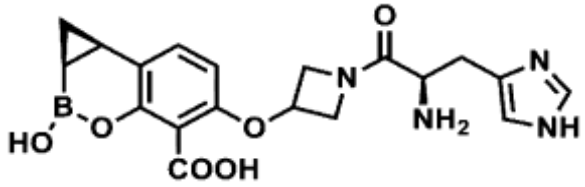
[Chemical Formula 241]



,

(1aS,7bR)-5-[(1-D-histidylazetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

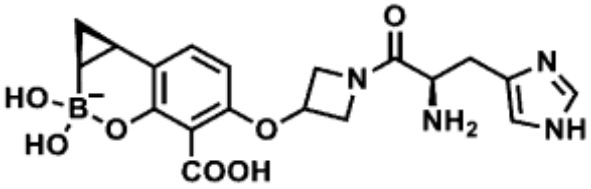
[Chemical Formula 242]



,

(2R,4S)-9-(1-D-histidylazetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

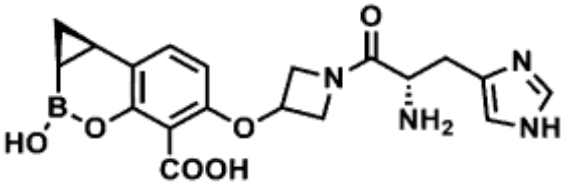
[Chemical Formula 243]



,

(1aS,7bR)-5-[(1-L-histidylazetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

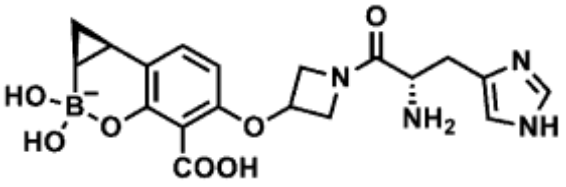
[Chemical Formula 244]



,

(2R,4S)-9-(1-L-histidylazetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

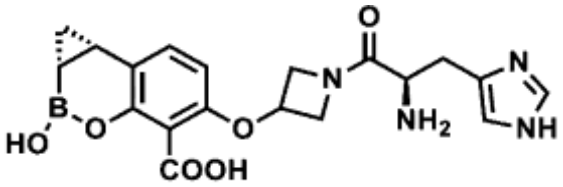
[Chemical Formula 245]



,

(1aR,7bS)-5-[(1-D-histidylazetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

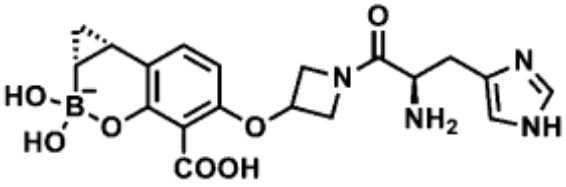
[Chemical Formula 246]



,

(2S,4R)-9-(1-D-histidylazetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

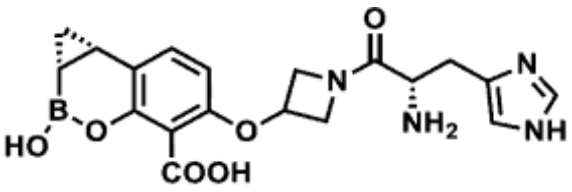
[Chemical Formula 247]



,

(1aR,7bS)-5-[(1-L-histidylazetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

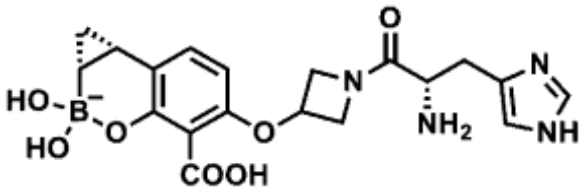
[Chemical Formula 248]



,

(2S,4R)-9-(1-L-histidylazetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

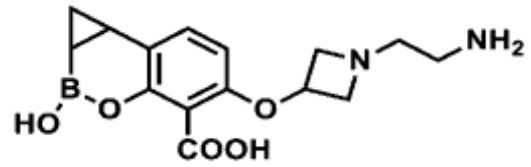
[Chemical Formula 249]



,

5-{[1-(2-aminoethyl)azetidin-3-yl]oxy}-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

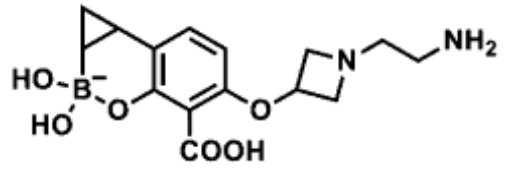
[Chemical Formula 250]



,

9-[1-(2-aminoethyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

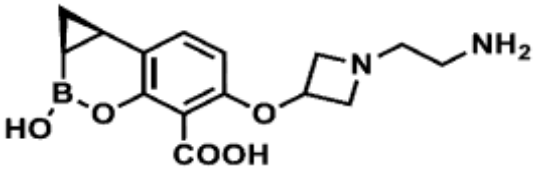
[Chemical Formula 251]



,

(1aS,7bR)-5-{[1-(2-aminoethyl)azetidin-3-yl]oxy}-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

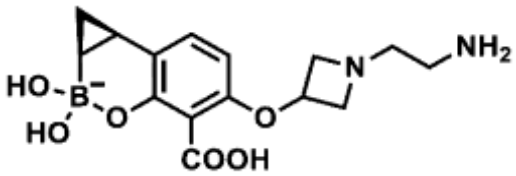
[Chemical Formula 252]



,

(2R,4S)-9-[1-(2-aminoethyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid

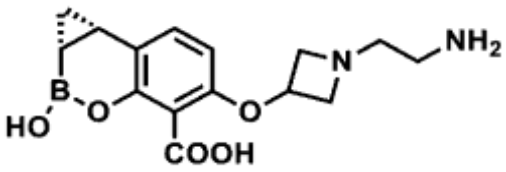
[Chemical Formula 253]



,

(1aR,7bS)-5-{[1-(2-aminoethyl)azetidin-3-yl]oxy}-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

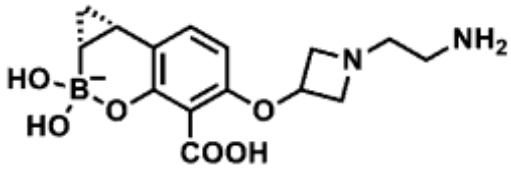
[Chemical Formula 254]



,

(2S,4R)-9-[1-(2-aminoethyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid

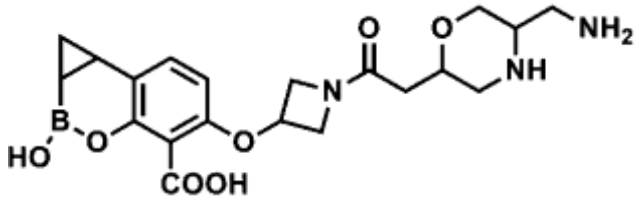
[Chemical Formula 255]



,

5-[(1-{[5-(aminomethyl)morpholin-2-yl]acetyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

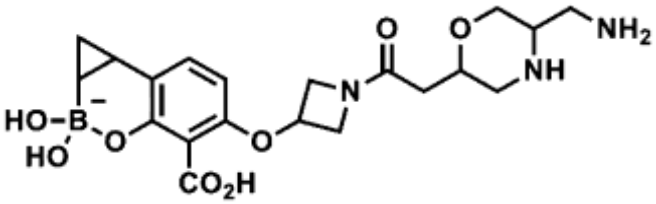
[Chemical Formula 256]



,

9-(1-{[5-(aminomethyl)morpholin-2-yl]acetyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

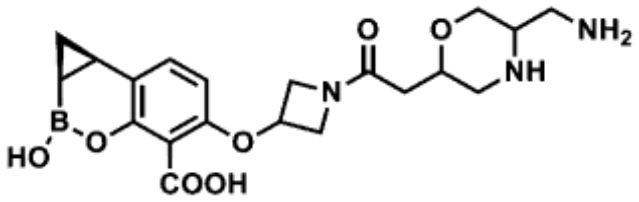
[Chemical Formula 257]



,

(1aS,7bR)-5-[(1-{[5-(aminomethyl)morpholin-2-yl]acetyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

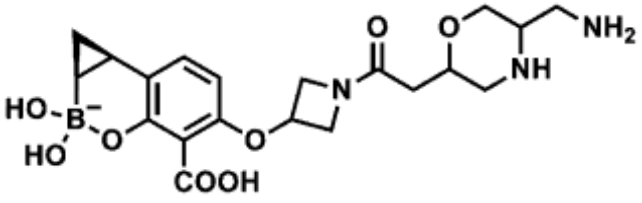
[Chemical Formula 258]



,

(2R,4S)-9-(1-{[5-(aminomethyl)morpholin-2-yl]acetyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

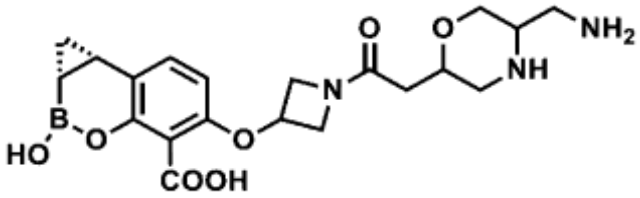
[Chemical Formula 259]



,

(1aR,7bS)-5-[(1-{[5-(aminomethyl)morpholin-2-yl]acetyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

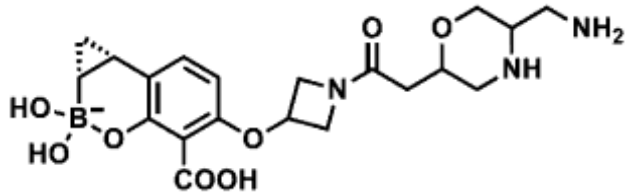
[Chemical Formula 260]



,

(2S,4R)-9-(1-{[5-(aminomethyl)morpholin-2-yl]acetyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

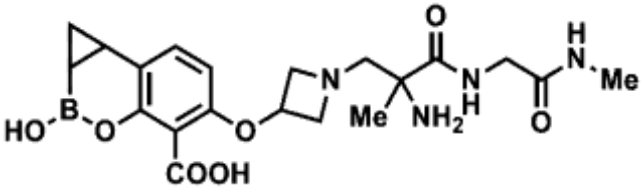
[Chemical Formula 261]



,

5-({1-[2-amino-2-methyl-3-{[2-(methylamino)-2-oxoethyl]amino}-3-oxopropyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

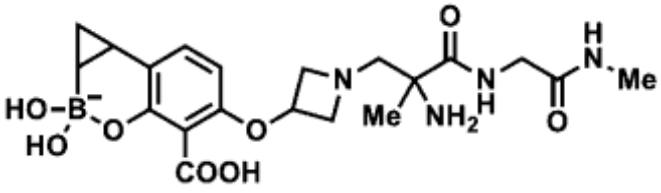
[Chemical Formula 262]



,

9-({1-[2-amino-2-methyl-3-{[2-(methylamino)-2-oxoethyl]amino}-3-oxopropyl]azetidin-3-yl}oxy)-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

[Chemical Formula 263]

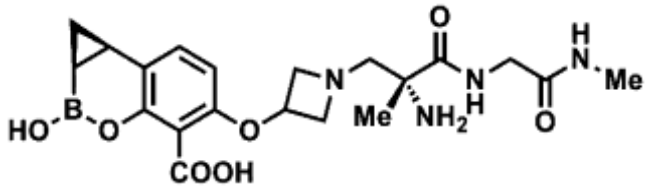


,

(1aS,7bR)-5-({1-[(2R)-2-amino-2-methyl-3-{[2-(methylamino)-2-oxoethyl]amino}-3-oxopropyl]azetidin-3-yl}oxy)-2-hydroxy-

1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

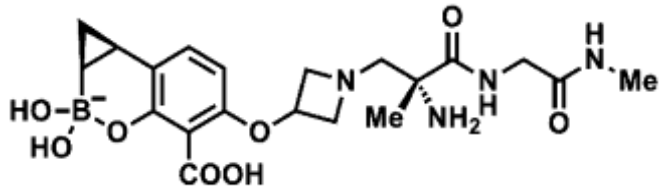
[Chemical Formula 264]



,

(2R,4S)-9-({1-[(2R)-2-amino-2-methyl-3-{[2-(methylamino)-2-oxoethyl]amino}-3-oxopropyl]azetidin-3-yl}oxy)-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

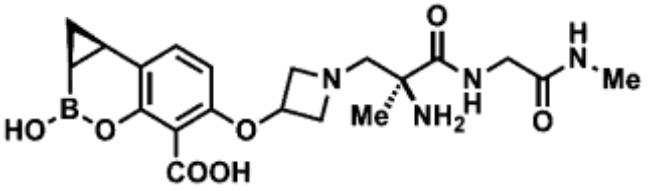
[Chemical Formula 265]



,

(1aS,7bR)-5-({1-[(2S)-2-amino-2-methyl-3-{[2-(methylamino)-2-oxoethyl]amino}-3-oxopropyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

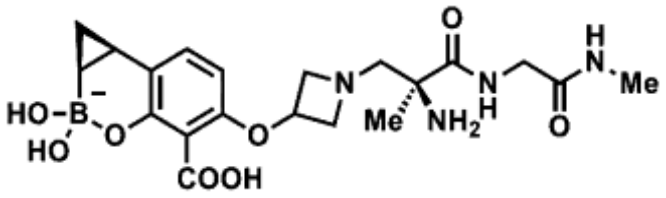
[Chemical Formula 266]



,

(2R,4S)-9-({1-[(2S)-2-amino-2-methyl-3-{[2-(methylamino)-2-oxoethyl]amino}-3-oxopropyl]azetidin-3-yl}oxy)-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

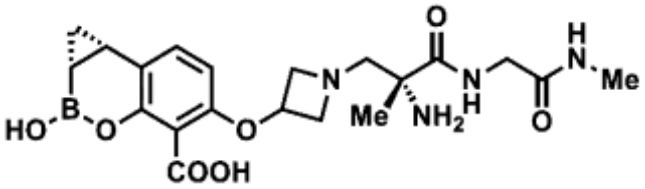
[Chemical Formula 267]



,

(1aR,7bS)-5-({1-[(2R)-2-amino-2-methyl-3-{[2-(methylamino)-2-oxoethyl]amino}-3-oxopropyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

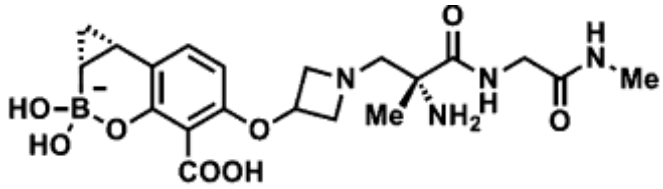
[Chemical Formula 268]



,

(2S,4R)-9-({1-[(2R)-2-amino-2-methyl-3-{[2-(methylamino)-2-oxoethyl]amino}-3-oxopropyl]azetidin-3-yl}oxy)-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

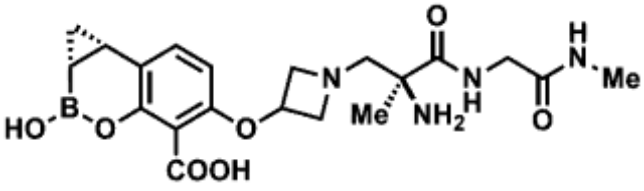
[Chemical Formula 269]



,

(1aR,7bS)-5-({1-[(2S)-2-amino-2-methyl-3-{[2-(methylamino)-2-oxoethyl]amino}-3-oxopropyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

[Chemical Formula 270]

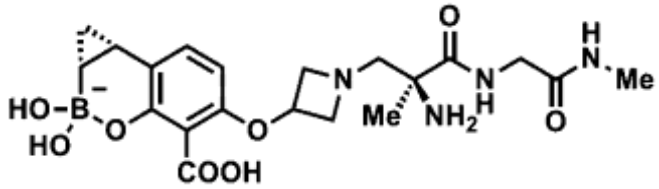


,

(2S,4R)-9-({1-[(2S)-2-amino-2-methyl-3-{[2-(methylamino)-2-oxoethyl]amino}-3-oxopropyl]azetidin-3-yl}oxy)-5,5-dihydroxy-6-

oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid

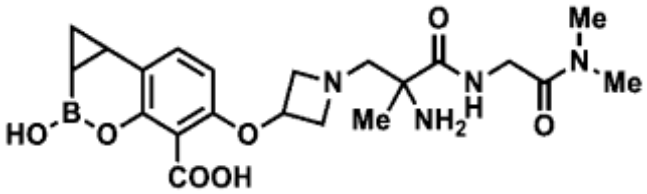
[Chemical Formula 271]



,

5-({1-[2-amino-3-{[2-(dimethylamino)-2-oxoethyl]amino}-2-methyl-3-oxopropyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

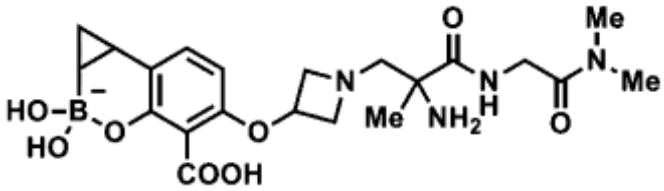
[Chemical Formula 272]



,

9-({1-[2-amino-3-{[2-(dimethylamino)-2-oxoethyl]amino}-2-methyl-3-oxopropyl]azetidin-3-yl}oxy)-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid

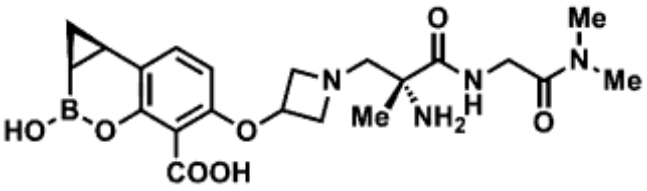
[Chemical Formula 273]



,

(1aS,7bR)-5-({1-[(2R)-2-amino-3-{[2-(dimethylamino)-2-oxoethyl]amino}-2-methyl-3-oxopropyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

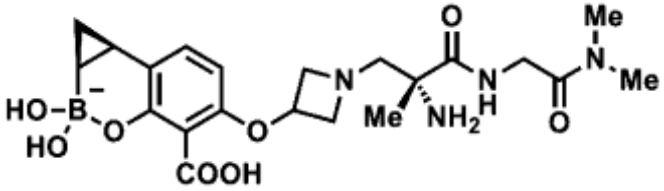
[Chemical Formula 274]



,

(2R,4S)-9-({1-[(2R)-2-amino-3-{[2-(dimethylamino)-2-oxoethyl]amino}-2-methyl-3-oxopropyl]azetidin-3-yl}oxy)-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

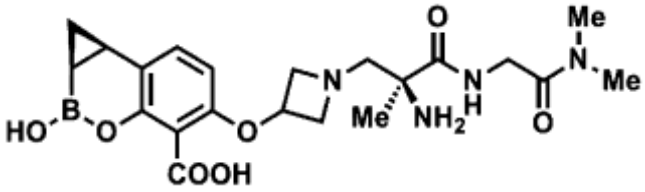
[Chemical Formula 275]



,

(1aS,7bR)-5-({1-[(2S)-2-amino-3-{[2-(dimethylamino)-2-oxoethyl]amino}-2-methyl-3-oxopropyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

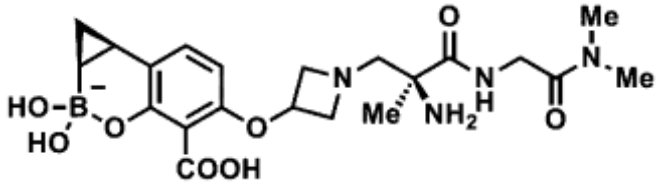
[Chemical Formula 276]



,

(2R,4S)-9-({1-[(2S)-2-amino-3-{[2-(dimethylamino)-2-oxoethyl]amino}-2-methyl-3-oxopropyl]azetidin-3-yl}oxy)-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

[Chemical Formula 277]

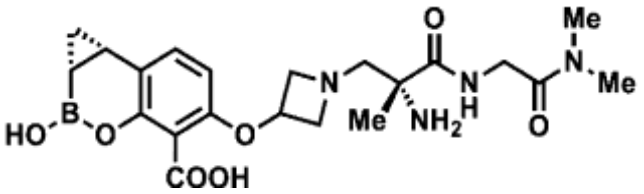


,

(1aR,7bS)-5-({1-[(2R)-2-amino-3-{[2-(dimethylamino)-2-oxoethyl]amino}-2-methyl-3-oxopropyl]azetidin-3-yl}oxy)-2-hydroxy-

1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

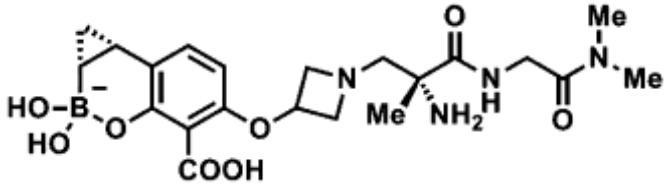
[Chemical Formula 278]



,

(2S,4R)-9-({1-[(2R)-2-amino-3-{[2-(dimethylamino)-2-oxoethyl]amino}-2-methyl-3-oxopropyl]azetidin-3-yl}oxy)-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

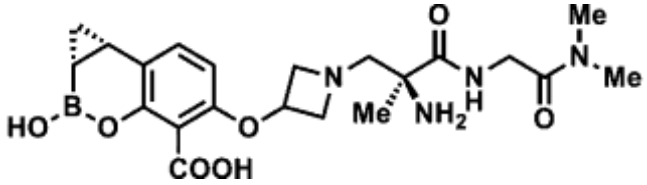
[Chemical Formula 279]



,

(1aR,7bS)-5-({1-[(2S)-2-amino-3-{[2-(dimethylamino)-2-oxoethyl]amino}-2-methyl-3-oxopropyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

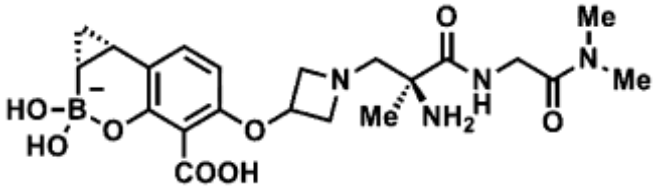
[Chemical Formula 280]



,

(2S,4R)-9-({1-[(2S)-2-amino-3-{[2-(dimethylamino)-2-oxoethyl]amino}-2-methyl-3-oxopropyl]azetidin-3-yl}oxy)-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

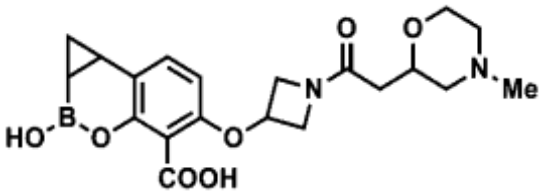
[Chemical Formula 281]



,

2-hydroxy-5-[(1-{[4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

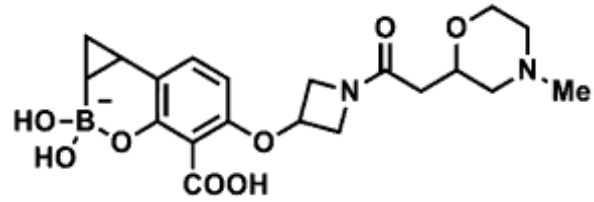
[Chemical Formula 282]



,

5,5-dihydroxy-9-[(1-{[(4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

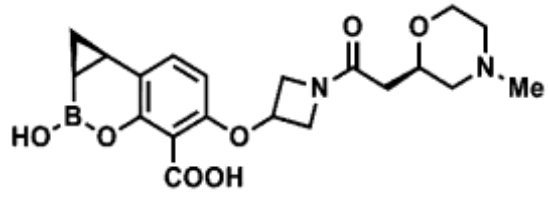
[Chemical Formula 283]



,

(1aS,7bR)-2-hydroxy-5-[(1-{[(2R)-4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

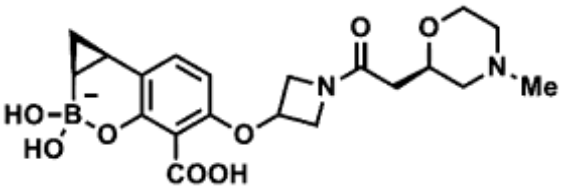
[Chemical Formula 284]



,

(2R,4S)-5,5-dihydroxy-9-[(1-{[(2R)-4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

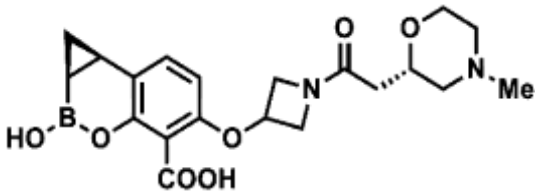
[Chemical Formula 285]



,

(1aS,7bR)-2-hydroxy-5-[(1-{[(2S)-4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

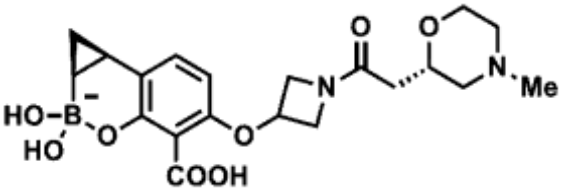
[Chemical Formula 286]



,

(2R,4S)-5,5-dihydroxy-9-[(1-{[(2S)-4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

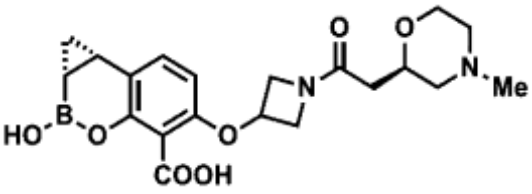
[Chemical Formula 287]



,

(1aR,7bS)-2-hydroxy-5-[(1-{[(2R)-4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

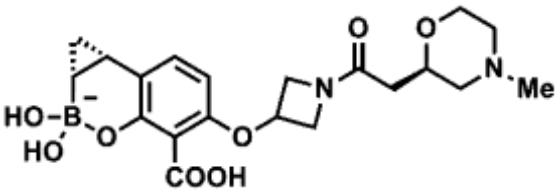
[Chemical Formula 288]



,

(2S,4R)-5,5-dihydroxy-9-[(1-{[(2R)-4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

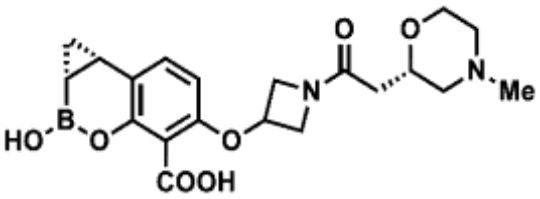
[Chemical Formula 289]



,

(1aR,7bS)-2-hydroxy-5-[(1-{[(2S)-4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

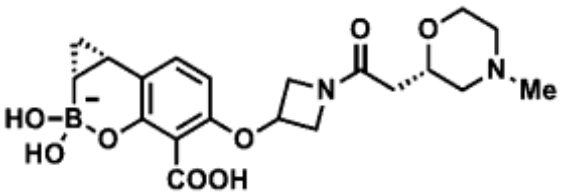
[Chemical Formula 290]



,

(2S,4R)-5,5-dihydroxy-9-[(1-{[(2R)-4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

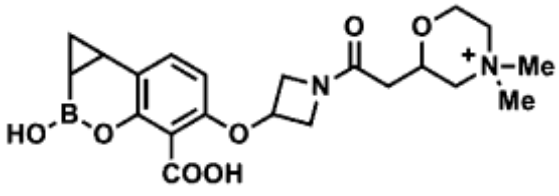
[Chemical Formula 291]



,

5-[(1-{[4,4-dimethylmorpholin-4-ium-2-yl]acetyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylate

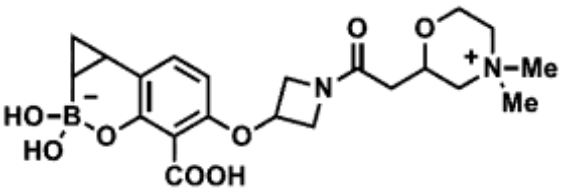
[Chemical Formula 292]



,

9-[(1-{[4,4-dimethylmorpholin-4-ium-2-yl]acetyl}azetidin-3-yl)oxy]-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

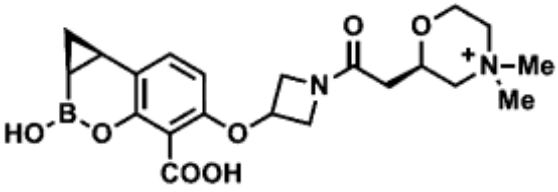
[Chemical Formula 293]



,

(1aS,7bR)-5-[(1-{[(2R)-4,4-dimethylmorpholin-4-ium-2-yl]acetyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylate

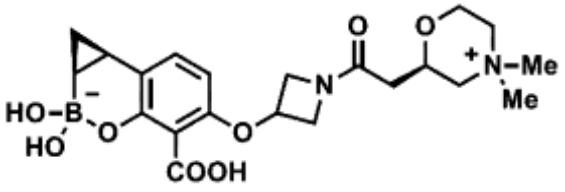
[Chemical Formula 294]



,

(2R,4S)-9-[(1-{[(2R)-4,4-dimethylmorpholin-4-ium-2-yl]acetyl}azetidin-3-yl)oxy]-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

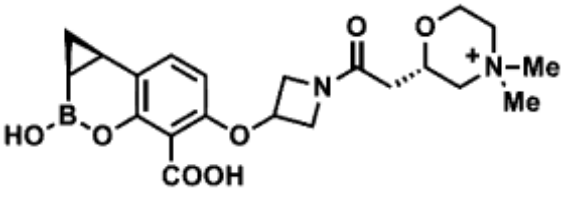
[Chemical Formula 295]



,

(1aS,7bR)-5-[(1-{[(2S)-4,4-dimethylmorpholin-4-ium-2-yl]acetyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylate

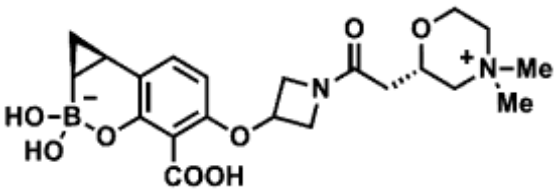
[Chemical Formula 296]



,

(2R,4S)-9-[(1-{[(2S)-4,4-dimethylmorpholin-4-ium-2-yl]acetyl}azetidin-3-yl)oxy]-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

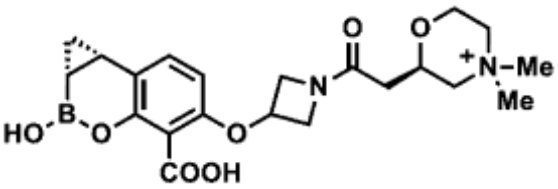
[Chemical Formula 297]



,

(1aR,7bS)-5-[(1-{[(2R)-4,4-dimethylmorpholin-4-ium-2-yl]acetyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylate

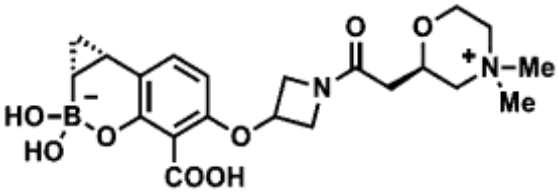
[Chemical Formula 298]



,

(2S,4R)-9-[(1-{[(2R)-4,4-dimethylmorpholin-4-ium-2-yl]acetyl}azetidin-3-yl)oxy]-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

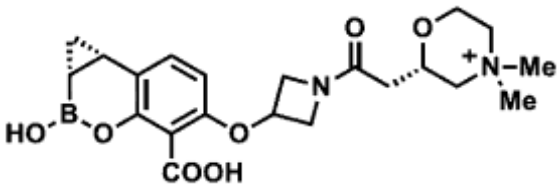
[Chemical Formula 299]



,

(1aR,7bS)-5-[(1-{[(2S)-4,4-dimethylmorpholin-4-ium-2-yl]acetyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylate

[Chemical Formula 300]

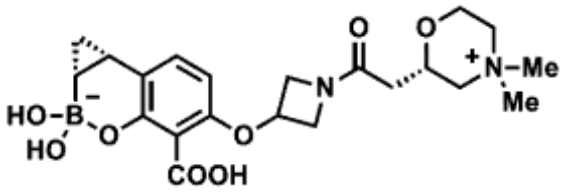


,

(2S,4R)-9-[(1-{[(2S)-4,4-dimethylmorpholin-4-ium-2-yl]acetyl}azetidin-3-yl)oxy]-5,5-dihydroxy-6-oxa-5-

boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid

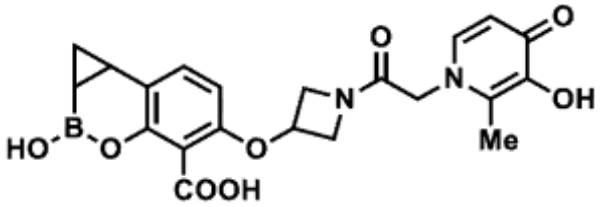
[Chemical Formula 301]



,

(1aR,7bS)-2-hydroxy-5-({1-[(3-hydroxy-2-methyl-4-oxopyridin-1(4H)-yl)acetyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

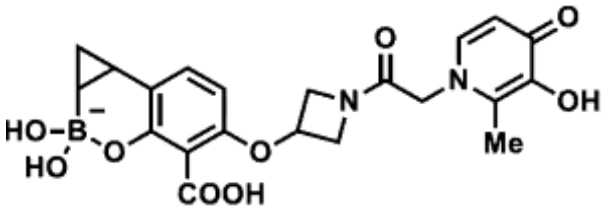
[Chemical Formula 302]



,

5,5-dihydroxy-9-({1-[(3-hydroxy-2-methyl-4-oxopyridin-1(4H)-yl)acetyl]azetidin-3-yl}oxy)-5-boranuidatricyclo[5.4.0.02,4]undeca-1(11),7,9-triene-8-carboxylic acid

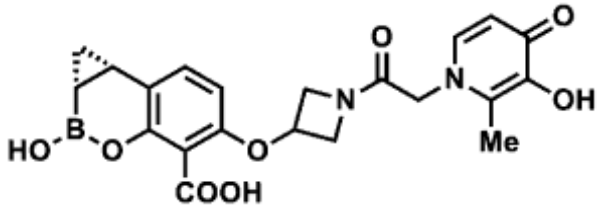
[Chemical Formula 303]



,

(1aR,7bS)-2-hydroxy-5-({1-[(3-hydroxy-2-methyl-4-oxopyridin-1(4H)-yl)acetyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

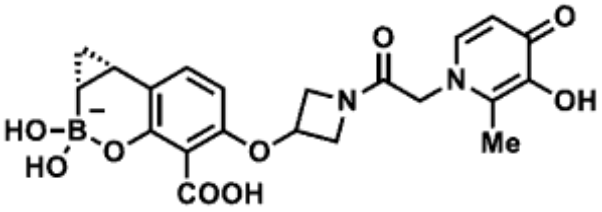
[Chemical Formula 304]



,

(2S,4R)-5,5-dihydroxy-9-({1-[(3-hydroxy-2-methyl-4-oxopyridin-1(4H)-yl)acetyl]azetidin-3-yl}oxy)-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

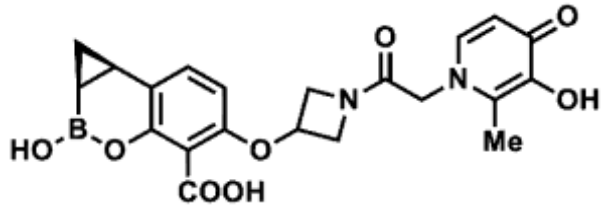
[Chemical Formula 305]



,

(1aS,7bR)-2-hydroxy-5-({1-[(3-hydroxy-2-methyl-4-oxopyridin-1(4H)-yl)acetyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

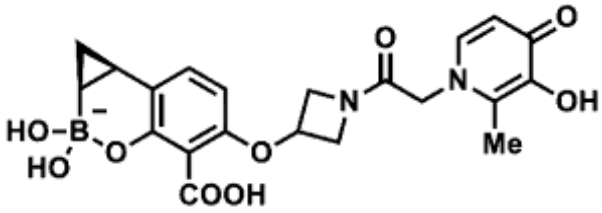
[Chemical Formula 306]



, and

(2R,4S)-5,5-dihydroxy-9-({1-[(3-hydroxy-2-methyl-4-oxopyridin-1(4H)-yl)acetyl]azetidin-3-yl}oxy)-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

[Chemical Formula 307]

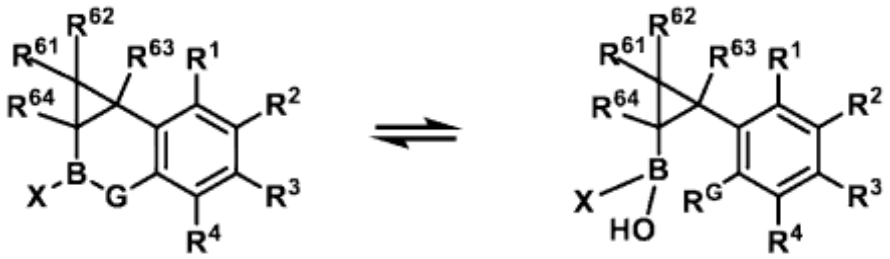


.

[Item 103]

A compound represented by formula (11):

[Chemical Formula 308]



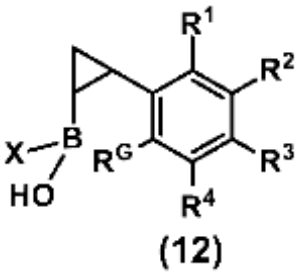
or a pharmaceutically acceptable salt thereof,

wherein R^G is a hydroxyl group, a thiol group, or $-NHR^{a1}$, R^{a1}, X, R^1, R^2, R^3, R^4, R^{61}, R^{62}, R^{63}, and R^{64} are defined the same as the definition according to any of items 1 to 16, and formula (1a) is defined the same as item 1 or 2.

[Item 104]

The compound or the pharmaceutically acceptable salt thereof according to item 103, wherein the compound of formula (11) is represented by formula (12):

[Chemical Formula 309]

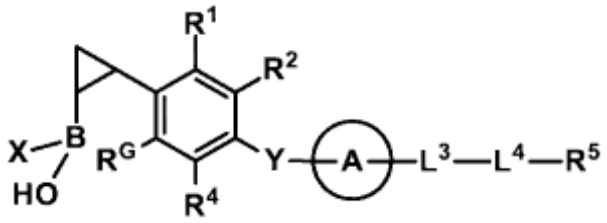


wherein X, R^1, R^2, R^3, and R^4 are defined the same as the definition according to item 17 or 18.

[Item 105]

The compound or the pharmaceutically acceptable salt thereof according to item 103 or 104, wherein the compound of formula (11) or formula (12) is represented by formula (13):

[Chemical Formula 310]



(13)

wherein X, Y, ring A, L^3, L^4, R^1, R^2, R^4, and R^5 are defined the same as the definition according to any of items 19 to 23 and 29 to 32.

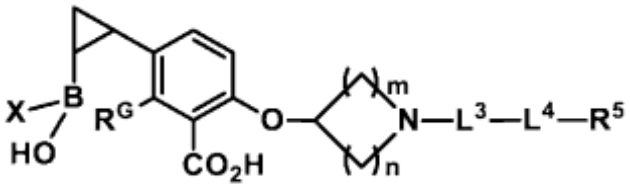
[Item 106]

The compound or the pharmaceutically acceptable salt thereof according to item 105, wherein X and R^G are hydroxyl groups, R^4 is a carboxyl group, and ring A is an optionally substituted 4- to 6-membered nitrogen-containing non-aryl heterocycle.

[Item 107]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 103 to 106, wherein the compound of formula (11), formula (12), or formula (13) is represented by formula (14):

[Chemical Formula 311]



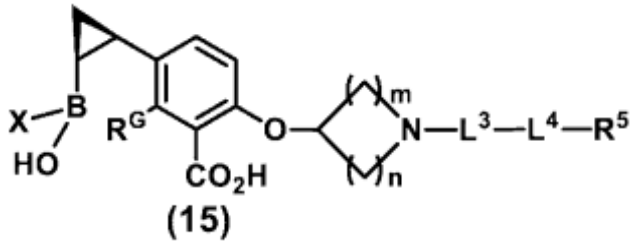
(14)

wherein X, L^3, L^4, m, n, and R^5 are defined the same as the definition according to any one of items 33 to 64.

[Item 108]

The compound or the pharmaceutically acceptable salt thereof according to item 107, wherein the compound of formula (14) is one of the enantiomers represented by formula (15):

[Chemical Formula 312]

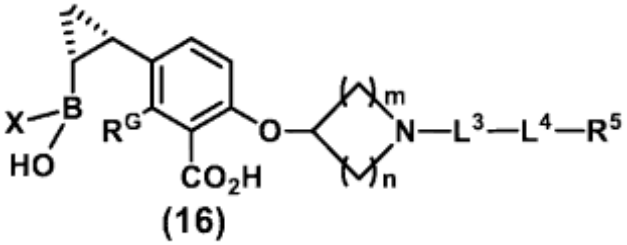


(15)

and

formula (16):

[Chemical Formula 313]



(16)

wherein X, L^3, L^4, m, n, and R^5 are defined the same as the definition according to any one of items 33 to 64.

[Item 109]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 103 to 108, wherein R^G is a hydroxyl group or a thiol group.

[Item 110]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 103 to 109, wherein R^G is a hydroxyl group.

[Item 111]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 103 to 110, wherein X is a hydroxyl group or a C_{1-6} alkoxy group.

[Item 112]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 103 to 111, wherein X is a hydroxyl group.

[Item 113]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 107 to 112, wherein m is 1 or 2, n is 1 or 2, and m + n is 2 or 3.

[Item 114]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 107 to 113, wherein m is 1, and n is 1.

[Item 115]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 103 to 114, wherein L^3 is defined the same as the definition according to item 25 or 26.

[Item 116]

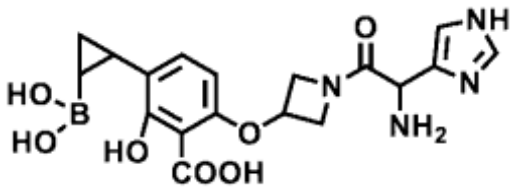
The compound or the pharmaceutically acceptable salt thereof according to any one of items 103 to 115, wherein L^4 and R^5 are defined the same as the definition according to any one of items 27 and 66 to 100.

[Item 117]

The compound or the pharmaceutically acceptable salt thereof according to item 104, selected from the group consisting of the compounds represented by the following names or structural formulas:

6-({1-[amino(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-3-(2-boronocyclopropyl)-2-hydroxybenzoic acid

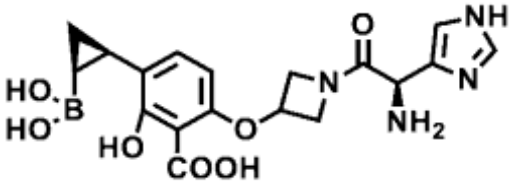
[Chemical Formula 314]



,

6-({1-[(2R)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

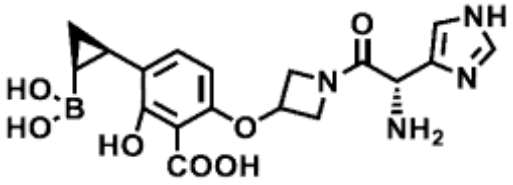
[Chemical Formula 315]



,

6-({1-[(2S)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

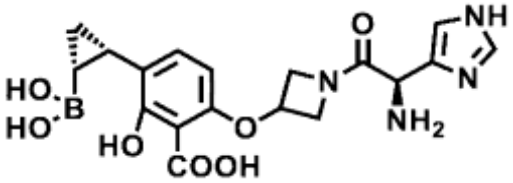
[Chemical Formula 316]



,

6-({1-[(2R)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

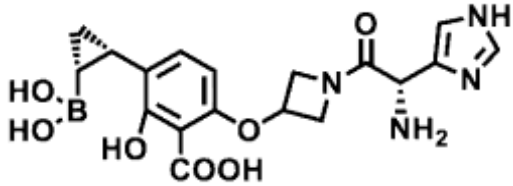
[Chemical Formula 317]



,

6-({1-[(2S)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

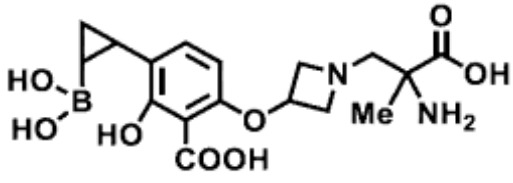
[Chemical Formula 318]



,

6-({1-(2-amino-2-carboxypropyl)azetidin-3-yl}oxy)-3-(2-boronocyclopropyl)-2-hydroxybenzoic acid

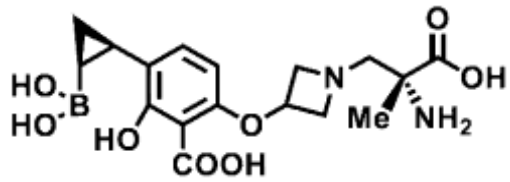
[Chemical Formula 319]



,

6-({1-[(2R)-2-amino-2-carboxypropyl]azetidin-3-yl}oxy)-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

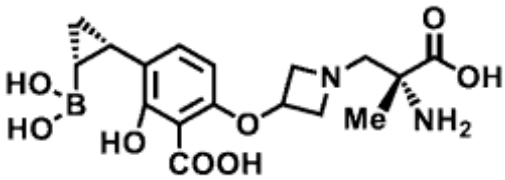
[Chemical Formula 320]



,

6-({1-[(2R)-2-amino-2-carboxypropyl]azetidin-3-yl}oxy)-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

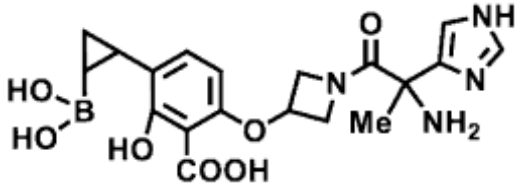
[Chemical Formula 321]



,

6-({1-[2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-3-(2-boronocyclopropyl)-2-hydroxybenzoic acid

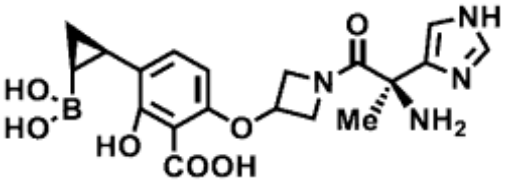
[Chemical Formula 322]



,

6-({1-[(2R)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

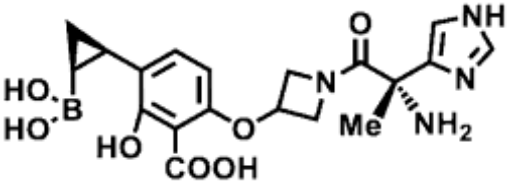
[Chemical Formula 323]



,

6-({1-[(2S)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

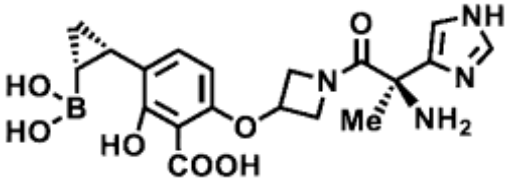
[Chemical Formula 324]



,

6-({1-[(2R)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

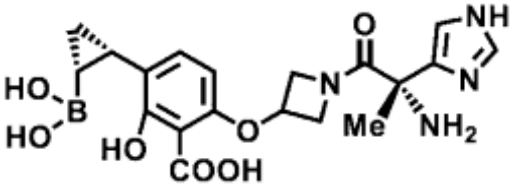
[Chemical Formula 325]



, and

6-({1-[(2S)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

[Chemical Formula 326]



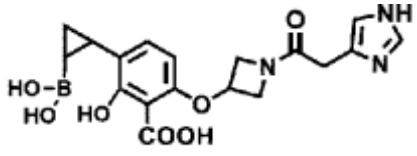
.

[Item 118]

The compound or the pharmaceutically acceptable salt thereof according to item 104, selected from the group consisting of the compounds represented by the following names or structural formulas:

2-boronocyclopropyl]-2-hydroxy-6-({1-[(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)benzoic acid

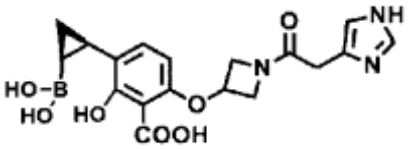
[Chemical Formula 327]



,

3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxy-6-({1-[(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)benzoic acid

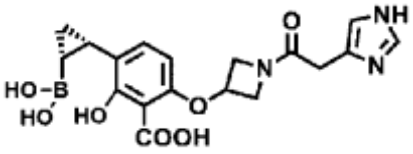
[Chemical Formula 328]



,

3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxy-6-({1-[(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)benzoic acid

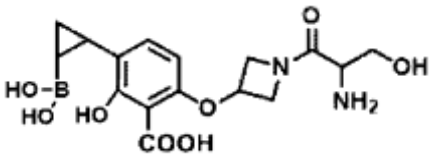
[Chemical Formula 329]



,

3-[2-boronocyclopropyl]-2-hydroxy-6-[(1-serylazetidin-3-yl)oxy]benzoic acid

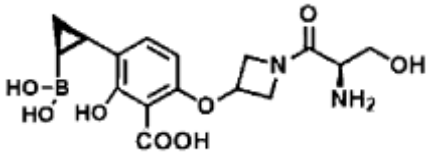
[Chemical Formula 330]



,

3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxy-6-[(1-D-serylazetidin-3-yl)oxy]benzoic acid

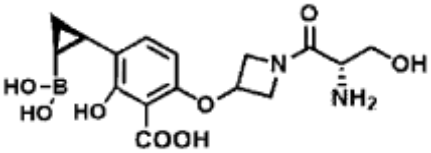
[Chemical Formula 331]



,

3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxy-6-[(1-L-serylazetidin-3-yl)oxy]benzoic acid

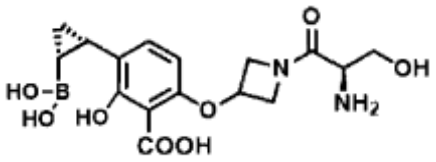
[Chemical Formula 332]



,

3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxy-6-[(1-D-serylazetidin-3-yl)oxy]benzoic acid

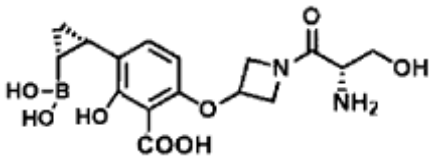
[Chemical Formula 333]



,

3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxy-6-[(1-L-serylazetidin-3-yl)oxy]benzoic acid

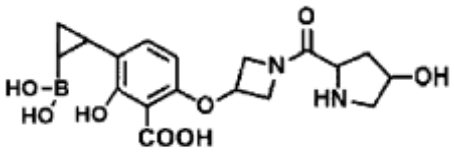
[Chemical Formula 334]



,

3-[2-boronocyclopropyl]-2-hydroxy-6-({1-[4-hydroxy-L-prolyl]azetidin-3-yl}oxy)benzoic acid

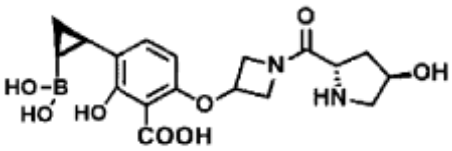
[Chemical Formula 335]



,

3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxy-6-({1-[(4R)-4-hydroxy-L-prolyl]azetidin-3-yl}oxy)benzoic acid

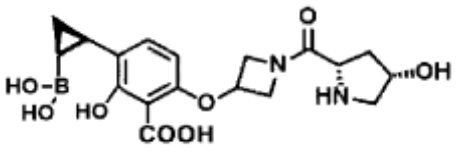
[Chemical Formula 336]



,

3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxy-6-({1-[(4S)-4-hydroxy-L-prolyl]azetidin-3-yl}oxy)benzoic acid

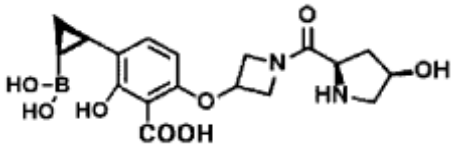
[Chemical Formula 337]



,

3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxy-6-({1-[(4R)-4-hydroxy-D-prolyl]azetidin-3-yl}oxy)benzoic acid

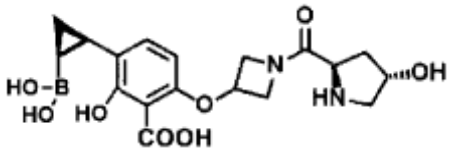
[Chemical Formula 338]



,

3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxy-6-({1-[(4S)-4-hydroxy-D-prolyl]azetidin-3-yl}oxy)benzoic acid

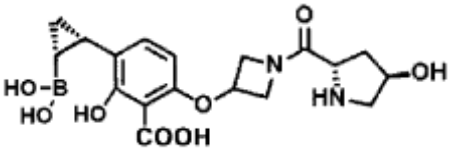
[Chemical Formula 339]



,

3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxy-6-({1-[(4R)-4-hydroxy-L-prolyl]azetidin-3-yl}oxy)benzoic acid

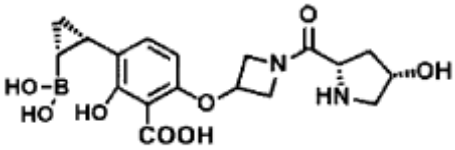
[Chemical Formula 340]



,

3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxy-6-({1-[(4S)-4-hydroxy-L-prolyl]azetidin-3-yl}oxy)benzoic acid

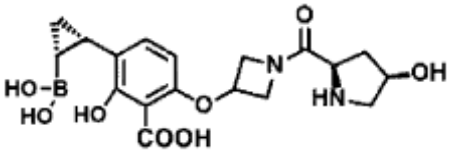
[Chemical Formula 341]



,

3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxy-6-({1-[(4R)-4-hydroxy-D-prolyl]azetidin-3-yl}oxy)benzoic acid

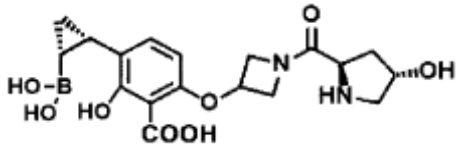
[Chemical Formula 342]



,

3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxy-6-({1-[(4S)-4-hydroxy-D-prolyl]azetidin-3-yl}oxy)benzoic acid

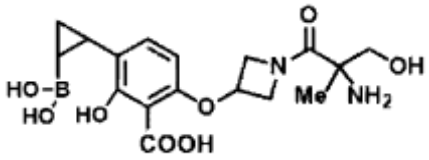
[Chemical Formula 343]



,

3-[2-boronocyclopropyl]-2-hydroxy-6-{[1-(2-methyl-seryl)azetidin-3-yl]oxy}benzoic acid

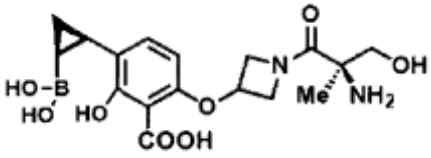
[Chemical Formula 344]



,

3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxy-6-{[1-(2-methyl-D-seryl)azetidin-3-yl]oxy}benzoic acid

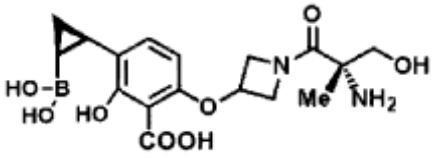
[Chemical Formula 345]



,

3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxy-6-{[1-(2-methyl-L-seryl)azetidin-3-yl]oxy}benzoic acid

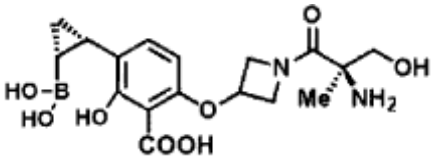
[Chemical Formula 346]



,

3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxy-6-{[1-(2-methyl-D-seryl)azetidin-3-yl]oxy}benzoic acid

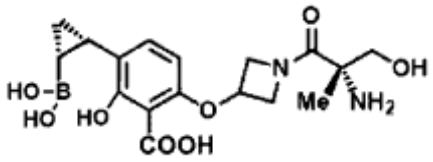
[Chemical Formula 347]



,

3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxy-6-{[1-(2-methyl-L-seryl)azetidin-3-yl]oxy}benzoic acid

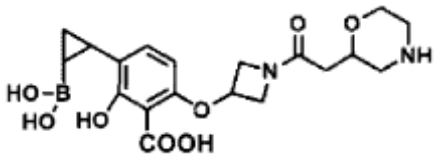
[Chemical Formula 348]



,

3-[(2-boronocyclopropyl]-2-hydroxy-6-[(1-{[morpholin-2-yl]acetyl}azetidin-3-yl)oxy]benzoic acid

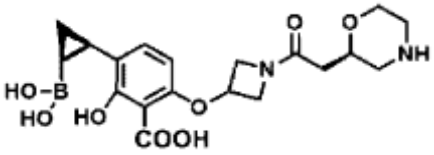
[Chemical Formula 349]



,

3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxy-6-[(1-{[(2R)-morpholin-2-yl]acetyl}azetidin-3-yl)oxy]benzoic acid

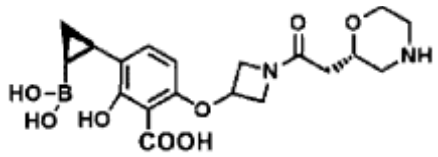
[Chemical Formula 350]



,

3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxy-6-[(1-{[(2S)-morpholin-2-yl]acetyl}azetidin-3-yl)oxy]benzoic acid

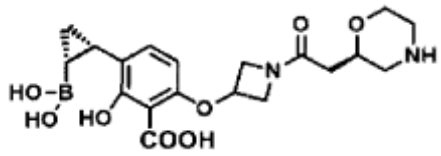
[Chemical Formula 351]



,

3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxy-6-[(1-{[(2R)-morpholin-2-yl]acetyl}azetidin-3-yl)oxy]benzoic acid

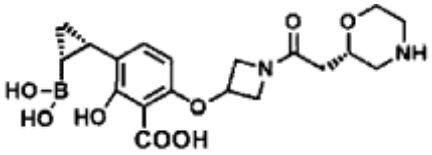
[Chemical Formula 352]



,

3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxy-6-[(1-{[(2S)-morpholin-2-yl]acetyl}azetidin-3-yl)oxy]benzoic acid

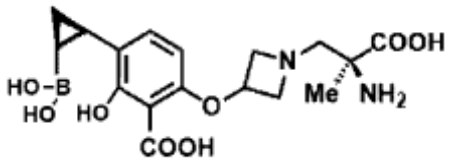
[Chemical Formula 353]



,

6-({1-[(2S)-2-amino-2-carboxypropyl]azetidin-3-yl}oxy)-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

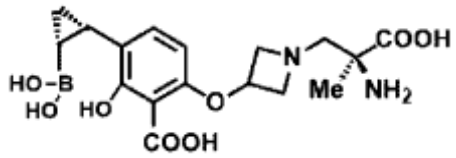
[Chemical Formula 354]



,

6-({1-[(2S)-2-amino-2-carboxypropyl]azetidin-3-yl}oxy)-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

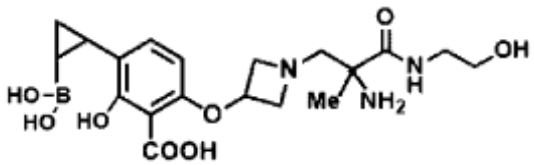
[Chemical Formula 355]



,

6-[(1-{2-amino-3-[(2-hydroxyethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-3-[2-boronocyclopropyl]-2-hydroxybenzoic acid

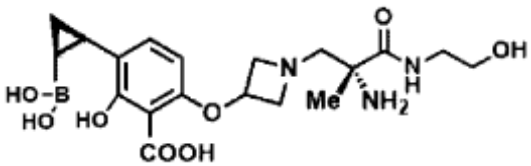
[Chemical Formula 356]



,

6-[(1-{(2R)-2-amino-3-[(2-hydroxyethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

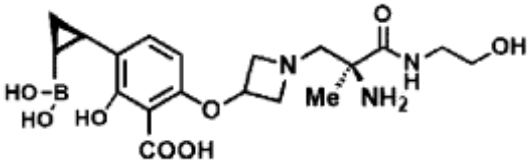
[Chemical Formula 357]



,

6-[(1-{(2S)-2-amino-3-[(2-hydroxyethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

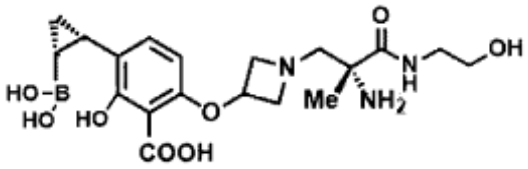
[Chemical Formula 358]



,

6-[(1-{(2R)-2-amino-3-[(2-hydroxyethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

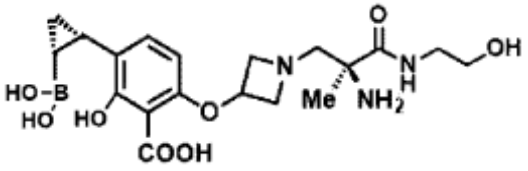
[Chemical Formula 359]



,

6-[(1-{(2S)-2-amino-3-[(2-hydroxyethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

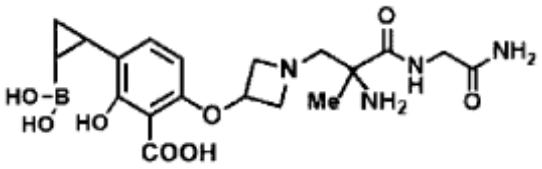
[Chemical Formula 360]



,

6-[(1-{2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-3-[2-boronocyclopropyl]-2-hydroxybenzoic acid

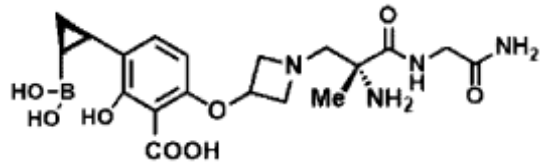
[Chemical Formula 361]



,

6-[(1-{(2R)-2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

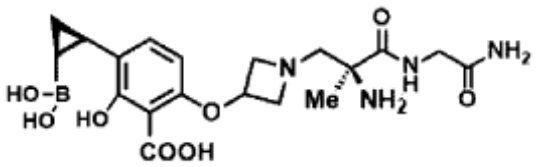
[Chemical Formula 362]



,

6-[(1-{(2S)-2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

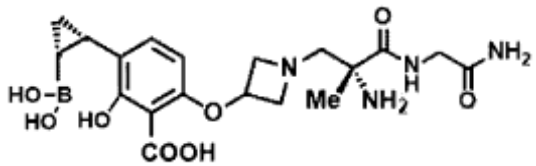
[Chemical Formula 363]



,

6-[(1-{(2R)-2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

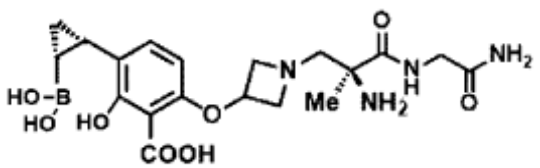
[Chemical Formula 364]



,

6-[(1-{(2S)-2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

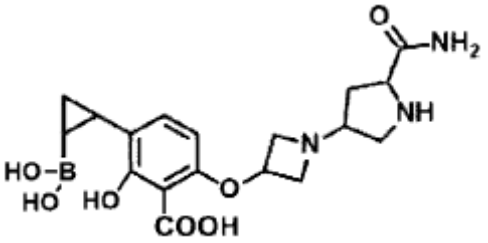
[Chemical Formula 365]



,

3-[2-boronocyclopropyl]-6-({1-[(5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxybenzoic acid

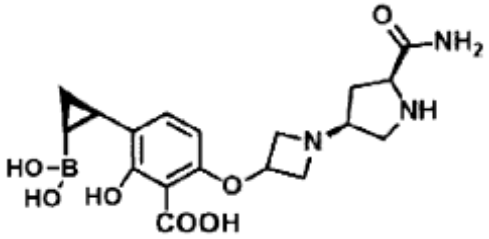
[Chemical Formula 366]



,

3-[(1R,2S)-2-boronocyclopropyl]-6-({1-[(3S,5S)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxybenzoic acid

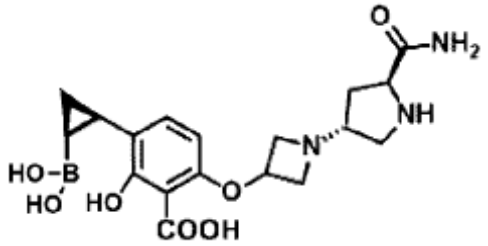
[Chemical Formula 367]



,

3-[(1R,2S)-2-boronocyclopropyl]-6-({1-[(3R,5S)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxybenzoic acid

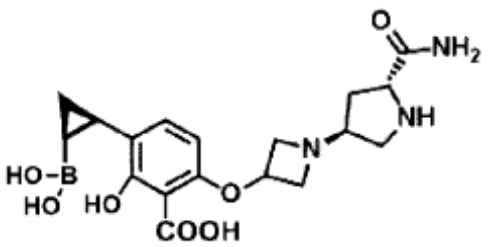
[Chemical Formula 368]



,

3-[(1R,2S)-2-boronocyclopropyl]-6-({1-[(3S,5R)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxybenzoic acid

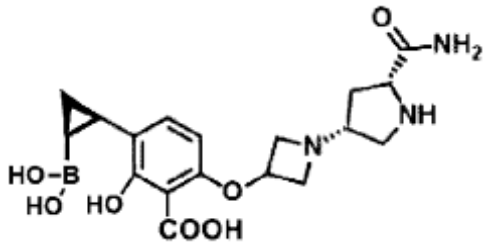
[Chemical Formula 369]



,

3-[(1R,2S)-2-boronocyclopropyl]-6-({1-[(3R,5R)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxybenzoic acid

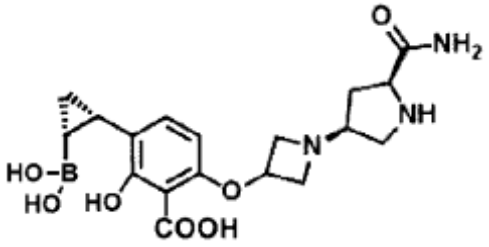
[Chemical Formula 370]



,

3-[(1S,2R)-2-boronocyclopropyl]-6-({1-[(3S,5S)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxybenzoic acid

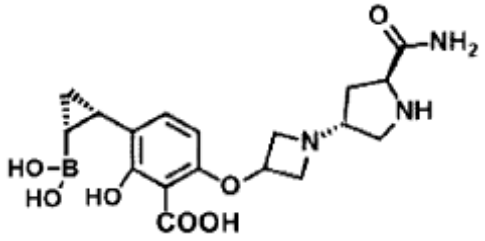
[Chemical Formula 371]



,

3-[(1S,2R)-2-boronocyclopropyl]-6-({1-[(3R,5S)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxybenzoic acid

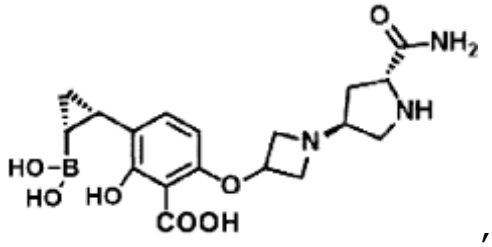
[Chemical Formula 372]



,

3-[(1S,2R)-2-boronocyclopropyl]-6-({1-[(3S,5R)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxybenzoic acid

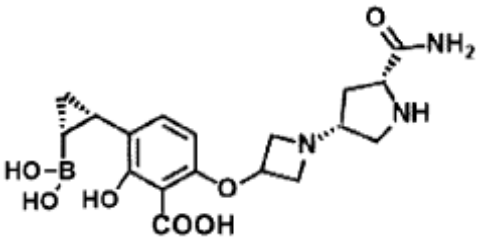
[Chemical Formula 373]



,

3-[(1S,2R)-2-boronocyclopropyl]-6-({1-[(3R,5R)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxybenzoic acid

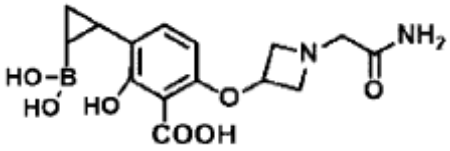
[Chemical Formula 374]



,

6-{[1-(2-amino-2-oxoethyl)azetidin-3-yl]oxy}-3-[2-boronocyclopropyl]-2-hydroxybenzoic acid

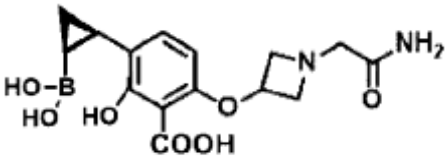
[Chemical Formula 375]



,

6-{[1-(2-amino-2-oxoethyl)azetidin-3-yl]oxy}-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

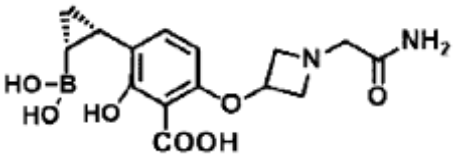
[Chemical Formula 376]



,

6-{[1-(2-amino-2-oxoethyl)azetidin-3-yl]oxy}-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

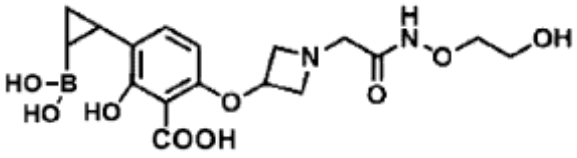
[Chemical Formula 377]



,

3-[(2-boronocyclopropyl]-2-hydroxy-6-[(1-{2-[(2-hydroxyethoxy)amino]-2-oxoethyl}azetidin-3-yl)oxy]benzoic acid

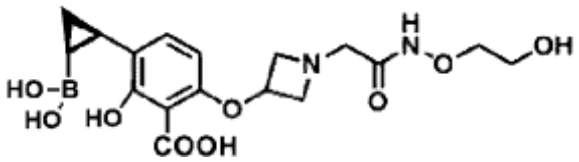
[Chemical Formula 378]



,

3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxy-6-[(1-{2-[(2-hydroxyethoxy)amino]-2-oxoethyl}azetidin-3-yl)oxy]benzoic acid

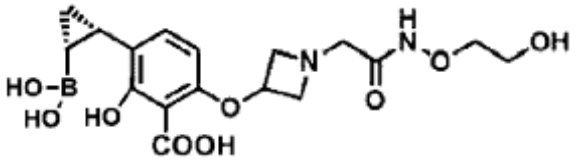
[Chemical Formula 379]



,

3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxy-6-[(1-{2-[(2-hydroxyethoxy)amino]-2-oxoethyl}azetidin-3-yl)oxy]benzoic acid

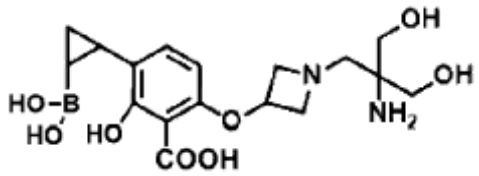
[Chemical Formula 380]



,

6-({1-[2-amino-3-hydroxy-2-(hydroxymethyl)propyl]azetidin-3-yl}oxy)-3-[2-boronocyclopropyl]-2-hydroxybenzoic acid

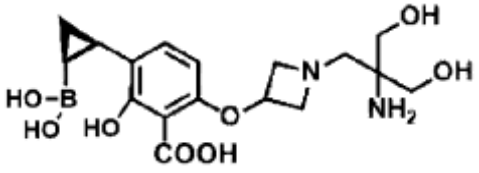
[Chemical Formula 381]



,

6-({1-[2-amino-3-hydroxy-2-(hydroxymethyl)propyl]azetidin-3-yl}oxy)-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

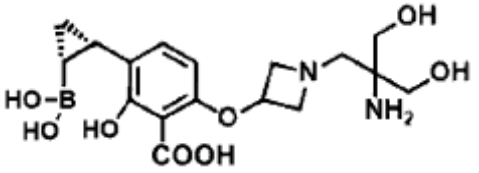
[Chemical Formula 382]



,

6-({1-[2-amino-3-hydroxy-2-(hydroxymethyl)propyl]azetidin-3-yl}oxy)-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

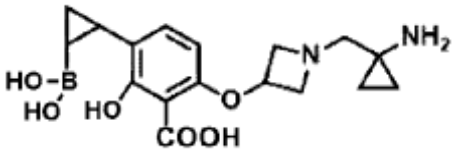
[Chemical Formula 383]



,

6-({1-[(1-aminocyclopropyl)methyl]azetidin-3-yl}oxy)-3-[2-boronocyclopropyl]-2-hydroxybenzoic acid

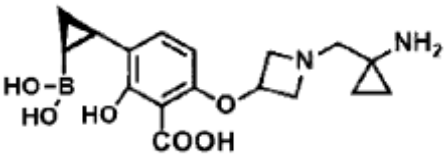
[Chemical Formula 384]



,

6-({1-[(1-aminocyclopropyl)methyl]azetidin-3-yl}oxy)-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

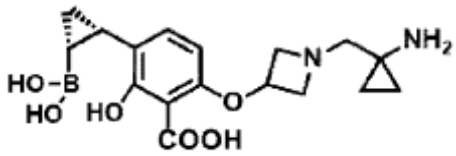
[Chemical Formula 385]



,

6-({1-[(1-aminocyclopropyl)methyl]azetidin-3-yl}oxy)-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

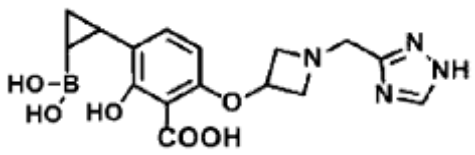
[Chemical Formula 386]



,

3-[2-boronocyclopropyl]-2-hydroxy-6-({1-[(1H-1,2,4-triazol-3-yl)methyl]azetidin-3-yl}oxy)benzoic acid

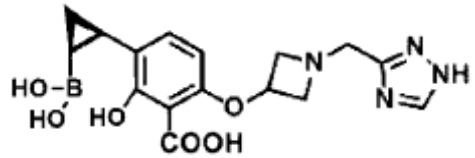
[Chemical Formula 387]



,

3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxy-6-({1-[(1H-1,2,4-triazol-3-yl)methyl]azetidin-3-yl}oxy)benzoic acid

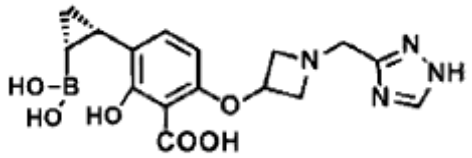
[Chemical Formula 388]



,

3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxy-6-({1-[(1H-1,2,4-triazol-3-yl)methyl]azetidin-3-yl}oxy)benzoic acid

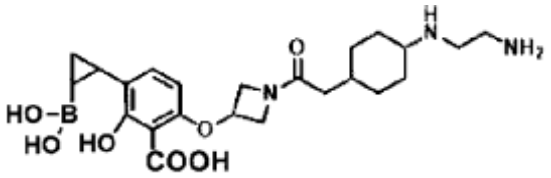
[Chemical Formula 389]



,

6-{[1-({4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-3-[2-boronocyclopropyl]-2-hydroxybenzoic acid

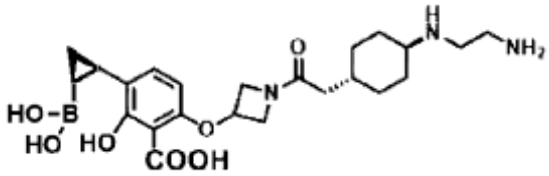
[Chemical Formula 390]



,

6-{[1-({(1r,4r)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

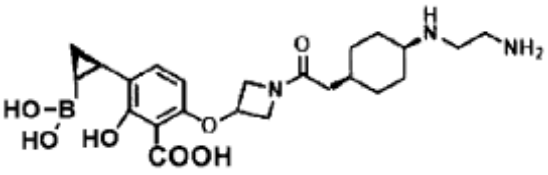
[Chemical Formula 391]



,

6-{[1-({(1s,4r)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

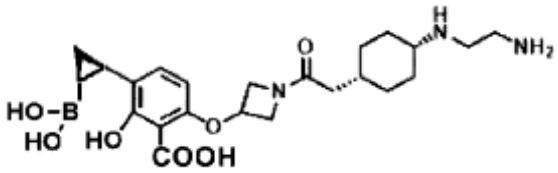
[Chemical Formula 392]



,

6-{[1-({(1r,4s)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

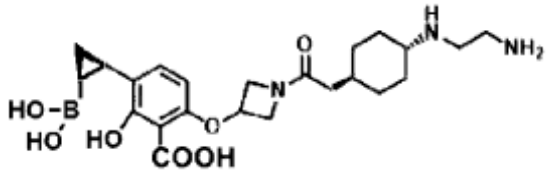
[Chemical Formula 393]



,

6-{[1-({(1s,4s)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

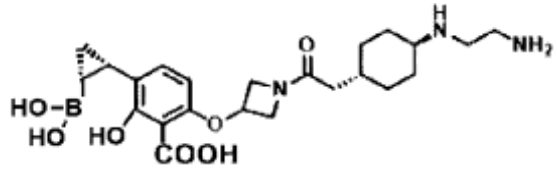
[Chemical Formula 394]



,

6-{[1-({(1r,4r)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

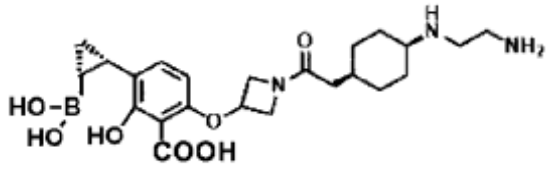
[Chemical Formula 395]



,

6-{[1-({(1s,4r)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

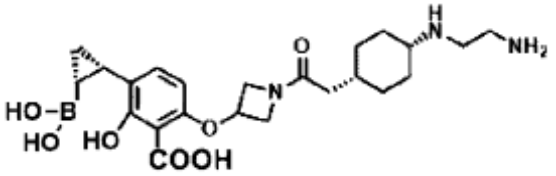
[Chemical Formula 396]



,

6-{[1-({(1r,4s)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

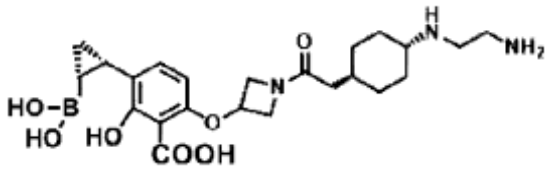
[Chemical Formula 397]



,

6-{[1-({(1s,4s)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

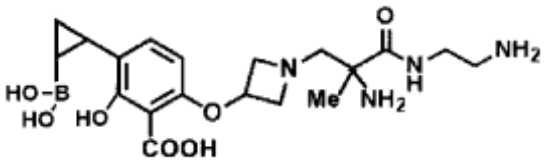
[Chemical Formula 398]



,

6-[(1-{2-amino-3-[(2-aminoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-3-[2-boronocyclopropyl]-2-hydroxybenzoic acid

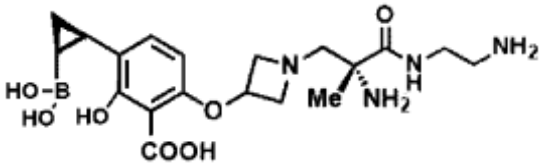
[Chemical Formula 399]



,

6-[(1-{(2R)-2-amino-3-[(2-aminoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

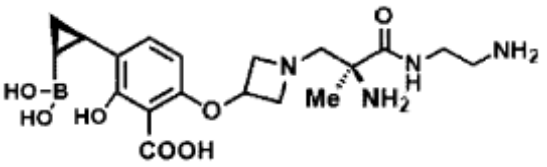
[Chemical Formula 400]



,

6-[(1-{(2S)-2-amino-3-[(2-aminoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

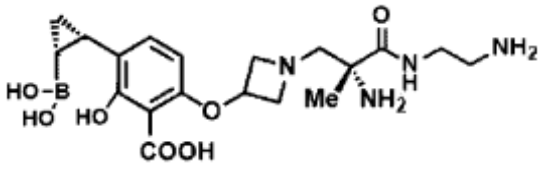
[Chemical Formula 401]



,

6-[(1-{(2R)-2-amino-3-[(2-aminoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

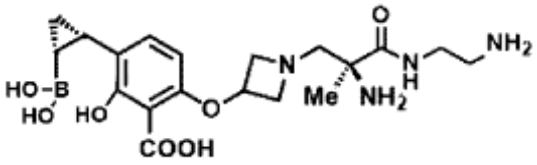
[Chemical Formula 402]



,

6-[(1-{(2S)-2-amino-3-[(2-aminoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

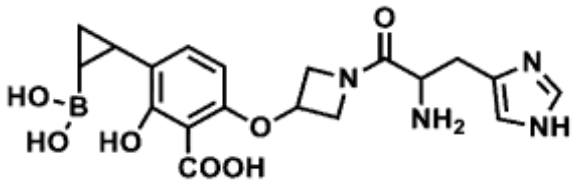
[Chemical Formula 403]



,

3-(2-boronocyclopropyl)-6-[(1-histidylazetidin-3-yl)oxy]-2-hydroxybenzoic acid

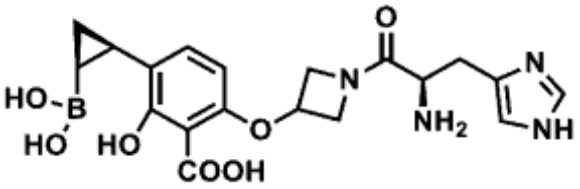
[Chemical Formula 404]



,

3-[(1R,2S)-2-boronocyclopropyl]-6-[(1-D-histidylazetidin-3-yl)oxy]-2-hydroxybenzoic acid

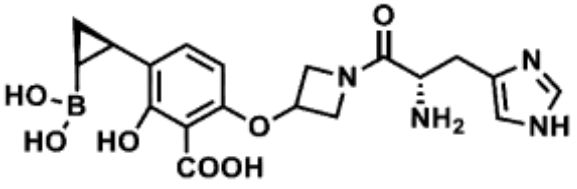
[Chemical Formula 405]



,

3-[(1R,2S)-2-boronocyclopropyl]-6-[(1-L-histidylazetidin-3-yl)oxy]-2-hydroxybenzoic acid

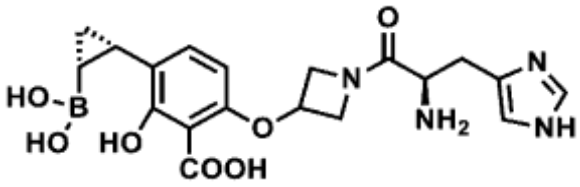
[Chemical Formula 406]



,

3-[(1S,2R)-2-boronocyclopropyl]-6-[(1-D-histidylazetidin-3-yl)oxy]-2-hydroxybenzoic acid

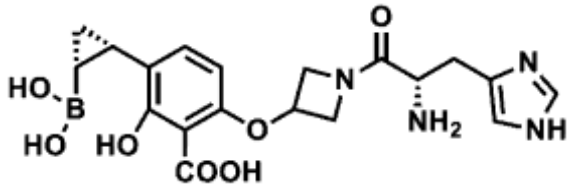
[Chemical Formula 407]



,

3-[(1S,2R)-2-boronocyclopropyl]-6-[(1-L-histidylazetidin-3-yl)oxy]-2-hydroxybenzoic acid

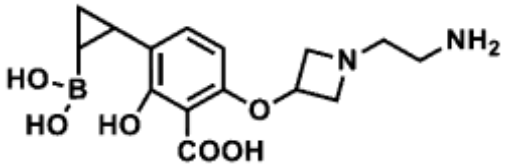
[Chemical Formula 408]



,

6-{[1-(2-aminoethyl)azetidin-3-yl]oxy}-3-(2-boronocyclopropyl)-2-hydroxybenzoic acid

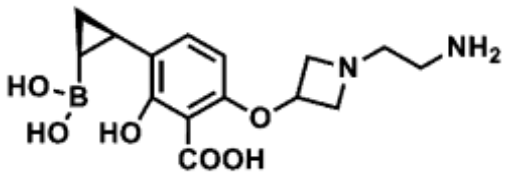
[Chemical Formula 409]



,

6-{[1-(2-aminoethyl)azetidin-3-yl]oxy}-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

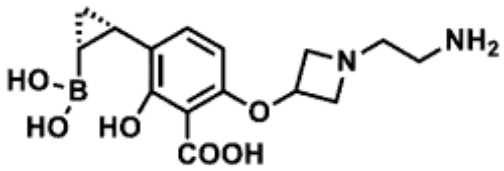
[Chemical Formula 410]



,

6-{[1-(2-aminoethyl)azetidin-3-yl]oxy}-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

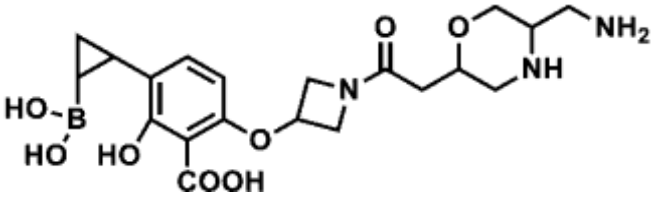
[Chemical Formula 411]



,

6-[(1-{[5-(aminomethyl)morpholin-2-yl]acetyl}azetidin-3-yl)oxy]-3-(2-boronocyclopropyl)-2-hydroxybenzoic acid

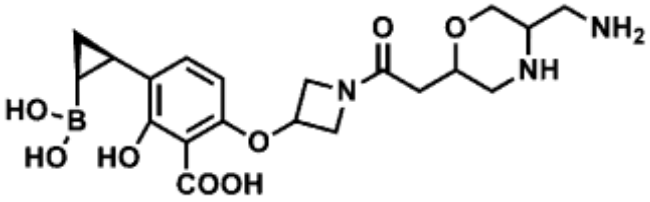
[Chemical Formula 412]



,

6-[(1-{[5-(aminomethyl)morpholin-2-yl]acetyl}azetidin-3-yl)oxy]-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

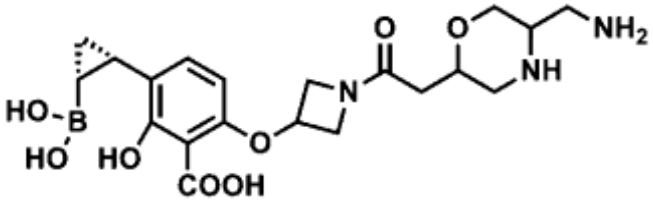
[Chemical Formula 413]



,

6-[(1-{[5-(aminomethyl)morpholin-2-yl]acetyl}azetidin-3-yl)oxy]-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

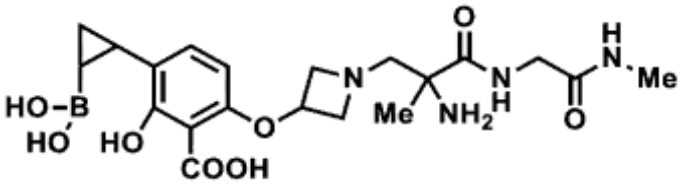
[Chemical Formula 414]



,

6-({1-[2-amino-2-methyl-3-{[2-(methylamino)-2-oxoethyl]amino}-3-oxopropyl]azetidin-3-yl}oxy)-3-[2-boronocyclopropyl]-2-hydroxybenzoic acid

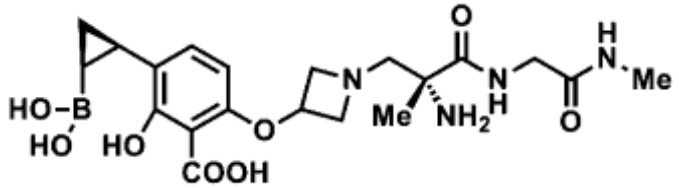
[Chemical Formula 415]



,

6-({1-[(2R)-2-amino-2-methyl-3-{[2-(methylamino)-2-oxoethyl]amino}-3-oxopropyl]azetidin-3-yl}oxy)-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

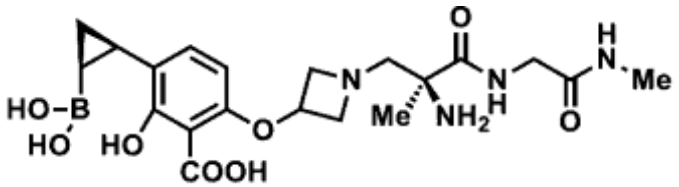
[Chemical Formula 416]



,

6-({1-[(2S)-2-amino-2-methyl-3-{[2-(methylamino)-2-oxoethyl]amino}-3-oxopropyl]azetidin-3-yl}oxy)-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

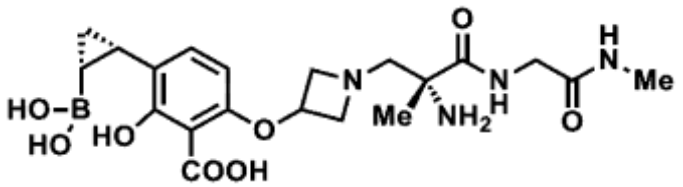
[Chemical Formula 417]



,

6-({1-[(2R)-2-amino-2-methyl-3-{[2-(methylamino)-2-oxoethyl]amino}-3-oxopropyl]azetidin-3-yl}oxy)-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

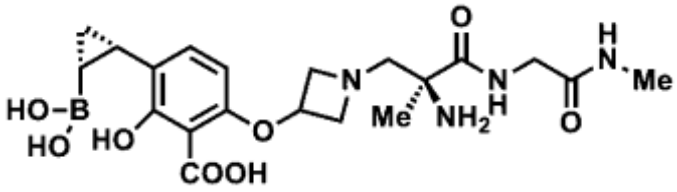
[Chemical Formula 418]



,

6-({1-[(2S)-2-amino-2-methyl-3-{[2-(methylamino)-2-oxoethyl]amino}-3-oxopropyl]azetidin-3-yl}oxy)-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

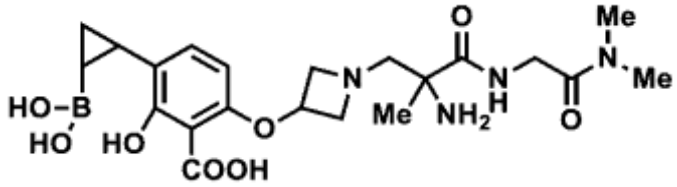
[Chemical Formula 419]



,

6-({1-[2-amino-3-{[2-(dimethylamino)-2-oxoethyl]amino}-2-methyl-3-oxopropyl]azetidin-3-yl}oxy)-3-[2-boronocyclopropyl]-2-hydroxybenzoic acid

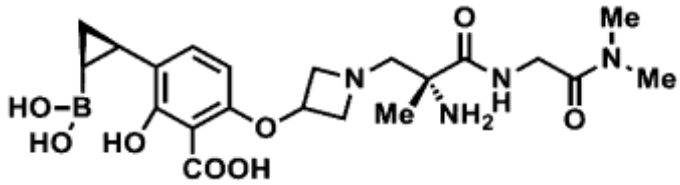
[Chemical Formula 420]



,

6-({1-[(2R)-2-amino-3-{[2-(dimethylamino)-2-oxoethyl]amino}-2-methyl-3-oxopropyl]azetidin-3-yl}oxy)-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

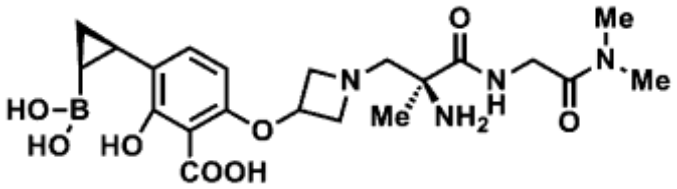
[Chemical Formula 421]



,

6-({1-[(2S)-2-amino-3-{[2-(dimethylamino)-2-oxoethyl]amino}-2-methyl-3-oxopropyl]azetidin-3-yl}oxy)-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

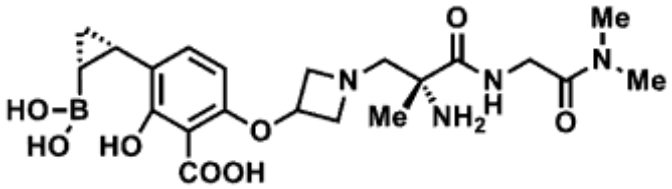
[Chemical Formula 422]



,

6-({1-[(2R)-2-amino-3-{[2-(dimethylamino)-2-oxoethyl]amino}-2-methyl-3-oxopropyl]azetidin-3-yl}oxy)-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

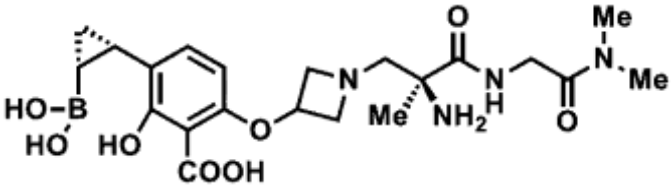
[Chemical Formula 423]



,

6-({1-[(2S)-2-amino-3-{[2-(dimethylamino)-2-oxoethyl]amino}-2-methyl-3-oxopropyl]azetidin-3-yl}oxy)-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

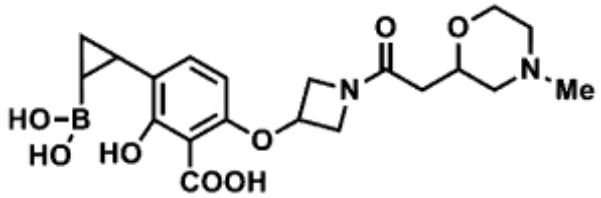
[Chemical Formula 424]



,

3-[2-boronocyclopropyl]-2-hydroxy-6-[(1-{[4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]benzoic acid

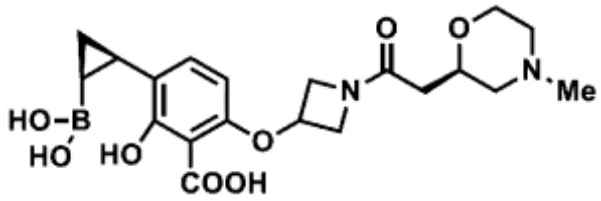
[Chemical Formula 425]



,

3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxy-6-[(1-{[(2R)-4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]benzoic acid

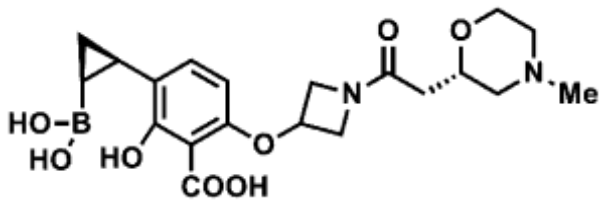
[Chemical Formula 426]



,

3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxy-6-[(1-{[(2S)-4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]benzoic acid

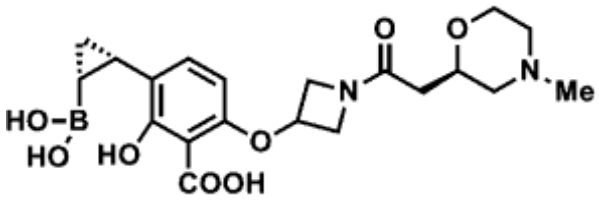
[Chemical Formula 427]



,

3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxy-6-[(1-{[(2R)-4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]benzoic acid

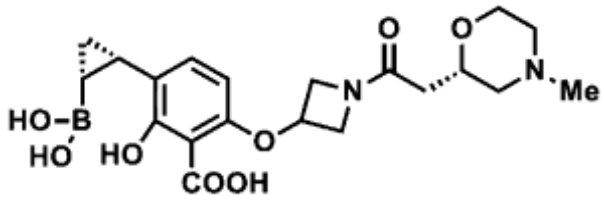
[Chemical Formula 428]



,

3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxy-6-[(1-{[(2S)-4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]benzoic acid

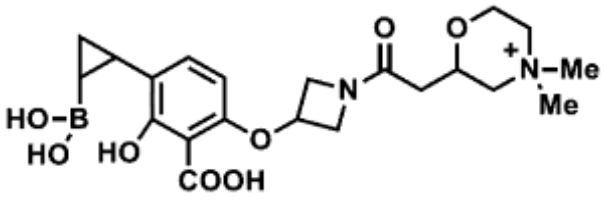
[Chemical Formula 429]



,

3-[2-boronocyclopropyl]-6-[(1-{[4,4-dimethylmorpholin-4-ium-2-yl]acetyl}azetidin-3-yl)oxy]-2-hydroxybenzoate

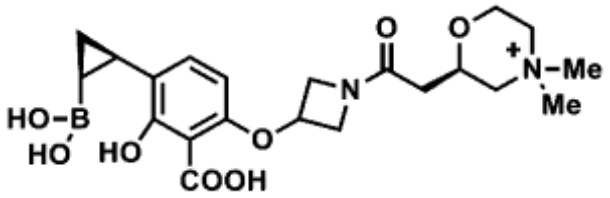
[Chemical Formula 430]



,

3-[(1R,2S)-2-boronocyclopropyl]-6-[(1-{[(2R)-4,4-dimethylmorpholin-4-ium-2-yl]acetyl}azetidin-3-yl)oxy]-2-hydroxybenzoate

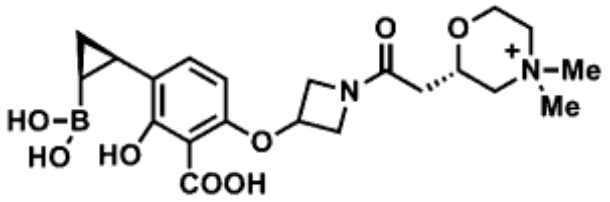
[Chemical Formula 431]



,

3-[(1R,2S)-2-boronocyclopropyl]-6-[(1-{[(2S)-4,4-dimethylmorpholin-4-ium-2-yl]acetyl}azetidin-3-yl)oxy]-2-hydroxybenzoate

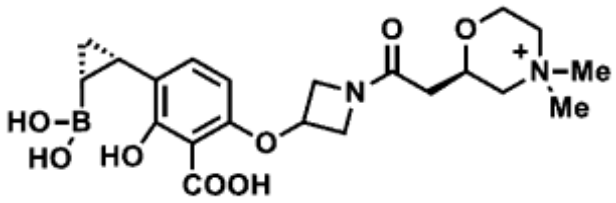
[Chemical Formula 432]



,

3-[(1S,2R)-2-boronocyclopropyl]-6-[(1-{[(2R)-4,4-dimethylmorpholin-4-ium-2-yl]acetyl}azetidin-3-yl)oxy]-2-hydroxybenzoate

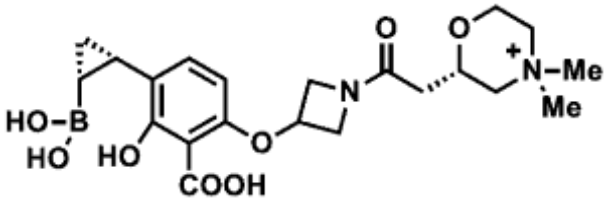
[Chemical Formula 433]



,

3-[(1S,2R)-2-boronocyclopropyl]-6-[(1-{[(2S)-4,4-dimethylmorpholin-4-ium-2-yl]acetyl}azetidin-3-yl)oxy]-2-hydroxybenzoate

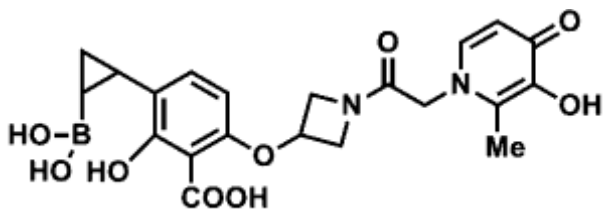
[Chemical Formula 434]



,

3-(2-boronocyclopropyl)-2-hydroxy-6-({1-[(3-hydroxy-2-methyl-4-oxopyridin-1(4H)-yl)acetyl]azetidin-3-yl}oxy)benzoic acid

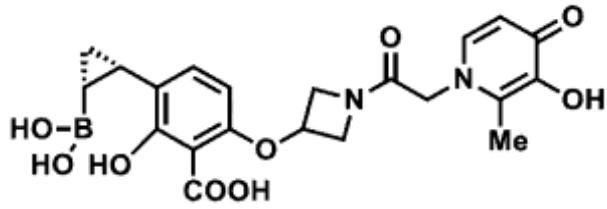
[Chemical Formula 435]



,

3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxy-6-({1-[(3-hydroxy-2-methyl-4-oxopyridin-1(4H)-yl)acetyl]azetidin-3-yl}oxy)benzoic acid

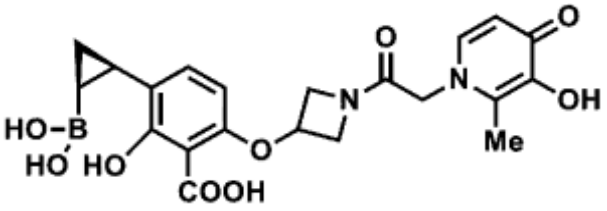
[Chemical Formula 436]



, and

3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxy-6-({1-[(3-hydroxy-2-methyl-4-oxopyridin-1(4H)-yl)acetyl]azetidin-3-yl}oxy)benzoic acid

[Chemical Formula 437]



.

[Item 119]

A medicament comprising the compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to item 118.

[Item 120]

The medicament according to item 119, which is a therapeutic drug or a prophylactic drug for a bacterial infection.

[Item 121]

An agent for inhibiting β-lactamase, comprising the compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 118 as an active ingredient.

[Item 122]

A pharmaceutical composition comprising the compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 118 and a pharmaceutically acceptable carrier.

[Item 123]

The pharmaceutical composition according to item 122, further comprising an additional agent.

[Item 124]

The pharmaceutical composition according to item 123, wherein the additional agent is selected from the group consisting of an antibacterial agent, an antifungal agent, an antiviral agent, an anti-inflammatory agent, and an anti-allergic agent.

[Item 125]

The pharmaceutical composition according to item 123 or 124, wherein the additional agent is a β-lactam agent.

[Item 126]

The pharmaceutical composition according to item 124 or 125, wherein a β-lactam agent, which is the additional agent, is selected from the group consisting of amoxicillin, ampicillin (pivampicillin, hetacillin, bacampicillin, metampicillin, and talampicillin), epicillin, carbenicillin (carindacillin), ticarcillin, temocillin, azlocillin, piperacillin, mezlocillin, mecillinam (pivmecillinam), sulbenicillin, benzylpenicillin (G), clometocillin, benzathine benzylpenicillin, procaine benzylpenicillin, azidocillin, penamecillin, phenoxymethyl penicillin (V), propicillin, benzathine phenoxymethylpenicillin, phenethicillin, cloxacillin (dicloxacillin and flucloxacillin), oxacillin, methicillin, nafcillin, faropenem, biapenem, doripenem, ertapenem, imipenem, meropenem, panipenem, tomopenem, razupenem, cefazolin, cefacetrile, cefadroxil, cephalexin, cefaloglycin, cefalonium, cefaloridine, cephalothin, cephapirin, cefatrizine, cefazedone, cefazaflur, cefradine, cefroxadine, ceftezole, cefaclor, cefamandole, cefminox, cefonicide, ceforanide, cefotiam, cefprozil, cefbuperazone, cefuroxime, cefuzonam, cefoxitin,

cefotetan, cefmetazole, loracarbef, cefixime, ceftazidime, ceftriaxone, cefcapene, cefdaloxime, cefdinir, cefditoren, cefetamet, cefmenoxime, cefodizime, cefoperazone, cefotaxime, cefpimizole, cefpiramide, cefpodoxime, cefsulodin, cefteram, ceftibuten, ceftiolene, ceftizoxime, flomoxef, latamoxef, cefepime, cefozopran, cefpirome, cefquinome, ceftobiprole, ceftaroline, CXA-101, RWJ-54428, MC-04546, ME1036, BAL30072, SYN2416, ceftiofur, cefquinome, cefovecin, aztreonam, tigemonam, carumonam, RWJ-442831, RWJ-333441, and RWJ-333442.

[Item 127]

The pharmaceutical composition according to item 125 or 126, wherein the β-lactam agent is selected from ceftazidime, biapenem, doripenem, ertapenem, imipenem, meropenem, or panipenem.

[Item 128]

The pharmaceutical composition according to item 125 or 126, wherein the β-lactam agent is selected from aztreonam, tigemonam, BAL30072, SYN2416, or carumonam.

[Item 129]

The pharmaceutical composition according to item 122, characterized in that an additional agent is concomitantly administered.

[Item 130]

The pharmaceutical composition according to item 129, wherein the additional agent is selected from an antibacterial agent, an antifungal agent, an antiviral agent, an anti-inflammatory agent, or an anti-allergic agent.

[Item 131]

The pharmaceutical composition according to item 129 or 130, wherein the additional agent is a β-lactam agent.

[Item 132]

The pharmaceutical composition according to item 130 or 131, wherein a β-lactam agent, which is the additional agent, is selected from the group consisting of amoxicillin, ampicillin

(pivampicillin, hetacillin, bacampicillin, metampicillin, and talampicillin), epicillin, carbenicillin (carindacillin), ticarcillin, temocillin, azlocillin, piperacillin, mezlocillin, mecillinam (pivmecillinam), sulbenicillin, benzylpenicillin (G), clometocillin, benzathine benzylpenicillin, procaine benzylpenicillin, azidocillin, penamecillin, phenoxymethyl penicillin (V), propicillin, benzathine phenoxymethylpenicillin, phenethicillin, cloxacillin (dicloxacillin and flucloxacillin), oxacillin, methicillin, nafcillin, faropenem, biapenem, doripenem, ertapenem, imipenem, meropenem, panipenem, tomopenem, razupenem, cefazolin, cefacetrile, cefadroxil, cephalexin, cefaloglycin, cefalonium, cefaloridine, cephalothin, cephapirin, cefatrizine, cefazedone, cefazaflur, cefradine, cefroxadine, ceftezole, cefaclor, cefamandole, cefminox, cefonicide, ceforanide, cefotiam, cefprozil, cefbuperazone, cefuroxime, cefuzonam, cefoxitin, cefotetan, cefmetazole, loracarbef, cefixime, ceftazidime, ceftriaxone, cefcapene, cefdaloxime, cefdinir, cefditoren, cefetamet, cefmenoxime, cefodizime, cefoperazone, cefotaxime, cefpimizole, cefpiramide, cefpodoxime, cefsulodin, cefteram, ceftibuten, ceftiolene, ceftizoxime, flomoxef, latamoxef, cefepime, cefozopran, cefpirome, cefquinome, ceftobiprole, ceftaroline, CXA-101, RWJ-54428, MC-04546, ME1036, BAL30072, SYN2416, ceftiofur, cefquinome, cefovecin, aztreonam, tigemonam, carumonam, RWJ-442831, RWJ-333441, and RWJ-333442.

[Item 133]

The pharmaceutical composition according to item 131 or 132, wherein the β-lactam agent is selected from the group consisting of ceftazidime, biapenem, doripenem, ertapenem, imipenem, meropenem, and panipenem.

[Item 134]

The pharmaceutical composition according to item 131 or 132, wherein the β-lactam agent is selected from the group consisting of aztreonam, tigemonam, BAL30072, SYN2416, and carumonam.

[Item 135]

The compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 118 for use in treating a bacterial infection.

[Item 136]

The compound or the pharmaceutically acceptable salt thereof according to item 135, wherein the bacterial infection is a bacterial infection in which a bacteria that can have a β-lactamase is involved.

[Item 137]

The compound or the pharmaceutically acceptable salt thereof according to item 135 or 136, wherein the bacterial infection is sepsis, febrile neutropenia, bacterial meningitis, bacterial endocarditis, otitis media, sinusitis, pneumonia, lung abscess, empyema, secondary infection of a chronic respiratory disease, pharyngolaryngitis, tonsillitis, osteomyelitis, arthritis, peritonitis, intraperitoneal abscess, cholecystitis, cholangitis, liver abscess, a deep skin infection, lymphangitis/lymphadenitis, secondary infection of trauma, burn injury, surgical wound, or the like, a urinary tract infection, a genital infection, an eye infection, or an odontogenic infection.

[Item 138]

A medicament comprised of a combination of the compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 118 and at least one agent selected from the group consisting of therapeutic agents for sepsis, febrile neutropenia, bacterial meningitis, bacterial endocarditis, otitis media, sinusitis, pneumonia, lung abscess, empyema, secondary infection of a chronic respiratory disease, pharyngolaryngitis, tonsillitis, osteomyelitis, arthritis, peritonitis, intraperitoneal abscess, cholecystitis, cholangitis, liver abscess, a deep skin infection, lymphangitis/lymphadenitis, secondary infection of trauma, burn

injury, surgical wound, or the like, a urinary tract infection, a genital infection, an eye infection, and an odontogenic infection.

[Item 139]

A pharmaceutical composition comprising a β-lactam agent, wherein the pharmaceutical composition is administered with the compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 118.

[Item 140]

A method for treating a bacterial infection, characterized in that a therapeutically effective amount of the compound or the pharmaceutically acceptable salt thereof according to any one of items 1 to 118 is administered to a patient in need thereof.

[Item 141]

The method according to item 140, wherein the bacterial infection is a bacterial infection in which a bacteria that can have a β-lactamase is involved.

[Item 142]

The method according to item 140 or 141, wherein the bacterial infection is sepsis, febrile neutropenia, bacterial meningitis, bacterial endocarditis, otitis media, sinusitis, pneumonia, lung abscess, empyema, secondary infection of a chronic respiratory disease, pharyngolaryngitis, tonsillitis, osteomyelitis, arthritis, peritonitis, intraperitoneal abscess, cholecystitis, cholangitis, liver abscess, a deep skin infection, lymphangitis/lymphadenitis, secondary infection of trauma, burn injury, surgical wound, or the like, a urinary tract infection, a genital infection, an eye infection, or an odontogenic infection.

[Item 143]

The method according to any one of items 140 to 142, characterized in that an additional agent is concomitantly administered.

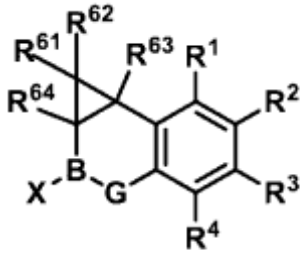
[0011]

Specifically, the present invention is also the following.

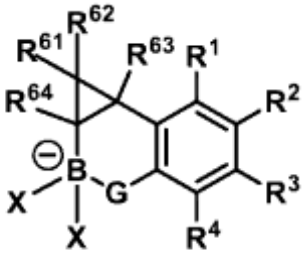
[Item B1]

A compound represented by formula (1a) or (1b):

[Chemical Formula 438]



(1a)



(1b)

or a pharmaceutically acceptable salt thereof,

wherein

G is an oxygen atom, a sulfur atom, or $-NR^{a1}-$,

X is a hydroxyl group, an optionally substituted alkoxy group, or $-NR^{a2}R^{b1}$,

R^{a1}, R^{a2}, and R^{b1} are the same or different, each independently a hydrogen atom, a hydroxyl group, an optionally substituted hydrocarbyl group, or an optionally substituted heterohydrocarbyl group,

wherein R^{a2} and R^{b1} together may form an optionally substituted nitrogen-containing non-aryl heterocycle,

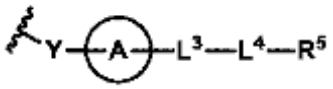
L^1 is a single bond, an oxygen atom, a sulfur atom, -SO-, $-SO_2-$, an optionally substituted hydrocarbylene group, or an optionally substituted heterohydrocarbylene group,

L^2 is a single bond or an optionally substituted hydrocarbylene group,

Z is a hydrogen atom, a hydroxyl group, an optionally substituted hydrocarbyl group, or an optionally substituted heterohydrocarbyl group,

one of R^1, R^2, and R^3 is represented by formula (2):

[Chemical Formula 439]



(2)

wherein

Y is an oxygen atom, a sulfur atom, or $-NR^j-$, and R^j is a hydrogen atom, a hydroxyl group, or an optionally substituted hydrocarbyl group,

ring A is an optionally substituted non-aryl heterocycle,

L^3 is an oxygen atom, a sulfur atom, an optionally substituted hydrocarbylene group, an optionally substituted heterohydrocarbylene group, $-S(=O)-$, or $-S(=O)_2-$,

L^4 is a single bond, an optionally substituted hydrocarbylene group, or $-C(=N-OR^{h1})-$,

R^{h1} is

1) a hydrogen atom,

2) a C_{1-6} alkyl group,

3) a C_{3-10} alicyclic group,

4) C_{6-10} aryl,

5) 5- or 6-membered heteroaryl, or

6) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 2) to 6) is optionally substituted),

R^5 is a hydrogen atom, a hydroxyl group, an optionally substituted hydrocarbyl group, or an optionally substituted heterohydrocarbyl group,

the remaining two (without the structure of formula (2) among R^1, R^2, and R^3) are the same or different, each independently a hydrogen atom, halogen, a hydroxyl group, an optionally substituted hydrocarbyl group, or an optionally substituted heterohydrocarbyl group,

R^4 is

1) $-C(=O)R^8$,

2) $-SO_2-L^6-R^8$,

(wherein R^8 in 1) and 2) is a hydroxyl group, an optionally substituted hydrocarbyl group, or an optionally substituted heterohydrocarbyl group, and L^6 is a single bond or an optionally substituted hydrocarbylene group),

3) $-NR^{a4}R^{b3}$,

4) $-B(OR^{m1})_2$,

5) $-PO(OR^{m1})(OR^{m2})$,

6) optionally substituted heteroaryl,

7) an optionally substituted non-aryl heterocycle, or

8) a bioisostere of one of 1) to 7),

(wherein the formulas of 1), 2), 4), 5), and 6) include a carboxylic acid isostere, and 8) may include them in duplicates),

R^{a4} and R^{b3} are the same or different, each independently having the same definition as R^{a1}, R^{a2}, and R^{b1}, wherein a combination of R^{a4} and R^{b3}, when attached to the same nitrogen atom, together may form an optionally substituted nitrogen-containing non-aryl heterocycle,

R^{m1} is a hydrogen atom or an optionally substituted hydrocarbyl group,

wherein if R^{m1} is attached to a boron atom via an oxygen atom, two R^{m1}, as alkylene, together with the boron atom and two oxygen atoms, may form a non-aryl heterocycle (wherein an alkylene moiety is optionally substituted in the non-aryl heterocycle),

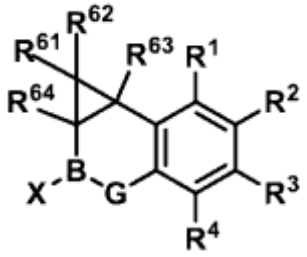
R^{m2} is a hydrogen atom or an optionally substituted hydrocarbyl group, and

R^{61}, R^{62}, R^{63}, and R^{64} are each independently a hydrogen atom, halogen, an optionally substituted alkyl group, or $-L^1-L^2-Z$.

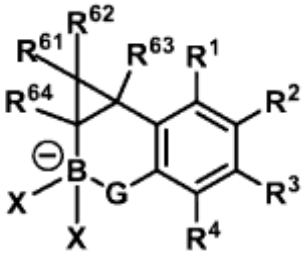
[Item B2]

The compound or the pharmaceutically acceptable salt thereof according to item B1, represented by formula (1a) or (1b):

[Chemical Formula 440]



(1a)



(1b)

wherein

G is an oxygen atom, a sulfur atom, or $-NR^{a1}-$,

X is a hydroxyl group, an optionally substituted C_{1-6} alkoxy group, or $-NR^{a2}R^{b1}$,

R^{a1}, R^{a2}, and R^{b1} are the same or different, each independently

1) a hydrogen atom,

2) a C_{1-6} alkyl group,

3) a C_{3-10} alicyclic group,

4) C_{6-10} aryl

5) 5- or 6-membered heteroaryl,

6) a 4- to 10-membered non-aryl heterocycle,

7) a C_{1-6} alkylcarbonyl group,

8) a C_{3-10} alicyclic carbonyl group,

9) a C_{6-10} arylcarbonyl group,

10) a 5- or 6-membered heteroarylcarbonyl group,

11) a C_{1-6} alkylsulfonyl group,

12) a C_{3-10} alicyclic sulfonyl group,

13) a C_{6-10} arylsulfonyl group,

14) a 5- or 6-membered heteroarylsulfonyl group, or

15) $-OR^{c1}$,

(wherein each substituent from 2) to 14) is optionally substituted),

wherein R^{a2} and R^{b1} together may form an optionally substituted 4- to 10-membered nitrogen-containing non-aryl heterocycle,

R^{c1} is

1) a hydrogen atom,
2) a C_{1-6} alkyl group,
3) a C_{3-10} alicyclic group,
4) C_{6-10} aryl,
5) 5- or 6-membered heteroaryl, or
6) a 4- to 10-membered non-aryl heterocycle,
(wherein each substituent from 2) to 6) is optionally substituted),

L^1 is a single bond, an oxygen atom, a sulfur atom, -SO-, -SO_2-, -NR^{d1}-, -$NR^{d1}C(=O)$-, or -$NR^{d1}SO_2$-,

L^2 is a single bond or an optionally substituted C_{1-6} alkylene group,

Z is
1) a hydrogen atom,
2) a hydroxyl group,
3) a cyano group,
4) a carboxyl group,
5) a C_{3-10} alicyclic group,
6) C_{6-10} aryl,
7) 5- or 6-membered heteroaryl,
8) a 4- to 10-membered non-aryl heterocycle,
9) a C_{1-6} alkoxy group,
10) a C_{3-10} alicyclic oxy group,
11) a C_{6-10} aryloxy group,
12) a 5- or 6-membered heteroaryloxy group,
13) a 4- to 10-membered non-aryl heterocyclyl oxy group,
14) a C_{1-6} alkylthio group,
15) a C_{3-10} alicyclic thio group,
16) a C_{6-10} arylthio group,
17) a 5- or 6-membered heteroarylthio group,
18) a 4- to 10-membered non-aryl heterocyclyl thio group,
(wherein each substituent from 5) to 18) is optionally substituted),
19) -SO_2-$NR^{e1}R^{f1}$,

20) $-NR^{e1}-C(=O)OR^{f1}$,

21) $-NR^{g1}-C(=O)NR^{e1}R^{f1}$,

22) $-NR^{e1}-C(=S)R^{f1}$,

23) $-NR^{e1}-C(=S)OR^{f1}$,

24) $-NR^{g1}-C(=S)NR^{e1}R^{f1}$,

25) $-NR^{g1}-CR^{e1}(=NR^{f1})$,

26) $-NR^{g1}-CR^{e1}(=N-OR^{f1})$,

27) $-NR^{h1}-C(=NR^{g1})NR^{e1}R^{f1}$,

28) $-NR^{h1}-C(=N-OR^{g1})NR^{e1}R^{f1}$,

29) $-NR^{i1}-C(=NR^{h1})NR^{g1}-NR^{e1}R^{f1}$,

30) $-NR^{i1}-C(=N-OR^{h1})NR^{g1}-NR^{e1}R^{f1}$,

31) $-NR^{e1}-SO_2-R^{f1}$,

32) $-NR^{g1}-SO_2-NR^{e1}R^{f1}$,

33) $-C(=O)OR^{e1}$,

34) $-C(=S)OR^{e1}$,

35) $-C(=S)NR^{e1}R^{f1}$,

36) $-C(=S)NR^{e1}OR^{f1}$,

37) $-C(=S)NR^{g1}-NR^{e1}R^{f1}$,

38) $-C(=NR^{e1})R^{f1}$,

39) $-C(=N-OR^{e1})R^{f1}$,

40) $-C(=NR^{h1})NR^{g1}-NR^{e1}R^{f1}$,

41) $-C(=N-OR^{h1})NR^{g1}-NR^{e1}R^{f1}$,

42) $-NR^{e1}R^{f1}$,

43) $-NR^{g1}-NR^{e1}R^{f1}$,

44) $-NR^{e1}OR^{f1}$,

45) $-NR^{e1}-C(=O)R^{f1}$,

46) $-C(=O)NR^{e1}R^{f1}$,

47) $-C(=O)NR^{e1}OR^{f1}$,

48) $-C(=O)NR^{g1}-NR^{e1}R^{f1}$,

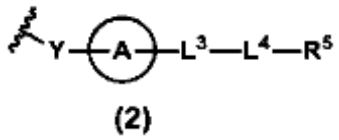
49) $-C(=O)R^{e1}$,

50) $-C(=NR^{g1})NR^{e1}R^{f1}$, or

51) $-C(=N-OR^{h1})NR^{e1}R^{f1}$,

one of R^1, R^2, and R^3 is a group represented by formula (2):

[Chemical Formula 441]



(2)

wherein

Y is an oxygen atom, a sulfur atom, or $-NR^j-$,

ring A is an optionally substituted 4- to 20-membered non-aryl heterocycle,

L^3 is

1) an oxygen atom,

2) a sulfur atom,

3) $-NR^{d2}-$,

4) $-NR^{d2}C(=O)-$,

5) $-NR^{d2}SO_2-$,

6) a C_{1-6} alkylene group,

7) a C_{3-10} cycloalkylene group,

8) a 4- to 10-membered non-aryl heterocyclylene group,

(wherein each substituent from 6) to 8) is optionally substituted),

9) $-C(=O)-$,

10) $-S(=O)-$, or

11) $-S(=O)_2-$,

L^4 is

1) a single bond,

2) a C_{1-6} alkylene group,

3) a C_{3-10} cycloalkylene group,

4) a C_{6-10} arylene group,

5) a 5- or 6-membered heteroarylene group,

6) a 4- to 10-membered non-aryl heterocyclylene group,

(wherein each substituent from 2) to 6) is optionally substituted), or

7) $-C(=N-OR^{h1})-$,

R^5 is

1) a hydrogen atom,

2) a C_{1-6} alkyl group,

3) a C_{3-10} alicyclic group,

4) a 4- to 10-membered non-aryl heterocycle,

5) C_{6-10} aryl,

6) 5- to 10-membered heteroaryl,

7) a C_{1-6} alkylthio group,

(wherein each substituent from 2) to 7) is optionally substituted, and if two substituents further substituted with the substituent of 1), 2), or 3) are each substituted on adjacent atoms within a ring, the two substituents together may further form a condensed ring structure),

8) $-NR^{e1}OH$,

9) a carboxyl group (-C(=O)OH),

10) a carboxylic acid isostere (wherein the carboxylic acid isostere comprises an ester group-$C(=O)OR^{20a}$),

11) a sulfo group (sulfonic acid group),

12) $-SO_2R^{e1}$,

13) $-SO_2-NR^{e1}R^{f1}$,

14) $-S(=O)(=NR^{f1})R^{e1}$,

15) $-NR^{e1}-C(=O)R^{f1}$,

16) $-NR^{e1}-C(=O)OR^{f1}$,

17) $-NR^{g1}-C(=O)NR^{e1}R^{f1}$,

18) $-NR^{e1}-SO_2-R^{f1}$,

19) $-NR^{g1}-SO_2-NR^{e1}R^{f1}$,

20) $-N=S(=O)R^{e1}R^{f1}$,

21) $-C(=O)NR^{50}R^{51}$, or

22) $-NR^{e1}R^{f1}$ (wherein if R^5 is the substituent of 22), $-L^3-L^4-R^5$ is not $-(CH_2)_{1-4}NR^{e1}R^{f1}$ (wherein R^{e1} and R^{f1} are a hydrogen atom, optionally substituted C_{1-4} alkyl, an optionally substituted C_{3-7} alicyclic group, optionally substituted 4- to 10-membered non-aryl heterocyclic group, optionally substituted C_{6-10} aryl, or optionally substituted 5- to 10-membered heteroaryl)),

R^{20a} is

1) a C_{1-6} alkyl group,
2) a C_{3-10} alicyclic group,
3) C_{6-10} aryl,
4) 5- or 6-membered heteroaryl, or
5) a 4- to 10-membered non-aryl heterocycle
(wherein each substituent from 1) to 5) is optionally substituted),

R^{50} represents
1) a hydrogen atom,
2) a C_{1-6} alkyl group,
3) a hydroxyl group,
4) a C_{1-6} alkoxy group,
5) a C_{3-6} cycloalkoxy group,
6) a C_{3-6} alicyclic group,
7) a 4- to 6-membered non-aryl heterocycle,
8) C_{6-10} aryl,
9) 5- to 10-membered heteroaryl
10) a 4- to 6-membered non-aryl heterocyclyl oxy,
11) C_{6-10} aryloxy,
12) 5- to 10-membered heteroaryloxy,
13) a C_{1-6} alkylsulfonyl group,
14) a C_{3-6} cycloalkoxysulfonyl group, or
15) a 4- to 6-membered non-aryl heterocyclyl sulfonyl group
(wherein each substituent of 2) and 4) to 15) is optionally substituted),

R^{51} represents
1) a hydrogen atom,
2) a C_{1-6} alkyl group,
3) a C_{3-6} alicyclic group,
4) a 4- to 6-membered non-aryl heterocycle,
5) C_{6-10} aryl, or
6) 5- to 10-membered heteroaryl,
(wherein each substituent from 2) to 6) is optionally substituted),
or

R^{50} and R^{51} together may form an optionally substituted 4- to 7-membered nitrogen-containing non-aryl heterocycle,

the remaining two (without the structure of formula (2) among R^1, R^2, and R^3) are the same or different, each independently a hydrogen atom, a halogen atom, an optionally substituted C_{1-6} alkyl group, an optionally substituted C_{1-6} alkoxy group, an optionally substituted C_{1-6} alkylthio group, optionally substituted 5- or 6-membered heteroaryl, or $-NR^{a3}R^{b2}$,

R^{d1}, R^{d2}, R^{e1}, R^{f1}, R^{g1}, R^{h1}, R^{i1}, and R^j are the same or different, each independently

1) a hydrogen atom,

2) a C_{1-6} alkyl group,

3) a C_{3-10} alicyclic group,

4) C_{6-10} aryl,

5) 5- or 6-membered heteroaryl, or

6) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 2) to 6) is optionally substituted),

a combination of R^{e1} and R^{f1}, when attached to the same nitrogen atom, together may form an optionally substituted 4- to 10-membered nitrogen-containing non-aryl heterocycle,

R^4 is

1) $-C(=O)R^8$,

2) $-SO_2-L^6-R^8$,

(wherein R^8 in 1) and 2) is $-NR^{a5}R^{b4}$, $-NR^{a5}-L^7-B(OR^{m1})_2$, $-OR^{m1}$, or an optionally substituted C_{1-6} alkyl group, and L^6 is a single bond or $-NR^{a6}-$),

3) $-NR^{a4}R^{b3}$,

4) $-B(OR^{m1})_2$,

5) $-PO(OR^{m1})(OR^{m2})$,

6) optionally substituted 5-membered heteroaryl,

7) an optionally substituted 5-membered non-aryl heterocycle, or

8) a bioisostere of one of 1) to 7),

(wherein the formulas of 2), 4), 5), and 6) include a carboxylic acid isostere, and 8) may include them in duplicates),

R^{a3}, R^{a4}, R^{a5}, R^{a6}, R^{b2}, R^{b3}, and R^{b4} are the same or different, each independently having the same definition as R^{a1}, R^{a2}, and R^{b1}, wherein a combination of R^{a3} and R^{b2}, R^{a4} and R^{b3}, or R^{a5} and R^{b4}, when attached to the same nitrogen atom, together may form an optionally substituted 4- to 10-membered nitrogen-containing non-aryl heterocycle,

R^{m1} is

1) a hydrogen atom,
2) a C_{1-6} alkyl group,
3) a C_{3-10} alicyclic group,
4) C_{6-10} aryl,
5) 5- or 6-membered heteroaryl, or
6) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 2) to 6) is optionally substituted),

wherein if R^{m1} is attached to a boron atom via an oxygen atom, two R^{m1}, as C_{2-4} alkylene, together with the boron atom and two oxygen atoms, may form a 5- to 7-membered non-aryl heterocycle (wherein an alkylene moiety is optionally substituted in the non-aryl heterocycle),

R^{m2} is a hydrogen atom, an optionally substituted C_{1-6} alkyl group, or an optionally substituted C_{3-10} alicyclic group,

L^7 is an optionally substituted C_{1-3} alkylene group,

R^{61}, R^{62}, and R^{63} are each independently a hydrogen atom, halogen, or an optionally substituted C_{1-6} alkyl group, and

R^{64} is a hydrogen atom, halogen, an optionally substituted C_{1-6} alkyl group, or $-L^1-L^2-Z$.

[Item B3]

The compound or the pharmaceutically acceptable salt thereof according to item B1 or B2, wherein

L^3 is

1) a C_{1-6} alkylene group,

2) a C_{3-10} cycloalkylene group, or

3) a 4- to 10-membered non-aryl heterocyclylene group,

(wherein each substituent from 1) to 3) is optionally substituted), and

L^4 is a single bond or an optionally substituted C_{1-5} alkylene group.

[Item B4]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B3, wherein

L^3 is an optionally substituted C_{1-4} alkylene group, and

L^4 is a single bond or an optionally substituted C_{1-3} alkylene group.

[Item B5]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B4, wherein

L^3 is $-(CR^{30}R^{31})_{n1}-$,

R^{30} and R^{31}, each independently, or if there are multiple instances of each of them, all of them independently represent

1) a hydrogen atom,

2) $-NR^{a7}R^{a8}$,

3) a C_{1-4} alkyl group,

4) C_{6-10} aryl,

5) 5- to 10-membered heteroaryl,

6) a C_{3-6} alicyclic group,

7) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 3) to 7) is optionally substituted), or

8) $-OR^{c2}$, or

R^{30} and R^{31}, together with the carbon atom to which they are attached, form a C_{3-6} alicyclic group or a 4- to 6-membered non-aryl heterocycle,

R^{a7} and R^{a8} are the same or different, each independently

1) a hydrogen atom,

2) a C_{1-6} alkyl group,
3) a C_{3-10} alicyclic group,
4) C_{6-10} aryl
5) 5- or 6-membered heteroaryl,
6) a 4- to 10-membered non-aryl heterocycle,
7) a C_{1-6} alkylcarbonyl group,
8) a C_{3-10} alicyclic carbonyl group,
9) a C_{6-10} arylcarbonyl group,
10) a 5- or 6-membered heteroarylcarbonyl group,
11) a C_{1-6} alkylsulfonyl group,
12) a C_{3-10} alicyclic sulfonyl group,
13) a C_{6-10} arylsulfonyl group,
14) a 5- or 6-membered heteroarylsulfonyl group, or
15) $-OR^{c3}$,
(wherein each substituent from 2) to 14) is optionally substituted),

wherein R^{a7} and R^{a8} together may form an optionally substituted 4- to 10-membered nitrogen-containing non-aryl heterocycle,

R^{c2} and R^{c3} are each independently,
1) a hydrogen atom,
2) a C_{1-6} alkyl group,
3) a C_{3-10} alicyclic group,
4) C_{6-10} aryl,
5) 5- or 6-membered heteroaryl, or
6) a 4- to 10-membered non-aryl heterocycle,
(wherein each substituent from 2) to 6) is optionally substituted),

n1 is an integer 1, 2, 3, or 4,

L^4 is $-(CR^{40}R^{41})_{n2}-$,

R^{40} and R^{41}, each independently, or if there are multiple instances of each of them, all of them independently represent
1) a hydrogen atom,
2) $-NR^{a9}R^{a10}$,

3) a C_{1-4} alkyl group,

4) C_{6-10} aryl,

5) 5- to 10-membered heteroaryl,

6) a C_{3-6} alicyclic group,

7) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 3) to 7) is optionally substituted), or

8) $-OR^{c4}$, or

R^{40} and R^{41}, together with the carbon atom to which they are attached, form a C_{3-6} alicyclic group or a 4- to 6-membered non-aryl heterocycle,

R^{a9} and R^{a10} are the same or different, each independently

1) a hydrogen atom,

2) a C_{1-6} alkyl group,

3) a C_{3-10} alicyclic group,

4) C_{6-10} aryl

5) 5- or 6-membered heteroaryl,

6) a 4- to 10-membered non-aryl heterocycle,

7) a C_{1-6} alkylcarbonyl group,

8) a C_{3-10} alicyclic carbonyl group,

9) a C_{6-10} arylcarbonyl group,

10) a 5- or 6-membered heteroarylcarbonyl group,

11) a C_{1-6} alkylsulfonyl group,

12) a C_{3-10} alicyclic sulfonyl group,

13) a C_{6-10} arylsulfonyl group,

14) a 5- or 6-membered heteroarylsulfonyl group,

(wherein each substituent from 2) to 14) is optionally substituted), or

15) $-OR^{c5}$,

wherein R^{a9} and R^{a10} together may form an optionally substituted 4- to 10-membered nitrogen-containing non-aryl heterocycle,

R^{c4} and R^{c5} are each independently defined the same as R^{c2} and R^{c3}, and

n2 is an integer 0 (i.e., when L^4 is a single bond), 1, 2, or 3.

[Item B6]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B5, wherein $-L^3-L^4-$ is an optionally substituted C_{1-2} alkylene group.

[Item B7]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B6, wherein $-L^3-L^4-$ is a C_{1-2} alkylene group optionally substituted with a C_{1-3} alkyl group, an amino group, or a hydroxymethyl group, or a plurality of the same or different groups thereamong (wherein two C_{1-3} alkyl groups, when attached to the same carbon atom, together with the carbon atom to which they are attached, may form a C_{3-6} alicyclic group).

[Item B8]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B7, wherein

R^5 is

1) a C_{3-10} alicyclic group,

2) C_{6-10} aryl,

3) 5- to 10-membered heteroaryl,

4) a C_{1-6} alkylthio group,

(wherein each substituent from 1) to 4) is optionally substituted, and if two substituents further substituted with the substituent of 2) or 3) are each substituted on adjacent atoms within a ring, the two substituents together may further form a condensed ring structure),

5) $-NR^{e1}OH$,

6) $-C(=O)NR^{50}R^{51}$,

7) $-SO_2-NR^{e1}R^{f1}$,

8) $-NR^{e1}-SO_2-R^{f1}$,

9) $-C(=O)OR^{20}$, or

10) $-NR^{e1}R^{f1}$ (wherein if R^5 is the substituent of 10), L^3 and/or L^4 is a C_{1-6} alkylene group that is necessarily substituted with one or more groups other than a hydrogen atom (wherein L^3 or L^4, together with said substituent, may form a C_{3-10} alicyclic group or a 4- to 10-membered non-aryl heterocycle)), and

R^{20} is

1) a hydrogen atom,

2) a C_{1-6} alkyl group,

3) a C_{3-10} alicyclic group,

4) C_{6-10} aryl,

5) 5- or 6-membered heteroaryl, or

6) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 2) to 6) is optionally substituted).

[Item B9]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B8, wherein

R^5 is

1) C_{6-10} aryl,

2) 5- to 10-membered heteroaryl,

3) $-C(=O)NR^{50}R^{51}$,

4) $-C(=O)OR^{20}$, or

5) $-NR^{e1}R^{f1}$ (wherein if R^5 is the substituent of 5), L^3 and/or L^4 is a C_{1-6} alkylene group that is necessarily substituted with one or more groups other than a hydrogen atom, and together with said substituent forms at least one C_{3-10} alicyclic group or 4- to 10-membered non-aryl heterocycle),

(wherein each substituent from 1) to 2) is optionally substituted, and any two groups thereof, when each is attached to adjacent atoms within a ring, together may further form a condensed ring structure).

[Item B10]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B9, wherein $Z\text{-}L^2\text{-}L^1$ is an optionally substituted $C_{1\text{-}6}$ alkylthio group.

[Item B11]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B10, wherein R^{61}, R^{62}, R^{63}, and R^{64} are each independently a hydrogen atom, a fluorine atom, or a $C_{1\text{-}3}$ alkyl group optionally substituted with a fluorine atom.

[Item B12]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B11, wherein R^{61}, R^{62}, R^{63}, and R^{64} are each independently a hydrogen atom or a fluorine atom.

[Item B13]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B12, wherein G is an oxygen atom.

[Item B14]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B13, wherein X is a hydroxyl group or an optionally substituted $C_{1\text{-}6}$ alkoxy group.

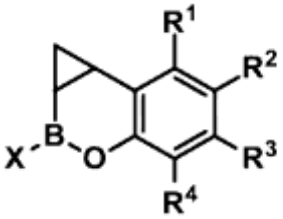
[Item B15]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B14, wherein X is a hydroxyl group.

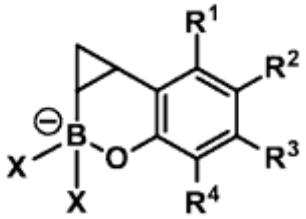
[Item B16]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B15, wherein the compounds of formulas (1a) and (1b) are represented by formulas (3a) and (3b), respectively:

[Chemical Formula 442]



(3a)



(3b)

wherein X, R^1, R^2, and R^3 are defined the same as any one of items B1 to B15, and

R^4 is selected from the group consisting of

1) $-C(=O)OR^{m1}$ (wherein R^{m1} is a hydrogen atom, a C_{1-6} alkyl group, a C_{3-10} alicyclic group, C_{6-10} aryl, 5- or 6-membered heteroaryl, or a 4- to 10-membered non-aryl heterocycle, wherein the C_{1-6} alkyl group, the C_{3-10} alicyclic group, the C_{6-10} aryl, the 5- or 6-membered heteroaryl, and the 4- to 10-membered non-aryl heterocycle are each optionally substituted), and

2) a bioisostere of 1).

[Item B17]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B16, wherein R^4 is

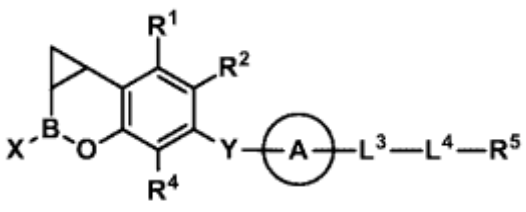
1) $-C(=O)OH$ (i.e., a carboxyl group), or

2) a carboxylic acid isostere.

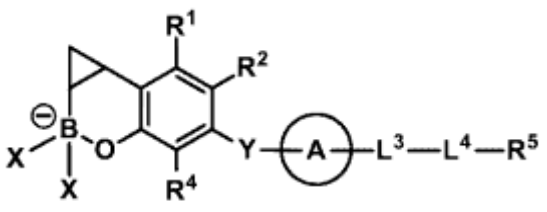
[Item B18]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B17, wherein the compounds of formulas (1a) and (1b) or the compounds of formulas (3a) and (3b) are represented by formulas (4a) and (4b), respectively:

[Chemical Formula 443]



(4a)



(4b)

wherein X, R^4, Y, ring A, L^3, L^4, and R^5 are defined the same as any one of items B1 to B17, and

R^1 and R^2 are the same or different, each independently a hydrogen atom, a halogen atom, a C_{1-6} alkyl group, a C_{1-6} alkoxy group, or a C_{1-6} alkylthio group (wherein the C_{1-6} alkyl group, the C_{1-6} alkoxy group, and the C_{1-6} alkylthio group are optionally substituted).

[Item B19]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B18, wherein ring A is an optionally substituted 4- to 10-membered non-aryl heterocycle.

[Item B20]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B19, wherein ring A is an optionally substituted 4- to 7-membered non-aryl heterocycle.

[Item B21]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B20, wherein Y is an oxygen atom or a sulfur atom.

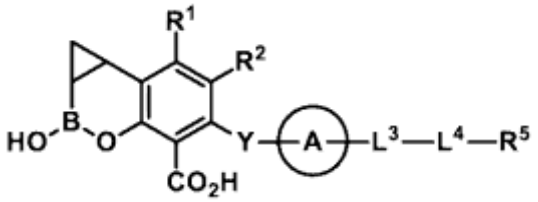
[Item B22]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B21, wherein Y is an oxygen atom.

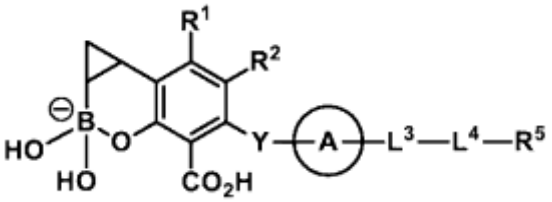
[Item B23]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B22, wherein the compounds of formulas (1a) and (1b) or the compounds of formulas (3a) and (3b) or the compounds of formulas (4a) and (4b) are represented by formulas (5a) and (5b), respectively:

[Chemical Formula 444]



(5a)



(5b)

wherein R^1, R^2, Y, L^3, L^4, and R^5 are defined the same as any one of items B1 to B22, and ring A is an optionally substituted 4- to 6-membered nitrogen-containing non-aryl heterocycle.

[Item B24]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B2 and 10 to 23, wherein L^3 is -C(=O)- or -S(=O)$_2$-.

[Item B25]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B2 and B10 to B24, wherein L^3 is -C(=O)-.

[Item B26]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B2 and B10 to B25, wherein L^4 is a single bond, -C(=N-OR^{h1})-, or an optionally substituted C_{1-6} alkylene group, wherein R^{h1} is an optionally substituted C_{1-6} alkyl group.

[Item B27]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B26, wherein R^1 and R^2 are the same or different, each independently selected from the group consisting of

1) a hydrogen atom,
2) a halogen atom,
3) a C_{1-6} alkyl group,
4) a C_{1-6} alkoxy group, and
5) a C_{1-6} alkylthio group,

(wherein each substituent from 3) to 5) is optionally substituted).

[Item B28]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B27, wherein R^1 and R^2 are the same or different, each independently selected from the group consisting of

1) a hydrogen atom,

2) a halogen atom,

3) a C_{1-6} alkyl group,

4) a C_{1-6} alkoxy group, and

5) a C_{1-6} alkylthio group,

(wherein each substituent from 3) to 5) is optionally substituted with a halogen atom).

[Item B29]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B28, wherein R^1 and R^2 are the same or different, each independently selected from the group consisting of

1) a hydrogen atom,

2) a halogen atom, and

3) a C_{1-6} alkyl group optionally substituted with a halogen atom.

[Item B30]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B29, wherein R^1 and R^2 are the same or different, each independently selected from the group consisting of

1) a hydrogen atom,

2) a fluorine atom, and

3) a C_{1-3} alkyl group optionally substituted with a fluorine atom.

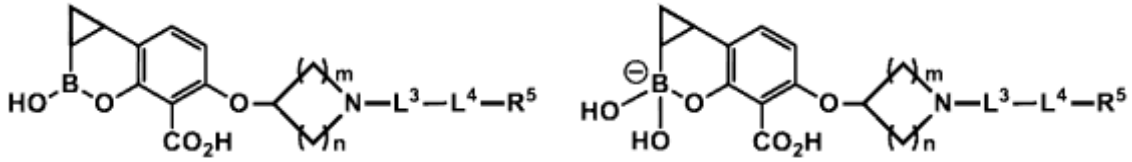
[Item B31]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B30, wherein R^1 and R^2 are both hydrogen atoms.

[Item B32]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B31, wherein the compounds of formulas (1a) and (1b) or the compounds of formulas (3a) and (3b) or the compounds of formulas (4a) and (4b) or the compounds of formulas (5a) and (5b) are represented by formulas (6a) and (6b), respectively:

[Chemical Formula 445]



(6a) (6b)

wherein L^3, L^4, and R^5 are defined the same as any one of items B1 to B31,

m is an integer 1, 2, or 3,

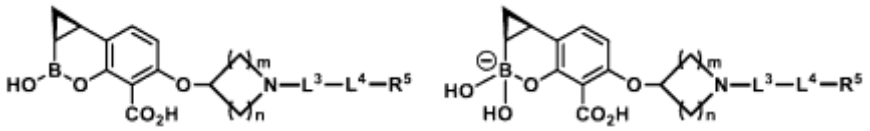
n is an integer 1, 2, or 3, and

m + n is 2, 3, or 4.

[Item B33]

The compound or the pharmaceutically acceptable salt thereof according to item B32, wherein the compounds of formulas (6a) and (6b) are enantiomers represented by formulas (7a) and (7b):

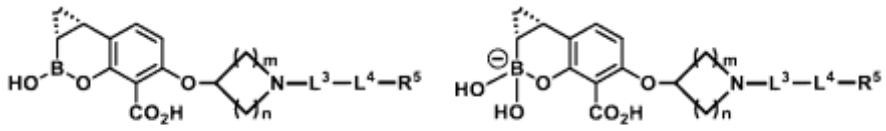
[Chemical Formula 446]



(7a) (7b)

or formulas (8a) and (8b):

[Chemical Formula 447]



(8a) (8b)

, respectively,

wherein L^3, L^4, and R^5 are defined the same as any one of items B1 to B32, and

m and n are defined the same as item B32.

[Item B34]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B33, wherein m is 1 or 2, n is 1 or 2, and m + n is 2 or 3.

[Item B35]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B34, wherein m is 1, and n is 1.

[Item B36]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B5, B8 to B23, and B27 to B35, wherein

L^3 is $-(CR^{30}R^{31})_{n1}-$,

R^{30} and R^{31} each independently, or if there are multiple instances of each of them, all of them independently represent

1) a hydrogen atom,

2) an optionally substituted C_{1-4} alkyl group, or

3) optionally substituted C_{6-10} aryl,

n1 is 1, 2, or 3,

L^4 is $-(CR^{40}R^{41})_{n2}-$,

R^{40} and R^{41} each independently, or if there are multiple instances of each of them, all of them independently represent

1) a hydrogen atom,

2) $-NR^{a9}R^{a10}$,

3) an optionally substituted C_{1-4} alkyl group, or

4) $-OR^{c4}$ or,

R^{40} and R^{41}, together with the carbon atom to which they are attached, form a C_{3-6} alicyclic group or a 4- to 6-membered non-aryl heterocycle,

R^{a9}, R^{a10}, and R^{c4} are the same or different, each independently

1) a hydrogen atom,

2) an optionally substituted C_{1-6} alkyl group, or

3) an optionally substituted C_{3-10} alicyclic group,

wherein R^{a9} and R^{a10} together may form an optionally substituted 4- to 10-membered nitrogen-containing non-aryl heterocycle, and

n2 is 0, 1, or 2.

[Item B37]

The compound or the pharmaceutically acceptable salt thereof according to item B36, wherein n1 is 1 or 2, and n2 is 0 or 1.

[Item B38]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B5, B8 to B23, and B27 to B37, wherein

L^3 is $-CR^{30}R^{31}-$,

R^{30} and R^{31} each independently represent

1) a hydrogen atom,

2) a C_{1-4} alkyl group (wherein the group is optionally substituted with halogen, $-NR^{a11}R^{a12}$, or $-OR^{c6}$), or

3) C_6 aryl (wherein the group is optionally substituted with halogen, $-NR^{a13}R^{a14}$, $-OR^{c7}$, or a C_{1-3} alkyl group (wherein the group is optionally substituted with halogen, $-NR^{a15}R^{a16}$, or $-OR^{c8}$)),

L^4 is $-(CR^{40}R^{41})_{n2}-$,

R^{40} and R^{41} each independently represent

1) a hydrogen atom,

2) $-NR^{a9}R^{a10}$,

3) a C_{1-4} alkyl group (wherein the group is optionally substituted with halogen, $-NR^{a17}R^{a18}$, or $-OR^{c9}$), or

4) $-OR^{c4}$, or

R^{40} and R^{41}, together with the carbon atom to which they are attached, form a C_{3-6} alicyclic group,

R^{a9}, R^{a10}, R^{a11}, R^{a12}, R^{a13}, R^{a14}, R^{a15}, R^{a16}, R^{a17}, R^{a18}, R^{c4}, R^{c6}, R^{c7}, R^{c8}, and R^{c9} are the same or different, each independently representing

1) a hydrogen atom, or

2) a C_{1-4} alkyl group (wherein the group is optionally substituted with halogen, $-NR^{a19}R^{a20}$, or $-OR^{c10}$),

R^{a19}, R^{a20}, and R^{c10} are the same or different, each independently representing

1) a hydrogen atom, or

2) a C_{1-4} alkyl group (wherein the group is optionally substituted with halogen),

wherein each combination of R^{a9} and R^{a10}, R^{a11} and R^{a12}, R^{a13} and R^{a14}, R^{a15} and R^{a16}, R^{a17} and R^{a18}, or R^{a19} and R^{a20} together may form an optionally substituted 4- to 7-membered nitrogen-containing non-aryl heterocycle, and

n2 is 0 or 1.

[Item B39]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B5, B8 to B23, and B27 to B38, wherein

L^3 is $-CH_2-$, $-CH(CH_2NH_2)-$, or $-CH(CH_2OH)-$, and

L^4 is a single bond, $-CH_2-$, $-CH(NH_2)-$, $-CMe(NH_2)-$, $-CEt(NH_2)-$, $-C(iso\text{-}Pr)(NH_2)-$, $-CH(CH_2NH_2)-$, $-CH(OH)-$, $-CH(CH_2OH)-$, or

[Chemical Formula 448]



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[Item B40]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B23 and B27 to B39, wherein R^5 is

1) C_{6-10} aryl, or

2) 5- to 10-membered heteroaryl,

(wherein each substituent from 1) to 2) is optionally substituted, and if two substituents further substituted with the substituent of 1) or 2) are each substituted on adjacent atoms within a ring,

the two substituents together may further form a condensed ring structure).

[Item B41]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B23 and B27 to B40, wherein

R^5 is C_6 aryl (i.e., phenyl) or 5-membered, 6-membered, 9-membered, or 10-membered heteroaryl,

each group of R^5 is optionally substituted with each of R^{6a} or R^{6b} at all chemically substitutable positions on a carbon atom or a nitrogen atom within a ring thereof,

wherein R^{6a}, which are substituents on the carbon atom, if there are multiple instances on the same ring, are all independently selected from the group consisting of

1) a hydrogen atom,
2) a hydroxyl group,
3) a cyano group,
4) halogen,
5) a C_{1-4} alkyl group,
6) a C_{3-10} alicyclic group,
7) a C_{1-4} alkoxy group,
8) a C_{3-10} alicyclic oxy group,
9) a C_{6-10} aryloxy group,
10) a 5- or 6-membered heteroaryloxy group,
11) a 4- to 10-membered non-aryl heterocyclyl oxy group,

(wherein each substituent from 5) and 11) is optionally substituted),

12) $-SO_2-NR^{e2}R^{f2}$,
13) $-NR^{g2}-CR^{e2}(=NR^{f2})$,
14) $-NR^{g2}-CR^{e2}(=N-OR^{f2})$,
15) $-NR^{h2}-C(=NR^{g2})NR^{e2}R^{f2}$,
16) $-NR^{h2}-C(=N-OR^{g2})NR^{e2}R^{f2}$,
17) $-NR^{i2}-C(=NR^{h2})NR^{g2}-NR^{e2}R^{f2}$,
18) $-NR^{i2}-C(=N-OR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

19) $-C(=NR^{e2})R^{f2}$,

20) $-C(=N-OR^{e2})R^{f2}$,

21) $-C(=NR^{h2})-NR^{e2}R^{f2}$,

22) $-C(=NR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

23) $-C(=N-OR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

24) $-NR^{e2}R^{f2}$,

25) $-NR^{g2}-NR^{e2}R^{f2}$,

26) $-NR^{e2}OR^{f2}$,

27) $-NR^{e2}-C(=O)R^{f2}$,

28) $-C(=O)NR^{e2}R^{f2}$,

29) $-C(=O)NR^{e2}OR^{f2}$,

30) $-C(=O)NR^{g2}-NR^{e2}R^{f2}$,

31) $-C(=O)R^{e2}$,

32) $-C(=O)OR^{e2}$, and

33) $-C(=N-OR^{h2})NR^{e2}R^{f2}$,

wherein R^{6b},which are substituents on the nitrogen atom, if there are multiple instances on the same ring, are all independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted),

4) a C_{3-10} alicyclic group

(wherein the alicyclic group is optionally substituted),

5) $-C(=NR^{e2})R^{f2}$,

6) $-C(=N-OR^{e2})R^{f2}$,

7) $-SO_2-NR^{e2}R^{f2}$,

8) $-C(=NR^{h2})-NR^{e2}R^{f2}$,

9) $-C(=NR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

10) $-C(=N-OR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

11) $-C(=O)NR^{e2}R^{f2}$,

12) $-C(=O)NR^{e2}OR^{f2}$,

13) $-C(=O)NR^{g2}-NR^{e2}R^{f2}$,

14) $-C(=O)R^{e2}$, and

15) $-C(=N-OR^{h2})NR^{e2}R^{f2}$, or

if a combination of two R^{6a} or R^{6a} and R^{6b} are each substituted on adjacent atoms within a ring, the two substituents together may form an optionally substituted 5- to 6-membered heteroaryl ring or an optionally substituted 5- to 7-membered non-aryl heterocycle, which further fuses to an attachment moiety between the adjacent atoms within the ring,

R^{e2}, R^{f2}, R^{g2}, R^{h2}, and R^{i2} are the same or different, each independently

1) a hydrogen atom,

2) a C_{1-6} alkyl group,

3) a C_{3-10} alicyclic group,

4) C_{6-10} aryl,

5) 5- or 6-membered heteroaryl, or

6) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 2) to 6) is optionally substituted), and

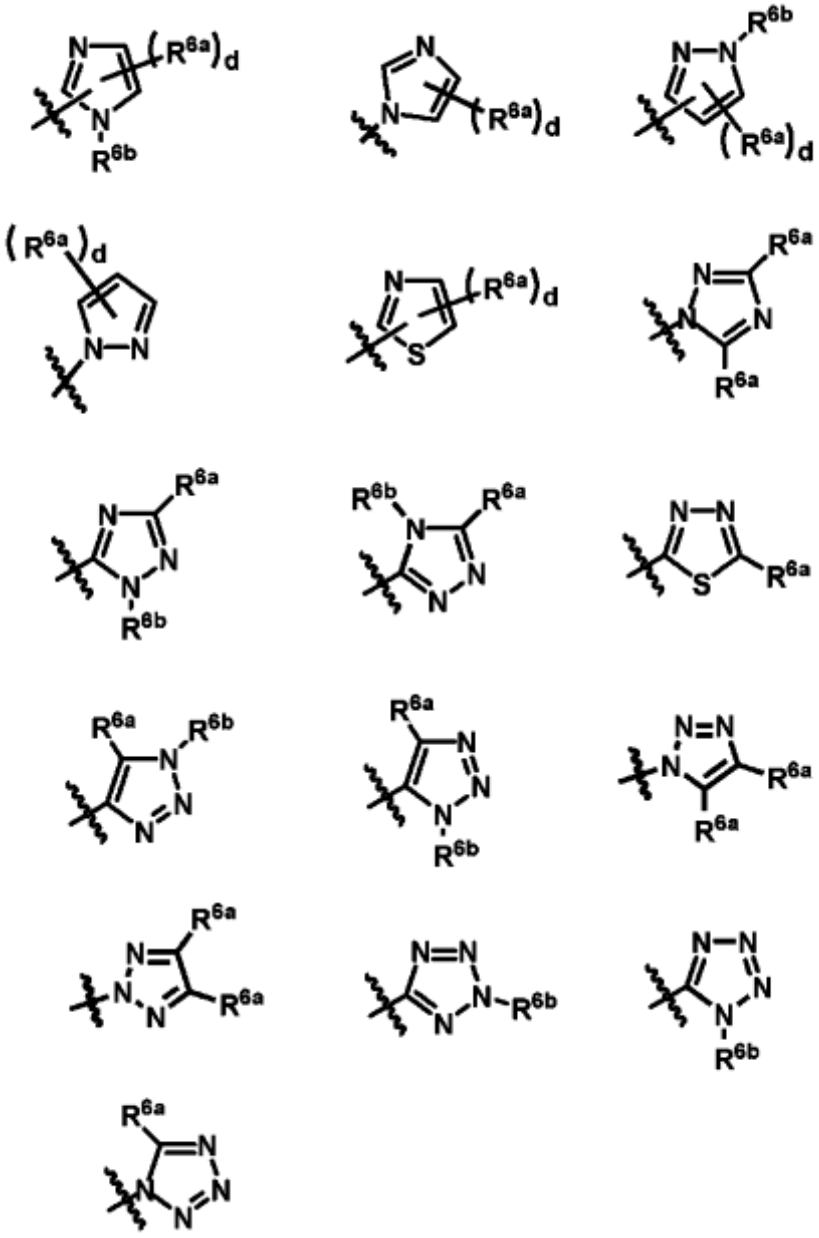
a combination of R^{e2} and R^{f2}, when attached to the same nitrogen atom, together may form an optionally substituted 4- to 10-membered nitrogen-containing non-aryl heterocycle.

[Item B42]

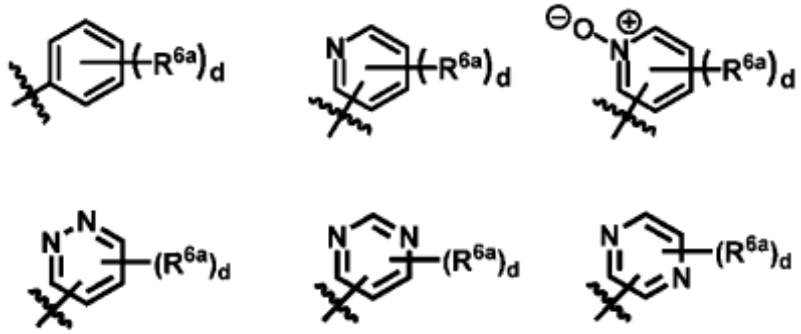
The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B23 and B27 to B41, wherein

R^5 is C_6 aryl or 5-membered, 6-membered, 9-membered, or 10-membered heteroaryl selected from the group consisting of

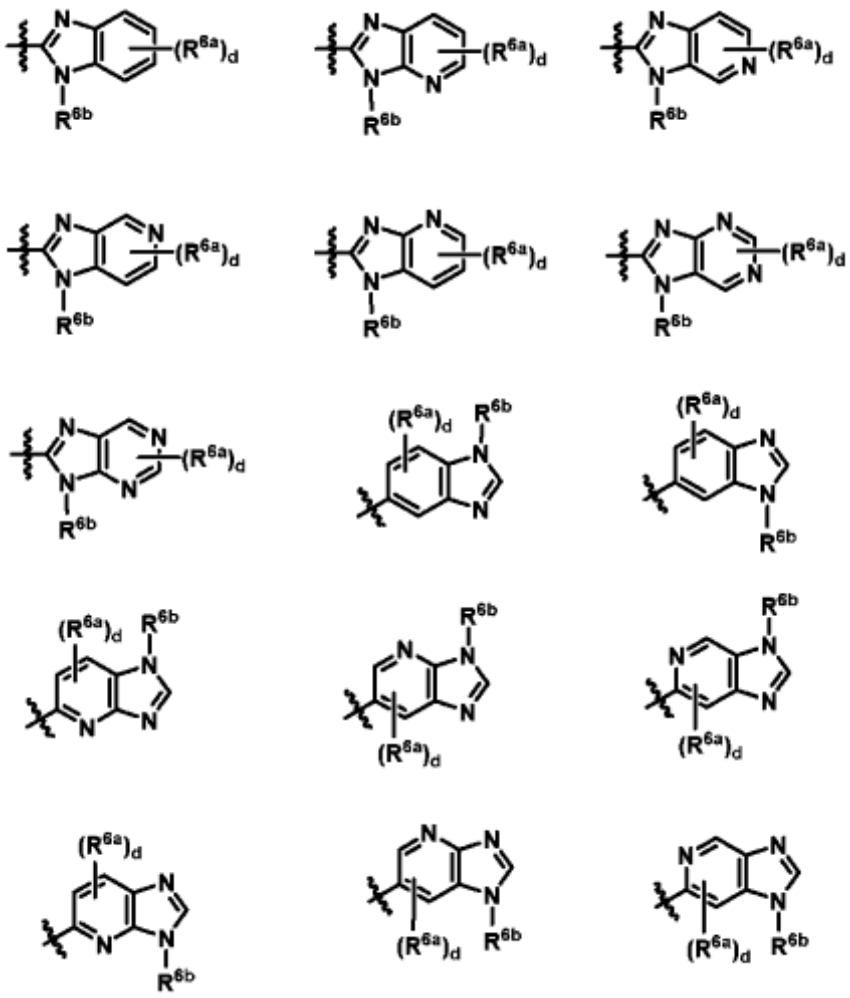
[Chemical Formula 449]



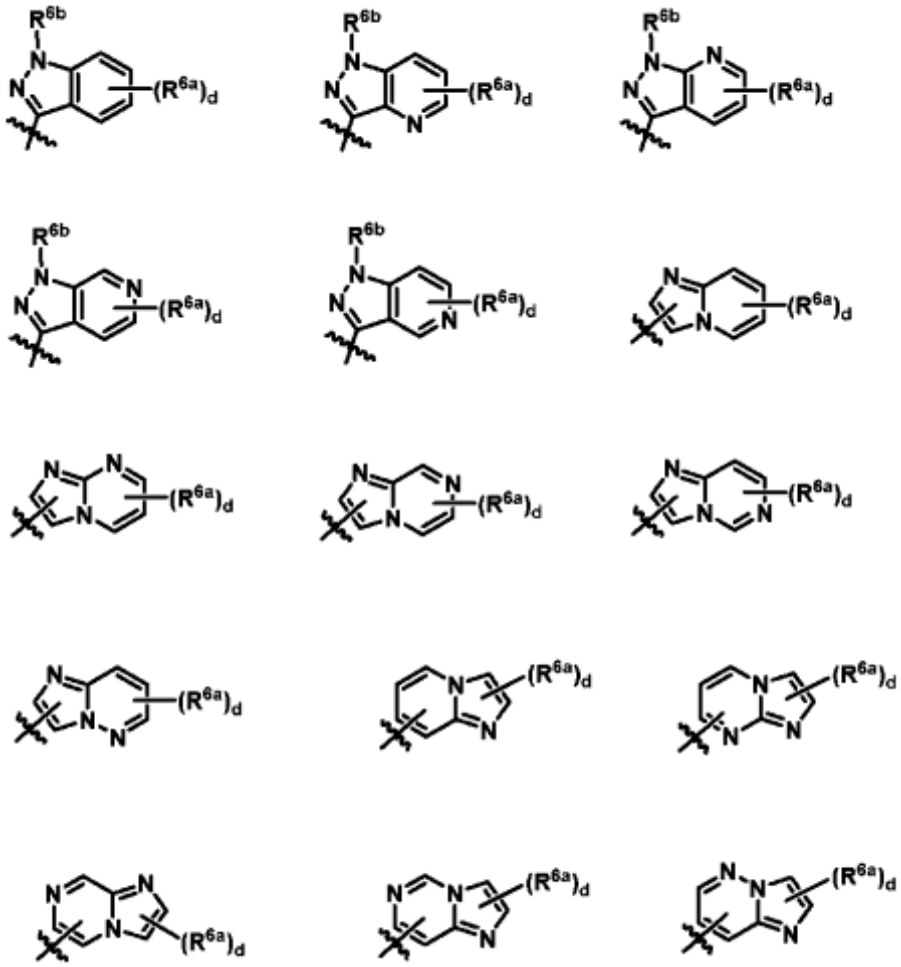
[Chemical Formula 450]



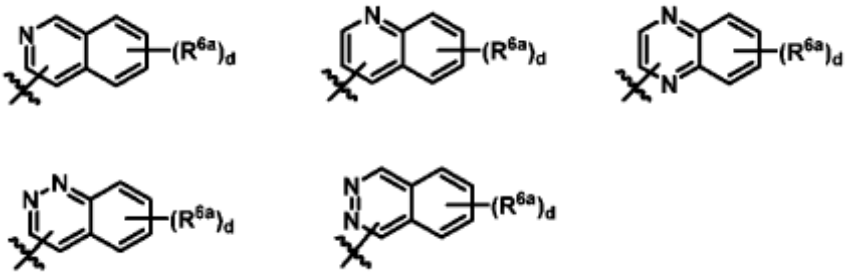
[Chemical Formula 451]



[Chemical Formula 452]



[Chemical Formula 453]



,

d is the number of chemically substitutable positions on a ring of each group by R^{6a}, and

each R^{6a} and each R^{6b} are defined the same as item B41.

[Item B43]

The compound or the pharmaceutically acceptable salt thereof according to item B41 or B42, wherein

R^{6a}, if there are multiple instances on the same ring, are all independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) halogen,

4) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted with $NR^{e2}R^{f2}$, $-C(=O)OR^{f2}$, $-C(=O)NR^{e2}R^{f2}$, $-C(=O)NR^{e2}(OR^{f2})$, or a hydroxyl group),

5) a C_{1-4} alkoxy group,

6) $-NR^{e2}R^{f2}$,

7) $-C(=O)NR^{e2}R^{f2}$, and

8) $-C(=O)OR^{e2}$, and

each R^{6b}, if there are multiple instances on the same ring, are all independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group, and

3) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted with $NR^{e2}R^{f2}$, $-C(=O)OR^{f2}$, $-C(=O)NR^{e2}R^{f2}$, $-C(=O)NR^{e2}(OR^{f2})$, or a hydroxyl group).

[Item B44]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B23 and B27 to B43, wherein R^{e2} and R^{f2} are the same or different, each independently a hydrogen atom, an optionally substituted C_{1-6} alkyl group, or an optionally substituted C_{3-10} alicyclic group.

[Item B45]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B23 and B27 to B44, wherein R^{e2} and R^{f2} are the same or different, each independently a hydrogen atom or an optionally substituted C_{1-6} alkyl group.

[Item B46]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B23 and B27 to B45, wherein R^{e2} and R^{f2} are hydrogen atoms.

[Item B47]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B41 to B46, wherein R^{6a} is $-NR^{e2}R^{f2}$, and one of R^{e2} and R^{f2} is a hydrogen atom and the other is a C_{1-4} alkyl group (wherein the alkyl group is optionally substituted with an amino group or a hydroxyl group).

[Item B48]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B23 and B27 to B39, wherein R^5 is $C(=O)NR^{50}R^{51}$.

[Item B49]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B23, B27 to B39, and B48, wherein

R^{50} represents

1) a hydrogen atom,
2) an optionally substituted C_{1-4} alkyl group,
3) a hydroxyl group,
4) an optionally substituted C_{1-4} alkoxy group, or
5) an optionally substituted C_{1-6} alkylsulfonyl group,

R^{51} represents

1) a hydrogen atom, or
2) an optionally substituted C_{1-4} alkyl group, or

R^{50} and R^{51} together may form a 4- to 6-membered nitrogen-containing non-aryl heterocycle.

[Item B50]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B23, B27 to B39, and B48 to B49, wherein

R^{50} represents

1) a hydrogen atom,

2) a C_{1-4} alkyl group (wherein the group is optionally substituted with halogen, a C_{3-6} alicyclic group, $-NR^{a21}R^{a22}$, or $-OR^{c11}$),

3) a hydroxyl group,

4) a C_{1-4} alkoxy group (wherein the group is optionally substituted with halogen, a C_{3-6} alicyclic group, $-NR^{a23}R^{a24}$, or $-OR^{c12}$), or

5) a C_{1-4} alkylsulfonyl group (wherein the group is optionally substituted with halogen, a C_{3-6} alicyclic group, $-NR^{a21}R^{a22}$, or $-OR^{c11}$),

R^{a21}, R^{a22}, R^{a23}, R^{a24}, R^{c11}, and R^{c12} are the same or different, each independently representing

1) a hydrogen atom, or

2) a C_{1-4} alkyl group (wherein the group is optionally substituted with halogen),

wherein each combination of R^{a21} and R^{a22} or R^{a23} and R^{a24} together may form an optionally substituted 4- to 7-membered nitrogen-containing non-aryl heterocycle, and

R^{51} is a hydrogen atom or C_{1-4} alkyl (wherein the group is optionally substituted with halogen).

[Item B51]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B23, B27 to B39, and B48 to B50, wherein

R^{50} represents

1) a hydrogen atom,

2) a C_{1-4} alkyl group (wherein the group is optionally substituted with a cyclopropyl group, $-NH_2$, -NHMe, or a -hydroxyl group),

3) a hydroxyl group,

4) a C_{1-4} alkoxy group (wherein the group is optionally substituted with a cyclopropyl group, $-NH_2$, -NHMe, or a -hydroxyl group), or

5) a C_{1-4} alkylsulfonyl group, and

R^{51} is a hydrogen atom.

[Item B52]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B23 and B27 to B39, wherein R^5 is $-C(=O)OR^{20}$.

[Item B53]

The compound or the pharmaceutically acceptable salt thereof according to item B52, wherein R^{20} is

1) a hydrogen atom, or

2) an optionally substituted C_{1-4} alkyl group.

[Item B54]

The compound or the pharmaceutically acceptable salt thereof according to item B53, wherein

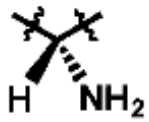
L^3 is $-CH_2-$, and

L^4 is $-CH(NH_2)-$ or $-CMe(NH_2)-$.

[Item B55]

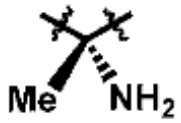
The compound or the pharmaceutically acceptable salt thereof according to item B54, wherein L^4 is

[Chemical Formula 454]



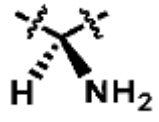
,

[Chemical Formula 455]



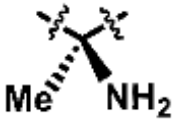
,

[Chemical Formula 456]



, or

[Chemical Formula 457]

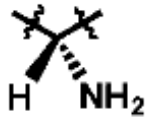


.

[Item B56]

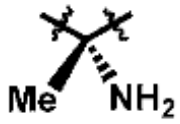
The compound or the pharmaceutically acceptable salt thereof according to item B54 or B55, wherein L^4 is

[Chemical Formula 458]



or

[Chemical Formula 459]



.

[Item B57]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B52 to B56, wherein R^{20} is a hydrogen atom.

[Item B58]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B23 and B27 to B39, wherein

R^5 is $-NR^{e1}R^{f1}$,

L^3 is $-CH_2-$,

L^4 is $-CR^{40}R^{41}-$, and

R^{40} and R^{41}, together with the carbon atom to which they are attached, form a C_{3-6} alicyclic group.

[Item B59]

The compound or the pharmaceutically acceptable salt thereof according to item B58, wherein

R^{e1} and R^{f1} are the same or different, each independently

1) a hydrogen atom, or

2) an optionally substituted C_{1-3} alkyl group, and

L^4 is

[Chemical Formula 460]



.

[Item B60]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B2 and B10 to B35, wherein L^4 is a single bond or a C_{1-6} alkylene group optionally substituted with $-NR^{21}R^{22}$ or $=NOR^{23}$, wherein R^{21}, R^{22}, and R^{23} are each independently a hydrogen atom, an optionally substituted C_{1-6} alkyl group, or an optionally substituted 4- to 10-membered non-aryl heterocyclyl carbonyl group.

[Item B61]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B2, B10 to B35, and B60, wherein L^4 is a single bond, $-CH_2-$, $-CH(NH_2)-$, $-CMe(NH_2)-$, $-CH(NHMe)-$, $-CD(NH_2)-$ (wherein D represents a heavy hydrogen atom), $-CH_2CH_2-$, or $-CH(NH_2)-CH_2-$, wherein if an amino group is present in L^4, carbon that attaches to the amino group attaches to L^3.

[Item B62]

The compound or the pharmaceutically acceptable salt thereof according to item B61, wherein

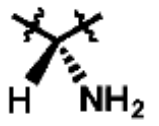
L^3 is $-C(=O)-$, and

L^4 is $-CH(NH_2)-$ or $-CMe(NH_2)-$.

[Item B63]

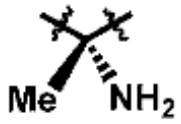
The compound or the pharmaceutically acceptable salt thereof according to item B62, wherein L^4 is an isomeric structure of one of

[Chemical Formula 461]



,

[Chemical Formula 462]



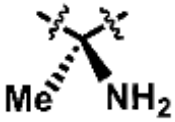
,

[Chemical Formula 463]



, and

[Chemical Formula 464]

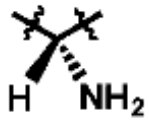


.

[Item B64]

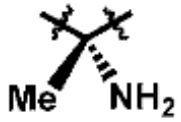
The compound or the pharmaceutically acceptable salt thereof according to item B62 or B63, wherein L^4 is

[Chemical Formula 465]



or

[Chemical Formula 466]



.

[Item B65]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B2, B10 to B35, and B60 to B64, wherein R^5 is a hydrogen atom, an optionally substituted C_{1-6} alkyl group, an optionally substituted 4- to 10-membered non-aryl heterocycle, optionally substituted C_{6-10} aryl, optionally substituted 5- or 6-membered heteroaryl, an optionally substituted C_{1-6} alkylthio group, or $-NR^{e1}OH$, wherein R^{e1} is a hydrogen atom or an optionally substituted C_{1-6} alkyl group.

[Item B66]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B2, B10 to B35, and B60 to B65, wherein R^5 is optionally substituted 5- or 6-membered heteroaryl or optionally substituted C_{6-10} aryl.

[Item B67]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B2, B10 to B35, and B60 to B66, wherein R^5 is optionally substituted 5- or 6-membered heteroaryl.

[Item B68]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B2, B10 to B35, and B60 to B67, wherein R^5 is an optionally substituted 4- to 10-membered non-aryl heterocycle.

[Item B69]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B2, B10 to B35, and B60 to B65, wherein L^4 is a single bond, and R^5 is $-NR^{e1}OH$, wherein R^{e1} is a hydrogen atom or an optionally substituted C_{1-6} alkyl group.

[Item B70]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B2 and B10 to B35, wherein

L^4 is

1) $-(CH_2)_p-CR^{10}(NHR^{11})-$,

2) $-(CH_2)_q-CR^{12}R^{13}-$, or

3) $-(CH_2)_p-CR^{10}(NHR^{11})-(CH_2)_q-CR^{12}R^{13}-$ (wherein p and q are independently 0 or 1),

R^{10} is

1) a hydrogen atom,

2) a carboxyl group, or

3) $-C(=O)NR^{10a}R^{10b}$,

R^{11} is

1) a hydrogen atom,

2) $-C(=O)R^{11a}$, or

3) an optionally substituted 5- or 6-membered non-aryl heterocyclyl carbonyl group,

wherein if R^{10} is $-C(=O)NR^{10a}R^{10b}$, R^{10b} and R^{11} together may form $-CH_2CH_2-$,

R^{12} is

1) a hydrogen atom, or

2) an optionally substituted C_{1-4} alkyl group,

R^{13} is

1) a hydrogen atom,

2) a hydroxyl group,

3) an optionally substituted C_{1-4} alkyl group,

4) a sulfanyl group,

5) a carboxyl group,

6) an optionally substituted C_{1-4} alkylthio group,

7) $-NR^{13a}R^{13b}$,

8) $-NR^{13a}-C(=O)R^{13b}$,

9) an optionally substituted 5- or 6-membered non-aryl heterocyclyl carbonylamino group,

10) $-NR^{13a}-C(=O)NR^{13b}R^{13c}$,

11) $-C(=O)NR^{13a}R^{13b}$,

12) $-C(=O)NR^{13a}OR^{13b}$,

13) $-S(=O)_2-R^{13a}$,

14) $-S(=O)_2-NR^{13a}R^{13b}$,

15) $-C(=O)NR^{13a}-S(=O)_2-R^{13b}$ or

16) $-C(=O)NR^{13a}-S(=O)_2-NR^{13b}R^{13c}$, and

R^{10a}, R^{10b}, R^{11a}, R^{13a}, R^{13b}, and R^{13c} are each independently a hydrogen atom or an optionally substituted C_{1-4} alkyl group.

[Item B71]

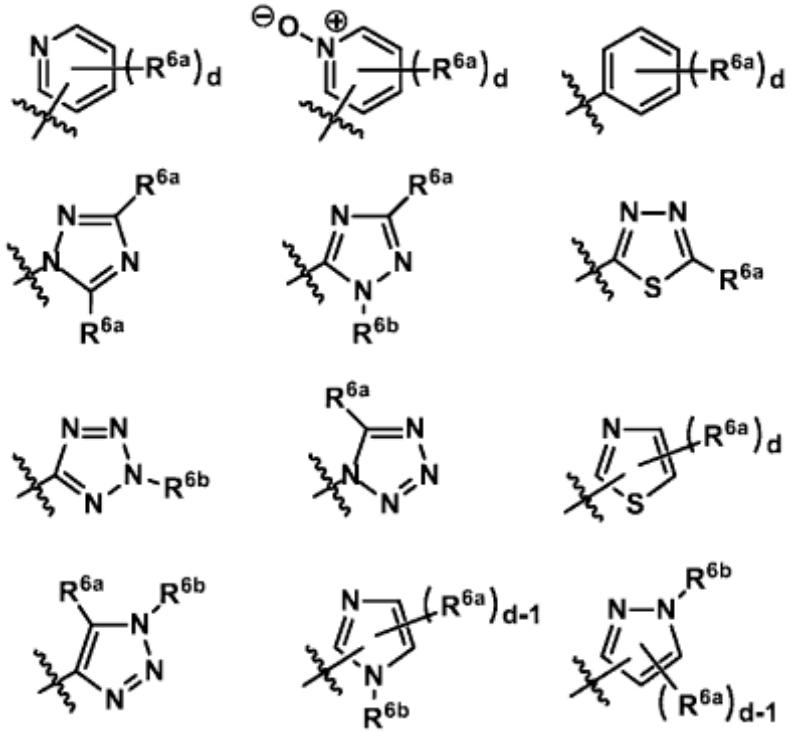
The compound or the pharmaceutically acceptable salt thereof according to item B70, wherein R^5 is a hydrogen atom or an optionally substituted C_{1-4} alkyl group.

[Item B72]

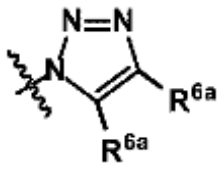
The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B2, B10 to B35, and B60 to B67, wherein

R^5 is selected from the group consisting of

[Chemical Formula 467]



[Chemical Formula 468]



,

subscript d is the number of substitutable positions on a ring of R^5,

each R^{6a} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) a cyano group,

4) a nitro group,

5) halogen,

6) a C_{1-4} alkyl group,

7) a C_{3-10} alicyclic group,

8) a C_{1-4} alkoxy group,

9) a C_{3-10} alicyclic oxy group,

10) a C_{6-10} aryloxy group,

11) a 5- or 6-membered heteroaryloxy group,

12) a 4- to 10-membered non-aryl heterocyclyl oxy group,

(wherein each substituent from 6) to 12) is optionally substituted),

13) $-SO_2-NR^{e2}R^{f2}$,

14) $-NR^{g2}-CR^{e2}(=NR^{f2})$,

15) $-NR^{g2}-CR^{e2}(=N-OR^{f2})$,

16) $-NR^{h2}-C(=NR^{g2})NR^{e2}R^{f2}$,

17) $-NR^{h2}-C(=N-OR^{g2})NR^{e2}R^{f2}$,

18) $-NR^{i2}-C(=NR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

19) $-NR^{i2}-C(=N-OR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

20) $-C(=NR^{e2})R^{f2}$,

21) $-C(=N-OR^{e2})R^{f2}$,

22) $-C(=NR^{h2})-NR^{e2}R^{f2}$,

23) $-C(=NR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

24) $-C(=N-OR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

25) $-NR^{e2}R^{f2}$,

26) $-NR^{g2}-NR^{e2}R^{f2}$,

27) $-NR^{e2}OR^{f2}$,

28) $-NR^{e2}-C(=O)R^{f2}$,

29) $-C(=O)NR^{e2}R^{f2}$,

30) $-C(=O)NR^{e2}OR^{f2}$,

31) $-C(=O)NR^{g2}-NR^{e2}R^{f2}$,

32) $-C(=O)R^{e2}$,

33) $-C(=O)OR^{e2}$, and

34) $-C(=N-OR^{h2})NR^{e2}R^{f2}$, and

each R^{6b} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted),

4) a C_{3-10} alicyclic group

(wherein the alicyclic group is optionally substituted),

5) $-C(=NR^{e2})R^{f2}$,

6) $-C(=N-OR^{e2})R^{f2}$,

7) $-SO_2-NR^{e2}R^{f2}$,

8) $-C(=NR^{h2})-NR^{e2}R^{f2}$,

9) $-C(=NR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

10) $-C(=N-OR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

11) $-C(=O)NR^{e2}R^{f2}$,

12) $-C(=O)NR^{e2}OR^{f2}$,

13) $-C(=O)NR^{g2}-NR^{e2}R^{f2}$,

14) $-C(=O)R^{e2}$, and

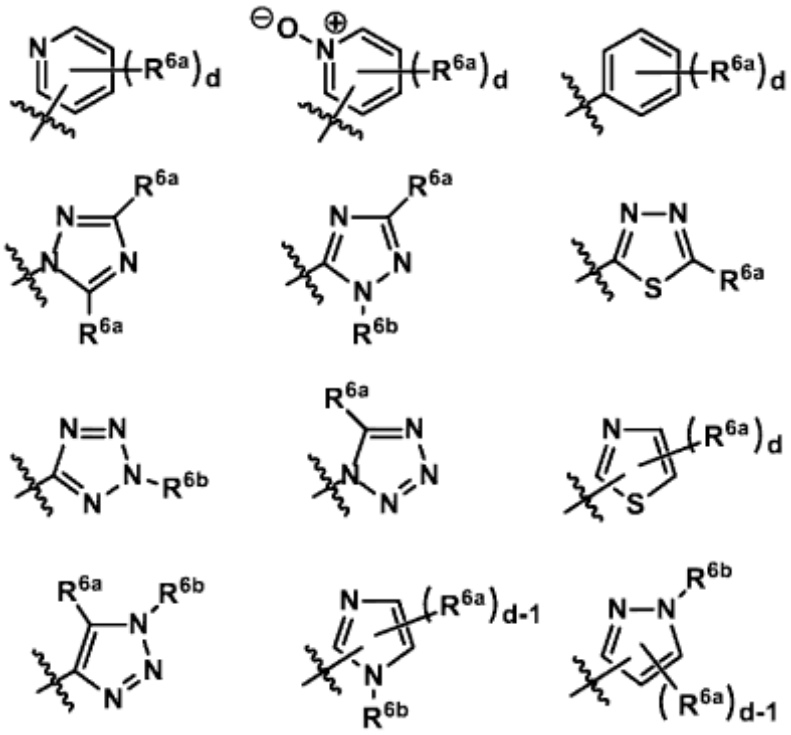
15) $-C(=N—OR^{h2})NR^{e2}R^{f2}$.

[Item B73]

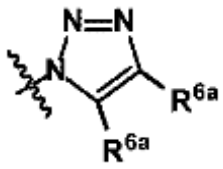
The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B2, B10 to B35, B60 to B67, and B72, wherein

R^5 is 5- or 6-membered aryl or heteroaryl selected from the group consisting of

[Chemical Formula 469]



[Chemical Formula 470]



,

subscript d is the number of substitutable positions on a ring of R^5,

each R^{6a} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) halogen,

4) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted with $NR^{e2}R^{f2}$, a 5- or 6-membered non-aryl heterocycle, $-C(=O)OR^{f2}$, or a hydroxyl group),

5) a C_{1-4} alkoxy group,

6) $-NR^{e2}R^{f2}$, and

7) $-C(=O)OR^{e2}$, and

each R^{6b} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group, and

3) a C_{1-4} alkyl group

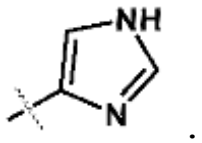
(wherein the alkyl group is optionally substituted with $NR^{e2}R^{f2}$, $-C(=O)NR^{e2}R^{f2}$, $-C(=O)OR^{f2}$, or a hydroxyl group).

[Item B74]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B2, B10 to B35, B60 to B67, and B72 to B73, wherein

R^5 is

[Chemical Formula 471]



.

[Item B75]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B2, B10 to B35, B60 to B67, and B72 to B73, wherein R^{e2} and R^{f2} are the same or different, each independently a hydrogen atom, an optionally substituted C_{1-6} alkyl group, or an optionally substituted C_{3-10} alicyclic group.

[Item B76]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B2, B10 to B35, B60 to B67, B72 to B73, and B75, wherein R^{e2} and R^{f2} are the same or different, each independently a hydrogen atom or an optionally substituted C_{1-6} alkyl group.

[Item B77]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B2, B10 to B35, B60 to B67, B72 to B73, and B75 to B76, wherein R^{e2} and R^{f2} are hydrogen atoms.

[Item B78]

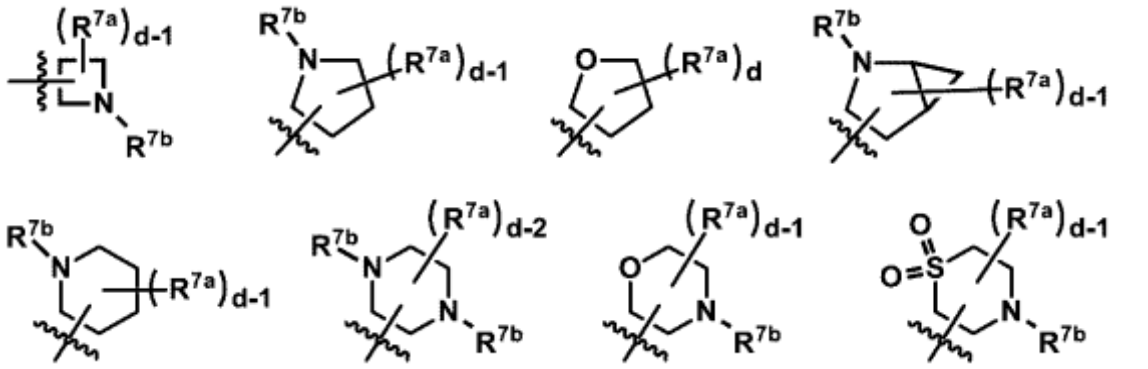
The compound or the pharmaceutically acceptable salt thereof according to any one of items B72 to 73 and B75 to B76, wherein R^{6a} is $-NR^{e2}R^{f2}$, and one of R^{e2} and R^{f2} is a hydrogen atom and the other is a C_{1-4} alkyl group (wherein the alkyl group is optionally substituted with an amino group or a hydroxyl group).

[Item B79]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B2, B10 to B35, B60 to B65, and B68, wherein

R^5 is a 4- to 6-membered non-aryl heterocycle selected from the group consisting of

[Chemical Formula 472]



,

subscript d is the number of substitutable positions on a ring of R^5,

each R^{7a} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) a cyano group,

4) halogen,

5) a C_{1-4} alkyl group,

6) a C_{3-10} alicyclic group,

7) a C_{1-4} alkoxy group,

8) a C_{3-10} alicyclic oxy group,

9) a C_{6-10} aryloxy group,

10) a 5- or 6-membered heteroaryloxy group,

11) a 4- to 10-membered non-aryl heterocyclyl oxy group,
(wherein each substituent from 5) and 11) is optionally substituted),
12) $-SO_2-NR^{e3}R^{f3}$,
13) $-NR^{g2}-CR^{e3}(=NR^{f3})$,
14) $-NR^{g2}-CR^{e3}(=N-OR^{f3})$,
15) $-NR^{h2}-C(=NR^{g2})NR^{e3}R^{f3}$,
16) $-NR^{h2}-C(=N-OR^{g2})NR^{e3}R^{f3}$,
17) $-NR^{i2}-C(=NR^{h2})NR^{g2}-NR^{e3}R^{f3}$,
18) $-NR^{i2}-C(=N-OR^{h2})NR^{g2}-NR^{e3}R^{f3}$,
19) $-C(=NR^{e3})R^{f3}$,
20) $-C(=N-OR^{e3})R^{f3}$,
21) $-C(=NR^{h2})-NR^{e3}R^{f3}$,
22) $-C(=NR^{h2})NR^{g2}-NR^{e3}R^{f3}$,
23) $-C(=N-OR^{h2})NR^{g2}-NR^{e3}R^{f3}$,
24) $-NR^{e3}R^{f3}$,
25) $-NR^{g2}-NR^{e3}R^{f3}$,
26) $-NR^{e3}OR^{f3}$,
27) $-NR^{e3}-C(=O)R^{f3}$,
28) $-C(=O)NR^{e3}R^{f3}$,
29) $-C(=O)NR^{e3}OR^{f3}$,
30) $-C(=O)NR^{g2}-NR^{e3}R^{f3}$,
31) $-C(=O)R^{e3}$,
32) $-C(=O)OR^{e3}$, and
33) $-C(=N-OR^{h2})NR^{e3}R^{f3}$,

each R^{7b} is independently selected from the group consisting of
1) a hydrogen atom,
2) a hydroxyl group,
3) a C_{1-4} alkyl group
(wherein the alkyl group is optionally substituted),
4) a C_{3-10} alicyclic group
(wherein the alicyclic group is optionally substituted),

5) $-C(=NR^{e3})R^{f3}$,

6) $-C(=N-OR^{e3})R^{f3}$,

7) $-SO_2-NR^{e3}R^{f3}$,

8) $-C(=NR^{h2})-NR^{e3}R^{f3}$,

9) $-C(=NR^{h2})NR^{g2}-NR^{e3}R^{f3}$,

10) $-C(=N-OR^{h2})NR^{g2}-NR^{e3}R^{f3}$,

11) $-C(=O)NR^{e3}R^{f3}$,

12) $-C(=O)NR^{e3}OR^{f3}$,

13) $-C(=O)NR^{g2}-NR^{e3}R^{f3}$,

14) $-C(=O)R^{e3}$, and

15) $-C(=N-OR^{h2})NR^{e3}R^{f3}$, and

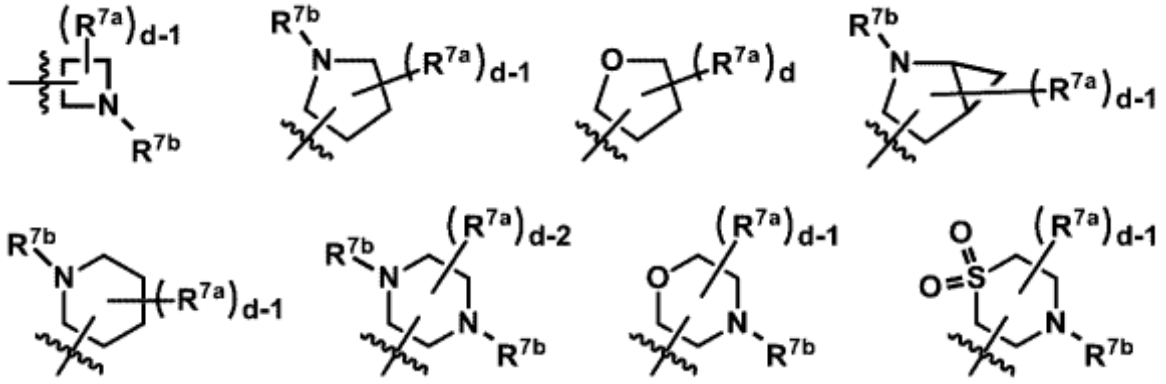
R^{e3} and R^{f3} are defined the same as R^{e2} and R^{f2} according to item B2.

[Item B80]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B2, B10 to B35, B60 to B65, B68, and B79, wherein

R^5 is a 4- to 6-membered non-aryl heterocycle selected from the group consisting of

[Chemical Formula 473]



,

subscript d is the number of substitutable positions on a ring of R^5,

each R^{7a} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) halogen,

4) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted with $NR^{e3}R^{f3}$, a 5- or 6-membered non-aryl heterocycle, $-C(=O)OR^{f3}$, or a hydroxyl group),

5) a C_{1-4} alkoxy group,

6) $-NR^{e3}R^{f3}$,

7) $-C(=O)OR^{e3}$,

8) C_{6-10} aryl, and

9) $-C(=O)NR^{e3}R^{f3}$,

each R^{7b} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group, and

3) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted with $NR^{e3}R^{f3}$, $-C(=O)OR^{f3}$, or a hydroxyl group), and

R^{e3} and R^{f3} are defined the same as R^{e2} and R^{f2} according to any of items B75 to B77.

[Item B81]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B2, B10 to B35, and B70 to B71, wherein

L^4 is $-CH(NH_2)-CHR^{13}-$, wherein carbon that attaches to the NH_2 attaches to L^3,

R^5 is a hydrogen atom, and

R^{13} is

1) $-NH-C(=O)CH_3$,

2) $-NH-C(=O)NH_2$,

3) $-NH-C(=O)CH(NH_2)-CH_2C(=O)NH_2$,

4) $-NH-C(=O)CH_2-NH_2$,

5) $-NH-C(=O)CH(NH_2)-CH_2OH$, or

6) a pyrrolidin-2-ylcarbonylamino group.

[Item B82]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B2, B10 to B35, and B70 to B71, wherein

L^4 is $-CH(NH_2)-CR^{12}R^{13}-$, wherein carbon that attaches to the NH_2 attaches to L^3,

R^5 is a hydrogen atom or methyl,

R^{12} is a hydrogen atom or methyl, and

R^{13} is a benzylthio group or a sulfanyl group.

[Item B83]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B2, B10 to B35, and B70 to B71, wherein

L^4 is $-CH(NH_2)-(CH_2)_q-CHR^{13}-$, wherein q is 0 or 1, and carbon that attaches to the NH_2 attaches to L^3,

R^5 is a hydrogen atom, and

R^{13} is

1) a carboxyl group,

2) $-C(=O)NH_2$,

3) $-C(=O)NH(CH_3)$,

4) $-C(=O)N(CH_3)_2$,

5) $-C(=O)NH-(CH_2)_2-OH$,

6) $-C(=O)NH-(CH_2)_2-NH_2$,

7) $-C(=O)NH-S(=O)_2-CH_3$,

8) $-C(=O)NHOH$,

9) $-S(=O)_2-NH_2$,

10) $-S(=O)_2-CH_3$, or

11) a hydroxyl group.

[Item B84]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B2, B10 to B35, and B70 to B71, wherein

L^4 is $-CH(NHR^{11})-CH_2-$, wherein carbon that attaches to the NHR^{11} attaches to L^3,

R^5 is hydrogen, and

R^{11} is

1) $-C(=O)CH(NH_2)-CH_2C(=O)NH_2$,

2) $-C(=O)CH_2-NH_2$,

3) $-C(=O)CH(CH_3)-NH_2$,

4) $-C(=O)CH(NH_2)-CH_2OH$, or

5) pyrrolidin-2-ylcarbonyl.

[Item B85]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B2, B10 to B35, and B70 to B71, wherein

L^4 is $-CH(NHR^{11})-CH(COOH)-$, wherein carbon that attaches to the NHR^{11} attaches to L^3,

R^5 is hydrogen, and

R^{11} is

1) $-C(=O)CH(NH_2)-CH_2C(=O)NH_2$,

2) $-C(=O)CH_2-NH_2$,

3) $-C(=O)CH(CH_3)-NH_2$,

4) $-C(=O)CH(NH_2)-CH_2OH$, or

5) pyrrolidin-2-ylcarbonyl.

[Item B86]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B2, B10 to B35, and B70 to B71, wherein

L^4 is $-CHR^{13}-$ or $-CH_2-CHR^{13}-$,

R^5 is hydrogen, and

R^{13} is $-C(=O)NH_2$ or $-C(=O)NHOH$.

[Item B87]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B2, B10 to B35, and B70 to B71, wherein

L^4 is $-CH_2-CR^{10}(NH_2)-$, wherein the CH_2 group attaches to L^3,

R^5 is hydrogen, and

R^{10} is a carboxy group or $-C(=O)NH_2$.

[Item B88]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B2, B10 to B35, and B70 to B71, wherein

L^4 is $-(CH_2)_p-CR^{10}(NHR^{11})-(CH_2)_q-CHR^{13}-$ or $-CHR^{13}-(CH_2)_q-CR^{10}(NHR^{11})-(CH_2)_p-$, wherein q is 0 or 1,

R^5 is hydrogen,

(1) if L^4 is $-CHR^{13}-(CH_2)_q-CR^{10}(NHR^{11})-(CH_2)_p-$,

carbon of the $-CHR^{13}-$ group attaches to L^3,

p is 0,

R^{10} is a hydrogen atom, a carboxyl group, or $-C(=O)NHR^{10b}$,

R^{11} is a hydrogen atom,

R^{10b} is a hydrogen atom,

wherein if R^{10} is $-C(=O)NHR^{10b}$, R^{10b} and R^{11} together may form $-CH_2CH_2-$, and

R^{13} is a hydrogen atom, and

(2) if L^4 is $-(CH_2)_p-CR^{10}(NHR^{11})-(CH_2)_q-CHR^{13}-$,

carbon of the $-(CH_2)_p-$ group attaches to L^3,

p is 1,

R^{10} and R^{11} are both hydrogen atoms,

R^{13} is a carboxyl group or $-C(=O)NR^{13a}R^{13b}$, and

R^{13a} and R^{13b} are each independently a hydrogen atom or an optionally substituted C_{1-4} alkyl group.

[Item B89]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B2, B10 to B35, and B70 to B71, wherein

L^4 is $-CR^{12}(NH_2)-$,

R^{12} is a hydrogen atom or a methyl group, and

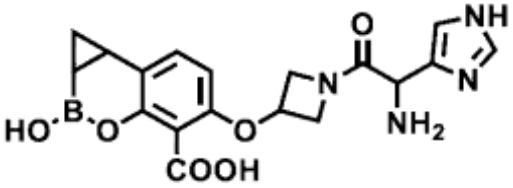
R^5 is a C_{1-4} alkyl group optionally substituted with a hydroxyl group.

[Item B90]

The compound or the pharmaceutically acceptable salt thereof according to item B1, selected from the group consisting of the compounds represented by the following names or structural formulas:

5-({1-[amino(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

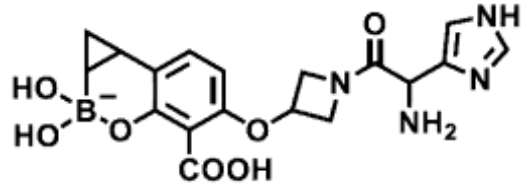
[Chemical Formula 474]



,

9-[1-[2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

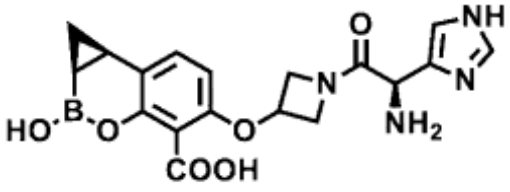
[Chemical Formula 475]



,

(1aS,7bR)-5-({1-[(2R)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

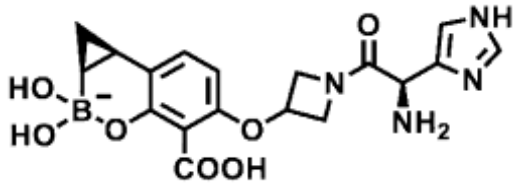
[Chemical Formula 476]



,

(2R,4S)-9-[1-[(2R)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

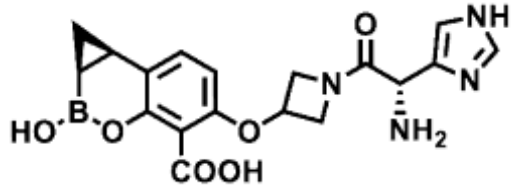
[Chemical Formula 477]



,

(1aS,7bR)-5-({1-[(2S)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

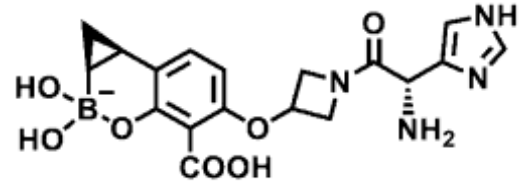
[Chemical Formula 478]



,

(2R,4S)-9-[1-[(2S)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

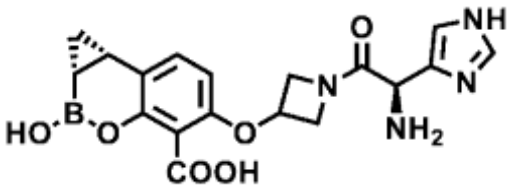
[Chemical Formula 479]



,

(1aR,7bS)-5-({1-[(2R)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

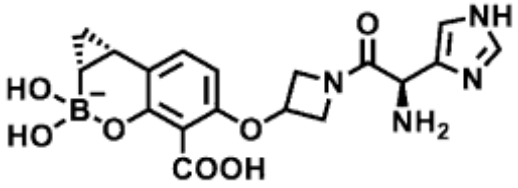
[Chemical Formula 480]



,

(2S,4R)-9-[1-[(2R)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

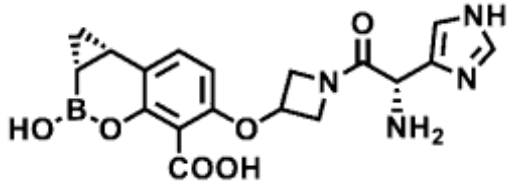
[Chemical Formula 481]



,

(1aR,7bS)-5-({1-[(2S)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

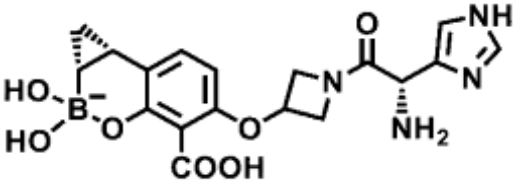
[Chemical Formula 482]



,

(2S,4R)-9-[1-[(2S)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

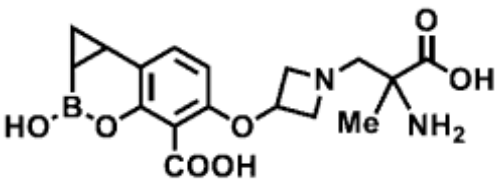
[Chemical Formula 483]



,

5-({1-(2-amino-2-carboxypropyl)azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

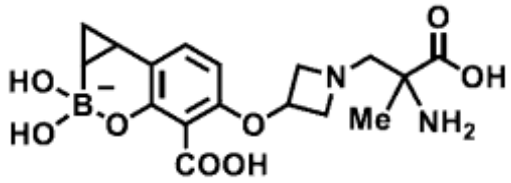
[Chemical Formula 484]



,

9-[1-(2-amino-2-carboxylatopropyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

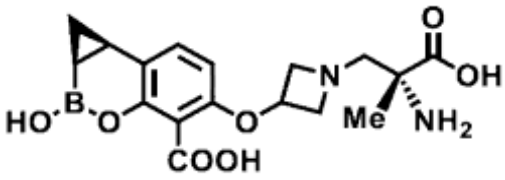
[Chemical Formula 485]



,

(1aS,7bR)-5-({1-[(2R)-2-amino-2-carboxypropyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

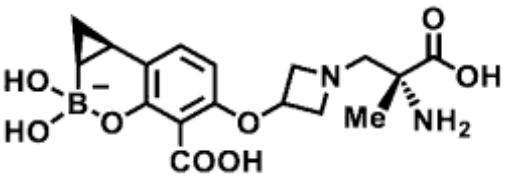
[Chemical Formula 486]



,

(2R,4S)-9-[1-[(2R)-2-amino-2-carboxylatopropyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

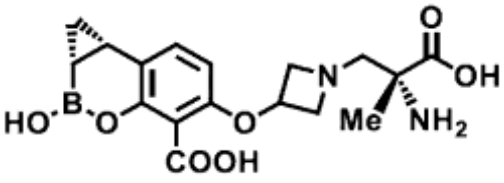
[Chemical Formula 487]



,

(1aR,7bS)-5-({1-[(2R)-2-amino-2-carboxypropyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

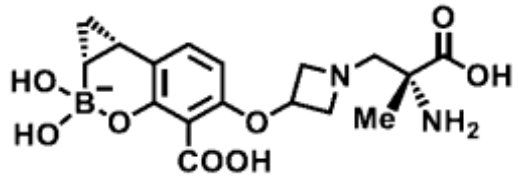
[Chemical Formula 488]



,

(2S,4R)-9-[1-[(2R)-2-amino-2-carboxylatopropyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

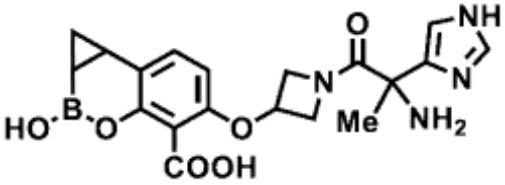
[Chemical Formula 489]



,

5-({1-[2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

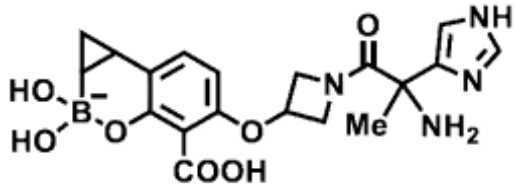
[Chemical Formula 490]



,

9-[1-[2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

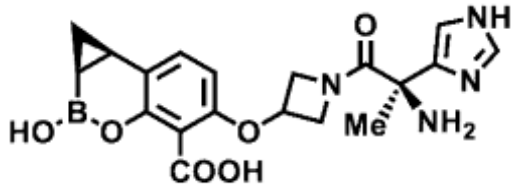
[Chemical Formula 491]



,

(1aS,7bR)-5-({1-[(2R)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

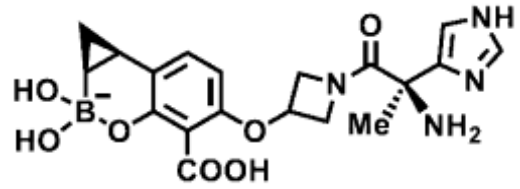
[Chemical Formula 492]



,

(2R,4S)-9-[1-[(2R)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

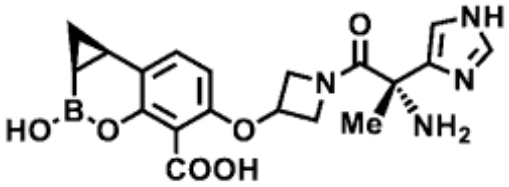
[Chemical Formula 493]



,

(1aS,7bR)-5-({1-[(2S)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

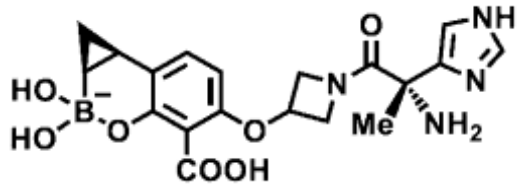
[Chemical Formula 494]



,

(2R,4S)-9-[1-[(2S)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

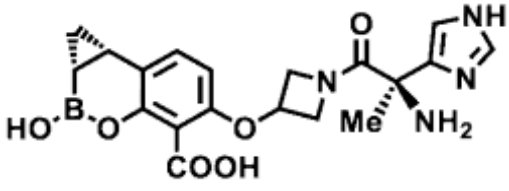
[Chemical Formula 495]



,

(1aR,7bS)-5-({1-[(2R)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

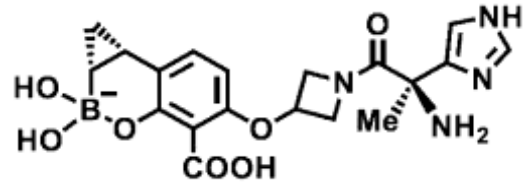
[Chemical Formula 496]



,

(2S,4R)-9-[1-[(2R)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

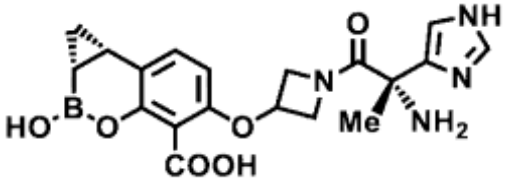
[Chemical Formula 497]



,

(1aR,7bS)-5-({1-[(2S)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

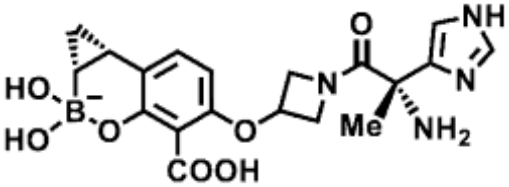
[Chemical Formula 498]



, and

(2S,4R)-9-[1-[(2S)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

[Chemical Formula 499]

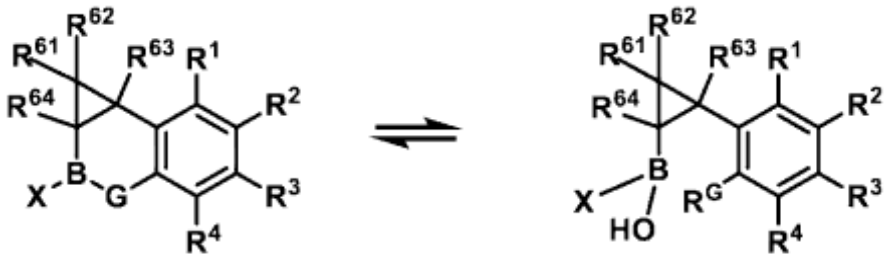


.

[Item B91]

A compound represented by formula (11):

[Chemical Formula 500]



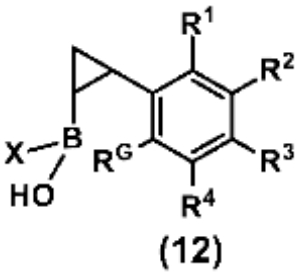
or a pharmaceutically acceptable salt thereof,

wherein R^G is a hydroxyl group, a thiol group, or $-NHR^{a1}$, R^{a1}, X, R^1, R^2, R^3, R^4, R^{61}, R^{62}, R^{63}, and R^{64} are defined the same as the definition according to any one of items B1 to B15, and formula (1a) is defined the same as item B1.

[Item B92]

The compound or the pharmaceutically acceptable salt thereof according to item B91, wherein the compound of formula (11) is represented by formula (12):

[Chemical Formula 501]

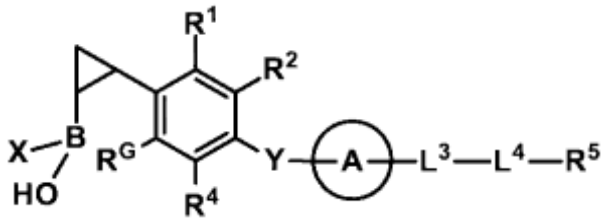


wherein X, R^1, R^2, R^3, and R^4 are defined the same as the definition according to item B16 or B17.

[Item B93]

The compound or the pharmaceutically acceptable salt thereof according to item B91 or B92, wherein the compound of formula (11) or formula (12) is represented by formula (13):

[Chemical Formula 502]



(13)

wherein X, Y, ring A, L^3, L^4, R^1, R^2, R^4, and R^5 are defined the same as the definition according to any one of items B18 to B22 and B28 to B31.

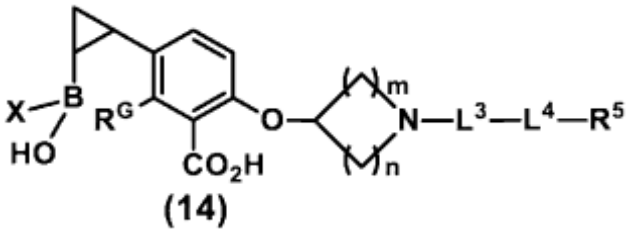
[Item B94]

The compound or the pharmaceutically acceptable salt thereof according to item B93, wherein X and R^G are hydroxyl groups, R^4 is a carboxyl group, and ring A is an optionally substituted 4- to 6-membered nitrogen-containing non-aryl heterocycle.

[Item B95]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B91 to B94, wherein the compound of formula (11), formula (12), or formula (13) is represented by formula (14):

[Chemical Formula 503]



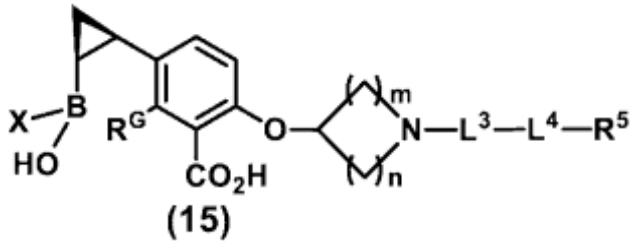
(14)

wherein X, L^3, L^4, m, n, and R^5 are defined the same as the definition according to any one of items B32 to B59.

[Item B96]

The compound or the pharmaceutically acceptable salt thereof according to item B95, wherein the compound of formula (14) is one of the enantiomers represented by formula (15):

[Chemical Formula 504]

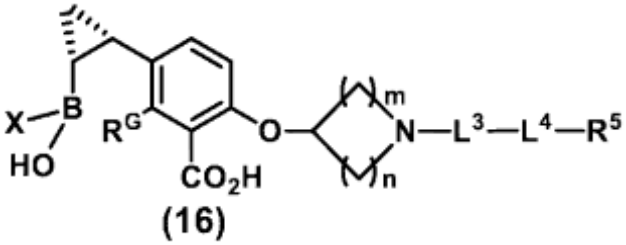


(15)

and

formula (16):

[Chemical Formula 505]



(16)

,

wherein X, L^3, L^4, m, n, and R^5 are defined the same as the definition according to any one of items B32 to B59.

[Item B97]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B91 to B96, wherein R^G is a hydroxyl group or a thiol group.

[Item B98]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B91 to B97, wherein R^G is a hydroxyl group.

[Item B99]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B91 to B98, wherein X is a hydroxyl group or a C_{1-6} alkoxy group.

[Item B100]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B91 to B99, wherein X is a hydroxyl group.

[Item B101]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B95 to B100, wherein m is 1 or 2, n is 1 or 2, and m + n is 2 or 3.

[Item B102]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B95 to B101, wherein m is 1, and n is 1.

[Item B103]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B91 to B102, wherein L^3 is defined the same as the definition according to item B24 or B25.

[Item B104]

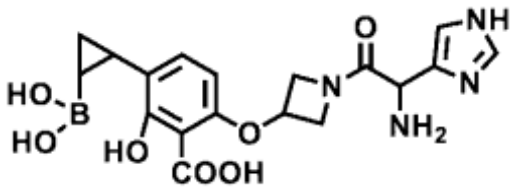
The compound or the pharmaceutically acceptable salt thereof according to any one of items B91 to B103, wherein L^4 and R^5 are defined the same as the definition according to any one of items B26 and B60 to B89.

[Item B105]

The compound or the pharmaceutically acceptable salt thereof according to item B92, selected from the group consisting of the compounds represented by the following names or structural formulas:

6-({1-[amino(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-3-(2-boronocyclopropyl)-2-hydroxybenzoic acid

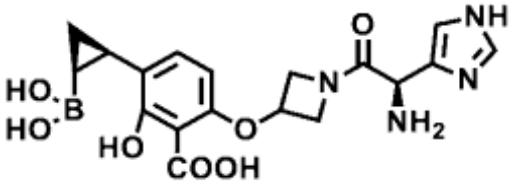
[Chemical Formula 506]



,

6-({1-[(2R)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

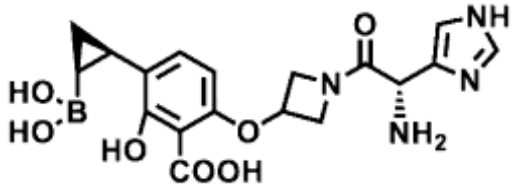
[Chemical Formula 507]



,

6-({1-[(2S)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

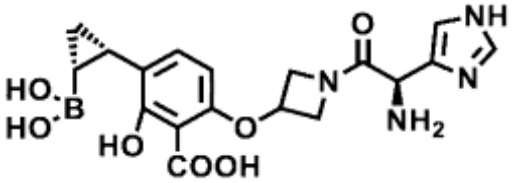
[Chemical Formula 508]



,

6-({1-[(2R)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

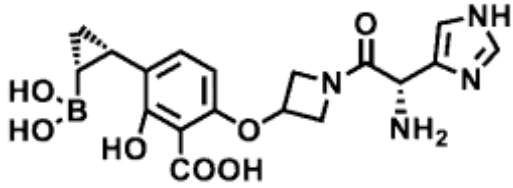
[Chemical Formula 509]



,

6-({1-[(2S)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

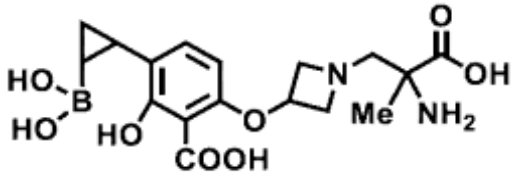
[Chemical Formula 510]



,

6-({1-(2-amino-2-carboxypropyl)azetidin-3-yl}oxy)-3-(2-boronocyclopropyl)-2-hydroxybenzoic acid

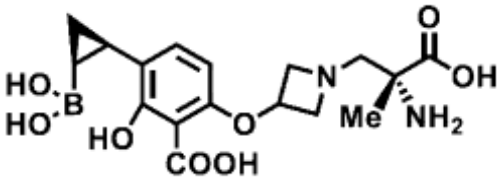
[Chemical Formula 511]



,

6-({1-[(2R)-2-amino-2-carboxypropyl]azetidin-3-yl}oxy)-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

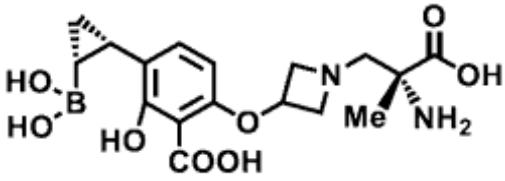
[Chemical Formula 512]



,

6-({1-[(2R)-2-amino-2-carboxypropyl]azetidin-3-yl}oxy)-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

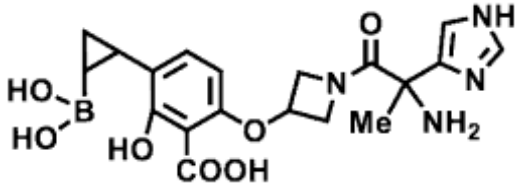
[Chemical Formula 513]



,

6-({1-[2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-3-(2-boronocyclopropyl)-2-hydroxybenzoic acid

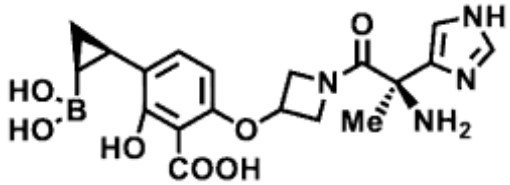
[Chemical Formula 514]



,

6-({1-[(2R)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

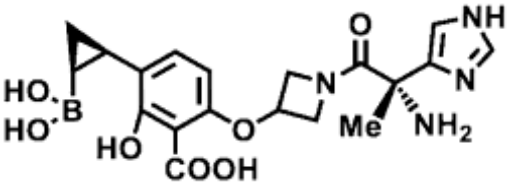
[Chemical Formula 515]



,

6-({1-[(2S)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

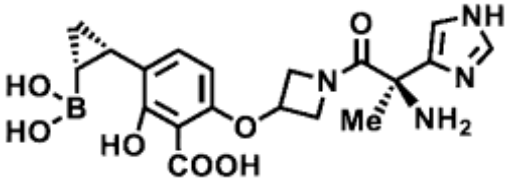
[Chemical Formula 516]



,

6-({1-[(2R)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

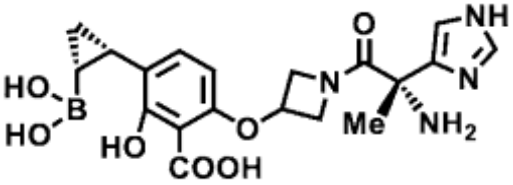
[Chemical Formula 517]



, and

6-({1-[(2S)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

[Chemical Formula 518]



.

[Item B106]

A medicament comprising the compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B105.

[Item B107]

The medicament according to item B106, which is a therapeutic drug or a prophylactic drug for a bacterial infection.

[Item B108]

An agent for inhibiting β-lactamase, comprising the compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B105 as an active ingredient.

[Item B109]

A pharmaceutical composition comprising the compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B105 and a pharmaceutically acceptable carrier.

[Item B110]

The pharmaceutical composition according to item B109, further comprising an additional agent.

[Item B111]

The pharmaceutical composition according to item B110, wherein the additional agent is selected from the group consisting of an antibacterial agent, an antifungal agent, an antiviral agent, an anti-inflammatory agent, and an anti-allergic agent.

[Item B112]

The pharmaceutical composition according to item B110 or B111, wherein the additional agent is a β-lactam agent.

[Item B113]

The pharmaceutical composition according to item B111 or B112, wherein a β-lactam agent, which is the additional agent, is selected from the group consisting of amoxicillin, ampicillin (pivampicillin, hetacillin, bacampicillin, metampicillin, and talampicillin), epicillin, carbenicillin (carindacillin), ticarcillin, temocillin, azlocillin, piperacillin, mezlocillin, mecillinam (pivmecillinam), sulbenicillin, benzylpenicillin (G), clometocillin, benzathine benzylpenicillin, procaine benzylpenicillin, azidocillin, penamecillin, phenoxymethyl penicillin (V), propicillin, benzathine phenoxymethylpenicillin, phenethicillin, cloxacillin (dicloxacillin and flucloxacillin), oxacillin, methicillin, nafcillin, faropenem, biapenem, doripenem, ertapenem, imipenem, meropenem, panipenem, tomopenem, razupenem, cefazolin, cefacetrile, cefadroxil, cephalexin, cefaloglycin, cefalonium, cefaloridine, cephalothin, cephapirin, cefatrizine, cefazedone, cefazaflur, cefradine, cefroxadine, ceftezole, cefaclor, cefamandole, cefminox, cefonicide, ceforanide, cefotiam, cefprozil, cefbuperazone, cefuroxime, cefuzonam, cefoxitin, cefotetan, cefmetazole, loracarbef, cefixime, ceftazidime, ceftriaxone, cefcapene, cefdaloxime, cefdinir, cefditoren, cefetamet, cefmenoxime, cefodizime, cefoperazone, cefotaxime, cefpimizole, cefpiramide, cefpodoxime, cefsulodin, cefteram,

ceftibuten, ceftiolene, ceftizoxime, flomoxef, latamoxef, cefepime, cefozopran, cefpirome, cefquinome, ceftobiprole, ceftaroline, CXA-101, RWJ-54428, MC-04546, ME1036, BAL30072, SYN2416, ceftiofur, cefquinome, cefovecin, aztreonam, tigemonam, carumonam, RWJ-442831, RWJ-333441, and RWJ-333442.

[Item B114]

The pharmaceutical composition according to item B112 or B113, wherein the β-lactam agent is selected from ceftazidime, biapenem, doripenem, ertapenem, imipenem, meropenem, or panipenem.

[Item B115]

The pharmaceutical composition according to item B112 or B113, wherein the β-lactam agent is selected from aztreonam, tigemonam, BAL30072, SYN2416, or carumonam.

[Item B116]

The pharmaceutical composition according to item B109, characterized in that an additional agent is concomitantly administered.

[Item B117]

The pharmaceutical composition according to item B116, wherein the additional agent is selected from an antibacterial agent, an antifungal agent, an antiviral agent, an anti-inflammatory agent, or an anti-allergic agent.

[Item B118]

The pharmaceutical composition according to item B116 or B117, wherein the additional agent is a β-lactam agent.

[Item B119]

The pharmaceutical composition according to item B117 or B118, wherein a β-lactam agent, which is the additional agent, is selected from the group consisting of amoxicillin, ampicillin (pivampicillin, hetacillin, bacampicillin, metampicillin, and talampicillin), epicillin, carbenicillin (carindacillin), ticarcillin, temocillin, azlocillin, piperacillin, mezlocillin, mecillinam (pivmecillinam), sulbenicillin, benzylpenicillin (G),

clometocillin, benzathine benzylpenicillin, procaine benzylpenicillin, azidocillin, penamecillin, phenoxymethyl penicillin (V), propicillin, benzathine phenoxymethylpenicillin, phenethicillin, cloxacillin (dicloxacillin and flucloxacillin), oxacillin, methicillin, nafcillin, faropenem, biapenem, doripenem, ertapenem, imipenem, meropenem, panipenem, tomopenem, razupenem, cefazolin, cefacetrile, cefadroxil, cephalexin, cefaloglycin, cefalonium, cefaloridine, cephalothin, cephapirin, cefatrizine, cefazedone, cefazaflur, cefradine, cefroxadine, ceftezole, cefaclor, cefamandole, cefminox, cefonicide, ceforanide, cefotiam, cefprozil, cefbuperazone, cefuroxime, cefuzonam, cefoxitin, cefotetan, cefmetazole, loracarbef, cefixime, ceftazidime, ceftriaxone, cefcapene, cefdaloxime, cefdinir, cefditoren, cefetamet, cefmenoxime, cefodizime, cefoperazone, cefotaxime, cefpimizole, cefpiramide, cefpodoxime, cefsulodin, cefteram, ceftibuten, ceftiolene, ceftizoxime, flomoxef, latamoxef, cefepime, cefozopran, cefpirome, cefquinome, ceftobiprole, ceftaroline, CXA-101, RWJ-54428, MC-04546, ME1036, BAL30072, SYN2416, ceftiofur, cefquinome, cefovecin, aztreonam, tigemonam, carumonam, RWJ-442831, RWJ-333441, and RWJ-333442.

[Item B120]

The pharmaceutical composition according to item B118 or B119, wherein the β-lactam agent is selected from the group consisting of ceftazidime, biapenem, doripenem, ertapenem, imipenem, meropenem, and panipenem.

[Item B121]

The pharmaceutical composition according to item B118 or B119, wherein the β-lactam agent is selected from the group consisting of aztreonam, tigemonam, BAL30072, SYN2416, and carumonam.

[Item B122]

The compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B105 for use in treating a bacterial infection.

[Item B123]

The compound or the pharmaceutically acceptable salt thereof according to item B122, wherein the bacterial infection is a bacterial infection in which a bacteria that can have a β-lactamase is involved.

[Item B124]

The compound or the pharmaceutically acceptable salt thereof according to item B122 or B123, wherein the bacterial infection is sepsis, febrile neutropenia, bacterial meningitis, bacterial endocarditis, otitis media, sinusitis, pneumonia, lung abscess, empyema, secondary infection of a chronic respiratory disease, pharyngolaryngitis, tonsillitis, osteomyelitis, arthritis, peritonitis, intraperitoneal abscess, cholecystitis, cholangitis, liver abscess, a deep skin infection, lymphangitis/lymphadenitis, secondary infection of trauma, burn injury, surgical wound, or the like, a urinary tract infection, a genital infection, eye infection, or an odontogenic infection.

[Item B125]

A medicament comprised of a combination of the compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B105 and at least one agent selected from the group consisting of therapeutic agents for sepsis, febrile neutropenia, bacterial meningitis, bacterial endocarditis, otitis media, sinusitis, pneumonia, lung abscess, empyema, secondary infection of a chronic respiratory disease, pharyngolaryngitis, tonsillitis, osteomyelitis, arthritis, peritonitis, intraperitoneal abscess, cholecystitis, cholangitis, liver abscess, a deep skin infection, lymphangitis/lymphadenitis, secondary infection of trauma, burn injury, surgical wound, or the like, a urinary tract infection, a genital infection, eye infection, and an odontogenic infection.

[Item B126]

A pharmaceutical composition comprising a β-lactam agent, wherein the pharmaceutical composition is administered with the

compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B105.

[Item B127]

A method for treating a bacterial infection, characterized in that a therapeutically effective amount of the compound or the pharmaceutically acceptable salt thereof according to any one of items B1 to B105 is administered to a patient in need thereof.

[Item B128]

The method according to item B127, wherein the bacterial infection is a bacterial infection in which a bacteria that can have a β-lactamase is involved.

[Item B129]

The method according to item B127 or B128, wherein the bacterial infection is sepsis, febrile neutropenia, bacterial meningitis, bacterial endocarditis, otitis media, sinusitis, pneumonia, lung abscess, empyema, secondary infection of a chronic respiratory disease, pharyngolaryngitis, tonsillitis, osteomyelitis, arthritis, peritonitis, intraperitoneal abscess, cholecystitis, cholangitis, liver abscess, a deep skin infection, lymphangitis/lymphadenitis, secondary infection of trauma, burn injury, surgical wound, or the like, a urinary tract infection, a genital infection, an eye infection, or an odontogenic infection.

[Item B130]

The method of any one of items B127 to B129, characterized in that an additional agent is concomitantly administered.

[0012]

The present invention is intended so that one or more of the features described above can be provided not only as the explicitly disclosed combinations, but also as other combinations thereof. Additional embodiments and advantages of the invention are recognized by those skilled in the art by reading and understanding the following detailed description as needed.

[Advantageous Effects of Invention]

[0013]

The compound of the invention has excellent inhibitory action against serine-β-lactamase with a serine residue at the center of enzymatic activity. A better embodiment of the compound of the invention is expected to have a broad β-lactamase inhibitory action or metallo-β-lactamase inhibitory action with zinc (Zn^{2+}) at the center of enzymatic activity against multiple types of β-lactamases. Therefore, the compound of the invention is useful alone or in concomitant use with a β-lactam agent as a therapeutic agent and/or prophylactic agent for a bacterial infection in which a bacteria that can have a β-lactamase is involved, i.e., sepsis, febrile neutropenia, bacterial meningitis, bacterial endocarditis, otitis media, sinusitis, pneumonia, lung abscess, empyema, secondary infection of a chronic respiratory disease, pharyngolaryngitis, tonsillitis, osteomyelitis, arthritis, peritonitis, intraperitoneal abscess, cholecystitis, cholangitis, liver abscess, a deep skin infection, lymphangitis/lymphadenitis, secondary infection of trauma, burn injury, surgical wound, or the like, a urinary tract infection, a genital infection, an eye infection, or an odontogenic infection.

[Description of Embodiments]

[0014]

The present invention is described hereinafter in more detail.

Throughout the entire specification, a singular expression should be understood as encompassing the concept thereof in the plural form, unless specifically noted otherwise. Thus, singular articles (e.g., "a", "an", "the", and the like in the case of English) should also be understood as encompassing the concept thereof in the plural form, unless specifically noted otherwise. The terms used herein should also be understood as being used in the meaning that is commonly used in the art, unless specifically noted otherwise. Thus, unless defined otherwise, all terminologies and scientific technical terms that are used herein have the same

meaning as the general understanding of those skilled in the art to which the present invention pertains. In case of a contradiction, the present specification (including the definitions) takes precedence.

[0015]

The terms and the general technologies that are used herein are first described.

[0016]

Unless specifically noted otherwise, the term "group" refers to a monovalent group. Examples of groups that are not a monovalent group include alkylene groups (divalent) and the like. The term "group" may also be omitted in the following descriptions of substituents or the like.

[0017]

Unless specifically limited, the number of substituents when defined as "optionally substituted" or "substituted" is not particularly limited herein, as long as a substitution is possible. The number of substituents is one or multiple substituents. Moreover, unless indicated otherwise, the description for each substituent is also applicable when the substituent is a part of or a substituent of another group.

[0018]

A substituent in "optionally substituted" is not particularly limited, but is preferably selected from substituent group α that consists of the following. The substituent is optionally substituted with 1 to 5 of the same or different substituents. While not particularly limited by the type of substituent, if an atom to which the substituent attaches is an oxygen atom, a nitrogen atom, or a sulfur atom, the substituent is limited to the following substituents that attaches to a carbon atom.

Substituent group α includes

1) a halogen atom

2) a hydroxyl group

3) a carboxyl group
4) a cyano group
5) a C_{1-6} alkyl group
6) a C_{2-6} alkenyl group
7) a C_{2-6} alkynyl group
8) a C_{1-6} alkoxy group
9) a C_{1-6} alkylthio group
10) a C_{1-6} alkylcarbonyl group
11) a C_{1-6} alkylsulfonyl group

(wherein each substituent from 5) to 11) is optionally substituted with 1 to 5 of the same or different substituents selected from substituent group β)

12) a C_{3-10} alicyclic group
13) a C_{3-10} alicyclic oxy group
14) a C_{6-10} aryloxy group
15) a 5- or 6-membered heteroaryloxy group
16) a 4- to 10-membered non-aryl heterocyclyl oxy group
17) a C_{3-10} alicyclic thio group
18) a C_{6-10} arylthio group
19) a 5- or 6-membered heteroarylthio group
20) a 4- to 10-membered non-aryl heterocyclyl thio group
21) C_{6-10} aryl
22) 5- or 6-membered heteroaryl
23) a 4- to 10-membered non-aryl heterocycle
24) a C_{3-10} alicyclic carbonyl group
25) a C_{6-10} arylcarbonyl group
26) a 5- or 6-membered heteroarylcarbonyl group
27) a 4- to 10-membered non-aryl heterocyclyl carbonyl group
28) a C_{3-10} alicyclic sulfonyl group
29) a C_{6-10} arylsulfonyl group
30) a 5- or 6-membered heteroarylsulfonyl group
31) a 4- to 10-membered non-aryl heterocyclyl sulfonyl group

(wherein each substituent from 12) to 31) is optionally substituted with 1 to 5 of substituent group β or 1) a C_{1-6} alkyl group)

32) $-NR^{10a}R^{11a}$

33) $-SO_2-NR^{10b}R^{11b}$

34) $-NR^{10c}-C(=O)R^{11c}$

35) $-NR^{10d}-C(=O)OR^{11d}$

36) $-NR^{12a}-C(=O)NR^{10e}R^{11e}$

37) $-NR^{10f}-C(=S)R^{11f}$

38) $-NR^{10g}-C(=S)OR^{11g}$,

39) $-NR^{12b}-C(=S)NR^{10h}R^{11h}$

40) $-NR^{10i}-SO_2-R^{11i}$

41) $-NR^{12c}-SO_2-NR^{10j}R^{11j}$

42) $-C(=O)OR^{10k}$

43) $-C(=O)NR^{10l}R^{11k}$

44) $-C(=O)NR^{10m}OR^{11l}$

45) $-C(=O)NR^{12d}-NR^{10n}R^{11m}$

46) $-C(=S)OR^{10o}$

47) $-C(=S)NR^{10p}R^{11n}$

48) $-C(=S)NR^{10q}OR^{11o}$

49) $-C(=S)NR^{12e}-NR^{10r}R^{11p}$

50) $-C(=NR^{13a})R^{10s}$

51) $-C(=NR^{13b})CHO$

52) $-C(=NR^{13c})NR^{10t}R^{11q}$

53) $-C(=NR^{13d})NR^{12f}-NR^{10u}R^{11r}$

54) $-NR^{17c}-C(=NR^{13k})R^{17d}$

55) $-NR^{12g}-C(=NR^{13e})-NR^{10v}R^{11s}$

56) $-NR^{14}-C(=NR^{13f})-NR^{12h}-NR^{10w}R^{11t}$

57) $-OC(=O)R^{10x}$

58) $-OC(=O)OR^{10y}$

59) $-OC(=O)NR^{10z1}R^{11u}$

60) $-NR^{12i}-NR^{10z2}R^{11v}$

61) $-NR^{10z3}OR^{11w}$

62) $-C(=N-OR^{13a})R^{10s}$

63) $-C(=N-OR^{13b})CHO$

64) $-C(=N-OR^{13c})NR^{10t}R^{11q}$ and

65) $-C(=N-OR^{13d})NR^{12f}-NR^{10u}R^{11r}$,

substituent group β is a group consisting of

1) a halogen atom,

2) a hydroxyl group,

3) a carboxyl group,

4) a cyano group,

5) a C_{3-10} alicyclic group,

6) a C_{1-6} alkoxy group,

7) a C_{3-10} alicyclic oxy group,

8) a C_{1-6} alkylthio group,

9) a 5- or 6-membered heteroarylthio group,

10) C_{6-10} aryl,

11) 5- or 6-membered heteroaryl,

12) a 4- to 10-membered non-aryl heterocycle,

13) a C_{1-6} alkylcarbonyl group,

14) a C_{3-10} alicyclic carbonyl group,

15) a C_{6-10} arylcarbonyl group,

16) a 5- or 6-membered heteroarylcarbonyl group,

17) a 4- to 10-membered non-aryl heterocyclyl carbonyl group,

18) $-NR^{15a}R^{16a}$,

19) $-SO_2-NR^{15b}R^{16b}$,

20) $-NR^{15c}-C(=O)R^{16c}$,

21) $-NR^{17a}-C(=O)NR^{15d}R^{16d}$,

22) $-C(=O)NR^{15e}R^{16e}$,

23) $-C(=NR^{13g})R^{15f}$,

24) $-C(=NR^{13h})NR^{15g}R^{16f}$,

25) $-NR^{16g}-C(=NR^{13i})R^{15h}$,

26) $-NR^{17b}-C(=NR^{13j})-NR^{15i}R^{16h}$,

27) $-C(=N-OR^{13g})R^{15f}$, and

28) $-C(=N-OR^{13h})NR^{15g}R^{16f}$,

(wherein each substituent from 5) to 17) in substituent group β is optionally substituted with 1 to 5 substituents selected from the group consisting of a halogen atom, a hydroxyl group, a cyano group, a carboxyl group, and $-NR^{18a}R^{18b}$),

R^{13a}, R^{13b}, R^{13c}, R^{13d}, R^{13e}, R^{13f}, R^{13g}, R^{13h}, R^{13i}, R^{13j}, and R^{13k} are the same or different, each independently a hydrogen atom, a hydroxyl group, a C_{1-6} alkyl group, or a C_{1-6} alkoxy group,

R^{10a}, R^{10b}, R^{10c}, R^{10d}, R^{10e}, R^{10f}, R^{10g}, R^{10h}, R^{10i}, R^{10j}, R^{10k}, R^{10l}, R^{10m}, R^{10n}, R^{10o}, R^{10p}, R^{10q}, R^{10r}, R^{10s}, R^{10t}, R^{10u}, R^{10v}, R^{10w}, R^{10x}, R^{10y}, R^{10z1}, R^{10z2}, R^{10z3}, R^{11a}, R^{11b}, R^{11c}, R^{11d}, R^{11e}, R^{11f}, R^{11g}, R^{11h}, R^{11i}, R^{11j}, R^{11k}, R^{11l}, R^{11m}, R^{11n}, R^{11o}, R^{11p}, R^{11q}, R^{11r}, ^{11s}, R^{11t}, R^{11u}, R^{11v}, R^{11w}, R^{12a}, R^{12b}, R^{12c}, R^{12d}, R^{12e}, R^{12f}, R^{12g}, R^{12h}, R^{12i}, R^{14}, R^{15a}, R^{15b}, R^{15c}, R^{15d}, R^{15e}, R^{15f}, R^{15g}, R^{15h}, R^{15i}, R^{16a}, R^{16b}, R^{16c}, R^{16d}, R^{16e}, R^{16f}, R^{16g}, R^{16h}, R^{17a}, R^{17b}, R^{17c}, and R^{17d} are the same or different, each independently a hydrogen atom or a C_{1-6} alkyl group (wherein the group is optionally substituted with 1 to 3 of the same or different substituents selected from a hydroxyl group, a cyano group, a C_{1-6} alkoxy group, and $-NR^{18a}R^{18b}$), and

R^{18a} and R^{18b} are the same or different, each independently a hydrogen atom or a C_{1-6} alkyl group.

[0019]

Preferred examples of substituents in "optionally substituted" include the following substituents.

Preferred substituent group α includes

1) a halogen atom
2) a hydroxyl group
3) a carboxyl group
4) a cyano group
5) a C_{1-6} alkyl group
6) a C_{1-6} alkoxy group
7) a C_{1-6} alkylthio group
8) a C_{1-6} alkylcarbonyl group

(wherein each substituent from 5) to 8) is optionally substituted with 1 to 5 of the same or different substituents selected from substituent group β)

9) a C_{3-10} alicyclic group

10) a C_{3-10} alicyclic oxy group

11) a C_{6-10} aryloxy group

12) a 5- or 6-membered heteroaryloxy group

13) a 4- to 10-membered non-aryl heterocyclyl oxy group

14) a C_{3-10} alicyclic thio group

15) a C_{6-10} arylthio group

16) a 5- or 6-membered heteroarylthio group

17) a 4- to 10-membered non-aryl heterocyclyl thio group

18) C_{6-10} aryl

19) 5- or 6-membered heteroaryl

20) a 4- to 10-membered non-aryl heterocycle

21) a C_{3-10} alicyclic carbonyl group

22) a C_{6-10} arylcarbonyl group

23) a 5- or 6-membered heteroarylcarbonyl group

24) a 4- to 10-membered non-aryl heterocyclyl carbonyl group

(wherein each substituent from 9) to 24) is optionally substituted with 1 to 5 of substituent group β or 1) a C_{1-6} alkyl group)

25) $-NR^{10a}R^{11a}$

26) $-SO_2-NR^{10b}R^{11b}$

27) $-NR^{10c}-C(=O)R^{11c}$

28) $-NR^{12a}-C(=O)NR^{10d}R^{11d}$

29) $-NR^{10e}-SO_2-R^{11e}$

30) $-NR^{12b}-SO_2-NR^{10f}R^{11f}$

31) $-C(=O)NR^{10g}R^{11g}$

32) $-C(=NR^{13a})R^{10h}$

33) $-C(=NR^{13b})NR^{10i}R^{11h}$

34) $-NR^{11f}-C(=NR^{13c})R^{10g}$

35) $-NR^{12c}-C(=NR^{13d})-NR^{10j}R^{11i}$

36) $-C(=N-OR^{13a})R^{10h}$ and

37) $-C(=N-OR^{13b})NR^{10i}R^{11h}$,

substituent group β is preferably a group consisting of

1) a halogen atom

2) a hydroxyl group

3) a cyano group

4) a C_{3-10} alicyclic group

5) a C_{1-6} alkoxy group

6) a C_{1-6} alkylthio group

7) a 5- or 6-membered heteroarylthio group

8) 5- or 6-membered heteroaryl

9) a 4- to 10-membered non-aryl heterocycle

10) a C_{1-6} alkylcarbonyl group

11) a C_{3-10} alicyclic carbonyl group

12) a C_{6-10} arylcarbonyl group

13) a 5- or 6-membered heteroarylcarbonyl group

14) a 4- to 10-membered non-aryl heterocyclyl carbonyl group

15) $-NR^{15a}R^{16a}$

16) $-NR^{15b}-C(=O)R^{16b}$

17) $-NR^{17a}-C(=O)NR^{15c}R^{16c}$

18) $-C(=O)NR^{15d}R^{16d}$

19) $-C(=NR^{13e})R^{15e}$

20) $-C(=NR^{13f})NR^{15f}R^{16e}$

21) $-NR^{16f}-C(=NR^{13g})R^{15g}$

22) $-NR^{17b}-C(=NR^{13h})-NR^{15h}R^{16g}$

23) $-C(=N-OR^{13e})R^{15e}$ and

24) $-C(=N-OR^{13f})NR^{15f}R^{16e}$

(wherein each substituent from 4) to 14) in substituent group β is optionally substituted with 1 to 5 substituents selected from the group consisting of a halogen atom, a hydroxyl group, a cyano group, a carboxyl group, and $-NR^{18a}R^{18b}$),

R^{13a}, R^{13b}, R^{13c}, R^{13d}, R^{13e}, R^{13f}, R^{13g}, and R^{13h} are the same or different, each independently a hydrogen atom, a hydroxyl group, a C_{1-6} alkyl group, or a C_{1-6} alkoxy group,

R^{10a}, R^{10b}, R^{10c}, R^{10d}, R^{10e}, R^{10f}, R^{10g}, R^{10h}, R^{10i}, R^{10j}, R^{11a}, R^{11b}, R^{11c}, R^{11d}, R^{11e}, R^{11f}, R^{11g}, R^{11h}, R^{11i}, R^{12a}, R^{12b}, R^{12c}, R^{15a}, R^{15b}, R^{15c}, R^{15d}, R^{15e}, R^{15f}, R^{15g}, R^{15h}, R^{16a}, R^{16b}, R^{16c}, R^{16d}, R^{16e}, R^{16f}, R^{16g}, R^{17a}, and R^{17b} are the same or different, each independently a hydrogen atom or a C_{1-6} alkyl group (wherein the group is optionally substituted with 1 to 3 of the same or different substituents selected from a hydroxyl group, a cyano group, a C_{1-6} alkoxy group, and $-NR^{18a}R^{18b}$), and

R^{18a} and R^{18b} are the same or different, each independently a hydrogen atom or a C_{1-6} alkyl group.

[0020]

More preferred examples of substituents in "optionally substituted" include the following substituents.

More preferred substituent group α includes

1) a halogen atom
2) a hydroxyl group
3) a cyano group
4) a C_{1-6} alkyl group
5) a C_{1-6} alkoxy group
6) a C_{1-6} alkylthio group
7) a C_{1-6} alkylcarbonyl group

(wherein each substituent from 4) to 7) is optionally substituted with 1 to 5 of the same or different substituents selected from substituent group β)

8) a 5- or 6-membered heteroaryloxy group
9) a 4- to 10-membered non-aryl heterocyclyl oxy group
10) a 5- or 6-membered heteroarylthio group
11) a 4- to 10-membered non-aryl heterocyclyl thio group
12) C_{6-10} aryl
13) 5- or 6-membered heteroaryl
14) a 4- to 10-membered non-aryl heterocycle

(wherein each substituent from 4) to 14) is optionally substituted with 1 to 5 of substituent group β or 1) a C_{1-6} alkyl group)

15) $-NR^{10a}R^{11a}$

16) $-NR^{11b}-C(=O)R^{10b}$

17) $-NR^{12a}-C(=O)NR^{10c}R^{11c}$

18) $-C(=O)NR^{10d}R^{11d}$

19) $-C(=NR^{13a})R^{10e}$

20) $-C(=NR^{13b})NR^{10f}R^{11e}$

21) $-NR^{11f}-C(=NR^{13c})R^{10g}$

22) $-NR^{12b}-C(=NR^{13d})-NR^{10h}R^{11g}$

23) $-C(=N-OR^{13a})R^{10e}$ and

24) $-C(=N-OR^{13b})NR^{10f}R^{11e}$,

substituent group β is more preferably

1) a halogen atom,

2) a hydroxyl group,

3) a cyano group,

4) $-NR^{15a}R^{16a}$,

5) $-NR^{15b}-C(=O)R^{16b}$,

6) $-NR^{17a}-C(=O)NR^{15c}R^{16c}$,

7) $-C(=O)NR^{15d}R^{16d}$,

8) $-C(=NR^{13e})R^{15e}$,

9) $-C(=NR^{13f})NR^{15f}R^{16e}$,

10) $-NR^{16f}-C(=NR^{13g})R^{15g}$,

11) $-NR^{17b}-C(=NR^{13h})-NR^{15h}R^{16g}$

12) $-C(=N-OR^{13e})R^{15e}$, and

13) $-C(=N-OR^{13f})NR^{15f}R^{16e}$,

R^{13a}, R^{13b}, R^{13c}, R^{13d}, R^{13e}, R^{13f}, R^{13g}, and R^{13h} are the same or different, each independently a hydrogen atom, a hydroxyl group, a C_{1-6} alkyl group, or a C_{1-6} alkoxy group,

R^{10a}, R^{10b}, R^{10c}, R^{10d}, R^{10e}, R^{10f}, R^{10g}, R^{10h}, R^{11a}, R^{11b}, R^{11c}, R^{11d}, R^{11e}, R^{11f}, R^{11g}, R^{12a}, R^{12b}, R^{15a}, R^{15b}, R^{15c}, R^{15d}, R^{15e}, R^{15f}, R^{15g}, R^{15h}, R^{16a}, R^{16b}, R^{16c}, R^{16d}, R^{16e}, R^{16f}, R^{16g}, R^{17a}, and R^{17b} are the same or different, each independently a hydrogen atom or a C_{1-6} alkyl group (wherein the group is optionally substituted with 1 to 3 of the

same or different substituents selected from a hydroxyl group, a cyano group, a C_{1-6} alkoxy group, and $-NR^{18a}R^{18b}$), and

R^{18a} and R^{18b} are the same or different, each independently a hydrogen atom or a C_{1-6} alkyl group.

[0021]

"C_{1-6}" means that the number of carbon atoms is 1 to 6. The same applies to other numbers. For example, "C_{1-4}" means that the number of carbon atoms is 1 to 4.

[0022]

A "heteroatom" refers to an oxygen atom, a nitrogen atom, a sulfur atom, or the like.

[0023]

A "halogen atom" refers to a fluorine atom, chlorine atom, bromine atom, or iodine atom, preferably a fluorine atom or chlorine atom, and still more preferably a fluorine atom. A "halogen atom" is also referred to as "halogen".

[0024]

"C_{1-6} alkyl group" refers to a linear or branched saturated hydrocarbon group with 1 to 6 carbon atoms. "C_{1-6} alkyl group" is preferably a "C_{1-4} alkyl group", more preferably a "C_{1-3} alkyl group", and still more preferably a "C_{1-2} alkyl group". Specific examples of "C_{1-6} alkyl group" include, but are not limited to, methyl, ethyl, propyl, butyl, isopropyl, isobutyl, tert-butyl, sec-butyl, isopentyl, neopentyl, tert-pentyl, 1,2-dimethylpropyl, and the like.

[0025]

"C_{2-6} alkenyl group" refers to a linear or branched unsaturated hydrocarbon group with 2 to 6 carbon atoms, comprising one or two or more carbon-carbon double bonds. "C_{2-6} alkenyl group" is preferably a "C_{2-4} alkenyl group". Specific examples of "C_{2-6} alkenyl group" include, but are not limited to, a vinyl group, 1-propylenyl group, 2-propylenyl group, 1-butenyl group, 2-butenyl

group, 3-butenyl group, 2-methyl-1-propylenyl group, 2-methyl-2-propylenyl group, and the like.

[0026]

"C_{2-6} alkynyl group" refers to a linear or branched unsaturated aliphatic hydrocarbon group comprising one or two or more triple bonds. "C_{2-6} alkynyl group" is preferably a "C_{2-4} alkynyl group". Specific examples thereof include, but are not limited to, an ethynyl group, 1-propynyl group, 2-propynyl group, 1-butynyl group, 1-methyl-2-propynyl group, 3-butynyl group, 1-pentynyl group, 1-hexynyl group, and the like.

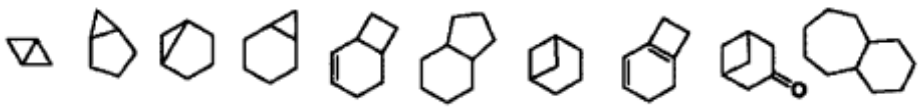
[0027]

"C_{3-20} alicyclic group" refers to a monocyclic or bicyclic non-aromatic hydrocarbon ring with 3 to 20 carbon atoms, including those with a partially unsaturated bond, those with a partially crosslinked structure, those that have a partially spiro form, and those having one or two or more carbonyl structures. "Alicyclic group" encompasses cycloalkyl groups, cycloalkenyl groups, and cycloalkynyl groups. "C_{3-20} alicyclic group" is preferably a "C_{3-10} alicyclic group", and more preferably a "C_{3-6} alicyclic group". Specific examples of "C_{3-20} alicyclic group" include, but are not limited to, a cyclopropyl group, cyclobutyl group, cyclopentyl group, cyclohexyl group, cycloheptyl group, cyclooctyl group, cyclohexadinyl group, cycloheptadinyl group, cyclooctadinyl group, adamantyl, norbornyl, and the like.

[0028]

Specific examples of "C_{3-20} alicyclic group" with a partially crosslinked structure include, but are not limited to, those with a structure shown below and the like.

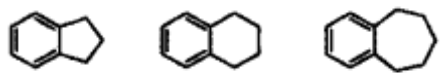
[Chemical Formula 519]



[0029]

"C_{3-20} alicyclic group" also encompasses compounds fused to an aromatic ring. Specific examples thereof include the groups represented by the following and the like.

[Chemical Formula 520]



[0030]

"C_{3-10} alicyclic group" and "C_{3-6} alicyclic group" refer to the "C_{3-20} alicyclic group" described above wherein the "C_{3-10} alicyclic group" and "C_{3-6} alicyclic group" are a monovalent group, respectively.

[0031]

"C_{6-10} aryl" refers to a monocyclic or bicyclic aromatic hydrocarbon ring with 6 to 10 carbon atoms. Specific examples thereof include, as C_6 aryl, a phenyl group, and, as C_{10} aryl, 1-naphthyl group, 2-naphthyl group, and the like. Preferred C_{6-10} aryl includes C_6 aryl and C_{10} aryl.

[0032]

"Heteroaryl" refers to an aromatic heterocycle comprising one or more of the same or different heteroatoms selected from the group consisting of an oxygen atom, a nitrogen atom, and a sulfur atom. Hereroaryl is preferably the "5- or 6-membered heteroaryl", "5- to 10-membered heteroaryl", or "9- or 10-membered heteroaryl" described below.

[0033]

"5- or 6-membered heteroaryl" refers to a monocyclic aromatic heterocycle consisting of 5 to 6 atoms, comprising 1 to 4 of the same or different heteroatoms selected from the group consisting of an oxygen atom, a nitrogen atom, and a sulfur atom. "5- or 6-membered heteroaryl" is also referred to as a "5- to 6-membered heteroaryl ring".

[0034]

"5- to 10-membered heteroaryl" refers to a monocyclic or bicyclic aromatic heterocycle consisting of 5 to 10 atoms, comprising 1 to 4 of the same or different heteroatoms selected from the group consisting of an oxygen atom, a nitrogen atom, and a sulfur atom.

[0035]

"9- or 10-membered heteroaryl" refers to a bicyclic aromatic heterocycle consisting of 9 to 10 atoms, comprising 1 to 4 of the same or different heteroatoms selected from the group consisting of an oxygen atom, a nitrogen atom, and a sulfur atom.

[0036]

"5- or 6-membered nitrogen-containing heteroaryl" refers to a monocyclic aromatic heterocycle consisting of 5 to 6 atoms, comprising 0 to 3 of the same or different heteroatoms selected from the group consisting of an oxygen atom, a nitrogen atom, and a sulfur atom, in addition to 1 nitrogen atom. "5- or 6-membered nitrogen-containing heteroaryl" is also referred to as a "5- to 6-membered nitrogen-containing heteroaryl ring".

[0037]

Specific examples of "6-membered heteroaryl" include, but are not limited to, pyridine, pyridazine, pyrimidine, pyrazine, and the like.

[0038]

Specific examples of "5-membered heteroaryl" include, but are not limited to, thiophene, pyrrole, thiazole, isothiazole, pyrazole, imidazole, furan, oxazole, isoxazole, oxadiazole, thiadiazole, triazole, tetrazole, and the like. 5-membered heteroaryl is preferably triazole or imidazole, and more preferably imidazole.

[0039]

Specific examples of "5- or 6-membered heteroaryl" include the specific examples for "5-membered heteroaryl" and "6-membered heteroaryl" described above.

[0040]

Specific examples of "9-membered heteroaryl" include, but are not limited to, indole, isoindole, indazole, benzimidazole, imidazopyridine, benzothiazole, azaindole, purine, and the like.

[0041]

Specific examples of "10-membered heteroaryl" include, but are not limited to, quinoline, isoquinoline, quinazoline, phthalazine, and the like.

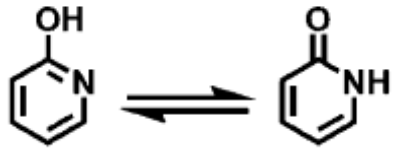
[0042]

Specific examples of "9- or 10-membered heteroaryl" include the specific examples for the "9-membered heteroaryl" and "10-membered heteroaryl" described above.

[0043]

"Optionally substituted heteroaryl" can be substituted with a substituent in "optionally substituted" described above. For example, pyridine, when substituted with a hydroxyl group at position 2, has the following tautomers 2-hydroxypyridine and 2-pyridone.

[Chemical Formula 521]



Thus, 2-pyridone is also encompassed by "optionally substituted heteroaryl" herein. Heteroaryl may form a condensed ring with an alicyclic group, aryl or a non-aryl heterocycle.

[0044]

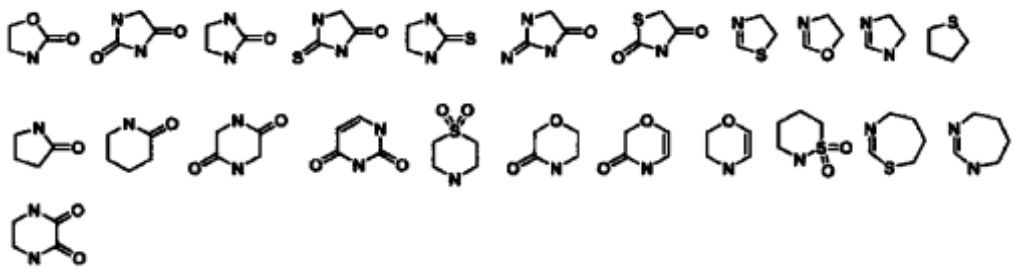
"Non-aryl heterocycle" refers to a monocyclic or bicyclic nonaromatic heterocycle comprising one or two or more of the same or different heteroatoms selected from the group consisting of an oxygen atom, a nitrogen atom, and a sulfur atom, including those with a partially unsaturated bond, those with a partially crosslinked structure, and those that have a partially spiro form.

A non-aryl heterocycle may form a condensed ring with aryl or heteroaryl and is preferably the following "4- to 20-membered non-aryl heterocycle".

[0045]

"4- to 20-membered non-aryl heterocycle" refers to a monocyclic or bicyclic non-aromatic heterocycle comprised of 4 to 20 atoms, comprising one or two or more of the same or different heteroatoms selected from the group consisting of an oxygen atom, a nitrogen atom, and a sulfur atom, including those with a partially unsaturated bond, those with a partially crosslinked structure, and those that have a partially spiro form. A non-aryl heterocycle may form a condensed ring with aryl or heteroaryl. When fused to, for example, C_{6-10} aryl or 5- or 6-membered heteroaryl, such a heterocycle is still encompassed by a non-aryl heterocycle. Such a heterocycle may comprise one or two or more carbonyl, thiocarbonyl, sulfinyl, or sulfonyl to make up the non-aryl heterocycle. For example, lactam, thiolactam, lactone, thiolactone, cyclic imide, cyclic carbamate, cyclic thiocarbamate, and other cyclic groups are also encompassed by said non-aryl heterocycle. In this regard, oxygen atoms of carbonyl, sulfinyl, and sulfonyl and sulfur atoms of thiocarbonyl are not included in the number of 4 to 20 members (size of ring) or the number of heteroatoms constituting the ring. Specific examples of "4- to 20-membered non-aryl heterocycle" include, but are not limited to, azetidine, pyrrolidine, piperidine, piperazine, morpholine, homopiperidine, oxetane, tetrahydrofuran, tetrahydropyran, and the like, those with a structure shown below, and the like.

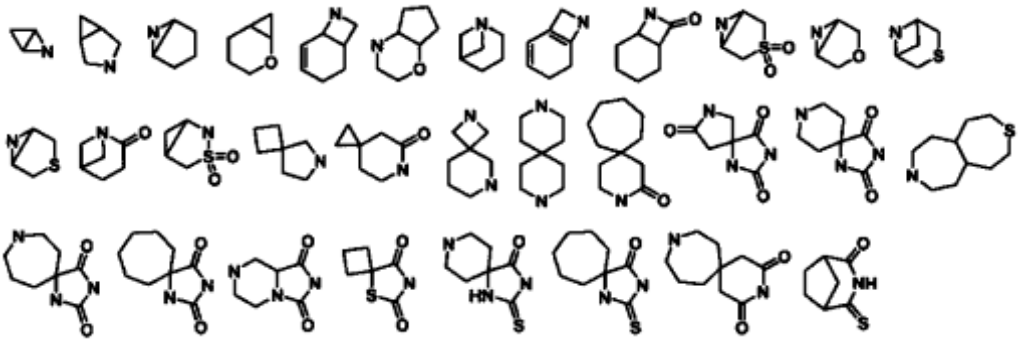
[Chemical Formula 522]



[0046]

Specific examples of "4- to 20-membered non-aryl heterocycle" with partial crosslinking or spiro structure include, but are not limited to, those with a structure shown below and the like.

[Chemical Formula 523]



[0047]

"Nitrogen-containing non-aryl heterocycle" refers to a monocyclic or bicyclic nonaromatic heterocycle comprising 0 or 1 or more of the same or different heteroatoms selected from the group consisting of an oxygen atom, a nitrogen atom, and a sulfur atom, in addition to one nitrogen atom, including those with a partially unsaturated bond, those with a partially crosslinked structure, and those that have a partially spiro form and is preferably the following "4- to 20-membered nitrogen-containing non-aryl heterocycle".

[0048]

"4- to 20-membered nitrogen-containing non-aryl heterocycle" refers to a monocyclic or bicyclic non-aromatic heterocycle comprised of 4 to 20 atoms, comprising 0 or 1 of the same or different heteroatoms selected from the group consisting of an

oxygen atom, a nitrogen atom, and a sulfur atom, in addition to 1 nitrogen atom, including those with a partially unsaturated bond, those with a partially crosslinked structure, and those that have a partially spiro form.

[0049]

"4- to 10-membered non-aryl heterocycle" refers to the "4- to 20-membered non-aryl heterocycle" described above wherein "4- to 10-membered non-aryl heterocycle" is a substituent that is a monovalent group.

[0050]

"4- to 10-membered nitrogen-containing non-aryl heterocycle", "4- to 7-membered nitrogen-containing non-aryl heterocycle", "5- to 7-membered nitrogen-containing non-aryl heterocycle", and "4- to 6-membered nitrogen-containing non-aryl heterocycle" refer to the "4- to 20-membered nitrogen-containing non-aryl heterocycle" described above wherein the "4- to 10-membered nitrogen-containing non-aryl heterocycle", "4- to 7-membered nitrogen-containing non-aryl heterocycle", "5- to 7-membered nitrogen-containing non-aryl heterocycle", and " 4- to 6-membered nitrogen-containing non-aryl heterocycle" are substituents that are a monovalent group, respectively.

[0051]

"5- to 7-membered non-aryl heterocycle" refers to the "4- to 20-membered non-aryl heterocycle" described above wherein "5- to 7-membered non-aryl heterocycle" is a substituent that is a monovalent group.

[0052]

"4- to 7-membered non-aryl heterocycle" and "4- to 6-membered non-aryl heterocycle" refer to the "4- to 20-membered non-aryl heterocycle" described above wherein "4- to 7-membered non-aryl heterocycle" and "4- to 6-membered non-aryl heterocycle" are substituents that are a monovalent group, respectively.

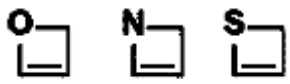
[0053]

Specific examples of "4-membered non-aryl heterocycle" include, but are not limited to, azetidine, oxetane, thietane, and the like.

[0054]

Specific examples of "4-membered non-aryl heterocycle" with a partially unsaturated bond include, but are not limited to, those with a structure shown below and the like.

[Chemical Formula 524]



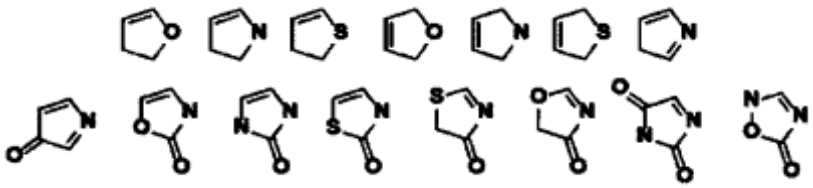
[0055]

Specific examples of "5-membered non-aryl heterocycle" include, but are not limited to, pyrrolidine, pyrrolidone, oxazolidinone, tetrahydrofuran, tetrahydrothiophene, and the like.

[0056]

Specific examples of "5-membered non-aryl heterocycle" with a partially unsaturated bond include, but are not limited to, those with a structure shown below and the like.

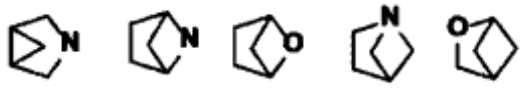
[Chemical Formula 525]



[0057]

Specific examples of "5-membered non-aryl heterocycle" with a partially crosslinked structure include, but are not limited to, those with a structure shown below and the like.

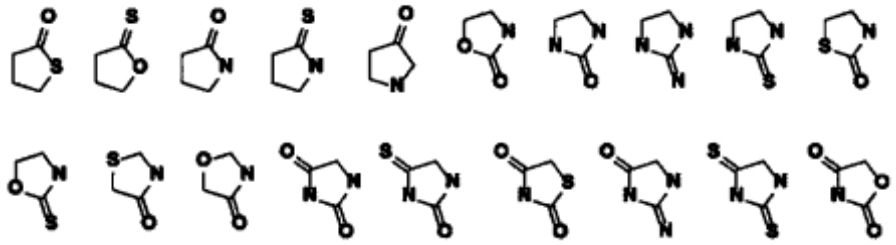
[Chemical Formula 526]



[0058]

Specific examples of "5-membered non-aryl heterocycle" comprising carbonyl, thiocarbonyl, or the like include, but are not limited to, those with a structure shown below and the like.

[Chemical Formula 527]



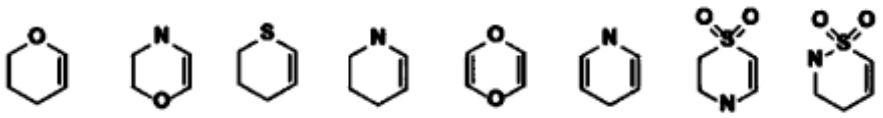
[0059]

Specific examples of "6-membered non-aryl heterocycle" include, but are not limited to, piperidine, piperazine, morpholine, tetrahydropyran, tetrahydrothiopyran, and the like.

[0060]

Specific examples of "6-membered non-aryl heterocycle" with a partially unsaturated bond include, but are not limited to, those with a structure shown below and the like.

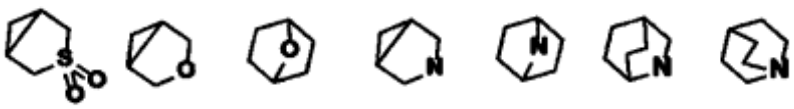
[Chemical Formula 528]



[0061]

Specific examples of "6-membered non-aryl heterocycle" with a partially crosslinked structure include, but are not limited to, those with a structure shown below and the like.

[Chemical Formula 529]



[0062]

"C_{1-6} alkoxy group" refers to a "C_{1-6} alkyloxy group", and the C_{1-6} alkyl moiety is defined the same as the C_{1-6} alkyl group

described above. "C_{1-6} alkoxy group" is preferably a "C_{1-4} alkoxy group", more preferably a "C_{1-3} alkoxy group", and still more preferably a "C_{1-2} alkoxy group". Specific examples of "C_{1-6} alkoxy group" include, but are not limited to, a methoxy group, ethoxy group, propoxy group, butoxy group, isopropoxy group, isobutoxy group, tert-butoxy group, sec-butoxy group, isopentyloxy group, neopentyloxy group, tert-pentyloxy group, 1,2-dimethylpropoxy group, and the like.

[0063]

"C_{3-10} alicyclic oxy group" refers to a (C_{3-10} alicyclic group)-O- group, and the C_{3-10} alicyclic moiety is defined the same as a C_{3-10} alicyclic group. "C_{3-6} alicyclic oxy group" refers to a (C_{3-6} alicyclic group)-O- group, and the C_{3-6} alicyclic moiety is defined the same as a C_{3-6} alicyclic group. "C_{3-6} alicyclic oxy group" is preferably a "C_{3-5} alicyclic oxy group". Specific examples of "C_{3-6} alicyclic oxy group" include, but are not limited to, a cyclopropyloxy group, cyclobutyloxy group, cyclopentyloxy group, cyclohexyloxy group, and the like.

[0064]

The C_{6-10} aryl moiety of a "C_{6-10} aryloxy group" is defined the same as the C_{6-10} aryl described above. "C_{6-10} aryloxy group" is preferably a "C_6 or C_{10} aryloxy group". Specific examples of "C_{6-10} aryloxy group" include, but are not limited to, a phenoxy group, 1-naphthyloxy group, 2-naphthyloxy group, and the like.

[0065]

The 5- or 6-membered heteroaryl moiety of "5- or 6-membered heteroaryloxy group" is defined the same as the "5-membered heteroaryl" or "6-membered heteroaryl" described above. Specific examples of "5- or 6-membered heteroaryloxy group" include, but are not limited to, a pyrazoyloxy group, triazoyloxy group, thiazoyloxy group, thiadiazoyloxy group, pyridyloxy group, pyridazoyloxy group, and the like.

[0066]

The 4- to 10-membered non-aryl heterocycle moiety of "4- to 10-membered non-aryl heterocyclyl oxy group" is defined the same as the "4- to 10-membered non-aryl heterocycle" described above. "4- to 10-membered non-aryl heterocyclyl oxy group" is preferably a "4- to 6-membered non-aryl heterocyclyl oxy group". Specific examples of "4- to 10-membered non-aryl heterocyclyl oxy group" include, but are not limited to, a tetrahydrofuranyloxy group, tetrahydropyranyloxy group, azetidinyloxy group, pyrrolidinyloxy group, piperidinyloxy group, and the like.

[0067]

The C_{1-6} alkyl moiety of "C_{1-6} alkylthio group" is defined the same as the C_{1-6} alkyl described above. "C_{1-6} alkylthio group" is preferably a "C_{1-4} alkylthio group", and more preferably a "C_{1-3} alkylthio group". Specific examples of "C_{1-6} alkylthio group" include, but are not limited to, a methylthio group, ethylthio group, propylthio group, butylthio group, isopropylthio group, isobutylthio group, tert-butylthio group, sec-butylthio group, isopentylthio group, neopentylthio group, tert-pentylthio group, 1,2-dimethylpropylthio group, and the like.

[0068]

"C_{3-10} alicyclic thio group" refers to a (C_{3-10} alicyclic group)-S- group, and the C_{3-10} alicyclic moiety is defined the same as the C_{3-10} alicyclic group described above. "C_{3-10} alicyclic thio group" is preferably a "C_{3-6} alicyclic thio group". Specific examples of "C_{3-6} alicyclic thio group" include, but are not limited to, a cyclopropylthio group, cyclobutylthio group, cyclopentylthio group, cyclohexylthio group, and the like.

[0069]

The C_{6-10} aryl moiety of "C_{6-10} arylthio group" is defined the same as the C_{6-10} aryl described above. "C_{6-10} arylthio group" is preferably a "C_6 or C_{10} arylthio group". Specific examples of "C_{6-10} arylhthio group" include, but are not limited to, a phenylthio group, 1-naphthylthio group, 2-naphthylthio group, and the like.

[0070]

The 5- or 6-membered heteroaryl moiety of "5- or 6-membered heteroarylthio group" is defined the same as the "5-membered heteroaryl" or "6-membered heteroaryl" described above. Specific examples of "5- or 6-membered heteroarylthio group" include, but are not limited to, a pyrazoylthio group, triazoylthio group, thiazoylthio group, thiadiazoylthio group, pyridylthio group, pyridazoylthio group, and the like.

[0071]

The 4- to 10-membered non-aryl heterocycle moiety of "4- to 10-membered non-aryl heterocyclyl thio group" is defined the same as the "4- to 10-membered non-aryl heterocycle" described above. "4- to 10-membered non-aryl heterocyclyl thio group" is preferably a "4- to 6-membered non-aryl heterocyclyl thio group". Specific examples of "4- to 10-membered non-aryl heterocyclyl thio group" include, but are not limited to, a tetrahydropyranylthio group, piperidinylthio group, and the like.

[0072]

"C_{1-6} alkylcarbonyl group" refers to a carbonyl group substituted with the "C_{1-6} alkyl group" described above. "C_{1-6} alkylcarbonyl group" is preferably a "C_{1-4} alkylcarbonyl group". Specific examples of "C_{1-6} alkylcarbonyl group" include, but are not limited to, an acetyl group, propionyl group, butyryl group, and the like.

[0073]

"C_{3-10} alicyclic carbonyl group" refers to a carbonyl group substituted with the "C_{3-10} alicyclic group" described above. "C_{3-10} alicyclic carbonyl group" is preferably a "C_{3-6} alicyclic carbonyl group". Specific examples of "C_{3-10} alicyclic carbonyl group" include, but are not limited to, a cyclopropylcarbonyl group, cyclopentylcarbonyl group, and the like.

[0074]

"C_{6-10} arylcarbonyl group" refers to a carbonyl group substituted with the "C_{6-10} aryl" described above. "C_{6-10} arylcarbonyl group" is preferably a "C_6 or C_{10} arylcarbonyl group". Specific examples of "C_{6-10} arylcarbonyl group" include, but are not limited to, a benzoyl group, 1-naphthylcarbonyl group, 2-naphthylcarbonyl group, and the like.

[0075]

"5- or 6-membered heteroarylcarbonyl group" refers to a carbonyl group substituted with the "5- or 6-membered heteroaryl" described above. Specific examples of "5- or 6-membered heteroarylcarbonyl group" include, but are not limited to, a pyrazoylcarbonyl group, triazoylcarbonyl group, thiazoylcarbonyl group, thiadiazoylcarbonyl group, pyridylcarbonyl group, pyridazoylcarbonyl group, and the like.

[0076]

"4- to 10-membered non-aryl heterocyclyl carbonyl group" refers to a carbonyl group substituted with the "4- to 10-membered non-aryl heterocycle" described above. "4- to 10-membered non-aryl heterocyclyl carbonyl group" is preferably a "4- to 6-membered non-aryl heterocyclyl carbonyl group". Specific examples of "4- to 10-membered non-aryl heterocyclyl carbonyl group" include, but are not limited to, an azetidinylcarbonyl group, pyrrolidinylcarbonyl group, piperidinylcarbonyl group, morpholinylcarbonyl group, and the like.

[0077]

"C_{1-6} alkylsulfonyl group" refers to a sulfonyl group substituted with the "C_{1-6} alkyl group" described above. "C_{1-6} alkylsulfonyl group" is preferably a "C_{1-4} alkylsulfonyl group". Specific examples of "C_{1-6} alkylsulfonyl group" include, but are not limited to, a methylsulfonyl group, propylsulfonyl group, butylsulfonyl group, and the like.

[0078]

"C_{3-10} alicyclic sulfonyl group" refers to a sulfonyl group substituted with the "C_{3-10} alicyclic group" described above. "C_{3-10} alicyclic sulfonyl group" is preferably a "C_{3-6} alicyclic sulfonyl group". Specific examples of "C_{3-10} alicyclic sulfonyl group" include, but are not limited to, a cyclopropylsulfonyl group, cyclobutylsulfonyl group, cyclopentylsulfonyl group, cyclohexylsulfonyl group, and the like.

[0079]

"C_{6-10} arylsulfonyl group" refers to a sulfonyl group substituted with the "C_{6-10} aryl" described above. "C_{6-10} arylsulfonyl group" is preferably a "C_6 or C_{10} arylsulfonyl group". Specific examples of "C_{6-10} arylsulfonyl group" include, but are not limited to, a phenylsulfonyl group, 1-naphthylsulfonyl group, 2-naphthylsulfonyl group, and the like.

[0080]

"5- or 6-membered heteroarylsulfonyl group" refers to a sulfonyl group substituted with the "5- or 6-membered heteroaryl" described above. Specific examples of "5- or 6-membered heteroarylsulfonyl group" include a pyrazoylsulfonyl group, triazoylsulfonyl group, thiazoylsulfonyl group, thiadiazoylsulfonyl group, pyridylsulfonyl group, pyridazoylsulfonyl group, and the like.

[0081]

"C_{1-6} alkylene group" refers to a substituent that is a divalent group due to removing two hydrogen atoms from saturated hydrocarbon with 1 to 6 carbon atoms. "C_{1-3} alkylene group" and "C_{2-4} alkylene group" refer to substituents that are divalent groups due to removing two hydrogen atoms from saturated hydrocarbon with 1 to 3 carbon atoms and 2 to 4 carbon atoms, respectively.

[0082]

"C_{3-10} cycloalkylene group" refers to a substituent that is a divalent group due to removing two hydrogen atoms from saturated

cyclic hydrocarbon with 3 to 10 carbon atoms. "C_{3-6} cycloalkylene group" and "C_{4-6} cycloalkylene group" refer to substituents that are divalent groups due to removing two hydrogen atoms from saturated cyclic hydrocarbon with 3 to 6 carbon atoms and 4 to 6 carbon atoms, respectively.

[0083]

"C_{6-10} arylene group" refers to a substituent that is a divalent group due to removing two hydrogen atoms from aromatic hydrocarbon with 6 to 10 carbon atoms. "C_6 arylene group" refers to a substituent that is a divalent group due to removing two hydrogen atoms from aromatic hydrocarbon with 6 carbon atoms.

[0084]

"5- or 6-membered heteroarylene group" refers to a substituent that is a divalent group due to removing two hydrogen atoms from a 5- or 6-membered heteroaryl ring. "5-membered heteroarylene group" and "6-membered heteroarylene group" refer to substituents that are divalent groups due to removing two hydrogen atoms from 5-membered and 6-membered heteroaryl rings, respectively.

[0085]

"4- to 10-membered non-aryl heterocyclylene group" refers to a substituent that is a divalent group due to removing two hydrogen atoms from a 4- to 10-membered non-aryl heterocycle. "4- to 5-membered non-aryl heterocyclylene group" and "4- to 6-membered non-aryl heterocyclylene group" refer to substituents that are divalent groups due to removing two hydrogen atoms from 4- to 5-membered and 4- to 6-membered non-aryl heterocycles, respectively.

[0086]

"Hydrocarbyl group", as used herein, refers to a monovalent group produced by removing a hydrogen atom from hydrocarbon consisting of only a carbon atom and hydrogen atoms. Hydrocarbyl can be aliphatic (linear or branched), alicyclic group, or

aromatic (aryl). Examples thereof include a methyl group, an ethyl group, an n-propyl group, an isopropyl group, a cyclopentyl group, a cyclohexyl group, a phenyl group, and the like. "Optionally substituted hydrocarbyl group" refers to a hydrocarbyl group that is substituted with a substituent described above. "Optionally substituted hydrocarbyl group" is optionally substituted with an oxo group (=O group), a thioxo group (=S group), or an imino group (=NR). Examples thereof include a formyl group, an acety group, and the like.

[0087]

"Hydrocarbylene group", as used herein, refers to a divalent group produced by removing two hydrogen atoms from hydrocarbon consisting of only a carbon atom and hydrogen atoms. Hydrocarbylene can be aliphatic (linear or branched), alicyclic group, or aromatic (aryl). Examples thereof include a methylene group, an ethylene group, an n-propylene group, an isopropylene group, a cyclopentandiyl group, a cyclohexandiyl group, a phenylene group, and the like. "Optionally substituted hydrocarbylene group" refers to a hydrocarbylene group that is substituted with a substituent described above. "Optionally substituted hydrocarbylene group" is optionally substituted with an oxo group (=O group), a thioxo group (=S group), or an imino group (=NR).

[0088]

"Heterohydrocarbyl group", as used herein, refers to a group wherein at least one carbon atom (may be all carbon atoms) of a hydrocarbyl group is substituted with a heteroatom. Examples of heteroatom include O, N, S, and P. Examples of heterohydrocarbyl group include heteroaryl, non-aryl heterocycle, alkoxy group, alkylthio group, carboxy group, carboxylic acid isostere (wherein the carboxylic acid isostere comprises an ester group-$C(=O)OR^{20a}$), $-NR^{e1}-C(=O)R^{f1}$, $-NR^{e1}-C(=O)OR^{f1}$, $-NR^{g1}-C(=O)NR^{e1}R^{f1}-C(=O)NR^{50}R^{51}-C(=O)NR^{50}R^{51}$ (wherein R^{20a}, R^{e1}, R^{f1}, R^{g1}, R^{50}, and R^{51} are defined the

same as item 1 or 2 herein), and the like. Examples thereof include a methoxy group, an ethoxy group, a cyano group, an imidazole group, a pyridinyl group, a pyrazole group, a triazole group, a pyrazinyl group, a pyridazinyl group, a pyrimidinyl group, and the like. "Optionally substituted heterohydrocarbyl group" refers to a heterohydrocarbyl group that is substituted with a substituent described above. "Optionally substituted heterohydrocarbyl group" is optionally substituted with an oxo group (=O group), a thioxo group (=S group), or an imino group (=NR). Examples thereof include a carboxyl group, a methoxycarbonyl group, an aminocarbonyl group, a hydroxyaminocarbonyl group, and the like.

[0089]

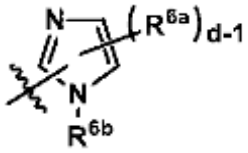
"Heterohydrocarbylene group", as used herein, refers to a group wherein at least one carbon atom (may be all carbon atoms) of a hydrocarbylene group is substituted with a heteroatom. Examples of heteroatom include O, N, S, and P. Examples of heterohydrocarbylene group include heteroarylene, a non-aryl heterocyclyl diyl group, an alkyleneoxy group, an alkylenethio group, and the like. Examples thereof include a methyleneoxy group, an ethyleneoxy group, an imino group (-NR- group), an imidazole diyl group, a pyridine diyl group, a pyrazole diyl group, a triazole diyl group, a pyradine diyl group, a pyridazine diyl group, a pyrimidine diyl group, and the like. "Optionally substituted heterohydrocarbylene group" refers to a heterohydrocarbylene group substituted with a substitutent described above. "Optionally substituted heterohydrocarbylene group" is optionally substituted with an oxo group (=O group), a thioxo group (=S group), or an imino group (=NR). Examples thereof include a carbonyloxy group, a methyleneoxycarbonyl group, an aminocarbonyl group, a hydroxyaminocarbonyl group, an iminocarbonyl group (-NRC(=O)- group), an iminosulfonyl group (-

$NRSO_2$- group), optionally substituted -NH-, optionally substituted -NH-SO_2-, and the like.

[0090]

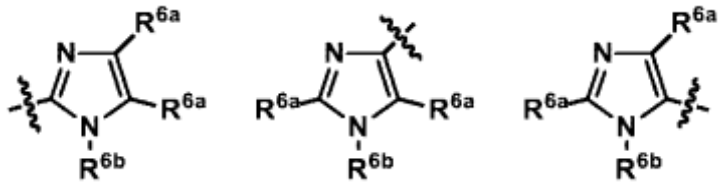
A bond intersecting a wavy line in the description of a specific structure of R^5 indicates a bond with L^4. A bond intersecting a bond between ring atoms means that there are variables (e.g., R^{6a}, R^{7a}, and the like) at each of the substitutable positions on a monocycle or fused polycycle including the ring atoms. For example, for a monocyclic 5-membered ring (heteroaryl),

[Chemical Formula 530]



(wherein d is 3) is one of

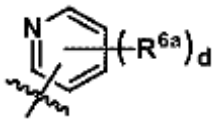
[Chemical Formula 531]



, and

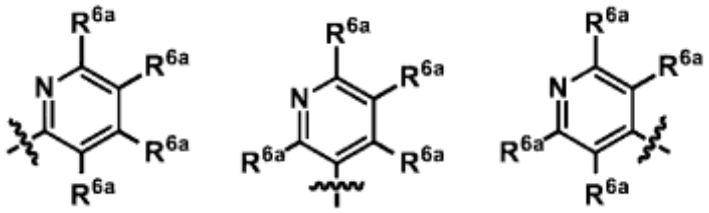
L^4 attaches to a ring carbon atom of the 5-membered ring. For example, for a monocyclic 6-membered ring (heteroaryl),

[Chemical Formula 532]



(wherein d is 4) is one of

[Chemical Formula 533]

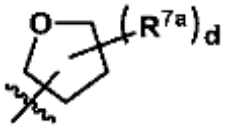


, and

L^4 attaches to a ring carbon atom of the 6-membered ring.

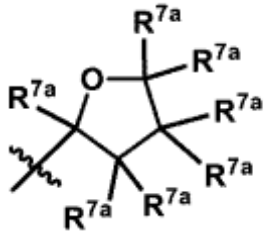
Alternatively, for example, for a monocyclic 5-membered ring (non-aryl heterocycle),

[Chemical Formula 534]



(wherein d is 7) is one of

[Chemical Formula 535]

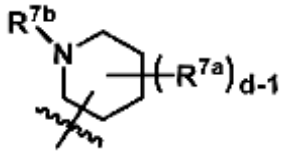




, and

L^4 attaches to a ring carbon atom of the 5-membered ring. For example, for a monocyclic 6-membered ring (non-aryl heterocycle),

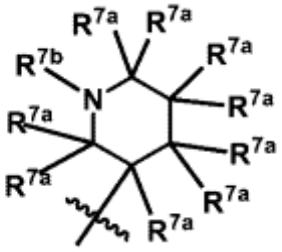
[Chemical Formula 536]

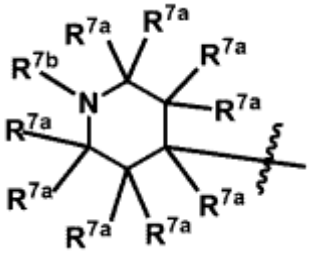


(wherein d is 10) is one of

[Chemical Formula 537]







, and

L^4 attaches to a ring carbon atom of the 6-membered ring.

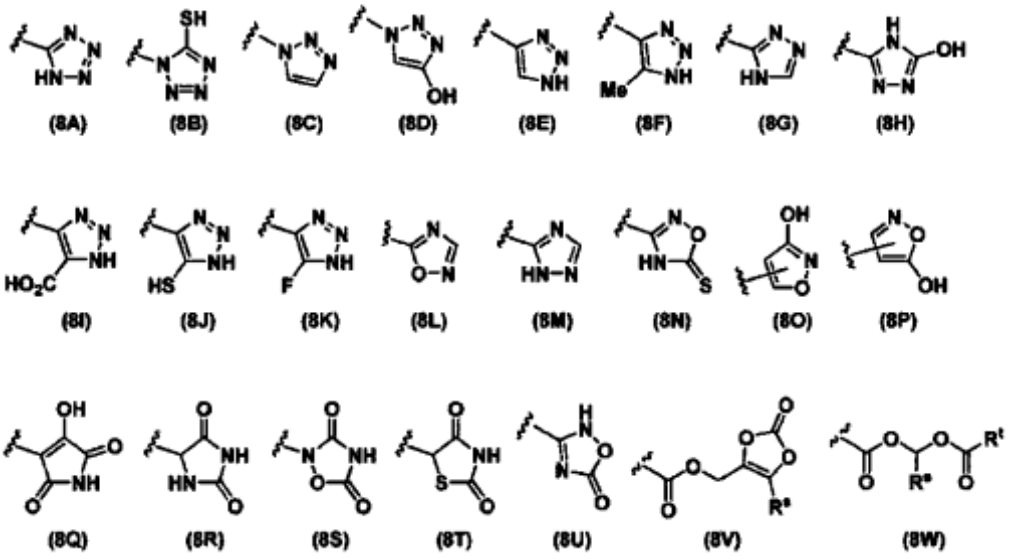
Subscript d is the number of substitutable positions on a ring of R^5, but is a number of substitutable positions excluding the attachment position to L^4.

[0091]

"Bioisostere" refers to another partial structure (functional group) serving the same biological role as a group (e.g., carboxyl group) in a drug molecule (prodrug structures are also encompassed as a concept of a bioisostere in the present invention). "Carboxylic acid isostere" refers to a bioisostere of carboxylic acid. Examples of the carboxylic acid isostere include, but are not limited to, an ester group-C(=O)OR^{20a}, $-SO_3H$, $-SO_2NHR^{19a}$, $-B(OR^{m1})_2$, $-PO(OR^{m1})(OR^{m2})$, $-CONHR^{19a}$, $-CONHSO_2R^{19a}$, $-CONR^{19a}CN$, $-CONHNHSO_2R^{19a}$, and substituents represented by the formulas (8A), (8B), (8C), (8D), (8E), (8F), (8G), (8H), (8I), (8J), (8K), (8L), (8M), (8N), (8O), (8P), (8Q), (8R), (8S), (8T), (8U), (8V), and (8W) described below (each of the substituents is further optionally substituted with 1 to 3 of the same or different R^{19b} at a chemical substitutable position),

[Chemical Formula 538]

式(8A) ; (8B) ; (8C) ; (8D) ; (8E) ; (8F) ; (8G) ; (8H) ;
(8I) ; (8J) ; (8K) ; (8L) ; (8M) ; (8N) ; (8O) ; (8P) ;
(8Q) ; (8R) ; (8S) ; (8T) ; (8U) ; (8V) ; (8W) :



wherein [in (8V) and (8W),

R^s is a hydrogen atom, a C_{1-6} alkyl group, or a C_{3-10} alicyclic group (wherein the C_{1-6} alkyl group or C_{3-10} alicyclic group is optionally substituted with 1 to 5 halogen atoms),

R^t is a hydrogen atom, a C_{1-6} alkyl group, a C_{1-6} alkoxy group, (wherein the C_{1-6} alkyl group or C_{1-6} alkoxy group is optionally substituted with 1 to 5 halogen atoms), a C_{3-10} alicyclic group, a C_{3-10} alicyclic oxy group, a phenyl group, a phenoxy group, a pyridyl group, or a pyridyloxy group (wherein the C_{3-10} alicyclic group, C_{3-10} alicyclic oxy group, phenyl group, phenoxy group, pyridyl group, or pyridyloxy group is optionally substituted with 1 to 5 substituents selected from the group consisting of a halogen atom, a C_{1-6} alkyl group, and a C_{1-6} alkoxy group)],

R^{19a} and R^{19b} are the same or different, each independently representing a hydrogen atom, a hydroxyl group, a C_{1-6} alkyl group, C_{6-10} aryl, 5- or 6-membered heteroaryl, or a 4- to 10-membered non-aryl heterocycle,

R^{20a} is

1) a C_{1-6} alkyl group,
2) a C_{3-10} alicyclic group,
3) C_{6-10} aryl,
4) 5- or 6-membered heteroaryl, or
5) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 1) to 5) is optionally substituted),

R^{m1} represents

1) a hydrogen atom,
2) a C_{1-6} alkyl group,
3) a C_{3-10} alicyclic group,
4) C_{6-10} aryl,
5) 5- or 6-membered heteroaryl, or
6) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 2) to 6) is optionally substituted),

wherein if R^{m1} is attached to a boron atom via an oxygen atom, two R^{m1}, as C_{2-4} alkylene, together with the boron atom and two oxygen atoms, may form a 5- to 7-membered non-aryl heterocycle (wherein an alkylene moiety is optionally substituted in the non-aryl heterocycle), and

R^{m2} represents a hydrogen atom, an optionally substituted C_{1-6} alkyl group, or an optionally substituted C_{3-10} alicyclic group, wherein, preferably,

R^{s} is a hydrogen atom or a C_{1-6} alkyl group, and

R^{t} is a hydrogen atom, a C_{1-6} alkyl group, a C_{1-6} alkoxy group, a C_{3-10} alicyclic group, or a C_{3-10} alicyclic oxy group, or alternatively preferably,

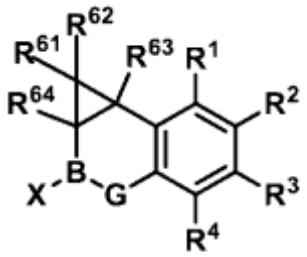
R^{19a} and R^{19b} are the same or different, each independently a hydrogen atom, a hydroxyl group, or a C_{1-6} alkyl group, or also preferably

R^{m1} and R^{m2} are the same or different, each independently a hydrogen atom, a C_{1-6} alkyl group, or a C_{3-10} alicyclic group.

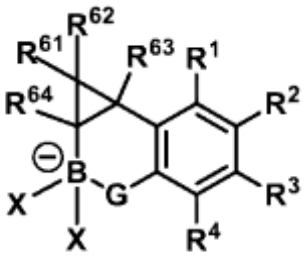
[0092]

An example of an embodiment of the compounds of the invention includes a compound represented by formula (1a) or (1b):

[Chemical Formula 539]



(1a)



(1b)

or a pharmaceutically acceptable salt thereof,

wherein

G is an oxygen atom, a sulfur atom, or $-NR^{a1}-$,

X is a hydroxyl group, an optionally substituted alkoxy group, or $-NR^{a2}R^{b1}$,

R^{a1}, R^{a2}, and R^{b1} are the same or different, each independently a hydrogen atom, a hydroxyl group, an optionally substituted hydrocarbyl group, or an optionally substituted heterohydrocarbyl group,

wherein R^{a2} and R^{b1} together may form an optionally substituted nitrogen-containing non-aryl heterocycle,

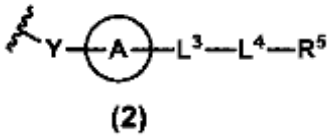
L^1 is a single bond, an oxygen atom, a sulfur atom, -SO-, -SO_2-, an optionally substituted hydrocarbylene group, or an optionally substituted heterohydrocarbylene group,

L^2 is a single bond or an optionally substituted hydrocarbylene group,

Z is a hydrogen atom, a hydroxyl group, an optionally substituted hydrocarbyl group, or an optionally substituted heterohydrocarbyl group,

one of R^1, R^2, and R^3 is represented by formula (2):

[Chemical Formula 540]



(2)

wherein

Y is an oxygen atom, a sulfur atom, or -NR^j-, and R^j is a hydrogen atom, a hydroxyl group, or an optionally substituted hydrocarbyl group,

ring A is an optionally substituted non-aryl heterocycle,

L^3 is an oxygen atom, a sulfur atom, an optionally substituted hydrocarbylene group, an optionally substituted heterohydrocarbylene group, optionally substituted -NH-, optionally substituted -NH-SO_2-, -S(=O)-, or -$S(=O)_2$-,

L^4 is a single bond, an optionally substituted hydrocarbylene group, an optionally substituted heterohydrocarbylene group, or -C(=N-OR^{h1})-,

R^{h1} is

1) a hydrogen atom,
2) a C_{1-6} alkyl group,
3) a C_{3-10} alicyclic group,
4) C_{6-10} aryl,
5) 5- or 6-membered heteroaryl, or

6) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 2) to 6) is optionally substituted),

R^5 is a hydrogen atom, a hydroxyl group, an optionally substituted hydrocarbyl group, an optionally substituted heterohydrocarbyl group, optionally substituted -NHOH, a sulfo group (sulfonic acid group), optionally substituted $-SO_2H$, optionally substituted $-SO_2-NH_2$, optionally substituted -S(=O)(=NH)H, optionally substituted $-NH-SO_2-H$, optionally substituted $-NH-SO_2-NH_2$, optionally substituted $-N=S(=O)H_2$, or optionally substituted $-NH_2$,

the remaining two (without the structure of formula (2) among R^1, R^2, and R^3) are the same or different, each independently a hydrogen atom, halogen, a hydroxyl group, an optionally substituted hydrocarbyl group, or an optionally substituted heterohydrocarbyl group,

R^4 is

1) $-C(=O)R^8$,

2) $-SO_2-L^6-R^8$,

(wherein R^8 in 1) and 2) is a hydroxyl group, an optionally substituted hydrocarbyl group, or an optionally substituted heterohydrocarbyl group, and L^6 is a single bond or an optionally substituted hydrocarbylene group),

3) $-NR^{a4}R^{b3}$,

4) $-B(OR^{m1})_2$,

5) $-PO(OR^{m1})(OR^{m2})$,

6) optionally substituted heteroaryl,

7) an optionally substituted non-aryl heterocycle, or

8) a bioisostere of one of 1) to 7),

(wherein the formulas of 1), 2), 4), 5), and 6) include a carboxylic acid isostere, and 8) may include them in duplicates),

R^{a4} and R^{b3} are the same or different, each independently having the same definition as R^{a1}, R^{a2}, and R^{b1}, wherein a combination of R^{a4} and R^{b3}, when attached to the same nitrogen atom,

together may form an optionally substituted nitrogen-containing non-aryl heterocycle,

R^{m1} is a hydrogen atom or an optionally substituted hydrocarbyl group,

wherein if R^{m1} is attached to a boron atom via an oxygen atom, two R^{m1}, as alkylene, together with the boron atom and two oxygen atoms, may form a non-aryl heterocycle (wherein an alkylene moiety is optionally substituted in the non-aryl heterocycle),

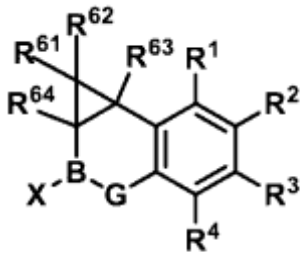
R^{m2} is a hydrogen atom or an optionally substituted hydrocarbyl group, and

R^{61}, R^{62}, R^{63}, and R^{64} are each independently a hydrogen atom, halogen, an optionally substituted alkyl group, or $-L^1-L^2-Z$.

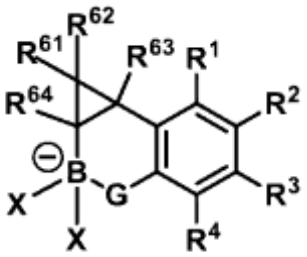
[0093]

Another example of an embodiment of the compounds of the invention includes a compound represented by (1a) or (1b):

[Chemical Formula 541]



(1a)



(1b)

or a pharmaceutically acceptable salt thereof,

wherein

G is an oxygen atom, a sulfur atom, or $-NR^{a1}-$,

X is a hydroxyl group, an optionally substituted alkoxy group, or $-NR^{a2}R^{b1}$,

R^{a1}, R^{a2}, and R^{b1} are the same or different, each independently a hydrogen atom, a hydroxyl group, an optionally substituted hydrocarbyl group, or an optionally substituted heterohydrocarbyl group,

wherein R^{a2} and R^{b1} together may form an optionally substituted nitrogen-containing non-aryl heterocycle,

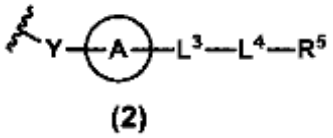
L^1 is a single bond, an oxygen atom, a sulfur atom, -SO-, -SO_2-, an optionally substituted hydrocarbylene group, or an optionally substituted heterohydrocarbylene group,

L^2 is a single bond or an optionally substituted hydrocarbylene group,

Z is a hydrogen atom, a hydroxyl group, an optionally substituted hydrocarbyl group, or an optionally substituted heterohydrocarbyl group,

one of R^1, R^2, and R^3 is represented by formula (2):

[Chemical Formula 542]



(2)

wherein

Y is an oxygen atom, a sulfur atom, or -NR^j-, and R^j is a hydrogen atom, a hydroxyl group, or an optionally substituted hydrocarbyl group,

ring A is an optionally substituted non-aryl heterocycle,

L^3 is an oxygen atom, a sulfur atom, an optionally substituted hydrocarbylene group, an optionally substituted heterohydrocarbylene group, -S(=O)- or -$S(=O)_2$-,

L^4 is a single bond, an optionally substituted hydrocarbylene group, or -$C(=N-OR^{h1})$-,

R^{h1} is

1) a hydrogen atom,
2) a C_{1-6} alkyl group,
3) a C_{3-10} alicyclic group,
4) C_{6-10} aryl,
5) 5- or 6-membered heteroaryl, or
6) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 2) to 6) is optionally substituted),

R^5 is a hydrogen atom, a hydroxyl group, an optionally substituted hydrocarbyl group, or an optionally substituted heterohydrocarbyl group,

the remaining two (without the structure of formula (2) among R^1, R^2, and R^3) are the same or different, each independently a hydrogen atom, halogen, a hydroxyl group, an optionally substituted hydrocarbyl group, or an optionally substituted heterohydrocarbyl group,

R^4 is

1) $-C(=O)R^8$,

2) $-SO_2-L^6-R^8$,

(wherein R^8 in 1) and 2) is a hydroxyl group, an optionally substituted hydrocarbyl group, or an optionally substituted heterohydrocarbyl group, and L^6 is a single bond or an optionally substituted hydrocarbylene group),

3) $-NR^{a4}R^{b3}$,

4) $-B(OR^{m1})_2$,

5) $-PO(OR^{m1})(OR^{m2})$,

6) optionally substituted heteroaryl,

7) an optionally substituted non-aryl heterocycle, or

8) a bioisostere of one of 1) to 7),

(wherein the formulas of 1), 2), 4), 5), and 6) include a carboxylic acid isostere, and 8) may include them in duplicates),

R^{a4} and R^{b3} are the same or different, each independently having the same definition as R^{a1}, R^{a2}, and R^{b1}, wherein a combination of R^{a4} and R^{b3}, when attached to the same nitrogen atom, together may form an optionally substituted nitrogen-containing non-aryl heterocycle,

R^{m1} is a hydrogen atom or an optionally substituted hydrocarbyl group,

wherein if R^{m1} is attached to a boron atom via an oxygen atom, two R^{m1}, as alkylene, together with the boron atom and two oxygen

atoms, may form a non-aryl heterocycle (wherein an alkylene moiety is optionally substituted in the non-aryl heterocycle),

R^{m2} is a hydrogen atom or an optionally substituted hydrocarbyl group, and

R^{61}, R^{62}, R^{63}, and R^{64} are each independently a hydrogen atom, halogen, an optionally substituted alkyl group, or $-L^1-L^2-Z$.

[0094]

In some embodiments, in formula (1a) or (1b),

G is an oxygen atom, a sulfur atom, or $-NR^{a1}-$,

X is a hydroxyl group, an optionally substituted C_{1-6} alkoxy group, or $-NR^{a2}R^{b1}$,

R^{a1}, R^{a2}, and R^{b1} are the same or different, each independently

1) a hydrogen atom,

2) a C_{1-6} alkyl group,

3) a C_{3-10} alicyclic group,

4) C_{6-10} aryl

5) 5- or 6-membered heteroaryl,

6) a 4- to 10-membered non-aryl heterocycle,

7) a C_{1-6} alkylcarbonyl group,

8) a C_{3-10} alicyclic carbonyl group,

9) a C_{6-10} arylcarbonyl group,

10) a 5- or 6-membered heteroarylcarbonyl group,

11) a C_{1-6} alkylsulfonyl group,

12) a C_{3-10} alicyclic sulfonyl group,

13) a C_{6-10} arylsulfonyl group,

14) a 5- or 6-membered heteroarylsulfonyl group, or

15) $-OR^{c1}$,

(wherein each substituent from 2) to 14) is optionally substituted),

wherein R^{a2} and R^{b1}, together may form an optionally substituted 4- to 10-membered nitrogen-containing non-aryl heterocycle,

R^{c1} is

1) a hydrogen atom,
2) a C_{1-6} alkyl group,
3) a C_{3-10} alicyclic group,
4) C_{6-10} aryl,
5) 5- or 6-membered heteroaryl, or
6) a 4- to 10-membered non-aryl heterocycle,
(wherein each substituent from 2) to 6) is optionally substituted),

L^1 is a single bond, an oxygen atom, a sulfur atom, -SO-, -SO_2-, -NR^{d1}-, -$NR^{d1}C(=O)$-, or -$NR^{d1}SO_2$-,

L^2 is a single bond or an optionally substituted C_{1-6} alkylene group,

Z is
1) a hydrogen atom,
2) a hydroxyl group,
3) a cyano group,
4) a carboxyl group,
5) a C_{3-10} alicyclic group,
6) C_{6-10} aryl,
7) 5- or 6-membered heteroaryl,
8) a 4- to 10-membered non-aryl heterocycle,
9) a C_{1-6} alkoxy group,
10) a C_{3-10} alicyclic oxy group,
11) a C_{6-10} aryloxy group,
12) a 5- or 6-membered heteroaryloxy group,
13) a 4- to 10-membered non-aryl heterocyclyl oxy group,
14) a C_{1-6} alkylthio group,
15) a C_{3-10} alicyclic thio group,
16) a C_{6-10} arylthio group,
17) a 5- or 6-membered heteroarylthio group,
18) a 4- to 10-membered non-aryl heterocyclyl thio group,
(wherein each substituent from 5) to 18) is optionally substituted),
19) -SO_2-$NR^{e1}R^{f1}$,

20) $-NR^{e1}-C(=O)OR^{f1}$,

21) $-NR^{g1}-C(=O)NR^{e1}R^{f1}$,

22) $-NR^{e1}-C(=S)R^{f1}$,

23) $-NR^{e1}-C(=S)OR^{f1}$,

24) $-NR^{g1}-C(=S)NR^{e1}R^{f1}$,

25) $-NR^{g1}-CR^{e1}(=NR^{f1})$,

26) $-NR^{g1}-CR^{e1}(=N-OR^{f1})$,

27) $-NR^{h1}-C(=NR^{g1})NR^{e1}R^{f1}$,

28) $-NR^{h1}-C(=N-OR^{g1})NR^{e1}R^{f1}$,

29) $-NR^{i1}-C(=NR^{h1})NR^{g1}-NR^{e1}R^{f1}$,

30) $-NR^{i1}-C(=N-OR^{h1})NR^{g1}-NR^{e1}R^{f1}$,

31) $-NR^{e1}-SO_2-R^{f1}$,

32) $-NR^{g1}-SO_2-NR^{e1}R^{f1}$,

33) $-C(=O)OR^{e1}$,

34) $-C(=S)OR^{e1}$,

35) $-C(=S)NR^{e1}R^{f1}$,

36) $-C(=S)NR^{e1}OR^{f1}$,

37) $-C(=S)NR^{g1}-NR^{e1}R^{f1}$,

38) $-C(=NR^{e1})R^{f1}$,

39) $-C(=N-OR^{e1})R^{f1}$,

40) $-C(=NR^{h1})NR^{g1}-NR^{e1}R^{f1}$,

41) $-C(=N-OR^{h1})NR^{g1}-NR^{e1}R^{f1}$,

42) $-NR^{e1}R^{f1}$,

43) $-NR^{g1}-NR^{e1}R^{f1}$,

44) $-NR^{e1}OR^{f1}$,

45) $-NR^{e1}-C(=O)R^{f1}$,

46) $-C(=O)NR^{e1}R^{f1}$,

47) $-C(=O)NR^{e1}OR^{f1}$,

48) $-C(=O)NR^{g1}-NR^{e1}R^{f1}$,

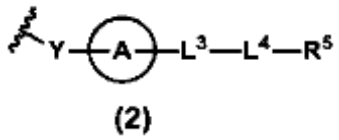
49) $-C(=O)R^{e1}$,

50) $-C(=NR^{g1})NR^{e1}R^{f1}$, or

51) $-C(=N-OR^{h1})NR^{e1}R^{f1}$,

one of R^1, R^2, and R^3 is a group represented by formula (2):

[Chemical Formula 543]



(2)

wherein

Y is an oxygen atom, a sulfur atom, or $-NR^j-$,

ring A is an optionally substituted 4- to 20-membered non-aryl heterocycle,

L^3 is

1) an oxygen atom,

2) a sulfur atom,

3) $-NR^{d2}-$,

4) $-NR^{d2}C(=O)-$,

5) $-NR^{d2}SO_2-$,

6) a C_{1-6} alkylene group,

7) a C_{3-10} cycloalkylene group,

8) a 4- to 10-membered non-aryl heterocyclylene group,

(wherein each substituent from 6) to 8) is optionally substituted),

9) $-C(=O)-$,

10) $-S(=O)-$, or

11) $-S(=O)_2-$,

L^4 is

1) a single bond,

2) a C_{1-6} alkylene group,

3) a C_{3-10} cycloalkylene group,

4) a C_{6-10} arylene group,

5) a 5- or 6-membered heteroarylene group,

6) a 4- to 10-membered non-aryl heterocyclylene group,

(wherein each substituent from 2) to 6) is optionally substituted), or

7) $-C(=N-OR^{h1})-$,

R^5 is

1) a hydrogen atom,

2) a C_{1-6} alkyl group,

3) a C_{3-10} alicyclic group,

4) a 4- to 10-membered non-aryl heterocycle,

5) C_{6-10} aryl,

6) 5- to 10-membered heteroaryl,

7) a C_{1-6} alkylthio group,

(wherein each substituent from 2) to 7) is optionally substituted, and if two substituents further substituted with the substituent of 1), 2), or 3) are each substituted on adjacent atoms within a ring, the two substituents together may further form a condensed ring structure),

8) $-NR^{e1}OH$,

9) a carboxyl group (-C(=O)OH)

10) a carboxylic acid isostere (wherein the carboxylic acid isostere comprises an ester group-$C(=O)OR^{20a}$),

11) a sulfo group (sulfonic acid group),

12) $-SO_2R^{e1}$,

13) $-SO_2-NR^{e1}R^{f1}$,

14) $-S(=O)(=NR^{f1})R^{e1}$,

15) $-NR^{e1}-C(=O)R^{f1}$,

16) $-NR^{e1}-C(=O)OR^{f1}$,

17) $-NR^{g1}-C(=O)NR^{e1}R^{f1}$,

18) $-NR^{e1}-SO_2-R^{f1}$,

19) $-NR^{g1}-SO_2-NR^{e1}R^{f1}$,

20) $-N=S(=O)R^{e1}R^{f1}$,

21) $-C(=O)NR^{50}R^{51}$, or

22) $-NR^{e1}R^{f1}$ (wherein if R^5 is the substituent of 22), $-L^3-L^4-R^5$ is not $-(CH_2)_{1-4}NR^{e1}R^{f1}$ (wherein R^{e1} and R^{f1} are a hydrogen atom, optionally substituted C_{1-4} alkyl, an optionally substituted C_{3-7} alicyclic group, an optionally substituted 4- to 10-membered non-aryl heterocyclic group, optionally substituted C_{6-10} aryl, or optionally substituted 5- to 10-membered heteroaryl)),

R^{20a} is

1) a C_{1-6} alkyl group,
2) a C_{3-10} alicyclic group,
3) C_{6-10} aryl,
4) 5- or 6-membered heteroaryl, or
5) a 4- to 10-membered non-aryl heterocycle,
(wherein each substituent from 1) to 5) is optionally substituted),

R^{50} represents
1) a hydrogen atom,
2) a C_{1-6} alkyl group,
3) a hydroxyl group,
4) a C_{1-6} alkoxy group,
5) a C_{3-6} cycloalkoxy group,
6) a C_{3-6} alicyclic group,
7) a 4- to 6-membered non-aryl heterocycle,
8) C_{6-10} aryl,
9) 5- to 10-membered heteroaryl,
10) a 4- to 6-membered non-aryl heterocyclyl oxy,
11) C_{6-10} aryloxy,
12) 5- to 10-membered heteroaryloxy,
13) a C_{1-6} alkylsulfonyl group,
14) a C_{3-6} cycloalkoxysulfonyl group, or
15) a 4- to 6-membered non-aryl heterocyclyl sulfonyl group,
(wherein each substituent of 2) and 4) to 15) is optionally substituted),

R^{51} represents
1) a hydrogen atom,
2) a C_{1-6} alkyl group,
3) a C_{3-6} alicyclic group,
4) a 4- to 6-membered non-aryl heterocycle,
5) C_{6-10} aryl, or
6) 5- to 10-membered heteroaryl,
(wherein each substituent from 2) to 6) is optionally substituted),
or

R^{50} and R^{51} together may form an optionally substituted 4- to 7-membered nitrogen-containing non-aryl heterocycle,

the remaining two (without the structure of formula (2) among R^1, R^2, and R^3) are the same or different, each independently a hydrogen atom, a halogen atom, an optionally substituted C_{1-6} alkyl group, an optionally substituted C_{1-6} alkoxy group, an optionally substituted C_{1-6} alkylthio group, optionally substituted 5- or 6-membered heteroaryl, or $-NR^{a3}R^{b2}$,

R^{d1}, R^{d2}, R^{e1}, R^{f1}, R^{g1}, R^{h1}, R^{i1}, and R^j are the same or different, each independently

1) a hydrogen atom,

2) a C_{1-6} alkyl group,

3) a C_{3-10} alicyclic group,

4) C_{6-10} aryl,

5) 5- or 6-membered heteroaryl, or

6) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 2) to 6) is optionally substituted),

a combination of R^{e1} and R^{f1}, when attached to the same nitrogen atom, together may form an optionally substituted 4- to 10-membered nitrogen-containing non-aryl heterocycle,

R^4 is

1) $-C(=O)R^8$,

2) $-SO_2-L^6-R^8$,

(wherein R^8 in 1) and 2) is $-NR^{a5}R^{b4}$, $-NR^{a5}-L^7-B(OR^{m1})_2$, $-OR^{m1}$, or an optionally substituted C_{1-6} alkyl group, and L^6 is a single bond or $-NR^{a6}-$),

3) $-NR^{a4}R^{b3}$,

4) $-B(OR^{m1})_2$,

5) $-PO(OR^{m1})(OR^{m2})$,

6) optionally substituted 5-membered heteroaryl,

7) an optionally substituted 5-membered non-aryl heterocycle, or

8) a bioisostere of one of 1) to 7),

(wherein the formulas of 2), 4), 5), and 6) include a carboxylic acid isostere, and 8) may include them in duplicates),

R^{a3}, R^{a4}, R^{a5}, R^{a6}, R^{b2}, R^{b3}, and R^{b4} are the same or different, each independently having the same definition as R^{a1}, R^{a2}, and R^{b1}, wherein a combination of R^{a3} and R^{b2}, R^{a4} and R^{b3}, or R^{a5} and R^{b4}, when attached to the same nitrogen atom, together may form an optionally substituted 4- to 10-membered nitrogen-containing non-aryl heterocycle,

R^{m1} is

1) a hydrogen atom,
2) a C_{1-6} alkyl group,
3) a C_{3-10} alicyclic group,
4) C_{6-10} aryl,
5) 5- or 6-membered heteroaryl, or
6) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 2) to 6) is optionally substituted),

wherein if R^{m1} is attached to a boron atom via an oxygen atom, two R^{m1}, as C_{2-4} alkylene, together with the boron atom and two oxygen atoms, may form a 5- to 7-membered non-aryl heterocycle (wherein an alkylene moiety is optionally substituted in the non-aryl heterocycle),

R^{m2} is a hydrogen atom, an optionally substituted C_{1-6} alkyl group, or an optionally substituted C_{3-10} alicyclic group,

L^7 is an optionally substituted C_{1-3} alkylene group,

R^{61}, R^{62}, and R^{63} are each independently a hydrogen atom, halogen or an optionally substituted C_{1-6} alkyl group, and

R^{64} is a hydrogen atom, halogen, an optionally substituted C_{1-6} alkyl group, or $-L^1-L^2-Z$.

[0095]

In some embodiments, L^3 is

1) a C_{1-6} alkylene group,
2) a C_{3-10} cycloalkylene group, or
3) a 4- to 10-membered non-aryl heterocyclylene group,

(wherein each substituent from 1) to 3) is optionally substituted), and

L^4 is a single bond or an optionally substituted C_{1-5} alkylene group.

[0096]

In some embodiments, L^3 is an optionally substituted C_{1-4} alkylene group, and

L^4 is a single bond or an optionally substituted C_{1-3} alkylene group.

[0097]

In some embodiments, L^3 is $-(CR^{30}R^{31})_{n1}-$,

R^{30} and R^{31} each independently, or if there are multiple instances of each of them, all of them independently represent

1) a hydrogen atom,
2) $-NR^{a7}R^{a8}$,
3) a C_{1-4} alkyl group,
4) C_{6-10} aryl,
5) 5- to 10-membered heteroaryl,
6) a C_{3-6} alicyclic group,
7) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 3) to 7) is optionally substituted), or

8) $-OR^{c2}$, or

R^{30} and R^{31}, together with the carbon atom to which they are attached, form a C_{3-6} alicyclic group or a 4- to 6-membered non-aryl heterocycle,

R^{a7} and R^{a8} are the same or different, each independently

1) a hydrogen atom,
2) a C_{1-6} alkyl group,
3) a C_{3-10} alicyclic group,
4) C_{6-10} aryl
5) 5- or 6-membered heteroaryl,
6) a 4- to 10-membered non-aryl heterocycle,

7) a C_{1-6} alkylcarbonyl group,
8) a C_{3-10} alicyclic carbonyl group,
9) a C_{6-10} arylcarbonyl group,
10) a 5- or 6-membered heteroarylcarbonyl group,
11) a C_{1-6} alkylsulfonyl group,
12) a C_{3-10} alicyclic sulfonyl group,
13) a C_{6-10} arylsulfonyl group,
14) a 5- or 6-membered heteroarylsulfonyl group, or
15) $-OR^{c3}$,
(wherein each substituent from 2) to 14) is optionally substituted),

wherein R^{a7} and R^{a8} together may form an optionally substituted 4- to 10-membered nitrogen-containing non-aryl heterocycle,

R^{c2} and R^{c3} are each independently,
1) a hydrogen atom,
2) a C_{1-6} alkyl group,
3) a C_{3-10} alicyclic group,
4) C_{6-10} aryl,
5) 5- or 6-membered heteroaryl, or
6) a 4- to 10-membered non-aryl heterocycle,
(wherein each substituent from 2) to 6) is optionally substituted),

n1 is an integer 1, 2, 3, or 4,

L^4 is $-(CR^{40}R^{41})_{n2}-$,

R^{40} and R^{41} each independently, or if there are multiple instances of each of them, all of them independently represent
1) a hydrogen atom,
2) $-NR^{a9}R^{a10}$,
3) a C_{1-4} alkyl group,
4) C_{6-10} aryl,
5) 5- to 10-membered heteroaryl,
6) a C_{3-6} alicyclic group,
7) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 3) to 7) is optionally substituted), or

8) $-OR^{c4}$, or

R^{40} and R^{41}, together with the carbon atom to which they are attached, form a C_{3-6} alicyclic group or a 4- to 6-membered non-aryl heterocycle,

R^{a9} and R^{a10} are the same or different, each independently

1) a hydrogen atom,

2) a C_{1-6} alkyl group,

3) a C_{3-10} alicyclic group,

4) C_{6-10} aryl

5) 5- or 6-membered heteroaryl,

6) a 4- to 10-membered non-aryl heterocycle,

7) a C_{1-6} alkylcarbonyl group,

8) a C_{3-10} alicyclic carbonyl group,

9) a C_{6-10} arylcarbonyl group,

10) a 5- or 6-membered heteroarylcarbonyl group,

11) a C_{1-6} alkylsulfonyl group,

12) a C_{3-10} alicyclic sulfonyl group,

13) a C_{6-10} arylsulfonyl group,

14) a 5- or 6-membered heteroarylsulfonyl group,

(wherein each substituent from 2) to 14) is optionally substituted), or

15) $-OR^{c5}$,

wherein R^{a9} and R^{a10} together may form an optionally substituted 4- to 10-membered nitrogen-containing non-aryl heterocycle,

R^{c4} and R^{c5} are each independently defined the same as R^{c2} and R^{c3}, and

n2 is an integer 0 (i.e., when L^4 is a single bond), 1, 2, or 3.

[0098]

In some embodiments, $-L^3-L^4-$ is an optionally substituted C_{1-2} alkylene group.

[0099]

In some embodiments, $-L^3-L^4-$ is a C_{1-2} alkylene group optionally substituted with a C_{1-3} alkyl group, an amino group, or a hydroxymethyl group, or a plurality of the same or different groups thereamong (wherein two C_{1-3} alkyl groups, when attached to the same carbon atom, together with the carbon atom to which they are attached, may form a C_{3-6} alicyclic group).

[0100]

R^5 is

1) a C_{3-10} alicyclic group,

2) C_{6-10} aryl,

3) 5- to 10-membered heteroaryl,

4) a C_{1-6} alkylthio group,

(wherein each substituent from 1) to 4) is optionally substituted, and if two substituents further substituted with the substituent of 2) or 3) are each substituted on adjacent atoms within a ring, the two substituents together may further form a condensed ring structure),

5) $-NR^{e1}OH$,

6) $-C(=O)NR^{50}R^{51}$,

7) $-SO_2-NR^{e1}R^{f1}$,

8) $-NR^{e1}-SO_2-R^{f1}$,

9) $-C(=O)OR^{20}$, or

10) $-NR^{e1}R^{f1}$ (wherein if R^5 is the substituent of 10), L^3 and/or L^4 is a C_{1-6} alkylene group that is necessarily substituted with one or more groups other than a hydrogen atom (wherein L^3 or L^4, together with said substituent, may form a C_{3-10} alicyclic group or a 4- to 10-membered non-aryl heterocycle)), and

R^{20} is

1) a hydrogen atom,

2) a C_{1-6} alkyl group,

3) a C_{3-10} alicyclic group,

4) C_{6-10} aryl,

5) 5- or 6-membered heteroaryl, or

6) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 2) to 6) is optionally substituted).

[0101]

In some embodiments, R^5 is

1) C_{6-10} aryl,

2) 5- to 10-membered heteroaryl,

3) $-C(=O)NR^{50}R^{51}$,

4) $-C(=O)OR^{20}$, or

5) $-NR^{e1}R^{f1}$ (wherein if R^5 is the substituent of 5), L^3 and/or L^4 is a C_{1-6} alkylene group that is necessarily substituted with one or more groups other than a hydrogen atom, and together with said substituent forms at least one C_{3-10} alicyclic group or 4- to 10-membered non-aryl heterocycle)

(wherein each substituent from 1) to 2) is optionally substituted, and any two groups thereof, when each is attached to adjacent atoms within a ring, together may further form a condensed ring structure).

[0102]

In some embodiments, $Z\text{-}L^2\text{-}L^1$ is an optionally substituted C_{1-6} alkylthio group.

[0103]

In some embodiments, R^{61}, R^{62}, R^{63}, and R^{64} are each independently a hydrogen atom, a fluorine atom, or a C_{1-3} alkyl group optionally substituted with a fluorine atom.

[0104]

In some embodiments, R^{61}, R^{62}, R^{63}, and R^{64} are each independently a hydrogen atom or a fluorine atom.

[0105]

In some embodiments, G is an oxygen atom.

[0106]

In some embodiments, X is a hydroxyl group or an optionally substituted C_{1-6} alkoxy group.

[0107]

In some embodiments, X is a hydroxyl group.

[0108]

In some embodiments, R^4 is

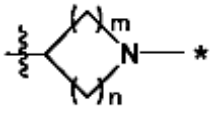
1) -C(=O)OH (i.e., a carboxyl group), or

2) a carboxylic acid isostere.

[0109]

In some embodiments, ring A is an optionally substituted 4- to 20-membered non-aryl heterocycle. In some embodiments, ring A is an optionally substituted 4- to 10-membered non-aryl heterocycle. In some embodiments, ring A is an optionally substituted 4- to 7-membered non-aryl heterocycle. In some embodiments, ring A is an optionally substituted 4- to 7-membered nitrogen-containing non-aryl heterocycle. In a certain embodiment, ring A is

[Chemical Formula 544]



,

wherein m is 1, 2, or 3, n is 1, 2, or 3, m + n is 2, 3, 4, or 5, a bond that is orthogonal to a wavy line indicates a bond with Y, and a bond with * indicates a bond with L^3. In some embodiments, m + n is 2, 3, or 4.

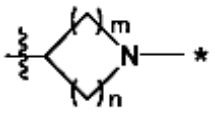
[0110]

In some embodiments, ring A is an optionally substituted 4- to 6-membered non-aryl heterocycle. In some embodiments, ring A is an optionally substituted 4- to 6-membered nitrogen-containing non-aryl heterocycle.

[0111]

In some embodiments, ring A is

[Chemical Formula 545]



,

wherein m + n is 2 or 3. In a preferred embodiment, m + n is 2. In a more preferred embodiment, m = 1 and n = 1.

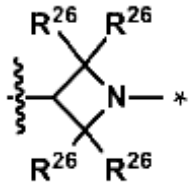
[0112]

In some embodiments, m is 1 or 2, n is 1 or 2, and m + n is 2 or 3. In some embodiments, m is 1, and n is 1.

[0113]

In some embodiments, ring A is an optionally substituted azetidine ring. In a certain embodiment in such embodiments, ring A is

[Chemical Formula 546]



,

wherein R^{26} represents a substituent on an azetidine ring and is defined the same as R^{6a}, a bond that is orthogonal to a wavy line indicates a bond with Y, and a bond with * indicates a bond with L^3. In a preferred embodiment, R^{26} are the same or different, each independently selected from the group consisting of

1) a hydrogen atom,

2) a halogen atom,

3) a C_{1-6} alkyl group, and

4) a C_{1-6} alkoxy group,

(wherein each of substituents 3) and 4) is optionally substituted with a halogen atom) (wherein a halogen atom in 2), 3), and 4) is more preferably a fluorine atom), and

in a more preferred embodiment, are selected from the group consisting of

1) a hydrogen atom,

2) a halogen atom, and

3) a C_{1-6} alkyl group optionally substituted with a halogen atom,
(wherein a halogen atom in 2) and 3) is more preferably a fluorine atom), and
most preferably are hydrogen atoms.

[0114]

In some embodiments, Y is an oxygen atom or a sulfur atom. In some embodiments, Y is an oxygen atom.

[0115]

In some embodiments, L^3 is $-C(=O)-$ or $-S(=O)_2-$. In some embodiments, L^3 is $-C(=O)-$.

[0116]

In some embodiments, L^4 is a single bond, $-C(=N-OR^{h1})-$, or an optionally substituted C_{1-6} alkylene group, wherein R^{h1} is an optionally substituted C_{1-6} alkyl group.

[0117]

In some embodiments, R^1 and R^2 are the same or different, each independently selected from the group consisting of
1) a hydrogen atom,
2) a halogen atom,
3) a C_{1-6} alkyl group,
4) a C_{1-6} alkoxy group, and
5) a C_{1-6} alkylthio group,
(wherein each substituent from 3) to 5) is optionally substituted).

[0118]

In some embodiments, R^1 and R^2 are the same or different, each independently selected from the group consisting of
1) a hydrogen atom,
2) a halogen atom,
3) a C_{1-6} alkyl group,
4) a C_{1-6} alkoxy group, and
5) a C_{1-6} alkylthio group,
(wherein each substituent from 3) to 5) is optionally substituted with a halogen atom).

[0119]

In some embodiments, R^1 and R^2 are the same or different, each independently selected from the group consisting of

1) a hydrogen atom,

2) a halogen atom,

3) a C_{1-6} alkyl group optionally substituted with a halogen atom.

[0120]

In some embodiments, R^1 and R^2 are the same or different, each independently selected from the group consisting of

1) a hydrogen atom,

2) a fluorine atom,

3) a C_{1-3} alkyl group optionally substituted with a fluorine atom.

[0121]

In some embodiments, R^1 and R^2 are both hydrogen atoms.

[0122]

In some embodiments, L^3 is $-(CR^{30}R^{31})_{n1}-$ or 4- to 10-membered non-aryl heterocyclylene,

R^{30} and R^{31} each independently, or if there are multiple instances of each of them, all of them independently represent

1) a hydrogen atom,

2) an optionally substituted C_{1-4} alkyl group, or

3) optionally substituted C_{6-10} aryl,

n1 is 1, 2, or 3,

L^4 is a single bond or $-(CR^{40}R^{41})_{n2}-$,

R^{40} and R^{41} each independently, or if there are multiple instances of each of them, all of them independently represent

1) a hydrogen atom,

2) $-NR^{a9}R^{a10}$,

3) an optionally substituted C_{1-4} alkyl group, or

4) $-OR^{c4}$, or

R^{40} and R^{41}, together with the carbon atom to which they are attached, form a C_{3-6} alicyclic group or a 4- to 6-membered non-aryl heterocycle,

R^{a9}, R^{a10}, and R^{c4} are the same or different, each independently

1) a hydrogen atom,

2) an optionally substituted C_{1-6} alkyl group, or

3) an optionally substituted C_{3-10} alicyclic group,

wherein R^{a9} and R^{a10} together may form an optionally substituted 4- to 10-membered nitrogen-containing non-aryl heterocycle, and

n2 is 0, 1, or 2.

[0123]

In some embodiments, L^3 is $-(CR^{30}R^{31})_{n1}-$,

R^{30} and R^{31} each independently, or if there are multiple instances of each of them, all of them independently represent

1) a hydrogen atom,

2) an optionally substituted C_{1-4} alkyl group, or

3) optionally substituted C_{6-10} aryl,

n1 is 1, 2, or 3,

L^4 is $-(CR^{40}R^{41})_{n2}-$,

R^{40} and R^{41} each independently, or if there are multiple instances of each of them, all of them independently represent

1) a hydrogen atom,

2) $-NR^{a9}R^{a10}$,

3) an optionally substituted C_{1-4} alkyl group, or

4) $-OR^{c4}$, or

R^{40} and R^{41}, together with the carbon atom to which they are attached, form a C_{3-6} alicyclic group or a 4- to 6-membered non-aryl heterocycle,

R^{a9}, R^{a10}, and R^{c4} are the same or different, each independently

1) a hydrogen atom,

2) an optionally substituted C_{1-6} alkyl group, or

3) an optionally substituted C_{3-10} alicyclic group,

wherein R^{a9} and R^{a10} together may form an optionally substituted 4- to 10-membered nitrogen-containing non-aryl heterocycle, and

n2 is 0, 1, or 2.

[0124]

In some embodiments, n1 is 1 or 2, and n2 is 0 or 1.

[0125]

In some embodiments, L^3 is $-CR^{30}R^{31}-$ or 4- to 10-membered non-aryl heterocyclylene,

R^{30} and R^{31} each independently represent,

1) a hydrogen atom,

2) a C_{1-4} alkyl group (wherein the group is optionally substituted with halogen, $-NR^{a11}R^{a12}$, or $-OR^{c6}$), or

3) C_6 aryl (wherein the group is optionally substituted with halogen, $-NR^{a13}R^{a14}$, $-OR^{c7}$, or a C_{1-3} alkyl group (wherein the group is optionally substituted with halogen, $-NR^{a15}R^{a16}$, or $-OR^{c8}$)),

L^4 is a single bond or $-(CR^{40}R^{41})_{n2}-$,

R^{40} and R^{41} each independently represent,

1) a hydrogen atom,

2) $-NR^{a9}R^{a10}$,

3) a C_{1-4} alkyl group (wherein the group is optionally substituted with halogen, $-NR^{a17}R^{a18}$, or $-OR^{c9}$), or

4) $-OR^{c4}$, or

R^{40} and R^{41}, together with the carbon atom to which they are attached, form a C_{3-6} alicyclic group,

R^{a9}, R^{a10}, R^{a11}, R^{a12}, R^{a13}, R^{a14}, R^{a15}, R^{a16}, R^{a17}, R^{a18}, R^{c4}, R^{c6}, R^{c7}, R^{c8}, and R^{c9} are the same or different, each independently representing

1) a hydrogen atom, or

2) a C_{1-4} alkyl group (wherein the group is optionally substituted with halogen, $-NR^{a19}R^{a20}$, or $-OR^{c10}$),

R^{a19}, R^{a20}, and R^{c10} are the same or different, each independently representing

1) a hydrogen atom, or

2) a C_{1-4} alkyl group (wherein the group is optionally substituted with halogen),

wherein each combination of R^{a9} and R^{a10}, R^{a11} and R^{a12}, R^{a13} and R^{a14}, R^{a15} and R^{a16}, R^{a17} and R^{a18}, or R^{a19} and R^{a20} together may form an optionally substituted 4- to 7-membered nitrogen-containing non-aryl heterocycle, and

n2 is 0 or 1.

[0126]

In some embodiments, L^3 is $-CR^{30}R^{31}-$,

R^{30} and R^{31} each independently represent,

1) a hydrogen atom,

2) a C_{1-4} alkyl group (wherein the group is optionally substituted with halogen, $-NR^{a11}R^{a12}$, or $-OR^{c6}$), or

3) C_6 aryl (wherein the group is optionally substituted with halogen, $-NR^{a13}R^{a14}$, $-OR^{c7}$, or a C_{1-3} alkyl group (wherein the group is optionally substituted with halogen, $-NR^{a15}R^{a16}$, or $-OR^{c8}$)),

L^4 is $-(CR^{40}R^{41})_{n2}-$,

R^{40} and R^{41} each independently represent,

1) a hydrogen atom,

2) $-NR^{a9}R^{a10}$,

3) a C_{1-4} alkyl group (wherein the group is optionally substituted with halogen, $-NR^{a17}R^{a18}$, or $-OR^{c9}$), or

4) $-OR^{c4}$, or

R^{40} and R^{41}, together with the carbon atom to which they are attached, form a C_{3-6} alicyclic group,

R^{a9}, R^{a10}, R^{a11}, R^{a12}, R^{a13}, R^{a14}, R^{a15}, R^{a16}, R^{a17}, R^{a18}, R^{c4}, R^{c6}, R^{c7}, R^{c8}, and R^{c9} are the same or different, each independently representing

1) a hydrogen atom or

2) a C_{1-4} alkyl group (wherein the group is optionally substituted with halogen, $-NR^{a19}R^{a20}$, or $-OR^{c10}$),

R^{a19}, R^{a20}, and R^{c10} are the same or different, each independently representing

1) a hydrogen atom, or

2) a C_{1-4} alkyl group (wherein the group is optionally substituted with halogen),

wherein each combination of R^{a9} and R^{a10}, R^{a11} and R^{a12}, R^{a13} and R^{a14}, R^{a15} and R^{a16}, R^{a17} and R^{a18}, or R^{a19} and R^{a20} together may form an optionally substituted 4- to 7-membered nitrogen-containing non-aryl heterocycle, and

n2 is 0 or 1.

[0127]

In some embodiments,

L^3 is $-CH_2-$, $-CH(CH_2NH_2)-$, or $-CH(CH_2OH)-$, and

L^4 and a single bond, $-CH_2-$, $-CH(NH_2)-$, $-CMe(NH_2)-$, $-CEt(NH_2)-$, $-C(iso\text{-}Pr)(NH_2)-$, $-CH(CH_2NH_2)-$, $-CH(OH)-$, $-CH(CH_2OH)-$, $-C(CH_2OH)_2-$, or

[Chemical Formula 547-1]



.

[0128]

In some embodiments,

L^3 is $-CH_2-$, $-CH(CH_2NH_2)-$, or $-CH(CH_2OH)-$, and

L^4 is a single bond, $-CH_2-$, $-CH(NH_2)-$, $-CMe(NH_2)-$, $-CEt(NH_2)-$, $-C(iso\text{-}Pr)(NH_2)-$, $-CH(CH_2NH_2)-$, $-CH(OH)-$, $-CH(CH_2OH)-$, or

[Chemical Formula 547-2]



.

[0129]

In some embodiments, L^3 is 4- to 10-membered non-aryl heterocyclylene.

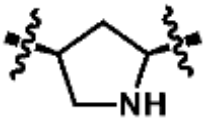
[0130]

In some embodiments, L^3 is 5-membered non-aryl heterocyclylene.

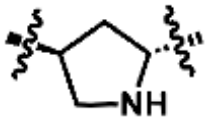
[0131]

In some embodiments, L^3 is

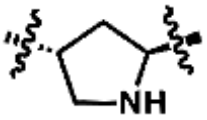
[Chemical Formula 547-3]



[Chemical Formula 547-4]

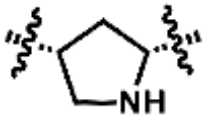


[Chemical Formula 547-5]



or

[Chemical Formula 547-6]



.

[0132]

In some embodiments, L^4 is a single bond.

[0133]

In some embodiments, R^5 is

1) C_{6-10} aryl, or

2) 5- to 10-membered heteroaryl,

(wherein each substituent from 1) to 2) is optionally substituted, and if two substituents further substituted with the substituent of 1) or 2) are each substituted on adjacent atoms within a ring, the two substituents together may further form a condensed ring structure).

[0134]

In some embodiments, R^5 is C_6 aryl (i.e., phenyl) or 5-membered, 6-membered, 9-membered, or 10-membered heteroaryl,

each group of R^5 is optionally substituted with each of R^{6a} or R^{6b} at all chemically substitutable positions on a carbon atom or a nitrogen atom within a ring thereof,

wherein R^{6a}, which are substituents on the carbon atom, if there are multiple instances on the same ring, are all independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) a cyano group,

4) halogen,

5) a C_{1-4} alkyl group,

6) a C_{3-10} alicyclic group,

7) a C_{1-4} alkoxy group,

8) a C_{3-10} alicyclic oxy group,

9) a C_{6-10} aryloxy group,

10) a 5- or 6-membered heteroaryloxy group,

11) a 4- to 10-membered non-aryl heterocyclyl oxy group,

(wherein each substituent from 5) and 11) is optionally substituted),

12) $-SO_2-NR^{e2}R^{f2}$,

13) $-NR^{g2}-CR^{e2}(=NR^{f2})$,

14) $-NR^{g2}-CR^{e2}(=N-OR^{f2})$,

15) $-NR^{h2}-C(=NR^{g2})NR^{e2}R^{f2}$,

16) $-NR^{h2}-C(=N-OR^{g2})NR^{e2}R^{f2}$,

17) $-NR^{i2}-C(=NR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

18) $-NR^{i2}-C(=N-OR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

19) $-C(=NR^{e2})R^{f2}$,

20) $-C(=N-OR^{e2})R^{f2}$,

21) $-C(=NR^{h2})-NR^{e2}R^{f2}$,

22) $-C(=NR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

23) $-C(=N-OR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

24) $-NR^{e2}R^{f2}$,

25) $-NR^{g2}-NR^{e2}R^{f2}$,

26) $-NR^{e2}OR^{f2}$,

27) $-NR^{e2}-C(=O)R^{f2}$,

28) $-C(=O)NR^{e2}R^{f2}$,

29) $-C(=O)NR^{e2}OR^{f2}$,

30) $-C(=O)NR^{g2}-NR^{e2}R^{f2}$,

31) $-C(=O)R^{e2}$,

32) $-C(=O)OR^{e2}$, and

33) $-C(=N-OR^{h2})NR^{e2}R^{f2}$,

wherein R^{6b}, which are substituents on the nitrogen atom, if there are multiple instances on the same ring, are all independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted),

4) a C_{3-10} alicyclic group

(wherein the alicyclic group is optionally substituted),

5) $-C(=NR^{e2})R^{f2}$,

6) $-C(=N-OR^{e2})R^{f2}$,

7) $-SO_2-NR^{e2}R^{f2}$,

8) $-C(=NR^{h2})-NR^{e2}R^{f2}$,

9) $-C(=NR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

10) $-C(=N-OR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

11) $-C(=O)NR^{e2}R^{f2}$,

12) $-C(=O)NR^{e2}OR^{f2}$,

13) $-C(=O)NR^{g2}-NR^{e2}R^{f2}$,

14) $-C(=O)R^{e2}$, and

15) $-C(=N—OR^{h2})NR^{e2}R^{f2}$, or

if a combination of two R^{6a} or R^{6a} and R^{6b} are each substituted on adjacent atoms within a ring, the two substituents together may form an optionally substituted 5- to 6-membered heteroaryl ring or an optionally substituted 5- to 7-membered non-aryl heterocycle,

which further fuses to an attachment moiety between the adjacent atoms within the ring,

R^{e2}, R^{f2}, R^{g2}, R^{h2}, and R^{i2} are the same or different, each independently

1) a hydrogen atom,

2) a C_{1-6} alkyl group,

3) a C_{3-10} alicyclic group,

4) C_{6-10} aryl,

5) 5- or 6-membered heteroaryl, or

6) a 4- to 10-membered non-aryl heterocycle,

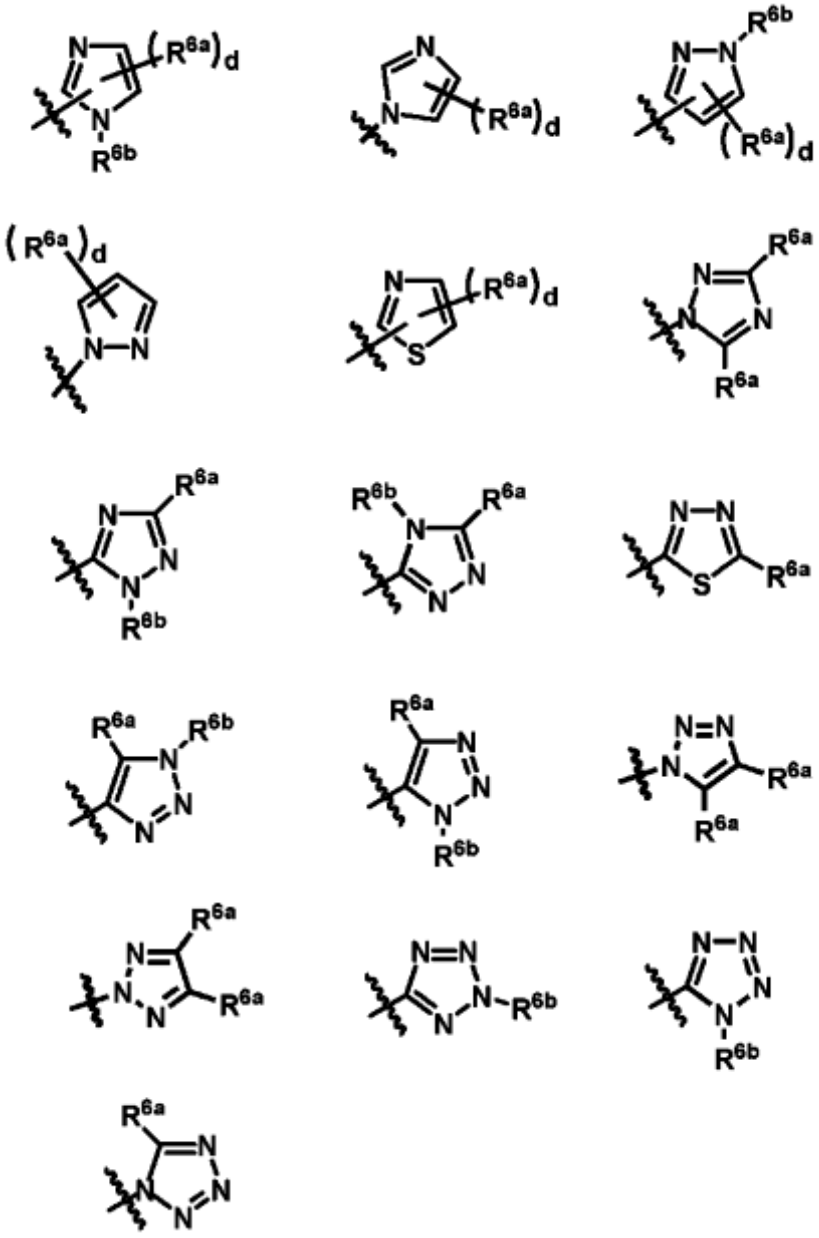
(wherein each substituent from 2) to 6) is optionally substituted), and

a combination of R^{e2} and R^{f2}, when attached to the same nitrogen atom, together may form an optionally substituted 4- to 10-membered nitrogen-containing non-aryl heterocycle.

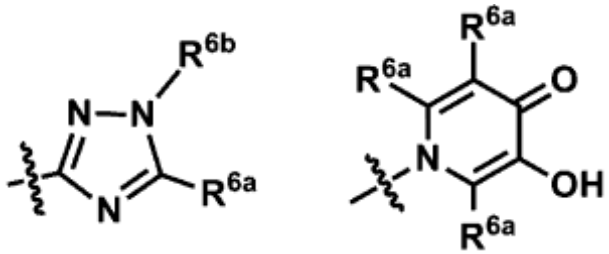
[0135]

R^5 is C_6 aryl or 5-membered, 6-membered, 9-membered, or 10-membered heteroaryl selected from the group consisting of

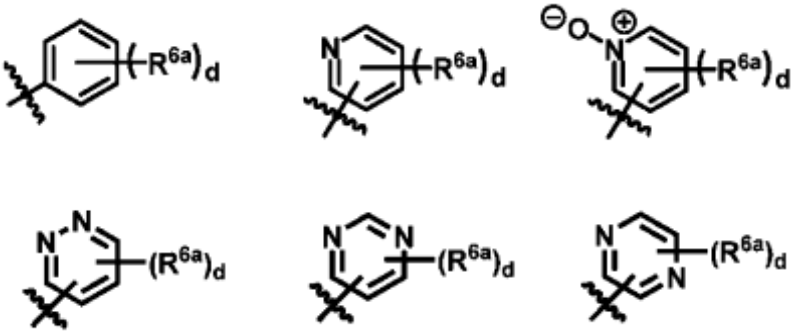
[Chemical Formula 548-1]



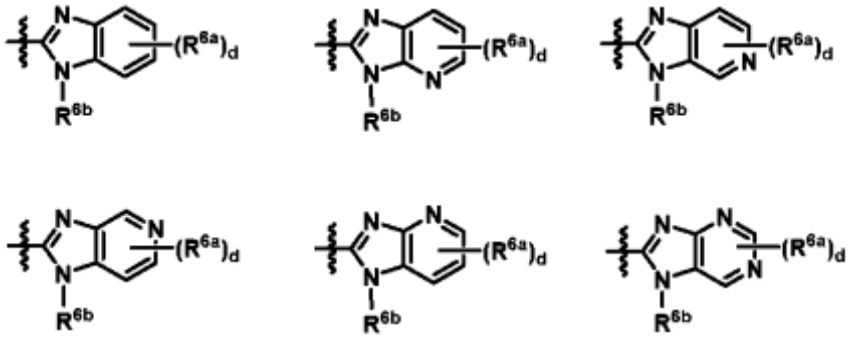
[Chemical Formula 548-2]

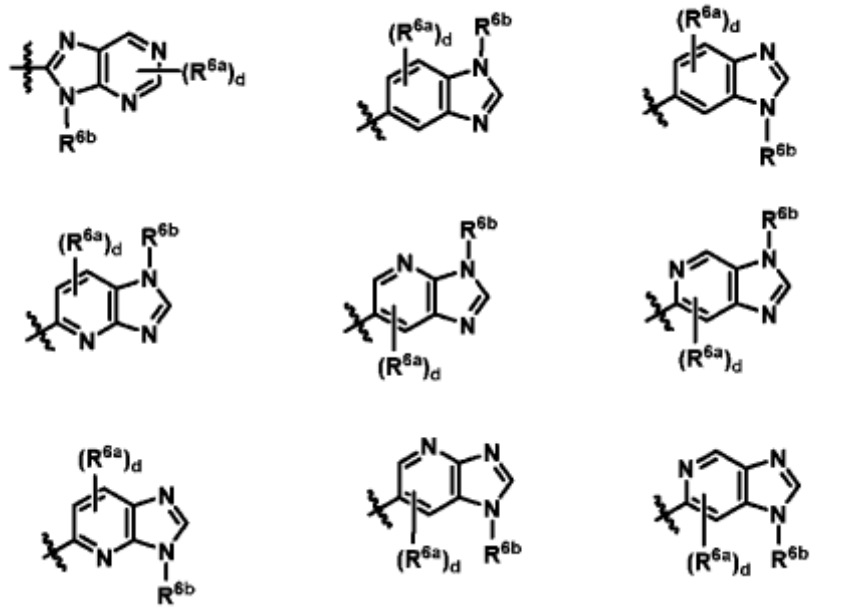


[Chemical Formula 548-3]

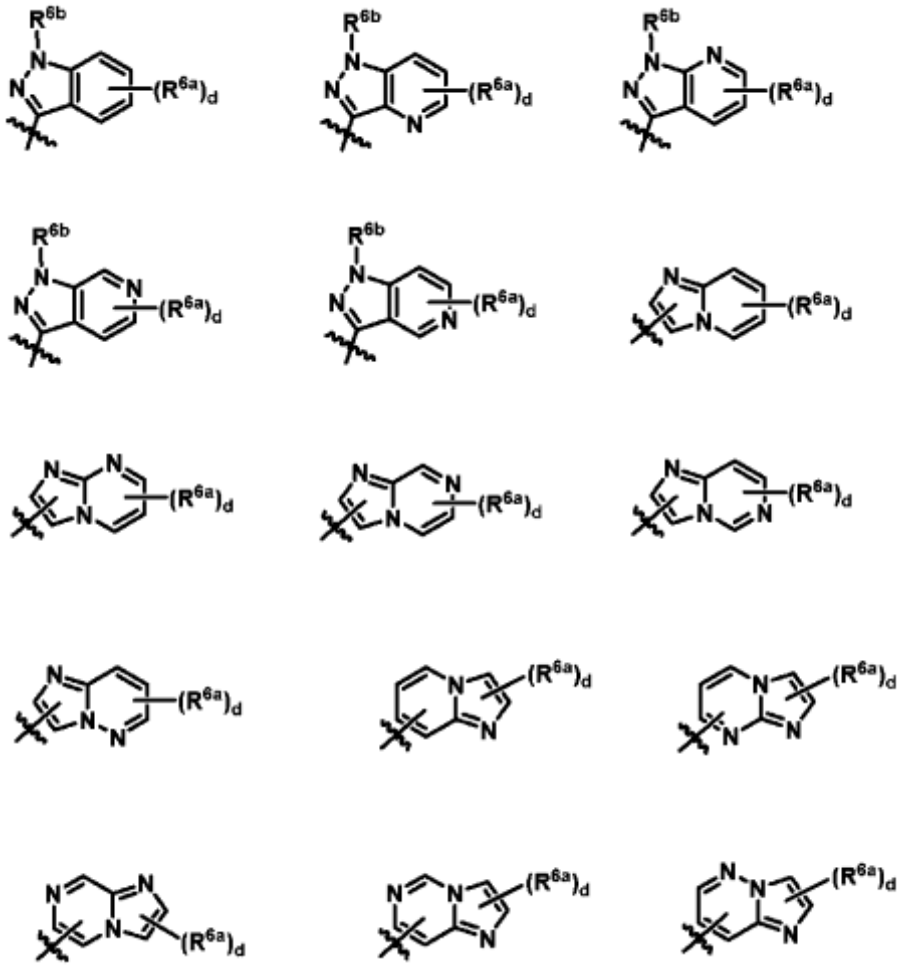


[Chemical Formula 548-4]

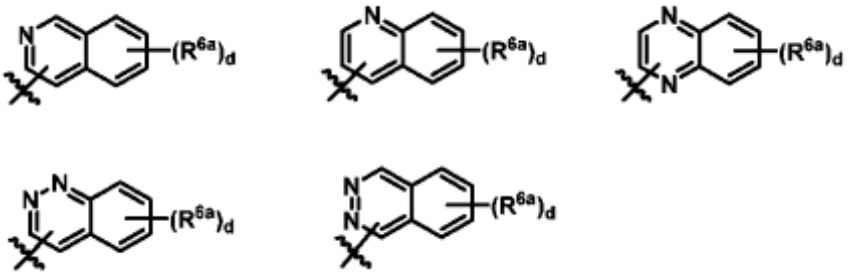




[Chemical Formula 548-5]



[Chemical Formula 548-6]



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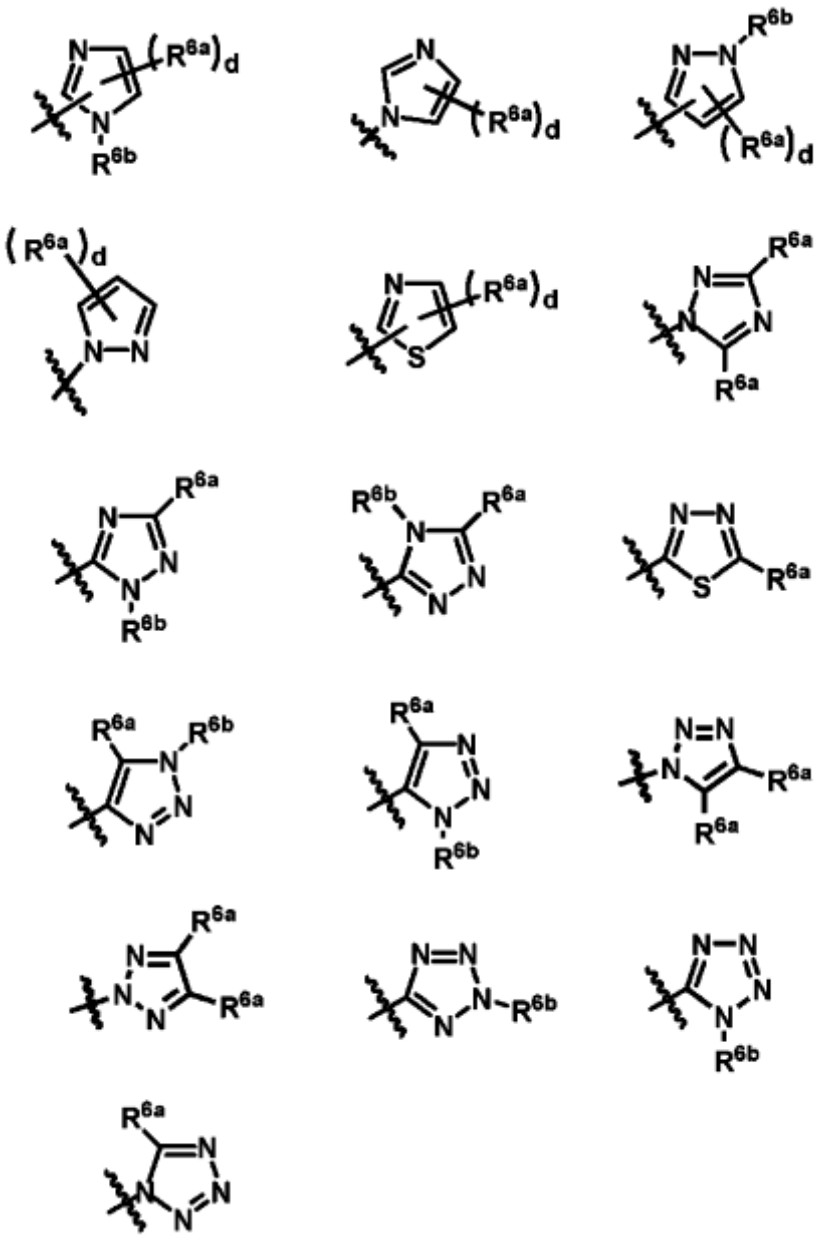
d is the number of chemically substitutable positions on a ring of each group by R^{6a}, and

each R^{6a} and each R^{6b} are defined the same as the present specification (e.g., item 46).

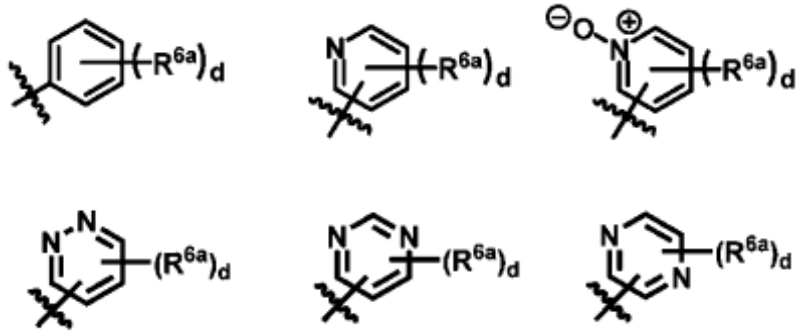
[0136]

In some embodiments, R^5 is C_6 aryl or 5-membered, 6-membered, 9-membered, or 10-membered heteroaryl selected from the group consisting of

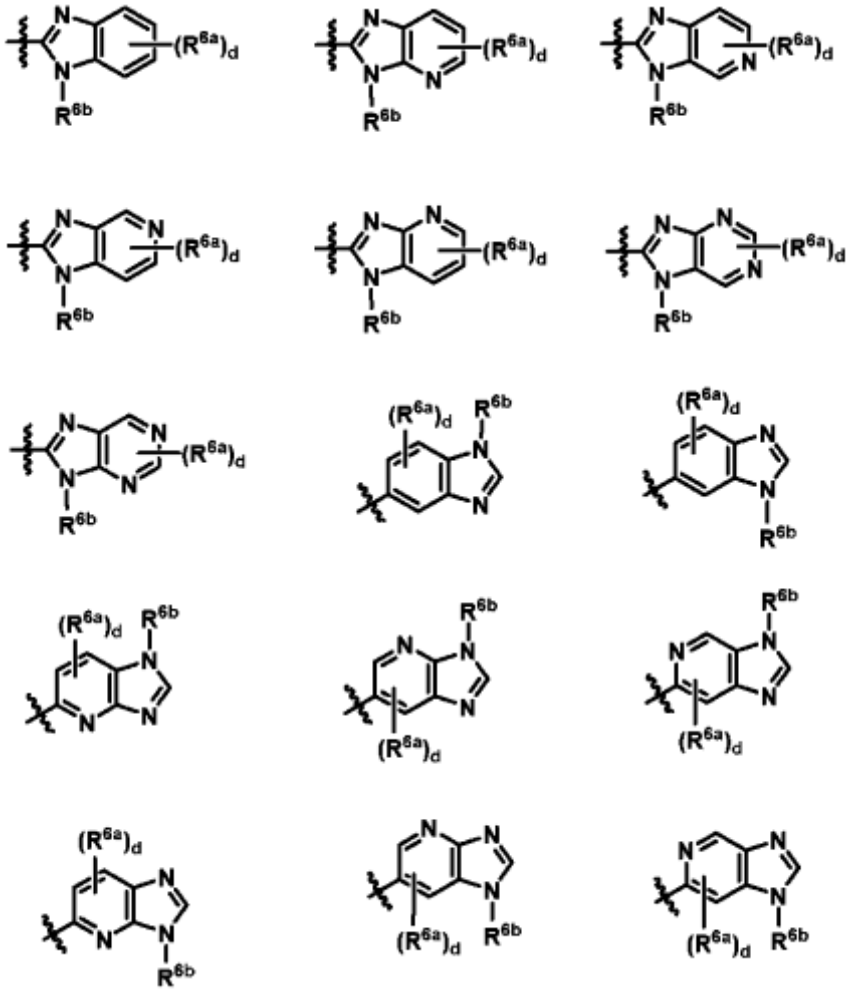
[Chemical Formula 548-7]



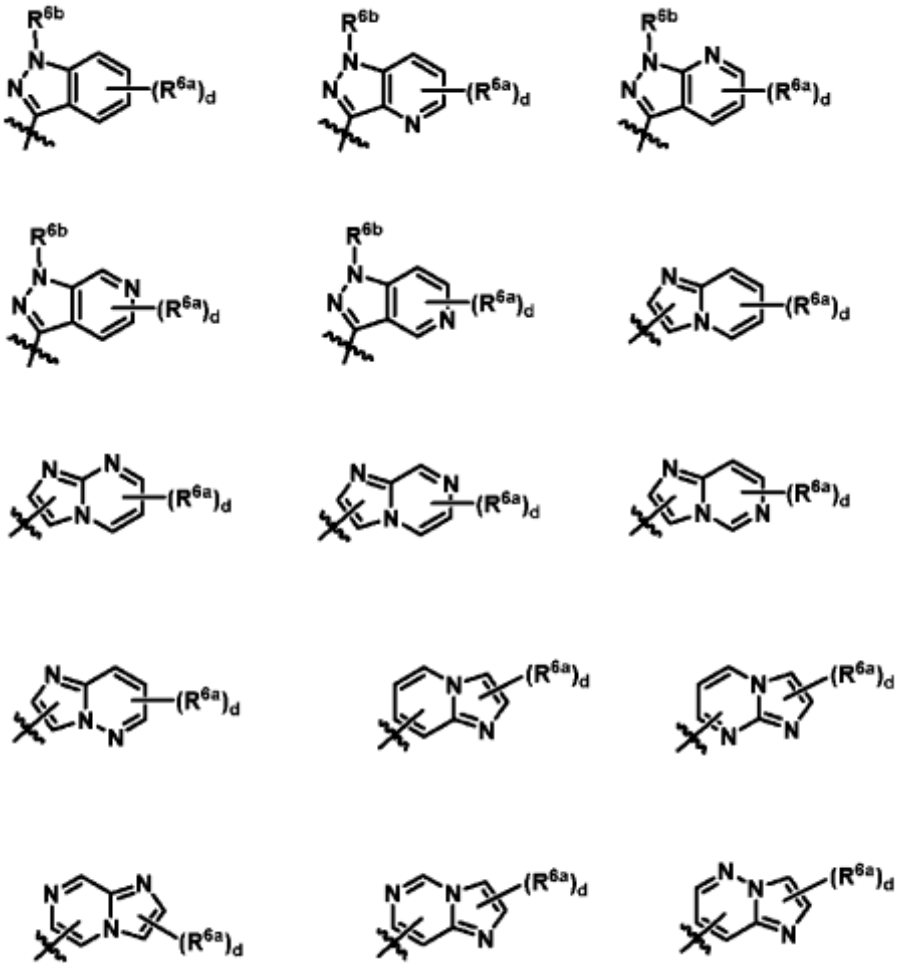
[Chemical Formula 548-8]



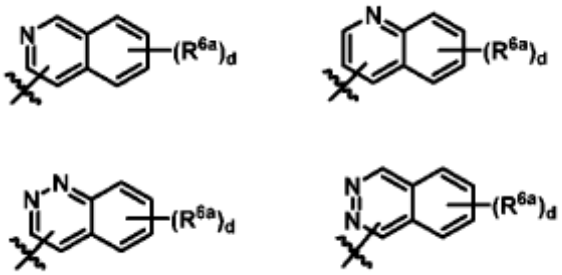
[Chemical Formula 548-9]



[Chemical Formula 549]



[Chemical Formula 550]



,

d is the number of chemically substitutable positions on a ring of each group by R^{6a}, and

each R^{6a} and each R^{6b} are defined the same as the definition herein (e.g., item 41).

[0137]

In some embodiments, R^{6a}, if there are multiple instances on the same ring, are all independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) halogen,

4) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted with $NR^{e2}R^{f2}$, $-C(=O)OR^{f2}$, $-C(=O)NR^{e2}R^{f2}$, $-C(=O)NR^{e2}(OR^{f2})$, or a hydroxyl group),

5) a C_{1-4} alkoxy group,

6) $-NR^{e2}R^{f2}$,

7) $-C(=O)NR^{e2}R^{f2}$, and

8) $-C(=O)OR^{e2}$, and

each R^{6b}, if there are multiple instances on the same ring, are all independently selected from the group consisting of 1) a hydrogen atom, 2) a hydroxyl group, and 3) a C_{1-4} alkyl group (wherein the alkyl group is optionally substituted with $NR^{e2}R^{f2}$, $-C(=O)OR^{f2}$, $-C(=O)NR^{e2}R^{f2}$, $-C(=O)NR^{e2}(OR^{f2})$, or a hydroxyl group).

[0138]

In some embodiments, R^{e2} and R^{f2} are the same or different, each independently a hydrogen atom, an optionally substituted C_{1-6} alkyl group, or an optionally substituted C_{3-10} alicyclic group. In some embodiments, R^{e2} and R^{f2} are the same or different, each independently a hydrogen atom or an optionally substituted C_{1-6} alkyl group. In some embodiments, R^{e2} and R^{f2} are hydrogen atoms.

[0139]

In some embodiments, R^{6a} is $-NR^{e2}R^{f2}$, and one of R^{e2} and R^{f2} is a hydrogen atom and the other is a C_{1-4} alkyl group (wherein the alkyl group is optionally substituted with an amino group or a hydroxyl group).

[0140]

In some embodiments, R^5 is $C(=O)NR^{50}R^{51}$.

[0141]

In some embodiments, R^{50} represents

1) a hydrogen atom,

2) an optionally substituted C_{1-4} alkyl group,

3) a hydroxyl group,

4) an optionally substituted C_{1-4} alkoxy group, or

5) an optionally substituted C_{1-6} alkylsulfonyl group,

R^{51} represents 1) a hydrogen atom or 2) an optionally substituted C_{1-4} alkyl group, or

R^{50} and R^{51} together may form a 4- to 6-membered nitrogen-containing non-aryl heterocycle.

[0142]

In some embodiments, R^{50} represents

1) a hydrogen atom,

2) a C_{1-4} alkyl group (wherein the group is optionally substituted with halogen, a C_{3-6} alicyclic group, $-NR^{a21}R^{a22}$, or $-OR^{c11}$),

3) a hydroxyl group,

4) a C_{1-4} alkoxy group (wherein the group is optionally substituted with halogen, a C_{3-6} alicyclic group, $-NR^{a23}R^{a24}$, or $-OR^{c12}$), or

5) a C_{1-4} alkylsulfonyl group (wherein the group is optionally substituted with halogen, a C_{3-6} alicyclic group, $-NR^{a21}R^{a22}$, or $-OR^{c11}$),

R^{a21}, R^{a22}, R^{a23}, R^{a24}, R^{c11}, and R^{c12} are the same or different, each independently representing 1) a hydrogen atom or 2) a C_{1-4} alkyl group (wherein the group is optionally substituted with halogen),

wherein each combination of R^{a21} and R^{a22} or R^{a23} and R^{a24} together may form an optionally substituted 4- to 7-membered nitrogen-containing non-aryl heterocycle, and

R^{51} is a hydrogen atom or C_{1-4} alkyl (wherein the group is optionally substituted with halogen).

[0143]

In some embodiments, R^{50} represents

1) a hydrogen atom,

2) a C_{1-4} alkyl group (wherein the group is optionally substituted with a cyclopropyl group, $-NH_2$, -NHMe, $-C(=O)NH_2$, -C(=O)NHMe, $-C(=O)NMe_2$, or a -hydroxyl group),

3) a hydroxyl group,

4) a C_{1-4} alkoxy group (wherein the group is optionally substituted with a cyclopropyl group, $-NH_2$, -NHMe, or a -hydroxyl group), or

5) a C_{1-4} alkylsulfonyl group, and,

R^{51} is a hydrogen atom.

[0144]

In some embodiments, R^{50} represents

1) a hydrogen atom,

2) a C_{1-4} alkyl group (wherein the group is optionally substituted with a cyclopropyl group, $-NH_2$, -NHMe, or a -hydroxyl group),

3) a hydroxyl group,

4) a C_{1-4} alkoxy group (wherein the group is optionally substituted with a cyclopropyl group, $-NH_2$, -NHMe, or a -hydroxyl group), or

5) a C_{1-4} alkylsulfonyl group, and

R^{51} is a hydrogen atom.

[0145]

In some embodiments, R^5 is $-C(=O)OR^{20}$.

[0146]

In some embodiments, R^{20} is 1) a hydrogen atom or 2) an optionally substituted C_{1-4} alkyl group.

[0147]

In some embodiments, L^3 is $-CH_2-$, and L^4 is $-CH(NH_2)-$ or $-CMe(NH_2)-$.

[0148]

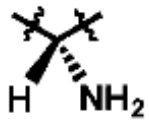
In some embodiments, L^3 is $-CH_2-$, and

L^4 is a single bond, $-CH(NH_2)-$, or $-CMe(NH_2)-$.

[0149]

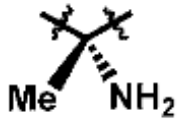
In some embodiments, L^3 is $-CH_2-$, and L^4 is

[Chemical Formula 551]



,

[Chemical Formula 552]



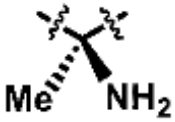
,

[Chemical Formula 553]



, or

[Chemical Formula 554]

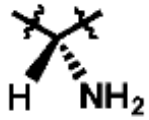


.

[0150]

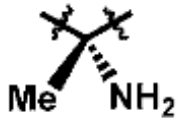
In some embodiments, L^3 is $-CH_2-$, and L^4 is

[Chemical Formula 555]



or

[Chemical Formula 556]



.

[0151]

In some embodiments, R^{20} is a hydrogen atom. In such a case, R^5 is, specifically, $-C(=O)OH$ (i.e., a carboxyl group).

[0152]

In some embodiments, R^5 is $-NR^{e1}R^{f1}$,

L^3 is $-CH_2-$,

L^4 is $-CR^{40}R^{41}-$, and

R^{40} and R^{41} are each independently a C_{1-4} alkyl group substituted with a hydroxyl group, or together with the carbon atom to which they are attached, form a C_{3-6} alicyclic group.

[0153]

In some embodiments, R^5 is $-NR^{e1}R^{f1}$, L^3 is $-CH_2-$, L^4 is $-CR^{40}R^{41}-$, and R^{40} and R^{41}, together with the carbon atom to which they are attached, form a C_{3-6} alicyclic group.

[0154]

In some embodiments, R^{e1} and R^{f1} are the same or different, each independently

1) a hydrogen atom, or

2) an optionally substituted C_{1-3} alkyl group, and

L^4 is

[Chemical Formula 557]



.

[0155]

In some embodiments, R^{e1} and R^{f1} are the same or different, each independently

1) a hydrogen atom, or

2) an optionally substituted C_{1-3} alkyl group, and

L^4 is a C_{1-4} alkylene group substituted with a hydroxyl group.

[0156]

In some embodiments, L^4 is a single bond or a C_{1-6} alkylene group optionally substituted with $-NR^{21}R^{22}$ or $=NOR^{23}$, wherein R^{21}, R^{22}, and R^{23} are each independently a hydrogen atom, an optionally substituted C_{1-6} alkyl group, or an optionally substituted 4- to 10-membered non-aryl heterocyclyl carbonyl group.

[0157]

In some embodiments, L^4 is a single bond, $-CH_2-$, $-CH(NH_2)-$, $-CMe(NH_2)-$, $-CH(NHMe)-$, $-CD(NH_2)-$ (wherein D represents a heavy

hydrogen atom), $-CH_2CH_2-$, or $-CH(NH_2)-CH_2-$, wherein if an amino group is present in L^4, carbon that attaches to the amino group attaches to L^3.

[0158]

In some embodiments, L^3 is $-C(=O)-$, and

L^4 is a single bond, $-CH_2-$, $-CH(NH_2)-$, $-CMe(NH_2)-$, or $-CH(NH_2)-CH_2-$.

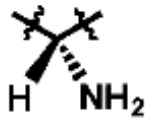
[0159]

In some embodiments, L^3 is $-C(=O)-$, and L^4 is $-CH(NH_2)-$ or $-CMe(NH_2)-$.

[0160]

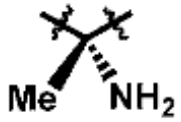
In some embodiments, L^4 is an isomeric structure of one of

[Chemical Formula 558-1]



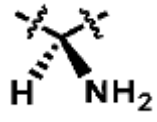
,

[Chemical Formula 558-2]



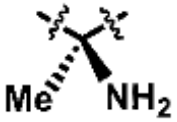
,

[Chemical Formula 558-3]



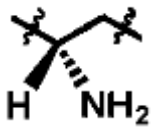
,

[Chemical Formula 558-4]



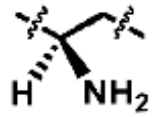
,

[Chemical Formula 558-5]



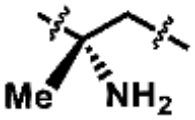
,

[Chemical Formula 558-6]



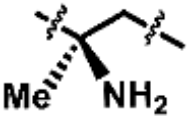
,

[Chemical Formula 558-7]



, and

[Chemical Formula 558-8]

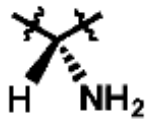


.

[0161]

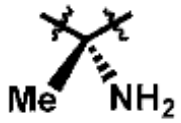
In some embodiments, L^3 is -C(=O)-, and L^4 is an isomeric structure of one of

[Chemical Formula 558-9]



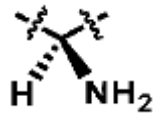
,

[Chemical Formula 559]



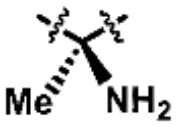
,

[Chemical Formula 560]



, and

[Chemical Formula 561]

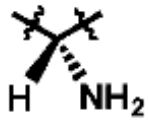


.

[0162]

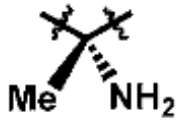
In some embodiments, L^3 is -C(=O)-, and L^4 is

[Chemical Formula 562]



or

[Chemical Formula 563-1]

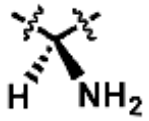


.

[0163]

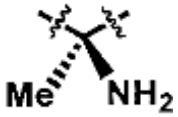
In some embodiments, L^4 is

[Chemical Formula 563-2]



or

[Chemical Formula 563-3]

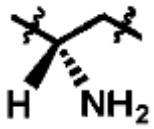


.

[0164]

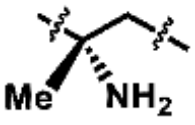
In some embodiments, L^4 is

[Chemical Formula 563-4]



or

[Chemical Formula 563-5]

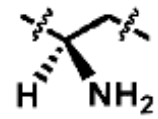


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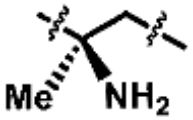
[0165]

In some embodiments, L^4 is

[Chemical Formula 563-6]

 or

[Chemical Formula 563-7]

 .

[0166]

In some embodiments, R^5 is a hydrogen atom, an optionally substituted C_{1-6} alkyl group, an optionally substituted C_{3-10} alicyclic group, an optionally substituted 4- to 10-membered non-aryl heterocycle, optionally substituted C_{6-10} aryl, optionally substituted 5- or 6-membered heteroaryl, an optionally substituted C_{1-6} alkylthio group, or $-NR^{e1}OH$, wherein R^{e1} is a hydrogen atom or an optionally substituted C_{1-6} alkyl group.

[0167]

In some embodiments, R^5 is a hydrogen atom, an optionally substituted C_{1-6} alkyl group, an optionally substituted 4- to 10-membered non-aryl heterocycle, optionally substituted C_{6-10} aryl, optionally substituted 5- or 6-membered heteroaryl, an optionally substituted C_{1-6} alkylthio group, or $-NR^{e1}OH$, wherein R^{e1} is a hydrogen atom or an optionally substituted C_{1-6} alkyl group.

[0168]

In some embodiments, R^5 is optionally substituted 5- or 6-membered heteroaryl or optionally substituted C_{6-10} aryl.

[0169]

In some embodiments, R^5 is optionally substituted 5- or 6-membered heteroaryl.

[0170]

In some embodiments, R^5 is an optionally substituted C_{4-10} alicyclic group or an optionally substituted 4- to 10-membered non-aryl heterocycle.

[0171]

In some embodiments, R^5 is an optionally substituted 4- to 10-membered non-aryl heterocycle.

[0172]

In some embodiments, L^4 is a single bond, and R^5 is $-NR^{e1}OH$, wherein R^{e1} is a hydrogen atom or an optionally substituted C_{1-6} alkyl group.

[0173]

In some embodiments, L^4 is

1) $-(CH_2)_p-CR^{10}(NHR^{11})-$,

2) $-(CH_2)_q-CR^{12}R^{13}-$, or

3) $-(CH_2)_p-CR^{10}(NHR^{11})-(CH_2)_q-CR^{12}R^{13}-$ (wherein p and q are independently 0 or 1),

R^{10} is

1) a hydrogen atom,

2) a carboxyl group, or

3) $-C(=O)NR^{10a}R^{10b}$,

R^{11} is

1) a hydrogen atom,

2) $-C(=O)R^{11a}$, or

3) an optionally substituted 5- or 6-membered non-aryl heterocyclyl carbonyl group,

wherein if R^{10} is $-C(=O)NR^{10a}R^{10b}$, R^{10b} and R^{11} together may form $-CH_2CH_2-$,

R^{12} is

1) a hydrogen atom, or

2) an optionally substituted C_{1-4} alkyl group,

R^{13} is

1) a hydrogen atom,

2) a hydroxyl group,

3) an optionally substituted C_{1-4} alkyl group,

4) a sulfanyl group,

5) a carboxyl group,

6) an optionally substituted C_{1-4} alkylthio group,

7) $-NR^{13a}R^{13b}$,

8) $-NR^{13a}-C(=O)R^{13b}$,

9) an optionally substituted 5- or 6-membered non-aryl heterocyclyl carbonylamino group,

10) $-NR^{13a}-C(=O)NR^{13b}R^{13c}$,

11) $-C(=O)NR^{13a}R^{13b}$,

12) $-C(=O)NR^{13a}OR^{13b}$,

13) $-S(=O)_2-R^{13a}$,

14) $-S(=O)_2-NR^{13a}R^{13b}$,

15) $-C(=O)NR^{13a}-S(=O)_2-R^{13b}$, or

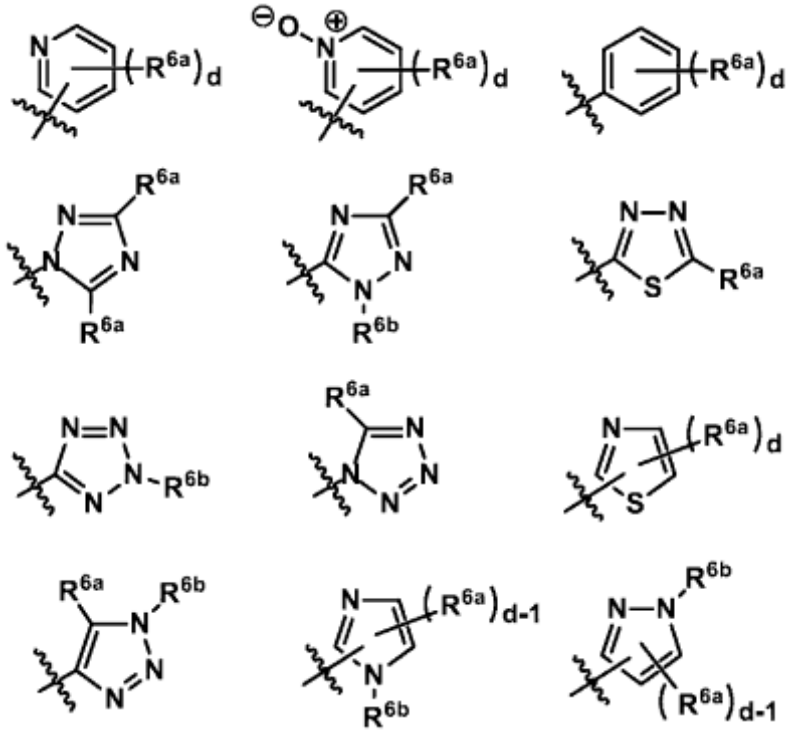
16) $-C(=O)NR^{13a}-S(=O)_2-NR^{13b}R^{13c}$, and

R^{10a}, R^{10b}, R^{11a}, R^{13a}, R^{13b}, and R^{13c} are each independently a hydrogen atom or an optionally substituted C_{1-4} alkyl group. In such a case, in some embodiments, R^5 is a hydrogen atom or an optionally substituted C_{1-4} alkyl group.

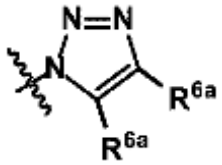
[0174]

In some embodiments, R^5 is selected from the group consisting of

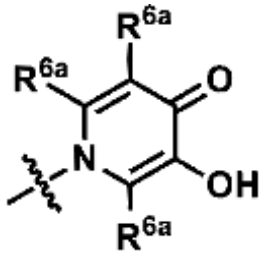
[Chemical Formula 563-8]



[Chemical Formula 563-9]



[Chemical Formula 564-1]



,

subscript d is the number of substitutable positions on a ring of R^5,

each R^{6a} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) a cyano group,

4) a nitro group,

5) halogen,

6) a C_{1-4} alkyl group,

7) a C_{3-10} alicyclic group,

8) a C_{1-4} alkoxy group,

9) a C_{3-10} alicyclic oxy group,

10) a C_{6-10} aryloxy group,

11) a 5- or 6-membered heteroaryloxy group,

12) a 4- to 10-membered non-aryl heterocyclyl oxy group,

(wherein each substituent from 6) to 12) is optionally substituted),

13) $-SO_2-NR^{e2}R^{f2}$,

14) $-NR^{g2}-CR^{e2}(=NR^{f2})$,

15) $-NR^{g2}-CR^{e2}(=N-OR^{f2})$,

16) $-NR^{h2}-C(=NR^{g2})NR^{e2}R^{f2}$,

17) $-NR^{h2}-C(=N-OR^{g2})NR^{e2}R^{f2}$,

18) $-NR^{i2}-C(=NR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

19) $-NR^{i2}-C(=N-OR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

20) $-C(=NR^{e2})R^{f2}$,

21) $-C(=N-OR^{e2})R^{f2}$,

22) $-C(=NR^{h2})-NR^{e2}R^{f2}$,

23) $-C(=NR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

24) $-C(=N-OR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

25) $-NR^{e2}R^{f2}$,

26) $-NR^{g2}-NR^{e2}R^{f2}$,

27) $-NR^{e2}OR^{f2}$,

28) $-NR^{e2}-C(=O)R^{f2}$,

29) $-C(=O)NR^{e2}R^{f2}$,

30) $-C(=O)NR^{e2}OR^{f2}$,

31) $-C(=O)NR^{g2}-NR^{e2}R^{f2}$,

32) $-C(=O)R^{e2}$,

33) $-C(=O)OR^{e2}$, and

34) $-C(=N-OR^{h2})NR^{e2}R^{f2}$, and

each R^{6b} is selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted),

4) a C_{3-10} alicyclic group

(wherein the alicyclic group is optionally substituted),

5) $-C(=NR^{e2})R^{f2}$,

6) $-C(=N-OR^{e2})R^{f2}$,

7) $-SO_2-NR^{e2}R^{f2}$,

8) $-C(=NR^{h2})-NR^{e2}R^{f2}$,

9) $-C(=NR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

10) $-C(=N-OR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

11) $-C(=O)NR^{e2}R^{f2}$,

12) $-C(=O)NR^{e2}OR^{f2}$,

13) $-C(=O)NR^{g2}-NR^{e2}R^{f2}$,

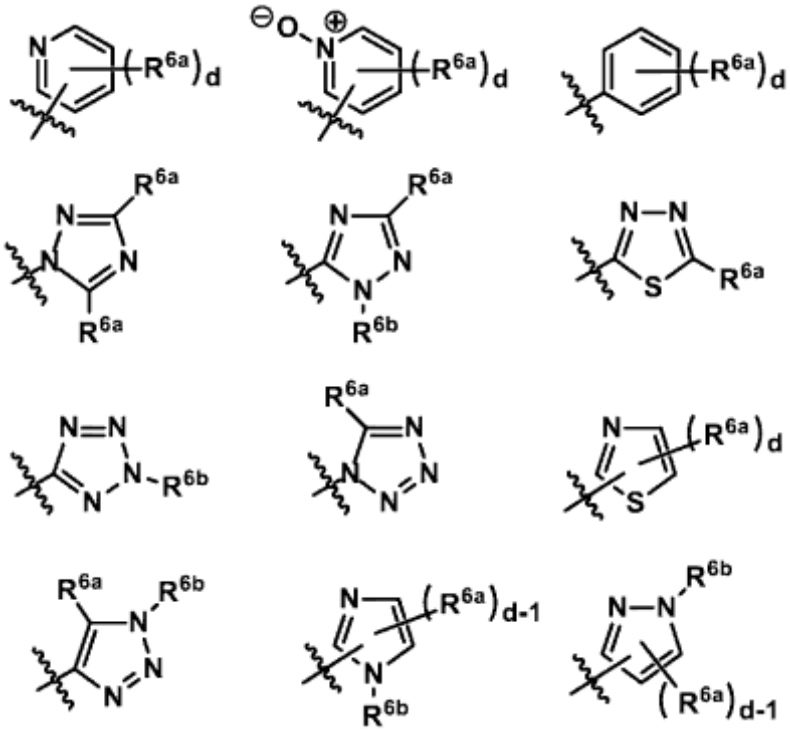
14) $-C(=O)R^{e2}$, and

15) $-C(=N-OR^{h2})NR^{e2}R^{f2}$.

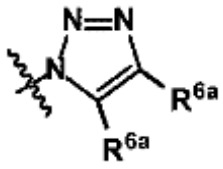
[0175]

In some embodiments, R^5 is 5- or 6-membered aryl or heteroaryl selected from the group consisting of

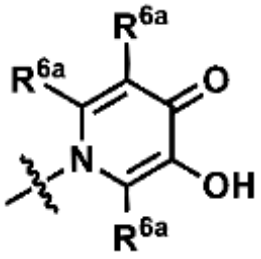
[Chemical Formula 564-2]



[Chemical Formula 564-3]



[Chemical Formula 564-4]



,

subscript d is the number of substitutable positions on a ring of R^5,

each R^{6a} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) halogen,

4) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted with $NR^{e2}R^{f2}$, a 5- or 6-membered non-aryl heterocycle, $-C(=O)OR^{f2}$, or a hydroxyl group),

5) a C_{1-4} alkoxy group,

6) $-NR^{e2}R^{f2}$, and

7) $-C(=O)OR^{e2}$, and

each R^{6b} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group, and

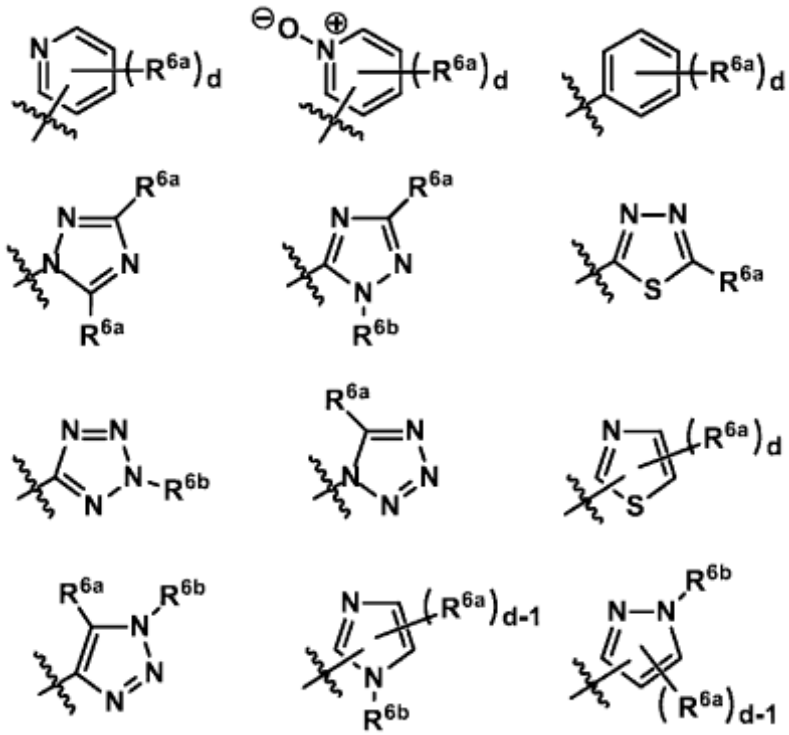
3) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted with $NR^{e2}R^{f2}$, $-C(=O)NR^{e2}R^{f2}$, $-C(=O)OR^{f2}$, or a hydroxyl group).

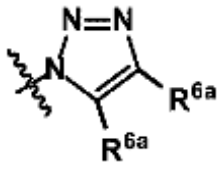
[0176]

In some embodiments, R^5 is selected from the group consisting of

[Chemical Formula 564-5]



[Chemical Formula 565]



,

subscript d is the number of substitutable positions on a ring of R^5,

each R^{6a} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) a cyano group,

4) a nitro group,

5) halogen,

6) a C_{1-4} alkyl group,

7) a C_{3-10} alicyclic group,

8) a C_{1-4} alkoxy group,

9) a C_{3-10} alicyclic oxy group,

10) a C_{6-10} aryloxy group,

11) a 5- or 6-membered heteroaryloxy group,

12) a 4- to 10-membered non-aryl heterocyclyl oxy group,

(wherein each substituent from 6) to 12) is optionally substituted),

13) $-SO_2-NR^{e2}R^{f2}$,

14) $-NR^{g2}-CR^{e2}(=NR^{f2})$,

15) $-NR^{g2}-CR^{e2}(=N-OR^{f2})$,

16) $-NR^{h2}-C(=NR^{g2})NR^{e2}R^{f2}$,

17) $-NR^{h2}-C(=N-OR^{g2})NR^{e2}R^{f2}$,

18) $-NR^{i2}-C(=NR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

19) $-NR^{i2}-C(=N-OR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

20) $-C(=NR^{e2})R^{f2}$,

21) $-C(=N-OR^{e2})R^{f2}$,

22) $-C(=NR^{h2})-NR^{e2}R^{f2}$,

23) $-C(=NR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

24) $-C(=N-OR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

25) $-NR^{e2}R^{f2}$,

26) $-NR^{g2}-NR^{e2}R^{f2}$,

27) $-NR^{e2}OR^{f2}$,

28) $-NR^{e2}-C(=O)R^{f2}$,

29) $-C(=O)NR^{e2}R^{f2}$,

30) $-C(=O)NR^{e2}OR^{f2}$,

31) $-C(=O)NR^{g2}-NR^{e2}R^{f2}$,

32) $-C(=O)R^{e2}$,

33) $-C(=O)OR^{e2}$, and

34) $-C(=N-OR^{h2})NR^{e2}R^{f2}$, and

each R^{6b} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted),

4) a C_{3-10} alicyclic group

(wherein the alicyclic group is optionally substituted),

5) $-C(=NR^{e2})R^{f2}$,

6) $-C(=N-OR^{e2})R^{f2}$,

7) $-SO_2-NR^{e2}R^{f2}$,

8) $-C(=NR^{h2})-NR^{e2}R^{f2}$,

9) $-C(=NR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

10) $-C(=N-OR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

11) $-C(=O)NR^{e2}R^{f2}$,

12) $-C(=O)NR^{e2}OR^{f2}$,

13) $-C(=O)NR^{g2}-NR^{e2}R^{f2}$,

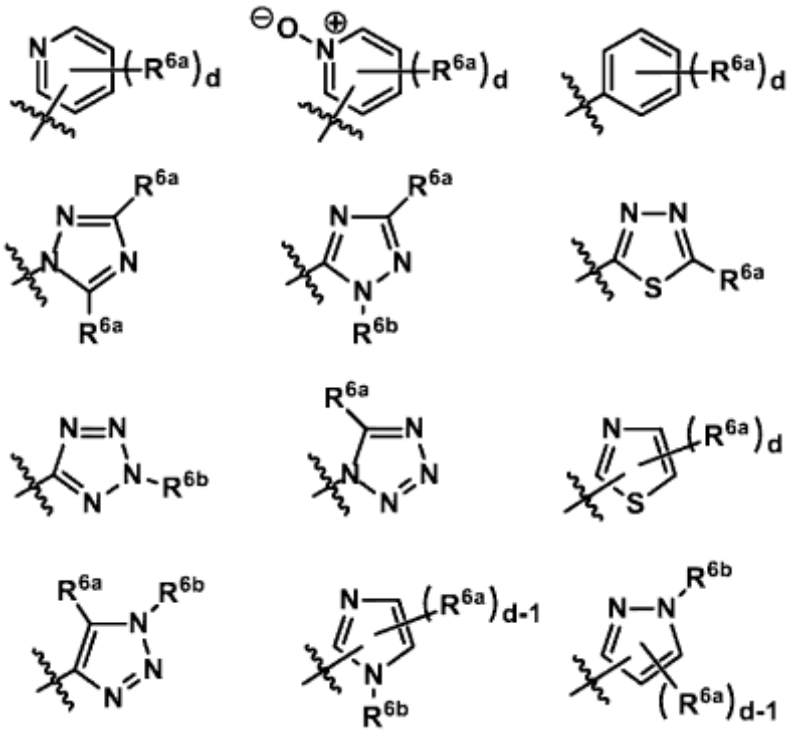
14) $-C(=O)R^{e2}$, and

15) $-C(=N-OR^{h2})NR^{e2}R^{f2}$.

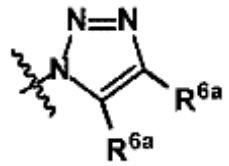
[0177]

In some embodiments, R^5 is 5- or 6-membered aryl or heteroaryl selected from the group consisting of

[Chemical Formula 566]



[Chemical Formula 567]



,

subscript d is the number of substitutable positions on a ring of R^5,

each R^{6a} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) halogen,

4) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted with $NR^{e2}R^{f2}$, a 5- or 6-membered non-aryl heterocycle, $-C(=O)OR^{f2}$, or a hydroxyl group),

5) a C_{1-4} alkoxy group,

6) $-NR^{e2}R^{f2}$, and

7) $-C(=O)OR^{e2}$, and

each R^{6b} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group, and

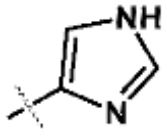
3) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted with $NR^{e2}R^{f2}$, $-C(=O)NR^{e2}R^{f2}$, $-C(=O)OR^{f2}$, or a hydroxyl group).

[0178]

In some embodiments, R^5 is

[Chemical Formula 568]



.

[0179]

In some embodiments, R^{e2} and R^{f2} are the same or different, each independently a hydrogen atom, an optionally substituted C_{1-6} alkyl group, or an optionally substituted C_{3-10} alicyclic group. In some embodiments, R^{e2} and R^{f2} are the same or different, each independently a hydrogen atom or an optionally substituted C_{1-6} alkyl group. In some embodiments, R^{e2} and R^{f2} are hydrogen atoms.

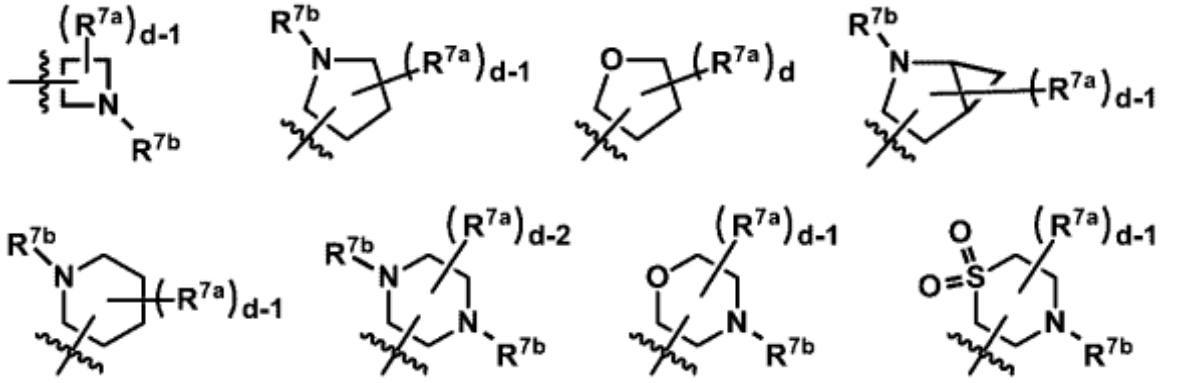
[0180]

In some embodiments, R^{6a} is $-NR^{e2}R^{f2}$, and one of R^{e2} and R^{f2} is a hydrogen atom and the other is a C_{1-4} alkyl group (wherein the alkyl group is optionally substituted with an amino group or a hydroxyl group).

[0181]

In some embodiments, R^5 is a 4- to 6-membered non-aryl heterocycle selected from the group consisting of

[Chemical Formula 569]



,

subscript d is the number of substitutable positions on a ring of R^5,

each R^{7a} is independently selected from the group consisting of

1) a hydrogen atom,
2) a hydroxyl group,
3) a cyano group,
4) halogen,
5) a C_{1-4} alkyl group,
6) a C_{3-10} alicyclic group,

7) a C_{1-4} alkoxy group,

8) a C_{3-10} alicyclic oxy group,

9) a C_{6-10} aryloxy group,

10) a 5- or 6-membered heteroaryloxy group,

11) a 4- to 10-membered non-aryl heterocyclyl oxy group,

(wherein each substituent from 5) and 11) is optionally substituted),

12) $-SO_2-NR^{e3}R^{f3}$,

13) $-NR^{g2}-CR^{e3}(=NR^{f3})$,

14) $-NR^{g2}-CR^{e3}(=N-OR^{f3})$,

15) $-NR^{h2}-C(=NR^{g2})NR^{e3}R^{f3}$,

16) $-NR^{h2}-C(=N-OR^{g2})NR^{e3}R^{f3}$,

17) $-NR^{i2}-C(=NR^{h2})NR^{g2}-NR^{e3}R^{f3}$,

18) $-NR^{i2}-C(=N-OR^{h2})NR^{g2}-NR^{e3}R^{f3}$,

19) $-C(=NR^{e3})R^{f3}$,

20) $-C(=N-OR^{e3})R^{f3}$,

21) $-C(=NR^{h2})-NR^{e3}R^{f3}$,

22) $-C(=NR^{h2})NR^{g2}-NR^{e3}R^{f3}$,

23) $-C(=N-OR^{h2})NR^{g2}-NR^{e3}R^{f3}$,

24) $-NR^{e3}R^{f3}$,

25) $-NR^{g2}-NR^{e3}R^{f3}$,

26) $-NR^{e3}OR^{f3}$,

27) $-NR^{e3}-C(=O)R^{f3}$,

28) $-C(=O)NR^{e3}R^{f3}$,

29) $-C(=O)NR^{e3}OR^{f3}$,

30) $-C(=O)NR^{g2}-NR^{e3}R^{f3}$,

31) $-C(=O)R^{e3}$,

32) $-C(=O)OR^{e3}$, and

33) $-C(=N-OR^{h2})NR^{e3}R^{f3}$,

each R^{7b} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted),

4) a C_{3-10} alicyclic group

(wherein the alicyclic group is optionally substituted),

5) $-C(=NR^{e3})R^{f3}$,

6) $-C(=N-OR^{e3})R^{f3}$,

7) $-SO_2-NR^{e3}R^{f3}$,

8) $-C(=NR^{h2})-NR^{e3}R^{f3}$,

9) $-C(=NR^{h2})NR^{g2}-NR^{e3}R^{f3}$,

10) $-C(=N-OR^{h2})NR^{g2}-NR^{e3}R^{f3}$,

11) $-C(=O)NR^{e3}R^{f3}$,

12) $-C(=O)NR^{e3}OR^{f3}$,

13) $-C(=O)NR^{g2}-NR^{e3}R^{f3}$,

14) $-C(=O)R^{e3}$, and

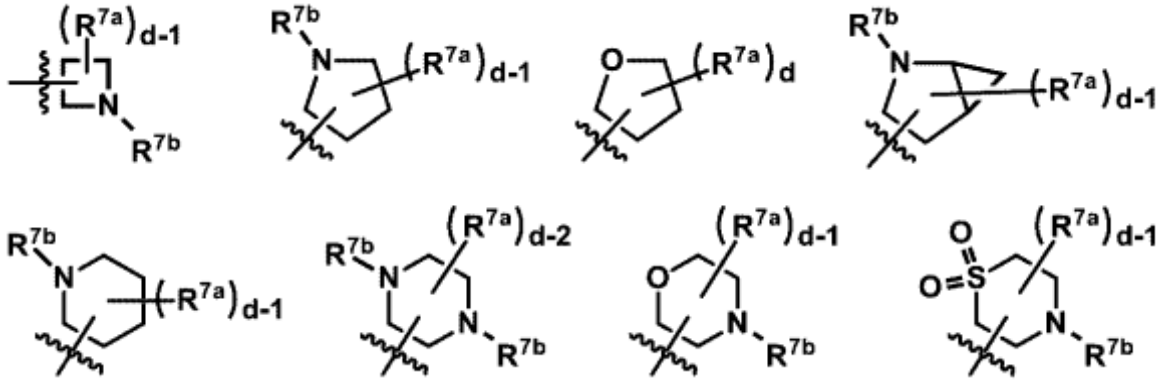
15) $-C(=N-OR^{h2})NR^{e3}R^{f3}$, and

R^{e3}, R^{f3}, R^{g2}, R^{h2}, and R^{i2} are defined the same as R^{e2}, R^{f2}, R^{g2}, R^{h2}, and R^{i2} defined herein.

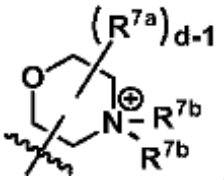
[0182]

In some embodiments, R^5 is a 4- to 6-membered non-aryl heterocycle selected from the group consisting of

[Chemical Formula 570-1]



[Chemical Formula 570-2]



,

subscript d is the number of substitutable positions on a ring of R^5,

each R^{7a} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) halogen,

4) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted with $NR^{e3}R^{f3}$, a 5- or 6-membered non-aryl heterocycle, $-C(=O)OR^{f3}$, or a hydroxyl group),

5) a C_{1-4} alkoxy group,

6) $-NR^{e3}R^{f3}$,

7) $-C(=O)OR^{e3}$,

8) C_{6-10} aryl, and

9) $-C(=O)NR^{e3}R^{f3}$,

each R^{7b} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group, and

3) a C_{1-4} alkyl group

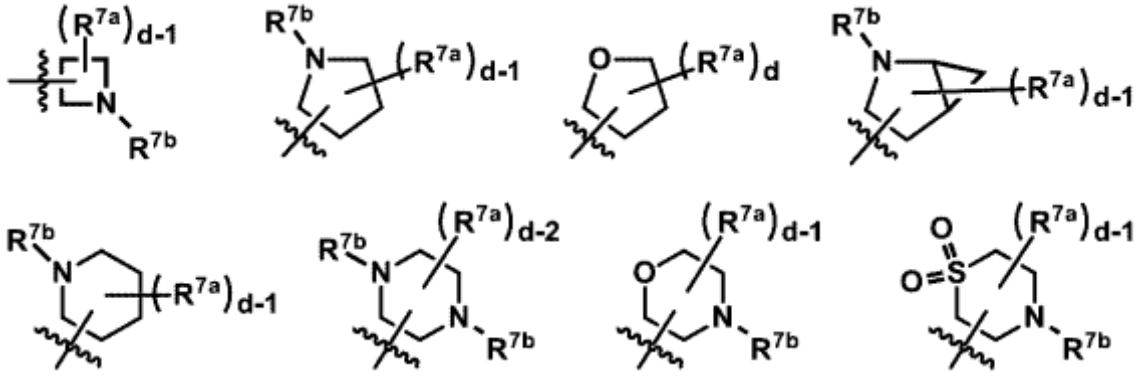
(wherein the alkyl group is optionally substituted with $NR^{e3}R^{f3}$, $-C(=O)OR^{f3}$, or a hydroxyl group), and

R^{e3} and R^{f3} are defined the same as R^{e2} and R^{f2} described herein (e.g., any one of items 84 to 86).

[0183]

In some embodiments, R^5 is a 4- to 6-membered non-aryl heterocycle selected from the group consisting of

[Chemical Formula 570-3]



,

subscript d is the number of substitutable positions on a ring of R^5,

each R^{7a} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) halogen,

4) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted with $NR^{e3}R^{f3}$, a 5- or 6-membered non-aryl heterocycle, $-C(=O)OR^{f3}$, or a hydroxyl group),

5) a C_{1-4} alkoxy group,

6) $-NR^{e3}R^{f3}$,

7) $-C(=O)OR^{e3}$,

8) C_{6-10} aryl, and

9) $-C(=O)NR^{e3}R^{f3}$,

each R^{7b} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group, and

3) a C_{1-4} alkyl group

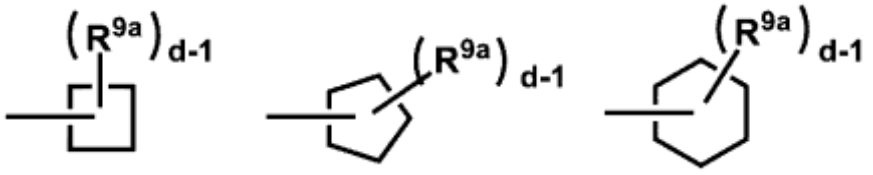
(wherein the alkyl group is optionally substituted with $NR^{e3}R^{f3}$, $-C(=O)OR^{f3}$, or a hydroxyl group), and

R^{e3} and R^{f3} are defined the same as R^{e2} and R^{f2} defined herein.

[0184]

In some embodiments, R^5 is C_{4-6} cycloalkyl selected from the group consisting of

[Chemical Formula 570-4]



,

subscript d is the number of substitutable positions on a ring of R^5,

each R^{9a} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) a cyano group,

4) halogen,

5) a C_{1-4} alkyl group,

6) a C_{3-10} alicyclic group,

7) a C_{1-4} alkoxy group,

8) a C_{3-10} alicyclic oxy group,

9) a C_{6-10} aryloxy group,

10) a 5- or 6-membered heteroaryloxy group,

11) a 4- to 10-membered non-aryl heterocyclyl oxy group,

(wherein each substituent from 5) and 11) is optionally substituted),

12) $-SO_2-NR^{e3}R^{f3}$,

13) $-NR^{g2}-CR^{e3}(=NR^{f3})$,

14) $-NR^{g2}-CR^{e3}(=N-OR^{f3})$,

15) $-NR^{h2}-C(=NR^{g2})NR^{e3}R^{f3}$,

16) $-NR^{h2}-C(=N-OR^{g2})NR^{e3}R^{f3}$,

17) $-NR^{i2}-C(=NR^{h2})NR^{g2}-NR^{e3}R^{f3}$,

18) $-NR^{i2}-C(=N-OR^{h2})NR^{g2}-NR^{e3}R^{f3}$,

19) $-C(=NR^{e3})R^{f3}$,

20) $-C(=N-OR^{e3})R^{f3}$,

21) $-C(=NR^{h2})-NR^{e3}R^{f3}$,

22) $-C(=NR^{h2})NR^{g2}-NR^{e3}R^{f3}$,

23) $-C(=N-OR^{h2})NR^{g2}-NR^{e3}R^{f3}$,

24) $-NR^{e3}R^{f3}$,

25) $-NR^{g2}-NR^{e3}R^{f3}$,

26) $-NR^{e3}OR^{f3}$,

27) $-NR^{e3}-C(=O)R^{f3}$,

28) $-C(=O)NR^{e3}R^{f3}$,

29) $-C(=O)NR^{e3}OR^{f3}$,

30) $-C(=O)NR^{g2}-NR^{e3}R^{f3}$,

31) $-C(=O)R^{e3}$,

32) $-C(=O)OR^{e3}$, and

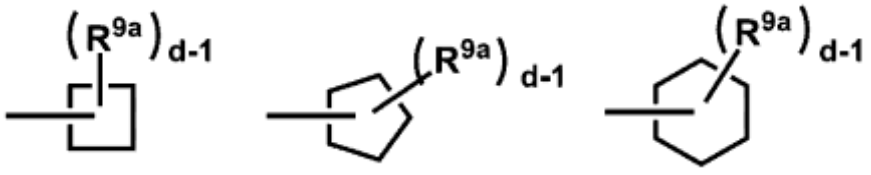
33) $-C(=N-OR^{h2})NR^{e3}R^{f3}$, and

R^{e3}, R^{f3}, R^{g2}, R^{h2}, and R^{i2} are defined the same as R^{e2} and R^{f2} described herein (e.g., item 3).

[0185]

In some embodiments, R^5 is C_{4-6} cycloalkyl selected from the group consisting of

[Chemical Formula 570-5]



,

subscript d is the number of substitutable positions on a ring of R^5,

each R^{9a} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) halogen,

4) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted with $NR^{e3}R^{f3}$, a 5- or 6-membered non-aryl heterocycle, $-C(=O)OR^{f3}$, or a hydroxyl group),

5) a C_{1-4} alkoxy group,

6) $-NR^{e3}R^{f3}$,

7) $-C(=O)OR^{e3}$,

8) C_{6-10} aryl, and

9) $-C(=O)NR^{e3}R^{f3}$, and

R^{e3} and R^{f3} are defined the same as R^{e2} and R^{f2} described herein (e.g., any of items 75 to 77).

[0186]

In some embodiments, L^4 is $-CH(NH_2)-CHR^{13}-$, wherein carbon that attaches to the NH_2 attaches to L^3,

R^5 is a hydrogen atom, and

R^{13} is

1) $-NH-C(=O)CH_3$,

2) $-NH-C(=O)NH_2$,

3) $-NH-C(=O)CH(NH_2)-CH_2C(=O)NH_2$,

4) $-NH-C(=O)CH_2-NH_2$,

5) $-NH-C(=O)CH(NH_2)-CH_2OH$, or

6) a pyrrolidin-2-ylcarbonylamino group.

[0187]

In some embodiments, L^4 is $-CH(NH_2)-CR^{12}R^{13}-$, wherein carbon that attaches to the NH_2 attaches to L^3,

R^5 is a hydrogen atom or methyl,

R^{12} is a hydrogen atom or methyl, and

R^{13} is a benzylthio group or a sulfanyl group.

[0188]

In some embodiments, L^4 is $-CH(NH_2)-(CH_2)_q-CHR^{13}-$, wherein q is 0 or 1, and carbon that attaches to the NH_2 attaches to L^3,

R^5 is a hydrogen atom, and

R^{13} is

1) a carboxyl group,

2) $-C(=O)NH_2$,

3) $-C(=O)NH(CH_3)$,

4) $-C(=O)N(CH_3)_2$,

5) $-C(=O)NH-(CH_2)_2-OH$,

6) $-C(=O)NH-(CH_2)_2-NH_2$,

7) $-C(=O)NH-S(=O)_2-CH_3$,

8) $-C(=O)NHOH$,

9) $-S(=O)_2-NH_2$,

10) $-S(=O)_2-CH_3$, or

11) a hydroxyl group.

[0189]

In some embodiments, L^4 is $-CH(NHR^{11})-CH_2-$, wherein carbon that attaches to the NHR^{11} attaches to L^3,

R^5 is hydrogen, and

R^{11} is

1) $-C(=O)CH(NH_2)-CH_2C(=O)NH_2$,

2) $-C(=O)CH_2-NH_2$,

3) $-C(=O)CH(CH_3)-NH_2$,

4) $-C(=O)CH(NH_2)-CH_2OH$, or

5) pyrrolidin-2-ylcarbonyl.

[0190]

In some embodiments, L^4 is $-CH(NHR^{11})-CH(COOH)-$, wherein carbon that attaches to the NHR^{11} attaches to L^3,

R^5 is hydrogen, and

R^{11} is

1) $-C(=O)CH(NH_2)-CH_2C(=O)NH_2$,

2) $-C(=O)CH_2-NH_2$,

3) $-C(=O)CH(CH_3)-NH_2$,

4) $-C(=O)CH(NH_2)-CH_2OH$, or

5) pyrrolidin-2-ylcarbonyl.

[0191]

In some embodiments, L^4 is $-CHR^{13}-$ or $-CH_2-CHR^{13}-$,

R^5 is hydrogen, and

R^{13} is $-C(=O)NH_2$ or $-C(=O)NHOH$.

[0192]

In some embodiments, L^4 is $-CH_2-CR^{10}(NH_2)-$, wherein the CH_2 group attaches to L^3,

R^5 is hydrogen, and

R^{10} is a carboxy group or $-C(=O)NH_2$.

[0193]

In some embodiments, L^4 is $-(CH_2)_p-CR^{10}(NHR^{11})-(CH_2)_q-CHR^{13}-$ or $-CHR^{13}-(CH_2)_q-CR^{10}(NHR^{11})-(CH_2)_p-$, wherein q is 0 or 1,

R^5 is hydrogen,

(1) if L^4 is $-CHR^{13}-(CH_2)_q-CR^{10}(NHR^{11})-(CH_2)_p-$,

carbon of the $-CHR^{13}-$ group attaches to L^3,

p is 0,

R^{10} is a hydrogen atom, a carboxyl group, or $-C(=O)NHR^{10b}$,

R^{11} is a hydrogen atom,

R^{10b} is a hydrogen atom,

wherein if R^{10} is $-C(=O)NHR^{10b}$, R^{10b} and R^{11} together may form $-CH_2CH_2-$, and

R^{13} is a hydrogen atom, and

(2) if L^4 is $-(CH_2)_p-CR^{10}(NHR^{11})-(CH_2)_q-CHR^{13}-$,

carbon of the $-(CH_2)_p-$ group attaches to L^3,

p is 1,

R^{10} and R^{11} are both hydrogen atoms,

R^{13} is a carboxyl group or $-C(=O)NR^{13a}R^{13b}$, and

R^{13a} and R^{13b} are each independently a hydrogen atom or an optionally substituted C_{1-4} alkyl group.

[0194]

In some embodiments, L^4 is $-CR^{12}(NH_2)-$,

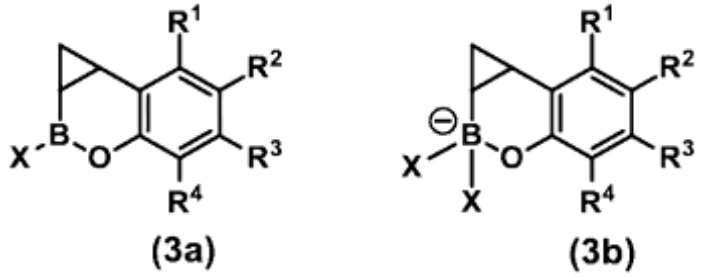
R^{12} is a hydrogen atom or a methyl group, and

R^5 is an optionally substituted C_{1-4} alkyl group with a hydroxyl group.

[0195]

A specific example of a specific embodiment of the compound of the invention includes compounds represented by formulas (3a) and (3b):

[Chemical Formula 571]



(3a) (3b)

or a pharmaceutically acceptable salt thereof, wherein X, R^1, R^2, and R^3 are as defined herein, and R^4 is selected from the group consisting of

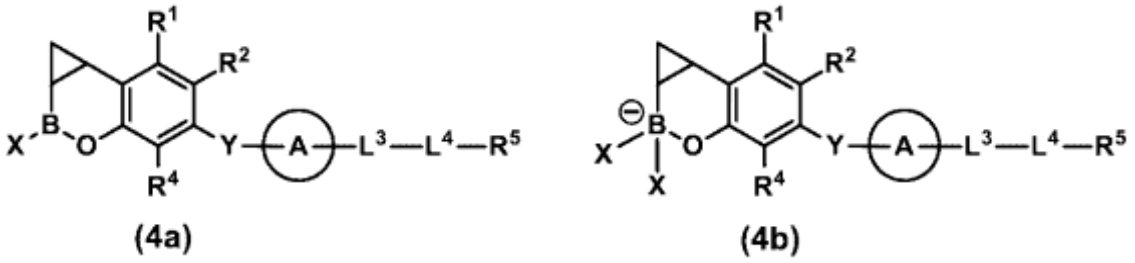
1) $-C(=O)OR^{m1}$ (wherein R^{m1} is a hydrogen atom, a C_{1-6} alkyl group, a C_{3-10} alicyclic group, C_{6-10} aryl, 5- or 6-membered heteroaryl, or a 4- to 10-membered non-aryl heterocycle, wherein the C_{1-6} alkyl group, the C_{3-10} alicyclic group, the C_{6-10} aryl, the 5- or 6-membered heteroaryl, and the 4- to 10-membered non-aryl heterocycle are each optionally substituted), and

2) a bioisostere of 1).

[0196]

A specific example of a preferred embodiment of the compound of the invention includes compounds represented by formulas (4a) and (4b):

[Chemical Formula 572]



(4a) (4b)

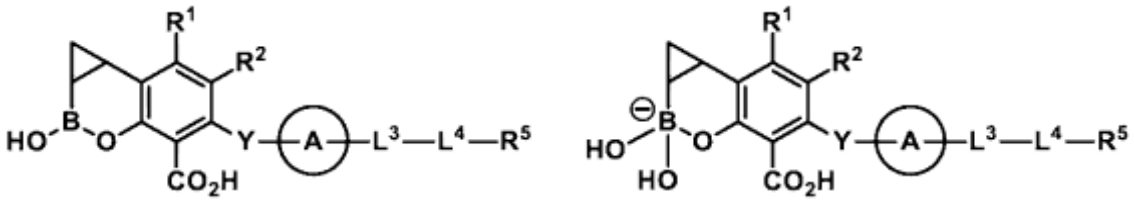
or a pharmaceutically acceptable salt thereof. In formulas (4a) and (4b), X, R^4, Y, ring A, L^3, L^4, and R^5 are defined the same as the definitions herein, and R^1 and R^2 are the same or different,

each independently a hydrogen atom, a halogen atom, a C_{1-6} alkyl group, a C_{1-6} alkoxy group, or a C_{1-6} alkylthio group (wherein the C_{1-6} alkyl group, C_{1-6} alkoxy group, and C_{1-6} alkylthio group are optionally substituted).

[0197]

A specific example of a more preferred embodiment of the compound of the invention includes compounds represented by formulas (5a) and (5b):

[Chemical Formula 573]



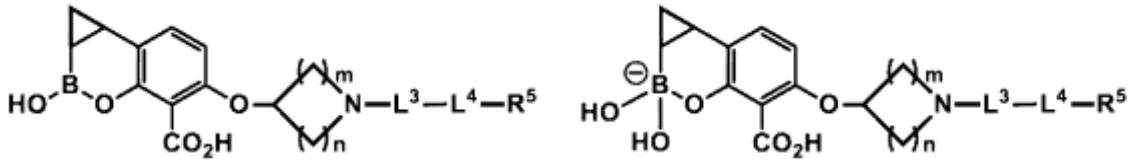
(5a) (5b)

or a pharmaceutically acceptable salt thereof. In formulas (5a) and (5b), R^1, R^2, Y, L^3, L^4, and R^5 are defined the same as the definitions herein, and ring A is an optionally substituted 4- to 6-membered nitrogen-containing non-aryl heterocycle.

[0198]

A specific example of a still more preferred embodiment of the compound of the invention includes compounds represented by formulas (6a) and (6b):

[Chemical Formula 574]



(6a) (6b)

or a pharmaceutically acceptable salt thereof. In formulas (6a) and (6b), L^3, L^4, and R^5 are defined the same as the definitions herein,

m is an integer 1, 2, or 3,

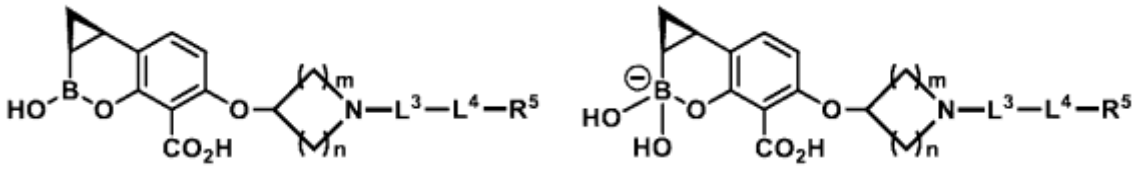
n is an integer 1, 2, or 3, and

m + n is 2, 3, or 4.

[0199]

A specific example of a yet still more preferred embodiment of the compound of the invention includes enantiomers represented by formulas (7a) and (7b):

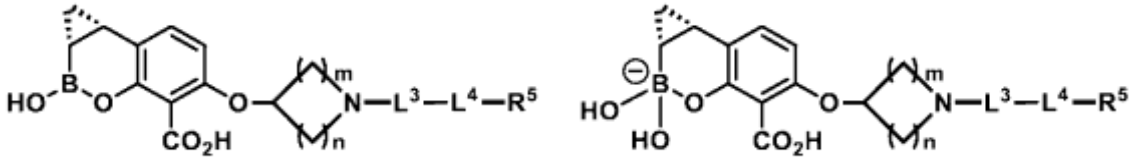
[Chemical Formula 575]



(7a) (7b)

or formulas (8a) and (8b):

[Chemical Formula 576]



(8a) (8b)

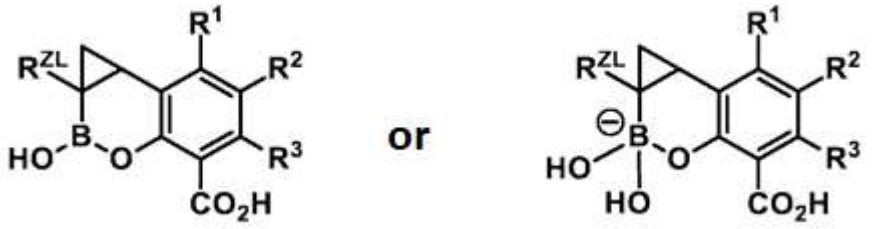
or a pharmaceutically acceptable salt thereof. In formulas (7a), (7b), (8a), and (8b), L^3, L^4, R^5, m, and n are defined the same as the definitions herein.

[0200]

A specific example of a preferred embodiment of the compound of the invention includes the following compounds:

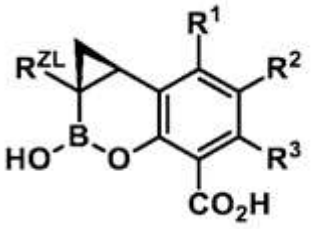
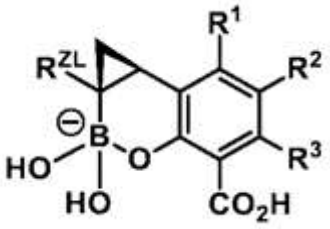
compounds represented by

[Chemical Formula 577]



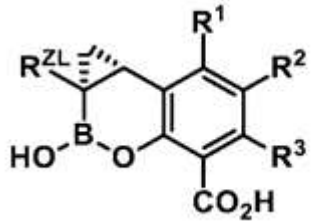
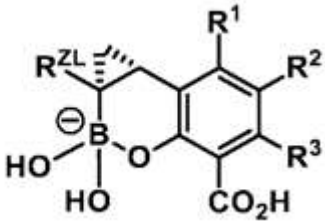
,

[Chemical Formula 578]

, or

[Chemical Formula 579]

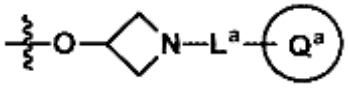



or a pharmaceutically acceptable salt thereof, wherein

R^{ZL} is a substituent selected from the group consisting of the Z1 to Z4 described below,

one of R^1, R^2, and R^3 is

[Chemical Formula 580]



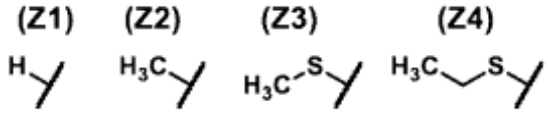
, and

the remaining two are hydrogen atoms, linking group L^a is a substituent selected from the group consisting of L1 to L69 described below, and substituent Q^a is a substituent selected from the group consisting of Q1 to Q161 described below;

[0201]

R^{ZL}:

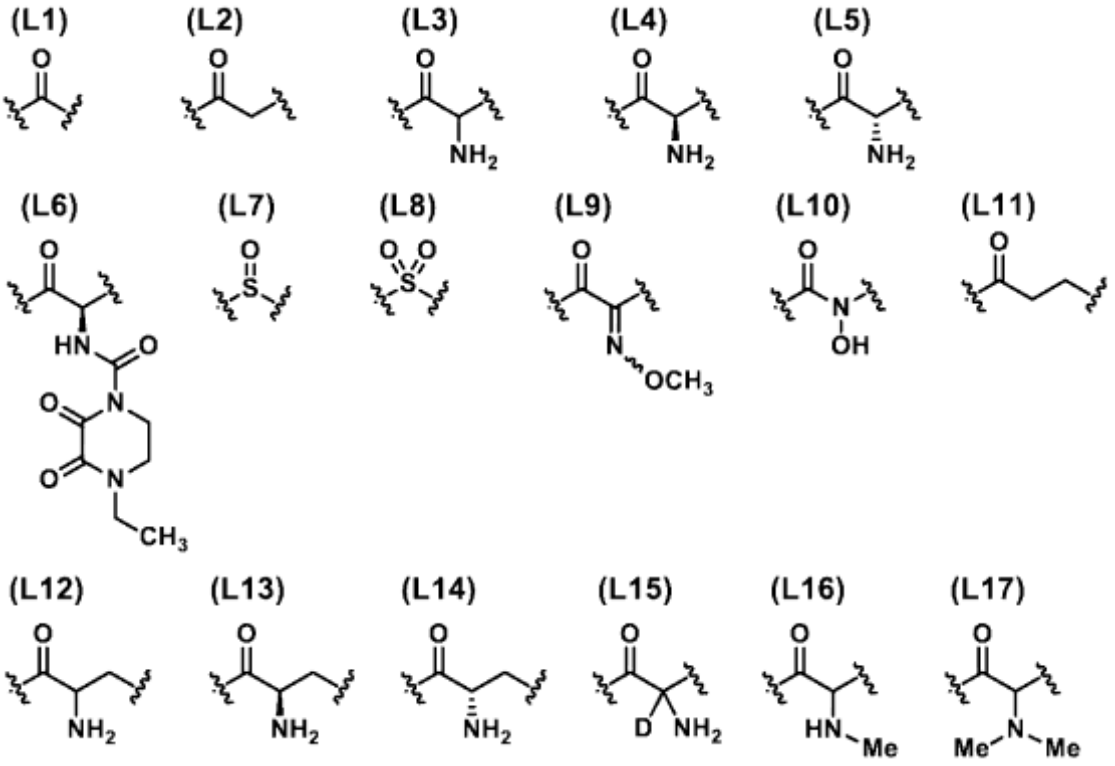
[Chemical Formula 581]



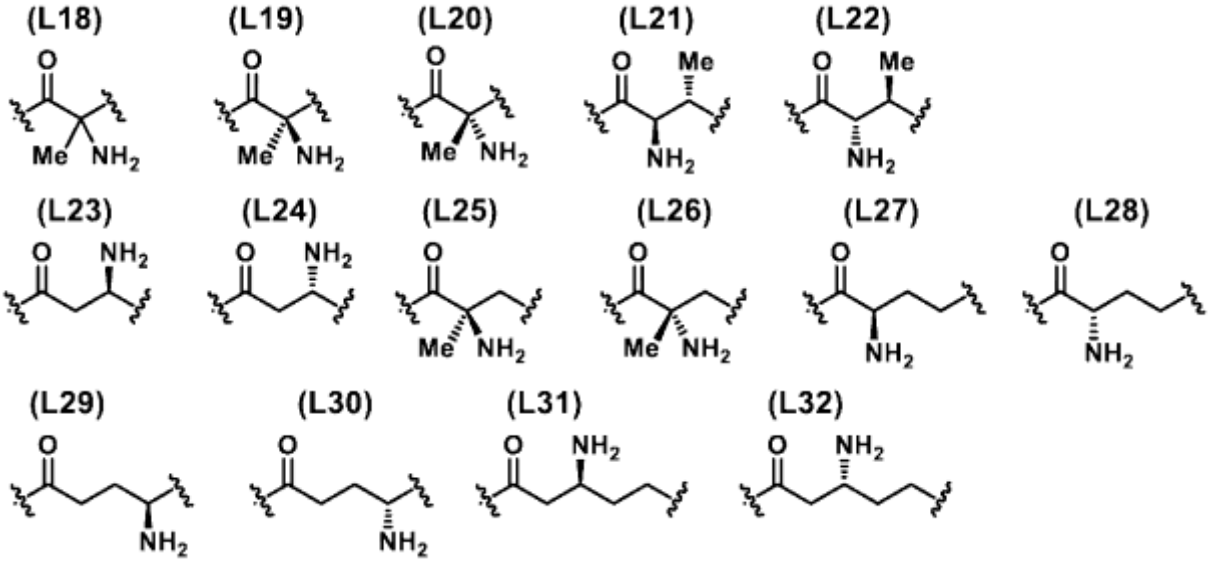
[0202]

linking group L^a:

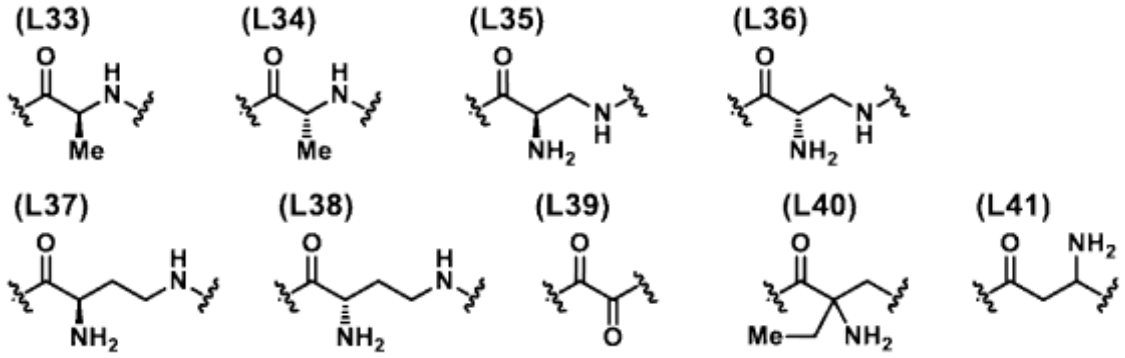
[Chemical Formula 582]



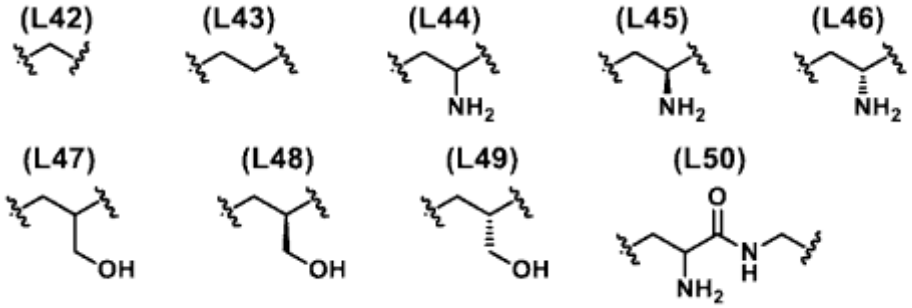
[Chemical Formula 583]

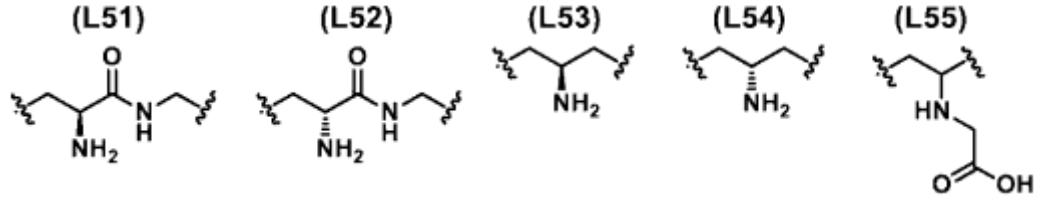


[Chemical Formula 584]

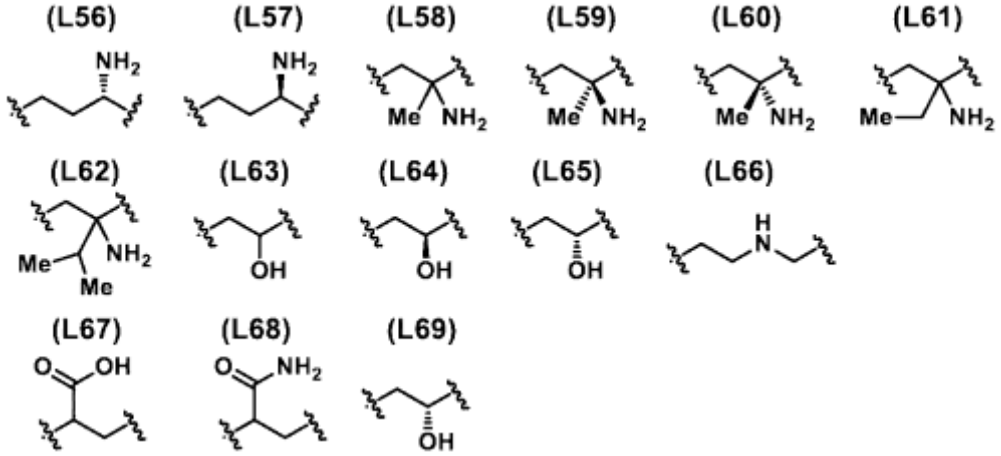


[Chemical Formula 585]





[Chemical Formula 586]

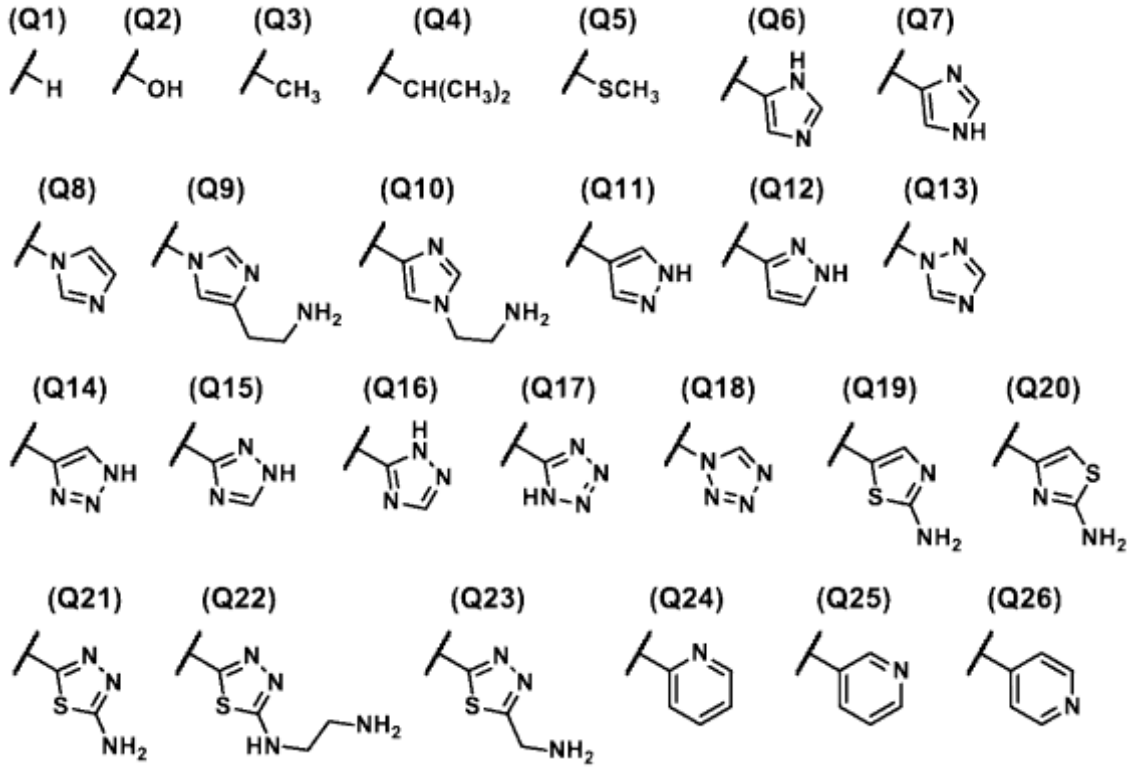


, and

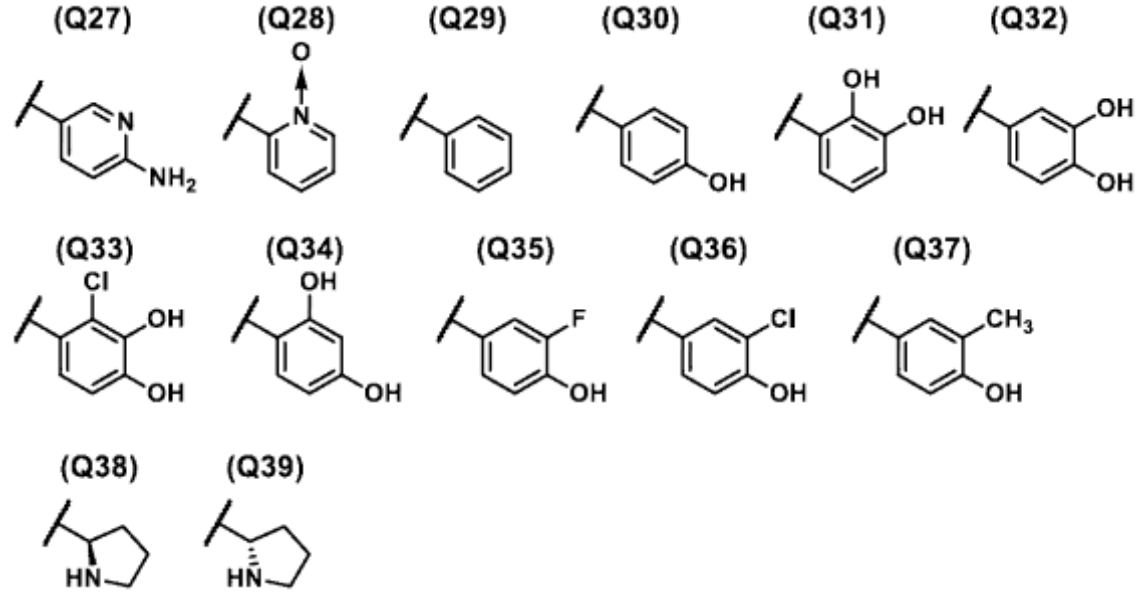
[0203]

substituent Q^a:

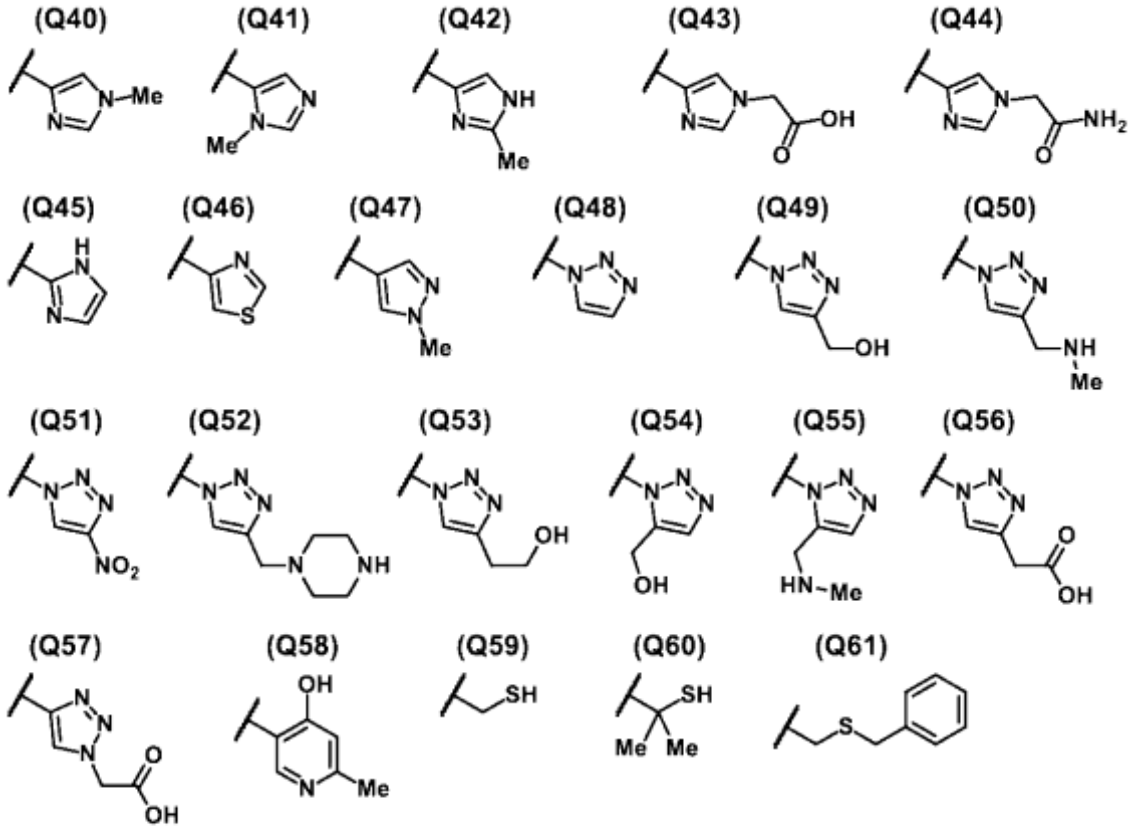
[Chemical Formula 587]



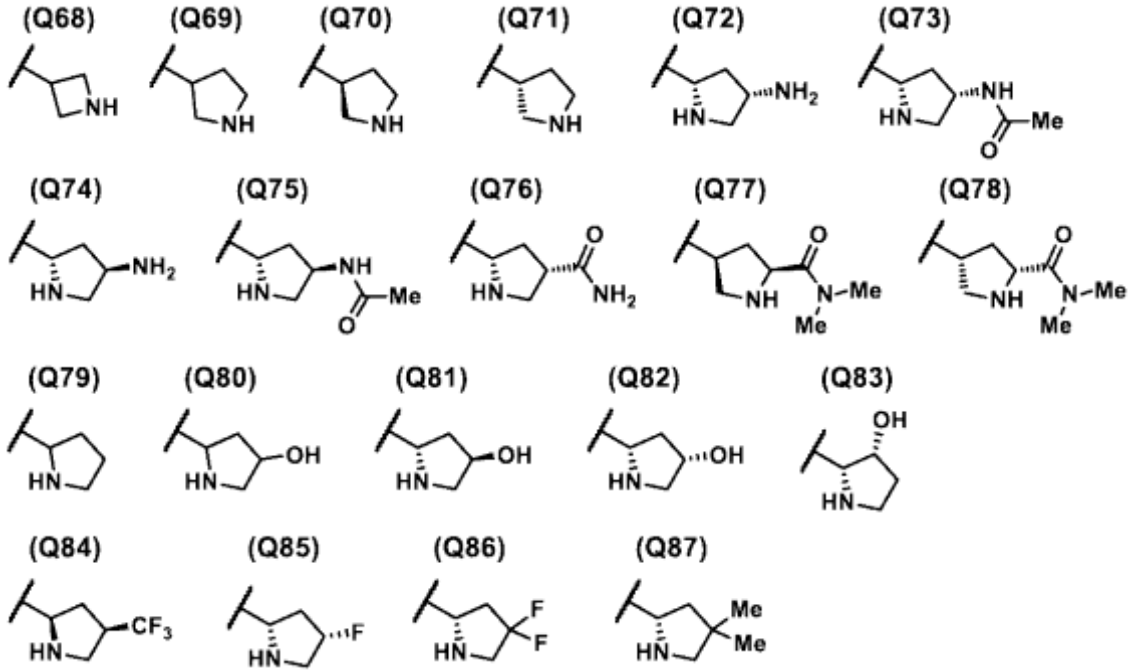
[Chemical Formula 588]



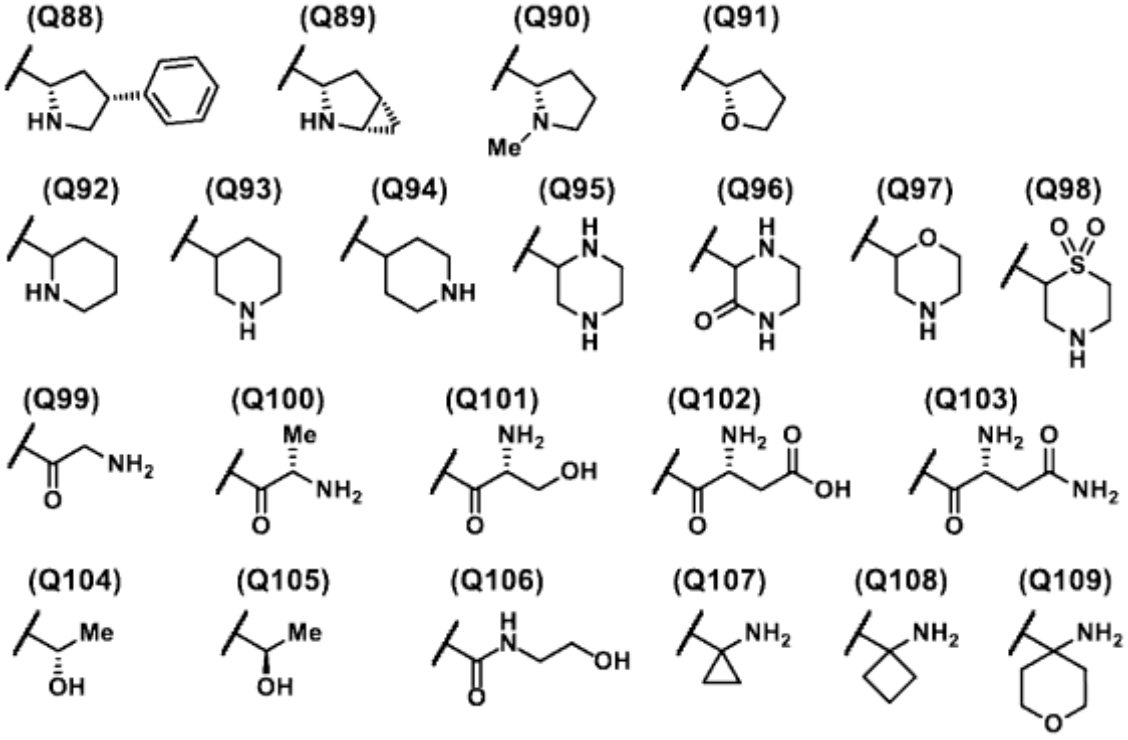
[Chemical Formula 589]



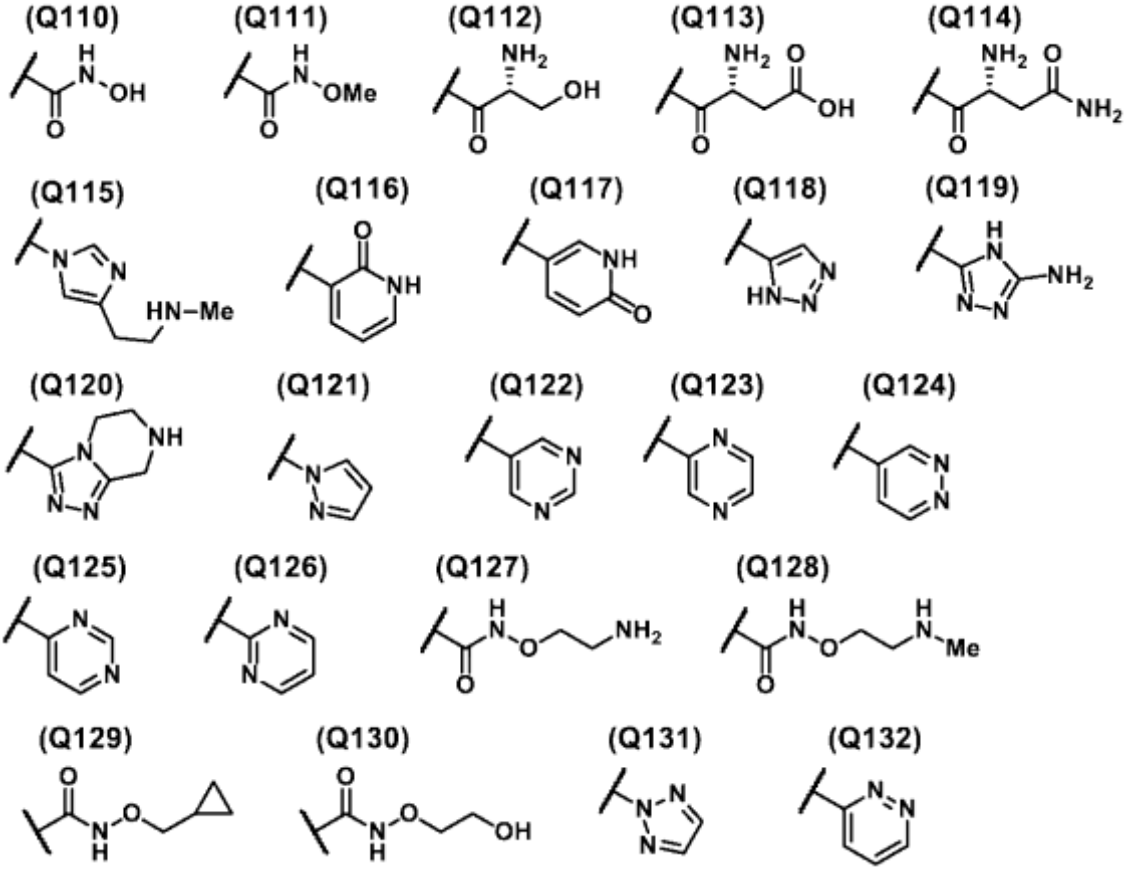
[Chemical Formula 590]



[Chemical Formula 591]

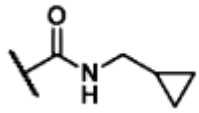


[Chemical Formula 592]

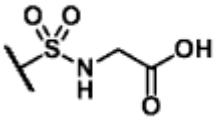


[Chemical Formula 593]

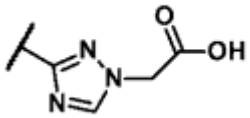
(Q133)



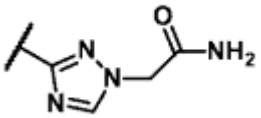
(Q134)



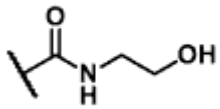
(Q135)



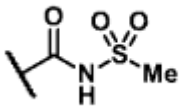
(Q136)



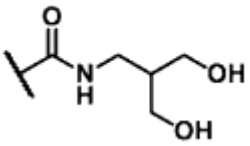
(Q137)



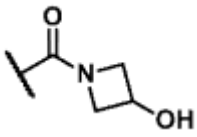
(Q138)



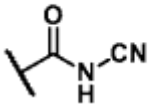
(Q139)



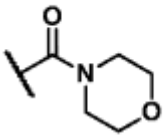
(Q140)



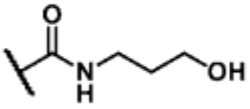
(Q141)



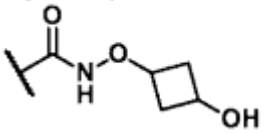
(Q142)



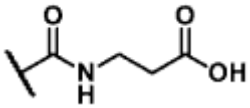
(Q143)



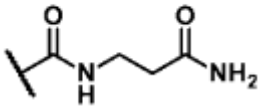
(Q144)



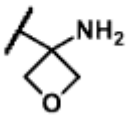
(Q145)



(Q146)

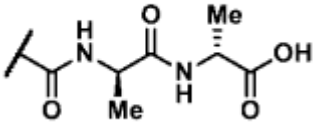


(Q147)

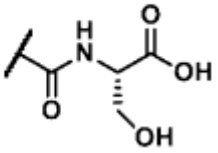


[Chemical Formula 594]

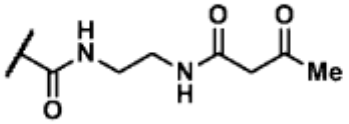
(Q148)



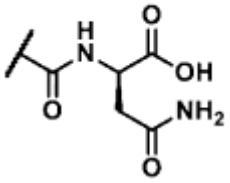
(Q149)



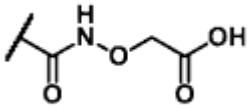
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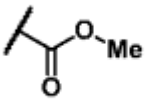
(Q151)



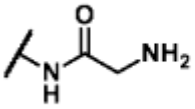
(Q152)



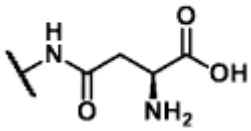
(Q153)



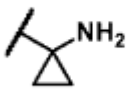
(Q154)



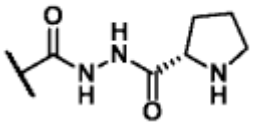
(Q155)



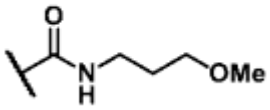
(Q156)



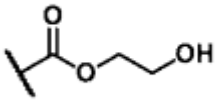
(Q157)



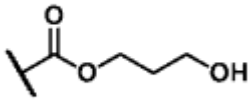
(Q158)



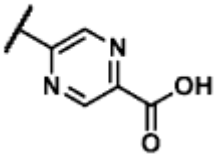
(Q159)



(Q160)



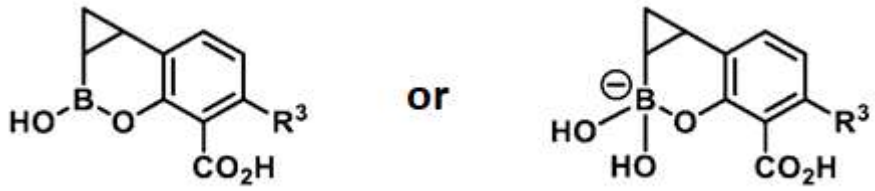
(Q161)



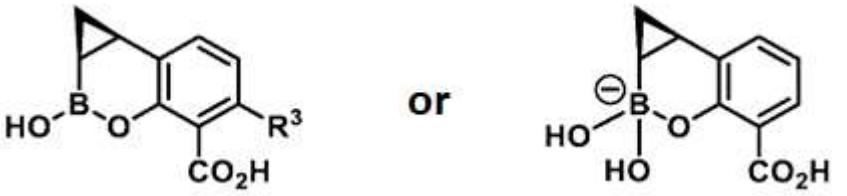
[0204]

A specific example of a more preferred embodiment of the compound of the invention includes a compound of the following formula:

[Chemical Formula 595]

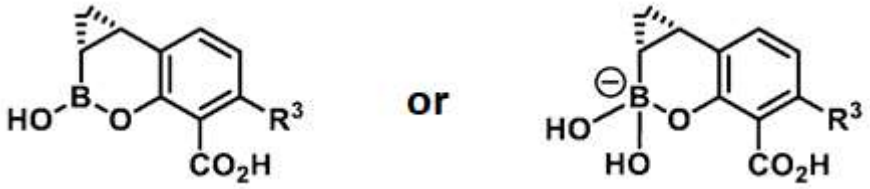


[Chemical Formula 596]



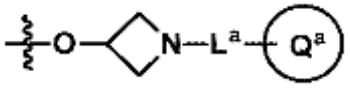
, or

[Chemical Formula 597]



or a pharmaceutically acceptable salt thereof, wherein R^3 is

[Chemical Formula 598]



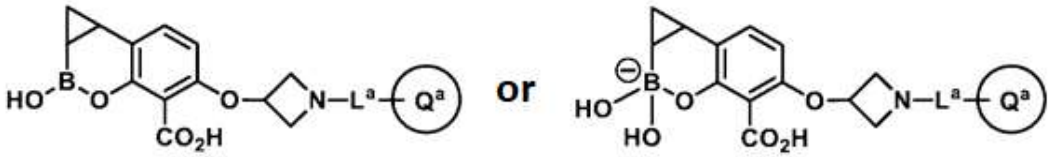
,

wherein linking group L^a is a substituent selected from the group consisting of L1 to L69 described above, and substituent Q^a is a substituent selected from the group consisting of Q1 to Q161 described above.

[0205]

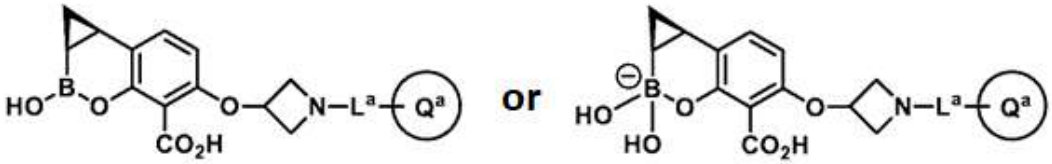
Examples of a more preferred embodiment of the compound of the invention include the compounds of the following Table (1) or a pharmaceutically acceptable salt thereof.

[Chemical Formula 599]



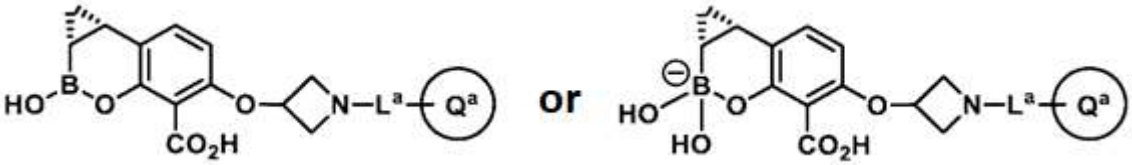
,

[Chemical Formula 600]



, or

[Chemical Formula 601]



[Table 1-1]

Example	L[a]	Q[a]	59	L1	Q59	118	L1	Q118	177	L2	Q16
1	L1	Q1	60	L1	Q60	119	L1	Q119	178	L2	Q17
2	L1	Q2	61	L1	Q61	120	L1	Q120	179	L2	Q18
3	L1	Q3	62	L1	Q62	121	L1	Q121	180	L2	Q19
4	L1	Q4	63	L1	Q63	122	L1	Q122	181	L2	Q20
5	L1	Q5	64	L1	Q64	123	L1	Q123	182	L2	Q21
6	L1	Q6	65	L1	Q65	124	L1	Q124	183	L2	Q22
7	L1	Q7	66	L1	Q66	125	L1	Q125	184	L2	Q23
8	L1	Q8	67	L1	Q67	126	L1	Q126	185	L2	Q24
9	L1	Q9	68	L1	Q68	127	L1	Q127	186	L2	Q25
10	L1	Q10	69	L1	Q69	128	L1	Q128	187	L2	Q26
11	L1	Q11	70	L1	Q70	129	L1	Q129	188	L2	Q27
12	L1	Q12	71	L1	Q71	130	L1	Q130	189	L2	Q28
13	L1	Q13	72	L1	Q72	131	L1	Q131	190	L2	Q29
14	L1	Q14	73	L1	Q73	132	L1	Q132	191	L2	Q30
15	L1	Q15	74	L1	Q74	133	L1	Q133	192	L2	Q31
16	L1	Q16	75	L1	Q75	134	L1	Q134	193	L2	Q32
17	L1	Q17	76	L1	Q76	135	L1	Q135	194	L2	Q33
18	L1	Q18	77	L1	Q77	136	L1	Q136	195	L2	Q34
19	L1	Q19	78	L1	Q78	137	L1	Q137	196	L2	Q35
20	L1	Q20	79	L1	Q79	138	L1	Q138	197	L2	Q36
21	L1	Q21	80	L1	Q80	139	L1	Q139	198	L2	Q37
22	L1	Q22	81	L1	Q81	140	L1	Q140	199	L2	Q38
23	L1	Q23	82	L1	Q82	141	L1	Q141	200	L2	Q39
24	L1	Q24	83	L1	Q83	142	L1	Q142	201	L2	Q40
25	L1	Q25	84	L1	Q84	143	L1	Q143	202	L2	Q41
26	L1	Q26	85	L1	Q85	144	L1	Q144	203	L2	Q42
27	L1	Q27	86	L1	Q86	145	L1	Q145	204	L2	Q43
28	L1	Q28	87	L1	Q87	146	L1	Q146	205	L2	Q44
29	L1	Q29	88	L1	Q88	147	L1	Q147	206	L2	Q45
30	L1	Q30	89	L1	Q89	148	L1	Q148	207	L2	Q46
31	L1	Q31	90	L1	Q90	149	L1	Q149	208	L2	Q47
32	L1	Q32	91	L1	Q91	150	L1	Q150	209	L2	Q48
33	L1	Q33	92	L1	Q92	151	L1	Q151	210	L2	Q49
34	L1	Q34	93	L1	Q93	152	L1	Q152	211	L2	Q50
35	L1	Q35	94	L1	Q94	153	L1	Q153	212	L2	Q51
36	L1	Q36	95	L1	Q95	154	L1	Q154	213	L2	Q52
37	L1	Q37	96	L1	Q96	155	L1	Q155	214	L2	Q53
38	L1	Q38	97	L1	Q97	156	L1	Q156	215	L2	Q54
39	L1	Q39	98	L1	Q98	157	L1	Q157	216	L2	Q55
40	L1	Q40	99	L1	Q99	158	L1	Q158	217	L2	Q56
41	L1	Q41	100	L1	Q100	159	L1	Q159	218	L2	Q57
42	L1	Q42	101	L1	Q101	160	L1	Q160	219	L2	Q58
43	L1	Q43	102	L1	Q102	161	L1	Q161	220	L2	Q59
44	L1	Q44	103	L1	Q103	162	L2	Q1	221	L2	Q60
45	L1	Q45	104	L1	Q104	163	L2	Q2	222	L2	Q61
46	L1	Q46	105	L1	Q105	164	L2	Q3	223	L2	Q62
47	L1	Q47	106	L1	Q106	165	L2	Q4	224	L2	Q63
48	L1	Q48	107	L1	Q107	166	L2	Q5	225	L2	Q64
49	L1	Q49	108	L1	Q108	167	L2	Q6	226	L2	Q65
50	L1	Q50	109	L1	Q109	168	L2	Q7	227	L2	Q66
51	L1	Q51	110	L1	Q110	169	L2	Q8	228	L2	Q67
52	L1	Q52	111	L1	Q111	170	L2	Q9	229	L2	Q68
53	L1	Q53	112	L1	Q112	171	L2	Q10	230	L2	Q69
54	L1	Q54	113	L1	Q113	172	L2	Q11	231	L2	Q70
55	L1	Q55	114	L1	Q114	173	L2	Q12	232	L2	Q71
56	L1	Q56	115	L1	Q115	174	L2	Q13	233	L2	Q72
57	L1	Q57	116	L1	Q116	175	L2	Q14	234	L2	Q73
58	L1	Q58	117	L1	Q117	176	L2	Q15	235	L2	Q74

[Table 1-2]

236	L2	Q75	295	L2	Q134	354	L3	Q32	413	L3	Q91
237	L2	Q76	296	L2	Q135	355	L3	Q33	414	L3	Q92
238	L2	Q77	297	L2	Q136	356	L3	Q34	415	L3	Q93
239	L2	Q78	298	L2	Q137	357	L3	Q35	416	L3	Q94
240	L2	Q79	299	L2	Q138	358	L3	Q36	417	L3	Q95
241	L2	Q80	300	L2	Q139	359	L3	Q37	418	L3	Q96
242	L2	Q81	301	L2	Q140	360	L3	Q38	419	L3	Q97
243	L2	Q82	302	L2	Q141	361	L3	Q39	420	L3	Q98
244	L2	Q83	303	L2	Q142	362	L3	Q40	421	L3	Q99
245	L2	Q84	304	L2	Q143	363	L3	Q41	422	L3	Q100
246	L2	Q85	305	L2	Q144	364	L3	Q42	423	L3	Q101
247	L2	Q86	306	L2	Q145	365	L3	Q43	424	L3	Q102
248	L2	Q87	307	L2	Q146	366	L3	Q44	425	L3	Q103
249	L2	Q88	308	L2	Q147	367	L3	Q45	426	L3	Q104
250	L2	Q89	309	L2	Q148	368	L3	Q46	427	L3	Q105
251	L2	Q90	310	L2	Q149	369	L3	Q47	428	L3	Q106
252	L2	Q91	311	L2	Q150	370	L3	Q48	429	L3	Q107
253	L2	Q92	312	L2	Q151	371	L3	Q49	430	L3	Q108
254	L2	Q93	313	L2	Q152	372	L3	Q50	431	L3	Q109
255	L2	Q94	314	L2	Q153	373	L3	Q51	432	L3	Q110
256	L2	Q95	315	L2	Q154	374	L3	Q52	433	L3	Q111
257	L2	Q96	316	L2	Q155	375	L3	Q53	434	L3	Q112
258	L2	Q97	317	L2	Q156	376	L3	Q54	435	L3	Q113
259	L2	Q98	318	L2	Q157	377	L3	Q55	436	L3	Q114
260	L2	Q99	319	L2	Q158	378	L3	Q56	437	L3	Q115
261	L2	Q100	320	L2	Q159	379	L3	Q57	438	L3	Q116
262	L2	Q101	321	L2	Q160	380	L3	Q58	439	L3	Q117
263	L2	Q102	322	L2	Q161	381	L3	Q59	440	L3	Q118
264	L2	Q103	323	L3	Q1	382	L3	Q60	441	L3	Q119
265	L2	Q104	324	L3	Q2	383	L3	Q61	442	L3	Q120
266	L2	Q105	325	L3	Q3	384	L3	Q62	443	L3	Q121
267	L2	Q106	326	L3	Q4	385	L3	Q63	444	L3	Q122
268	L2	Q107	327	L3	Q5	386	L3	Q64	445	L3	Q123
269	L2	Q108	328	L3	Q6	387	L3	Q65	446	L3	Q124
270	L2	Q109	329	L3	Q7	388	L3	Q66	447	L3	Q125
271	L2	Q110	330	L3	Q8	389	L3	Q67	448	L3	Q126
272	L2	Q111	331	L3	Q9	390	L3	Q68	449	L3	Q127
273	L2	Q112	332	L3	Q10	391	L3	Q69	450	L3	Q128
274	L2	Q113	333	L3	Q11	392	L3	Q70	451	L3	Q129
275	L2	Q114	334	L3	Q12	393	L3	Q71	452	L3	Q130
276	L2	Q115	335	L3	Q13	394	L3	Q72	453	L3	Q131
277	L2	Q116	336	L3	Q14	395	L3	Q73	454	L3	Q132
278	L2	Q117	337	L3	Q15	396	L3	Q74	455	L3	Q133
279	L2	Q118	338	L3	Q16	397	L3	Q75	456	L3	Q134
280	L2	Q119	339	L3	Q17	398	L3	Q76	457	L3	Q135
281	L2	Q120	340	L3	Q18	399	L3	Q77	458	L3	Q136
282	L2	Q121	341	L3	Q19	400	L3	Q78	459	L3	Q137
283	L2	Q122	342	L3	Q20	401	L3	Q79	460	L3	Q138
284	L2	Q123	343	L3	Q21	402	L3	Q80	461	L3	Q139
285	L2	Q124	344	L3	Q22	403	L3	Q81	462	L3	Q140
286	L2	Q125	345	L3	Q23	404	L3	Q82	463	L3	Q141
287	L2	Q126	346	L3	Q24	405	L3	Q83	464	L3	Q142
288	L2	Q127	347	L3	Q25	406	L3	Q84	465	L3	Q143
289	L2	Q128	348	L3	Q26	407	L3	Q85	466	L3	Q144
290	L2	Q129	349	L3	Q27	408	L3	Q86	467	L3	Q145
291	L2	Q130	350	L3	Q28	409	L3	Q87	468	L3	Q146
292	L2	Q131	351	L3	Q29	410	L3	Q88	469	L3	Q147
293	L2	Q132	352	L3	Q30	411	L3	Q89	470	L3	Q148
294	L2	Q133	353	L3	Q31	412	L3	Q90	471	L3	Q149

[Table 1-3]

472	L3	Q150	531	L4	Q48	590	L4	Q107	649	L5	Q5
473	L3	Q151	532	L4	Q49	591	L4	Q108	650	L5	Q6
474	L3	Q152	533	L4	Q50	592	L4	Q109	651	L5	Q7
475	L3	Q153	534	L4	Q51	593	L4	Q110	652	L5	Q8
476	L3	Q154	535	L4	Q52	594	L4	Q111	653	L5	Q9
477	L3	Q155	536	L4	Q53	595	L4	Q112	654	L5	Q10
478	L3	Q156	537	L4	Q54	596	L4	Q113	655	L5	Q11
479	L3	Q157	538	L4	Q55	597	L4	Q114	656	L5	Q12
480	L3	Q158	539	L4	Q56	598	L4	Q115	657	L5	Q13
481	L3	Q159	540	L4	Q57	599	L4	Q116	658	L5	Q14
482	L3	Q160	541	L4	Q58	600	L4	Q117	659	L5	Q15
483	L3	Q161	542	L4	Q59	601	L4	Q118	660	L5	Q16
484	L4	Q1	543	L4	Q60	602	L4	Q119	661	L5	Q17
485	L4	Q2	544	L4	Q61	603	L4	Q120	662	L5	Q18
486	L4	Q3	545	L4	Q62	604	L4	Q121	663	L5	Q19
487	L4	Q4	546	L4	Q63	605	L4	Q122	664	L5	Q20
488	L4	Q5	547	L4	Q64	606	L4	Q123	665	L5	Q21
489	L4	Q6	548	L4	Q65	607	L4	Q124	666	L5	Q22
490	L4	Q7	549	L4	Q66	608	L4	Q125	667	L5	Q23
491	L4	Q8	550	L4	Q67	609	L4	Q126	668	L5	Q24
492	L4	Q9	551	L4	Q68	610	L4	Q127	669	L5	Q25
493	L4	Q10	552	L4	Q69	611	L4	Q128	670	L5	Q26
494	L4	Q11	553	L4	Q70	612	L4	Q129	671	L5	Q27
495	L4	Q12	554	L4	Q71	613	L4	Q130	672	L5	Q28
496	L4	Q13	555	L4	Q72	614	L4	Q131	673	L5	Q29
497	L4	Q14	556	L4	Q73	615	L4	Q132	674	L5	Q30
498	L4	Q15	557	L4	Q74	616	L4	Q133	675	L5	Q31
499	L4	Q16	558	L4	Q75	617	L4	Q134	676	L5	Q32
500	L4	Q17	559	L4	Q76	618	L4	Q135	677	L5	Q33
501	L4	Q18	560	L4	Q77	619	L4	Q136	678	L5	Q34
502	L4	Q19	561	L4	Q78	620	L4	Q137	679	L5	Q35
503	L4	Q20	562	L4	Q79	621	L4	Q138	680	L5	Q36
504	L4	Q21	563	L4	Q80	622	L4	Q139	681	L5	Q37
505	L4	Q22	564	L4	Q81	623	L4	Q140	682	L5	Q38
506	L4	Q23	565	L4	Q82	624	L4	Q141	683	L5	Q39
507	L4	Q24	566	L4	Q83	625	L4	Q142	684	L5	Q40
508	L4	Q25	567	L4	Q84	626	L4	Q143	685	L5	Q41
509	L4	Q26	568	L4	Q85	627	L4	Q144	686	L5	Q42
510	L4	Q27	569	L4	Q86	628	L4	Q145	687	L5	Q43
511	L4	Q28	570	L4	Q87	629	L4	Q146	688	L5	Q44
512	L4	Q29	571	L4	Q88	630	L4	Q147	689	L5	Q45
513	L4	Q30	572	L4	Q89	631	L4	Q148	690	L5	Q46
514	L4	Q31	573	L4	Q90	632	L4	Q149	691	L5	Q47
515	L4	Q32	574	L4	Q91	633	L4	Q150	692	L5	Q48
516	L4	Q33	575	L4	Q92	634	L4	Q151	693	L5	Q49
517	L4	Q34	576	L4	Q93	635	L4	Q152	694	L5	Q50
518	L4	Q35	577	L4	Q94	636	L4	Q153	695	L5	Q51
519	L4	Q36	578	L4	Q95	637	L4	Q154	696	L5	Q52
520	L4	Q37	579	L4	Q96	638	L4	Q155	697	L5	Q53
521	L4	Q38	580	L4	Q97	639	L4	Q156	698	L5	Q54
522	L4	Q39	581	L4	Q98	640	L4	Q157	699	L5	Q55
523	L4	Q40	582	L4	Q99	641	L4	Q158	700	L5	Q56
524	L4	Q41	583	L4	Q100	642	L4	Q159	701	L5	Q57
525	L4	Q42	584	L4	Q101	643	L4	Q160	702	L5	Q58
526	L4	Q43	585	L4	Q102	644	L4	Q161	703	L5	Q59
527	L4	Q44	586	L4	Q103	645	L5	Q1	704	L5	Q60
528	L4	Q45	587	L4	Q104	646	L5	Q2	705	L5	Q61
529	L4	Q46	588	L4	Q105	647	L5	Q3	706	L5	Q62
530	L4	Q47	589	L4	Q106	648	L5	Q4	707	L5	Q63

[Table 1-4]

708	L5	Q64	767	L5	Q123	826	L6	Q21	885	L6	Q80
709	L5	Q65	768	L5	Q124	827	L6	Q22	886	L6	Q81
710	L5	Q66	769	L5	Q125	828	L6	Q23	887	L6	Q82
711	L5	Q67	770	L5	Q126	829	L6	Q24	888	L6	Q83
712	L5	Q68	771	L5	Q127	830	L6	Q25	889	L6	Q84
713	L5	Q69	772	L5	Q128	831	L6	Q26	890	L6	Q85
714	L5	Q70	773	L5	Q129	832	L6	Q27	891	L6	Q86
715	L5	Q71	774	L5	Q130	833	L6	Q28	892	L6	Q87
716	L5	Q72	775	L5	Q131	834	L6	Q29	893	L6	Q88
717	L5	Q73	776	L5	Q132	835	L6	Q30	894	L6	Q89
718	L5	Q74	777	L5	Q133	836	L6	Q31	895	L6	Q90
719	L5	Q75	778	L5	Q134	837	L6	Q32	896	L6	Q91
720	L5	Q76	779	L5	Q135	838	L6	Q33	897	L6	Q92
721	L5	Q77	780	L5	Q136	839	L6	Q34	898	L6	Q93
722	L5	Q78	781	L5	Q137	840	L6	Q35	899	L6	Q94
723	L5	Q79	782	L5	Q138	841	L6	Q36	900	L6	Q95
724	L5	Q80	783	L5	Q139	842	L6	Q37	901	L6	Q96
725	L5	Q81	784	L5	Q140	843	L6	Q38	902	L6	Q97
726	L5	Q82	785	L5	Q141	844	L6	Q39	903	L6	Q98
727	L5	Q83	786	L5	Q142	845	L6	Q40	904	L6	Q99
728	L5	Q84	787	L5	Q143	846	L6	Q41	905	L6	Q100
729	L5	Q85	788	L5	Q144	847	L6	Q42	906	L6	Q101
730	L5	Q86	789	L5	Q145	848	L6	Q43	907	L6	Q102
731	L5	Q87	790	L5	Q146	849	L6	Q44	908	L6	Q103
732	L5	Q88	791	L5	Q147	850	L6	Q45	909	L6	Q104
733	L5	Q89	792	L5	Q148	851	L6	Q46	910	L6	Q105
734	L5	Q90	793	L5	Q149	852	L6	Q47	911	L6	Q106
735	L5	Q91	794	L5	Q150	853	L6	Q48	912	L6	Q107
736	L5	Q92	795	L5	Q151	854	L6	Q49	913	L6	Q108
737	L5	Q93	796	L5	Q152	855	L6	Q50	914	L6	Q109
738	L5	Q94	797	L5	Q153	856	L6	Q51	915	L6	Q110
739	L5	Q95	798	L5	Q154	857	L6	Q52	916	L6	Q111
740	L5	Q96	799	L5	Q155	858	L6	Q53	917	L6	Q112
741	L5	Q97	800	L5	Q156	859	L6	Q54	918	L6	Q113
742	L5	Q98	801	L5	Q157	860	L6	Q55	919	L6	Q114
743	L5	Q99	802	L5	Q158	861	L6	Q56	920	L6	Q115
744	L5	Q100	803	L5	Q159	862	L6	Q57	921	L6	Q116
745	L5	Q101	804	L5	Q160	863	L6	Q58	922	L6	Q117
746	L5	Q102	805	L5	Q161	864	L6	Q59	923	L6	Q118
747	L5	Q103	806	L6	Q1	865	L6	Q60	924	L6	Q119
748	L5	Q104	807	L6	Q2	866	L6	Q61	925	L6	Q120
749	L5	Q105	808	L6	Q3	867	L6	Q62	926	L6	Q121
750	L5	Q106	809	L6	Q4	868	L6	Q63	927	L6	Q122
751	L5	Q107	810	L6	Q5	869	L6	Q64	928	L6	Q123
752	L5	Q108	811	L6	Q6	870	L6	Q65	929	L6	Q124
753	L5	Q109	812	L6	Q7	871	L6	Q66	930	L6	Q125
754	L5	Q110	813	L6	Q8	872	L6	Q67	931	L6	Q126
755	L5	Q111	814	L6	Q9	873	L6	Q68	932	L6	Q127
756	L5	Q112	815	L6	Q10	874	L6	Q69	933	L6	Q128
757	L5	Q113	816	L6	Q11	875	L6	Q70	934	L6	Q129
758	L5	Q114	817	L6	Q12	876	L6	Q71	935	L6	Q130
759	L5	Q115	818	L6	Q13	877	L6	Q72	936	L6	Q131
760	L5	Q116	819	L6	Q14	878	L6	Q73	937	L6	Q132
761	L5	Q117	820	L6	Q15	879	L6	Q74	938	L6	Q133
762	L5	Q118	821	L6	Q16	880	L6	Q75	939	L6	Q134
763	L5	Q119	822	L6	Q17	881	L6	Q76	940	L6	Q135
764	L5	Q120	823	L6	Q18	882	L6	Q77	941	L6	Q136
765	L5	Q121	824	L6	Q19	883	L6	Q78	942	L6	Q137
766	L5	Q122	825	L6	Q20	884	L6	Q79	943	L6	Q138

[Table 1-5]

944	L6	Q139	1003	L7	Q37	1062	L7	Q96	1121	L7	Q155
945	L6	Q140	1004	L7	Q38	1063	L7	Q97	1122	L7	Q156
946	L6	Q141	1005	L7	Q39	1064	L7	Q98	1123	L7	Q157
947	L6	Q142	1006	L7	Q40	1065	L7	Q99	1124	L7	Q158
948	L6	Q143	1007	L7	Q41	1066	L7	Q100	1125	L7	Q159
949	L6	Q144	1008	L7	Q42	1067	L7	Q101	1126	L7	Q160
950	L6	Q145	1009	L7	Q43	1068	L7	Q102	1127	L7	Q161
951	L6	Q146	1010	L7	Q44	1069	L7	Q103	1128	L8	Q1
952	L6	Q147	1011	L7	Q45	1070	L7	Q104	1129	L8	Q2
953	L6	Q148	1012	L7	Q46	1071	L7	Q105	1130	L8	Q3
954	L6	Q149	1013	L7	Q47	1072	L7	Q106	1131	L8	Q4
955	L6	Q150	1014	L7	Q48	1073	L7	Q107	1132	L8	Q5
956	L6	Q151	1015	L7	Q49	1074	L7	Q108	1133	L8	Q6
957	L6	Q152	1016	L7	Q50	1075	L7	Q109	1134	L8	Q7
958	L6	Q153	1017	L7	Q51	1076	L7	Q110	1135	L8	Q8
959	L6	Q154	1018	L7	Q52	1077	L7	Q111	1136	L8	Q9
960	L6	Q155	1019	L7	Q53	1078	L7	Q112	1137	L8	Q10
961	L6	Q156	1020	L7	Q54	1079	L7	Q113	1138	L8	Q11
962	L6	Q157	1021	L7	Q55	1080	L7	Q114	1139	L8	Q12
963	L6	Q158	1022	L7	Q56	1081	L7	Q115	1140	L8	Q13
964	L6	Q159	1023	L7	Q57	1082	L7	Q116	1141	L8	Q14
965	L6	Q160	1024	L7	Q58	1083	L7	Q117	1142	L8	Q15
966	L6	Q161	1025	L7	Q59	1084	L7	Q118	1143	L8	Q16
967	L7	Q1	1026	L7	Q60	1085	L7	Q119	1144	L8	Q17
968	L7	Q2	1027	L7	Q61	1086	L7	Q120	1145	L8	Q18
969	L7	Q3	1028	L7	Q62	1087	L7	Q121	1146	L8	Q19
970	L7	Q4	1029	L7	Q63	1088	L7	Q122	1147	L8	Q20
971	L7	Q5	1030	L7	Q64	1089	L7	Q123	1148	L8	Q21
972	L7	Q6	1031	L7	Q65	1090	L7	Q124	1149	L8	Q22
973	L7	Q7	1032	L7	Q66	1091	L7	Q125	1150	L8	Q23
974	L7	Q8	1033	L7	Q67	1092	L7	Q126	1151	L8	Q24
975	L7	Q9	1034	L7	Q68	1093	L7	Q127	1152	L8	Q25
976	L7	Q10	1035	L7	Q69	1094	L7	Q128	1153	L8	Q26
977	L7	Q11	1036	L7	Q70	1095	L7	Q129	1154	L8	Q27
978	L7	Q12	1037	L7	Q71	1096	L7	Q130	1155	L8	Q28
979	L7	Q13	1038	L7	Q72	1097	L7	Q131	1156	L8	Q29
980	L7	Q14	1039	L7	Q73	1098	L7	Q132	1157	L8	Q30
981	L7	Q15	1040	L7	Q74	1099	L7	Q133	1158	L8	Q31
982	L7	Q16	1041	L7	Q75	1100	L7	Q134	1159	L8	Q32
983	L7	Q17	1042	L7	Q76	1101	L7	Q135	1160	L8	Q33
984	L7	Q18	1043	L7	Q77	1102	L7	Q136	1161	L8	Q34
985	L7	Q19	1044	L7	Q78	1103	L7	Q137	1162	L8	Q35
986	L7	Q20	1045	L7	Q79	1104	L7	Q138	1163	L8	Q36
987	L7	Q21	1046	L7	Q80	1105	L7	Q139	1164	L8	Q37
988	L7	Q22	1047	L7	Q81	1106	L7	Q140	1165	L8	Q38
989	L7	Q23	1048	L7	Q82	1107	L7	Q141	1166	L8	Q39
990	L7	Q24	1049	L7	Q83	1108	L7	Q142	1167	L8	Q40
991	L7	Q25	1050	L7	Q84	1109	L7	Q143	1168	L8	Q41
992	L7	Q26	1051	L7	Q85	1110	L7	Q144	1169	L8	Q42
993	L7	Q27	1052	L7	Q86	1111	L7	Q145	1170	L8	Q43
994	L7	Q28	1053	L7	Q87	1112	L7	Q146	1171	L8	Q44
995	L7	Q29	1054	L7	Q88	1113	L7	Q147	1172	L8	Q45
996	L7	Q30	1055	L7	Q89	1114	L7	Q148	1173	L8	Q46
997	L7	Q31	1056	L7	Q90	1115	L7	Q149	1174	L8	Q47
998	L7	Q32	1057	L7	Q91	1116	L7	Q150	1175	L8	Q48
999	L7	Q33	1058	L7	Q92	1117	L7	Q151	1176	L8	Q49
1000	L7	Q34	1059	L7	Q93	1118	L7	Q152	1177	L8	Q50
1001	L7	Q35	1060	L7	Q94	1119	L7	Q153	1178	L8	Q51
1002	L7	Q36	1061	L7	Q95	1120	L7	Q154	1179	L8	Q52

[Table 1-6]

1180	L8	Q53	1239	L8	Q112	1298	L9	Q10	1357	L9	Q69
1181	L8	Q54	1240	L8	Q113	1299	L9	Q11	1358	L9	Q70
1182	L8	Q55	1241	L8	Q114	1300	L9	Q12	1359	L9	Q71
1183	L8	Q56	1242	L8	Q115	1301	L9	Q13	1360	L9	Q72
1184	L8	Q57	1243	L8	Q116	1302	L9	Q14	1361	L9	Q73
1185	L8	Q58	1244	L8	Q117	1303	L9	Q15	1362	L9	Q74
1186	L8	Q59	1245	L8	Q118	1304	L9	Q16	1363	L9	Q75
1187	L8	Q60	1246	L8	Q119	1305	L9	Q17	1364	L9	Q76
1188	L8	Q61	1247	L8	Q120	1306	L9	Q18	1365	L9	Q77
1189	L8	Q62	1248	L8	Q121	1307	L9	Q19	1366	L9	Q78
1190	L8	Q63	1249	L8	Q122	1308	L9	Q20	1367	L9	Q79
1191	L8	Q64	1250	L8	Q123	1309	L9	Q21	1368	L9	Q80
1192	L8	Q65	1251	L8	Q124	1310	L9	Q22	1369	L9	Q81
1193	L8	Q66	1252	L8	Q125	1311	L9	Q23	1370	L9	Q82
1194	L8	Q67	1253	L8	Q126	1312	L9	Q24	1371	L9	Q83
1195	L8	Q68	1254	L8	Q127	1313	L9	Q25	1372	L9	Q84
1196	L8	Q69	1255	L8	Q128	1314	L9	Q26	1373	L9	Q85
1197	L8	Q70	1256	L8	Q129	1315	L9	Q27	1374	L9	Q86
1198	L8	Q71	1257	L8	Q130	1316	L9	Q28	1375	L9	Q87
1199	L8	Q72	1258	L8	Q131	1317	L9	Q29	1376	L9	Q88
1200	L8	Q73	1259	L8	Q132	1318	L9	Q30	1377	L9	Q89
1201	L8	Q74	1260	L8	Q133	1319	L9	Q31	1378	L9	Q90
1202	L8	Q75	1261	L8	Q134	1320	L9	Q32	1379	L9	Q91
1203	L8	Q76	1262	L8	Q135	1321	L9	Q33	1380	L9	Q92
1204	L8	Q77	1263	L8	Q136	1322	L9	Q34	1381	L9	Q93
1205	L8	Q78	1264	L8	Q137	1323	L9	Q35	1382	L9	Q94
1206	L8	Q79	1265	L8	Q138	1324	L9	Q36	1383	L9	Q95
1207	L8	Q80	1266	L8	Q139	1325	L9	Q37	1384	L9	Q96
1208	L8	Q81	1267	L8	Q140	1326	L9	Q38	1385	L9	Q97
1209	L8	Q82	1268	L8	Q141	1327	L9	Q39	1386	L9	Q98
1210	L8	Q83	1269	L8	Q142	1328	L9	Q40	1387	L9	Q99
1211	L8	Q84	1270	L8	Q143	1329	L9	Q41	1388	L9	Q100
1212	L8	Q85	1271	L8	Q144	1330	L9	Q42	1389	L9	Q101
1213	L8	Q86	1272	L8	Q145	1331	L9	Q43	1390	L9	Q102
1214	L8	Q87	1273	L8	Q146	1332	L9	Q44	1391	L9	Q103
1215	L8	Q88	1274	L8	Q147	1333	L9	Q45	1392	L9	Q104
1216	L8	Q89	1275	L8	Q148	1334	L9	Q46	1393	L9	Q105
1217	L8	Q90	1276	L8	Q149	1335	L9	Q47	1394	L9	Q106
1218	L8	Q91	1277	L8	Q150	1336	L9	Q48	1395	L9	Q107
1219	L8	Q92	1278	L8	Q151	1337	L9	Q49	1396	L9	Q108
1220	L8	Q93	1279	L8	Q152	1338	L9	Q50	1397	L9	Q109
1221	L8	Q94	1280	L8	Q153	1339	L9	Q51	1398	L9	Q110
1222	L8	Q95	1281	L8	Q154	1340	L9	Q52	1399	L9	Q111
1223	L8	Q96	1282	L8	Q155	1341	L9	Q53	1400	L9	Q112
1224	L8	Q97	1283	L8	Q156	1342	L9	Q54	1401	L9	Q113
1225	L8	Q98	1284	L8	Q157	1343	L9	Q55	1402	L9	Q114
1226	L8	Q99	1285	L8	Q158	1344	L9	Q56	1403	L9	Q115
1227	L8	Q100	1286	L8	Q159	1345	L9	Q57	1404	L9	Q116
1228	L8	Q101	1287	L8	Q160	1346	L9	Q58	1405	L9	Q117
1229	L8	Q102	1288	L8	Q161	1347	L9	Q59	1406	L9	Q118
1230	L8	Q103	1289	L9	Q1	1348	L9	Q60	1407	L9	Q119
1231	L8	Q104	1290	L9	Q2	1349	L9	Q61	1408	L9	Q120
1232	L8	Q105	1291	L9	Q3	1350	L9	Q62	1409	L9	Q121
1233	L8	Q106	1292	L9	Q4	1351	L9	Q63	1410	L9	Q122
1234	L8	Q107	1293	L9	Q5	1352	L9	Q64	1411	L9	Q123
1235	L8	Q108	1294	L9	Q6	1353	L9	Q65	1412	L9	Q124
1236	L8	Q109	1295	L9	Q7	1354	L9	Q66	1413	L9	Q125
1237	L8	Q110	1296	L9	Q8	1355	L9	Q67	1414	L9	Q126
1238	L8	Q111	1297	L9	Q9	1356	L9	Q68	1415	L9	Q127

[Table 1-7]

1416	L9	Q128
1417	L9	Q129
1418	L9	Q130
1419	L9	Q131
1420	L9	Q132
1421	L9	Q133
1422	L9	Q134
1423	L9	Q135
1424	L9	Q136
1425	L9	Q137
1426	L9	Q138
1427	L9	Q139
1428	L9	Q140
1429	L9	Q141
1430	L9	Q142
1431	L9	Q143
1432	L9	Q144
1433	L9	Q145
1434	L9	Q146
1435	L9	Q147
1436	L9	Q148
1437	L9	Q149
1438	L9	Q150
1439	L9	Q151
1440	L9	Q152
1441	L9	Q153
1442	L9	Q154
1443	L9	Q155
1444	L9	Q156
1445	L9	Q157
1446	L9	Q158
1447	L9	Q159
1448	L9	Q160
1449	L9	Q161
1450	L10	Q1
1451	L10	Q2
1452	L10	Q3
1453	L10	Q4
1454	L10	Q5
1455	L10	Q6
1456	L10	Q7
1457	L10	Q8
1458	L10	Q9
1459	L10	Q10
1460	L10	Q11
1461	L10	Q12
1462	L10	Q13
1463	L10	Q14
1464	L10	Q15
1465	L10	Q16
1466	L10	Q17
1467	L10	Q18
1468	L10	Q19
1469	L10	Q20
1470	L10	Q21
1471	L10	Q22
1472	L10	Q23
1473	L10	Q24
1474	L10	Q25

1475	L10	Q26
1476	L10	Q27
1477	L10	Q28
1478	L10	Q29
1479	L10	Q30
1480	L10	Q31
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1486	L10	Q37
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1488	L10	Q39
1489	L10	Q40
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1491	L10	Q42
1492	L10	Q43
1493	L10	Q44
1494	L10	Q45
1495	L10	Q46
1496	L10	Q47
1497	L10	Q48
1498	L10	Q49
1499	L10	Q50
1500	L10	Q51
1501	L10	Q52
1502	L10	Q53
1503	L10	Q54
1504	L10	Q55
1505	L10	Q56
1506	L10	Q57
1507	L10	Q58
1508	L10	Q59
1509	L10	Q60
1510	L10	Q61
1511	L10	Q62
1512	L10	Q63
1513	L10	Q64
1514	L10	Q65
1515	L10	Q66
1516	L10	Q67
1517	L10	Q68
1518	L10	Q69
1519	L10	Q70
1520	L10	Q71
1521	L10	Q72
1522	L10	Q73
1523	L10	Q74
1524	L10	Q75
1525	L10	Q76
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1531	L10	Q82
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1534	L10	Q85
1535	L10	Q86
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1540	L10	Q91
1541	L10	Q92
1542	L10	Q93
1543	L10	Q94
1544	L10	Q95
1545	L10	Q96
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1559	L10	Q110
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1589	L10	Q140
1590	L10	Q141
1591	L10	Q142
1592	L10	Q143

1593	L10	Q144
1594	L10	Q145
1595	L10	Q146
1596	L10	Q147
1597	L10	Q148
1598	L10	Q149
1599	L10	Q150
1600	L10	Q151
1601	L10	Q152
1602	L10	Q153
1603	L10	Q154
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1606	L10	Q157
1607	L10	Q158
1608	L10	Q159
1609	L10	Q160
1610	L10	Q161
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1612	L11	Q2
1613	L11	Q3
1614	L11	Q4
1615	L11	Q5
1616	L11	Q6
1617	L11	Q7
1618	L11	Q8
1619	L11	Q9
1620	L11	Q10
1621	L11	Q11
1622	L11	Q12
1623	L11	Q13
1624	L11	Q14
1625	L11	Q15
1626	L11	Q16
1627	L11	Q17
1628	L11	Q18
1629	L11	Q19
1630	L11	Q20
1631	L11	Q21
1632	L11	Q22
1633	L11	Q23
1634	L11	Q24
1635	L11	Q25
1636	L11	Q26
1637	L11	Q27
1638	L11	Q28
1639	L11	Q29
1640	L11	Q30
1641	L11	Q31
1642	L11	Q32
1643	L11	Q33
1644	L11	Q34
1645	L11	Q35
1646	L11	Q36
1647	L11	Q37
1648	L11	Q38
1649	L11	Q39
1650	L11	Q40
1651	L11	Q41

[Table 1-8]

1652	L11	Q42	1711	L11	Q101	1770	L11	Q160	1829	L12	Q58
1653	L11	Q43	1712	L11	Q102	1771	L11	Q161	1830	L12	Q59
1654	L11	Q44	1713	L11	Q103	1772	L12	Q1	1831	L12	Q60
1655	L11	Q45	1714	L11	Q104	1773	L12	Q2	1832	L12	Q61
1656	L11	Q46	1715	L11	Q105	1774	L12	Q3	1833	L12	Q62
1657	L11	Q47	1716	L11	Q106	1775	L12	Q4	1834	L12	Q63
1658	L11	Q48	1717	L11	Q107	1776	L12	Q5	1835	L12	Q64
1659	L11	Q49	1718	L11	Q108	1777	L12	Q6	1836	L12	Q65
1660	L11	Q50	1719	L11	Q109	1778	L12	Q7	1837	L12	Q66
1661	L11	Q51	1720	L11	Q110	1779	L12	Q8	1838	L12	Q67
1662	L11	Q52	1721	L11	Q111	1780	L12	Q9	1839	L12	Q68
1663	L11	Q53	1722	L11	Q112	1781	L12	Q10	1840	L12	Q69
1664	L11	Q54	1723	L11	Q113	1782	L12	Q11	1841	L12	Q70
1665	L11	Q55	1724	L11	Q114	1783	L12	Q12	1842	L12	Q71
1666	L11	Q56	1725	L11	Q115	1784	L12	Q13	1843	L12	Q72
1667	L11	Q57	1726	L11	Q116	1785	L12	Q14	1844	L12	Q73
1668	L11	Q58	1727	L11	Q117	1786	L12	Q15	1845	L12	Q74
1669	L11	Q59	1728	L11	Q118	1787	L12	Q16	1846	L12	Q75
1670	L11	Q60	1729	L11	Q119	1788	L12	Q17	1847	L12	Q76
1671	L11	Q61	1730	L11	Q120	1789	L12	Q18	1848	L12	Q77
1672	L11	Q62	1731	L11	Q121	1790	L12	Q19	1849	L12	Q78
1673	L11	Q63	1732	L11	Q122	1791	L12	Q20	1850	L12	Q79
1674	L11	Q64	1733	L11	Q123	1792	L12	Q21	1851	L12	Q80
1675	L11	Q65	1734	L11	Q124	1793	L12	Q22	1852	L12	Q81
1676	L11	Q66	1735	L11	Q125	1794	L12	Q23	1853	L12	Q82
1677	L11	Q67	1736	L11	Q126	1795	L12	Q24	1854	L12	Q83
1678	L11	Q68	1737	L11	Q127	1796	L12	Q25	1855	L12	Q84
1679	L11	Q69	1738	L11	Q128	1797	L12	Q26	1856	L12	Q85
1680	L11	Q70	1739	L11	Q129	1798	L12	Q27	1857	L12	Q86
1681	L11	Q71	1740	L11	Q130	1799	L12	Q28	1858	L12	Q87
1682	L11	Q72	1741	L11	Q131	1800	L12	Q29	1859	L12	Q88
1683	L11	Q73	1742	L11	Q132	1801	L12	Q30	1860	L12	Q89
1684	L11	Q74	1743	L11	Q133	1802	L12	Q31	1861	L12	Q90
1685	L11	Q75	1744	L11	Q134	1803	L12	Q32	1862	L12	Q91
1686	L11	Q76	1745	L11	Q135	1804	L12	Q33	1863	L12	Q92
1687	L11	Q77	1746	L11	Q136	1805	L12	Q34	1864	L12	Q93
1688	L11	Q78	1747	L11	Q137	1806	L12	Q35	1865	L12	Q94
1689	L11	Q79	1748	L11	Q138	1807	L12	Q36	1866	L12	Q95
1690	L11	Q80	1749	L11	Q139	1808	L12	Q37	1867	L12	Q96
1691	L11	Q81	1750	L11	Q140	1809	L12	Q38	1868	L12	Q97
1692	L11	Q82	1751	L11	Q141	1810	L12	Q39	1869	L12	Q98
1693	L11	Q83	1752	L11	Q142	1811	L12	Q40	1870	L12	Q99
1694	L11	Q84	1753	L11	Q143	1812	L12	Q41	1871	L12	Q100
1695	L11	Q85	1754	L11	Q144	1813	L12	Q42	1872	L12	Q101
1696	L11	Q86	1755	L11	Q145	1814	L12	Q43	1873	L12	Q102
1697	L11	Q87	1756	L11	Q146	1815	L12	Q44	1874	L12	Q103
1698	L11	Q88	1757	L11	Q147	1816	L12	Q45	1875	L12	Q104
1699	L11	Q89	1758	L11	Q148	1817	L12	Q46	1876	L12	Q105
1700	L11	Q90	1759	L11	Q149	1818	L12	Q47	1877	L12	Q106
1701	L11	Q91	1760	L11	Q150	1819	L12	Q48	1878	L12	Q107
1702	L11	Q92	1761	L11	Q151	1820	L12	Q49	1879	L12	Q108
1703	L11	Q93	1762	L11	Q152	1821	L12	Q50	1880	L12	Q109
1704	L11	Q94	1763	L11	Q153	1822	L12	Q51	1881	L12	Q110
1705	L11	Q95	1764	L11	Q154	1823	L12	Q52	1882	L12	Q111
1706	L11	Q96	1765	L11	Q155	1824	L12	Q53	1883	L12	Q112
1707	L11	Q97	1766	L11	Q156	1825	L12	Q54	1884	L12	Q113
1708	L11	Q98	1767	L11	Q157	1826	L12	Q55	1885	L12	Q114
1709	L11	Q99	1768	L11	Q158	1827	L12	Q56	1886	L12	Q115
1710	L11	Q100	1769	L11	Q159	1828	L12	Q57	1887	L12	Q116

[Table 1-9]

1888	L12	Q117	1947	L13	Q15	2006	L13	Q74	2065	L13	Q133
1889	L12	Q118	1948	L13	Q16	2007	L13	Q75	2066	L13	Q134
1890	L12	Q119	1949	L13	Q17	2008	L13	Q76	2067	L13	Q135
1891	L12	Q120	1950	L13	Q18	2009	L13	Q77	2068	L13	Q136
1892	L12	Q121	1951	L13	Q19	2010	L13	Q78	2069	L13	Q137
1893	L12	Q122	1952	L13	Q20	2011	L13	Q79	2070	L13	Q138
1894	L12	Q123	1953	L13	Q21	2012	L13	Q80	2071	L13	Q139
1895	L12	Q124	1954	L13	Q22	2013	L13	Q81	2072	L13	Q140
1896	L12	Q125	1955	L13	Q23	2014	L13	Q82	2073	L13	Q141
1897	L12	Q126	1956	L13	Q24	2015	L13	Q83	2074	L13	Q142
1898	L12	Q127	1957	L13	Q25	2016	L13	Q84	2075	L13	Q143
1899	L12	Q128	1958	L13	Q26	2017	L13	Q85	2076	L13	Q144
1900	L12	Q129	1959	L13	Q27	2018	L13	Q86	2077	L13	Q145
1901	L12	Q130	1960	L13	Q28	2019	L13	Q87	2078	L13	Q146
1902	L12	Q131	1961	L13	Q29	2020	L13	Q88	2079	L13	Q147
1903	L12	Q132	1962	L13	Q30	2021	L13	Q89	2080	L13	Q148
1904	L12	Q133	1963	L13	Q31	2022	L13	Q90	2081	L13	Q149
1905	L12	Q134	1964	L13	Q32	2023	L13	Q91	2082	L13	Q150
1906	L12	Q135	1965	L13	Q33	2024	L13	Q92	2083	L13	Q151
1907	L12	Q136	1966	L13	Q34	2025	L13	Q93	2084	L13	Q152
1908	L12	Q137	1967	L13	Q35	2026	L13	Q94	2085	L13	Q153
1909	L12	Q138	1968	L13	Q36	2027	L13	Q95	2086	L13	Q154
1910	L12	Q139	1969	L13	Q37	2028	L13	Q96	2087	L13	Q155
1911	L12	Q140	1970	L13	Q38	2029	L13	Q97	2088	L13	Q156
1912	L12	Q141	1971	L13	Q39	2030	L13	Q98	2089	L13	Q157
1913	L12	Q142	1972	L13	Q40	2031	L13	Q99	2090	L13	Q158
1914	L12	Q143	1973	L13	Q41	2032	L13	Q100	2091	L13	Q159
1915	L12	Q144	1974	L13	Q42	2033	L13	Q101	2092	L13	Q160
1916	L12	Q145	1975	L13	Q43	2034	L13	Q102	2093	L13	Q161
1917	L12	Q146	1976	L13	Q44	2035	L13	Q103	2094	L14	Q1
1918	L12	Q147	1977	L13	Q45	2036	L13	Q104	2095	L14	Q2
1919	L12	Q148	1978	L13	Q46	2037	L13	Q105	2096	L14	Q3
1920	L12	Q149	1979	L13	Q47	2038	L13	Q106	2097	L14	Q4
1921	L12	Q150	1980	L13	Q48	2039	L13	Q107	2098	L14	Q5
1922	L12	Q151	1981	L13	Q49	2040	L13	Q108	2099	L14	Q6
1923	L12	Q152	1982	L13	Q50	2041	L13	Q109	2100	L14	Q7
1924	L12	Q153	1983	L13	Q51	2042	L13	Q110	2101	L14	Q8
1925	L12	Q154	1984	L13	Q52	2043	L13	Q111	2102	L14	Q9
1926	L12	Q155	1985	L13	Q53	2044	L13	Q112	2103	L14	Q10
1927	L12	Q156	1986	L13	Q54	2045	L13	Q113	2104	L14	Q11
1928	L12	Q157	1987	L13	Q55	2046	L13	Q114	2105	L14	Q12
1929	L12	Q158	1988	L13	Q56	2047	L13	Q115	2106	L14	Q13
1930	L12	Q159	1989	L13	Q57	2048	L13	Q116	2107	L14	Q14
1931	L12	Q160	1990	L13	Q58	2049	L13	Q117	2108	L14	Q15
1932	L12	Q161	1991	L13	Q59	2050	L13	Q118	2109	L14	Q16
1933	L13	Q1	1992	L13	Q60	2051	L13	Q119	2110	L14	Q17
1934	L13	Q2	1993	L13	Q61	2052	L13	Q120	2111	L14	Q18
1935	L13	Q3	1994	L13	Q62	2053	L13	Q121	2112	L14	Q19
1936	L13	Q4	1995	L13	Q63	2054	L13	Q122	2113	L14	Q20
1937	L13	Q5	1996	L13	Q64	2055	L13	Q123	2114	L14	Q21
1938	L13	Q6	1997	L13	Q65	2056	L13	Q124	2115	L14	Q22
1939	L13	Q7	1998	L13	Q66	2057	L13	Q125	2116	L14	Q23
1940	L13	Q8	1999	L13	Q67	2058	L13	Q126	2117	L14	Q24
1941	L13	Q9	2000	L13	Q68	2059	L13	Q127	2118	L14	Q25
1942	L13	Q10	2001	L13	Q69	2060	L13	Q128	2119	L14	Q26
1943	L13	Q11	2002	L13	Q70	2061	L13	Q129	2120	L14	Q27
1944	L13	Q12	2003	L13	Q71	2062	L13	Q130	2121	L14	Q28
1945	L13	Q13	2004	L13	Q72	2063	L13	Q131	2122	L14	Q29
1946	L13	Q14	2005	L13	Q73	2064	L13	Q132	2123	L14	Q30

[Table 1-10]

2124	L14	Q31	2183	L14	Q90	2242	L14	Q149	2301	L15	Q47
2125	L14	Q32	2184	L14	Q91	2243	L14	Q150	2302	L15	Q48
2126	L14	Q33	2185	L14	Q92	2244	L14	Q151	2303	L15	Q49
2127	L14	Q34	2186	L14	Q93	2245	L14	Q152	2304	L15	Q50
2128	L14	Q35	2187	L14	Q94	2246	L14	Q153	2305	L15	Q51
2129	L14	Q36	2188	L14	Q95	2247	L14	Q154	2306	L15	Q52
2130	L14	Q37	2189	L14	Q96	2248	L14	Q155	2307	L15	Q53
2131	L14	Q38	2190	L14	Q97	2249	L14	Q156	2308	L15	Q54
2132	L14	Q39	2191	L14	Q98	2250	L14	Q157	2309	L15	Q55
2133	L14	Q40	2192	L14	Q99	2251	L14	Q158	2310	L15	Q56
2134	L14	Q41	2193	L14	Q100	2252	L14	Q159	2311	L15	Q57
2135	L14	Q42	2194	L14	Q101	2253	L14	Q160	2312	L15	Q58
2136	L14	Q43	2195	L14	Q102	2254	L14	Q161	2313	L15	Q59
2137	L14	Q44	2196	L14	Q103	2255	L15	Q1	2314	L15	Q60
2138	L14	Q45	2197	L14	Q104	2256	L15	Q2	2315	L15	Q61
2139	L14	Q46	2198	L14	Q105	2257	L15	Q3	2316	L15	Q62
2140	L14	Q47	2199	L14	Q106	2258	L15	Q4	2317	L15	Q63
2141	L14	Q48	2200	L14	Q107	2259	L15	Q5	2318	L15	Q64
2142	L14	Q49	2201	L14	Q108	2260	L15	Q6	2319	L15	Q65
2143	L14	Q50	2202	L14	Q109	2261	L15	Q7	2320	L15	Q66
2144	L14	Q51	2203	L14	Q110	2262	L15	Q8	2321	L15	Q67
2145	L14	Q52	2204	L14	Q111	2263	L15	Q9	2322	L15	Q68
2146	L14	Q53	2205	L14	Q112	2264	L15	Q10	2323	L15	Q69
2147	L14	Q54	2206	L14	Q113	2265	L15	Q11	2324	L15	Q70
2148	L14	Q55	2207	L14	Q114	2266	L15	Q12	2325	L15	Q71
2149	L14	Q56	2208	L14	Q115	2267	L15	Q13	2326	L15	Q72
2150	L14	Q57	2209	L14	Q116	2268	L15	Q14	2327	L15	Q73
2151	L14	Q58	2210	L14	Q117	2269	L15	Q15	2328	L15	Q74
2152	L14	Q59	2211	L14	Q118	2270	L15	Q16	2329	L15	Q75
2153	L14	Q60	2212	L14	Q119	2271	L15	Q17	2330	L15	Q76
2154	L14	Q61	2213	L14	Q120	2272	L15	Q18	2331	L15	Q77
2155	L14	Q62	2214	L14	Q121	2273	L15	Q19	2332	L15	Q78
2156	L14	Q63	2215	L14	Q122	2274	L15	Q20	2333	L15	Q79
2157	L14	Q64	2216	L14	Q123	2275	L15	Q21	2334	L15	Q80
2158	L14	Q65	2217	L14	Q124	2276	L15	Q22	2335	L15	Q81
2159	L14	Q66	2218	L14	Q125	2277	L15	Q23	2336	L15	Q82
2160	L14	Q67	2219	L14	Q126	2278	L15	Q24	2337	L15	Q83
2161	L14	Q68	2220	L14	Q127	2279	L15	Q25	2338	L15	Q84
2162	L14	Q69	2221	L14	Q128	2280	L15	Q26	2339	L15	Q85
2163	L14	Q70	2222	L14	Q129	2281	L15	Q27	2340	L15	Q86
2164	L14	Q71	2223	L14	Q130	2282	L15	Q28	2341	L15	Q87
2165	L14	Q72	2224	L14	Q131	2283	L15	Q29	2342	L15	Q88
2166	L14	Q73	2225	L14	Q132	2284	L15	Q30	2343	L15	Q89
2167	L14	Q74	2226	L14	Q133	2285	L15	Q31	2344	L15	Q90
2168	L14	Q75	2227	L14	Q134	2286	L15	Q32	2345	L15	Q91
2169	L14	Q76	2228	L14	Q135	2287	L15	Q33	2346	L15	Q92
2170	L14	Q77	2229	L14	Q136	2288	L15	Q34	2347	L15	Q93
2171	L14	Q78	2230	L14	Q137	2289	L15	Q35	2348	L15	Q94
2172	L14	Q79	2231	L14	Q138	2290	L15	Q36	2349	L15	Q95
2173	L14	Q80	2232	L14	Q139	2291	L15	Q37	2350	L15	Q96
2174	L14	Q81	2233	L14	Q140	2292	L15	Q38	2351	L15	Q97
2175	L14	Q82	2234	L14	Q141	2293	L15	Q39	2352	L15	Q98
2176	L14	Q83	2235	L14	Q142	2294	L15	Q40	2353	L15	Q99
2177	L14	Q84	2236	L14	Q143	2295	L15	Q41	2354	L15	Q100
2178	L14	Q85	2237	L14	Q144	2296	L15	Q42	2355	L15	Q101
2179	L14	Q86	2238	L14	Q145	2297	L15	Q43	2356	L15	Q102
2180	L14	Q87	2239	L14	Q146	2298	L15	Q44	2357	L15	Q103
2181	L14	Q88	2240	L14	Q147	2299	L15	Q45	2358	L15	Q104
2182	L14	Q89	2241	L14	Q148	2300	L15	Q46	2359	L15	Q105

[Table 1-11]

2360	L15	Q106	2419	L16	Q4	2478	L16	Q63	2537	L16	Q122
2361	L15	Q107	2420	L16	Q5	2479	L16	Q64	2538	L16	Q123
2362	L15	Q108	2421	L16	Q6	2480	L16	Q65	2539	L16	Q124
2363	L15	Q109	2422	L16	Q7	2481	L16	Q66	2540	L16	Q125
2364	L15	Q110	2423	L16	Q8	2482	L16	Q67	2541	L16	Q126
2365	L15	Q111	2424	L16	Q9	2483	L16	Q68	2542	L16	Q127
2366	L15	Q112	2425	L16	Q10	2484	L16	Q69	2543	L16	Q128
2367	L15	Q113	2426	L16	Q11	2485	L16	Q70	2544	L16	Q129
2368	L15	Q114	2427	L16	Q12	2486	L16	Q71	2545	L16	Q130
2369	L15	Q115	2428	L16	Q13	2487	L16	Q72	2546	L16	Q131
2370	L15	Q116	2429	L16	Q14	2488	L16	Q73	2547	L16	Q132
2371	L15	Q117	2430	L16	Q15	2489	L16	Q74	2548	L16	Q133
2372	L15	Q118	2431	L16	Q16	2490	L16	Q75	2549	L16	Q134
2373	L15	Q119	2432	L16	Q17	2491	L16	Q76	2550	L16	Q135
2374	L15	Q120	2433	L16	Q18	2492	L16	Q77	2551	L16	Q136
2375	L15	Q121	2434	L16	Q19	2493	L16	Q78	2552	L16	Q137
2376	L15	Q122	2435	L16	Q20	2494	L16	Q79	2553	L16	Q138
2377	L15	Q123	2436	L16	Q21	2495	L16	Q80	2554	L16	Q139
2378	L15	Q124	2437	L16	Q22	2496	L16	Q81	2555	L16	Q140
2379	L15	Q125	2438	L16	Q23	2497	L16	Q82	2556	L16	Q141
2380	L15	Q126	2439	L16	Q24	2498	L16	Q83	2557	L16	Q142
2381	L15	Q127	2440	L16	Q25	2499	L16	Q84	2558	L16	Q143
2382	L15	Q128	2441	L16	Q26	2500	L16	Q85	2559	L16	Q144
2383	L15	Q129	2442	L16	Q27	2501	L16	Q86	2560	L16	Q145
2384	L15	Q130	2443	L16	Q28	2502	L16	Q87	2561	L16	Q146
2385	L15	Q131	2444	L16	Q29	2503	L16	Q88	2562	L16	Q147
2386	L15	Q132	2445	L16	Q30	2504	L16	Q89	2563	L16	Q148
2387	L15	Q133	2446	L16	Q31	2505	L16	Q90	2564	L16	Q149
2388	L15	Q134	2447	L16	Q32	2506	L16	Q91	2565	L16	Q150
2389	L15	Q135	2448	L16	Q33	2507	L16	Q92	2566	L16	Q151
2390	L15	Q136	2449	L16	Q34	2508	L16	Q93	2567	L16	Q152
2391	L15	Q137	2450	L16	Q35	2509	L16	Q94	2568	L16	Q153
2392	L15	Q138	2451	L16	Q36	2510	L16	Q95	2569	L16	Q154
2393	L15	Q139	2452	L16	Q37	2511	L16	Q96	2570	L16	Q155
2394	L15	Q140	2453	L16	Q38	2512	L16	Q97	2571	L16	Q156
2395	L15	Q141	2454	L16	Q39	2513	L16	Q98	2572	L16	Q157
2396	L15	Q142	2455	L16	Q40	2514	L16	Q99	2573	L16	Q158
2397	L15	Q143	2456	L16	Q41	2515	L16	Q100	2574	L16	Q159
2398	L15	Q144	2457	L16	Q42	2516	L16	Q101	2575	L16	Q160
2399	L15	Q145	2458	L16	Q43	2517	L16	Q102	2576	L16	Q161
2400	L15	Q146	2459	L16	Q44	2518	L16	Q103	2577	L17	Q1
2401	L15	Q147	2460	L16	Q45	2519	L16	Q104	2578	L17	Q2
2402	L15	Q148	2461	L16	Q46	2520	L16	Q105	2579	L17	Q3
2403	L15	Q149	2462	L16	Q47	2521	L16	Q106	2580	L17	Q4
2404	L15	Q150	2463	L16	Q48	2522	L16	Q107	2581	L17	Q5
2405	L15	Q151	2464	L16	Q49	2523	L16	Q108	2582	L17	Q6
2406	L15	Q152	2465	L16	Q50	2524	L16	Q109	2583	L17	Q7
2407	L15	Q153	2466	L16	Q51	2525	L16	Q110	2584	L17	Q8
2408	L15	Q154	2467	L16	Q52	2526	L16	Q111	2585	L17	Q9
2409	L15	Q155	2468	L16	Q53	2527	L16	Q112	2586	L17	Q10
2410	L15	Q156	2469	L16	Q54	2528	L16	Q113	2587	L17	Q11
2411	L15	Q157	2470	L16	Q55	2529	L16	Q114	2588	L17	Q12
2412	L15	Q158	2471	L16	Q56	2530	L16	Q115	2589	L17	Q13
2413	L15	Q159	2472	L16	Q57	2531	L16	Q116	2590	L17	Q14
2414	L15	Q160	2473	L16	Q58	2532	L16	Q117	2591	L17	Q15
2415	L15	Q161	2474	L16	Q59	2533	L16	Q118	2592	L17	Q16
2416	L16	Q1	2475	L16	Q60	2534	L16	Q119	2593	L17	Q17
2417	L16	Q2	2476	L16	Q61	2535	L16	Q120	2594	L17	Q18
2418	L16	Q3	2477	L16	Q62	2536	L16	Q121	2595	L17	Q19

[Table 1-12]

2596	L17	Q20	2655	L17	Q79	2714	L17	Q138	2773	L18	Q36
2597	L17	Q21	2656	L17	Q80	2715	L17	Q139	2774	L18	Q37
2598	L17	Q22	2657	L17	Q81	2716	L17	Q140	2775	L18	Q38
2599	L17	Q23	2658	L17	Q82	2717	L17	Q141	2776	L18	Q39
2600	L17	Q24	2659	L17	Q83	2718	L17	Q142	2777	L18	Q40
2601	L17	Q25	2660	L17	Q84	2719	L17	Q143	2778	L18	Q41
2602	L17	Q26	2661	L17	Q85	2720	L17	Q144	2779	L18	Q42
2603	L17	Q27	2662	L17	Q86	2721	L17	Q145	2780	L18	Q43
2604	L17	Q28	2663	L17	Q87	2722	L17	Q146	2781	L18	Q44
2605	L17	Q29	2664	L17	Q88	2723	L17	Q147	2782	L18	Q45
2606	L17	Q30	2665	L17	Q89	2724	L17	Q148	2783	L18	Q46
2607	L17	Q31	2666	L17	Q90	2725	L17	Q149	2784	L18	Q47
2608	L17	Q32	2667	L17	Q91	2726	L17	Q150	2785	L18	Q48
2609	L17	Q33	2668	L17	Q92	2727	L17	Q151	2786	L18	Q49
2610	L17	Q34	2669	L17	Q93	2728	L17	Q152	2787	L18	Q50
2611	L17	Q35	2670	L17	Q94	2729	L17	Q153	2788	L18	Q51
2612	L17	Q36	2671	L17	Q95	2730	L17	Q154	2789	L18	Q52
2613	L17	Q37	2672	L17	Q96	2731	L17	Q155	2790	L18	Q53
2614	L17	Q38	2673	L17	Q97	2732	L17	Q156	2791	L18	Q54
2615	L17	Q39	2674	L17	Q98	2733	L17	Q157	2792	L18	Q55
2616	L17	Q40	2675	L17	Q99	2734	L17	Q158	2793	L18	Q56
2617	L17	Q41	2676	L17	Q100	2735	L17	Q159	2794	L18	Q57
2618	L17	Q42	2677	L17	Q101	2736	L17	Q160	2795	L18	Q58
2619	L17	Q43	2678	L17	Q102	2737	L17	Q161	2796	L18	Q59
2620	L17	Q44	2679	L17	Q103	2738	L18	Q1	2797	L18	Q60
2621	L17	Q45	2680	L17	Q104	2739	L18	Q2	2798	L18	Q61
2622	L17	Q46	2681	L17	Q105	2740	L18	Q3	2799	L18	Q62
2623	L17	Q47	2682	L17	Q106	2741	L18	Q4	2800	L18	Q63
2624	L17	Q48	2683	L17	Q107	2742	L18	Q5	2801	L18	Q64
2625	L17	Q49	2684	L17	Q108	2743	L18	Q6	2802	L18	Q65
2626	L17	Q50	2685	L17	Q109	2744	L18	Q7	2803	L18	Q66
2627	L17	Q51	2686	L17	Q110	2745	L18	Q8	2804	L18	Q67
2628	L17	Q52	2687	L17	Q111	2746	L18	Q9	2805	L18	Q68
2629	L17	Q53	2688	L17	Q112	2747	L18	Q10	2806	L18	Q69
2630	L17	Q54	2689	L17	Q113	2748	L18	Q11	2807	L18	Q70
2631	L17	Q55	2690	L17	Q114	2749	L18	Q12	2808	L18	Q71
2632	L17	Q56	2691	L17	Q115	2750	L18	Q13	2809	L18	Q72
2633	L17	Q57	2692	L17	Q116	2751	L18	Q14	2810	L18	Q73
2634	L17	Q58	2693	L17	Q117	2752	L18	Q15	2811	L18	Q74
2635	L17	Q59	2694	L17	Q118	2753	L18	Q16	2812	L18	Q75
2636	L17	Q60	2695	L17	Q119	2754	L18	Q17	2813	L18	Q76
2637	L17	Q61	2696	L17	Q120	2755	L18	Q18	2814	L18	Q77
2638	L17	Q62	2697	L17	Q121	2756	L18	Q19	2815	L18	Q78
2639	L17	Q63	2698	L17	Q122	2757	L18	Q20	2816	L18	Q79
2640	L17	Q64	2699	L17	Q123	2758	L18	Q21	2817	L18	Q80
2641	L17	Q65	2700	L17	Q124	2759	L18	Q22	2818	L18	Q81
2642	L17	Q66	2701	L17	Q125	2760	L18	Q23	2819	L18	Q82
2643	L17	Q67	2702	L17	Q126	2761	L18	Q24	2820	L18	Q83
2644	L17	Q68	2703	L17	Q127	2762	L18	Q25	2821	L18	Q84
2645	L17	Q69	2704	L17	Q128	2763	L18	Q26	2822	L18	Q85
2646	L17	Q70	2705	L17	Q129	2764	L18	Q27	2823	L18	Q86
2647	L17	Q71	2706	L17	Q130	2765	L18	Q28	2824	L18	Q87
2648	L17	Q72	2707	L17	Q131	2766	L18	Q29	2825	L18	Q88
2649	L17	Q73	2708	L17	Q132	2767	L18	Q30	2826	L18	Q89
2650	L17	Q74	2709	L17	Q133	2768	L18	Q31	2827	L18	Q90
2651	L17	Q75	2710	L17	Q134	2769	L18	Q32	2828	L18	Q91
2652	L17	Q76	2711	L17	Q135	2770	L18	Q33	2829	L18	Q92
2653	L17	Q77	2712	L17	Q136	2771	L18	Q34	2830	L18	Q93
2654	L17	Q78	2713	L17	Q137	2772	L18	Q35	2831	L18	Q94

[Table 1-13]

2832	L18	Q95
2833	L18	Q96
2834	L18	Q97
2835	L18	Q98
2836	L18	Q99
2837	L18	Q100
2838	L18	Q101
2839	L18	Q102
2840	L18	Q103
2841	L18	Q104
2842	L18	Q105
2843	L18	Q106
2844	L18	Q107
2845	L18	Q108
2846	L18	Q109
2847	L18	Q110
2848	L18	Q111
2849	L18	Q112
2850	L18	Q113
2851	L18	Q114
2852	L18	Q115
2853	L18	Q116
2854	L18	Q117
2855	L18	Q118
2856	L18	Q119
2857	L18	Q120
2858	L18	Q121
2859	L18	Q122
2860	L18	Q123
2861	L18	Q124
2862	L18	Q125
2863	L18	Q126
2864	L18	Q127
2865	L18	Q128
2866	L18	Q129
2867	L18	Q130
2868	L18	Q131
2869	L18	Q132
2870	L18	Q133
2871	L18	Q134
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2898	L18	Q161
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3006	L19	Q108
3007	L19	Q109
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3009	L19	Q111
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3061	L20	Q2
3062	L20	Q3
3063	L20	Q4
3064	L20	Q5
3065	L20	Q6
3066	L20	Q7
3067	L20	Q8

[Table 1-14]

3068	L20	Q9	3127	L20	Q68	3186	L20	Q127	3245	L21	Q25
3069	L20	Q10	3128	L20	Q69	3187	L20	Q128	3246	L21	Q26
3070	L20	Q11	3129	L20	Q70	3188	L20	Q129	3247	L21	Q27
3071	L20	Q12	3130	L20	Q71	3189	L20	Q130	3248	L21	Q28
3072	L20	Q13	3131	L20	Q72	3190	L20	Q131	3249	L21	Q29
3073	L20	Q14	3132	L20	Q73	3191	L20	Q132	3250	L21	Q30
3074	L20	Q15	3133	L20	Q74	3192	L20	Q133	3251	L21	Q31
3075	L20	Q16	3134	L20	Q75	3193	L20	Q134	3252	L21	Q32
3076	L20	Q17	3135	L20	Q76	3194	L20	Q135	3253	L21	Q33
3077	L20	Q18	3136	L20	Q77	3195	L20	Q136	3254	L21	Q34
3078	L20	Q19	3137	L20	Q78	3196	L20	Q137	3255	L21	Q35
3079	L20	Q20	3138	L20	Q79	3197	L20	Q138	3256	L21	Q36
3080	L20	Q21	3139	L20	Q80	3198	L20	Q139	3257	L21	Q37
3081	L20	Q22	3140	L20	Q81	3199	L20	Q140	3258	L21	Q38
3082	L20	Q23	3141	L20	Q82	3200	L20	Q141	3259	L21	Q39
3083	L20	Q24	3142	L20	Q83	3201	L20	Q142	3260	L21	Q40
3084	L20	Q25	3143	L20	Q84	3202	L20	Q143	3261	L21	Q41
3085	L20	Q26	3144	L20	Q85	3203	L20	Q144	3262	L21	Q42
3086	L20	Q27	3145	L20	Q86	3204	L20	Q145	3263	L21	Q43
3087	L20	Q28	3146	L20	Q87	3205	L20	Q146	3264	L21	Q44
3088	L20	Q29	3147	L20	Q88	3206	L20	Q147	3265	L21	Q45
3089	L20	Q30	3148	L20	Q89	3207	L20	Q148	3266	L21	Q46
3090	L20	Q31	3149	L20	Q90	3208	L20	Q149	3267	L21	Q47
3091	L20	Q32	3150	L20	Q91	3209	L20	Q150	3268	L21	Q48
3092	L20	Q33	3151	L20	Q92	3210	L20	Q151	3269	L21	Q49
3093	L20	Q34	3152	L20	Q93	3211	L20	Q152	3270	L21	Q50
3094	L20	Q35	3153	L20	Q94	3212	L20	Q153	3271	L21	Q51
3095	L20	Q36	3154	L20	Q95	3213	L20	Q154	3272	L21	Q52
3096	L20	Q37	3155	L20	Q96	3214	L20	Q155	3273	L21	Q53
3097	L20	Q38	3156	L20	Q97	3215	L20	Q156	3274	L21	Q54
3098	L20	Q39	3157	L20	Q98	3216	L20	Q157	3275	L21	Q55
3099	L20	Q40	3158	L20	Q99	3217	L20	Q158	3276	L21	Q56
3100	L20	Q41	3159	L20	Q100	3218	L20	Q159	3277	L21	Q57
3101	L20	Q42	3160	L20	Q101	3219	L20	Q160	3278	L21	Q58
3102	L20	Q43	3161	L20	Q102	3220	L20	Q161	3279	L21	Q59
3103	L20	Q44	3162	L20	Q103	3221	L21	Q1	3280	L21	Q60
3104	L20	Q45	3163	L20	Q104	3222	L21	Q2	3281	L21	Q61
3105	L20	Q46	3164	L20	Q105	3223	L21	Q3	3282	L21	Q62
3106	L20	Q47	3165	L20	Q106	3224	L21	Q4	3283	L21	Q63
3107	L20	Q48	3166	L20	Q107	3225	L21	Q5	3284	L21	Q64
3108	L20	Q49	3167	L20	Q108	3226	L21	Q6	3285	L21	Q65
3109	L20	Q50	3168	L20	Q109	3227	L21	Q7	3286	L21	Q66
3110	L20	Q51	3169	L20	Q110	3228	L21	Q8	3287	L21	Q67
3111	L20	Q52	3170	L20	Q111	3229	L21	Q9	3288	L21	Q68
3112	L20	Q53	3171	L20	Q112	3230	L21	Q10	3289	L21	Q69
3113	L20	Q54	3172	L20	Q113	3231	L21	Q11	3290	L21	Q70
3114	L20	Q55	3173	L20	Q114	3232	L21	Q12	3291	L21	Q71
3115	L20	Q56	3174	L20	Q115	3233	L21	Q13	3292	L21	Q72
3116	L20	Q57	3175	L20	Q116	3234	L21	Q14	3293	L21	Q73
3117	L20	Q58	3176	L20	Q117	3235	L21	Q15	3294	L21	Q74
3118	L20	Q59	3177	L20	Q118	3236	L21	Q16	3295	L21	Q75
3119	L20	Q60	3178	L20	Q119	3237	L21	Q17	3296	L21	Q76
3120	L20	Q61	3179	L20	Q120	3238	L21	Q18	3297	L21	Q77
3121	L20	Q62	3180	L20	Q121	3239	L21	Q19	3298	L21	Q78
3122	L20	Q63	3181	L20	Q122	3240	L21	Q20	3299	L21	Q79
3123	L20	Q64	3182	L20	Q123	3241	L21	Q21	3300	L21	Q80
3124	L20	Q65	3183	L20	Q124	3242	L21	Q22	3301	L21	Q81
3125	L20	Q66	3184	L20	Q125	3243	L21	Q23	3302	L21	Q82
3126	L20	Q67	3185	L20	Q126	3244	L21	Q24	3303	L21	Q83

[Table 1-15]

3304	L21	Q84	3363	L21	Q143	3422	L22	Q41	3481	L22	Q100
3305	L21	Q85	3364	L21	Q144	3423	L22	Q42	3482	L22	Q101
3306	L21	Q86	3365	L21	Q145	3424	L22	Q43	3483	L22	Q102
3307	L21	Q87	3366	L21	Q146	3425	L22	Q44	3484	L22	Q103
3308	L21	Q88	3367	L21	Q147	3426	L22	Q45	3485	L22	Q104
3309	L21	Q89	3368	L21	Q148	3427	L22	Q46	3486	L22	Q105
3310	L21	Q90	3369	L21	Q149	3428	L22	Q47	3487	L22	Q106
3311	L21	Q91	3370	L21	Q150	3429	L22	Q48	3488	L22	Q107
3312	L21	Q92	3371	L21	Q151	3430	L22	Q49	3489	L22	Q108
3313	L21	Q93	3372	L21	Q152	3431	L22	Q50	3490	L22	Q109
3314	L21	Q94	3373	L21	Q153	3432	L22	Q51	3491	L22	Q110
3315	L21	Q95	3374	L21	Q154	3433	L22	Q52	3492	L22	Q111
3316	L21	Q96	3375	L21	Q155	3434	L22	Q53	3493	L22	Q112
3317	L21	Q97	3376	L21	Q156	3435	L22	Q54	3494	L22	Q113
3318	L21	Q98	3377	L21	Q157	3436	L22	Q55	3495	L22	Q114
3319	L21	Q99	3378	L21	Q158	3437	L22	Q56	3496	L22	Q115
3320	L21	Q100	3379	L21	Q159	3438	L22	Q57	3497	L22	Q116
3321	L21	Q101	3380	L21	Q160	3439	L22	Q58	3498	L22	Q117
3322	L21	Q102	3381	L21	Q161	3440	L22	Q59	3499	L22	Q118
3323	L21	Q103	3382	L22	Q1	3441	L22	Q60	3500	L22	Q119
3324	L21	Q104	3383	L22	Q2	3442	L22	Q61	3501	L22	Q120
3325	L21	Q105	3384	L22	Q3	3443	L22	Q62	3502	L22	Q121
3326	L21	Q106	3385	L22	Q4	3444	L22	Q63	3503	L22	Q122
3327	L21	Q107	3386	L22	Q5	3445	L22	Q64	3504	L22	Q123
3328	L21	Q108	3387	L22	Q6	3446	L22	Q65	3505	L22	Q124
3329	L21	Q109	3388	L22	Q7	3447	L22	Q66	3506	L22	Q125
3330	L21	Q110	3389	L22	Q8	3448	L22	Q67	3507	L22	Q126
3331	L21	Q111	3390	L22	Q9	3449	L22	Q68	3508	L22	Q127
3332	L21	Q112	3391	L22	Q10	3450	L22	Q69	3509	L22	Q128
3333	L21	Q113	3392	L22	Q11	3451	L22	Q70	3510	L22	Q129
3334	L21	Q114	3393	L22	Q12	3452	L22	Q71	3511	L22	Q130
3335	L21	Q115	3394	L22	Q13	3453	L22	Q72	3512	L22	Q131
3336	L21	Q116	3395	L22	Q14	3454	L22	Q73	3513	L22	Q132
3337	L21	Q117	3396	L22	Q15	3455	L22	Q74	3514	L22	Q133
3338	L21	Q118	3397	L22	Q16	3456	L22	Q75	3515	L22	Q134
3339	L21	Q119	3398	L22	Q17	3457	L22	Q76	3516	L22	Q135
3340	L21	Q120	3399	L22	Q18	3458	L22	Q77	3517	L22	Q136
3341	L21	Q121	3400	L22	Q19	3459	L22	Q78	3518	L22	Q137
3342	L21	Q122	3401	L22	Q20	3460	L22	Q79	3519	L22	Q138
3343	L21	Q123	3402	L22	Q21	3461	L22	Q80	3520	L22	Q139
3344	L21	Q124	3403	L22	Q22	3462	L22	Q81	3521	L22	Q140
3345	L21	Q125	3404	L22	Q23	3463	L22	Q82	3522	L22	Q141
3346	L21	Q126	3405	L22	Q24	3464	L22	Q83	3523	L22	Q142
3347	L21	Q127	3406	L22	Q25	3465	L22	Q84	3524	L22	Q143
3348	L21	Q128	3407	L22	Q26	3466	L22	Q85	3525	L22	Q144
3349	L21	Q129	3408	L22	Q27	3467	L22	Q86	3526	L22	Q145
3350	L21	Q130	3409	L22	Q28	3468	L22	Q87	3527	L22	Q146
3351	L21	Q131	3410	L22	Q29	3469	L22	Q88	3528	L22	Q147
3352	L21	Q132	3411	L22	Q30	3470	L22	Q89	3529	L22	Q148
3353	L21	Q133	3412	L22	Q31	3471	L22	Q90	3530	L22	Q149
3354	L21	Q134	3413	L22	Q32	3472	L22	Q91	3531	L22	Q150
3355	L21	Q135	3414	L22	Q33	3473	L22	Q92	3532	L22	Q151
3356	L21	Q136	3415	L22	Q34	3474	L22	Q93	3533	L22	Q152
3357	L21	Q137	3416	L22	Q35	3475	L22	Q94	3534	L22	Q153
3358	L21	Q138	3417	L22	Q36	3476	L22	Q95	3535	L22	Q154
3359	L21	Q139	3418	L22	Q37	3477	L22	Q96	3536	L22	Q155
3360	L21	Q140	3419	L22	Q38	3478	L22	Q97	3537	L22	Q156
3361	L21	Q141	3420	L22	Q39	3479	L22	Q98	3538	L22	Q157
3362	L21	Q142	3421	L22	Q40	3480	L22	Q99	3539	L22	Q158

[Table 1-16]

3540	L22	Q159	3599	L23	Q57	3658	L23	Q116	3717	L24	Q14
3541	L22	Q160	3600	L23	Q58	3659	L23	Q117	3718	L24	Q15
3542	L22	Q161	3601	L23	Q59	3660	L23	Q118	3719	L24	Q16
3543	L23	Q1	3602	L23	Q60	3661	L23	Q119	3720	L24	Q17
3544	L23	Q2	3603	L23	Q61	3662	L23	Q120	3721	L24	Q18
3545	L23	Q3	3604	L23	Q62	3663	L23	Q121	3722	L24	Q19
3546	L23	Q4	3605	L23	Q63	3664	L23	Q122	3723	L24	Q20
3547	L23	Q5	3606	L23	Q64	3665	L23	Q123	3724	L24	Q21
3548	L23	Q6	3607	L23	Q65	3666	L23	Q124	3725	L24	Q22
3549	L23	Q7	3608	L23	Q66	3667	L23	Q125	3726	L24	Q23
3550	L23	Q8	3609	L23	Q67	3668	L23	Q126	3727	L24	Q24
3551	L23	Q9	3610	L23	Q68	3669	L23	Q127	3728	L24	Q25
3552	L23	Q10	3611	L23	Q69	3670	L23	Q128	3729	L24	Q26
3553	L23	Q11	3612	L23	Q70	3671	L23	Q129	3730	L24	Q27
3554	L23	Q12	3613	L23	Q71	3672	L23	Q130	3731	L24	Q28
3555	L23	Q13	3614	L23	Q72	3673	L23	Q131	3732	L24	Q29
3556	L23	Q14	3615	L23	Q73	3674	L23	Q132	3733	L24	Q30
3557	L23	Q15	3616	L23	Q74	3675	L23	Q133	3734	L24	Q31
3558	L23	Q16	3617	L23	Q75	3676	L23	Q134	3735	L24	Q32
3559	L23	Q17	3618	L23	Q76	3677	L23	Q135	3736	L24	Q33
3560	L23	Q18	3619	L23	Q77	3678	L23	Q136	3737	L24	Q34
3561	L23	Q19	3620	L23	Q78	3679	L23	Q137	3738	L24	Q35
3562	L23	Q20	3621	L23	Q79	3680	L23	Q138	3739	L24	Q36
3563	L23	Q21	3622	L23	Q80	3681	L23	Q139	3740	L24	Q37
3564	L23	Q22	3623	L23	Q81	3682	L23	Q140	3741	L24	Q38
3565	L23	Q23	3624	L23	Q82	3683	L23	Q141	3742	L24	Q39
3566	L23	Q24	3625	L23	Q83	3684	L23	Q142	3743	L24	Q40
3567	L23	Q25	3626	L23	Q84	3685	L23	Q143	3744	L24	Q41
3568	L23	Q26	3627	L23	Q85	3686	L23	Q144	3745	L24	Q42
3569	L23	Q27	3628	L23	Q86	3687	L23	Q145	3746	L24	Q43
3570	L23	Q28	3629	L23	Q87	3688	L23	Q146	3747	L24	Q44
3571	L23	Q29	3630	L23	Q88	3689	L23	Q147	3748	L24	Q45
3572	L23	Q30	3631	L23	Q89	3690	L23	Q148	3749	L24	Q46
3573	L23	Q31	3632	L23	Q90	3691	L23	Q149	3750	L24	Q47
3574	L23	Q32	3633	L23	Q91	3692	L23	Q150	3751	L24	Q48
3575	L23	Q33	3634	L23	Q92	3693	L23	Q151	3752	L24	Q49
3576	L23	Q34	3635	L23	Q93	3694	L23	Q152	3753	L24	Q50
3577	L23	Q35	3636	L23	Q94	3695	L23	Q153	3754	L24	Q51
3578	L23	Q36	3637	L23	Q95	3696	L23	Q154	3755	L24	Q52
3579	L23	Q37	3638	L23	Q96	3697	L23	Q155	3756	L24	Q53
3580	L23	Q38	3639	L23	Q97	3698	L23	Q156	3757	L24	Q54
3581	L23	Q39	3640	L23	Q98	3699	L23	Q157	3758	L24	Q55
3582	L23	Q40	3641	L23	Q99	3700	L23	Q158	3759	L24	Q56
3583	L23	Q41	3642	L23	Q100	3701	L23	Q159	3760	L24	Q57
3584	L23	Q42	3643	L23	Q101	3702	L23	Q160	3761	L24	Q58
3585	L23	Q43	3644	L23	Q102	3703	L23	Q161	3762	L24	Q59
3586	L23	Q44	3645	L23	Q103	3704	L24	Q1	3763	L24	Q60
3587	L23	Q45	3646	L23	Q104	3705	L24	Q2	3764	L24	Q61
3588	L23	Q46	3647	L23	Q105	3706	L24	Q3	3765	L24	Q62
3589	L23	Q47	3648	L23	Q106	3707	L24	Q4	3766	L24	Q63
3590	L23	Q48	3649	L23	Q107	3708	L24	Q5	3767	L24	Q64
3591	L23	Q49	3650	L23	Q108	3709	L24	Q6	3768	L24	Q65
3592	L23	Q50	3651	L23	Q109	3710	L24	Q7	3769	L24	Q66
3593	L23	Q51	3652	L23	Q110	3711	L24	Q8	3770	L24	Q67
3594	L23	Q52	3653	L23	Q111	3712	L24	Q9	3771	L24	Q68
3595	L23	Q53	3654	L23	Q112	3713	L24	Q10	3772	L24	Q69
3596	L23	Q54	3655	L23	Q113	3714	L24	Q11	3773	L24	Q70
3597	L23	Q55	3656	L23	Q114	3715	L24	Q12	3774	L24	Q71
3598	L23	Q56	3657	L23	Q115	3716	L24	Q13	3775	L24	Q72

[Table 1-17]

3776	L24	Q73	3835	L24	Q132	3894	L25	Q30	3953	L25	Q89
3777	L24	Q74	3836	L24	Q133	3895	L25	Q31	3954	L25	Q90
3778	L24	Q75	3837	L24	Q134	3896	L25	Q32	3955	L25	Q91
3779	L24	Q76	3838	L24	Q135	3897	L25	Q33	3956	L25	Q92
3780	L24	Q77	3839	L24	Q136	3898	L25	Q34	3957	L25	Q93
3781	L24	Q78	3840	L24	Q137	3899	L25	Q35	3958	L25	Q94
3782	L24	Q79	3841	L24	Q138	3900	L25	Q36	3959	L25	Q95
3783	L24	Q80	3842	L24	Q139	3901	L25	Q37	3960	L25	Q96
3784	L24	Q81	3843	L24	Q140	3902	L25	Q38	3961	L25	Q97
3785	L24	Q82	3844	L24	Q141	3903	L25	Q39	3962	L25	Q98
3786	L24	Q83	3845	L24	Q142	3904	L25	Q40	3963	L25	Q99
3787	L24	Q84	3846	L24	Q143	3905	L25	Q41	3964	L25	Q100
3788	L24	Q85	3847	L24	Q144	3906	L25	Q42	3965	L25	Q101
3789	L24	Q86	3848	L24	Q145	3907	L25	Q43	3966	L25	Q102
3790	L24	Q87	3849	L24	Q146	3908	L25	Q44	3967	L25	Q103
3791	L24	Q88	3850	L24	Q147	3909	L25	Q45	3968	L25	Q104
3792	L24	Q89	3851	L24	Q148	3910	L25	Q46	3969	L25	Q105
3793	L24	Q90	3852	L24	Q149	3911	L25	Q47	3970	L25	Q106
3794	L24	Q91	3853	L24	Q150	3912	L25	Q48	3971	L25	Q107
3795	L24	Q92	3854	L24	Q151	3913	L25	Q49	3972	L25	Q108
3796	L24	Q93	3855	L24	Q152	3914	L25	Q50	3973	L25	Q109
3797	L24	Q94	3856	L24	Q153	3915	L25	Q51	3974	L25	Q110
3798	L24	Q95	3857	L24	Q154	3916	L25	Q52	3975	L25	Q111
3799	L24	Q96	3858	L24	Q155	3917	L25	Q53	3976	L25	Q112
3800	L24	Q97	3859	L24	Q156	3918	L25	Q54	3977	L25	Q113
3801	L24	Q98	3860	L24	Q157	3919	L25	Q55	3978	L25	Q114
3802	L24	Q99	3861	L24	Q158	3920	L25	Q56	3979	L25	Q115
3803	L24	Q100	3862	L24	Q159	3921	L25	Q57	3980	L25	Q116
3804	L24	Q101	3863	L24	Q160	3922	L25	Q58	3981	L25	Q117
3805	L24	Q102	3864	L24	Q161	3923	L25	Q59	3982	L25	Q118
3806	L24	Q103	3865	L25	Q1	3924	L25	Q60	3983	L25	Q119
3807	L24	Q104	3866	L25	Q2	3925	L25	Q61	3984	L25	Q120
3808	L24	Q105	3867	L25	Q3	3926	L25	Q62	3985	L25	Q121
3809	L24	Q106	3868	L25	Q4	3927	L25	Q63	3986	L25	Q122
3810	L24	Q107	3869	L25	Q5	3928	L25	Q64	3987	L25	Q123
3811	L24	Q108	3870	L25	Q6	3929	L25	Q65	3988	L25	Q124
3812	L24	Q109	3871	L25	Q7	3930	L25	Q66	3989	L25	Q125
3813	L24	Q110	3872	L25	Q8	3931	L25	Q67	3990	L25	Q126
3814	L24	Q111	3873	L25	Q9	3932	L25	Q68	3991	L25	Q127
3815	L24	Q112	3874	L25	Q10	3933	L25	Q69	3992	L25	Q128
3816	L24	Q113	3875	L25	Q11	3934	L25	Q70	3993	L25	Q129
3817	L24	Q114	3876	L25	Q12	3935	L25	Q71	3994	L25	Q130
3818	L24	Q115	3877	L25	Q13	3936	L25	Q72	3995	L25	Q131
3819	L24	Q116	3878	L25	Q14	3937	L25	Q73	3996	L25	Q132
3820	L24	Q117	3879	L25	Q15	3938	L25	Q74	3997	L25	Q133
3821	L24	Q118	3880	L25	Q16	3939	L25	Q75	3998	L25	Q134
3822	L24	Q119	3881	L25	Q17	3940	L25	Q76	3999	L25	Q135
3823	L24	Q120	3882	L25	Q18	3941	L25	Q77	4000	L25	Q136
3824	L24	Q121	3883	L25	Q19	3942	L25	Q78	4001	L25	Q137
3825	L24	Q122	3884	L25	Q20	3943	L25	Q79	4002	L25	Q138
3826	L24	Q123	3885	L25	Q21	3944	L25	Q80	4003	L25	Q139
3827	L24	Q124	3886	L25	Q22	3945	L25	Q81	4004	L25	Q140
3828	L24	Q125	3887	L25	Q23	3946	L25	Q82	4005	L25	Q141
3829	L24	Q126	3888	L25	Q24	3947	L25	Q83	4006	L25	Q142
3830	L24	Q127	3889	L25	Q25	3948	L25	Q84	4007	L25	Q143
3831	L24	Q128	3890	L25	Q26	3949	L25	Q85	4008	L25	Q144
3832	L24	Q129	3891	L25	Q27	3950	L25	Q86	4009	L25	Q145
3833	L24	Q130	3892	L25	Q28	3951	L25	Q87	4010	L25	Q146
3834	L24	Q131	3893	L25	Q29	3952	L25	Q88	4011	L25	Q147

[Table 1-18]

4012	L25	Q148	4071	L26	Q46	4130	L26	Q105	4189	L27	Q3
4013	L25	Q149	4072	L26	Q47	4131	L26	Q106	4190	L27	Q4
4014	L25	Q150	4073	L26	Q48	4132	L26	Q107	4191	L27	Q5
4015	L25	Q151	4074	L26	Q49	4133	L26	Q108	4192	L27	Q6
4016	L25	Q152	4075	L26	Q50	4134	L26	Q109	4193	L27	Q7
4017	L25	Q153	4076	L26	Q51	4135	L26	Q110	4194	L27	Q8
4018	L25	Q154	4077	L26	Q52	4136	L26	Q111	4195	L27	Q9
4019	L25	Q155	4078	L26	Q53	4137	L26	Q112	4196	L27	Q10
4020	L25	Q156	4079	L26	Q54	4138	L26	Q113	4197	L27	Q11
4021	L25	Q157	4080	L26	Q55	4139	L26	Q114	4198	L27	Q12
4022	L25	Q158	4081	L26	Q56	4140	L26	Q115	4199	L27	Q13
4023	L25	Q159	4082	L26	Q57	4141	L26	Q116	4200	L27	Q14
4024	L25	Q160	4083	L26	Q58	4142	L26	Q117	4201	L27	Q15
4025	L25	Q161	4084	L26	Q59	4143	L26	Q118	4202	L27	Q16
4026	L26	Q1	4085	L26	Q60	4144	L26	Q119	4203	L27	Q17
4027	L26	Q2	4086	L26	Q61	4145	L26	Q120	4204	L27	Q18
4028	L26	Q3	4087	L26	Q62	4146	L26	Q121	4205	L27	Q19
4029	L26	Q4	4088	L26	Q63	4147	L26	Q122	4206	L27	Q20
4030	L26	Q5	4089	L26	Q64	4148	L26	Q123	4207	L27	Q21
4031	L26	Q6	4090	L26	Q65	4149	L26	Q124	4208	L27	Q22
4032	L26	Q7	4091	L26	Q66	4150	L26	Q125	4209	L27	Q23
4033	L26	Q8	4092	L26	Q67	4151	L26	Q126	4210	L27	Q24
4034	L26	Q9	4093	L26	Q68	4152	L26	Q127	4211	L27	Q25
4035	L26	Q10	4094	L26	Q69	4153	L26	Q128	4212	L27	Q26
4036	L26	Q11	4095	L26	Q70	4154	L26	Q129	4213	L27	Q27
4037	L26	Q12	4096	L26	Q71	4155	L26	Q130	4214	L27	Q28
4038	L26	Q13	4097	L26	Q72	4156	L26	Q131	4215	L27	Q29
4039	L26	Q14	4098	L26	Q73	4157	L26	Q132	4216	L27	Q30
4040	L26	Q15	4099	L26	Q74	4158	L26	Q133	4217	L27	Q31
4041	L26	Q16	4100	L26	Q75	4159	L26	Q134	4218	L27	Q32
4042	L26	Q17	4101	L26	Q76	4160	L26	Q135	4219	L27	Q33
4043	L26	Q18	4102	L26	Q77	4161	L26	Q136	4220	L27	Q34
4044	L26	Q19	4103	L26	Q78	4162	L26	Q137	4221	L27	Q35
4045	L26	Q20	4104	L26	Q79	4163	L26	Q138	4222	L27	Q36
4046	L26	Q21	4105	L26	Q80	4164	L26	Q139	4223	L27	Q37
4047	L26	Q22	4106	L26	Q81	4165	L26	Q140	4224	L27	Q38
4048	L26	Q23	4107	L26	Q82	4166	L26	Q141	4225	L27	Q39
4049	L26	Q24	4108	L26	Q83	4167	L26	Q142	4226	L27	Q40
4050	L26	Q25	4109	L26	Q84	4168	L26	Q143	4227	L27	Q41
4051	L26	Q26	4110	L26	Q85	4169	L26	Q144	4228	L27	Q42
4052	L26	Q27	4111	L26	Q86	4170	L26	Q145	4229	L27	Q43
4053	L26	Q28	4112	L26	Q87	4171	L26	Q146	4230	L27	Q44
4054	L26	Q29	4113	L26	Q88	4172	L26	Q147	4231	L27	Q45
4055	L26	Q30	4114	L26	Q89	4173	L26	Q148	4232	L27	Q46
4056	L26	Q31	4115	L26	Q90	4174	L26	Q149	4233	L27	Q47
4057	L26	Q32	4116	L26	Q91	4175	L26	Q150	4234	L27	Q48
4058	L26	Q33	4117	L26	Q92	4176	L26	Q151	4235	L27	Q49
4059	L26	Q34	4118	L26	Q93	4177	L26	Q152	4236	L27	Q50
4060	L26	Q35	4119	L26	Q94	4178	L26	Q153	4237	L27	Q51
4061	L26	Q36	4120	L26	Q95	4179	L26	Q154	4238	L27	Q52
4062	L26	Q37	4121	L26	Q96	4180	L26	Q155	4239	L27	Q53
4063	L26	Q38	4122	L26	Q97	4181	L26	Q156	4240	L27	Q54
4064	L26	Q39	4123	L26	Q98	4182	L26	Q157	4241	L27	Q55
4065	L26	Q40	4124	L26	Q99	4183	L26	Q158	4242	L27	Q56
4066	L26	Q41	4125	L26	Q100	4184	L26	Q159	4243	L27	Q57
4067	L26	Q42	4126	L26	Q101	4185	L26	Q160	4244	L27	Q58
4068	L26	Q43	4127	L26	Q102	4186	L26	Q161	4245	L27	Q59
4069	L26	Q44	4128	L26	Q103	4187	L27	Q1	4246	L27	Q60
4070	L26	Q45	4129	L26	Q104	4188	L27	Q2	4247	L27	Q61

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4248	L27	Q62	4307	L27	Q121	4366	L28	Q19	4425	L28	Q78
4249	L27	Q63	4308	L27	Q122	4367	L28	Q20	4426	L28	Q79
4250	L27	Q64	4309	L27	Q123	4368	L28	Q21	4427	L28	Q80
4251	L27	Q65	4310	L27	Q124	4369	L28	Q22	4428	L28	Q81
4252	L27	Q66	4311	L27	Q125	4370	L28	Q23	4429	L28	Q82
4253	L27	Q67	4312	L27	Q126	4371	L28	Q24	4430	L28	Q83
4254	L27	Q68	4313	L27	Q127	4372	L28	Q25	4431	L28	Q84
4255	L27	Q69	4314	L27	Q128	4373	L28	Q26	4432	L28	Q85
4256	L27	Q70	4315	L27	Q129	4374	L28	Q27	4433	L28	Q86
4257	L27	Q71	4316	L27	Q130	4375	L28	Q28	4434	L28	Q87
4258	L27	Q72	4317	L27	Q131	4376	L28	Q29	4435	L28	Q88
4259	L27	Q73	4318	L27	Q132	4377	L28	Q30	4436	L28	Q89
4260	L27	Q74	4319	L27	Q133	4378	L28	Q31	4437	L28	Q90
4261	L27	Q75	4320	L27	Q134	4379	L28	Q32	4438	L28	Q91
4262	L27	Q76	4321	L27	Q135	4380	L28	Q33	4439	L28	Q92
4263	L27	Q77	4322	L27	Q136	4381	L28	Q34	4440	L28	Q93
4264	L27	Q78	4323	L27	Q137	4382	L28	Q35	4441	L28	Q94
4265	L27	Q79	4324	L27	Q138	4383	L28	Q36	4442	L28	Q95
4266	L27	Q80	4325	L27	Q139	4384	L28	Q37	4443	L28	Q96
4267	L27	Q81	4326	L27	Q140	4385	L28	Q38	4444	L28	Q97
4268	L27	Q82	4327	L27	Q141	4386	L28	Q39	4445	L28	Q98
4269	L27	Q83	4328	L27	Q142	4387	L28	Q40	4446	L28	Q99
4270	L27	Q84	4329	L27	Q143	4388	L28	Q41	4447	L28	Q100
4271	L27	Q85	4330	L27	Q144	4389	L28	Q42	4448	L28	Q101
4272	L27	Q86	4331	L27	Q145	4390	L28	Q43	4449	L28	Q102
4273	L27	Q87	4332	L27	Q146	4391	L28	Q44	4450	L28	Q103
4274	L27	Q88	4333	L27	Q147	4392	L28	Q45	4451	L28	Q104
4275	L27	Q89	4334	L27	Q148	4393	L28	Q46	4452	L28	Q105
4276	L27	Q90	4335	L27	Q149	4394	L28	Q47	4453	L28	Q106
4277	L27	Q91	4336	L27	Q150	4395	L28	Q48	4454	L28	Q107
4278	L27	Q92	4337	L27	Q151	4396	L28	Q49	4455	L28	Q108
4279	L27	Q93	4338	L27	Q152	4397	L28	Q50	4456	L28	Q109
4280	L27	Q94	4339	L27	Q153	4398	L28	Q51	4457	L28	Q110
4281	L27	Q95	4340	L27	Q154	4399	L28	Q52	4458	L28	Q111
4282	L27	Q96	4341	L27	Q155	4400	L28	Q53	4459	L28	Q112
4283	L27	Q97	4342	L27	Q156	4401	L28	Q54	4460	L28	Q113
4284	L27	Q98	4343	L27	Q157	4402	L28	Q55	4461	L28	Q114
4285	L27	Q99	4344	L27	Q158	4403	L28	Q56	4462	L28	Q115
4286	L27	Q100	4345	L27	Q159	4404	L28	Q57	4463	L28	Q116
4287	L27	Q101	4346	L27	Q160	4405	L28	Q58	4464	L28	Q117
4288	L27	Q102	4347	L27	Q161	4406	L28	Q59	4465	L28	Q118
4289	L27	Q103	4348	L28	Q1	4407	L28	Q60	4466	L28	Q119
4290	L27	Q104	4349	L28	Q2	4408	L28	Q61	4467	L28	Q120
4291	L27	Q105	4350	L28	Q3	4409	L28	Q62	4468	L28	Q121
4292	L27	Q106	4351	L28	Q4	4410	L28	Q63	4469	L28	Q122
4293	L27	Q107	4352	L28	Q5	4411	L28	Q64	4470	L28	Q123
4294	L27	Q108	4353	L28	Q6	4412	L28	Q65	4471	L28	Q124
4295	L27	Q109	4354	L28	Q7	4413	L28	Q66	4472	L28	Q125
4296	L27	Q110	4355	L28	Q8	4414	L28	Q67	4473	L28	Q126
4297	L27	Q111	4356	L28	Q9	4415	L28	Q68	4474	L28	Q127
4298	L27	Q112	4357	L28	Q10	4416	L28	Q69	4475	L28	Q128
4299	L27	Q113	4358	L28	Q11	4417	L28	Q70	4476	L28	Q129
4300	L27	Q114	4359	L28	Q12	4418	L28	Q71	4477	L28	Q130
4301	L27	Q115	4360	L28	Q13	4419	L28	Q72	4478	L28	Q131
4302	L27	Q116	4361	L28	Q14	4420	L28	Q73	4479	L28	Q132
4303	L27	Q117	4362	L28	Q15	4421	L28	Q74	4480	L28	Q133
4304	L27	Q118	4363	L28	Q16	4422	L28	Q75	4481	L28	Q134
4305	L27	Q119	4364	L28	Q17	4423	L28	Q76	4482	L28	Q135
4306	L27	Q120	4365	L28	Q18	4424	L28	Q77	4483	L28	Q136

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4484	L28	Q137	4543	L29	Q35	4602	L29	Q94	4661	L29	Q153
4485	L28	Q138	4544	L29	Q36	4603	L29	Q95	4662	L29	Q154
4486	L28	Q139	4545	L29	Q37	4604	L29	Q96	4663	L29	Q155
4487	L28	Q140	4546	L29	Q38	4605	L29	Q97	4664	L29	Q156
4488	L28	Q141	4547	L29	Q39	4606	L29	Q98	4665	L29	Q157
4489	L28	Q142	4548	L29	Q40	4607	L29	Q99	4666	L29	Q158
4490	L28	Q143	4549	L29	Q41	4608	L29	Q100	4667	L29	Q159
4491	L28	Q144	4550	L29	Q42	4609	L29	Q101	4668	L29	Q160
4492	L28	Q145	4551	L29	Q43	4610	L29	Q102	4669	L29	Q161
4493	L28	Q146	4552	L29	Q44	4611	L29	Q103	4670	L30	Q1
4494	L28	Q147	4553	L29	Q45	4612	L29	Q104	4671	L30	Q2
4495	L28	Q148	4554	L29	Q46	4613	L29	Q105	4672	L30	Q3
4496	L28	Q149	4555	L29	Q47	4614	L29	Q106	4673	L30	Q4
4497	L28	Q150	4556	L29	Q48	4615	L29	Q107	4674	L30	Q5
4498	L28	Q151	4557	L29	Q49	4616	L29	Q108	4675	L30	Q6
4499	L28	Q152	4558	L29	Q50	4617	L29	Q109	4676	L30	Q7
4500	L28	Q153	4559	L29	Q51	4618	L29	Q110	4677	L30	Q8
4501	L28	Q154	4560	L29	Q52	4619	L29	Q111	4678	L30	Q9
4502	L28	Q155	4561	L29	Q53	4620	L29	Q112	4679	L30	Q10
4503	L28	Q156	4562	L29	Q54	4621	L29	Q113	4680	L30	Q11
4504	L28	Q157	4563	L29	Q55	4622	L29	Q114	4681	L30	Q12
4505	L28	Q158	4564	L29	Q56	4623	L29	Q115	4682	L30	Q13
4506	L28	Q159	4565	L29	Q57	4624	L29	Q116	4683	L30	Q14
4507	L28	Q160	4566	L29	Q58	4625	L29	Q117	4684	L30	Q15
4508	L28	Q161	4567	L29	Q59	4626	L29	Q118	4685	L30	Q16
4509	L29	Q1	4568	L29	Q60	4627	L29	Q119	4686	L30	Q17
4510	L29	Q2	4569	L29	Q61	4628	L29	Q120	4687	L30	Q18
4511	L29	Q3	4570	L29	Q62	4629	L29	Q121	4688	L30	Q19
4512	L29	Q4	4571	L29	Q63	4630	L29	Q122	4689	L30	Q20
4513	L29	Q5	4572	L29	Q64	4631	L29	Q123	4690	L30	Q21
4514	L29	Q6	4573	L29	Q65	4632	L29	Q124	4691	L30	Q22
4515	L29	Q7	4574	L29	Q66	4633	L29	Q125	4692	L30	Q23
4516	L29	Q8	4575	L29	Q67	4634	L29	Q126	4693	L30	Q24
4517	L29	Q9	4576	L29	Q68	4635	L29	Q127	4694	L30	Q25
4518	L29	Q10	4577	L29	Q69	4636	L29	Q128	4695	L30	Q26
4519	L29	Q11	4578	L29	Q70	4637	L29	Q129	4696	L30	Q27
4520	L29	Q12	4579	L29	Q71	4638	L29	Q130	4697	L30	Q28
4521	L29	Q13	4580	L29	Q72	4639	L29	Q131	4698	L30	Q29
4522	L29	Q14	4581	L29	Q73	4640	L29	Q132	4699	L30	Q30
4523	L29	Q15	4582	L29	Q74	4641	L29	Q133	4700	L30	Q31
4524	L29	Q16	4583	L29	Q75	4642	L29	Q134	4701	L30	Q32
4525	L29	Q17	4584	L29	Q76	4643	L29	Q135	4702	L30	Q33
4526	L29	Q18	4585	L29	Q77	4644	L29	Q136	4703	L30	Q34
4527	L29	Q19	4586	L29	Q78	4645	L29	Q137	4704	L30	Q35
4528	L29	Q20	4587	L29	Q79	4646	L29	Q138	4705	L30	Q36
4529	L29	Q21	4588	L29	Q80	4647	L29	Q139	4706	L30	Q37
4530	L29	Q22	4589	L29	Q81	4648	L29	Q140	4707	L30	Q38
4531	L29	Q23	4590	L29	Q82	4649	L29	Q141	4708	L30	Q39
4532	L29	Q24	4591	L29	Q83	4650	L29	Q142	4709	L30	Q40
4533	L29	Q25	4592	L29	Q84	4651	L29	Q143	4710	L30	Q41
4534	L29	Q26	4593	L29	Q85	4652	L29	Q144	4711	L30	Q42
4535	L29	Q27	4594	L29	Q86	4653	L29	Q145	4712	L30	Q43
4536	L29	Q28	4595	L29	Q87	4654	L29	Q146	4713	L30	Q44
4537	L29	Q29	4596	L29	Q88	4655	L29	Q147	4714	L30	Q45
4538	L29	Q30	4597	L29	Q89	4656	L29	Q148	4715	L30	Q46
4539	L29	Q31	4598	L29	Q90	4657	L29	Q149	4716	L30	Q47
4540	L29	Q32	4599	L29	Q91	4658	L29	Q150	4717	L30	Q48
4541	L29	Q33	4600	L29	Q92	4659	L29	Q151	4718	L30	Q49
4542	L29	Q34	4601	L29	Q93	4660	L29	Q152	4719	L30	Q50

[Table 1-21]

4720	L30	Q51	4779	L30	Q110	4838	L31	Q8	4897	L31	Q67
4721	L30	Q52	4780	L30	Q111	4839	L31	Q9	4898	L31	Q68
4722	L30	Q53	4781	L30	Q112	4840	L31	Q10	4899	L31	Q69
4723	L30	Q54	4782	L30	Q113	4841	L31	Q11	4900	L31	Q70
4724	L30	Q55	4783	L30	Q114	4842	L31	Q12	4901	L31	Q71
4725	L30	Q56	4784	L30	Q115	4843	L31	Q13	4902	L31	Q72
4726	L30	Q57	4785	L30	Q116	4844	L31	Q14	4903	L31	Q73
4727	L30	Q58	4786	L30	Q117	4845	L31	Q15	4904	L31	Q74
4728	L30	Q59	4787	L30	Q118	4846	L31	Q16	4905	L31	Q75
4729	L30	Q60	4788	L30	Q119	4847	L31	Q17	4906	L31	Q76
4730	L30	Q61	4789	L30	Q120	4848	L31	Q18	4907	L31	Q77
4731	L30	Q62	4790	L30	Q121	4849	L31	Q19	4908	L31	Q78
4732	L30	Q63	4791	L30	Q122	4850	L31	Q20	4909	L31	Q79
4733	L30	Q64	4792	L30	Q123	4851	L31	Q21	4910	L31	Q80
4734	L30	Q65	4793	L30	Q124	4852	L31	Q22	4911	L31	Q81
4735	L30	Q66	4794	L30	Q125	4853	L31	Q23	4912	L31	Q82
4736	L30	Q67	4795	L30	Q126	4854	L31	Q24	4913	L31	Q83
4737	L30	Q68	4796	L30	Q127	4855	L31	Q25	4914	L31	Q84
4738	L30	Q69	4797	L30	Q128	4856	L31	Q26	4915	L31	Q85
4739	L30	Q70	4798	L30	Q129	4857	L31	Q27	4916	L31	Q86
4740	L30	Q71	4799	L30	Q130	4858	L31	Q28	4917	L31	Q87
4741	L30	Q72	4800	L30	Q131	4859	L31	Q29	4918	L31	Q88
4742	L30	Q73	4801	L30	Q132	4860	L31	Q30	4919	L31	Q89
4743	L30	Q74	4802	L30	Q133	4861	L31	Q31	4920	L31	Q90
4744	L30	Q75	4803	L30	Q134	4862	L31	Q32	4921	L31	Q91
4745	L30	Q76	4804	L30	Q135	4863	L31	Q33	4922	L31	Q92
4746	L30	Q77	4805	L30	Q136	4864	L31	Q34	4923	L31	Q93
4747	L30	Q78	4806	L30	Q137	4865	L31	Q35	4924	L31	Q94
4748	L30	Q79	4807	L30	Q138	4866	L31	Q36	4925	L31	Q95
4749	L30	Q80	4808	L30	Q139	4867	L31	Q37	4926	L31	Q96
4750	L30	Q81	4809	L30	Q140	4868	L31	Q38	4927	L31	Q97
4751	L30	Q82	4810	L30	Q141	4869	L31	Q39	4928	L31	Q98
4752	L30	Q83	4811	L30	Q142	4870	L31	Q40	4929	L31	Q99
4753	L30	Q84	4812	L30	Q143	4871	L31	Q41	4930	L31	Q100
4754	L30	Q85	4813	L30	Q144	4872	L31	Q42	4931	L31	Q101
4755	L30	Q86	4814	L30	Q145	4873	L31	Q43	4932	L31	Q102
4756	L30	Q87	4815	L30	Q146	4874	L31	Q44	4933	L31	Q103
4757	L30	Q88	4816	L30	Q147	4875	L31	Q45	4934	L31	Q104
4758	L30	Q89	4817	L30	Q148	4876	L31	Q46	4935	L31	Q105
4759	L30	Q90	4818	L30	Q149	4877	L31	Q47	4936	L31	Q106
4760	L30	Q91	4819	L30	Q150	4878	L31	Q48	4937	L31	Q107
4761	L30	Q92	4820	L30	Q151	4879	L31	Q49	4938	L31	Q108
4762	L30	Q93	4821	L30	Q152	4880	L31	Q50	4939	L31	Q109
4763	L30	Q94	4822	L30	Q153	4881	L31	Q51	4940	L31	Q110
4764	L30	Q95	4823	L30	Q154	4882	L31	Q52	4941	L31	Q111
4765	L30	Q96	4824	L30	Q155	4883	L31	Q53	4942	L31	Q112
4766	L30	Q97	4825	L30	Q156	4884	L31	Q54	4943	L31	Q113
4767	L30	Q98	4826	L30	Q157	4885	L31	Q55	4944	L31	Q114
4768	L30	Q99	4827	L30	Q158	4886	L31	Q56	4945	L31	Q115
4769	L30	Q100	4828	L30	Q159	4887	L31	Q57	4946	L31	Q116
4770	L30	Q101	4829	L30	Q160	4888	L31	Q58	4947	L31	Q117
4771	L30	Q102	4830	L30	Q161	4889	L31	Q59	4948	L31	Q118
4772	L30	Q103	4831	L31	Q1	4890	L31	Q60	4949	L31	Q119
4773	L30	Q104	4832	L31	Q2	4891	L31	Q61	4950	L31	Q120
4774	L30	Q105	4833	L31	Q3	4892	L31	Q62	4951	L31	Q121
4775	L30	Q106	4834	L31	Q4	4893	L31	Q63	4952	L31	Q122
4776	L30	Q107	4835	L31	Q5	4894	L31	Q64	4953	L31	Q123
4777	L30	Q108	4836	L31	Q6	4895	L31	Q65	4954	L31	Q124
4778	L30	Q109	4837	L31	Q7	4896	L31	Q66	4955	L31	Q125

[Table 1-22]

4956	L31	Q126	5015	L32	Q24	5074	L32	Q83	5133	L32	Q142
4957	L31	Q127	5016	L32	Q25	5075	L32	Q84	5134	L32	Q143
4958	L31	Q128	5017	L32	Q26	5076	L32	Q85	5135	L32	Q144
4959	L31	Q129	5018	L32	Q27	5077	L32	Q86	5136	L32	Q145
4960	L31	Q130	5019	L32	Q28	5078	L32	Q87	5137	L32	Q146
4961	L31	Q131	5020	L32	Q29	5079	L32	Q88	5138	L32	Q147
4962	L31	Q132	5021	L32	Q30	5080	L32	Q89	5139	L32	Q148
4963	L31	Q133	5022	L32	Q31	5081	L32	Q90	5140	L32	Q149
4964	L31	Q134	5023	L32	Q32	5082	L32	Q91	5141	L32	Q150
4965	L31	Q135	5024	L32	Q33	5083	L32	Q92	5142	L32	Q151
4966	L31	Q136	5025	L32	Q34	5084	L32	Q93	5143	L32	Q152
4967	L31	Q137	5026	L32	Q35	5085	L32	Q94	5144	L32	Q153
4968	L31	Q138	5027	L32	Q36	5086	L32	Q95	5145	L32	Q154
4969	L31	Q139	5028	L32	Q37	5087	L32	Q96	5146	L32	Q155
4970	L31	Q140	5029	L32	Q38	5088	L32	Q97	5147	L32	Q156
4971	L31	Q141	5030	L32	Q39	5089	L32	Q98	5148	L32	Q157
4972	L31	Q142	5031	L32	Q40	5090	L32	Q99	5149	L32	Q158
4973	L31	Q143	5032	L32	Q41	5091	L32	Q100	5150	L32	Q159
4974	L31	Q144	5033	L32	Q42	5092	L32	Q101	5151	L32	Q160
4975	L31	Q145	5034	L32	Q43	5093	L32	Q102	5152	L32	Q161
4976	L31	Q146	5035	L32	Q44	5094	L32	Q103	5153	L33	Q1
4977	L31	Q147	5036	L32	Q45	5095	L32	Q104	5154	L33	Q2
4978	L31	Q148	5037	L32	Q46	5096	L32	Q105	5155	L33	Q3
4979	L31	Q149	5038	L32	Q47	5097	L32	Q106	5156	L33	Q4
4980	L31	Q150	5039	L32	Q48	5098	L32	Q107	5157	L33	Q5
4981	L31	Q151	5040	L32	Q49	5099	L32	Q108	5158	L33	Q6
4982	L31	Q152	5041	L32	Q50	5100	L32	Q109	5159	L33	Q7
4983	L31	Q153	5042	L32	Q51	5101	L32	Q110	5160	L33	Q8
4984	L31	Q154	5043	L32	Q52	5102	L32	Q111	5161	L33	Q9
4985	L31	Q155	5044	L32	Q53	5103	L32	Q112	5162	L33	Q10
4986	L31	Q156	5045	L32	Q54	5104	L32	Q113	5163	L33	Q11
4987	L31	Q157	5046	L32	Q55	5105	L32	Q114	5164	L33	Q12
4988	L31	Q158	5047	L32	Q56	5106	L32	Q115	5165	L33	Q13
4989	L31	Q159	5048	L32	Q57	5107	L32	Q116	5166	L33	Q14
4990	L31	Q160	5049	L32	Q58	5108	L32	Q117	5167	L33	Q15
4991	L31	Q161	5050	L32	Q59	5109	L32	Q118	5168	L33	Q16
4992	L32	Q1	5051	L32	Q60	5110	L32	Q119	5169	L33	Q17
4993	L32	Q2	5052	L32	Q61	5111	L32	Q120	5170	L33	Q18
4994	L32	Q3	5053	L32	Q62	5112	L32	Q121	5171	L33	Q19
4995	L32	Q4	5054	L32	Q63	5113	L32	Q122	5172	L33	Q20
4996	L32	Q5	5055	L32	Q64	5114	L32	Q123	5173	L33	Q21
4997	L32	Q6	5056	L32	Q65	5115	L32	Q124	5174	L33	Q22
4998	L32	Q7	5057	L32	Q66	5116	L32	Q125	5175	L33	Q23
4999	L32	Q8	5058	L32	Q67	5117	L32	Q126	5176	L33	Q24
5000	L32	Q9	5059	L32	Q68	5118	L32	Q127	5177	L33	Q25
5001	L32	Q10	5060	L32	Q69	5119	L32	Q128	5178	L33	Q26
5002	L32	Q11	5061	L32	Q70	5120	L32	Q129	5179	L33	Q27
5003	L32	Q12	5062	L32	Q71	5121	L32	Q130	5180	L33	Q28
5004	L32	Q13	5063	L32	Q72	5122	L32	Q131	5181	L33	Q29
5005	L32	Q14	5064	L32	Q73	5123	L32	Q132	5182	L33	Q30
5006	L32	Q15	5065	L32	Q74	5124	L32	Q133	5183	L33	Q31
5007	L32	Q16	5066	L32	Q75	5125	L32	Q134	5184	L33	Q32
5008	L32	Q17	5067	L32	Q76	5126	L32	Q135	5185	L33	Q33
5009	L32	Q18	5068	L32	Q77	5127	L32	Q136	5186	L33	Q34
5010	L32	Q19	5069	L32	Q78	5128	L32	Q137	5187	L33	Q35
5011	L32	Q20	5070	L32	Q79	5129	L32	Q138	5188	L33	Q36
5012	L32	Q21	5071	L32	Q80	5130	L32	Q139	5189	L33	Q37
5013	L32	Q22	5072	L32	Q81	5131	L32	Q140	5190	L33	Q38
5014	L32	Q23	5073	L32	Q82	5132	L32	Q141	5191	L33	Q39

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5192	L33	Q40	5251	L33	Q99	5310	L33	Q158	5369	L34	Q56
5193	L33	Q41	5252	L33	Q100	5311	L33	Q159	5370	L34	Q57
5194	L33	Q42	5253	L33	Q101	5312	L33	Q160	5371	L34	Q58
5195	L33	Q43	5254	L33	Q102	5313	L33	Q161	5372	L34	Q59
5196	L33	Q44	5255	L33	Q103	5314	L34	Q1	5373	L34	Q60
5197	L33	Q45	5256	L33	Q104	5315	L34	Q2	5374	L34	Q61
5198	L33	Q46	5257	L33	Q105	5316	L34	Q3	5375	L34	Q62
5199	L33	Q47	5258	L33	Q106	5317	L34	Q4	5376	L34	Q63
5200	L33	Q48	5259	L33	Q107	5318	L34	Q5	5377	L34	Q64
5201	L33	Q49	5260	L33	Q108	5319	L34	Q6	5378	L34	Q65
5202	L33	Q50	5261	L33	Q109	5320	L34	Q7	5379	L34	Q66
5203	L33	Q51	5262	L33	Q110	5321	L34	Q8	5380	L34	Q67
5204	L33	Q52	5263	L33	Q111	5322	L34	Q9	5381	L34	Q68
5205	L33	Q53	5264	L33	Q112	5323	L34	Q10	5382	L34	Q69
5206	L33	Q54	5265	L33	Q113	5324	L34	Q11	5383	L34	Q70
5207	L33	Q55	5266	L33	Q114	5325	L34	Q12	5384	L34	Q71
5208	L33	Q56	5267	L33	Q115	5326	L34	Q13	5385	L34	Q72
5209	L33	Q57	5268	L33	Q116	5327	L34	Q14	5386	L34	Q73
5210	L33	Q58	5269	L33	Q117	5328	L34	Q15	5387	L34	Q74
5211	L33	Q59	5270	L33	Q118	5329	L34	Q16	5388	L34	Q75
5212	L33	Q60	5271	L33	Q119	5330	L34	Q17	5389	L34	Q76
5213	L33	Q61	5272	L33	Q120	5331	L34	Q18	5390	L34	Q77
5214	L33	Q62	5273	L33	Q121	5332	L34	Q19	5391	L34	Q78
5215	L33	Q63	5274	L33	Q122	5333	L34	Q20	5392	L34	Q79
5216	L33	Q64	5275	L33	Q123	5334	L34	Q21	5393	L34	Q80
5217	L33	Q65	5276	L33	Q124	5335	L34	Q22	5394	L34	Q81
5218	L33	Q66	5277	L33	Q125	5336	L34	Q23	5395	L34	Q82
5219	L33	Q67	5278	L33	Q126	5337	L34	Q24	5396	L34	Q83
5220	L33	Q68	5279	L33	Q127	5338	L34	Q25	5397	L34	Q84
5221	L33	Q69	5280	L33	Q128	5339	L34	Q26	5398	L34	Q85
5222	L33	Q70	5281	L33	Q129	5340	L34	Q27	5399	L34	Q86
5223	L33	Q71	5282	L33	Q130	5341	L34	Q28	5400	L34	Q87
5224	L33	Q72	5283	L33	Q131	5342	L34	Q29	5401	L34	Q88
5225	L33	Q73	5284	L33	Q132	5343	L34	Q30	5402	L34	Q89
5226	L33	Q74	5285	L33	Q133	5344	L34	Q31	5403	L34	Q90
5227	L33	Q75	5286	L33	Q134	5345	L34	Q32	5404	L34	Q91
5228	L33	Q76	5287	L33	Q135	5346	L34	Q33	5405	L34	Q92
5229	L33	Q77	5288	L33	Q136	5347	L34	Q34	5406	L34	Q93
5230	L33	Q78	5289	L33	Q137	5348	L34	Q35	5407	L34	Q94
5231	L33	Q79	5290	L33	Q138	5349	L34	Q36	5408	L34	Q95
5232	L33	Q80	5291	L33	Q139	5350	L34	Q37	5409	L34	Q96
5233	L33	Q81	5292	L33	Q140	5351	L34	Q38	5410	L34	Q97
5234	L33	Q82	5293	L33	Q141	5352	L34	Q39	5411	L34	Q98
5235	L33	Q83	5294	L33	Q142	5353	L34	Q40	5412	L34	Q99
5236	L33	Q84	5295	L33	Q143	5354	L34	Q41	5413	L34	Q100
5237	L33	Q85	5296	L33	Q144	5355	L34	Q42	5414	L34	Q101
5238	L33	Q86	5297	L33	Q145	5356	L34	Q43	5415	L34	Q102
5239	L33	Q87	5298	L33	Q146	5357	L34	Q44	5416	L34	Q103
5240	L33	Q88	5299	L33	Q147	5358	L34	Q45	5417	L34	Q104
5241	L33	Q89	5300	L33	Q148	5359	L34	Q46	5418	L34	Q105
5242	L33	Q90	5301	L33	Q149	5360	L34	Q47	5419	L34	Q106
5243	L33	Q91	5302	L33	Q150	5361	L34	Q48	5420	L34	Q107
5244	L33	Q92	5303	L33	Q151	5362	L34	Q49	5421	L34	Q108
5245	L33	Q93	5304	L33	Q152	5363	L34	Q50	5422	L34	Q109
5246	L33	Q94	5305	L33	Q153	5364	L34	Q51	5423	L34	Q110
5247	L33	Q95	5306	L33	Q154	5365	L34	Q52	5424	L34	Q111
5248	L33	Q96	5307	L33	Q155	5366	L34	Q53	5425	L34	Q112
5249	L33	Q97	5308	L33	Q156	5367	L34	Q54	5426	L34	Q113
5250	L33	Q98	5309	L33	Q157	5368	L34	Q55	5427	L34	Q114

[Table 1-24]

5428	L34	Q115	5487	L35	Q13	5546	L35	Q72	5605	L35	Q131
5429	L34	Q116	5488	L35	Q14	5547	L35	Q73	5606	L35	Q132
5430	L34	Q117	5489	L35	Q15	5548	L35	Q74	5607	L35	Q133
5431	L34	Q118	5490	L35	Q16	5549	L35	Q75	5608	L35	Q134
5432	L34	Q119	5491	L35	Q17	5550	L35	Q76	5609	L35	Q135
5433	L34	Q120	5492	L35	Q18	5551	L35	Q77	5610	L35	Q136
5434	L34	Q121	5493	L35	Q19	5552	L35	Q78	5611	L35	Q137
5435	L34	Q122	5494	L35	Q20	5553	L35	Q79	5612	L35	Q138
5436	L34	Q123	5495	L35	Q21	5554	L35	Q80	5613	L35	Q139
5437	L34	Q124	5496	L35	Q22	5555	L35	Q81	5614	L35	Q140
5438	L34	Q125	5497	L35	Q23	5556	L35	Q82	5615	L35	Q141
5439	L34	Q126	5498	L35	Q24	5557	L35	Q83	5616	L35	Q142
5440	L34	Q127	5499	L35	Q25	5558	L35	Q84	5617	L35	Q143
5441	L34	Q128	5500	L35	Q26	5559	L35	Q85	5618	L35	Q144
5442	L34	Q129	5501	L35	Q27	5560	L35	Q86	5619	L35	Q145
5443	L34	Q130	5502	L35	Q28	5561	L35	Q87	5620	L35	Q146
5444	L34	Q131	5503	L35	Q29	5562	L35	Q88	5621	L35	Q147
5445	L34	Q132	5504	L35	Q30	5563	L35	Q89	5622	L35	Q148
5446	L34	Q133	5505	L35	Q31	5564	L35	Q90	5623	L35	Q149
5447	L34	Q134	5506	L35	Q32	5565	L35	Q91	5624	L35	Q150
5448	L34	Q135	5507	L35	Q33	5566	L35	Q92	5625	L35	Q151
5449	L34	Q136	5508	L35	Q34	5567	L35	Q93	5626	L35	Q152
5450	L34	Q137	5509	L35	Q35	5568	L35	Q94	5627	L35	Q153
5451	L34	Q138	5510	L35	Q36	5569	L35	Q95	5628	L35	Q154
5452	L34	Q139	5511	L35	Q37	5570	L35	Q96	5629	L35	Q155
5453	L34	Q140	5512	L35	Q38	5571	L35	Q97	5630	L35	Q156
5454	L34	Q141	5513	L35	Q39	5572	L35	Q98	5631	L35	Q157
5455	L34	Q142	5514	L35	Q40	5573	L35	Q99	5632	L35	Q158
5456	L34	Q143	5515	L35	Q41	5574	L35	Q100	5633	L35	Q159
5457	L34	Q144	5516	L35	Q42	5575	L35	Q101	5634	L35	Q160
5458	L34	Q145	5517	L35	Q43	5576	L35	Q102	5635	L35	Q161
5459	L34	Q146	5518	L35	Q44	5577	L35	Q103	5636	L36	Q1
5460	L34	Q147	5519	L35	Q45	5578	L35	Q104	5637	L36	Q2
5461	L34	Q148	5520	L35	Q46	5579	L35	Q105	5638	L36	Q3
5462	L34	Q149	5521	L35	Q47	5580	L35	Q106	5639	L36	Q4
5463	L34	Q150	5522	L35	Q48	5581	L35	Q107	5640	L36	Q5
5464	L34	Q151	5523	L35	Q49	5582	L35	Q108	5641	L36	Q6
5465	L34	Q152	5524	L35	Q50	5583	L35	Q109	5642	L36	Q7
5466	L34	Q153	5525	L35	Q51	5584	L35	Q110	5643	L36	Q8
5467	L34	Q154	5526	L35	Q52	5585	L35	Q111	5644	L36	Q9
5468	L34	Q155	5527	L35	Q53	5586	L35	Q112	5645	L36	Q10
5469	L34	Q156	5528	L35	Q54	5587	L35	Q113	5646	L36	Q11
5470	L34	Q157	5529	L35	Q55	5588	L35	Q114	5647	L36	Q12
5471	L34	Q158	5530	L35	Q56	5589	L35	Q115	5648	L36	Q13
5472	L34	Q159	5531	L35	Q57	5590	L35	Q116	5649	L36	Q14
5473	L34	Q160	5532	L35	Q58	5591	L35	Q117	5650	L36	Q15
5474	L34	Q161	5533	L35	Q59	5592	L35	Q118	5651	L36	Q16
5475	L35	Q1	5534	L35	Q60	5593	L35	Q119	5652	L36	Q17
5476	L35	Q2	5535	L35	Q61	5594	L35	Q120	5653	L36	Q18
5477	L35	Q3	5536	L35	Q62	5595	L35	Q121	5654	L36	Q19
5478	L35	Q4	5537	L35	Q63	5596	L35	Q122	5655	L36	Q20
5479	L35	Q5	5538	L35	Q64	5597	L35	Q123	5656	L36	Q21
5480	L35	Q6	5539	L35	Q65	5598	L35	Q124	5657	L36	Q22
5481	L35	Q7	5540	L35	Q66	5599	L35	Q125	5658	L36	Q23
5482	L35	Q8	5541	L35	Q67	5600	L35	Q126	5659	L36	Q24
5483	L35	Q9	5542	L35	Q68	5601	L35	Q127	5660	L36	Q25
5484	L35	Q10	5543	L35	Q69	5602	L35	Q128	5661	L36	Q26
5485	L35	Q11	5544	L35	Q70	5603	L35	Q129	5662	L36	Q27
5486	L35	Q12	5545	L35	Q71	5604	L35	Q130	5663	L36	Q28

[Table 1-25]

5664	L36	Q29	5723	L36	Q88	5782	L36	Q147	5841	L37	Q45
5665	L36	Q30	5724	L36	Q89	5783	L36	Q148	5842	L37	Q46
5666	L36	Q31	5725	L36	Q90	5784	L36	Q149	5843	L37	Q47
5667	L36	Q32	5726	L36	Q91	5785	L36	Q150	5844	L37	Q48
5668	L36	Q33	5727	L36	Q92	5786	L36	Q151	5845	L37	Q49
5669	L36	Q34	5728	L36	Q93	5787	L36	Q152	5846	L37	Q50
5670	L36	Q35	5729	L36	Q94	5788	L36	Q153	5847	L37	Q51
5671	L36	Q36	5730	L36	Q95	5789	L36	Q154	5848	L37	Q52
5672	L36	Q37	5731	L36	Q96	5790	L36	Q155	5849	L37	Q53
5673	L36	Q38	5732	L36	Q97	5791	L36	Q156	5850	L37	Q54
5674	L36	Q39	5733	L36	Q98	5792	L36	Q157	5851	L37	Q55
5675	L36	Q40	5734	L36	Q99	5793	L36	Q158	5852	L37	Q56
5676	L36	Q41	5735	L36	Q100	5794	L36	Q159	5853	L37	Q57
5677	L36	Q42	5736	L36	Q101	5795	L36	Q160	5854	L37	Q58
5678	L36	Q43	5737	L36	Q102	5796	L36	Q161	5855	L37	Q59
5679	L36	Q44	5738	L36	Q103	5797	L37	Q1	5856	L37	Q60
5680	L36	Q45	5739	L36	Q104	5798	L37	Q2	5857	L37	Q61
5681	L36	Q46	5740	L36	Q105	5799	L37	Q3	5858	L37	Q62
5682	L36	Q47	5741	L36	Q106	5800	L37	Q4	5859	L37	Q63
5683	L36	Q48	5742	L36	Q107	5801	L37	Q5	5860	L37	Q64
5684	L36	Q49	5743	L36	Q108	5802	L37	Q6	5861	L37	Q65
5685	L36	Q50	5744	L36	Q109	5803	L37	Q7	5862	L37	Q66
5686	L36	Q51	5745	L36	Q110	5804	L37	Q8	5863	L37	Q67
5687	L36	Q52	5746	L36	Q111	5805	L37	Q9	5864	L37	Q68
5688	L36	Q53	5747	L36	Q112	5806	L37	Q10	5865	L37	Q69
5689	L36	Q54	5748	L36	Q113	5807	L37	Q11	5866	L37	Q70
5690	L36	Q55	5749	L36	Q114	5808	L37	Q12	5867	L37	Q71
5691	L36	Q56	5750	L36	Q115	5809	L37	Q13	5868	L37	Q72
5692	L36	Q57	5751	L36	Q116	5810	L37	Q14	5869	L37	Q73
5693	L36	Q58	5752	L36	Q117	5811	L37	Q15	5870	L37	Q74
5694	L36	Q59	5753	L36	Q118	5812	L37	Q16	5871	L37	Q75
5695	L36	Q60	5754	L36	Q119	5813	L37	Q17	5872	L37	Q76
5696	L36	Q61	5755	L36	Q120	5814	L37	Q18	5873	L37	Q77
5697	L36	Q62	5756	L36	Q121	5815	L37	Q19	5874	L37	Q78
5698	L36	Q63	5757	L36	Q122	5816	L37	Q20	5875	L37	Q79
5699	L36	Q64	5758	L36	Q123	5817	L37	Q21	5876	L37	Q80
5700	L36	Q65	5759	L36	Q124	5818	L37	Q22	5877	L37	Q81
5701	L36	Q66	5760	L36	Q125	5819	L37	Q23	5878	L37	Q82
5702	L36	Q67	5761	L36	Q126	5820	L37	Q24	5879	L37	Q83
5703	L36	Q68	5762	L36	Q127	5821	L37	Q25	5880	L37	Q84
5704	L36	Q69	5763	L36	Q128	5822	L37	Q26	5881	L37	Q85
5705	L36	Q70	5764	L36	Q129	5823	L37	Q27	5882	L37	Q86
5706	L36	Q71	5765	L36	Q130	5824	L37	Q28	5883	L37	Q87
5707	L36	Q72	5766	L36	Q131	5825	L37	Q29	5884	L37	Q88
5708	L36	Q73	5767	L36	Q132	5826	L37	Q30	5885	L37	Q89
5709	L36	Q74	5768	L36	Q133	5827	L37	Q31	5886	L37	Q90
5710	L36	Q75	5769	L36	Q134	5828	L37	Q32	5887	L37	Q91
5711	L36	Q76	5770	L36	Q135	5829	L37	Q33	5888	L37	Q92
5712	L36	Q77	5771	L36	Q136	5830	L37	Q34	5889	L37	Q93
5713	L36	Q78	5772	L36	Q137	5831	L37	Q35	5890	L37	Q94
5714	L36	Q79	5773	L36	Q138	5832	L37	Q36	5891	L37	Q95
5715	L36	Q80	5774	L36	Q139	5833	L37	Q37	5892	L37	Q96
5716	L36	Q81	5775	L36	Q140	5834	L37	Q38	5893	L37	Q97
5717	L36	Q82	5776	L36	Q141	5835	L37	Q39	5894	L37	Q98
5718	L36	Q83	5777	L36	Q142	5836	L37	Q40	5895	L37	Q99
5719	L36	Q84	5778	L36	Q143	5837	L37	Q41	5896	L37	Q100
5720	L36	Q85	5779	L36	Q144	5838	L37	Q42	5897	L37	Q101
5721	L36	Q86	5780	L36	Q145	5839	L37	Q43	5898	L37	Q102
5722	L36	Q87	5781	L36	Q146	5840	L37	Q44	5899	L37	Q103

Table 1-26]

5900	L37	Q104
5901	L37	Q105
5902	L37	Q106
5903	L37	Q107
5904	L37	Q108
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5996	L38	Q39
5997	L38	Q40
5998	L38	Q41
5999	L38	Q42
6000	L38	Q43
6001	L38	Q44
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6125	L39	Q7
6126	L39	Q8
6127	L39	Q9
6128	L39	Q10
6129	L39	Q11
6130	L39	Q12
6131	L39	Q13
6132	L39	Q14
6133	L39	Q15
6134	L39	Q16
6135	L39	Q17

[Table 1-27]

6136	L39	Q18	6195	L39	Q77	6254	L39	Q136	6313	L40	Q34
6137	L39	Q19	6196	L39	Q78	6255	L39	Q137	6314	L40	Q35
6138	L39	Q20	6197	L39	Q79	6256	L39	Q138	6315	L40	Q36
6139	L39	Q21	6198	L39	Q80	6257	L39	Q139	6316	L40	Q37
6140	L39	Q22	6199	L39	Q81	6258	L39	Q140	6317	L40	Q38
6141	L39	Q23	6200	L39	Q82	6259	L39	Q141	6318	L40	Q39
6142	L39	Q24	6201	L39	Q83	6260	L39	Q142	6319	L40	Q40
6143	L39	Q25	6202	L39	Q84	6261	L39	Q143	6320	L40	Q41
6144	L39	Q26	6203	L39	Q85	6262	L39	Q144	6321	L40	Q42
6145	L39	Q27	6204	L39	Q86	6263	L39	Q145	6322	L40	Q43
6146	L39	Q28	6205	L39	Q87	6264	L39	Q146	6323	L40	Q44
6147	L39	Q29	6206	L39	Q88	6265	L39	Q147	6324	L40	Q45
6148	L39	Q30	6207	L39	Q89	6266	L39	Q148	6325	L40	Q46
6149	L39	Q31	6208	L39	Q90	6267	L39	Q149	6326	L40	Q47
6150	L39	Q32	6209	L39	Q91	6268	L39	Q150	6327	L40	Q48
6151	L39	Q33	6210	L39	Q92	6269	L39	Q151	6328	L40	Q49
6152	L39	Q34	6211	L39	Q93	6270	L39	Q152	6329	L40	Q50
6153	L39	Q35	6212	L39	Q94	6271	L39	Q153	6330	L40	Q51
6154	L39	Q36	6213	L39	Q95	6272	L39	Q154	6331	L40	Q52
6155	L39	Q37	6214	L39	Q96	6273	L39	Q155	6332	L40	Q53
6156	L39	Q38	6215	L39	Q97	6274	L39	Q156	6333	L40	Q54
6157	L39	Q39	6216	L39	Q98	6275	L39	Q157	6334	L40	Q55
6158	L39	Q40	6217	L39	Q99	6276	L39	Q158	6335	L40	Q56
6159	L39	Q41	6218	L39	Q100	6277	L39	Q159	6336	L40	Q57
6160	L39	Q42	6219	L39	Q101	6278	L39	Q160	6337	L40	Q58
6161	L39	Q43	6220	L39	Q102	6279	L39	Q161	6338	L40	Q59
6162	L39	Q44	6221	L39	Q103	6280	L40	Q1	6339	L40	Q60
6163	L39	Q45	6222	L39	Q104	6281	L40	Q2	6340	L40	Q61
6164	L39	Q46	6223	L39	Q105	6282	L40	Q3	6341	L40	Q62
6165	L39	Q47	6224	L39	Q106	6283	L40	Q4	6342	L40	Q63
6166	L39	Q48	6225	L39	Q107	6284	L40	Q5	6343	L40	Q64
6167	L39	Q49	6226	L39	Q108	6285	L40	Q6	6344	L40	Q65
6168	L39	Q50	6227	L39	Q109	6286	L40	Q7	6345	L40	Q66
6169	L39	Q51	6228	L39	Q110	6287	L40	Q8	6346	L40	Q67
6170	L39	Q52	6229	L39	Q111	6288	L40	Q9	6347	L40	Q68
6171	L39	Q53	6230	L39	Q112	6289	L40	Q10	6348	L40	Q69
6172	L39	Q54	6231	L39	Q113	6290	L40	Q11	6349	L40	Q70
6173	L39	Q55	6232	L39	Q114	6291	L40	Q12	6350	L40	Q71
6174	L39	Q56	6233	L39	Q115	6292	L40	Q13	6351	L40	Q72
6175	L39	Q57	6234	L39	Q116	6293	L40	Q14	6352	L40	Q73
6176	L39	Q58	6235	L39	Q117	6294	L40	Q15	6353	L40	Q74
6177	L39	Q59	6236	L39	Q118	6295	L40	Q16	6354	L40	Q75
6178	L39	Q60	6237	L39	Q119	6296	L40	Q17	6355	L40	Q76
6179	L39	Q61	6238	L39	Q120	6297	L40	Q18	6356	L40	Q77
6180	L39	Q62	6239	L39	Q121	6298	L40	Q19	6357	L40	Q78
6181	L39	Q63	6240	L39	Q122	6299	L40	Q20	6358	L40	Q79
6182	L39	Q64	6241	L39	Q123	6300	L40	Q21	6359	L40	Q80
6183	L39	Q65	6242	L39	Q124	6301	L40	Q22	6360	L40	Q81
6184	L39	Q66	6243	L39	Q125	6302	L40	Q23	6361	L40	Q82
6185	L39	Q67	6244	L39	Q126	6303	L40	Q24	6362	L40	Q83
6186	L39	Q68	6245	L39	Q127	6304	L40	Q25	6363	L40	Q84
6187	L39	Q69	6246	L39	Q128	6305	L40	Q26	6364	L40	Q85
6188	L39	Q70	6247	L39	Q129	6306	L40	Q27	6365	L40	Q86
6189	L39	Q71	6248	L39	Q130	6307	L40	Q28	6366	L40	Q87
6190	L39	Q72	6249	L39	Q131	6308	L40	Q29	6367	L40	Q88
6191	L39	Q73	6250	L39	Q132	6309	L40	Q30	6368	L40	Q89
6192	L39	Q74	6251	L39	Q133	6310	L40	Q31	6369	L40	Q90
6193	L39	Q75	6252	L39	Q134	6311	L40	Q32	6370	L40	Q91
6194	L39	Q76	6253	L39	Q135	6312	L40	Q33	6371	L40	Q92

[Table 1-28]

6372	L40	Q93
6373	L40	Q94
6374	L40	Q95
6375	L40	Q96
6376	L40	Q97
6377	L40	Q98
6378	L40	Q99
6379	L40	Q100
6380	L40	Q101
6381	L40	Q102
6382	L40	Q103
6383	L40	Q104
6384	L40	Q105
6385	L40	Q106
6386	L40	Q107
6387	L40	Q108
6388	L40	Q109
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6390	L40	Q111
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6393	L40	Q114
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6395	L40	Q116
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6397	L40	Q118
6398	L40	Q119
6399	L40	Q120
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6401	L40	Q122
6402	L40	Q123
6403	L40	Q124
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6407	L40	Q128
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6409	L40	Q130
6410	L40	Q131
6411	L40	Q132
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6419	L40	Q140
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6424	L40	Q145
6425	L40	Q146
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6427	L40	Q148
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6431	L40	Q152
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6434	L40	Q155
6435	L40	Q156
6436	L40	Q157
6437	L40	Q158
6438	L40	Q159
6439	L40	Q160
6440	L40	Q161
6441	L41	Q1
6442	L41	Q2
6443	L41	Q3
6444	L41	Q4
6445	L41	Q5
6446	L41	Q6
6447	L41	Q7
6448	L41	Q8
6449	L41	Q9
6450	L41	Q10
6451	L41	Q11
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6454	L41	Q14
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6595	L41	Q155
6596	L41	Q156
6597	L41	Q157
6598	L41	Q158
6599	L41	Q159
6600	L41	Q160
6601	L41	Q161
6602	L42	Q1
6603	L42	Q2
6604	L42	Q3
6605	L42	Q4
6606	L42	Q5
6607	L42	Q6

[Table 1-29]

6608	L42	Q7	6667	L42	Q66	6726	L42	Q125	6785	L43	Q23
6609	L42	Q8	6668	L42	Q67	6727	L42	Q126	6786	L43	Q24
6610	L42	Q9	6669	L42	Q68	6728	L42	Q127	6787	L43	Q25
6611	L42	Q10	6670	L42	Q69	6729	L42	Q128	6788	L43	Q26
6612	L42	Q11	6671	L42	Q70	6730	L42	Q129	6789	L43	Q27
6613	L42	Q12	6672	L42	Q71	6731	L42	Q130	6790	L43	Q28
6614	L42	Q13	6673	L42	Q72	6732	L42	Q131	6791	L43	Q29
6615	L42	Q14	6674	L42	Q73	6733	L42	Q132	6792	L43	Q30
6616	L42	Q15	6675	L42	Q74	6734	L42	Q133	6793	L43	Q31
6617	L42	Q16	6676	L42	Q75	6735	L42	Q134	6794	L43	Q32
6618	L42	Q17	6677	L42	Q76	6736	L42	Q135	6795	L43	Q33
6619	L42	Q18	6678	L42	Q77	6737	L42	Q136	6796	L43	Q34
6620	L42	Q19	6679	L42	Q78	6738	L42	Q137	6797	L43	Q35
6621	L42	Q20	6680	L42	Q79	6739	L42	Q138	6798	L43	Q36
6622	L42	Q21	6681	L42	Q80	6740	L42	Q139	6799	L43	Q37
6623	L42	Q22	6682	L42	Q81	6741	L42	Q140	6800	L43	Q38
6624	L42	Q23	6683	L42	Q82	6742	L42	Q141	6801	L43	Q39
6625	L42	Q24	6684	L42	Q83	6743	L42	Q142	6802	L43	Q40
6626	L42	Q25	6685	L42	Q84	6744	L42	Q143	6803	L43	Q41
6627	L42	Q26	6686	L42	Q85	6745	L42	Q144	6804	L43	Q42
6628	L42	Q27	6687	L42	Q86	6746	L42	Q145	6805	L43	Q43
6629	L42	Q28	6688	L42	Q87	6747	L42	Q146	6806	L43	Q44
6630	L42	Q29	6689	L42	Q88	6748	L42	Q147	6807	L43	Q45
6631	L42	Q30	6690	L42	Q89	6749	L42	Q148	6808	L43	Q46
6632	L42	Q31	6691	L42	Q90	6750	L42	Q149	6809	L43	Q47
6633	L42	Q32	6692	L42	Q91	6751	L42	Q150	6810	L43	Q48
6634	L42	Q33	6693	L42	Q92	6752	L42	Q151	6811	L43	Q49
6635	L42	Q34	6694	L42	Q93	6753	L42	Q152	6812	L43	Q50
6636	L42	Q35	6695	L42	Q94	6754	L42	Q153	6813	L43	Q51
6637	L42	Q36	6696	L42	Q95	6755	L42	Q154	6814	L43	Q52
6638	L42	Q37	6697	L42	Q96	6756	L42	Q155	6815	L43	Q53
6639	L42	Q38	6698	L42	Q97	6757	L42	Q156	6816	L43	Q54
6640	L42	Q39	6699	L42	Q98	6758	L42	Q157	6817	L43	Q55
6641	L42	Q40	6700	L42	Q99	6759	L42	Q158	6818	L43	Q56
6642	L42	Q41	6701	L42	Q100	6760	L42	Q159	6819	L43	Q57
6643	L42	Q42	6702	L42	Q101	6761	L42	Q160	6820	L43	Q58
6644	L42	Q43	6703	L42	Q102	6762	L42	Q161	6821	L43	Q59
6645	L42	Q44	6704	L42	Q103	6763	L43	Q1	6822	L43	Q60
6646	L42	Q45	6705	L42	Q104	6764	L43	Q2	6823	L43	Q61
6647	L42	Q46	6706	L42	Q105	6765	L43	Q3	6824	L43	Q62
6648	L42	Q47	6707	L42	Q106	6766	L43	Q4	6825	L43	Q63
6649	L42	Q48	6708	L42	Q107	6767	L43	Q5	6826	L43	Q64
6650	L42	Q49	6709	L42	Q108	6768	L43	Q6	6827	L43	Q65
6651	L42	Q50	6710	L42	Q109	6769	L43	Q7	6828	L43	Q66
6652	L42	Q51	6711	L42	Q110	6770	L43	Q8	6829	L43	Q67
6653	L42	Q52	6712	L42	Q111	6771	L43	Q9	6830	L43	Q68
6654	L42	Q53	6713	L42	Q112	6772	L43	Q10	6831	L43	Q69
6655	L42	Q54	6714	L42	Q113	6773	L43	Q11	6832	L43	Q70
6656	L42	Q55	6715	L42	Q114	6774	L43	Q12	6833	L43	Q71
6657	L42	Q56	6716	L42	Q115	6775	L43	Q13	6834	L43	Q72
6658	L42	Q57	6717	L42	Q116	6776	L43	Q14	6835	L43	Q73
6659	L42	Q58	6718	L42	Q117	6777	L43	Q15	6836	L43	Q74
6660	L42	Q59	6719	L42	Q118	6778	L43	Q16	6837	L43	Q75
6661	L42	Q60	6720	L42	Q119	6779	L43	Q17	6838	L43	Q76
6662	L42	Q61	6721	L42	Q120	6780	L43	Q18	6839	L43	Q77
6663	L42	Q62	6722	L42	Q121	6781	L43	Q19	6840	L43	Q78
6664	L42	Q63	6723	L42	Q122	6782	L43	Q20	6841	L43	Q79
6665	L42	Q64	6724	L42	Q123	6783	L43	Q21	6842	L43	Q80
6666	L42	Q65	6725	L42	Q124	6784	L43	Q22	6843	L43	Q81

[Table 1-30]

6844	L43	Q82	6903	L43	Q141	6962	L44	Q39	7021	L44	Q98
6845	L43	Q83	6904	L43	Q142	6963	L44	Q40	7022	L44	Q99
6846	L43	Q84	6905	L43	Q143	6964	L44	Q41	7023	L44	Q100
6847	L43	Q85	6906	L43	Q144	6965	L44	Q42	7024	L44	Q101
6848	L43	Q86	6907	L43	Q145	6966	L44	Q43	7025	L44	Q102
6849	L43	Q87	6908	L43	Q146	6967	L44	Q44	7026	L44	Q103
6850	L43	Q88	6909	L43	Q147	6968	L44	Q45	7027	L44	Q104
6851	L43	Q89	6910	L43	Q148	6969	L44	Q46	7028	L44	Q105
6852	L43	Q90	6911	L43	Q149	6970	L44	Q47	7029	L44	Q106
6853	L43	Q91	6912	L43	Q150	6971	L44	Q48	7030	L44	Q107
6854	L43	Q92	6913	L43	Q151	6972	L44	Q49	7031	L44	Q108
6855	L43	Q93	6914	L43	Q152	6973	L44	Q50	7032	L44	Q109
6856	L43	Q94	6915	L43	Q153	6974	L44	Q51	7033	L44	Q110
6857	L43	Q95	6916	L43	Q154	6975	L44	Q52	7034	L44	Q111
6858	L43	Q96	6917	L43	Q155	6976	L44	Q53	7035	L44	Q112
6859	L43	Q97	6918	L43	Q156	6977	L44	Q54	7036	L44	Q113
6860	L43	Q98	6919	L43	Q157	6978	L44	Q55	7037	L44	Q114
6861	L43	Q99	6920	L43	Q158	6979	L44	Q56	7038	L44	Q115
6862	L43	Q100	6921	L43	Q159	6980	L44	Q57	7039	L44	Q116
6863	L43	Q101	6922	L43	Q160	6981	L44	Q58	7040	L44	Q117
6864	L43	Q102	6923	L43	Q161	6982	L44	Q59	7041	L44	Q118
6865	L43	Q103	6924	L44	Q1	6983	L44	Q60	7042	L44	Q119
6866	L43	Q104	6925	L44	Q2	6984	L44	Q61	7043	L44	Q120
6867	L43	Q105	6926	L44	Q3	6985	L44	Q62	7044	L44	Q121
6868	L43	Q106	6927	L44	Q4	6986	L44	Q63	7045	L44	Q122
6869	L43	Q107	6928	L44	Q5	6987	L44	Q64	7046	L44	Q123
6870	L43	Q108	6929	L44	Q6	6988	L44	Q65	7047	L44	Q124
6871	L43	Q109	6930	L44	Q7	6989	L44	Q66	7048	L44	Q125
6872	L43	Q110	6931	L44	Q8	6990	L44	Q67	7049	L44	Q126
6873	L43	Q111	6932	L44	Q9	6991	L44	Q68	7050	L44	Q127
6874	L43	Q112	6933	L44	Q10	6992	L44	Q69	7051	L44	Q128
6875	L43	Q113	6934	L44	Q11	6993	L44	Q70	7052	L44	Q129
6876	L43	Q114	6935	L44	Q12	6994	L44	Q71	7053	L44	Q130
6877	L43	Q115	6936	L44	Q13	6995	L44	Q72	7054	L44	Q131
6878	L43	Q116	6937	L44	Q14	6996	L44	Q73	7055	L44	Q132
6879	L43	Q117	6938	L44	Q15	6997	L44	Q74	7056	L44	Q133
6880	L43	Q118	6939	L44	Q16	6998	L44	Q75	7057	L44	Q134
6881	L43	Q119	6940	L44	Q17	6999	L44	Q76	7058	L44	Q135
6882	L43	Q120	6941	L44	Q18	7000	L44	Q77	7059	L44	Q136
6883	L43	Q121	6942	L44	Q19	7001	L44	Q78	7060	L44	Q137
6884	L43	Q122	6943	L44	Q20	7002	L44	Q79	7061	L44	Q138
6885	L43	Q123	6944	L44	Q21	7003	L44	Q80	7062	L44	Q139
6886	L43	Q124	6945	L44	Q22	7004	L44	Q81	7063	L44	Q140
6887	L43	Q125	6946	L44	Q23	7005	L44	Q82	7064	L44	Q141
6888	L43	Q126	6947	L44	Q24	7006	L44	Q83	7065	L44	Q142
6889	L43	Q127	6948	L44	Q25	7007	L44	Q84	7066	L44	Q143
6890	L43	Q128	6949	L44	Q26	7008	L44	Q85	7067	L44	Q144
6891	L43	Q129	6950	L44	Q27	7009	L44	Q86	7068	L44	Q145
6892	L43	Q130	6951	L44	Q28	7010	L44	Q87	7069	L44	Q146
6893	L43	Q131	6952	L44	Q29	7011	L44	Q88	7070	L44	Q147
6894	L43	Q132	6953	L44	Q30	7012	L44	Q89	7071	L44	Q148
6895	L43	Q133	6954	L44	Q31	7013	L44	Q90	7072	L44	Q149
6896	L43	Q134	6955	L44	Q32	7014	L44	Q91	7073	L44	Q150
6897	L43	Q135	6956	L44	Q33	7015	L44	Q92	7074	L44	Q151
6898	L43	Q136	6957	L44	Q34	7016	L44	Q93	7075	L44	Q152
6899	L43	Q137	6958	L44	Q35	7017	L44	Q94	7076	L44	Q153
6900	L43	Q138	6959	L44	Q36	7018	L44	Q95	7077	L44	Q154
6901	L43	Q139	6960	L44	Q37	7019	L44	Q96	7078	L44	Q155
6902	L43	Q140	6961	L44	Q38	7020	L44	Q97	7079	L44	Q156

[Table 1-31]

7080	L44	Q157	7139	L45	Q55	7198	L45	Q114	7257	L46	Q12
7081	L44	Q158	7140	L45	Q56	7199	L45	Q115	7258	L46	Q13
7082	L44	Q159	7141	L45	Q57	7200	L45	Q116	7259	L46	Q14
7083	L44	Q160	7142	L45	Q58	7201	L45	Q117	7260	L46	Q15
7084	L44	Q161	7143	L45	Q59	7202	L45	Q118	7261	L46	Q16
7085	L45	Q1	7144	L45	Q60	7203	L45	Q119	7262	L46	Q17
7086	L45	Q2	7145	L45	Q61	7204	L45	Q120	7263	L46	Q18
7087	L45	Q3	7146	L45	Q62	7205	L45	Q121	7264	L46	Q19
7088	L45	Q4	7147	L45	Q63	7206	L45	Q122	7265	L46	Q20
7089	L45	Q5	7148	L45	Q64	7207	L45	Q123	7266	L46	Q21
7090	L45	Q6	7149	L45	Q65	7208	L45	Q124	7267	L46	Q22
7091	L45	Q7	7150	L45	Q66	7209	L45	Q125	7268	L46	Q23
7092	L45	Q8	7151	L45	Q67	7210	L45	Q126	7269	L46	Q24
7093	L45	Q9	7152	L45	Q68	7211	L45	Q127	7270	L46	Q25
7094	L45	Q10	7153	L45	Q69	7212	L45	Q128	7271	L46	Q26
7095	L45	Q11	7154	L45	Q70	7213	L45	Q129	7272	L46	Q27
7096	L45	Q12	7155	L45	Q71	7214	L45	Q130	7273	L46	Q28
7097	L45	Q13	7156	L45	Q72	7215	L45	Q131	7274	L46	Q29
7098	L45	Q14	7157	L45	Q73	7216	L45	Q132	7275	L46	Q30
7099	L45	Q15	7158	L45	Q74	7217	L45	Q133	7276	L46	Q31
7100	L45	Q16	7159	L45	Q75	7218	L45	Q134	7277	L46	Q32
7101	L45	Q17	7160	L45	Q76	7219	L45	Q135	7278	L46	Q33
7102	L45	Q18	7161	L45	Q77	7220	L45	Q136	7279	L46	Q34
7103	L45	Q19	7162	L45	Q78	7221	L45	Q137	7280	L46	Q35
7104	L45	Q20	7163	L45	Q79	7222	L45	Q138	7281	L46	Q36
7105	L45	Q21	7164	L45	Q80	7223	L45	Q139	7282	L46	Q37
7106	L45	Q22	7165	L45	Q81	7224	L45	Q140	7283	L46	Q38
7107	L45	Q23	7166	L45	Q82	7225	L45	Q141	7284	L46	Q39
7108	L45	Q24	7167	L45	Q83	7226	L45	Q142	7285	L46	Q40
7109	L45	Q25	7168	L45	Q84	7227	L45	Q143	7286	L46	Q41
7110	L45	Q26	7169	L45	Q85	7228	L45	Q144	7287	L46	Q42
7111	L45	Q27	7170	L45	Q86	7229	L45	Q145	7288	L46	Q43
7112	L45	Q28	7171	L45	Q87	7230	L45	Q146	7289	L46	Q44
7113	L45	Q29	7172	L45	Q88	7231	L45	Q147	7290	L46	Q45
7114	L45	Q30	7173	L45	Q89	7232	L45	Q148	7291	L46	Q46
7115	L45	Q31	7174	L45	Q90	7233	L45	Q149	7292	L46	Q47
7116	L45	Q32	7175	L45	Q91	7234	L45	Q150	7293	L46	Q48
7117	L45	Q33	7176	L45	Q92	7235	L45	Q151	7294	L46	Q49
7118	L45	Q34	7177	L45	Q93	7236	L45	Q152	7295	L46	Q50
7119	L45	Q35	7178	L45	Q94	7237	L45	Q153	7296	L46	Q51
7120	L45	Q36	7179	L45	Q95	7238	L45	Q154	7297	L46	Q52
7121	L45	Q37	7180	L45	Q96	7239	L45	Q155	7298	L46	Q53
7122	L45	Q38	7181	L45	Q97	7240	L45	Q156	7299	L46	Q54
7123	L45	Q39	7182	L45	Q98	7241	L45	Q157	7300	L46	Q55
7124	L45	Q40	7183	L45	Q99	7242	L45	Q158	7301	L46	Q56
7125	L45	Q41	7184	L45	Q100	7243	L45	Q159	7302	L46	Q57
7126	L45	Q42	7185	L45	Q101	7244	L45	Q160	7303	L46	Q58
7127	L45	Q43	7186	L45	Q102	7245	L45	Q161	7304	L46	Q59
7128	L45	Q44	7187	L45	Q103	7246	L46	Q1	7305	L46	Q60
7129	L45	Q45	7188	L45	Q104	7247	L46	Q2	7306	L46	Q61
7130	L45	Q46	7189	L45	Q105	7248	L46	Q3	7307	L46	Q62
7131	L45	Q47	7190	L45	Q106	7249	L46	Q4	7308	L46	Q63
7132	L45	Q48	7191	L45	Q107	7250	L46	Q5	7309	L46	Q64
7133	L45	Q49	7192	L45	Q108	7251	L46	Q6	7310	L46	Q65
7134	L45	Q50	7193	L45	Q109	7252	L46	Q7	7311	L46	Q66
7135	L45	Q51	7194	L45	Q110	7253	L46	Q8	7312	L46	Q67
7136	L45	Q52	7195	L45	Q111	7254	L46	Q9	7313	L46	Q68
7137	L45	Q53	7196	L45	Q112	7255	L46	Q10	7314	L46	Q69
7138	L45	Q54	7197	L45	Q113	7256	L46	Q11	7315	L46	Q70

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7316	L46	Q71	7375	L46	Q130	7434	L47	Q28	7493	L47	Q87
7317	L46	Q72	7376	L46	Q131	7435	L47	Q29	7494	L47	Q88
7318	L46	Q73	7377	L46	Q132	7436	L47	Q30	7495	L47	Q89
7319	L46	Q74	7378	L46	Q133	7437	L47	Q31	7496	L47	Q90
7320	L46	Q75	7379	L46	Q134	7438	L47	Q32	7497	L47	Q91
7321	L46	Q76	7380	L46	Q135	7439	L47	Q33	7498	L47	Q92
7322	L46	Q77	7381	L46	Q136	7440	L47	Q34	7499	L47	Q93
7323	L46	Q78	7382	L46	Q137	7441	L47	Q35	7500	L47	Q94
7324	L46	Q79	7383	L46	Q138	7442	L47	Q36	7501	L47	Q95
7325	L46	Q80	7384	L46	Q139	7443	L47	Q37	7502	L47	Q96
7326	L46	Q81	7385	L46	Q140	7444	L47	Q38	7503	L47	Q97
7327	L46	Q82	7386	L46	Q141	7445	L47	Q39	7504	L47	Q98
7328	L46	Q83	7387	L46	Q142	7446	L47	Q40	7505	L47	Q99
7329	L46	Q84	7388	L46	Q143	7447	L47	Q41	7506	L47	Q100
7330	L46	Q85	7389	L46	Q144	7448	L47	Q42	7507	L47	Q101
7331	L46	Q86	7390	L46	Q145	7449	L47	Q43	7508	L47	Q102
7332	L46	Q87	7391	L46	Q146	7450	L47	Q44	7509	L47	Q103
7333	L46	Q88	7392	L46	Q147	7451	L47	Q45	7510	L47	Q104
7334	L46	Q89	7393	L46	Q148	7452	L47	Q46	7511	L47	Q105
7335	L46	Q90	7394	L46	Q149	7453	L47	Q47	7512	L47	Q106
7336	L46	Q91	7395	L46	Q150	7454	L47	Q48	7513	L47	Q107
7337	L46	Q92	7396	L46	Q151	7455	L47	Q49	7514	L47	Q108
7338	L46	Q93	7397	L46	Q152	7456	L47	Q50	7515	L47	Q109
7339	L46	Q94	7398	L46	Q153	7457	L47	Q51	7516	L47	Q110
7340	L46	Q95	7399	L46	Q154	7458	L47	Q52	7517	L47	Q111
7341	L46	Q96	7400	L46	Q155	7459	L47	Q53	7518	L47	Q112
7342	L46	Q97	7401	L46	Q156	7460	L47	Q54	7519	L47	Q113
7343	L46	Q98	7402	L46	Q157	7461	L47	Q55	7520	L47	Q114
7344	L46	Q99	7403	L46	Q158	7462	L47	Q56	7521	L47	Q115
7345	L46	Q100	7404	L46	Q159	7463	L47	Q57	7522	L47	Q116
7346	L46	Q101	7405	L46	Q160	7464	L47	Q58	7523	L47	Q117
7347	L46	Q102	7406	L46	Q161	7465	L47	Q59	7524	L47	Q118
7348	L46	Q103	7407	L47	Q1	7466	L47	Q60	7525	L47	Q119
7349	L46	Q104	7408	L47	Q2	7467	L47	Q61	7526	L47	Q120
7350	L46	Q105	7409	L47	Q3	7468	L47	Q62	7527	L47	Q121
7351	L46	Q106	7410	L47	Q4	7469	L47	Q63	7528	L47	Q122
7352	L46	Q107	7411	L47	Q5	7470	L47	Q64	7529	L47	Q123
7353	L46	Q108	7412	L47	Q6	7471	L47	Q65	7530	L47	Q124
7354	L46	Q109	7413	L47	Q7	7472	L47	Q66	7531	L47	Q125
7355	L46	Q110	7414	L47	Q8	7473	L47	Q67	7532	L47	Q126
7356	L46	Q111	7415	L47	Q9	7474	L47	Q68	7533	L47	Q127
7357	L46	Q112	7416	L47	Q10	7475	L47	Q69	7534	L47	Q128
7358	L46	Q113	7417	L47	Q11	7476	L47	Q70	7535	L47	Q129
7359	L46	Q114	7418	L47	Q12	7477	L47	Q71	7536	L47	Q130
7360	L46	Q115	7419	L47	Q13	7478	L47	Q72	7537	L47	Q131
7361	L46	Q116	7420	L47	Q14	7479	L47	Q73	7538	L47	Q132
7362	L46	Q117	7421	L47	Q15	7480	L47	Q74	7539	L47	Q133
7363	L46	Q118	7422	L47	Q16	7481	L47	Q75	7540	L47	Q134
7364	L46	Q119	7423	L47	Q17	7482	L47	Q76	7541	L47	Q135
7365	L46	Q120	7424	L47	Q18	7483	L47	Q77	7542	L47	Q136
7366	L46	Q121	7425	L47	Q19	7484	L47	Q78	7543	L47	Q137
7367	L46	Q122	7426	L47	Q20	7485	L47	Q79	7544	L47	Q138
7368	L46	Q123	7427	L47	Q21	7486	L47	Q80	7545	L47	Q139
7369	L46	Q124	7428	L47	Q22	7487	L47	Q81	7546	L47	Q140
7370	L46	Q125	7429	L47	Q23	7488	L47	Q82	7547	L47	Q141
7371	L46	Q126	7430	L47	Q24	7489	L47	Q83	7548	L47	Q142
7372	L46	Q127	7431	L47	Q25	7490	L47	Q84	7549	L47	Q143
7373	L46	Q128	7432	L47	Q26	7491	L47	Q85	7550	L47	Q144
7374	L46	Q129	7433	L47	Q27	7492	L47	Q86	7551	L47	Q145

[Table 1-33]

7552	L47	Q146	7611	L48	Q44	7670	L48	Q103	7729	L49	Q1
7553	L47	Q147	7612	L48	Q45	7671	L48	Q104	7730	L49	Q2
7554	L47	Q148	7613	L48	Q46	7672	L48	Q105	7731	L49	Q3
7555	L47	Q149	7614	L48	Q47	7673	L48	Q106	7732	L49	Q4
7556	L47	Q150	7615	L48	Q48	7674	L48	Q107	7733	L49	Q5
7557	L47	Q151	7616	L48	Q49	7675	L48	Q108	7734	L49	Q6
7558	L47	Q152	7617	L48	Q50	7676	L48	Q109	7735	L49	Q7
7559	L47	Q153	7618	L48	Q51	7677	L48	Q110	7736	L49	Q8
7560	L47	Q154	7619	L48	Q52	7678	L48	Q111	7737	L49	Q9
7561	L47	Q155	7620	L48	Q53	7679	L48	Q112	7738	L49	Q10
7562	L47	Q156	7621	L48	Q54	7680	L48	Q113	7739	L49	Q11
7563	L47	Q157	7622	L48	Q55	7681	L48	Q114	7740	L49	Q12
7564	L47	Q158	7623	L48	Q56	7682	L48	Q115	7741	L49	Q13
7565	L47	Q159	7624	L48	Q57	7683	L48	Q116	7742	L49	Q14
7566	L47	Q160	7625	L48	Q58	7684	L48	Q117	7743	L49	Q15
7567	L47	Q161	7626	L48	Q59	7685	L48	Q118	7744	L49	Q16
7568	L48	Q1	7627	L48	Q60	7686	L48	Q119	7745	L49	Q17
7569	L48	Q2	7628	L48	Q61	7687	L48	Q120	7746	L49	Q18
7570	L48	Q3	7629	L48	Q62	7688	L48	Q121	7747	L49	Q19
7571	L48	Q4	7630	L48	Q63	7689	L48	Q122	7748	L49	Q20
7572	L48	Q5	7631	L48	Q64	7690	L48	Q123	7749	L49	Q21
7573	L48	Q6	7632	L48	Q65	7691	L48	Q124	7750	L49	Q22
7574	L48	Q7	7633	L48	Q66	7692	L48	Q125	7751	L49	Q23
7575	L48	Q8	7634	L48	Q67	7693	L48	Q126	7752	L49	Q24
7576	L48	Q9	7635	L48	Q68	7694	L48	Q127	7753	L49	Q25
7577	L48	Q10	7636	L48	Q69	7695	L48	Q128	7754	L49	Q26
7578	L48	Q11	7637	L48	Q70	7696	L48	Q129	7755	L49	Q27
7579	L48	Q12	7638	L48	Q71	7697	L48	Q130	7756	L49	Q28
7580	L48	Q13	7639	L48	Q72	7698	L48	Q131	7757	L49	Q29
7581	L48	Q14	7640	L48	Q73	7699	L48	Q132	7758	L49	Q30
7582	L48	Q15	7641	L48	Q74	7700	L48	Q133	7759	L49	Q31
7583	L48	Q16	7642	L48	Q75	7701	L48	Q134	7760	L49	Q32
7584	L48	Q17	7643	L48	Q76	7702	L48	Q135	7761	L49	Q33
7585	L48	Q18	7644	L48	Q77	7703	L48	Q136	7762	L49	Q34
7586	L48	Q19	7645	L48	Q78	7704	L48	Q137	7763	L49	Q35
7587	L48	Q20	7646	L48	Q79	7705	L48	Q138	7764	L49	Q36
7588	L48	Q21	7647	L48	Q80	7706	L48	Q139	7765	L49	Q37
7589	L48	Q22	7648	L48	Q81	7707	L48	Q140	7766	L49	Q38
7590	L48	Q23	7649	L48	Q82	7708	L48	Q141	7767	L49	Q39
7591	L48	Q24	7650	L48	Q83	7709	L48	Q142	7768	L49	Q40
7592	L48	Q25	7651	L48	Q84	7710	L48	Q143	7769	L49	Q41
7593	L48	Q26	7652	L48	Q85	7711	L48	Q144	7770	L49	Q42
7594	L48	Q27	7653	L48	Q86	7712	L48	Q145	7771	L49	Q43
7595	L48	Q28	7654	L48	Q87	7713	L48	Q146	7772	L49	Q44
7596	L48	Q29	7655	L48	Q88	7714	L48	Q147	7773	L49	Q45
7597	L48	Q30	7656	L48	Q89	7715	L48	Q148	7774	L49	Q46
7598	L48	Q31	7657	L48	Q90	7716	L48	Q149	7775	L49	Q47
7599	L48	Q32	7658	L48	Q91	7717	L48	Q150	7776	L49	Q48
7600	L48	Q33	7659	L48	Q92	7718	L48	Q151	7777	L49	Q49
7601	L48	Q34	7660	L48	Q93	7719	L48	Q152	7778	L49	Q50
7602	L48	Q35	7661	L48	Q94	7720	L48	Q153	7779	L49	Q51
7603	L48	Q36	7662	L48	Q95	7721	L48	Q154	7780	L49	Q52
7604	L48	Q37	7663	L48	Q96	7722	L48	Q155	7781	L49	Q53
7605	L48	Q38	7664	L48	Q97	7723	L48	Q156	7782	L49	Q54
7606	L48	Q39	7665	L48	Q98	7724	L48	Q157	7783	L49	Q55
7607	L48	Q40	7666	L48	Q99	7725	L48	Q158	7784	L49	Q56
7608	L48	Q41	7667	L48	Q100	7726	L48	Q159	7785	L49	Q57
7609	L48	Q42	7668	L48	Q101	7727	L48	Q160	7786	L49	Q58
7610	L48	Q43	7669	L48	Q102	7728	L48	Q161	7787	L49	Q59

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7788	L49	Q60	7847	L49	Q119	7906	L50	Q17	7965	L50	Q76
7789	L49	Q61	7848	L49	Q120	7907	L50	Q18	7966	L50	Q77
7790	L49	Q62	7849	L49	Q121	7908	L50	Q19	7967	L50	Q78
7791	L49	Q63	7850	L49	Q122	7909	L50	Q20	7968	L50	Q79
7792	L49	Q64	7851	L49	Q123	7910	L50	Q21	7969	L50	Q80
7793	L49	Q65	7852	L49	Q124	7911	L50	Q22	7970	L50	Q81
7794	L49	Q66	7853	L49	Q125	7912	L50	Q23	7971	L50	Q82
7795	L49	Q67	7854	L49	Q126	7913	L50	Q24	7972	L50	Q83
7796	L49	Q68	7855	L49	Q127	7914	L50	Q25	7973	L50	Q84
7797	L49	Q69	7856	L49	Q128	7915	L50	Q26	7974	L50	Q85
7798	L49	Q70	7857	L49	Q129	7916	L50	Q27	7975	L50	Q86
7799	L49	Q71	7858	L49	Q130	7917	L50	Q28	7976	L50	Q87
7800	L49	Q72	7859	L49	Q131	7918	L50	Q29	7977	L50	Q88
7801	L49	Q73	7860	L49	Q132	7919	L50	Q30	7978	L50	Q89
7802	L49	Q74	7861	L49	Q133	7920	L50	Q31	7979	L50	Q90
7803	L49	Q75	7862	L49	Q134	7921	L50	Q32	7980	L50	Q91
7804	L49	Q76	7863	L49	Q135	7922	L50	Q33	7981	L50	Q92
7805	L49	Q77	7864	L49	Q136	7923	L50	Q34	7982	L50	Q93
7806	L49	Q78	7865	L49	Q137	7924	L50	Q35	7983	L50	Q94
7807	L49	Q79	7866	L49	Q138	7925	L50	Q36	7984	L50	Q95
7808	L49	Q80	7867	L49	Q139	7926	L50	Q37	7985	L50	Q96
7809	L49	Q81	7868	L49	Q140	7927	L50	Q38	7986	L50	Q97
7810	L49	Q82	7869	L49	Q141	7928	L50	Q39	7987	L50	Q98
7811	L49	Q83	7870	L49	Q142	7929	L50	Q40	7988	L50	Q99
7812	L49	Q84	7871	L49	Q143	7930	L50	Q41	7989	L50	Q100
7813	L49	Q85	7872	L49	Q144	7931	L50	Q42	7990	L50	Q101
7814	L49	Q86	7873	L49	Q145	7932	L50	Q43	7991	L50	Q102
7815	L49	Q87	7874	L49	Q146	7933	L50	Q44	7992	L50	Q103
7816	L49	Q88	7875	L49	Q147	7934	L50	Q45	7993	L50	Q104
7817	L49	Q89	7876	L49	Q148	7935	L50	Q46	7994	L50	Q105
7818	L49	Q90	7877	L49	Q149	7936	L50	Q47	7995	L50	Q106
7819	L49	Q91	7878	L49	Q150	7937	L50	Q48	7996	L50	Q107
7820	L49	Q92	7879	L49	Q151	7938	L50	Q49	7997	L50	Q108
7821	L49	Q93	7880	L49	Q152	7939	L50	Q50	7998	L50	Q109
7822	L49	Q94	7881	L49	Q153	7940	L50	Q51	7999	L50	Q110
7823	L49	Q95	7882	L49	Q154	7941	L50	Q52	8000	L50	Q111
7824	L49	Q96	7883	L49	Q155	7942	L50	Q53	8001	L50	Q112
7825	L49	Q97	7884	L49	Q156	7943	L50	Q54	8002	L50	Q113
7826	L49	Q98	7885	L49	Q157	7944	L50	Q55	8003	L50	Q114
7827	L49	Q99	7886	L49	Q158	7945	L50	Q56	8004	L50	Q115
7828	L49	Q100	7887	L49	Q159	7946	L50	Q57	8005	L50	Q116
7829	L49	Q101	7888	L49	Q160	7947	L50	Q58	8006	L50	Q117
7830	L49	Q102	7889	L49	Q161	7948	L50	Q59	8007	L50	Q118
7831	L49	Q103	7890	L50	Q1	7949	L50	Q60	8008	L50	Q119
7832	L49	Q104	7891	L50	Q2	7950	L50	Q61	8009	L50	Q120
7833	L49	Q105	7892	L50	Q3	7951	L50	Q62	8010	L50	Q121
7834	L49	Q106	7893	L50	Q4	7952	L50	Q63	8011	L50	Q122
7835	L49	Q107	7894	L50	Q5	7953	L50	Q64	8012	L50	Q123
7836	L49	Q108	7895	L50	Q6	7954	L50	Q65	8013	L50	Q124
7837	L49	Q109	7896	L50	Q7	7955	L50	Q66	8014	L50	Q125
7838	L49	Q110	7897	L50	Q8	7956	L50	Q67	8015	L50	Q126
7839	L49	Q111	7898	L50	Q9	7957	L50	Q68	8016	L50	Q127
7840	L49	Q112	7899	L50	Q10	7958	L50	Q69	8017	L50	Q128
7841	L49	Q113	7900	L50	Q11	7959	L50	Q70	8018	L50	Q129
7842	L49	Q114	7901	L50	Q12	7960	L50	Q71	8019	L50	Q130
7843	L49	Q115	7902	L50	Q13	7961	L50	Q72	8020	L50	Q131
7844	L49	Q116	7903	L50	Q14	7962	L50	Q73	8021	L50	Q132
7845	L49	Q117	7904	L50	Q15	7963	L50	Q74	8022	L50	Q133
7846	L49	Q118	7905	L50	Q16	7964	L50	Q75	8023	L50	Q134

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8024	L50	Q135	8083	L51	Q33	8142	L51	Q92	8201	L51	Q151
8025	L50	Q136	8084	L51	Q34	8143	L51	Q93	8202	L51	Q152
8026	L50	Q137	8085	L51	Q35	8144	L51	Q94	8203	L51	Q153
8027	L50	Q138	8086	L51	Q36	8145	L51	Q95	8204	L51	Q154
8028	L50	Q139	8087	L51	Q37	8146	L51	Q96	8205	L51	Q155
8029	L50	Q140	8088	L51	Q38	8147	L51	Q97	8206	L51	Q156
8030	L50	Q141	8089	L51	Q39	8148	L51	Q98	8207	L51	Q157
8031	L50	Q142	8090	L51	Q40	8149	L51	Q99	8208	L51	Q158
8032	L50	Q143	8091	L51	Q41	8150	L51	Q100	8209	L51	Q159
8033	L50	Q144	8092	L51	Q42	8151	L51	Q101	8210	L51	Q160
8034	L50	Q145	8093	L51	Q43	8152	L51	Q102	8211	L51	Q161
8035	L50	Q146	8094	L51	Q44	8153	L51	Q103	8212	L52	Q1
8036	L50	Q147	8095	L51	Q45	8154	L51	Q104	8213	L52	Q2
8037	L50	Q148	8096	L51	Q46	8155	L51	Q105	8214	L52	Q3
8038	L50	Q149	8097	L51	Q47	8156	L51	Q106	8215	L52	Q4
8039	L50	Q150	8098	L51	Q48	8157	L51	Q107	8216	L52	Q5
8040	L50	Q151	8099	L51	Q49	8158	L51	Q108	8217	L52	Q6
8041	L50	Q152	8100	L51	Q50	8159	L51	Q109	8218	L52	Q7
8042	L50	Q153	8101	L51	Q51	8160	L51	Q110	8219	L52	Q8
8043	L50	Q154	8102	L51	Q52	8161	L51	Q111	8220	L52	Q9
8044	L50	Q155	8103	L51	Q53	8162	L51	Q112	8221	L52	Q10
8045	L50	Q156	8104	L51	Q54	8163	L51	Q113	8222	L52	Q11
8046	L50	Q157	8105	L51	Q55	8164	L51	Q114	8223	L52	Q12
8047	L50	Q158	8106	L51	Q56	8165	L51	Q115	8224	L52	Q13
8048	L50	Q159	8107	L51	Q57	8166	L51	Q116	8225	L52	Q14
8049	L50	Q160	8108	L51	Q58	8167	L51	Q117	8226	L52	Q15
8050	L50	Q161	8109	L51	Q59	8168	L51	Q118	8227	L52	Q16
8051	L51	Q1	8110	L51	Q60	8169	L51	Q119	8228	L52	Q17
8052	L51	Q2	8111	L51	Q61	8170	L51	Q120	8229	L52	Q18
8053	L51	Q3	8112	L51	Q62	8171	L51	Q121	8230	L52	Q19
8054	L51	Q4	8113	L51	Q63	8172	L51	Q122	8231	L52	Q20
8055	L51	Q5	8114	L51	Q64	8173	L51	Q123	8232	L52	Q21
8056	L51	Q6	8115	L51	Q65	8174	L51	Q124	8233	L52	Q22
8057	L51	Q7	8116	L51	Q66	8175	L51	Q125	8234	L52	Q23
8058	L51	Q8	8117	L51	Q67	8176	L51	Q126	8235	L52	Q24
8059	L51	Q9	8118	L51	Q68	8177	L51	Q127	8236	L52	Q25
8060	L51	Q10	8119	L51	Q69	8178	L51	Q128	8237	L52	Q26
8061	L51	Q11	8120	L51	Q70	8179	L51	Q129	8238	L52	Q27
8062	L51	Q12	8121	L51	Q71	8180	L51	Q130	8239	L52	Q28
8063	L51	Q13	8122	L51	Q72	8181	L51	Q131	8240	L52	Q29
8064	L51	Q14	8123	L51	Q73	8182	L51	Q132	8241	L52	Q30
8065	L51	Q15	8124	L51	Q74	8183	L51	Q133	8242	L52	Q31
8066	L51	Q16	8125	L51	Q75	8184	L51	Q134	8243	L52	Q32
8067	L51	Q17	8126	L51	Q76	8185	L51	Q135	8244	L52	Q33
8068	L51	Q18	8127	L51	Q77	8186	L51	Q136	8245	L52	Q34
8069	L51	Q19	8128	L51	Q78	8187	L51	Q137	8246	L52	Q35
8070	L51	Q20	8129	L51	Q79	8188	L51	Q138	8247	L52	Q36
8071	L51	Q21	8130	L51	Q80	8189	L51	Q139	8248	L52	Q37
8072	L51	Q22	8131	L51	Q81	8190	L51	Q140	8249	L52	Q38
8073	L51	Q23	8132	L51	Q82	8191	L51	Q141	8250	L52	Q39
8074	L51	Q24	8133	L51	Q83	8192	L51	Q142	8251	L52	Q40
8075	L51	Q25	8134	L51	Q84	8193	L51	Q143	8252	L52	Q41
8076	L51	Q26	8135	L51	Q85	8194	L51	Q144	8253	L52	Q42
8077	L51	Q27	8136	L51	Q86	8195	L51	Q145	8254	L52	Q43
8078	L51	Q28	8137	L51	Q87	8196	L51	Q146	8255	L52	Q44
8079	L51	Q29	8138	L51	Q88	8197	L51	Q147	8256	L52	Q45
8080	L51	Q30	8139	L51	Q89	8198	L51	Q148	8257	L52	Q46
8081	L51	Q31	8140	L51	Q90	8199	L51	Q149	8258	L52	Q47
8082	L51	Q32	8141	L51	Q91	8200	L51	Q150	8259	L52	Q48

[Table 1-36]

8260	L52	Q49	8319	L52	Q108	8378	L53	Q6	8437	L53	Q65
8261	L52	Q50	8320	L52	Q109	8379	L53	Q7	8438	L53	Q66
8262	L52	Q51	8321	L52	Q110	8380	L53	Q8	8439	L53	Q67
8263	L52	Q52	8322	L52	Q111	8381	L53	Q9	8440	L53	Q68
8264	L52	Q53	8323	L52	Q112	8382	L53	Q10	8441	L53	Q69
8265	L52	Q54	8324	L52	Q113	8383	L53	Q11	8442	L53	Q70
8266	L52	Q55	8325	L52	Q114	8384	L53	Q12	8443	L53	Q71
8267	L52	Q56	8326	L52	Q115	8385	L53	Q13	8444	L53	Q72
8268	L52	Q57	8327	L52	Q116	8386	L53	Q14	8445	L53	Q73
8269	L52	Q58	8328	L52	Q117	8387	L53	Q15	8446	L53	Q74
8270	L52	Q59	8329	L52	Q118	8388	L53	Q16	8447	L53	Q75
8271	L52	Q60	8330	L52	Q119	8389	L53	Q17	8448	L53	Q76
8272	L52	Q61	8331	L52	Q120	8390	L53	Q18	8449	L53	Q77
8273	L52	Q62	8332	L52	Q121	8391	L53	Q19	8450	L53	Q78
8274	L52	Q63	8333	L52	Q122	8392	L53	Q20	8451	L53	Q79
8275	L52	Q64	8334	L52	Q123	8393	L53	Q21	8452	L53	Q80
8276	L52	Q65	8335	L52	Q124	8394	L53	Q22	8453	L53	Q81
8277	L52	Q66	8336	L52	Q125	8395	L53	Q23	8454	L53	Q82
8278	L52	Q67	8337	L52	Q126	8396	L53	Q24	8455	L53	Q83
8279	L52	Q68	8338	L52	Q127	8397	L53	Q25	8456	L53	Q84
8280	L52	Q69	8339	L52	Q128	8398	L53	Q26	8457	L53	Q85
8281	L52	Q70	8340	L52	Q129	8399	L53	Q27	8458	L53	Q86
8282	L52	Q71	8341	L52	Q130	8400	L53	Q28	8459	L53	Q87
8283	L52	Q72	8342	L52	Q131	8401	L53	Q29	8460	L53	Q88
8284	L52	Q73	8343	L52	Q132	8402	L53	Q30	8461	L53	Q89
8285	L52	Q74	8344	L52	Q133	8403	L53	Q31	8462	L53	Q90
8286	L52	Q75	8345	L52	Q134	8404	L53	Q32	8463	L53	Q91
8287	L52	Q76	8346	L52	Q135	8405	L53	Q33	8464	L53	Q92
8288	L52	Q77	8347	L52	Q136	8406	L53	Q34	8465	L53	Q93
8289	L52	Q78	8348	L52	Q137	8407	L53	Q35	8466	L53	Q94
8290	L52	Q79	8349	L52	Q138	8408	L53	Q36	8467	L53	Q95
8291	L52	Q80	8350	L52	Q139	8409	L53	Q37	8468	L53	Q96
8292	L52	Q81	8351	L52	Q140	8410	L53	Q38	8469	L53	Q97
8293	L52	Q82	8352	L52	Q141	8411	L53	Q39	8470	L53	Q98
8294	L52	Q83	8353	L52	Q142	8412	L53	Q40	8471	L53	Q99
8295	L52	Q84	8354	L52	Q143	8413	L53	Q41	8472	L53	Q100
8296	L52	Q85	8355	L52	Q144	8414	L53	Q42	8473	L53	Q101
8297	L52	Q86	8356	L52	Q145	8415	L53	Q43	8474	L53	Q102
8298	L52	Q87	8357	L52	Q146	8416	L53	Q44	8475	L53	Q103
8299	L52	Q88	8358	L52	Q147	8417	L53	Q45	8476	L53	Q104
8300	L52	Q89	8359	L52	Q148	8418	L53	Q46	8477	L53	Q105
8301	L52	Q90	8360	L52	Q149	8419	L53	Q47	8478	L53	Q106
8302	L52	Q91	8361	L52	Q150	8420	L53	Q48	8479	L53	Q107
8303	L52	Q92	8362	L52	Q151	8421	L53	Q49	8480	L53	Q108
8304	L52	Q93	8363	L52	Q152	8422	L53	Q50	8481	L53	Q109
8305	L52	Q94	8364	L52	Q153	8423	L53	Q51	8482	L53	Q110
8306	L52	Q95	8365	L52	Q154	8424	L53	Q52	8483	L53	Q111
8307	L52	Q96	8366	L52	Q155	8425	L53	Q53	8484	L53	Q112
8308	L52	Q97	8367	L52	Q156	8426	L53	Q54	8485	L53	Q113
8309	L52	Q98	8368	L52	Q157	8427	L53	Q55	8486	L53	Q114
8310	L52	Q99	8369	L52	Q158	8428	L53	Q56	8487	L53	Q115
8311	L52	Q100	8370	L52	Q159	8429	L53	Q57	8488	L53	Q116
8312	L52	Q101	8371	L52	Q160	8430	L53	Q58	8489	L53	Q117
8313	L52	Q102	8372	L52	Q161	8431	L53	Q59	8490	L53	Q118
8314	L52	Q103	8373	L53	Q1	8432	L53	Q60	8491	L53	Q119
8315	L52	Q104	8374	L53	Q2	8433	L53	Q61	8492	L53	Q120
8316	L52	Q105	8375	L53	Q3	8434	L53	Q62	8493	L53	Q121
8317	L52	Q106	8376	L53	Q4	8435	L53	Q63	8494	L53	Q122
8318	L52	Q107	8377	L53	Q5	8436	L53	Q64	8495	L53	Q123

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8496	L53	Q124	8555	L54	Q22	8614	L54	Q81	8673	L54	Q140
8497	L53	Q125	8556	L54	Q23	8615	L54	Q82	8674	L54	Q141
8498	L53	Q126	8557	L54	Q24	8616	L54	Q83	8675	L54	Q142
8499	L53	Q127	8558	L54	Q25	8617	L54	Q84	8676	L54	Q143
8500	L53	Q128	8559	L54	Q26	8618	L54	Q85	8677	L54	Q144
8501	L53	Q129	8560	L54	Q27	8619	L54	Q86	8678	L54	Q145
8502	L53	Q130	8561	L54	Q28	8620	L54	Q87	8679	L54	Q146
8503	L53	Q131	8562	L54	Q29	8621	L54	Q88	8680	L54	Q147
8504	L53	Q132	8563	L54	Q30	8622	L54	Q89	8681	L54	Q148
8505	L53	Q133	8564	L54	Q31	8623	L54	Q90	8682	L54	Q149
8506	L53	Q134	8565	L54	Q32	8624	L54	Q91	8683	L54	Q150
8507	L53	Q135	8566	L54	Q33	8625	L54	Q92	8684	L54	Q151
8508	L53	Q136	8567	L54	Q34	8626	L54	Q93	8685	L54	Q152
8509	L53	Q137	8568	L54	Q35	8627	L54	Q94	8686	L54	Q153
8510	L53	Q138	8569	L54	Q36	8628	L54	Q95	8687	L54	Q154
8511	L53	Q139	8570	L54	Q37	8629	L54	Q96	8688	L54	Q155
8512	L53	Q140	8571	L54	Q38	8630	L54	Q97	8689	L54	Q156
8513	L53	Q141	8572	L54	Q39	8631	L54	Q98	8690	L54	Q157
8514	L53	Q142	8573	L54	Q40	8632	L54	Q99	8691	L54	Q158
8515	L53	Q143	8574	L54	Q41	8633	L54	Q100	8692	L54	Q159
8516	L53	Q144	8575	L54	Q42	8634	L54	Q101	8693	L54	Q160
8517	L53	Q145	8576	L54	Q43	8635	L54	Q102	8694	L54	Q161
8518	L53	Q146	8577	L54	Q44	8636	L54	Q103	8695	L55	Q1
8519	L53	Q147	8578	L54	Q45	8637	L54	Q104	8696	L55	Q2
8520	L53	Q148	8579	L54	Q46	8638	L54	Q105	8697	L55	Q3
8521	L53	Q149	8580	L54	Q47	8639	L54	Q106	8698	L55	Q4
8522	L53	Q150	8581	L54	Q48	8640	L54	Q107	8699	L55	Q5
8523	L53	Q151	8582	L54	Q49	8641	L54	Q108	8700	L55	Q6
8524	L53	Q152	8583	L54	Q50	8642	L54	Q109	8701	L55	Q7
8525	L53	Q153	8584	L54	Q51	8643	L54	Q110	8702	L55	Q8
8526	L53	Q154	8585	L54	Q52	8644	L54	Q111	8703	L55	Q9
8527	L53	Q155	8586	L54	Q53	8645	L54	Q112	8704	L55	Q10
8528	L53	Q156	8587	L54	Q54	8646	L54	Q113	8705	L55	Q11
8529	L53	Q157	8588	L54	Q55	8647	L54	Q114	8706	L55	Q12
8530	L53	Q158	8589	L54	Q56	8648	L54	Q115	8707	L55	Q13
8531	L53	Q159	8590	L54	Q57	8649	L54	Q116	8708	L55	Q14
8532	L53	Q160	8591	L54	Q58	8650	L54	Q117	8709	L55	Q15
8533	L53	Q161	8592	L54	Q59	8651	L54	Q118	8710	L55	Q16
8534	L54	Q1	8593	L54	Q60	8652	L54	Q119	8711	L55	Q17
8535	L54	Q2	8594	L54	Q61	8653	L54	Q120	8712	L55	Q18
8536	L54	Q3	8595	L54	Q62	8654	L54	Q121	8713	L55	Q19
8537	L54	Q4	8596	L54	Q63	8655	L54	Q122	8714	L55	Q20
8538	L54	Q5	8597	L54	Q64	8656	L54	Q123	8715	L55	Q21
8539	L54	Q6	8598	L54	Q65	8657	L54	Q124	8716	L55	Q22
8540	L54	Q7	8599	L54	Q66	8658	L54	Q125	8717	L55	Q23
8541	L54	Q8	8600	L54	Q67	8659	L54	Q126	8718	L55	Q24
8542	L54	Q9	8601	L54	Q68	8660	L54	Q127	8719	L55	Q25
8543	L54	Q10	8602	L54	Q69	8661	L54	Q128	8720	L55	Q26
8544	L54	Q11	8603	L54	Q70	8662	L54	Q129	8721	L55	Q27
8545	L54	Q12	8604	L54	Q71	8663	L54	Q130	8722	L55	Q28
8546	L54	Q13	8605	L54	Q72	8664	L54	Q131	8723	L55	Q29
8547	L54	Q14	8606	L54	Q73	8665	L54	Q132	8724	L55	Q30
8548	L54	Q15	8607	L54	Q74	8666	L54	Q133	8725	L55	Q31
8549	L54	Q16	8608	L54	Q75	8667	L54	Q134	8726	L55	Q32
8550	L54	Q17	8609	L54	Q76	8668	L54	Q135	8727	L55	Q33
8551	L54	Q18	8610	L54	Q77	8669	L54	Q136	8728	L55	Q34
8552	L54	Q19	8611	L54	Q78	8670	L54	Q137	8729	L55	Q35
8553	L54	Q20	8612	L54	Q79	8671	L54	Q138	8730	L55	Q36
8554	L54	Q21	8613	L54	Q80	8672	L54	Q139	8731	L55	Q37

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8732	L55	Q38	8791	L55	Q97	8850	L55	Q156	8909	L56	Q54
8733	L55	Q39	8792	L55	Q98	8851	L55	Q157	8910	L56	Q55
8734	L55	Q40	8793	L55	Q99	8852	L55	Q158	8911	L56	Q56
8735	L55	Q41	8794	L55	Q100	8853	L55	Q159	8912	L56	Q57
8736	L55	Q42	8795	L55	Q101	8854	L55	Q160	8913	L56	Q58
8737	L55	Q43	8796	L55	Q102	8855	L55	Q161	8914	L56	Q59
8738	L55	Q44	8797	L55	Q103	8856	L56	Q1	8915	L56	Q60
8739	L55	Q45	8798	L55	Q104	8857	L56	Q2	8916	L56	Q61
8740	L55	Q46	8799	L55	Q105	8858	L56	Q3	8917	L56	Q62
8741	L55	Q47	8800	L55	Q106	8859	L56	Q4	8918	L56	Q63
8742	L55	Q48	8801	L55	Q107	8860	L56	Q5	8919	L56	Q64
8743	L55	Q49	8802	L55	Q108	8861	L56	Q6	8920	L56	Q65
8744	L55	Q50	8803	L55	Q109	8862	L56	Q7	8921	L56	Q66
8745	L55	Q51	8804	L55	Q110	8863	L56	Q8	8922	L56	Q67
8746	L55	Q52	8805	L55	Q111	8864	L56	Q9	8923	L56	Q68
8747	L55	Q53	8806	L55	Q112	8865	L56	Q10	8924	L56	Q69
8748	L55	Q54	8807	L55	Q113	8866	L56	Q11	8925	L56	Q70
8749	L55	Q55	8808	L55	Q114	8867	L56	Q12	8926	L56	Q71
8750	L55	Q56	8809	L55	Q115	8868	L56	Q13	8927	L56	Q72
8751	L55	Q57	8810	L55	Q116	8869	L56	Q14	8928	L56	Q73
8752	L55	Q58	8811	L55	Q117	8870	L56	Q15	8929	L56	Q74
8753	L55	Q59	8812	L55	Q118	8871	L56	Q16	8930	L56	Q75
8754	L55	Q60	8813	L55	Q119	8872	L56	Q17	8931	L56	Q76
8755	L55	Q61	8814	L55	Q120	8873	L56	Q18	8932	L56	Q77
8756	L55	Q62	8815	L55	Q121	8874	L56	Q19	8933	L56	Q78
8757	L55	Q63	8816	L55	Q122	8875	L56	Q20	8934	L56	Q79
8758	L55	Q64	8817	L55	Q123	8876	L56	Q21	8935	L56	Q80
8759	L55	Q65	8818	L55	Q124	8877	L56	Q22	8936	L56	Q81
8760	L55	Q66	8819	L55	Q125	8878	L56	Q23	8937	L56	Q82
8761	L55	Q67	8820	L55	Q126	8879	L56	Q24	8938	L56	Q83
8762	L55	Q68	8821	L55	Q127	8880	L56	Q25	8939	L56	Q84
8763	L55	Q69	8822	L55	Q128	8881	L56	Q26	8940	L56	Q85
8764	L55	Q70	8823	L55	Q129	8882	L56	Q27	8941	L56	Q86
8765	L55	Q71	8824	L55	Q130	8883	L56	Q28	8942	L56	Q87
8766	L55	Q72	8825	L55	Q131	8884	L56	Q29	8943	L56	Q88
8767	L55	Q73	8826	L55	Q132	8885	L56	Q30	8944	L56	Q89
8768	L55	Q74	8827	L55	Q133	8886	L56	Q31	8945	L56	Q90
8769	L55	Q75	8828	L55	Q134	8887	L56	Q32	8946	L56	Q91
8770	L55	Q76	8829	L55	Q135	8888	L56	Q33	8947	L56	Q92
8771	L55	Q77	8830	L55	Q136	8889	L56	Q34	8948	L56	Q93
8772	L55	Q78	8831	L55	Q137	8890	L56	Q35	8949	L56	Q94
8773	L55	Q79	8832	L55	Q138	8891	L56	Q36	8950	L56	Q95
8774	L55	Q80	8833	L55	Q139	8892	L56	Q37	8951	L56	Q96
8775	L55	Q81	8834	L55	Q140	8893	L56	Q38	8952	L56	Q97
8776	L55	Q82	8835	L55	Q141	8894	L56	Q39	8953	L56	Q98
8777	L55	Q83	8836	L55	Q142	8895	L56	Q40	8954	L56	Q99
8778	L55	Q84	8837	L55	Q143	8896	L56	Q41	8955	L56	Q100
8779	L55	Q85	8838	L55	Q144	8897	L56	Q42	8956	L56	Q101
8780	L55	Q86	8839	L55	Q145	8898	L56	Q43	8957	L56	Q102
8781	L55	Q87	8840	L55	Q146	8899	L56	Q44	8958	L56	Q103
8782	L55	Q88	8841	L55	Q147	8900	L56	Q45	8959	L56	Q104
8783	L55	Q89	8842	L55	Q148	8901	L56	Q46	8960	L56	Q105
8784	L55	Q90	8843	L55	Q149	8902	L56	Q47	8961	L56	Q106
8785	L55	Q91	8844	L55	Q150	8903	L56	Q48	8962	L56	Q107
8786	L55	Q92	8845	L55	Q151	8904	L56	Q49	8963	L56	Q108
8787	L55	Q93	8846	L55	Q152	8905	L56	Q50	8964	L56	Q109
8788	L55	Q94	8847	L55	Q153	8906	L56	Q51	8965	L56	Q110
8789	L55	Q95	8848	L55	Q154	8907	L56	Q52	8966	L56	Q111
8790	L55	Q96	8849	L55	Q155	8908	L56	Q53	8967	L56	Q112

[Table 1-39]

8968	L56	Q113	9027	L57	Q11	9086	L57	Q70	9145	L57	Q129
8969	L56	Q114	9028	L57	Q12	9087	L57	Q71	9146	L57	Q130
8970	L56	Q115	9029	L57	Q13	9088	L57	Q72	9147	L57	Q131
8971	L56	Q116	9030	L57	Q14	9089	L57	Q73	9148	L57	Q132
8972	L56	Q117	9031	L57	Q15	9090	L57	Q74	9149	L57	Q133
8973	L56	Q118	9032	L57	Q16	9091	L57	Q75	9150	L57	Q134
8974	L56	Q119	9033	L57	Q17	9092	L57	Q76	9151	L57	Q135
8975	L56	Q120	9034	L57	Q18	9093	L57	Q77	9152	L57	Q136
8976	L56	Q121	9035	L57	Q19	9094	L57	Q78	9153	L57	Q137
8977	L56	Q122	9036	L57	Q20	9095	L57	Q79	9154	L57	Q138
8978	L56	Q123	9037	L57	Q21	9096	L57	Q80	9155	L57	Q139
8979	L56	Q124	9038	L57	Q22	9097	L57	Q81	9156	L57	Q140
8980	L56	Q125	9039	L57	Q23	9098	L57	Q82	9157	L57	Q141
8981	L56	Q126	9040	L57	Q24	9099	L57	Q83	9158	L57	Q142
8982	L56	Q127	9041	L57	Q25	9100	L57	Q84	9159	L57	Q143
8983	L56	Q128	9042	L57	Q26	9101	L57	Q85	9160	L57	Q144
8984	L56	Q129	9043	L57	Q27	9102	L57	Q86	9161	L57	Q145
8985	L56	Q130	9044	L57	Q28	9103	L57	Q87	9162	L57	Q146
8986	L56	Q131	9045	L57	Q29	9104	L57	Q88	9163	L57	Q147
8987	L56	Q132	9046	L57	Q30	9105	L57	Q89	9164	L57	Q148
8988	L56	Q133	9047	L57	Q31	9106	L57	Q90	9165	L57	Q149
8989	L56	Q134	9048	L57	Q32	9107	L57	Q91	9166	L57	Q150
8990	L56	Q135	9049	L57	Q33	9108	L57	Q92	9167	L57	Q151
8991	L56	Q136	9050	L57	Q34	9109	L57	Q93	9168	L57	Q152
8992	L56	Q137	9051	L57	Q35	9110	L57	Q94	9169	L57	Q153
8993	L56	Q138	9052	L57	Q36	9111	L57	Q95	9170	L57	Q154
8994	L56	Q139	9053	L57	Q37	9112	L57	Q96	9171	L57	Q155
8995	L56	Q140	9054	L57	Q38	9113	L57	Q97	9172	L57	Q156
8996	L56	Q141	9055	L57	Q39	9114	L57	Q98	9173	L57	Q157
8997	L56	Q142	9056	L57	Q40	9115	L57	Q99	9174	L57	Q158
8998	L56	Q143	9057	L57	Q41	9116	L57	Q100	9175	L57	Q159
8999	L56	Q144	9058	L57	Q42	9117	L57	Q101	9176	L57	Q160
9000	L56	Q145	9059	L57	Q43	9118	L57	Q102	9177	L57	Q161
9001	L56	Q146	9060	L57	Q44	9119	L57	Q103	9178	L58	Q1
9002	L56	Q147	9061	L57	Q45	9120	L57	Q104	9179	L58	Q2
9003	L56	Q148	9062	L57	Q46	9121	L57	Q105	9180	L58	Q3
9004	L56	Q149	9063	L57	Q47	9122	L57	Q106	9181	L58	Q4
9005	L56	Q150	9064	L57	Q48	9123	L57	Q107	9182	L58	Q5
9006	L56	Q151	9065	L57	Q49	9124	L57	Q108	9183	L58	Q6
9007	L56	Q152	9066	L57	Q50	9125	L57	Q109	9184	L58	Q7
9008	L56	Q153	9067	L57	Q51	9126	L57	Q110	9185	L58	Q8
9009	L56	Q154	9068	L57	Q52	9127	L57	Q111	9186	L58	Q9
9010	L56	Q155	9069	L57	Q53	9128	L57	Q112	9187	L58	Q10
9011	L56	Q156	9070	L57	Q54	9129	L57	Q113	9188	L58	Q11
9012	L56	Q157	9071	L57	Q55	9130	L57	Q114	9189	L58	Q12
9013	L56	Q158	9072	L57	Q56	9131	L57	Q115	9190	L58	Q13
9014	L56	Q159	9073	L57	Q57	9132	L57	Q116	9191	L58	Q14
9015	L56	Q160	9074	L57	Q58	9133	L57	Q117	9192	L58	Q15
9016	L56	Q161	9075	L57	Q59	9134	L57	Q118	9193	L58	Q16
9017	L57	Q1	9076	L57	Q60	9135	L57	Q119	9194	L58	Q17
9018	L57	Q2	9077	L57	Q61	9136	L57	Q120	9195	L58	Q18
9019	L57	Q3	9078	L57	Q62	9137	L57	Q121	9196	L58	Q19
9020	L57	Q4	9079	L57	Q63	9138	L57	Q122	9197	L58	Q20
9021	L57	Q5	9080	L57	Q64	9139	L57	Q123	9198	L58	Q21
9022	L57	Q6	9081	L57	Q65	9140	L57	Q124	9199	L58	Q22
9023	L57	Q7	9082	L57	Q66	9141	L57	Q125	9200	L58	Q23
9024	L57	Q8	9083	L57	Q67	9142	L57	Q126	9201	L58	Q24
9025	L57	Q9	9084	L57	Q68	9143	L57	Q127	9202	L58	Q25
9026	L57	Q10	9085	L57	Q69	9144	L57	Q128	9203	L58	Q26

[Table 1-40]

9204	L58	Q27	9263	L58	Q86	9322	L58	Q145	9381	L59	Q43
9205	L58	Q28	9264	L58	Q87	9323	L58	Q146	9382	L59	Q44
9206	L58	Q29	9265	L58	Q88	9324	L58	Q147	9383	L59	Q45
9207	L58	Q30	9266	L58	Q89	9325	L58	Q148	9384	L59	Q46
9208	L58	Q31	9267	L58	Q90	9326	L58	Q149	9385	L59	Q47
9209	L58	Q32	9268	L58	Q91	9327	L58	Q150	9386	L59	Q48
9210	L58	Q33	9269	L58	Q92	9328	L58	Q151	9387	L59	Q49
9211	L58	Q34	9270	L58	Q93	9329	L58	Q152	9388	L59	Q50
9212	L58	Q35	9271	L58	Q94	9330	L58	Q153	9389	L59	Q51
9213	L58	Q36	9272	L58	Q95	9331	L58	Q154	9390	L59	Q52
9214	L58	Q37	9273	L58	Q96	9332	L58	Q155	9391	L59	Q53
9215	L58	Q38	9274	L58	Q97	9333	L58	Q156	9392	L59	Q54
9216	L58	Q39	9275	L58	Q98	9334	L58	Q157	9393	L59	Q55
9217	L58	Q40	9276	L58	Q99	9335	L58	Q158	9394	L59	Q56
9218	L58	Q41	9277	L58	Q100	9336	L58	Q159	9395	L59	Q57
9219	L58	Q42	9278	L58	Q101	9337	L58	Q160	9396	L59	Q58
9220	L58	Q43	9279	L58	Q102	9338	L58	Q161	9397	L59	Q59
9221	L58	Q44	9280	L58	Q103	9339	L59	Q1	9398	L59	Q60
9222	L58	Q45	9281	L58	Q104	9340	L59	Q2	9399	L59	Q61
9223	L58	Q46	9282	L58	Q105	9341	L59	Q3	9400	L59	Q62
9224	L58	Q47	9283	L58	Q106	9342	L59	Q4	9401	L59	Q63
9225	L58	Q48	9284	L58	Q107	9343	L59	Q5	9402	L59	Q64
9226	L58	Q49	9285	L58	Q108	9344	L59	Q6	9403	L59	Q65
9227	L58	Q50	9286	L58	Q109	9345	L59	Q7	9404	L59	Q66
9228	L58	Q51	9287	L58	Q110	9346	L59	Q8	9405	L59	Q67
9229	L58	Q52	9288	L58	Q111	9347	L59	Q9	9406	L59	Q68
9230	L58	Q53	9289	L58	Q112	9348	L59	Q10	9407	L59	Q69
9231	L58	Q54	9290	L58	Q113	9349	L59	Q11	9408	L59	Q70
9232	L58	Q55	9291	L58	Q114	9350	L59	Q12	9409	L59	Q71
9233	L58	Q56	9292	L58	Q115	9351	L59	Q13	9410	L59	Q72
9234	L58	Q57	9293	L58	Q116	9352	L59	Q14	9411	L59	Q73
9235	L58	Q58	9294	L58	Q117	9353	L59	Q15	9412	L59	Q74
9236	L58	Q59	9295	L58	Q118	9354	L59	Q16	9413	L59	Q75
9237	L58	Q60	9296	L58	Q119	9355	L59	Q17	9414	L59	Q76
9238	L58	Q61	9297	L58	Q120	9356	L59	Q18	9415	L59	Q77
9239	L58	Q62	9298	L58	Q121	9357	L59	Q19	9416	L59	Q78
9240	L58	Q63	9299	L58	Q122	9358	L59	Q20	9417	L59	Q79
9241	L58	Q64	9300	L58	Q123	9359	L59	Q21	9418	L59	Q80
9242	L58	Q65	9301	L58	Q124	9360	L59	Q22	9419	L59	Q81
9243	L58	Q66	9302	L58	Q125	9361	L59	Q23	9420	L59	Q82
9244	L58	Q67	9303	L58	Q126	9362	L59	Q24	9421	L59	Q83
9245	L58	Q68	9304	L58	Q127	9363	L59	Q25	9422	L59	Q84
9246	L58	Q69	9305	L58	Q128	9364	L59	Q26	9423	L59	Q85
9247	L58	Q70	9306	L58	Q129	9365	L59	Q27	9424	L59	Q86
9248	L58	Q71	9307	L58	Q130	9366	L59	Q28	9425	L59	Q87
9249	L58	Q72	9308	L58	Q131	9367	L59	Q29	9426	L59	Q88
9250	L58	Q73	9309	L58	Q132	9368	L59	Q30	9427	L59	Q89
9251	L58	Q74	9310	L58	Q133	9369	L59	Q31	9428	L59	Q90
9252	L58	Q75	9311	L58	Q134	9370	L59	Q32	9429	L59	Q91
9253	L58	Q76	9312	L58	Q135	9371	L59	Q33	9430	L59	Q92
9254	L58	Q77	9313	L58	Q136	9372	L59	Q34	9431	L59	Q93
9255	L58	Q78	9314	L58	Q137	9373	L59	Q35	9432	L59	Q94
9256	L58	Q79	9315	L58	Q138	9374	L59	Q36	9433	L59	Q95
9257	L58	Q80	9316	L58	Q139	9375	L59	Q37	9434	L59	Q96
9258	L58	Q81	9317	L58	Q140	9376	L59	Q38	9435	L59	Q97
9259	L58	Q82	9318	L58	Q141	9377	L59	Q39	9436	L59	Q98
9260	L58	Q83	9319	L58	Q142	9378	L59	Q40	9437	L59	Q99
9261	L58	Q84	9320	L58	Q143	9379	L59	Q41	9438	L59	Q100
9262	L58	Q85	9321	L58	Q144	9380	L59	Q42	9439	L59	Q101

[Table 1-41]

9440	L59	Q102	9499	L59	Q161	9558	L60	Q59	9617	L60	Q118
9441	L59	Q103	9500	L60	Q1	9559	L60	Q60	9618	L60	Q119
9442	L59	Q104	9501	L60	Q2	9560	L60	Q61	9619	L60	Q120
9443	L59	Q105	9502	L60	Q3	9561	L60	Q62	9620	L60	Q121
9444	L59	Q106	9503	L60	Q4	9562	L60	Q63	9621	L60	Q122
9445	L59	Q107	9504	L60	Q5	9563	L60	Q64	9622	L60	Q123
9446	L59	Q108	9505	L60	Q6	9564	L60	Q65	9623	L60	Q124
9447	L59	Q109	9506	L60	Q7	9565	L60	Q66	9624	L60	Q125
9448	L59	Q110	9507	L60	Q8	9566	L60	Q67	9625	L60	Q126
9449	L59	Q111	9508	L60	Q9	9567	L60	Q68	9626	L60	Q127
9450	L59	Q112	9509	L60	Q10	9568	L60	Q69	9627	L60	Q128
9451	L59	Q113	9510	L60	Q11	9569	L60	Q70	9628	L60	Q129
9452	L59	Q114	9511	L60	Q12	9570	L60	Q71	9629	L60	Q130
9453	L59	Q115	9512	L60	Q13	9571	L60	Q72	9630	L60	Q131
9454	L59	Q116	9513	L60	Q14	9572	L60	Q73	9631	L60	Q132
9455	L59	Q117	9514	L60	Q15	9573	L60	Q74	9632	L60	Q133
9456	L59	Q118	9515	L60	Q16	9574	L60	Q75	9633	L60	Q134
9457	L59	Q119	9516	L60	Q17	9575	L60	Q76	9634	L60	Q135
9458	L59	Q120	9517	L60	Q18	9576	L60	Q77	9635	L60	Q136
9459	L59	Q121	9518	L60	Q19	9577	L60	Q78	9636	L60	Q137
9460	L59	Q122	9519	L60	Q20	9578	L60	Q79	9637	L60	Q138
9461	L59	Q123	9520	L60	Q21	9579	L60	Q80	9638	L60	Q139
9462	L59	Q124	9521	L60	Q22	9580	L60	Q81	9639	L60	Q140
9463	L59	Q125	9522	L60	Q23	9581	L60	Q82	9640	L60	Q141
9464	L59	Q126	9523	L60	Q24	9582	L60	Q83	9641	L60	Q142
9465	L59	Q127	9524	L60	Q25	9583	L60	Q84	9642	L60	Q143
9466	L59	Q128	9525	L60	Q26	9584	L60	Q85	9643	L60	Q144
9467	L59	Q129	9526	L60	Q27	9585	L60	Q86	9644	L60	Q145
9468	L59	Q130	9527	L60	Q28	9586	L60	Q87	9645	L60	Q146
9469	L59	Q131	9528	L60	Q29	9587	L60	Q88	9646	L60	Q147
9470	L59	Q132	9529	L60	Q30	9588	L60	Q89	9647	L60	Q148
9471	L59	Q133	9530	L60	Q31	9589	L60	Q90	9648	L60	Q149
9472	L59	Q134	9531	L60	Q32	9590	L60	Q91	9649	L60	Q150
9473	L59	Q135	9532	L60	Q33	9591	L60	Q92	9650	L60	Q151
9474	L59	Q136	9533	L60	Q34	9592	L60	Q93	9651	L60	Q152
9475	L59	Q137	9534	L60	Q35	9593	L60	Q94	9652	L60	Q153
9476	L59	Q138	9535	L60	Q36	9594	L60	Q95	9653	L60	Q154
9477	L59	Q139	9536	L60	Q37	9595	L60	Q96	9654	L60	Q155
9478	L59	Q140	9537	L60	Q38	9596	L60	Q97	9655	L60	Q156
9479	L59	Q141	9538	L60	Q39	9597	L60	Q98	9656	L60	Q157
9480	L59	Q142	9539	L60	Q40	9598	L60	Q99	9657	L60	Q158
9481	L59	Q143	9540	L60	Q41	9599	L60	Q100	9658	L60	Q159
9482	L59	Q144	9541	L60	Q42	9600	L60	Q101	9659	L60	Q160
9483	L59	Q145	9542	L60	Q43	9601	L60	Q102	9660	L60	Q161
9484	L59	Q146	9543	L60	Q44	9602	L60	Q103	9661	L61	Q1
9485	L59	Q147	9544	L60	Q45	9603	L60	Q104	9662	L61	Q2
9486	L59	Q148	9545	L60	Q46	9604	L60	Q105	9663	L61	Q3
9487	L59	Q149	9546	L60	Q47	9605	L60	Q106	9664	L61	Q4
9488	L59	Q150	9547	L60	Q48	9606	L60	Q107	9665	L61	Q5
9489	L59	Q151	9548	L60	Q49	9607	L60	Q108	9666	L61	Q6
9490	L59	Q152	9549	L60	Q50	9608	L60	Q109	9667	L61	Q7
9491	L59	Q153	9550	L60	Q51	9609	L60	Q110	9668	L61	Q8
9492	L59	Q154	9551	L60	Q52	9610	L60	Q111	9669	L61	Q9
9493	L59	Q155	9552	L60	Q53	9611	L60	Q112	9670	L61	Q10
9494	L59	Q156	9553	L60	Q54	9612	L60	Q113	9671	L61	Q11
9495	L59	Q157	9554	L60	Q55	9613	L60	Q114	9672	L61	Q12
9496	L59	Q158	9555	L60	Q56	9614	L60	Q115	9673	L61	Q13
9497	L59	Q159	9556	L60	Q57	9615	L60	Q116	9674	L61	Q14
9498	L59	Q160	9557	L60	Q58	9616	L60	Q117	9675	L61	Q15

[Table 1-42]

9676	L61	Q16	9735	L61	Q75	9794	L61	Q134	9853	L62	Q32
9677	L61	Q17	9736	L61	Q76	9795	L61	Q135	9854	L62	Q33
9678	L61	Q18	9737	L61	Q77	9796	L61	Q136	9855	L62	Q34
9679	L61	Q19	9738	L61	Q78	9797	L61	Q137	9856	L62	Q35
9680	L61	Q20	9739	L61	Q79	9798	L61	Q138	9857	L62	Q36
9681	L61	Q21	9740	L61	Q80	9799	L61	Q139	9858	L62	Q37
9682	L61	Q22	9741	L61	Q81	9800	L61	Q140	9859	L62	Q38
9683	L61	Q23	9742	L61	Q82	9801	L61	Q141	9860	L62	Q39
9684	L61	Q24	9743	L61	Q83	9802	L61	Q142	9861	L62	Q40
9685	L61	Q25	9744	L61	Q84	9803	L61	Q143	9862	L62	Q41
9686	L61	Q26	9745	L61	Q85	9804	L61	Q144	9863	L62	Q42
9687	L61	Q27	9746	L61	Q86	9805	L61	Q145	9864	L62	Q43
9688	L61	Q28	9747	L61	Q87	9806	L61	Q146	9865	L62	Q44
9689	L61	Q29	9748	L61	Q88	9807	L61	Q147	9866	L62	Q45
9690	L61	Q30	9749	L61	Q89	9808	L61	Q148	9867	L62	Q46
9691	L61	Q31	9750	L61	Q90	9809	L61	Q149	9868	L62	Q47
9692	L61	Q32	9751	L61	Q91	9810	L61	Q150	9869	L62	Q48
9693	L61	Q33	9752	L61	Q92	9811	L61	Q151	9870	L62	Q49
9694	L61	Q34	9753	L61	Q93	9812	L61	Q152	9871	L62	Q50
9695	L61	Q35	9754	L61	Q94	9813	L61	Q153	9872	L62	Q51
9696	L61	Q36	9755	L61	Q95	9814	L61	Q154	9873	L62	Q52
9697	L61	Q37	9756	L61	Q96	9815	L61	Q155	9874	L62	Q53
9698	L61	Q38	9757	L61	Q97	9816	L61	Q156	9875	L62	Q54
9699	L61	Q39	9758	L61	Q98	9817	L61	Q157	9876	L62	Q55
9700	L61	Q40	9759	L61	Q99	9818	L61	Q158	9877	L62	Q56
9701	L61	Q41	9760	L61	Q100	9819	L61	Q159	9878	L62	Q57
9702	L61	Q42	9761	L61	Q101	9820	L61	Q160	9879	L62	Q58
9703	L61	Q43	9762	L61	Q102	9821	L61	Q161	9880	L62	Q59
9704	L61	Q44	9763	L61	Q103	9822	L62	Q1	9881	L62	Q60
9705	L61	Q45	9764	L61	Q104	9823	L62	Q2	9882	L62	Q61
9706	L61	Q46	9765	L61	Q105	9824	L62	Q3	9883	L62	Q62
9707	L61	Q47	9766	L61	Q106	9825	L62	Q4	9884	L62	Q63
9708	L61	Q48	9767	L61	Q107	9826	L62	Q5	9885	L62	Q64
9709	L61	Q49	9768	L61	Q108	9827	L62	Q6	9886	L62	Q65
9710	L61	Q50	9769	L61	Q109	9828	L62	Q7	9887	L62	Q66
9711	L61	Q51	9770	L61	Q110	9829	L62	Q8	9888	L62	Q67
9712	L61	Q52	9771	L61	Q111	9830	L62	Q9	9889	L62	Q68
9713	L61	Q53	9772	L61	Q112	9831	L62	Q10	9890	L62	Q69
9714	L61	Q54	9773	L61	Q113	9832	L62	Q11	9891	L62	Q70
9715	L61	Q55	9774	L61	Q114	9833	L62	Q12	9892	L62	Q71
9716	L61	Q56	9775	L61	Q115	9834	L62	Q13	9893	L62	Q72
9717	L61	Q57	9776	L61	Q116	9835	L62	Q14	9894	L62	Q73
9718	L61	Q58	9777	L61	Q117	9836	L62	Q15	9895	L62	Q74
9719	L61	Q59	9778	L61	Q118	9837	L62	Q16	9896	L62	Q75
9720	L61	Q60	9779	L61	Q119	9838	L62	Q17	9897	L62	Q76
9721	L61	Q61	9780	L61	Q120	9839	L62	Q18	9898	L62	Q77
9722	L61	Q62	9781	L61	Q121	9840	L62	Q19	9899	L62	Q78
9723	L61	Q63	9782	L61	Q122	9841	L62	Q20	9900	L62	Q79
9724	L61	Q64	9783	L61	Q123	9842	L62	Q21	9901	L62	Q80
9725	L61	Q65	9784	L61	Q124	9843	L62	Q22	9902	L62	Q81
9726	L61	Q66	9785	L61	Q125	9844	L62	Q23	9903	L62	Q82
9727	L61	Q67	9786	L61	Q126	9845	L62	Q24	9904	L62	Q83
9728	L61	Q68	9787	L61	Q127	9846	L62	Q25	9905	L62	Q84
9729	L61	Q69	9788	L61	Q128	9847	L62	Q26	9906	L62	Q85
9730	L61	Q70	9789	L61	Q129	9848	L62	Q27	9907	L62	Q86
9731	L61	Q71	9790	L61	Q130	9849	L62	Q28	9908	L62	Q87
9732	L61	Q72	9791	L61	Q131	9850	L62	Q29	9909	L62	Q88
9733	L61	Q73	9792	L61	Q132	9851	L62	Q30	9910	L62	Q89
9734	L61	Q74	9793	L61	Q133	9852	L62	Q31	9911	L62	Q90

[Table 1-43]

9912	L62	Q91	9971	L62	Q150	10030	L63	Q48	10089	L63	Q107
9913	L62	Q92	9972	L62	Q151	10031	L63	Q49	10090	L63	Q108
9914	L62	Q93	9973	L62	Q152	10032	L63	Q50	10091	L63	Q109
9915	L62	Q94	9974	L62	Q153	10033	L63	Q51	10092	L63	Q110
9916	L62	Q95	9975	L62	Q154	10034	L63	Q52	10093	L63	Q111
9917	L62	Q96	9976	L62	Q155	10035	L63	Q53	10094	L63	Q112
9918	L62	Q97	9977	L62	Q156	10036	L63	Q54	10095	L63	Q113
9919	L62	Q98	9978	L62	Q157	10037	L63	Q55	10096	L63	Q114
9920	L62	Q99	9979	L62	Q158	10038	L63	Q56	10097	L63	Q115
9921	L62	Q100	9980	L62	Q159	10039	L63	Q57	10098	L63	Q116
9922	L62	Q101	9981	L62	Q160	10040	L63	Q58	10099	L63	Q117
9923	L62	Q102	9982	L62	Q161	10041	L63	Q59	10100	L63	Q118
9924	L62	Q103	9983	L63	Q1	10042	L63	Q60	10101	L63	Q119
9925	L62	Q104	9984	L63	Q2	10043	L63	Q61	10102	L63	Q120
9926	L62	Q105	9985	L63	Q3	10044	L63	Q62	10103	L63	Q121
9927	L62	Q106	9986	L63	Q4	10045	L63	Q63	10104	L63	Q122
9928	L62	Q107	9987	L63	Q5	10046	L63	Q64	10105	L63	Q123
9929	L62	Q108	9988	L63	Q6	10047	L63	Q65	10106	L63	Q124
9930	L62	Q109	9989	L63	Q7	10048	L63	Q66	10107	L63	Q125
9931	L62	Q110	9990	L63	Q8	10049	L63	Q67	10108	L63	Q126
9932	L62	Q111	9991	L63	Q9	10050	L63	Q68	10109	L63	Q127
9933	L62	Q112	9992	L63	Q10	10051	L63	Q69	10110	L63	Q128
9934	L62	Q113	9993	L63	Q11	10052	L63	Q70	10111	L63	Q129
9935	L62	Q114	9994	L63	Q12	10053	L63	Q71	10112	L63	Q130
9936	L62	Q115	9995	L63	Q13	10054	L63	Q72	10113	L63	Q131
9937	L62	Q116	9996	L63	Q14	10055	L63	Q73	10114	L63	Q132
9938	L62	Q117	9997	L63	Q15	10056	L63	Q74	10115	L63	Q133
9939	L62	Q118	9998	L63	Q16	10057	L63	Q75	10116	L63	Q134
9940	L62	Q119	9999	L63	Q17	10058	L63	Q76	10117	L63	Q135
9941	L62	Q120	10000	L63	Q18	10059	L63	Q77	10118	L63	Q136
9942	L62	Q121	10001	L63	Q19	10060	L63	Q78	10119	L63	Q137
9943	L62	Q122	10002	L63	Q20	10061	L63	Q79	10120	L63	Q138
9944	L62	Q123	10003	L63	Q21	10062	L63	Q80	10121	L63	Q139
9945	L62	Q124	10004	L63	Q22	10063	L63	Q81	10122	L63	Q140
9946	L62	Q125	10005	L63	Q23	10064	L63	Q82	10123	L63	Q141
9947	L62	Q126	10006	L63	Q24	10065	L63	Q83	10124	L63	Q142
9948	L62	Q127	10007	L63	Q25	10066	L63	Q84	10125	L63	Q143
9949	L62	Q128	10008	L63	Q26	10067	L63	Q85	10126	L63	Q144
9950	L62	Q129	10009	L63	Q27	10068	L63	Q86	10127	L63	Q145
9951	L62	Q130	10010	L63	Q28	10069	L63	Q87	10128	L63	Q146
9952	L62	Q131	10011	L63	Q29	10070	L63	Q88	10129	L63	Q147
9953	L62	Q132	10012	L63	Q30	10071	L63	Q89	10130	L63	Q148
9954	L62	Q133	10013	L63	Q31	10072	L63	Q90	10131	L63	Q149
9955	L62	Q134	10014	L63	Q32	10073	L63	Q91	10132	L63	Q150
9956	L62	Q135	10015	L63	Q33	10074	L63	Q92	10133	L63	Q151
9957	L62	Q136	10016	L63	Q34	10075	L63	Q93	10134	L63	Q152
9958	L62	Q137	10017	L63	Q35	10076	L63	Q94	10135	L63	Q153
9959	L62	Q138	10018	L63	Q36	10077	L63	Q95	10136	L63	Q154
9960	L62	Q139	10019	L63	Q37	10078	L63	Q96	10137	L63	Q155
9961	L62	Q140	10020	L63	Q38	10079	L63	Q97	10138	L63	Q156
9962	L62	Q141	10021	L63	Q39	10080	L63	Q98	10139	L63	Q157
9963	L62	Q142	10022	L63	Q40	10081	L63	Q99	10140	L63	Q158
9964	L62	Q143	10023	L63	Q41	10082	L63	Q100	10141	L63	Q159
9965	L62	Q144	10024	L63	Q42	10083	L63	Q101	10142	L63	Q160
9966	L62	Q145	10025	L63	Q43	10084	L63	Q102	10143	L63	Q161
9967	L62	Q146	10026	L63	Q44	10085	L63	Q103	10144	L64	Q1
9968	L62	Q147	10027	L63	Q45	10086	L63	Q104	10145	L64	Q2
9969	L62	Q148	10028	L63	Q46	10087	L63	Q105	10146	L64	Q3
9970	L62	Q149	10029	L63	Q47	10088	L63	Q106	10147	L64	Q4

[Table 1-44]

10148	L64	Q5	10207	L64	Q64	10266	L64	Q123	10325	L65	Q21
10149	L64	Q6	10208	L64	Q65	10267	L64	Q124	10326	L65	Q22
10150	L64	Q7	10209	L64	Q66	10268	L64	Q125	10327	L65	Q23
10151	L64	Q8	10210	L64	Q67	10269	L64	Q126	10328	L65	Q24
10152	L64	Q9	10211	L64	Q68	10270	L64	Q127	10329	L65	Q25
10153	L64	Q10	10212	L64	Q69	10271	L64	Q128	10330	L65	Q26
10154	L64	Q11	10213	L64	Q70	10272	L64	Q129	10331	L65	Q27
10155	L64	Q12	10214	L64	Q71	10273	L64	Q130	10332	L65	Q28
10156	L64	Q13	10215	L64	Q72	10274	L64	Q131	10333	L65	Q29
10157	L64	Q14	10216	L64	Q73	10275	L64	Q132	10334	L65	Q30
10158	L64	Q15	10217	L64	Q74	10276	L64	Q133	10335	L65	Q31
10159	L64	Q16	10218	L64	Q75	10277	L64	Q134	10336	L65	Q32
10160	L64	Q17	10219	L64	Q76	10278	L64	Q135	10337	L65	Q33
10161	L64	Q18	10220	L64	Q77	10279	L64	Q136	10338	L65	Q34
10162	L64	Q19	10221	L64	Q78	10280	L64	Q137	10339	L65	Q35
10163	L64	Q20	10222	L64	Q79	10281	L64	Q138	10340	L65	Q36
10164	L64	Q21	10223	L64	Q80	10282	L64	Q139	10341	L65	Q37
10165	L64	Q22	10224	L64	Q81	10283	L64	Q140	10342	L65	Q38
10166	L64	Q23	10225	L64	Q82	10284	L64	Q141	10343	L65	Q39
10167	L64	Q24	10226	L64	Q83	10285	L64	Q142	10344	L65	Q40
10168	L64	Q25	10227	L64	Q84	10286	L64	Q143	10345	L65	Q41
10169	L64	Q26	10228	L64	Q85	10287	L64	Q144	10346	L65	Q42
10170	L64	Q27	10229	L64	Q86	10288	L64	Q145	10347	L65	Q43
10171	L64	Q28	10230	L64	Q87	10289	L64	Q146	10348	L65	Q44
10172	L64	Q29	10231	L64	Q88	10290	L64	Q147	10349	L65	Q45
10173	L64	Q30	10232	L64	Q89	10291	L64	Q148	10350	L65	Q46
10174	L64	Q31	10233	L64	Q90	10292	L64	Q149	10351	L65	Q47
10175	L64	Q32	10234	L64	Q91	10293	L64	Q150	10352	L65	Q48
10176	L64	Q33	10235	L64	Q92	10294	L64	Q151	10353	L65	Q49
10177	L64	Q34	10236	L64	Q93	10295	L64	Q152	10354	L65	Q50
10178	L64	Q35	10237	L64	Q94	10296	L64	Q153	10355	L65	Q51
10179	L64	Q36	10238	L64	Q95	10297	L64	Q154	10356	L65	Q52
10180	L64	Q37	10239	L64	Q96	10298	L64	Q155	10357	L65	Q53
10181	L64	Q38	10240	L64	Q97	10299	L64	Q156	10358	L65	Q54
10182	L64	Q39	10241	L64	Q98	10300	L64	Q157	10359	L65	Q55
10183	L64	Q40	10242	L64	Q99	10301	L64	Q158	10360	L65	Q56
10184	L64	Q41	10243	L64	Q100	10302	L64	Q159	10361	L65	Q57
10185	L64	Q42	10244	L64	Q101	10303	L64	Q160	10362	L65	Q58
10186	L64	Q43	10245	L64	Q102	10304	L64	Q161	10363	L65	Q59
10187	L64	Q44	10246	L64	Q103	10305	L65	Q1	10364	L65	Q60
10188	L64	Q45	10247	L64	Q104	10306	L65	Q2	10365	L65	Q61
10189	L64	Q46	10248	L64	Q105	10307	L65	Q3	10366	L65	Q62
10190	L64	Q47	10249	L64	Q106	10308	L65	Q4	10367	L65	Q63
10191	L64	Q48	10250	L64	Q107	10309	L65	Q5	10368	L65	Q64
10192	L64	Q49	10251	L64	Q108	10310	L65	Q6	10369	L65	Q65
10193	L64	Q50	10252	L64	Q109	10311	L65	Q7	10370	L65	Q66
10194	L64	Q51	10253	L64	Q110	10312	L65	Q8	10371	L65	Q67
10195	L64	Q52	10254	L64	Q111	10313	L65	Q9	10372	L65	Q68
10196	L64	Q53	10255	L64	Q112	10314	L65	Q10	10373	L65	Q69
10197	L64	Q54	10256	L64	Q113	10315	L65	Q11	10374	L65	Q70
10198	L64	Q55	10257	L64	Q114	10316	L65	Q12	10375	L65	Q71
10199	L64	Q56	10258	L64	Q115	10317	L65	Q13	10376	L65	Q72
10200	L64	Q57	10259	L64	Q116	10318	L65	Q14	10377	L65	Q73
10201	L64	Q58	10260	L64	Q117	10319	L65	Q15	10378	L65	Q74
10202	L64	Q59	10261	L64	Q118	10320	L65	Q16	10379	L65	Q75
10203	L64	Q60	10262	L64	Q119	10321	L65	Q17	10380	L65	Q76
10204	L64	Q61	10263	L64	Q120	10322	L65	Q18	10381	L65	Q77
10205	L64	Q62	10264	L64	Q121	10323	L65	Q19	10382	L65	Q78
10206	L64	Q63	10265	L64	Q122	10324	L65	Q20	10383	L65	Q79

[Table 1-45]

10384	L65	Q80	10443	L65	Q139	10502	L66	Q37	10561	L66	Q96
10385	L65	Q81	10444	L65	Q140	10503	L66	Q38	10562	L66	Q97
10386	L65	Q82	10445	L65	Q141	10504	L66	Q39	10563	L66	Q98
10387	L65	Q83	10446	L65	Q142	10505	L66	Q40	10564	L66	Q99
10388	L65	Q84	10447	L65	Q143	10506	L66	Q41	10565	L66	Q100
10389	L65	Q85	10448	L65	Q144	10507	L66	Q42	10566	L66	Q101
10390	L65	Q86	10449	L65	Q145	10508	L66	Q43	10567	L66	Q102
10391	L65	Q87	10450	L65	Q146	10509	L66	Q44	10568	L66	Q103
10392	L65	Q88	10451	L65	Q147	10510	L66	Q45	10569	L66	Q104
10393	L65	Q89	10452	L65	Q148	10511	L66	Q46	10570	L66	Q105
10394	L65	Q90	10453	L65	Q149	10512	L66	Q47	10571	L66	Q106
10395	L65	Q91	10454	L65	Q150	10513	L66	Q48	10572	L66	Q107
10396	L65	Q92	10455	L65	Q151	10514	L66	Q49	10573	L66	Q108
10397	L65	Q93	10456	L65	Q152	10515	L66	Q50	10574	L66	Q109
10398	L65	Q94	10457	L65	Q153	10516	L66	Q51	10575	L66	Q110
10399	L65	Q95	10458	L65	Q154	10517	L66	Q52	10576	L66	Q111
10400	L65	Q96	10459	L65	Q155	10518	L66	Q53	10577	L66	Q112
10401	L65	Q97	10460	L65	Q156	10519	L66	Q54	10578	L66	Q113
10402	L65	Q98	10461	L65	Q157	10520	L66	Q55	10579	L66	Q114
10403	L65	Q99	10462	L65	Q158	10521	L66	Q56	10580	L66	Q115
10404	L65	Q100	10463	L65	Q159	10522	L66	Q57	10581	L66	Q116
10405	L65	Q101	10464	L65	Q160	10523	L66	Q58	10582	L66	Q117
10406	L65	Q102	10465	L65	Q161	10524	L66	Q59	10583	L66	Q118
10407	L65	Q103	10466	L66	Q1	10525	L66	Q60	10584	L66	Q119
10408	L65	Q104	10467	L66	Q2	10526	L66	Q61	10585	L66	Q120
10409	L65	Q105	10468	L66	Q3	10527	L66	Q62	10586	L66	Q121
10410	L65	Q106	10469	L66	Q4	10528	L66	Q63	10587	L66	Q122
10411	L65	Q107	10470	L66	Q5	10529	L66	Q64	10588	L66	Q123
10412	L65	Q108	10471	L66	Q6	10530	L66	Q65	10589	L66	Q124
10413	L65	Q109	10472	L66	Q7	10531	L66	Q66	10590	L66	Q125
10414	L65	Q110	10473	L66	Q8	10532	L66	Q67	10591	L66	Q126
10415	L65	Q111	10474	L66	Q9	10533	L66	Q68	10592	L66	Q127
10416	L65	Q112	10475	L66	Q10	10534	L66	Q69	10593	L66	Q128
10417	L65	Q113	10476	L66	Q11	10535	L66	Q70	10594	L66	Q129
10418	L65	Q114	10477	L66	Q12	10536	L66	Q71	10595	L66	Q130
10419	L65	Q115	10478	L66	Q13	10537	L66	Q72	10596	L66	Q131
10420	L65	Q116	10479	L66	Q14	10538	L66	Q73	10597	L66	Q132
10421	L65	Q117	10480	L66	Q15	10539	L66	Q74	10598	L66	Q133
10422	L65	Q118	10481	L66	Q16	10540	L66	Q75	10599	L66	Q134
10423	L65	Q119	10482	L66	Q17	10541	L66	Q76	10600	L66	Q135
10424	L65	Q120	10483	L66	Q18	10542	L66	Q77	10601	L66	Q136
10425	L65	Q121	10484	L66	Q19	10543	L66	Q78	10602	L66	Q137
10426	L65	Q122	10485	L66	Q20	10544	L66	Q79	10603	L66	Q138
10427	L65	Q123	10486	L66	Q21	10545	L66	Q80	10604	L66	Q139
10428	L65	Q124	10487	L66	Q22	10546	L66	Q81	10605	L66	Q140
10429	L65	Q125	10488	L66	Q23	10547	L66	Q82	10606	L66	Q141
10430	L65	Q126	10489	L66	Q24	10548	L66	Q83	10607	L66	Q142
10431	L65	Q127	10490	L66	Q25	10549	L66	Q84	10608	L66	Q143
10432	L65	Q128	10491	L66	Q26	10550	L66	Q85	10609	L66	Q144
10433	L65	Q129	10492	L66	Q27	10551	L66	Q86	10610	L66	Q145
10434	L65	Q130	10493	L66	Q28	10552	L66	Q87	10611	L66	Q146
10435	L65	Q131	10494	L66	Q29	10553	L66	Q88	10612	L66	Q147
10436	L65	Q132	10495	L66	Q30	10554	L66	Q89	10613	L66	Q148
10437	L65	Q133	10496	L66	Q31	10555	L66	Q90	10614	L66	Q149
10438	L65	Q134	10497	L66	Q32	10556	L66	Q91	10615	L66	Q150
10439	L65	Q135	10498	L66	Q33	10557	L66	Q92	10616	L66	Q151
10440	L65	Q136	10499	L66	Q34	10558	L66	Q93	10617	L66	Q152
10441	L65	Q137	10500	L66	Q35	10559	L66	Q94	10618	L66	Q153
10442	L65	Q138	10501	L66	Q36	10560	L66	Q95	10619	L66	Q154

[Table 1-46]

10620	L66	Q155
10621	L66	Q156
10622	L66	Q157
10623	L66	Q158
10624	L66	Q159
10625	L66	Q160
10626	L66	Q161
10627	L67	Q1
10628	L67	Q2
10629	L67	Q3
10630	L67	Q4
10631	L67	Q5
10632	L67	Q6
10633	L67	Q7
10634	L67	Q8
10635	L67	Q9
10636	L67	Q10
10637	L67	Q11
10638	L67	Q12
10639	L67	Q13
10640	L67	Q14
10641	L67	Q15
10642	L67	Q16
10643	L67	Q17
10644	L67	Q18
10645	L67	Q19
10646	L67	Q20
10647	L67	Q21
10648	L67	Q22
10649	L67	Q23
10650	L67	Q24
10651	L67	Q25
10652	L67	Q26
10653	L67	Q27
10654	L67	Q28
10655	L67	Q29
10656	L67	Q30
10657	L67	Q31
10658	L67	Q32
10659	L67	Q33
10660	L67	Q34
10661	L67	Q35
10662	L67	Q36
10663	L67	Q37
10664	L67	Q38
10665	L67	Q39
10666	L67	Q40
10667	L67	Q41
10668	L67	Q42
10669	L67	Q43
10670	L67	Q44
10671	L67	Q45
10672	L67	Q46
10673	L67	Q47
10674	L67	Q48
10675	L67	Q49
10676	L67	Q50
10677	L67	Q51
10678	L67	Q52
10679	L67	Q53
10680	L67	Q54
10681	L67	Q55
10682	L67	Q56
10683	L67	Q57
10684	L67	Q58
10685	L67	Q59
10686	L67	Q60
10687	L67	Q61
10688	L67	Q62
10689	L67	Q63
10690	L67	Q64
10691	L67	Q65
10692	L67	Q66
10693	L67	Q67
10694	L67	Q68
10695	L67	Q69
10696	L67	Q70
10697	L67	Q71
10698	L67	Q72
10699	L67	Q73
10700	L67	Q74
10701	L67	Q75
10702	L67	Q76
10703	L67	Q77
10704	L67	Q78
10705	L67	Q79
10706	L67	Q80
10707	L67	Q81
10708	L67	Q82
10709	L67	Q83
10710	L67	Q84
10711	L67	Q85
10712	L67	Q86
10713	L67	Q87
10714	L67	Q88
10715	L67	Q89
10716	L67	Q90
10717	L67	Q91
10718	L67	Q92
10719	L67	Q93
10720	L67	Q94
10721	L67	Q95
10722	L67	Q96
10723	L67	Q97
10724	L67	Q98
10725	L67	Q99
10726	L67	Q100
10727	L67	Q101
10728	L67	Q102
10729	L67	Q103
10730	L67	Q104
10731	L67	Q105
10732	L67	Q106
10733	L67	Q107
10734	L67	Q108
10735	L67	Q109
10736	L67	Q110
10737	L67	Q111
10738	L67	Q112
10739	L67	Q113
10740	L67	Q114
10741	L67	Q115
10742	L67	Q116
10743	L67	Q117
10744	L67	Q118
10745	L67	Q119
10746	L67	Q120
10747	L67	Q121
10748	L67	Q122
10749	L67	Q123
10750	L67	Q124
10751	L67	Q125
10752	L67	Q126
10753	L67	Q127
10754	L67	Q128
10755	L67	Q129
10756	L67	Q130
10757	L67	Q131
10758	L67	Q132
10759	L67	Q133
10760	L67	Q134
10761	L67	Q135
10762	L67	Q136
10763	L67	Q137
10764	L67	Q138
10765	L67	Q139
10766	L67	Q140
10767	L67	Q141
10768	L67	Q142
10769	L67	Q143
10770	L67	Q144
10771	L67	Q145
10772	L67	Q146
10773	L67	Q147
10774	L67	Q148
10775	L67	Q149
10776	L67	Q150
10777	L67	Q151
10778	L67	Q152
10779	L67	Q153
10780	L67	Q154
10781	L67	Q155
10782	L67	Q156
10783	L67	Q157
10784	L67	Q158
10785	L67	Q159
10786	L67	Q160
10787	L67	Q161
10788	L68	Q1
10789	L68	Q2
10790	L68	Q3
10791	L68	Q4
10792	L68	Q5
10793	L68	Q6
10794	L68	Q7
10795	L68	Q8
10796	L68	Q9
10797	L68	Q10
10798	L68	Q11
10799	L68	Q12
10800	L68	Q13
10801	L68	Q14
10802	L68	Q15
10803	L68	Q16
10804	L68	Q17
10805	L68	Q18
10806	L68	Q19
10807	L68	Q20
10808	L68	Q21
10809	L68	Q22
10810	L68	Q23
10811	L68	Q24
10812	L68	Q25
10813	L68	Q26
10814	L68	Q27
10815	L68	Q28
10816	L68	Q29
10817	L68	Q30
10818	L68	Q31
10819	L68	Q32
10820	L68	Q33
10821	L68	Q34
10822	L68	Q35
10823	L68	Q36
10824	L68	Q37
10825	L68	Q38
10826	L68	Q39
10827	L68	Q40
10828	L68	Q41
10829	L68	Q42
10830	L68	Q43
10831	L68	Q44
10832	L68	Q45
10833	L68	Q46
10834	L68	Q47
10835	L68	Q48
10836	L68	Q49
10837	L68	Q50
10838	L68	Q51
10839	L68	Q52
10840	L68	Q53
10841	L68	Q54
10842	L68	Q55
10843	L68	Q56
10844	L68	Q57
10845	L68	Q58
10846	L68	Q59
10847	L68	Q60
10848	L68	Q61
10849	L68	Q62
10850	L68	Q63
10851	L68	Q64
10852	L68	Q65
10853	L68	Q66
10854	L68	Q67
10855	L68	Q68

[Table 1-47]

10856	L68	Q69	10915	L68	Q128	10974	L69	Q26	11033	L69	Q85
10857	L68	Q70	10916	L68	Q129	10975	L69	Q27	11034	L69	Q86
10858	L68	Q71	10917	L68	Q130	10976	L69	Q28	11035	L69	Q87
10859	L68	Q72	10918	L68	Q131	10977	L69	Q29	11036	L69	Q88
10860	L68	Q73	10919	L68	Q132	10978	L69	Q30	11037	L69	Q89
10861	L68	Q74	10920	L68	Q133	10979	L69	Q31	11038	L69	Q90
10862	L68	Q75	10921	L68	Q134	10980	L69	Q32	11039	L69	Q91
10863	L68	Q76	10922	L68	Q135	10981	L69	Q33	11040	L69	Q92
10864	L68	Q77	10923	L68	Q136	10982	L69	Q34	11041	L69	Q93
10865	L68	Q78	10924	L68	Q137	10983	L69	Q35	11042	L69	Q94
10866	L68	Q79	10925	L68	Q138	10984	L69	Q36	11043	L69	Q95
10867	L68	Q80	10926	L68	Q139	10985	L69	Q37	11044	L69	Q96
10868	L68	Q81	10927	L68	Q140	10986	L69	Q38	11045	L69	Q97
10869	L68	Q82	10928	L68	Q141	10987	L69	Q39	11046	L69	Q98
10870	L68	Q83	10929	L68	Q142	10988	L69	Q40	11047	L69	Q99
10871	L68	Q84	10930	L68	Q143	10989	L69	Q41	11048	L69	Q100
10872	L68	Q85	10931	L68	Q144	10990	L69	Q42	11049	L69	Q101
10873	L68	Q86	10932	L68	Q145	10991	L69	Q43	11050	L69	Q102
10874	L68	Q87	10933	L68	Q146	10992	L69	Q44	11051	L69	Q103
10875	L68	Q88	10934	L68	Q147	10993	L69	Q45	11052	L69	Q104
10876	L68	Q89	10935	L68	Q148	10994	L69	Q46	11053	L69	Q105
10877	L68	Q90	10936	L68	Q149	10995	L69	Q47	11054	L69	Q106
10878	L68	Q91	10937	L68	Q150	10996	L69	Q48	11055	L69	Q107
10879	L68	Q92	10938	L68	Q151	10997	L69	Q49	11056	L69	Q108
10880	L68	Q93	10939	L68	Q152	10998	L69	Q50	11057	L69	Q109
10881	L68	Q94	10940	L68	Q153	10999	L69	Q51	11058	L69	Q110
10882	L68	Q95	10941	L68	Q154	11000	L69	Q52	11059	L69	Q111
10883	L68	Q96	10942	L68	Q155	11001	L69	Q53	11060	L69	Q112
10884	L68	Q97	10943	L68	Q156	11002	L69	Q54	11061	L69	Q113
10885	L68	Q98	10944	L68	Q157	11003	L69	Q55	11062	L69	Q114
10886	L68	Q99	10945	L68	Q158	11004	L69	Q56	11063	L69	Q115
10887	L68	Q100	10946	L68	Q159	11005	L69	Q57	11064	L69	Q116
10888	L68	Q101	10947	L68	Q160	11006	L69	Q58	11065	L69	Q117
10889	L68	Q102	10948	L68	Q161	11007	L69	Q59	11066	L69	Q118
10890	L68	Q103	10949	L69	Q1	11008	L69	Q60	11067	L69	Q119
10891	L68	Q104	10950	L69	Q2	11009	L69	Q61	11068	L69	Q120
10892	L68	Q105	10951	L69	Q3	11010	L69	Q62	11069	L69	Q121
10893	L68	Q106	10952	L69	Q4	11011	L69	Q63	11070	L69	Q122
10894	L68	Q107	10953	L69	Q5	11012	L69	Q64	11071	L69	Q123
10895	L68	Q108	10954	L69	Q6	11013	L69	Q65	11072	L69	Q124
10896	L68	Q109	10955	L69	Q7	11014	L69	Q66	11073	L69	Q125
10897	L68	Q110	10956	L69	Q8	11015	L69	Q67	11074	L69	Q126
10898	L68	Q111	10957	L69	Q9	11016	L69	Q68	11075	L69	Q127
10899	L68	Q112	10958	L69	Q10	11017	L69	Q69	11076	L69	Q128
10900	L68	Q113	10959	L69	Q11	11018	L69	Q70	11077	L69	Q129
10901	L68	Q114	10960	L69	Q12	11019	L69	Q71	11078	L69	Q130
10902	L68	Q115	10961	L69	Q13	11020	L69	Q72	11079	L69	Q131
10903	L68	Q116	10962	L69	Q14	11021	L69	Q73	11080	L69	Q132
10904	L68	Q117	10963	L69	Q15	11022	L69	Q74	11081	L69	Q133
10905	L68	Q118	10964	L69	Q16	11023	L69	Q75	11082	L69	Q134
10906	L68	Q119	10965	L69	Q17	11024	L69	Q76	11083	L69	Q135
10907	L68	Q120	10966	L69	Q18	11025	L69	Q77	11084	L69	Q136
10908	L68	Q121	10967	L69	Q19	11026	L69	Q78	11085	L69	Q137
10909	L68	Q122	10968	L69	Q20	11027	L69	Q79	11086	L69	Q138
10910	L68	Q123	10969	L69	Q21	11028	L69	Q80	11087	L69	Q139
10911	L68	Q124	10970	L69	Q22	11029	L69	Q81	11088	L69	Q140
10912	L68	Q125	10971	L69	Q23	11030	L69	Q82	11089	L69	Q141
10913	L68	Q126	10972	L69	Q24	11031	L69	Q83	11090	L69	Q142
10914	L68	Q127	10973	L69	Q25	11032	L69	Q84	11091	L69	Q143

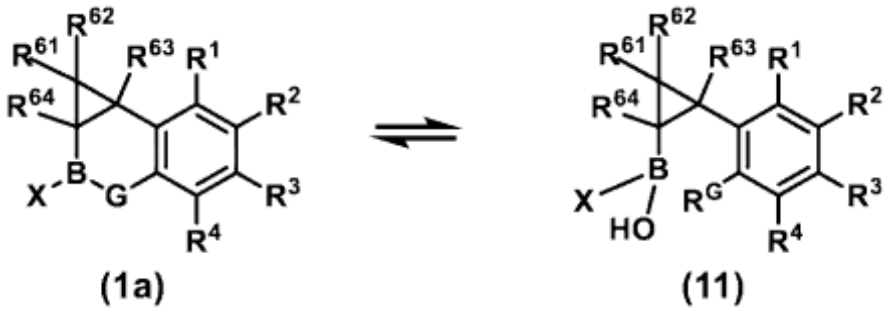
[Table 1-48]

11092	L69	Q144	11098	L69	Q150	11104	L69	Q156
11093	L69	Q145	11099	L69	Q151	11105	L69	Q157
11094	L69	Q146	11100	L69	Q152	11106	L69	Q158
11095	L69	Q147	11101	L69	Q153	11107	L69	Q159
11096	L69	Q148	11102	L69	Q154	11108	L69	Q160
11097	L69	Q149	11103	L69	Q155	11109	L69	Q161

[0206]

A specific example of another embodiment of the compound of the invention includes a compound represented by formula (11):

[Chemical Formula 602]

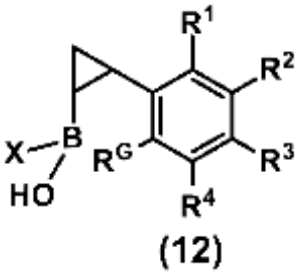


or a pharmaceutically acceptable salt thereof. In formula (11), R^G is a hydroxyl group, a thiol group, or $-NHR^{a1}$, R^{a1}, X, R^1, R^2, R^3, R^4, R^{61}, R^{62}, R^{63}, and R^{64} are defined the same as the definition herein (e.g., any one of items 1 to 16 and items B1 to B15), and formula (1a) is defined the same as the definition herein.

[0207]

A specific example of another embodiment of the compound of the invention includes a compound represented by formula (12):

[Chemical Formula 603]



or a pharmaceutically acceptable salt thereof. In formula (12), R^G is a hydroxyl group, a thiol group, or $-NHR^{a1}$, R^{a1}, X, R^1, R^2, R^3, and R^4 are defined the same as the definition herein (e.g., item

16 or 17 or item B16 or B17). A compound of formula (12) is in an interchangeable relationship with, and thus can be biologically equivalent with, a compound of formula (1a) or (3a) due to an equilibrium reaction in an aqueous solution or in the body.

[0208]

In some embodiments, X and R^G are hydroxyl groups, R^4 is a carboxyl group, and ring A is an optionally substituted 4- to 6-membered nitrogen-containing non-aryl heterocycle.

[0209]

In some embodiments, R^G is a hydroxyl group or a thiol group. In some embodiments, R^G is a hydroxyl group.

[0210]

In some embodiments, X is a hydroxyl group or a C_{1-6} alkoxy group. In some embodiments, X is a hydroxyl group.

[0211]

In some embodiments, m is 1 or 2, n is 1 or 2, and m + n is 2 or 3. In some embodiments, m is 1, and n is 1.

[0212]

In some embodiments, L^3 is defined the same as the definition herein (e.g., item 25 or 26 or B24 or B25).

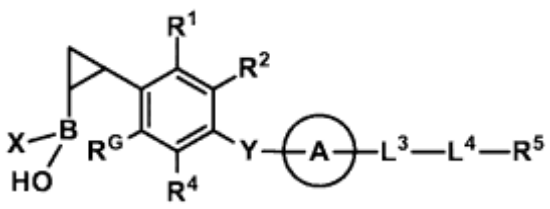
[0213]

In some embodiments, L^4 and R^5 are defined the same as the definition herein (e.g., any one of items 27 and 66 to 100 and B26 and B60 to B89).

[0214]

A specific example of another embodiment of the compound of the invention includes a compound represented by formula (13):

[Chemical Formula 604]



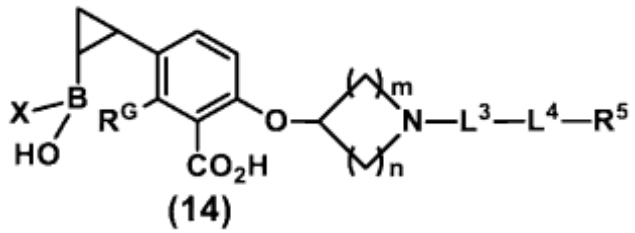
(13)

or a pharmaceutically acceptable salt thereof. In formula (13), X, Y, ring A, L^3, L^4, R^1, R^2, R^4, R^5, and R^G are defined the same as the definition herein (e.g., any one of items 19 to 23 and 29 to 32, 103, 104, B18 to B22, B28 to B31, B91, B92, etc.).

[0215]

A specific example of another embodiment of the compound of the invention includes a compound represented by formula (14):

[Chemical Formula 605]



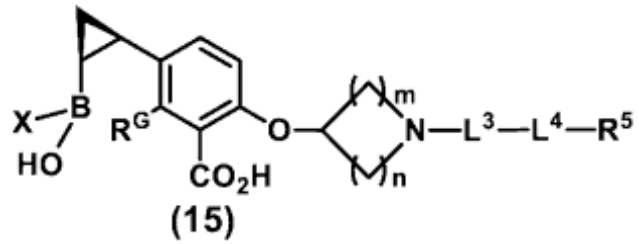
(14)

or a pharmaceutically acceptable salt thereof. In formula (14), X, L^3, L^4, m, n, R^5, and R^G are defined the same as the definition herein (e.g., any one of items 33 to 65, 103, 104, B32 to B59, B91, B92, etc.).

[0216]

A specific example of another embodiment of the compound of the invention includes a compound represented by formula (15):

[Chemical Formula 606]

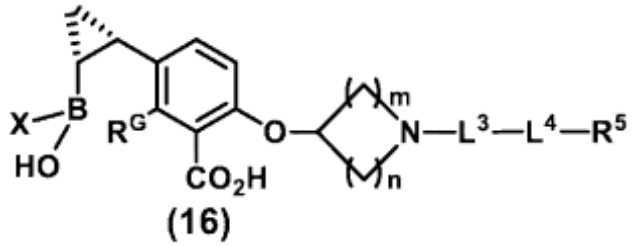


(15)

or

formula (16):

[Chemical Formula 607]



(16)

or a pharmaceutically acceptable salt thereof. In formula (15) or formula (16), X, L^3, L^4, m, n, R^5, and R^G are defined the same as the definition herein (e.g., any one of items 33 to 65, 103, 104, B32 to B59, B91, item B92, etc.).

[0217]

The compound of the invention is described further hereinafter.

The compound of the invention can have, depending on the type of substituent, a tautomer, stereoisomers such as geometric isomer, and enantiomer, which are encompassed by the present invention. Specifically, if the compound of the invention has one or more asymmetric carbon atoms, there is a diastereomer or an enantiomer, where a mixture of such a diastereomer or enantiomer or isolated diastereomer or enantiomer are also encompassed by the compound of the invention. Accordingly, a description of a structure of the compound of the invention herein is interpreted as encompassing all possible isomers, unless specifically noted otherwise. For example with regard to tautomers, a description of one of two descriptions of the following imidazole groups, when either one is described, is interpreted as encompassing both tautomers and mixtures of any ratio of the tautomers in the compound of the invention.

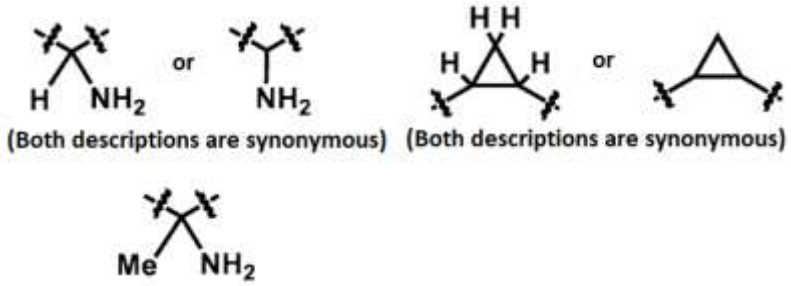
[Chemical Formula 608]



For example with regard to asymmetric carbon atoms, if the structure of a bond with a substituent is described with a solid line (see, for example, the following description examples) or this is described only by a formula without an explicit description of isomers (e.g., $-CH(NH_2)-$, $-CMe(NH_2)-$, or the like), possible diastereomers, enantiomers, and other isomers are

interpreted so that even if an individual isomer is explicitly described separately herein, regardless of the description, a mixture of such isomers of any ratio and each of any isolated possible isomer are encompassed by the compound of the invention by the description of the structure with a solid line or a description with only a formula.

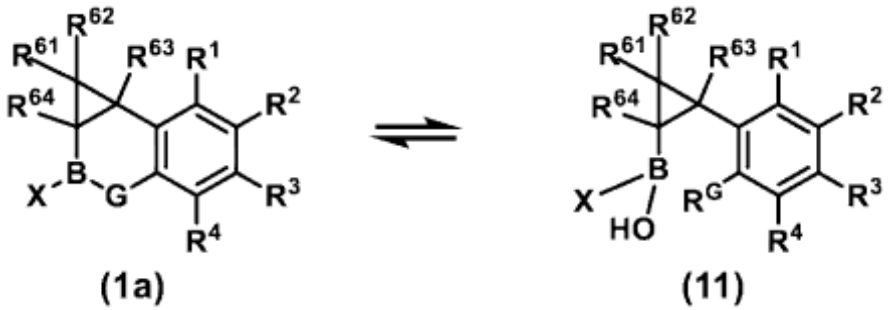
[Chemical Formula 609]



[0218]

The compound of the invention can also have a structure represented by the following formula (11) due to an equilibrium state or the like, depending on the environment conditions such as temperature or humidity, or a physical factor in a solid, liquid, solution, or the like. The compound of the invention also encompasses compounds with such a structure.

[Chemical Formula 610]



In formula (11), X represents a hydroxyl group, a thiol group, or $-NHR^{a1}$, R^G, R^1, R^2, R^3, R^4, R^{a1}, R^{61}, R^{62}, R^{63}, and R^{64} are defined the same as the definitions herein, and formula (1a) is defined the same as the definition herein.

[0219]

For example, the structures of the compounds in the Examples herein are based on estimation considered the most appropriate by those skilled in the art using proton nuclear magnetic resonance spectrum (^{1}H-NMR), liquid chromatography mass spectrometry (LCMS), or the like, but the structures are just estimates under each specific measurement environment. In particular, the structure of formula (1a), the structure of formula (1b), and the structure of formula (11) are possibly converted to each other or partially converted to one of the structures and mixed due to a property unique to each compound, various environmental conditions such as temperature or humidity, or physical factor in a solid, liquid, solution or the like.

[0220]

The compound of the invention also includes various hydrates, solvates, and crystalline polymorphisms.

[0221]

Furthermore, the compound of the invention may be substituted with an isotope (e.g., ^{2}H (or D), ^{3}H (or T), ^{11}C, ^{13}C, ^{14}C, ^{13}N, ^{15}N, ^{15}O, ^{35}S, ^{18}F, ^{125}I, or the like). Such compounds are also encompassed by the compound of the invention.

[0222]

Prodrugs of the compound of the invention are also within the scope of the invention. As used herein, a prodrug refers to a derivative that results in the compound of formula (1a), (1b), or (11) by acid hydrolysis or enzymatic degradation in the body. If, for example, the compound of formula (1a), (1b), or (11) has a hydroxyl group, amino group, or carboxyl group, these groups can be modified in accordance with a conventional method to manufacture a prodrug.

[0223]

Examples for a compound with a carboxy group include compounds whose carboxyl group has been converted to an

alkoxycarbonyl group, alkylthiocarbonyl group, or alkylaminocarbonyl group.

[0224]

Examples for a compound with an amino group include compounds whose amino group has been substituted with an alkanoyl group to be converted to an alkanoylamino group, substituted with an alkoxycarbonyl group to be converted to an alkoxycarbonylamino group, modified to an alkanoyloxymethylamino group, or converted to a hydroxylamine.

[0225]

Examples for a compound with a hydroxyl group include compounds whose hydroxyl group has been substituted with the alkanoyl group described above to be converted to an alkanoyloxy group, converted to a phosphate ester, or converted to an alkanoyloxymethyloxy group.

[0226]

Examples of the alkyl moiety of a group used in producing prodrugs include the alkyl group described above. The alkyl group is optionally substituted with, for example, an alkoxy group or the like. Preferred examples thereof include the following.

[0227]

Examples of compounds whose carboxyl group has been converted to an alkoxycarbonyl group include alkoxycarbonyl such as methoxycarbonyl and ethoxycarbonyl, and alkoxycarbonyl substituted with an alkoxy group such as methoxymethoxycarbonyl, ethoxymethoxycarbonyl, 2-methoxyethoxycarbonyl, 2-methoxyethoxymethoxycarbonyl, and pivaloyloxymethoxycarbonyl.

[0228]

As used herein, "pharmaceutically acceptable salt" refers to an acid addition salt or base addition salt which is pharmaceutically acceptable for use. Examples of "pharmaceutically acceptable salts" include, but are not limited to, acid addition salts such as acetate, propionate, butyrate, formate,

trifluoroacetate, maleate, fumarate, tartrate, citrate, stearate, succinate, ethylsuccinate, malonate, lactobionate, gluconate, glucoheptonate, benzoate, methanesulfonate, benzenesulfonate, para-toluenesulfonate (tosylate), laurylsulfate, malate, ascorbate, mandelate, saccharinate, xinafoate, pamoate, cinnamate, adipate, cysteine salt, N-acetyl cysteine salt, hydrochloride, hydrobromide, phosphate, sulfate, hydroiodide, nicotinate, oxalate, picrate, thiocyanate, undecanoate, acrylic acid polymer salt, and carboxyvinyl polymer; inorganic base addition salts such as lithium salt, sodium salt, potassium salt, and calcium salt; organic base addition salts such as morpholine and piperidine; amino acid addition salts wherein the amino acid is aspartic acid or glutamic acid; and the like.

[0229]

The compounds of the invention can be administered directly, or as a formulation, medicament, or a pharmaceutical composition using a suitable dosage form, by oral or parenteral administration. Specific examples of such dosage forms include, but are not limited to, tablets, capsules, powder, granules, liquid agents, suspension, injections, patches, poultice, and the like. These formulations can be manufactured by a known method using an additive that is commonly used as a pharmaceutical additive.

[0230]

As these additives, an excipient, disintegrant, binding agent, fluidizer, lubricant, coating agent, solubilizing agent, solubilization promotor, thickener, dispersant, stabilizer, sweetener, flavoring agent, or the like can be used depending on the objective. Specific examples of these additives include, but are not limited to, lactose, mannitol, crystalline cellulose, low-substituted hydroxypropyl cellulose, corn starch, partially pregelatinized starch, carmellose calcium, croscarmellose sodium, hydroxypropyl cellulose, hydroxypropyl methylcellulose, polyvinyl

alcohol, magnesium stearate, sodium stearyl fumarate, polyethylene glycol, propylene glycol, titanium oxide, talc, and the like.

[0231]

The dosage of the compound of the invention is appropriately selected depending on the animal targeted for administration, route of administration, disease, patient's age, body weight, and symptom. For example, the dosage is 0.01 mg as the lower limit (preferably 100 mg) and 10000 mg as the upper limit (preferably 6000 mg) per day for adults for oral administration. This amount can be administered once daily, or divided into several doses.

[0232]

The compound of the invention is a compound with inhibitory activity against β-lactamase. Thus, the compound can be a prophylactic or therapeutic agent that is useful for a bacterial infection by combined use with an antimicrobial agent. Specific examples of such bacterial infections include sepsis, febrile neutropenia, bacterial meningitis, bacterial endocarditis, otitis media, sinusitis, pneumonia, lung abscess, empyema, secondary infection of a chronic respiratory disease, pharyngolaryngitis, tonsillitis, osteomyelitis, arthritis, peritonitis, intraperitoneal abscess, cholecystitis, cholangitis, liver abscess, a deep skin infection, lymphangitis/lymphadenitis, secondary infection of trauma, burn injury, surgical wound, or the like, a urinary tract infection, a genital infection, an eye infection, an odontogenic infection, and the like.

[0233]

The compound of the invention can be used in combination with at least one agent selected from an antimicrobial agent, an antifungal agent, an antiviral agent, an anti-inflammatory agent, or an anti-allergic agent for treating one or more bacterial infections described herein. The agent is preferably an antimicrobial agent, and more preferably a β-lactam agent. Specific examples thereof include amoxicillin, ampicillin

(pivampicillin, hetacillin, bacampicillin, metampicillin, and talampicillin), epicillin, carbenicillin (carindacillin), ticarcillin, temocillin, azlocillin, piperacillin, mezlocillin, mecillinam (pivmecillinam), sulbenicillin, benzylpenicillin (G), clometocillin, benzathine benzylpenicillin, procaine benzylpenicillin, azidocillin, penamecillin, phenoxymethyl penicillin (V), propicillin, benzathine phenoxymethylpenicillin, phenethicillin, cloxacillin (dicloxacillin and flucloxacillin), oxacillin, methicillin, nafcillin, faropenem, biapenem, doripenem, ertapenem, imipenem, meropenem, panipenem, tomopenem, razupenem, cefazolin, cefacetrile, cefadroxil, cephalexin, cefaloglycin, cefalonium, cefaloridine, cephalothin, cephapirin, cefatrizine, cefazedone, cefazaflur, cefradine, cefroxadine, ceftezole, cefaclor, cefamandole, cefminox, cefonicide, ceforanide, cefotiam, cefprozil, cefbuperazone, cefuroxime, cefuzonam, cefoxitin, cefotetan, cefmetazole, loracarbef, cefixime, ceftazidime, ceftriaxone, cefcapene, cefdaloxime, cefdinir, cefditoren, cefetamet, cefmenoxime, cefodizime, cefoperazone, cefotaxime, cefpimizole, cefpiramide, cefpodoxime, cefsulodin, cefteram, ceftibuten, ceftiolene, ceftizoxime, flomoxef, latamoxef, cefepime, cefozopran, cefpirome, cefquinome, ceftobiprole, ceftaroline, CXA-101, RWJ-54428, MC-04546, ME1036, BAL30072, SYN2416, ceftiofur, cefquinome, cefovecin, aztreonam, tigemonam, carumonam, RWJ-442831, RWJ-333441, and RWJ-333442. The timing of dosing of the compound of the invention and therapeutic agents thereof is not limited. The compound and therapeutic agent can be administered concurrently or sequentially to a subject being administered therewith. The compound of the invention and the therapeutic agents can be formulated as a combined agent. The dosage of the therapeutic agent can be appropriately selected based on the clinically used dose. The ratio of the compound of the invention and the therapeutic agents can be appropriately selected depending

on the subject of administration, route of administration, target disease, symptom, combination, or the like.

[0234]

In another embodiment of the invention, the compound of the invention can be combined and administered concomitantly or administered at different times upon use of a pharmaceutical composition comprising an antimicrobial agent such as a β-lactam agent. Such a pharmaceutical composition comprising a β-lactam agent is also within the scope of the invention, and can be used for treating or preventing a bacterial infection such as sepsis, febrile neutropenia, bacterial meningitis, bacterial endocarditis, otitis media, sinusitis, pneumonia, lung abscess, empyema, secondary infection of a chronic respiratory disease, pharyngolaryngitis, tonsillitis, osteomyelitis, arthritis, peritonitis, intraperitoneal abscess, cholecystitis, cholangitis, liver abscess, a deep skin infection, lymphangitis/lymphadenitis, secondary infection of trauma, burn injury, surgical wound, or the like, a urinary tract infection, a genital infection, an eye infection, or an odontogenic infection.

[0235]

Such a medicament, formulation, or pharmaceutical composition can be manufactured by mixing the compound of the invention and/or an additional agent (e.g., antimicrobial agent such as a β-lactam agent) with any suitable component, together or separately, as a combined agent or as separate agents using any technology that is known in the art. An appropriate formulation such as a tablet, capsule, powder, granule, liquid agent, suspension, injection, patch, or poultice can be formulated by using any technology that is known in the art. If the compound of the invention and/or an additional agent (e.g., antimicrobial agent such as a β-lactam agent) are prepared as separate agents, they can be provided as a kit of two agents. The kit can provide one of the components as a single agent, with instructions (package insert or the like)

instructing to combine and administer the other component (for the compound of the invention, the additional agent (e.g., antimicrobial agent such as a β-lactam agent); for the addition agent (e.g., antimicrobial agent such as a β-lactam agent), the compound of the invention) concurrently or at different times.

[0236]

If the compound of the invention is used as an active ingredient of a medicament, the compound can be intended for use in not just humans, but also animals other than humans (cat, dog, cow, chicken, fish, and the like).

[0237]

Hereinafter, the method of manufacturing the compound of the invention is described with examples, but the present invention is not limited thereto.

[0238]

The compound of the invention can be manufactured by, for example, the manufacturing methods described below, but the methods are not limited to such methods. These manufacturing methods can be appropriately improved upon based on the expertise of those skilled in the art of organic synthetic chemistry. Salts of the compounds used as a starting material can be used in the manufacturing method described below, as long as the reaction is not affected.

[0239]

In the manufacturing methods described below, even if use of a protecting group is not specifically described, a functional group other than those at the reaction point can be protected as needed and deprotected after the completion of a reaction or after a series of reactions to obtain a compound of interest if one of the functional groups other than those at the reaction point is altered under the reaction condition or if it is unsuitable for post-reaction processing. Common protecting groups described in the document (T. W. Greene and P. G. M. Wuts, "Protective Group in

Organic Synthesis", 3rd Ed., John Wiley and Sons, Inc., New York (1999)) or the like can be used as the protecting groups used in these processes. A protecting group can be introduced or removed by a method that is commonly used in organic synthetic chemistry (e.g., method described in the aforementioned document or the like) or a method in accordance therewith.

[0240]

The starting material and intermediate in the manufacturing methods described below can be purchased as a commercially available product or are available by synthesis in accordance with a method described in a known document or a known method from a known compound. Salts of the starting material and intermediate can also be used, as long as the reaction is not affected.

[0241]

The intermediate and compound of interest in the manufacturing methods described below can also be converted into another compound encompassed by the present invention by appropriately converting their functional groups. A functional group can be converted, in doing so, by a method that is commonly used in organic synthetic chemistry (e.g., the method described in R. C. Larock, "Comprehensive Organic Transformations", 2nd Ed., John Wiley and Sons, Inc., New York (1999) or the like) or a method in accordance therewith.

[0242]

An inert solvent in the manufacturing methods described below refers to a solvent that does not react with starting materials, reagents, bases, acids, catalysts, ligands, or the like used in a reaction (hereinafter, also referred to as "starting materials or the like used in a reaction"). A solvent used in each step can be used as an inert solvent even if the solvent reacts with the starting materials or the like used in the reaction, as long as the reaction of interest proceeds to result in a compound of interest.

[0243]

Manufacturing Method 1

Compound (1a-1), which is a compound represented by formula (1a) (hereinafter, also referred to as compound (1a); the same applies to other compounds) wherein G = O, can be manufactured, for example, by the following manufacturing method. The compound (1a) defined in item 1 can also be manufactured in the same manner.

[0244]

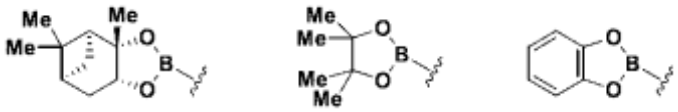
[Chemical Formula 611]



wherein X, R^1, R^2, R^3, R^4, R^{61}, R^{62}, R^{63}, and R^{64} are defined the same as item 1, PG^1 represents a protecting group of a hydroxyl group (e.g., a tert-butoxycarbonyl group, acetyl group, methoxymethyl group, p-methoxybenzyl group, tert-butyldimethylsilyl group, trimethylsilyl group, or the like), X^a is OPG^3 or defined the same as X defined in item 1, and PG^2 and PG^3 represent protecting groups of boronic acid (e.g., an optionally substituted C_{1-6} alkyl group, a structure represented by the following formula formed together by PG^2 and PG^3 as $-B(OPG^2)(OPG^3)$, or the like).

[0245]

[Chemical Formula 612]



[0246]

Step 1-1: In this reaction step, compound (1a-1) can be manufactured in accordance with a known method (e.g., WO 2014/151958, WO 2015/191907, WO 2016/003929, WO 2018/005662, etc.) by using the compound represented by formula (II) (hereinafter, also referred to as compound (II)) as a raw material. More

specifically, the compound can be manufactured, for example, by using step 1-1-1 or step 1-1-2 described below. Compound (II) can be manufactured, for example, in the same manner as Manufacturing Methods 4, 8, 15-19, or the like described below or a known method from a corresponding raw material that can be purchased or prepared.

[0247]

Step 1-1-1: Compound (1a-1) can be manufactured by reacting boronic acid with compound (II) in an inert solvent under an acidic condition. Examples of boronic acid include phenylboronic acid and 2-methylpropyl boronic acid. The boronic acid can be used in the range of 0.001 to 100 equivalents with respect to compound (II), which is preferably 1 to 3 equivalents. Examples of acids include hydrochloric acid, trifluoroacetic acid, and the like. An acid can be used in the range of 0.001 to 100 equivalents with respect to compound (II), which is preferably 1 to 20 equivalents. Specific examples of inert solvents include halogenated hydrocarbon solvents such as dichloromethane and dichloroethane, hydrocarbon solvents such as hexane and heptane, ether solvents such as tetrahydrofuran (THF) and cyclopentyl methyl ether (CPME), nitrile solvents such as acetonitrile and propionitrile, acetic acid, and water, which can be used alone or as a mixture solvent. The acids described above can also be directly used as a solvent. A mixture solvent of hexane/acetonitrile, acetic acid, or CPME is preferably used as a solvent. The reaction temperature is selected from the range of about -10°C to about 100°C, but is more preferably in the range of about 0°C to room temperature.

[0248]

Step 1-1-2: compound (1a-1) can be manufactured by reacting triethylsilane with compound (II) in a trifluoroacetic acid solvent. The triethylsilane can be used in the range of 0.001 to 100 equivalents with respect to compound (II), which is preferably

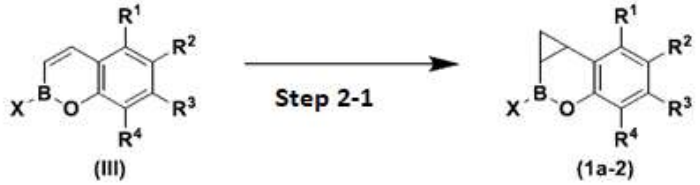
1 to 50 equivalents. The reaction temperature is selected from the range of about -10°C to about 70°C.

[0249]

Manufacturing Method 2

Compound (1a-2), which is compound (1a-1) wherein R^{61}, R^{62}, R^{63}, and R^{64} are hydrogen atoms, can be manufactured, for example, by the manufacturing method described below.

[Chemical Formula 613]



wherein X, R^1, R^2, R^3, and R^4 are defined the same as item 1.

[0250]

Step 2-1: In this reaction step, compound (1a-2) can be manufactured in accordance with a known method (e.g., WO 2019/075084, etc.) by using a corresponding compound (III) as a raw material. Compound (III) can be manufactured, for example, in the same manner as Manufacturing Methods 12, 13, 23, or 24 described below or a known method from a corresponding raw material that can be purchased or prepared.

More specifically, compound (1a-2) can be manufactured, for example, by reacting metal carbenoid or halogenated organic zinc with compound (III) in an inert solvent. Examples of metal carbenoid include diazomethane/palladium (II) acetate (wherein (II) indicates that palladium is divalent). The diazomethane can be used in the range of 1 to 100 equivalents with respect to compound (III), which is preferably 1 to 3 equivalents. The palladium (II) acetate can be used in the range of 0.001 to 10 equivalents with respect to compound (III), which is preferably 0.01 to 1 equivalent. Examples of halogenated organic zinc include diiodomethane/diethylzinc. The diiodomethane can be used in the range of 1 to 100 equivalents with respect to compound (III),

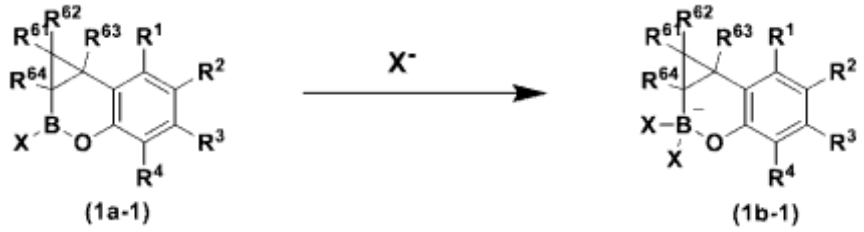
which is preferably 1 to 20 equivalents. The diethylzinc can be used in the range of 1 to 100 equivalents with respect to compound (III), which is preferably 1 to 10 equivalents. Specific examples of inert solvents include halogenated hydrocarbon solvents such as dichloromethane and dichloroethane, ether solvents such as THF and 1,2-dimethoxyethane (DME), which can be used alone or as a mixture solvent. The reaction temperature is selected from the range of about -100°C to the boiling point of the solvent used, but is more preferably in the range of about -78°C to room temperature.

[0251]

Manufacturing Method 3

Compound (1a-1) can be obtained as compound (1b-1), which is a compound represented by formula (1b) wherein G = O, by, for example, reacting with a reagent that generates nucleophilic X^- (X anion) (e.g., alkali metal salt generating a hydroxide anion HO^-, alkali metal salt of C_{1-6} alkoxide generating a C_{1-6} alkoxide anion, the alkali metal salt of amide generating amide anion $R^{a2}R^{b1}N^-$, or the like), depending on the property of compound. Compound (1b) defined in item 1 can be manufactured in the same manner.

[Chemical Formula 614]



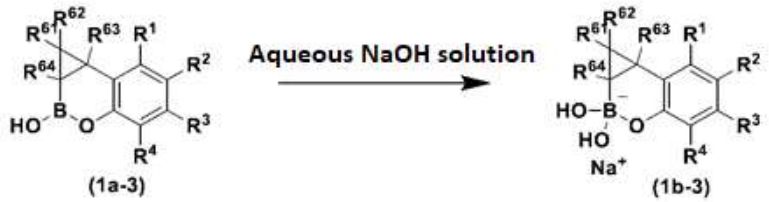
wherein X, R^1, R^2, R^3, R^4, R^{61}, R^{62}, R^{63}, and R^{64} are defined the same as item 1.

[0252]

For example, a compound of formula (1a-3), which is a compound represented by formula (1a-1) wherein X is a hydroxyl group, can be treated with an alkali aqueous solution to obtain a compound of formula (1b-3) as an alkali metal salt. As an alkali aqueous solution, an aqueous solution of the alkali metal salt

generating a hydroxide anion HO^- described above (e.g., potassium carbonate, sodium carbonate, potassium hydrogen carbonate, sodium hydrogen carbonate, potassium dihydrogen phosphate, dipotassium hydrogen phosphate, potassium phosphate, sodium dihydrogen phosphate, disodium hydrogen phosphate, sodium phosphate, potassium hydroxide, sodium hydroxide, or the like) can be used. More specifically, for exmaple, compound (1a-3) can be treated with an aqueous sodium hydroxide solution to obtain a compound of formula (1b-3) as a sodium salt depending on the property of compound. Compound (1a-3) can be treated with an alkali aqueous solution upon purification or post-processing after a manufacturing reaction to be isolated as compound (1b-3), or converted into compound (1b-3) by applying said treatment on the isolated compound (1a-3).

[Chemical Formula 615]

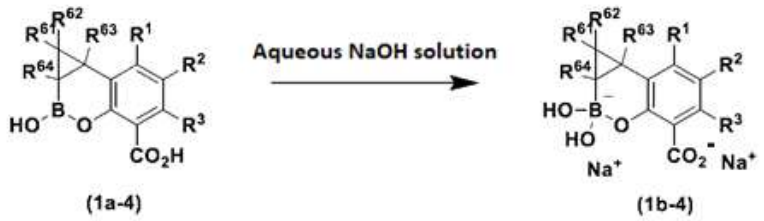


wherein R^1, R^2, R^3, R^4, R^{61}, R^{62}, R^{63}, and R^{64} are defined the same as item 1.

[0253]

For example, a compound of formula (1a-4), which is a compound represented by formula (1a-1) wherein X is a hydroxyl group and R^4 is a carboxyl group, can be obtained as a disodium salt compound of formula (1b-4) by treatment with an aqueous sodium hydroxide solution depending on the property of the compound.

[Chemical Formula 616]

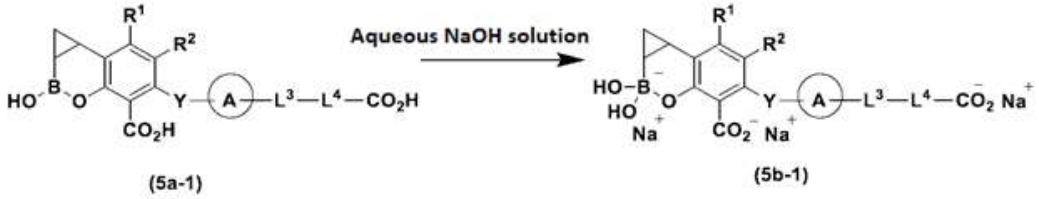


wherein R^1, R^2, R^3, R^{61}, R^{62}, R^{63}, and R^{64} are defined the same as item 1. In formula (1b-4), two sodium ions Na^+ are described separately in the vicinity of two types of negatively charged groups, but this is synonymous to describing collectively as $2Na^+$ and represents disodium salt.

[0254]

For example, a compound of formula (5a-1), which is a compound represented by formula (5a) defined in item 24 wherein R^5 is a carboxyl group, is obtained in some cases as a trisodium salt compound of formula (5b-1), depending on the property of the compound, by treatment with an aqueous sodium hydroxide solution.

[Chemical Formula 617]



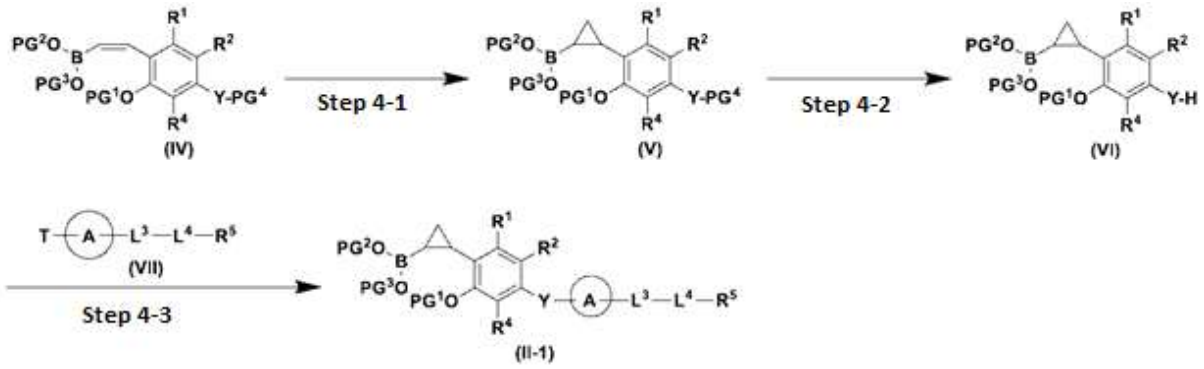
wherein A, L^3, L^4, Y, R^1, and R^2 are defined the same as any one of items 1 to 24. In formula (5b-1), three sodium ions Na^+ are described separately in the vicinity of three types of negatively charged groups, but this is synonymous to describing collectively as $3Na^+$ and represents trisodium salt.

[0255]

Manufacturing Method 4

Compound (II), which is represented by formula (II-1) described below can be manufactured, for example, by the manufacturing method described below.

[Chemical Formula 618]



wherein Y, A, L^3, L^4, R^1, R^2, R^4, and R^5 are defined the same as item 1. PG^4 represents a protecting group of a hydroxyl group (e.g., tert-butoxycarbonyl group, acetyl group, methoxymethyl group, p-methoxybenzyl group, tert-butyldimethylsilyl group, trimethylsilyl group, methyl group, or the like). In formula (VI), H in group -Y-H is a hydrogen atom, T represents a hydroxyl group or a leaving group (e.g., a halogen atom such as chlorine, bromine, or iodine, a lower alkylsulfonyloxy group such as methanesulfonyloxy, a trihalogenomethanesulfonyloxy group such as trifluoromethanesulfonyloxy, an arylsulfonyloxy group such as benzenesulfonyloxy or p-toluenesulfonyloxy, or the like), and PG^1, PG^2, and PG^3 are each defined the same as the definition described in Manufacturing Method 1.

[0256]

Step 4-1: Compound (V) can be manufactured by a method according to step 2-1 of Manufacturing Method 2 by using compound (IV) as a raw material. Compound (IV) can be manufactured, for example, in the same manner as Manufacturing Methods 5 to 7 described below or a known method from a corresponding raw material that can be purchased or prepared.

[0257]

Step 4-2: Compound (VI) can be manufactured by deprotecting protecting group PG^4 of compound (V). This step can be performed, for example, in accordance with the method described in a reference (T. W. Greene and P. G. M. Wuts, “Protective Group in

Organic Synthesis", 3rd Ed., John Wiley and Sons, Inc., New York (1999) or the like).

[0258]

Step 4-3: If Y is an oxygen atom, and T is a hydroxyl group, compound (II) can be manufactured by reacting compound (VII) with compound (VI) under the so-called Mitsunobu reaction in an inert solvent in the presence of an azo compound analog and an organic phosphorous compound or phosphorane compound under normal pressure or under pressure. Specific examples of inert solvents include ether solvents such as THF and DME, hydrocarbon solvents such as toluene and benzene, and the like. Examples of azo compound analogs include diethyl azodicarboxylate, diisopropyl azodicarboxylate, and the like. An azo compound analog can be used at 0.001 to 100 equivalents with respect to compound (VI), which is preferably 1 to 10 equivalents. Examples of organic phosphorous compounds include triphenylphosphine, tributylphosphine, and the like. An organic phosphorous compound can be used at 0.001 to 100 equivalents with respect to compound (VI), which is preferably 1 to 10 equivalents. Examples of phosphorane compounds include (cyanomethylene)tributylphosphorane, (cyanomethylene)trimethylphosphorane, and the like. A phosphorane compound can be used at 0.001 to 100 equivalents with respect to compound (VI), which is preferably 1 to 10 equivalents. The reaction temperature is selected from the range of about -10°C to about 100°C.

[0259]

Alternatively, if Y is an oxygen atom, a sulfur atom, or -NR^j-, and T is a leaving group (e.g., a halogen atom such as chlorine, bromine, or iodine, a lower alkylsulfonyloxy group such as a methanesulfonyloxy group, a trihalogenomethanesulfonyloxy group such as a trifluoromethanesulfonyloxy group, an arylsulfonyloxy group such as a benzenesulfonyloxy group or p-toluenesulfonyloxy group, or the like), compound (II) can be

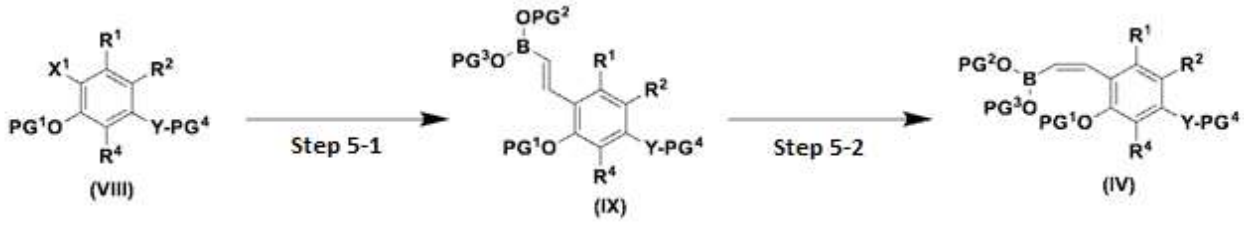
manufactured by reacting compound (VII) with compound (VI) in an inert solvent in the presence of a base under normal pressure or under pressure. Specific examples of inert solvents include ether solvents such as THF and DME, halogenated hydrocarbon solvents such as dichloromethane and dichloroethane, aprotic solvents such as N,N-dimethylformamide (DMF), N-methylpyrrolidone (NMP), and dimethyl sulfoxide (DMSO), and the like. Examples of bases include potassium tert-butoxy, sodium hydride, triethylamine, diisopropylethylamine, potassium carbonate, sodium carbonate, cesium carbonate, and the like. A base can be used at 0.001 to 100 equivalents with respect to compound (VI), which is preferably 0.5 to 10 equivalents. Compound (VII) can be used at 0.001 to 100 equivalents with respect to compound (VI), which is preferably 1 to 10 equivalents. The reaction temperature is selected from the range of about -10°C to about 100°C.

[0260]

Manufacturing Method 5

Compound (IV) can be manufactured, for example, by the manufacturing method described below by using compound (VIII) as a raw material.

[Chemical Formula 619]



wherein Y, R^1, R^2, and R^4 are defined the same as item 1. X^1 represents an iodine atom, a bromine atom, a chlorine atom, or a substituted sulfonyloxy group (e.g., methanesulfonyloxy group, trifluoromethanesulfonyloxy group, p-toluenesulfonyloxy group, or the like), PG^1, PG^2, and PG^3 are each defined the same as the definition described in Manufacturing Method 1, and PG^4 is defined the same as the definition described in Manufacturing Method 4.

[0261]

A commercially available product that is purchased or a compound synthesized in accordance with a known method (e.g., the method described in R. C. Larock, "Comprehensive Organic Transformations", 2nd Ed., John Wiley and Sons, Inc., New York (1999), or the method described in WO 2016/003929, WO 2016/149393, or the like) from a known compound as the starting material compound (VIII).

[0262]

Step 5-1: Compound (IX) can be manufactured by a coupling reaction of vinyl boronate ester with compound (VIII) in an inert solvent in the presence of a transition metal catalyst and a base under a so-called Heck reaction condition. The reaction may be performed in the presence of a ligand as needed. Specific examples of vinyl boronate ester include 4,4,5,5-tetramethyl-2-vinyl-1,3,2-dioxaborolane. The vinyl boronate ester can be used in the range of 1 to 100 equivalents with respect to compound (VIII), which is preferably 1 to 3 equivalents. Specific examples of transition metal catalysts include palladium (II) acetate, tris(dibenzylideneacetone)dipalladium(0), and bis(tri-tert-butylphosphine)palladium(0) (wherein (II) and (0) indicate that palladium is divalent and zerovalent, respectively). The transition metal catalyst can be used in the range of 0.001 to 10 equivalents with respect to compound (VIII), which is preferably 0.01 to 1 equivalent. Specific examples of bases include organic bases such as triethylamine and inorganic bases such as potassium carbonate, silver carbonate, and potassium acetate. The base can be used in the range of 1 to 100 equivalents with respect to compound (VIII), which is preferably 1 to 5 equivalents. Specific examples of ligands include BINAP and tri(o-tolyl)phosphine. The ligand can be used in the range of 0.001 to 10 equivalents with respect to compound (VIII), which is preferably 0.01 to 2 equivalents. Specific examples of inert solvents include

halogenated hydrocarbon solvents such as dichloromethane and dichloroethane, ether solvents such as THF and CPME, aromatic hydrocarbon solvents such as toluene and benzene, and aprotic polar solvents such as DMF and N,N-dimethylacetamide (DMA), which can be used alone or as a mixture solvent. Toluene is preferably used as a solvent. The reaction temperature is selected from the range of room temperature to the boiling point of the solvent used, but is more preferably in the range of about 50°C to about 130°C.

[0263]

Step 5-2: Compound (IV) can be manufactured from corresponding compound (IX) in accordance with a known method (e.g., Angewandte Chemie International Edition (2018), 57(XII), 3168-3172).

[0264]

More specifically, compound (IV) is a compound in which a geometric isomerism of a double bond is a (Z) form (or cis form). This compound can be manufactured through an EZ isomerization reaction by light irradiation on compound (IX) obtained primarily as an (E) form (or trans form) in the previous step in the presence of a photoreaction catalyst (photosensitizer) in an inert solvent. Specific examples of photoreaction catalysts include tris(2-phenylpyridinato)iridium(III). The photoreaction catalyst can be used in the range of 0.001 to 10 equivalents with respect to compound (IX), which is preferably 0.01 to 2 equivalents. Preferred examples of wavelengths of irradiated light include 450 nm. Specific examples of inert solvents include acetonitrile. The reaction temperature is selected from the range of about -10°C to the boiling point of the solvent used, but is more preferably in the range of about 0°C to about 50°C.

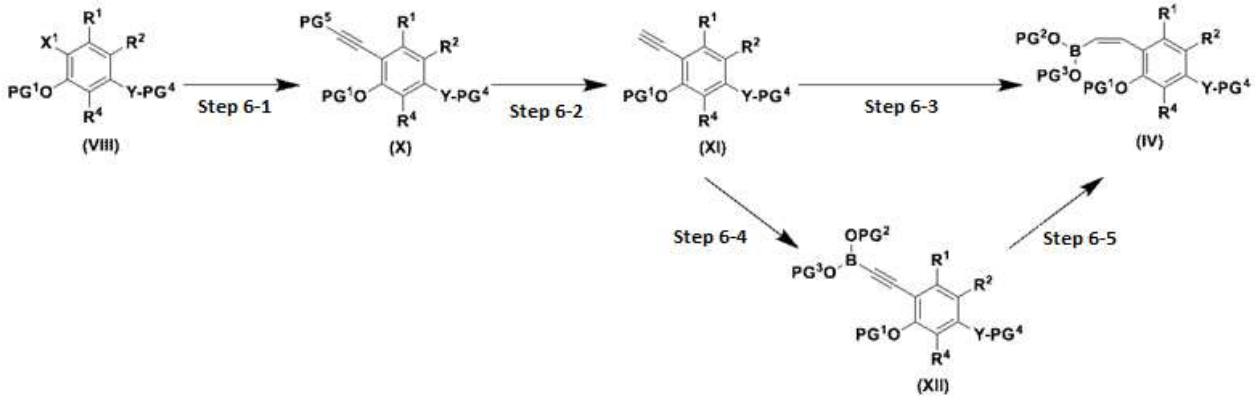
[0265]

Manufacturing Method 6

Compound (IV) can be manufactured, for example, by the manufacturing method described below by using compound (VIII) as a

raw material. Compound (IV) can also be manufactured from compound (VIII) in accordance with a known method (e.g., WO 2018/005662, etc.).

[Chemical Formula 620]



wherein Y, R^1, R^2, and R^4 are defined the same as item 1. PG^5 is a protecting group of terminal alkyne (trimethylsilyl group, tert-butyldimethylsilyl group, or the like), X^1 is defined the same as the definition described in Manufacturing Method 5, PG^1, PG^2, and PG^3 are each defined the same as the definition described in Manufacturing Method 1, and PG^4 is defined the same as the definition described in Manufacturing Method 4.

[0266]

Step 6-1: Compound (X) can be manufactured through a coupling reaction of a terminal alkyne compound with only one end of acetylene protected by PG^5 with compound (VIII) in an inert solvent in the presence of a transition metal catalyst, copper catalyst, and base under a so-called Sonogashira reaction condition. The reaction can be performed in the presence of a ligand as needed. Specific examples of terminal alkyne compounds include trimethylsilylacetylene and (tert-butyldimethylsilyl)acetylene. The terminal alkyne compound can be used in the range of 1 to 100 equivalents with respect to compound (VIII), which is preferably 1 to 3 equivalents. Specific examples of transition metal catalysts include tetrakis(triphenylphosphine)palladium(0),

dichlorobis(triphenylphosphine)palladium(II), dichlorobis(acetonitrile)palladium(II), and palladium(II) chloride (wherein (0) and (II) indicate that palladium is zerovalent and divalent, respectively). The transition metal catalyst can be used in the range of 0.001 to 10 equivalents with respect to compound (VIII), which is preferably 0.01 to 1 equivalent. Specific examples of copper catalysts include copper powder, halogenated copper (I), copper (I) acetate, and the like, and preferred examples include copper (I) iodide (wherein (I) indicates that copper is monovalent). The copper catalyst can be used in the range of 0.001 to 10 equivalents with respect to compound (VIII), which is preferably 0.01 to 1 equivalent. Specific examples of bases include diethylamine, triethylamine, and the like. The base can be used in the range of 1 to 100 equivalents with respect to compound (VIII), which is preferably 1 to 5 equivalents. Specific examples of ligands include triphenylphosphine, tri-tert-butylphosphine, 2,2-bis(diphenylphosphino)-1,1-binaphthyl, 2-(di-tert-butylphosphino)biphenyl, 1,1'-bis(diphenylphosphino)ferrocene, and the like. The ligand can be used in the range of 0.001 to 10 equivalents with respect to compound (VIII), which is preferably 0.01 to 2 equivalents. Specific examples of inert solvents include ether solvents such as tetrahydrofuran (THF) and diethyl ether, and aprotic polar solvents such as N,N-dimethylformamide (DMF), which can be used alone or as a mixture solvent. Toluene is preferably used as a solvent. The reaction temperature is selected from the range of about -78°C to the boiling point of the solvent used.

[0267]

Step 6-2: Compound (XI) can be manufactured by removing protecting group PG^5 of compound (X) from using a known deprotecting reaction (see, for example, T. W. Greene and P. G. M. Wuts, "Protective Group in Organic Synthesis", 3rd Ed., John Wiley and Sons, Inc., New York (1999)).

[0268]

Step 6-3: Compound (IV) can be manufactured from a corresponding compound (XI) in accordance with a known method (e.g., Journal of the American Chemical Society (2000), 122(XX), 4990-4991).

[0269]

Step 6-4: Compound (XII) can be manufactured from a corresponding compound (XI) in accordance with a known method (e.g., Chemical Science (2017), 8(1), 165-168).

[0270]

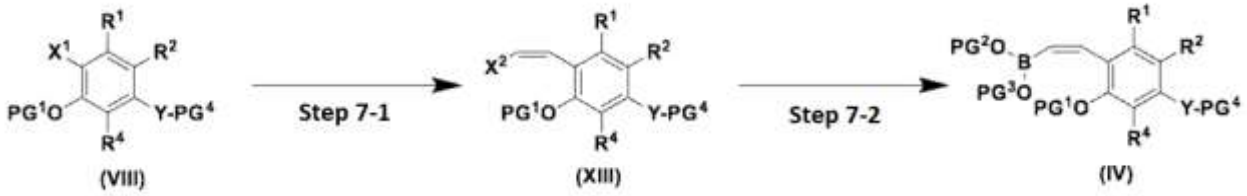
Step 6-5: Compound (IV) can be manufactured by catalytic hydrogenation on compound (XII) in an inert solvent in the presence of a catalyst and under a hydrogen atmosphere. Specific examples of catalysts include a Lindlar's catalyst. The catalyst can be used in the range of 0.005 to 50 equivalents with respect to compound (XII), which is preferably 0.01 to 10 equivalents. Specific examples of inert solvents include ester solvents such as ethyl acetate and alcohol solvents such as methanol and ethanol, which can be used alone or as a mixture solvent. The reaction temperature is selected from the range of about -20°C to the boiling point of the solvent used, but is more preferably in the range of about 0°C to about 50°C. Hydrogen pressure is generally normal pressure, but can be adjusted to medium or high pressure in accordance with the reactivity of a compound.

[0271]

Manufacturing Method 7

Compound (IV) can be manufactured, for example, by the manufacturing method described below by using compound (VIII) as a raw material.

[Chemical Formula 621]



wherein Y, R^1, R^2, and R^4 are defined the same as item 1. X^2 is an iodine atom, a bromine atom, a chlorine atom, or a substituted sulfonyloxy group (e.g., a methanesulfonyloxy group or a trifluoromethanesulfonyloxy group), X^1 is defined the same as the definition described in Manufacturing Method 5, PG^1, PG^2, and PG^3 are each defined the same as the definition described in Manufacturing Method 1, and PG^4 is defined the same as the definition described in Manufacturing Method 4.

[0272]

Step 7-1: Compound (XIII) can be manufactured from a corresponding compound (VIII) in accordance with a known method (e.g., WO 2018/005662, WO 2019/075084, etc.).

[0273]

Step 7-2: Compound (IV) can be manufactured by a coupling reaction of compound (XIII) with a corresponding borane compound in an inert solvent in the presence of a transition metal catalyst and a base under a so-called Miyaura-Ishiyama borylation reaction condition. The reaction can be performed in the presence of a ligand as needed. Specific examples of borane compounds include pinacolborane, pinacoldiborane, and diboronic acid. A borane compound can be used in the range of 1 to 100 equivalents with respect to compound (XIII), which is preferably 1 to 3 equivalents. Specific examples of transition metal catalysts include [1,1'-bis(diphenylphosphino)ferrocene]palladium(II) dichloride, tris(dibenzylideneacetone)palladium(0), and the like (wherein (II) and (0) indicate that palladium is divalent and zerovalent, respectively). An transition metal catalyst can be used in the range of 0.001 to 10 equivalents with respect to compound (XIII), which is preferably 0.01 to 1 equivalents. Specific examples of

ligands include triphenylphosphine, XPhos, 2-(di-tert-butylphosphino)biphenyl, 1,1'-bis(diphenylphosphino)ferrocene, and the like. A ligand can be used in the range of 0.001 to 10 equivalents with respect to compound (XIII), which is preferably 0.01 to 2 equivalents. Specific examples of bases include potassium acetate, potassium phenoxide, and the like. A base can be used in the range of 1 to 100 equivalents with respect to compound (XIII), which is preferably 1 to 5 equivalents. Specific examples of inert solvents include halogenated hydrocarbon solvents such as dichloromethane and dichloroethane, ether solvents such as THF and 1,4-dioxane, and aprotic polar solvents such as DMF and DMSO, which can be used alone or as a mixture solvent. The reaction temperature is selected from the range of about -20°C to about 180°C, but is more preferably in the range of about 50°C to about 130°C.

[0274]

Manufacturing Method 8

Compound (II-1) can be manufactured, for example, by the manufacturing method described below by using compound (XIV) as a raw material.

[Chemical Formula 622]



wherein Y, A, L^3, L^4, R^1, R^2, R^4, and R^5 are defined the same as item 1. PG^1, PG^2, and PG^3 are each defined the same as the definition described in Manufacturing Method 1.

[0275]

Step 8-1: Compound (II) can be manufactured by the method in accordance with step 2-1 in Manufacturing Method 2 by using compound (XIV) as a raw material. Compound (XIV) can be manufactured, for example, in the same manner as Manufacturing

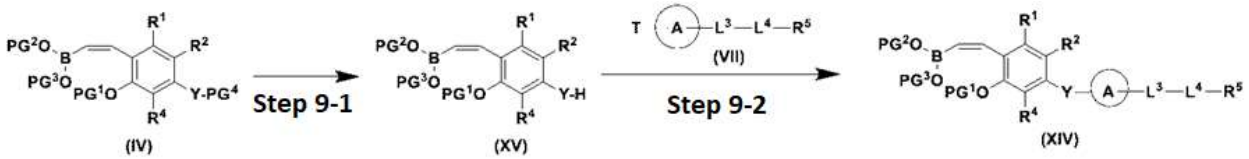
Methods 9 to 11 described below or a known method from a corresponding raw material that can be purchased or prepared.

[0276]

Manufacturing Method 9

Compound (XIV) can be manufactured, for example, by the manufacturing method described below by using compound (IV) as a raw material.

[Chemical Formula 623]



wherein Y, A, L^3, L^4, R^1, R^2, R^4, and R^5 are defined the same as item 1. PG^1, PG^2, and PG^3 are each defined the same as the definition described in Manufacturing Method 1, and T and PG^4 are defined the same as the definition described in Manufacturing Method 4.

[0277]

Step 9-1: compound (XV) can be manufactured by a method in accordance with step 4-2 in Manufacturing Method 4 by using compound (IV) as a raw material.

[0278]

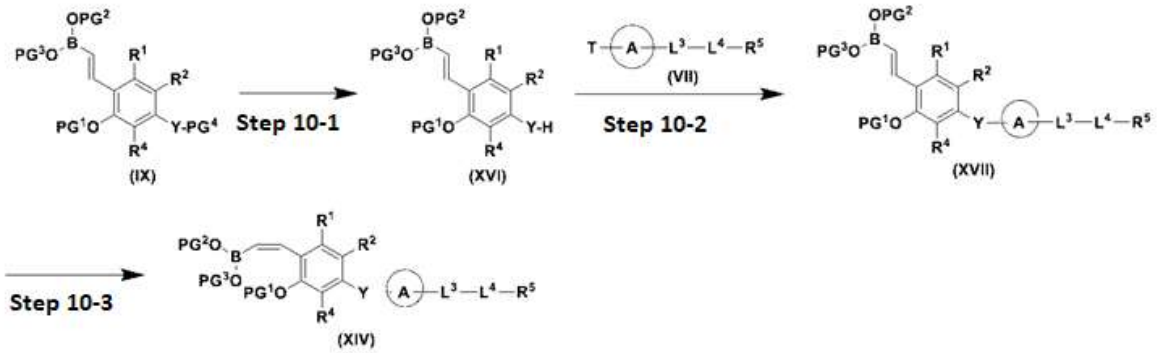
Step 9-2: Compound (XIV) can be manufactured by a method in accordance with step 4-3 in Manufacturing Method 4 by using compound (XV) as a raw material.

[0279]

Manufacturing Method 10

Compound (XIV) can also be manufactured, for example, by the manufacturing method described below by using compound (IX) as a raw material.

[Chemical Formula 624]



wherein Y, A, L^3, L^4, R^1, R^2, R^4, and R^5 are defined the same as item 1. PG^1, PG^2, and PG^3 are each defined the same as the definition described in Manufacturing Method 1, H of group -Y-H in formula (XVI) is a hydrogen atom, and T and PG^4 are defined the same as the definition described in Manufacturing Method 4.

[0280]

Step 10-1: Compound (XVI) can be manufactured by a method in accordance with step 4-2 in Manufacturing Method 4 by using compound (IX) as a raw material.

[0281]

Step 10-2: Compound (XVII) can be manufactured by a method in accordance with step 4-3 in Manufacturing Method 4 by using compound (XVI) as a raw material.

[0282]

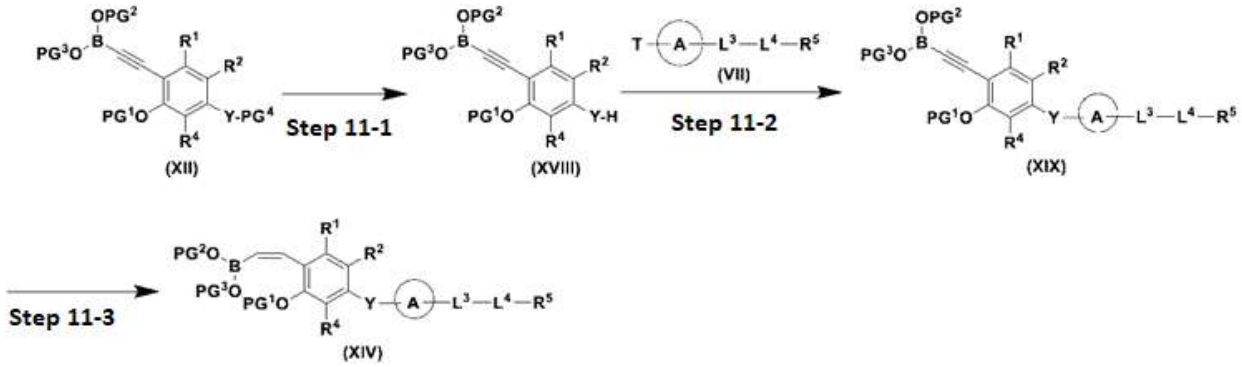
Step 10-3: Compound (XIV) can be manufactured by a method in accordance with step 5-2 in Manufacturing Method 5 by using compound (XVII) as a raw material.

[0283]

Manufacturing Method 11

Compound (XIV) can also be manufactured, for example, by the manufacturing method described below by using compound (XII) as a raw material.

[Chemical Formula 625]



wherein Y, A, L^3, L^4, R^1, R^2, R^4, and R^5 are defined the same as item 1. PG^1, PG^2, and PG^3 are each defined the same as the definition described in Manufacturing Method 1, H of group -Y-H in formula (XVIII) is a hydrogen atom, and T and PG^4 are defined the same as the definition described in Manufacturing Method 4.

[0284]

Step 11-1: Compound (XVIII) can be manufactured by a method in accordance with step 4-2 in Manufacturing Method 4 by using compound (XII) as a raw material.

[0285]

Step 11-2: Compound (XIX) can be manufactured by a method in accordance with step 4-3 in Manufacturing Method 4 by using compound (XVIII) as a raw material.

[0286]

Step 11-3: Compound (XIV) can be manufactured by a method in accordance with step 6-5 in Manufacturing Method 6 by using compound (XIX) as a raw material.

[0287]

Manufacturing Method 12

Compound (III) represented by formula (III-1) can be manufactured, for example, by the manufacturing method described below by using compound (XIV) as a raw material.

[Chemical Formula 626]



wherein X, Y, A, L^3, L^4, R^1, R^2, R^4, and R^5 are defined the same as item 1. PG^1, PG^2, and PG^3 are each defined the same as the definition described in Manufacturing Method 1.

[0288]

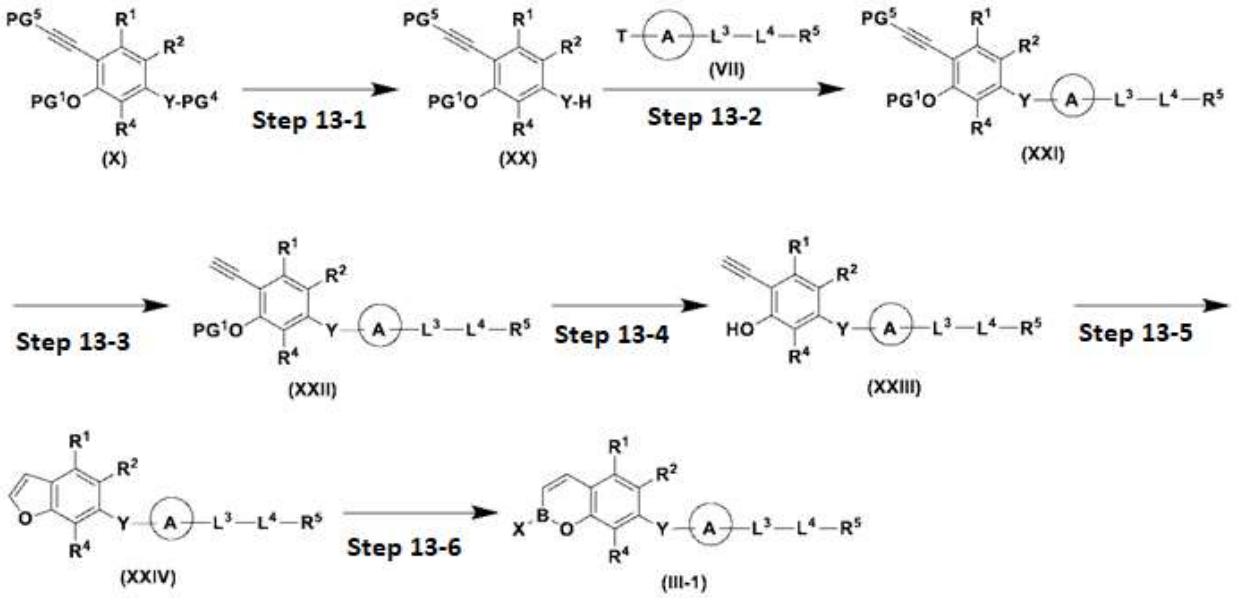
Step 12-1: Compound (III-1) can be manufactured by a method in accordance with step 1-1, step 1-1-1, or step 1-1-2 in Manufacturing Method 1 by using compound (XIV) as a raw material.

[0289]

Manufacturing Method 13

Compound (III-1) can also be manufactured, for example, by the manufacturing method described below by using compound (X) as a raw material.

[Chemical Formula 627]



wherein Y, A, L^3, L^4, R^1, R^2, R^4, and R^5 are defined the same as item 1. PG^1, PG^2, and PG^3 are each defined the same as the definition described in Manufacturing Method 1, H of group -Y-H in formula (XX) is a hydrogen atom, T and PG^4 are defined the same as

the definition described in Manufacturing Method 4, and PG^5 is defined the same as the definition described in Manufacturing Method 6.

[0290]

Step 13-1: Compound (XX) can be manufactured by a method in accordance with step 4-2 in Manufacturing Method 4 by using compound (X) as a raw material.

[0291]

Step 13-2: Compound (XXI) can be manufactured by a method in accordance with step 4-3 in Manufacturing Method 4 by using compound (XX) as a raw material.

[0292]

Step 13-3: Compound (XXII) can be manufactured by a method in accordance with step 6-2 in Manufacturing Method 6 by using compound (XXI) as a raw material.

[0293]

Step 13-4: Compound (XXIII) can be manufactured by a method in accordance with step 4-2 in Manufacturing Method 4 by using compound (XXII) as a raw material.

[0294]

Step 13-5: Compound (XXIV) can be manufactured by an intramolecular cyclization reaction on compound (XXIII) in an inert solvent in the presence of a catalyst and a base. Specific examples of catalysts include copper iodide and the like. A catalyst can be used in the range of 0.001 to 10 equivalents with respect to compound (XXIII), which is preferably 0.01 to 1 equivalent. Specific examples of bases include triethylamine, sodium carbonate, and the like. A base can be used in the range of 1 to 200 equivalents with respect to compound (XXIII), which is preferably 1 to 50 equivalents. Specific examples of inert solvents include alcohol solvents such as ethanol and aprotic polar solvents such as DMF and DMSO, which can be used alone or as a mixture solvent. The reaction temperature is selected from the

range of about 0°C to about 180°C, but is more preferably in the range of about 50°C to about 130°C.

[0295]

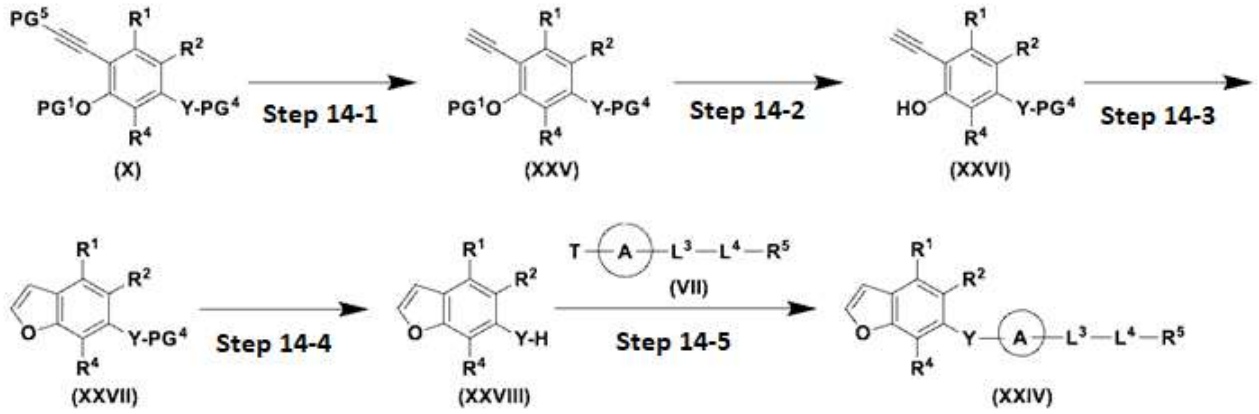
Step 13-6: Compound (III-1) can be manufactured from a corresponding compound (XXIV) in accordance with a known method (e.g., Journal of the American Chemical Society (2016), 138 (47), 15315-15318, WO 2019/075084, etc.). More specifically, compound (III-1) can be manufactured by reacting diboron with compound (XXIV) in an inert solvent in the presence of a transition metal catalyst and a base. Examples of diboron include bis(pinacolato)diboron and bis(pinanediolato)diboron. Diboron can be used in the range of 1 to 100 equivalents with respect to compound (XXIV), which is preferably 1 to 3 equivalents. Examples of transition metal catalysts include [1,3-bis(2,6-diisopropylphenyl)imidazol-2-ylidene]triphenylphosphine nickel (II) dichloride and bis(1,5-cyclooctadiene) nickel(0)/1,3-dimethylimidazol-2-ylidene (wherein (II) and (0) indicate that nickel is divalent and zerovalent, respectively). A transition metal catalyst can be used in the range of 0.001 to 10 equivalents with respect to compound (XXIV), which is preferably 0.01 to 1 equivalent. Specific examples of bases include potassium carbonate and cesium carbonate, and cesium carbonate is preferably used. A base can be used in the range of 1 to 100 equivalents with respect to compound (XXIV), which is preferably 1 to 5 equivalents. Specific examples of inert solvents include halogenated hydrocarbon solvents such as dichloromethane and dichloroethane, ether solvents such as THF and CPME, and aromatic hydrocarbon such as toluene and benzene, which can be used alone or as a mixture solvent. Toluene is preferably used as an inert solvent. The reaction temperature is selected from the range of room temperature to the boiling point of the solvent used, but is more preferably in the range of about 80°C to about 110°C.

[0296]

Manufacturing Method 14

Compound (XXIV) can also be manufactured, for example, by the manufacturing method described below by using compound (X) as a raw material.

[Chemical Formula 628]



wherein Y, A, L^3, L^4, R^1, R^2, R^4, and R^5 are defined the same as item 1. PG^1, PG^2, and PG^3 are each defined the same as the definition described in Manufacturing Method 1, H of group -Y-H in formula (XXVIII) is a hydrogen atom, T and PG^4 are defined the same as the definition described in Manufacturing Method 4, and PG^5 is defined the same as the definition described in Manufacturing Method 6.

[0297]

Step 14-1: Compound (XXV) can be manufactured by a method in accordance with step 6-2 in Manufacturing Method 6 by using compound (X) as a raw material.

[0298]

Step 14-2: Compound (XXVI) can be manufactured by a method in accordance with step 4-2 in Manufacturing Method 4 by using compound (XXV) as a raw material.

[0299]

Step 14-3: Compound (XXVII) can be manufactured by a method in accordance with step 13-5 in Manufacturing Method 13 by using compound (XXVI) as a raw material.

[0300]

Step 14-4: Compound (XXVIII) can be manufactured by a method in accordance with step 4-2 in Manufacturing Method 4 by using compound (XXVII) as a raw material.

[0301]

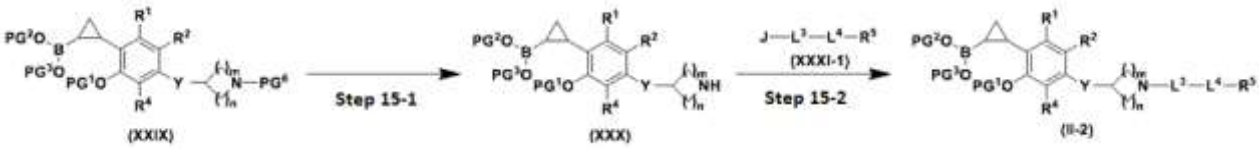
Step 14-5: Compound (XXIV) can be manufactured by a method in accordance with step 4-3 in Manufacturing Method 4 by using compound (XXVIII) as a raw material.

[0302]

Manufacturing Method 15

A compound represented by formula (II), which is represented by formula (II-2), can be manufactured, for example, by the manufacturing method described below by using compound (XXIX) as a raw material.

[Chemical Formula 629]



wherein Y, L^3, L^4, R^1, R^2, R^4, and R^5 are defined the same as item 1, and m and n are defined the same as item 33. PG^1, PG^2, and PG^3 are each defined the same as the definition described in Manufacturing Method 1, PG^6 is a protecting group of an amino group (e.g., an ethoxycarbonyl group, tert-butoxycarbonyl group, acetyl group, benzoyl group, trifluoroacetyl group, benzyloxycarbonyl group, 3- or 4-chlorobenzyloxycarbonyl group, triphenylmethyl group, methanesulfonyl group, p-toluenesulfonyl group, trimethylsilyl group, benzyloxycarbonyl group, 3- or 4-chlorobenzyloxycarbonyl group, benzylsulfonyl group, benzyl group, 4-nitrobenzyl group, 4-methoxybenzyl group, methyl group, ethyl group, or the like), and J is a leaving group (e.g., a halogen atom such as chlorine, bromine, or iodine, or a substituted sulfonyloxy group (e.g., a methanesulfonyloxy group, a trifluoromethanesulfonyloxy group, a p-toluenesulfonyloxy group, or the like)).

[0303]

Step 15-1: Compound (XXX) can be manufactured by deprotecting protecting group PG^6 of compound (XXIX). This step can be performed, for example, in accordance with a method described in a reference (T. W. Greene and P. G. M. Wuts, "Protective Group in Organic Synthesis", 3rd Ed., John Wiley and Sons, Inc., New York (1999)) or the like. Compound (XXIX) can be manufactured, for example, in the same manner as Manufacturing Method 18 or 19 described below or a known method from a corresponding raw material that can be purchased or prepared.

[0304]

Step 15-2: Compound (II-2) can be manufactured by reacting compound (XXXI-1) in an inert solvent in the presence of a base by using compound (XXX) as a raw material. The reaction can be performed in the presence of a suitable phase transfer catalyst as needed. Compound (XXXI-1) can be used at 0.001 to 100 equivalents with respect to compound (XXX), which is preferably 1 to 10 equivalents.

[0305]

Specific examples of bases include organic bases such as triethylamine, N,N-diisopropylethylamine, and pyridine, inorganic bases such as potassium carbonate, sodium carbonate, cesium carbonate, potassium hydrogen carbonate, sodium hydrogen carbonate, potassium dihydrogen phosphate, dipotassium hydrogen phosphate, potassium phosphate, sodium dihydrogen phosphate, disodium hydrogen phosphate, sodium phosphate, potassium hydroxide, sodium hydroxide, and sodium hydride, and metal alkoxide such as sodium methoxide and potassium tert-butoxide. A base can be used at 0.001 to 100 equivalents with respect to compound (XXX), which is preferably 0.5 to 10 equivalents. Specific examples of phase transfer catalysts include tetrabutylammonium hydrogensulfate and the like. A phase transfer catalyst can be used at 0.001 to 100 equivalents with respect to compound (XXX), which is preferably 0.1 to 10 equivalents. Specific examples of inert solvents include

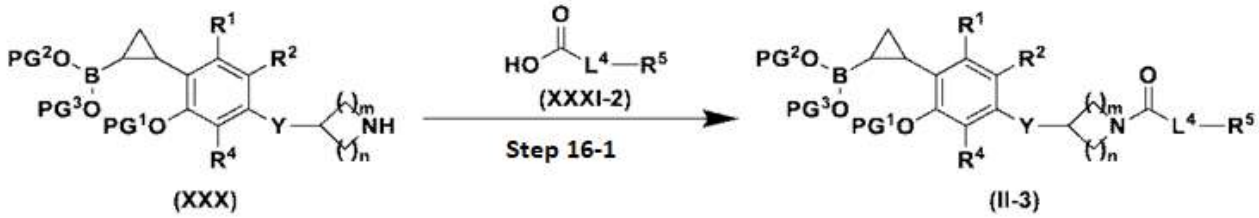
halogenated hydrocarbons such as chloroform and dichloromethane, aromatic hydrocarbons such as benzene and toluene, ether solvents such as tetrahydrofuran (THF), diethyl ether, 1,4-dioxane, and 1,2-dimethoxyethane (DME), lower alcohol such as methanol, ethanol, and 2-propanol, aprotic polar solvents such as acetonitrile, N,N-dimethylformamide (DMF), and N-methyl-2-pyrrolidone (NMP), water, and mixture solvents thereof. The reaction temperature is selected from the range of about -20°C to the boiling point of the solvent used.

[0306]

Manufacturing Method 16

A compound of formula (II) represented by formula (II-3) can be manufactured, for example, by the manufacturing method described below by using compound (XXX) as a raw material.

[Chemical Formula 630]



wherein Y, L^4, R^1, R^2, R^4, and R^5 are defined the same as item 1, and m and n are defined the same as item 33. PG^1, PG^2, and PG^3 are each defined the same as the definition described in Manufacturing Method 1, and PG^6 is defined the same as the definition described in Manufacturing Method 15.

[0307]

Step 16-1: Compound (II-3) can be manufactured by a condensation reaction of compound (XXX) with compound (XXXI-2) in an inert solvent in the presence of a condensing agent. Compound (XXXI-2) can be used at 0.001 to 100 equivalents with respect to compound (XXX), which is preferably 1 to 10 equivalents. Various condensing agents that are used in a conventional method can be used as the condensing agent. Examples thereof include 1-ethyl-3-

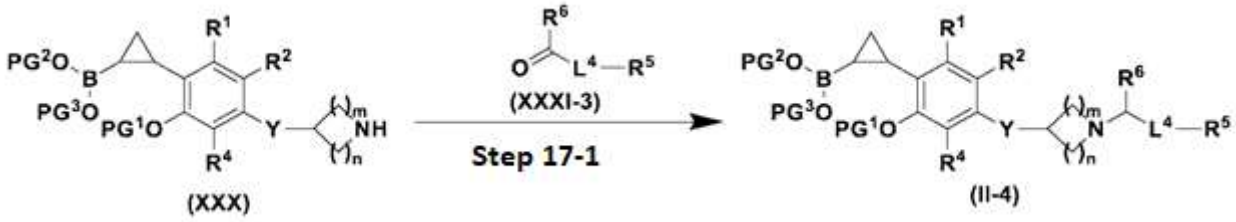
(3-dimethylaminopropyl)carbodiimide (EDC, EDCI) (and hydrochlorides thereof), O-(7-azabenzotriazol-1-yl)-N,N,N',N',-tetramethyluronium hexafluorophosphate (HATU), and the like. A condensing agent can be used at 0.001 to 100 equivalents with respect to compound (XXX), which is preferably 1 to 10 equivalents. Examples of bases include diisopropylethylamine, triethylamine, and the like. A base can be used at 0.001 to 100 equivalents with respect to compound (XXX), which is preferably 1 to 10 equivalents. Specific examples of inert solvents include ether solvents such as THF and DME, halogenated hydrocarbon solvents such as dichloromethane and chloroform, aprotic solvents such as DMF, NMP, and DMSO, and the like. The reaction temperature is selected from the range of about -78°C to about 100°C.

[0308]

Manufacturing Method 17

A compound of formula (II) represented by formula (II-4) can be manufactured, for example, by the manufacturing method described below by using compound (XXX) as a raw material,.

[Chemical Formula 631]



wherein Y, L^4, R^1, R^2, R^4, and R^5 are defined the same as item 1, and m and n are defined the same as item 33. PG^1, PG^2, and PG^3 are each defined the same as the definition described in Manufacturing Method 1, PG^6 is defined the same as the definition described in Manufacturing Method 15, and R^6 represents a hydrogen atom or an optionally substituted C_{1-6} alkyl group.

[0309]

Step 17-1: Compound (II-4) can be manufactured by a so-called reductive amination reaction of compound (XXXI-3) with compound

(XXX) in an inert solvent in the presence of a reducing agent. The reaction can be performed in the presence of a base, an acid, or other additives as needed. Compound (XXXI-3) can be used at 0.001 to 100 equivalents with respect to compound (XXX), which is preferably 1 to 10 equivalents. Specific exmaples of reducing agents include lithium aluminum hydride, sodium borohydride, sodium triacetoxyborohydride, sodium cyanoborohydride, diisobutylaluminium hydride, lithium tri(sec-butyl)borohydride, sodium tri(sec-butyl)borohydride, potassium tri(sec-butyl)borohydride, borane-dimethylsulfide complex, borane-tetrahydrofuran complex, lithium triethyl borohydride, ammonium formate, and the like. Alternatively, a hydrogenation reaction can also be performed using a metal catalyst such as palladium on carbon or palladium oxide instead of a reducing agent. A reducing agent can be used at 0.001 to 100 equivalents with respect to compound (XXX), which is preferably 0.5 to 10 equivalents. Specific examples of bases include organic bases such as triethylamine, diisopropylethylamine, and pyridine; inorganic bases such as potassium carbonate, sodium carbonate, cesium carbonate, potassium hydrogen carbonate, sodium hydrogen carbonate, potassium dihydrogen phosphate, dipotassium hydrogen phosphate, potassium phosphate, sodium dihydrogen phosphate, disodium hydrogen phosphate, sodium phosphate, potassium hydroxide, sodium hydroxide, and sodium hydride; metal alkoxides such as sodium methoxide and potassium tert-butoxide; and the like. A base can be used at 0.001 to 100 equivalents with respect to compound (XXX), which is preferably 0.5 to 10 equivalents. Specific examples of acids include organic acids such as acetic acid, trifluoroacetic acid, and methanesulfonic acid; inorganic acids such as hydrochloric acid and sulfuric acid, and the like. An acid can be used at 0.001 to 100 equivalents with respect to compound (XXX), which is preferably 0.5 to 10 equivalents. Examples of other additives include dehydrating agents such as tetramethyl

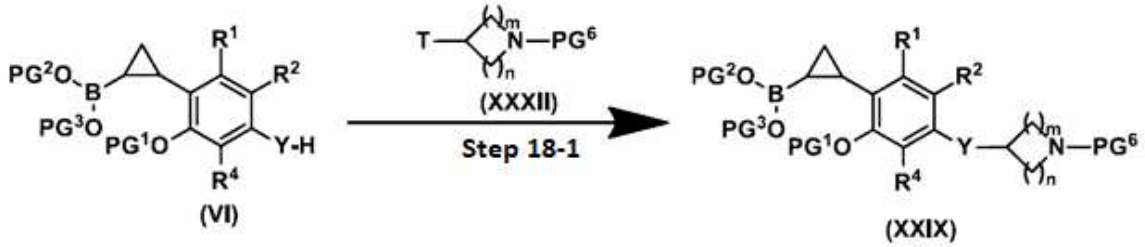
orthosilicate and methyl orthoformate; zinc chloride, titanium tetrachloride, lanthanum sulfate, magnesium sulfate-p-pyridinium p-toluenesulfonate, magnesium bromide, indium chloride, zirconium chloride, magnesium triflate, ytterbium(III)triflate (wherein (III) indicates that ytterbium is trivalent), scandium triflate, alumina, copper sulfate, titanium isopropoxide, titanium tetraethoxide, and other Lewis acids. An additive can be used at 0.001 to 100 equivalents with respect to compound (XXX), which is preferably 0.5 to 10 equivalents. Specific examples of inert solvents include water, acetonitrile; halogenated hydrocarbons such as chloroform and dichloromethane; aromatic hydrocarbons such as benzene and toluene; ether solvents such as DME, THF, and 1,4-dioxane; alcohol solvents such as methanol, ethanol, and 2-propanol; aprotic polar solvents such as DMF and NMP; mixture solvents thereof; and the like. The reaction temperature is selected from the range of about -20°C to the boiling point of the solvent used.

[0310]

Manufacturing Method 18

Compound (XXIX) can be manufactured, for example, by the manufacturing method described below by using compound (VI) as a raw material,.

[Chemical Formula 632]



wherein Y, R^1, R^2, and R^4 are defined the same as item 1, and m and n are defined the same as item 33. H of group -Y-H in formula (VI) is a hydrogen atom, PG^1, PG^2, and PG^3 are each defined the same as the definition described in Manufacturing Method 1, T is defined the same as the definition described in Manufacturing Method 4,

and PG^6 is defined the same as the definition described in Manufacturing Method 15.

[0311]

Step 18-1: Compound (XXIX) can be manufactured by a method in accordance with step 4-3 in Manufacturing Method 4 by using compound (VI) as a raw material.

[0312]

Manufacturing Method 19

Compound (XXIX) can also be manufactured, for example, by the manufacturing method described below by using compound (XXXIII) as a raw material.

[Chemical Formula 633]



(XXXIII) (XXIX)

wherein Y, R^1, R^2, and R^4 are defined the same as item 1, and m and n are defined the same as item 33. PG^1, PG^2, and PG^3 are each defined the same as the definition described in Manufacturing Method 1, and PG^6 is defined the same as the definition described in Manufacturing Method 15.

[0313]

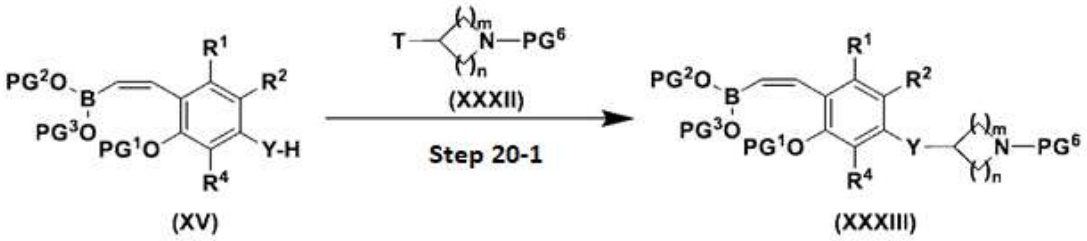
Step 19-1: Compound (XXIX) can be manufactured by a method in accordance with step 2-1 in Manufacturing Method 2 by using compound (XXXIII) as a raw material. Compound (XXXIII) can be manufactured, for example, in the same manner as Manufacturing Methods 20 to 22 described below or a known method from a corresponding raw material that can be purchased or prepared.

[0314]

Manufacturing Method 20

Compound (XXXIII) can be manufactured, for example, by the manufacturing method described below by using compound (XV) as a raw material.

[Chemical Formula 634]



wherein Y, R^1, R^2, and R^4 are defined the same as item 1, and m and n are defined the same as item 33. H of group -Y-H in formula (XV) is a hydrogen atom, PG^1, PG^2, and PG^3 are each defined the same as the definition described in Manufacturing Method 1, T is defined the same as the definition described in Manufacturing Method 4, and PG^6 is defined the same as the definition in Manufacturing Method 15.

[0315]

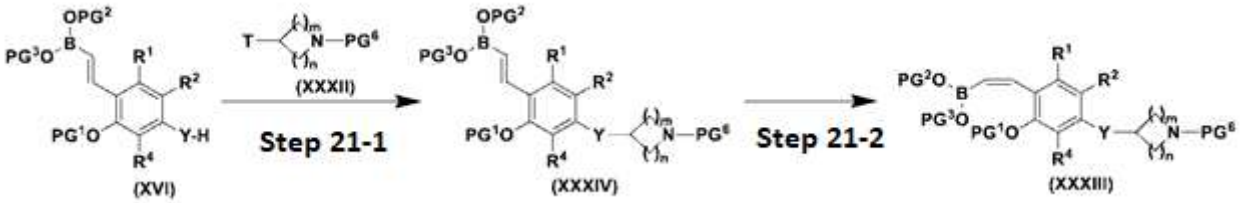
Step 20-1: Compound (XXXIII) can be manufactured by a method in accordance with step 4-3 in Manufacturing Method 4 by using compound (XV) as a raw material.

[0316]

Manufacturing Method 21

Compound (XXXIII) can also be manufactured, for example, by the manufacturing method described below by using compound (XVI) as a raw material.

[Chemical Formula 635]



wherein Y, R^1, R^2, and R^4 are defined the same as item 1, and m and n are defined the same as item 33. H of group -Y-H in formula (XVI) is a hydrogen atom, PG^1, PG^2, and PG^3 are each defined the same as the definition described in Manufacturing Method 1, T is defined the same as the definition described in Manufacturing

Method 4, and PG^6 is defined the same as the definition described in Manufacturing Method 15.

[0317]

Step 21-1: Compound (XXXIV) can be manufactured by a method in accordance with step 4-3 in Manufacturing Method 4 by using compound (XVI) as a raw material.

[0318]

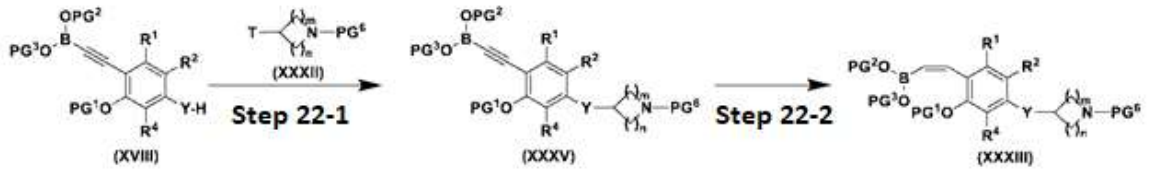
Step 21-2: Compound (XXXIII) can be manufactured by a method in accordance with step 5-2 in Manufacturing Method 5 by using compound (XXXIV) as a raw material.

[0319]

Manufacturing Method 22

Compound (XXXIII) can also be manufactured, for example, by the manufacturing method described below by using compound (XVIII) as a raw material.

[Chemical Formula 636]



wherein Y, R^1, R^2, and R^4 are defined the same as item 1, and m and n are defined the same as item 33. H of group -Y-H in formula (XVIII) is a hydrogen atom, PG^1, PG^2, and PG^3 are each defined the same as the definition described in Manufacturing Method 1, T is defined the same as the definition described in Manufacturing Method 4, and PG^6 is defined the same as the definition described in Manufacturing Method 15.

[0320]

Step 22-1: Compound (XXXV) can be manufactured by a method in accordance with step 4-3 in Manufacturing Method 4 by using compound (XVIII) as a raw material.

[0321]

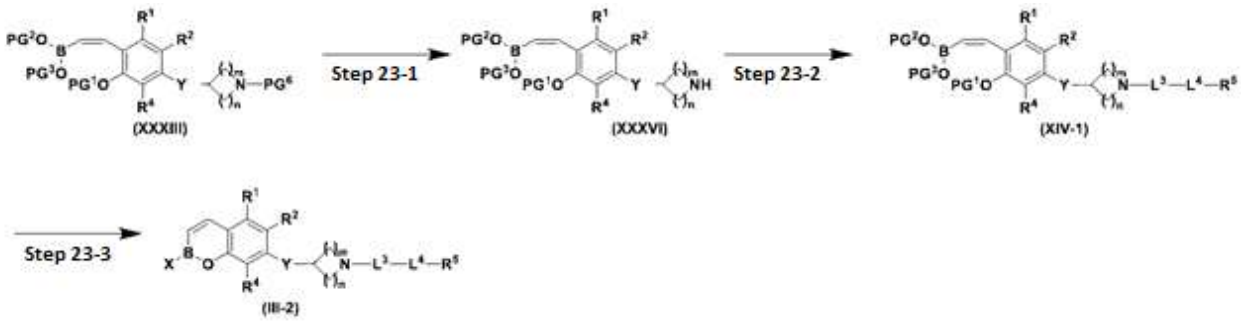
Step 22-2: Compound (XXXIII) can be manufactured by a method in accordance with step 6-5 in Manufacturing Method 6 by using compound (XXXV) as a raw material.

[0322]

Manufacturing Method 23

A compound of formula (III) represented by formula (III-2) can be manufactured, for example, by the manufacturing method described below by using compound (XXXIII) as a raw material.

[Chemical Formula 637]



wherein Y, L^3, L^4, R^1, R^2, R^4, and R^5 are defined the same as item 1, and m and n are defined the same as item 33. PG^1, PG^2, and PG^3 are each defined the same as the definition described in Manufacturing Method 1, T is defined the same as the definition described in Manufacturing Method 4, and PG^6 is defined the same as the definition described in Manufacturing Method 15.

[0323]

Step 23-1: Compound (XXXVI) can be manufactured by a method in accordance with step 15-1 in Manufacturing Method 15 by using compound (XXXIII) as a raw material.

[0324]

Step 23-2: Compound (XIV-1) can be manufactured by a method in accordance with step 15-2 in Manufacturing Method 15, step 16-1 in Manufacturing Method 16, or step 17-1 in Manufacturing Method 17 by using compound (XXXVI) as a raw material.

[0325]

Step 23-3: Compound (III-2) can be manufactured by a method in accordance with step 1-1, step 1-1-1, or step 1-1-2 in

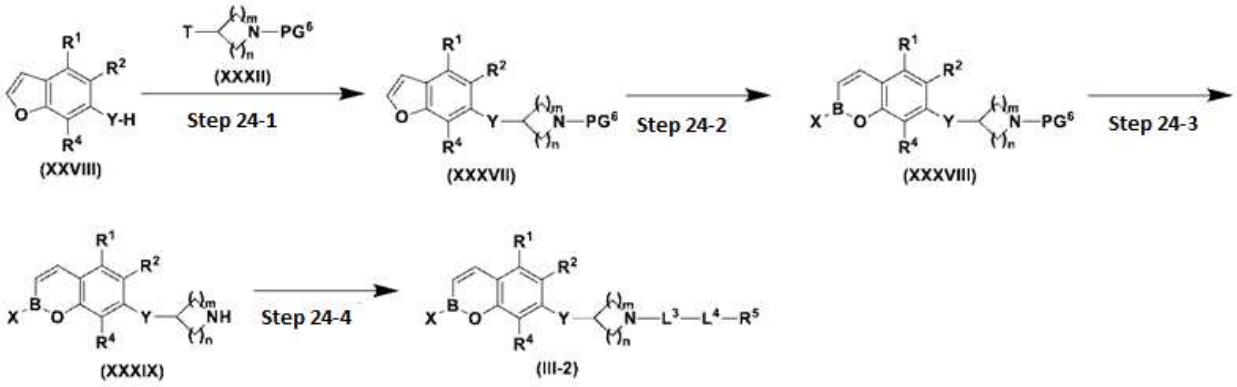
Manufacturing Method 1 (same as step 12-1 in Manufacturing Method 12) by using compound (XIV-1) as a raw material.

[0326]

Manufacturing Method 24

A compound represented by formula (III-2) can be manufactured, for example, by the manufacturing method described below by using compound (XXVIII) as a raw material.

[Chemical Formula 638]



wherein Y, L^3, L^4, R^1, R^2, R^4, and R^5 are defined the same as item 1, and m and n are defined the same as item 33. H of group -Y-H in formula (XXVIII) is a hydrogen atom, T is defined the same as the definition described in Manufacturing Method 4, and PG^6 is defined the same as the definition described in Manufacturing Method 15.

[0327]

Step 24-1: Compound (XXXVII) can be manufactured by a method in accordance with step 4-3 in Manufacturing Method 4 by using compound (XXVIII) as a raw material.

[0328]

Step 24-2: Compound (XXXVIII) can be manufactured by a method in accordance with step 13-6 in Manufacturing Method 13 by using compound (XXXVII) as a raw material.

[0329]

Step 24-3: Compound (XXXIX) can be manufactured by a method in accordance with step 15-1 in Manufacturing Method 15 by using compound (XXXVIII) as a raw material.

[0330]

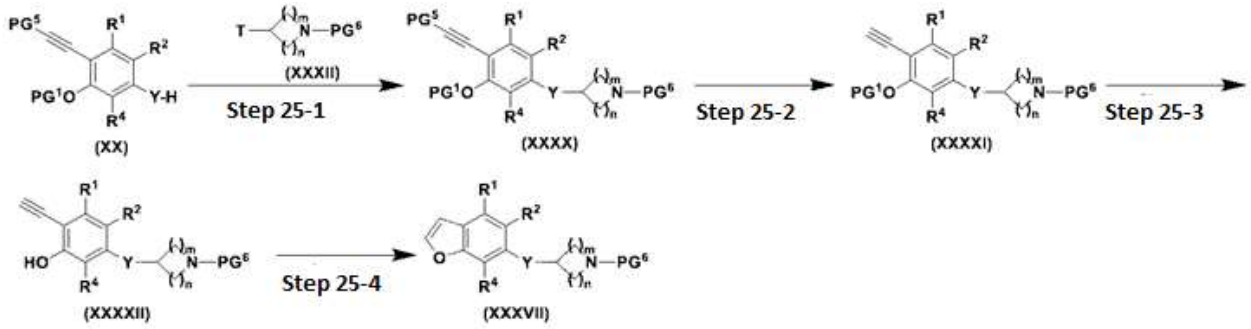
Step 24-4: Compound (III-2) can be manufactured by a method in accordance with step 15-2 in Manufacturing Method 15, step 16-1 in Manufacturing Method 16, or step 17-1 in Manufacturing Method 17 by using compound (XXXIX) as a raw material.

[0331]

Manufacturing Method 25

Compound (XXXVII) can also be manufactured, for example, by the manufacturing method described below by using compound (XX) as a raw material.

[Chemical Formula 639]



wherein Y, R^1, R^2, and R^4 are defined the same as item 1, and m and n are defined the same as item 33. H of group -Y-H in formula (XX) is a hydrogen atom, PG^1 is defined the same as the definition described in Manufacturing Method 1, T is defined the same as the definition described in Manufacturing Method 4, PG^5 is defined the same as the definition described in Manufacturing Method 6, and PG^6 is defined the same as the definition described in Manufacturing Method 15.

[0332]

Step 25-1: Compound (XXXX) can be manufactured by a method in accordance with step 4-3 in Manufacturing Method 4 by using compound (XX) as a raw material.

[0333]

Step 25-2: Compound (XXXXI) can be manufactured by a method in accordance with step 6-2 in Manufacturing Method 6 by using compound (XXXX) as a raw material.

[0334]

Step 25-3: Compound (XXXXII) can be manufactured by a method in accordance with step 4-2 in Manufacturing Method 4 by using compound (XXXXI) as a raw material.

[0335]

Step 25-4: Compound (XXXVII) can be manufactured by a method in accordance with step 13-5 in Manufacturing Method 13 by using compound (XXXXII) as a raw material.

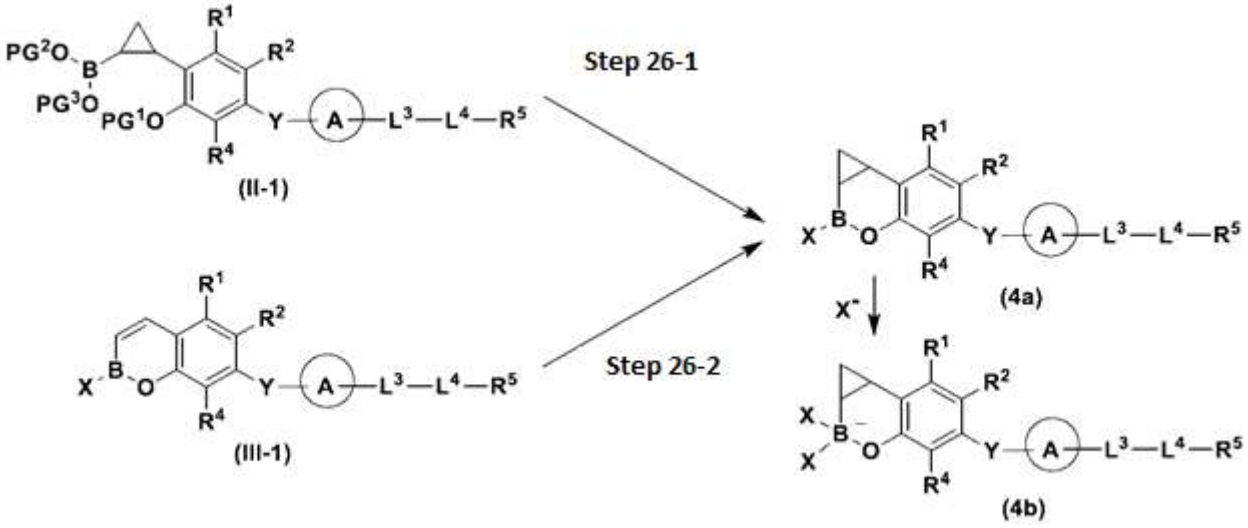
[0336]

Manufacturing Method 26

A compound represented by formula (4a) defined in item 19 (hereinafter, also referred to as compound (4a)) and a compound represented by formula (4b) (hereinafter, also referred to as compound (4b)) can be manufactured, for example, by the manufacturing method described below by using compound (II-1) or compound (III-1) as a raw material,.

[0337]

[Chemical Formula 640]



wherein A, X, Y, L^3, L^4, R^1, R^2, R^4, and R^5 are defined the same as any of items 1 to 19. PG^1, PG^2, and PG^3 in formula (II-1) are each defined the same as the definition described in Manufacturing Method 1.

[0338]

Step 26-1: Compound (4a) can be manufactured by a method in accordance with step 1-1, step 1-1-1, or step 1-1-2 in Manufacturing Method 1 by using compound (II-1) as a raw material. Compound (4b) can also be obtained by a method in accordance with Manufacturing Method 3, by using compound (4a) as a raw material or in a step of manufacturing compound (4a).

[0339]

Step 26-2: Compound (4a) can be manufactured by a method in accordance with step 2-1 in Manufacturing Method 2 by using compound (III-1) as a raw material. In the same manner, compound (4b) can be obtained in accordance with Manufacturing Method 3, by using compound (4a) as a raw material or in a step of manufacturing compound (4a).

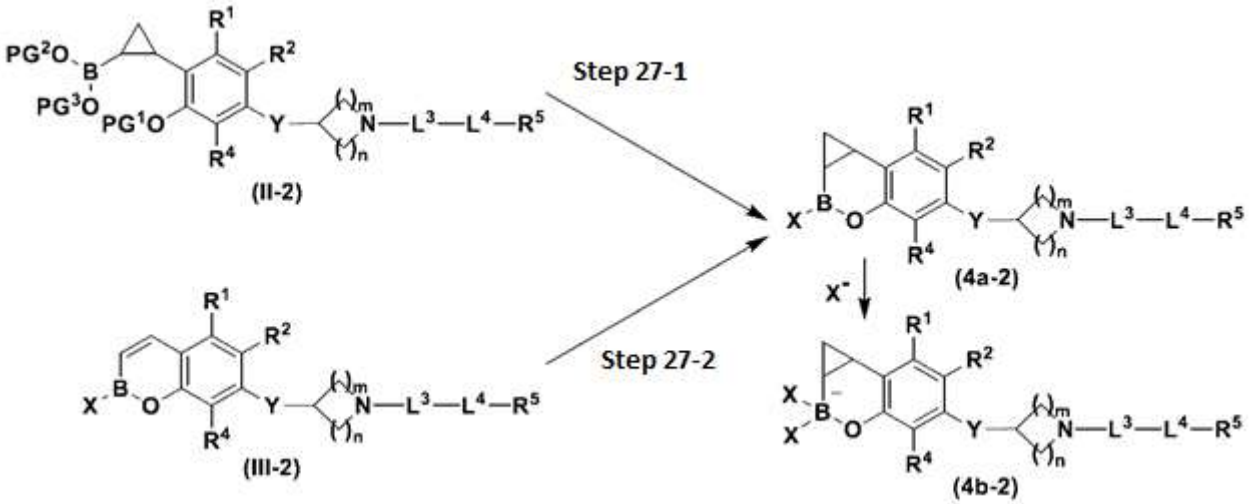
[0340]

Manufacturing Method 27

Compound (4a) and compound (4b) defined in item 19 represented by formula (4a-2) and formula (4b-2) described below can be manufactured, for example, by the manufacturing method described below by using compound (II-2) or compound (III-2) as a raw material.

[0341]

[Chemical Formula 641]



wherein X, Y, L^3, L^4, R^1, R^2, R^4, and R^5 are defined the same as any of items 1 to 19, and m and n are defined the same as item 33. PG^1, PG^2, and PG^3 in formula (II-2) are each defined the same as the definition described in Manufacturing Method 1.

[0342]

Step 27-1: Compound (4a-2) can be manufactured by a method in accordance with step 1-1, step 1-1-1, or step 1-1-2 in Manufacturing Method 1 by using compound (II-2) as a raw material. Compound (4b-2) can also be obtained by a method in accordance with Manufacturing Method 3, by using compound (4a-2) as a raw material or in a step of manufacturing compound (4a-2).

[0343]

Step 27-2: Compound (4a-2) can be manufactured by a method in accordance with step 2-1 in Manufacturing Method 2 by using compound (III-2) as a raw material. In the same manner, compound (4b-2) can be obtained by a method in accordance with Manufacturing Method 3, by using compound (4a-2) as a raw material or in a step of manufacturing compound (4a-2).

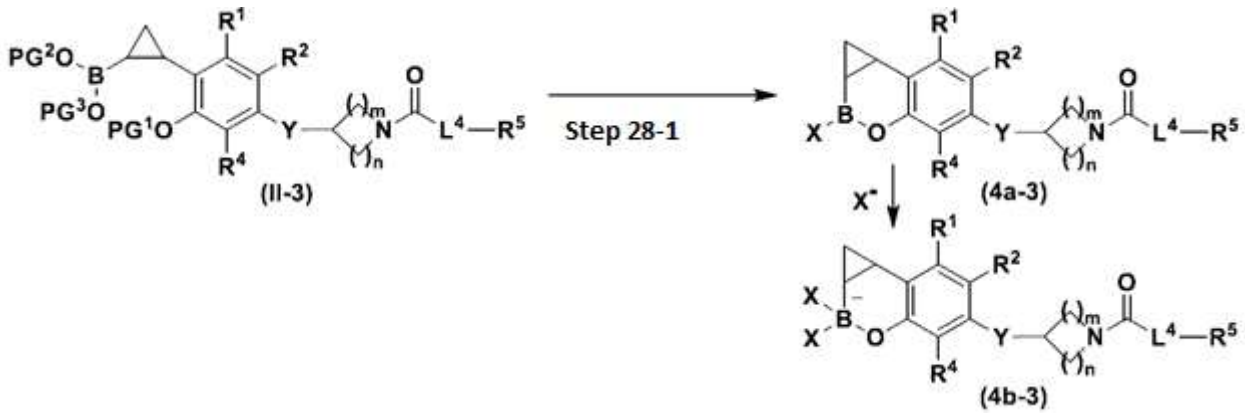
[0344]

Manufacturing Method 28

Compound (4a) and compound (4b) defined in item 19 represented by formula (4a-3) and formula (4b-3) described below can be manufactured, for example, by the manufacturing method described below by using compound (II-3) as a raw material.

[0345]

[Chemical Formula 642]



wherein X, Y, L^4, R^1, R^2, R^4, and R^5 are defined the same as any of items 1 to 19, and m and n are defined the same as item 33. PG^1, PG^2, and PG^3 in formula (II-3) are each defined the same as the definition described in Manufacturing Method 1.

[0346]

Step 28-1: Compound (4a-3) can be manufactured by a method in accordance with step 1-1, step 1-1-1, or step 1-1-2 in Manufacturing Method 1 by using compound (II-3) as a raw material. Compound (4b-3) can be obtained by a method in accordance with Manufacturing Method 3, by using compound (4a-3) as a raw material or in a step of manufacturing compound (4a-3).

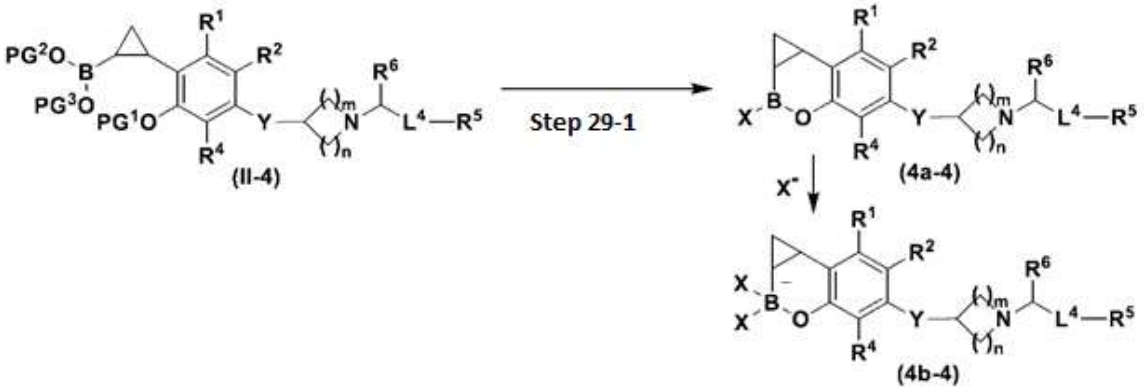
[0347]

Manufacturing Method 29

Compound (4a) and compound (4b) defined in item 19 represented by formula (4a-4) and formula (4b-4) described below can be manufactured, for example, by the manufacturing method described below by using compound (II-4) as a raw material.

[0348]

[Chemical Formula 643]



wherein X, Y, L^4, R^1, R^2, R^4, and R^5 are defined the same as any of items 1 to 19, and m and n are defined the same as item 33. R^6 is defined the same as the definition described in Manufacturing Method 17, and PG^1, PG^2, and PG^3 in formula (II-4) are each defined the same as the definition described in Manufacturing Method 1.

[0349]

Step 29-1: Compound (4a-4) can be manufactured by a method in accordance with step 1-1, step 1-1-1, or step 1-1-2 in Manufacturing Method 1 by using compound (II-4) as a raw material. Compound (4b-4) can be obtained by a method in accordance with Manufacturing Method 3, by using compound (4a-4) as a raw material or in a step of manufacturing compound (4a-4).

[0350]

The intermediate and compound of interest in the manufacturing methods described above can be isolated and purified by subjecting them to a purification method that is commonly used in organic synthesis chemistry, e.g., neutralization, filtration, extraction, washing, drying, concentration, recrystallization, various chromatography, or the like. Each intermediate can also be subjected to the subsequent reaction without any particular purification.

[0351]

Optically active forms of the compound of the invention can be manufactured by using an optically active starting material or intermediate, or by optically resolving a racemate of the final

product or intermediate. Examples of optical resolution methods include physical separation methods using an optically active column and chemical separation methods such as fractional crystallization method. A diastereomer of the compound of the invention can be manufactured by, for example, a separation method such as column chromatography or fractional crystallization.

[0352]

A pharmaceutically acceptable salt of a compound represented by formula (1a) or (1b) can be manufactured by, for example, mixing a compound represented by formula (1a) or formula (1b) with a pharmaceutically acceptable acid or base in a solvent such as water, methanol, ethanol, 2-propanol, ethyl acetate, or acetone, but the manufacturing method is not limited thereto.

[0353]

As used herein, "or" is used when "at least one or more" of the listed matters in the sentence can be employed. When explicitly described herein as "within the range of two values", the range also includes the two values themselves.

[0354]

Reference literatures such as scientific literatures, patents, and patent applications cited herein are incorporated herein by reference to the same extent that the entirety of each document is specifically described. The US patent publications corresponding to the aforementioned prior art documents, i.e., Patent Literatures 1 to 10 (Patent Literature 1: US 2014/0194382A1; US 2014/0194385A1; Patent Literature 2: US 2014/0194381A1; US 2014/0194384A1; Patent Literature 3: US 2017/0088561A1; Patent Literature 4: US 2017/0136047A1; Patent Literature 5: US 2018/051041A1; Patent Literature 6: US 2014/0171390A1; Patent Literature 7: US 2014/0194386A1; Patent Literature 8: US 2016/0024121A1; Patent Literature 9: US 2015/0361107A1; US 2015/0361108A1; Patent Literature 10: US 2018/0002351A1) are also

incorporated herein by reference to the same extent that the entirety of each document is specifically described.

[0355]

As described above, the present invention has been described while showing preferred embodiments to facilitate understanding. The present invention is described hereinafter based on Examples. The above descriptions and the following Examples are not provided to limit the present invention, but for the sole purpose of exemplification. Thus, the scope of the present invention is not limited to the embodiments and Examples specifically described herein and is limited only by the scope of claims.

[Examples]

[0356]

While the present invention is described more specifically with Reference Examples, Examples, and Test Examples hereinafter, the preset invention is not limited thereto.

[0357]

Compounds were identified using proton nuclear magnetic resonance spectrum (^{1}H-NMR), liquid chromatography-mass spectrometry (LCMS), or the like. Tetramethylsilane was used as an internal standard for nuclear magnetic resonance spectrum.

[0358]

For column chromatography in the Reference Examples and Examples, Yamazen Corporation's silica gel column, YMC's ODS-A column, YMC's YMC-Actus Triart C18, or YMC's YMC-Actus pro C18 were used. For TLC (silica gel plate) in purification using a thin layer chromatography (TLC), Silica gel 60F254 (Merck) was used, and for TLC (NH silica gel plate), TLC plate NH (Fuji Silysia) was used.

[0359]

Various data described in the Reference Examples and Example were obtained with the following equipment.

NMR spectrum: 400 MHz or 270 MHz: JEOL JNM-AL series AL400 or JEOL EX270

LC-MS spectrum: Waters ACQUITY™ UltraPerformance LC

[0360]

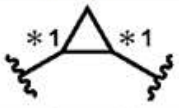
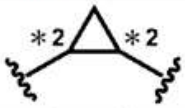
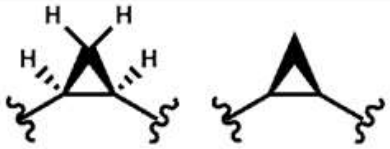
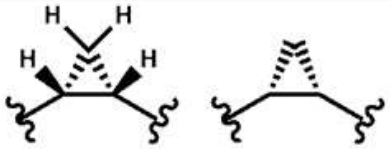
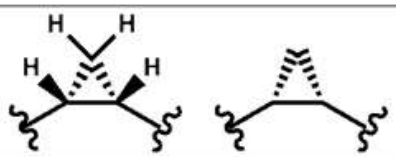
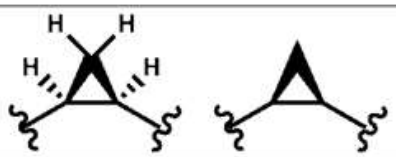
The compound names described in the Reference Examples and Examples were named using ACD/Name (ACD/Labs 12.0, Advanced Chemistry Development Inc.), which are not necessarily in accordance with the IUPAC nomenclature.

[0361]

*1 and *2 appended to asymmetric carbon atoms in the structural formulas in the Reference Examples and the Examples indicate that the configuration of the carbon atom is not a racemate of a mixture of any ratio, but is substantially independent. If, for example, there are descriptions of structures of a compound (isomer 1) having a 3-membered ring (cyclopropane ring) or the three-membered ring further forming a condensed ring structure and having two *1 appended two asymmetric carbons constituting the three-membered ring (corresponding to two bridgehead position carbons in case of a condensed ring structure) and compound (isomer 2) similarly appended with two *2, this indicates that two bonds to three-membered ring methylene carbon from the two symmetric carbons in the same molecular structure have a configuration orientated toward the same direction in either a direction from the page surface to the backside or the front side (i.e., cis configuration), and indicates that isomer 1 and isomer 2 are different isomers. Specifically, this indicates that if one of isomer 1 and isomer 2 has a configuration in which the two bonds to a three-membered ring methylene carbon from two asymmetric carbons is oriented from the page surface to the back side, the other isomer is a configuration in which the bonds are oriented in the direction from the page surface to the front side, or the two isomers are enantiomers of each other with respect to the partial structure of the two asymmetric carbons. For example,

the following table shows that the relationship between isomer 1 and isomer 2 is either case 1 or case 2 (the denotation describing a hydrogen atom (left side) and a denotation omitting a hydrogen atom (right side) for a stereochemical structure described in parallel in the following table are synonymous herein).

[Table 2]

	Isomer 1	Isomer 2
Examples of description of isomer		
Case 1	 (Descriptions on both left and right are synonymous)	 (Descriptions on both left and right are synonymous)
Case 2		

[0362]

The measuring conditions (hereinafter, also referred to as the measurement methods) for a high performance liquid chromatography-mass spectrometry (LCMS) system are described below. The observed mass spectrometry value [MS(m/z)] is indicated by $[M+1]^+$ (or denoted as $[M+H]^+$), etc., and the time of retention at which the mass spectrometry value was observed is indicated by Rt (min). The measurement conditions A to I used for measurement are denoted in each actual measurement value. For example, "LCMS: $[M+H]^+$/Rt = 620/1.32^A" expresses that measurement was taken under measurement condition A.

[0363]

Measurement Condition A

Measuring equipment: Waters ACQUITY™ UltraPerformance LC

Column: ACQUITY UPLC BEH C18 1.7 μm 2.1 × 30 mm column

Solvent: solution A: 0.05% HCOOH/H_2O, solution B: CH_3CN

Gradient condition:
0.0 to 1.3 minutes; A/B = 99/1 to 5/95 (linear gradient)
1.3 to 1.5 minutes; A/B = 99/1
Flow rate: 0.80 mL/min
UV: 220 nm, 254 nm
Column temperature: 40°C

[0364]

Measurement Condition B

Measuring equipment: Waters ACQUITY™ UltraPerformance LC
Column: ACQUITY UPLC BEH C18 1.7 μm 2.1 × 30 mm column
Solvent: solution A: 0.05% HCOOH/H_2O, solution B: CH_3CN
Gradient condition:
0.0 to 1.3 minutes; A/B = 90/10 to 5/95 (linear gradient)
1.3 to 1.5 minutes; A/B = 90/10
Flow rate: 0.80 mL/min
UV: 220 nm, 254 nm
Column temperature: 40°C

[0365]

Measurement Condition C

Measuring equipment: Waters ACQUITY™ UltraPerformance LC
Column: ACQUITY UPLC BEH C18 1.7 μm 2.1 × 30 mm column
Solvent: solution A: 0.05% HCOOH/H_2O, solution B: CH_3CN
Gradient condition:
0.0 to 1.3 minutes; A/B = 60/40 to 5/95 (linear gradient)
1.3 to 1.5 minutes; A/B = 60/40
Flow rate: 0.80 mL/min
UV: 220 nm, 254 nm
Column temperature: 40°C

[0366]

Measurement Condition D

Measuring equipment: Shimadzu LCMS-2020
Column: Phenomenex Kinetex 1.7 μm C18 (50 mm x 2.10 mm)
Solvent: solution A: 0.05% TFA/H_2O, solution B: CH_3CN

Gradient condition:
0.0 to 1.9 minutes; A/B = 90/10 to 1/99 (linear gradient)
1.91 to 3.00 minutes; A/B = 1/99
Flow rate: 0.50 mL/min
UV: 220 nm, 254 nm
Column temperature: 40°C

[0367]

Measurement Condition E

Measuring equipment: Shimadzu LCMS-2020
Column: Phenomenex Kinetex 1.7 μm C18 (50 mm x 2.10 mm)
Solvent: solution A: 0.05% TFA/H_2O, solution B: CH_3CN
Gradient condition:
0.0 to 1.9 minutes; A/B = 40/60 to 1/99 (linear gradient)
1.91 to 3.00 minutes; A/B = 1/99
Flow rate: 0.50 mL/min
UV: 220 nm, 254 nm
Column temperature: 40°C

[0368]

Measurement Condition F

Measuring equipment: Shimadzu LCMS-2020
Column: Phenomenex Kinetex 1.7 μm C18 (50 mm x 2.10 mm)
Solvent: solution A: 0.05% TFA/H_2O, solution B: CH_3CN
Gradient condition:
0.0 to 1.9 minutes; A/B = 99/1 to 1/99 (linear gradient)
1.91 to 3.00 minutes; A/B = 1/99
Flow rate: 0.50 mL/min
UV: 220 nm, 254 nm
Column temperature: 40°C

[0369]

Measurement Condition G

Measuring equipment: Waters AQUITY™ UPLC H-Class System
Column: ACQUITY UPLC HSS T3 1.8 μm 2.1 × 35 mm column
Solvent: solution A: 0.1% HCOOH/H_2O, solution B: 0.1% HCOOH/CH_3CN

Gradient condition:

0.0 to 2.4 minutes; A/B = 90/10 to 0/100 (linear gradient)

2.4 to 3.2 minutes; A/B = 0/100

Flow rate: 0.7 mL/min

UV: 190 to 800 nm

Column temperature: 40°C

[0370]

Measurement Condition H

Measuring equipment: Waters ACQUITY™ UltraPerformance LC

Column: ACQUITY UPLC BEH C18 1.7 μm 2.1 × 30 mm column

Solvent: solution A: 0.06% $HCOOH/H_2O$, solution B: 0.06% $HCOOH/CH_3CN$

Gradient condition:

0.0 to 1.3 minutes; A/B = 98/2 to 4/96 (linear gradient)

1.3 to 1.5 minutes; A/B = 98/2

Flow rate: 0.80 mL/min

UV: 220 nm, 254 nm

Column temperature: 40°C

[0371]

Measurement Condition I

Measuring equipment: Shimadzu LCMS-2020

Column: Phenomenex Kinetex 1.7 μm C18 (50 mm × 2.10 mm)

Solvent: solution A: 0.05% TFA/H_2O, solution B: CH_3CN

Gradient condition:

0.0 to 1.9 minutes; A/B = 70/30 to 1/99 (linear gradient)

1.91 to 3.00 minutes; A/B = 1/99

Flow rate: 0.50 mL/min

UV: 220, 254 nm

Column temperature: 40°C

[0372]

Throughout the specification, the abbreviations described above and the following abbreviations are used, for example, in

the Reference Examples, Examples, and Test Examples in some cases to simplify the description.

$CDCl_3$: deuterated chloroform

CD_3OD: deuterated methanol

s: singlet

d: doublet

t: triplet

q: quadruplet

m: multiplet

br: broad

dd: double doublet

J: coupling constant

Hz: Hertz

δ: chemical shift

min: minute

THF: tetrahydrofuran

DMF: N,N-dimethylformamide

Me: methyl

MeCN: acetonitrile

Boc or BOC: tert-butoxycarbonyl

tBu or ^{t}Bu or t-Bu: tert-butyl

Cbz: benzyloxycarbonyl

HCl: hydrogen chloride; represents hydrochloride especially when denoted in a structural formula of a basic compound such as amine

LED: Light Emitting Diode

MEPM: meropenem

MIC: minimum inhibitory concentration

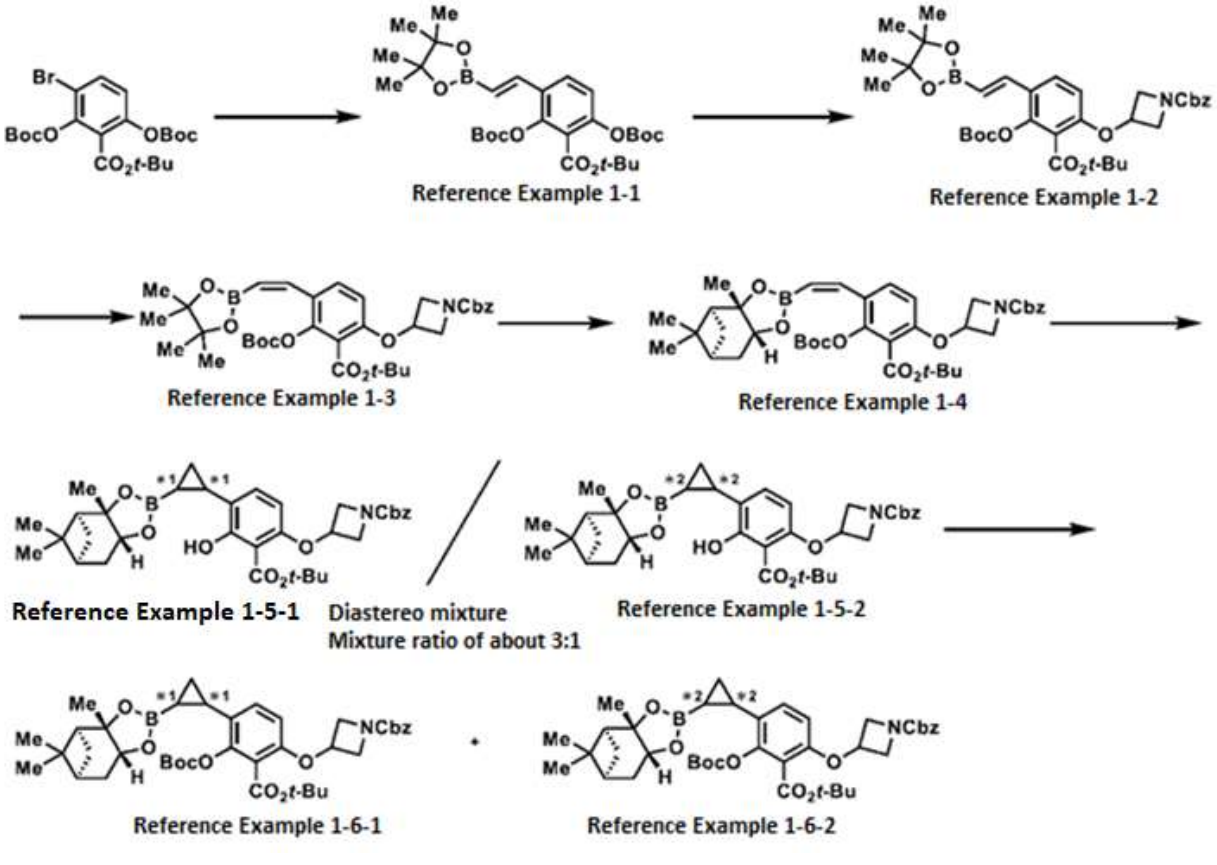
HPLC: high performance liquid chromatography

[0373]

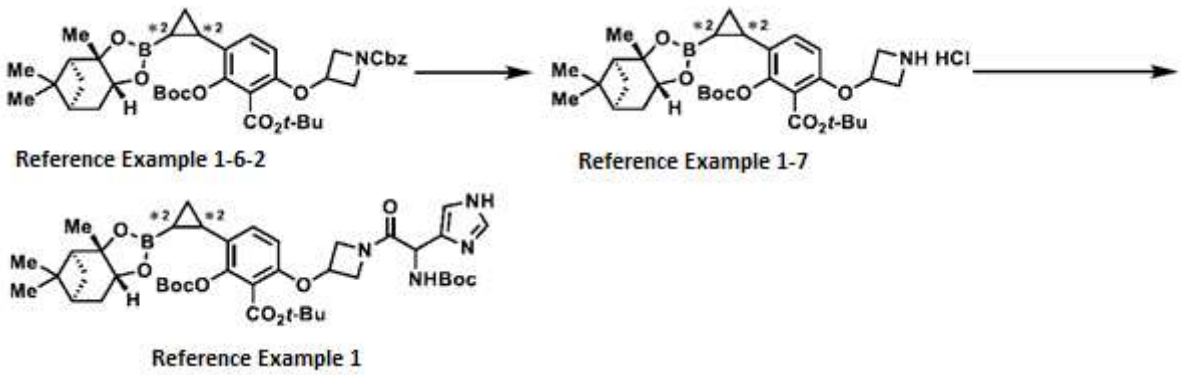
Reference Example 1: tert-butyl 6-[(1-{[(tert-butoxycarbonyl)amino](1H-imidazol-4-yl)acetyl}azetidin-3-yl)oxy]-2-[(tert-butoxycarbonyl)oxy]-3-{2-[(3aS,4S,6S,7aR)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-

yl]cyclopropyl}benzoate (derived from diastereomer 1-5-2; diastereo mixture)

[Chemical Formula 644]



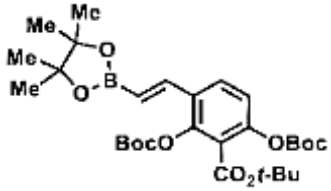
[Chemical Formula 645]



[0374]

Reference Example 1-1: tert-butyl 2,6-bis[(tert-butoxycarbonyl)oxy]-3-[(E)-2-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)ethenyl]benzoate

[Chemical Formula 646]



Triethylamine (6.10 mL, 43.7 mmol), 4,4,5,5-tetramethyl-2-vinyl-1,3,2-dioxaborolane (4.45 mL, 26.2 mmol), and bis(tri-tert-butylphosphine)palladium(0) (1.14 g, 2.22 mmol) were added to a toluene (87 mL) solution of tert-butyl 3-bromo-2,6-bis{(tert-butoxycarbonyl)oxy}benzoate (10.7 g, 21.9 mmol). The reaction mixture was stirred for 4 hours at 80°C. The reaction mixture was cooled to room temperature, and then filtered through celite to concentrate the filtrate. The resulting residue was purified by silica gel column chromatography to obtain the title compound (7.37 g).

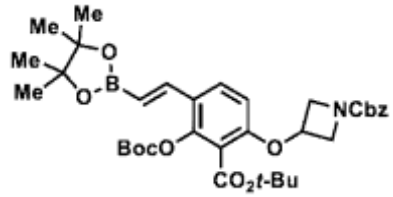
[0375]

^{1}H-NMR (400 MHZ, $CDCl_3$) δ: 7.61 (1H, d, J = 8.5 Hz), 7.36 (1H, d, J = 18.3 Hz), 7.08 (1H, d, J = 8.5 Hz), 6.11 (1H, d, J = 18.7 Hz), 1.54 (9H, s), 1.51 (9H, s), 1.51 (9H, s), 1.25 (12H, s).

[0376]

Reference Example 1-2: benzyl 3-{2-(tert-butoxycarbonyl)-3-[(tert-butoxycarbonyl)oxy]-4-[(E)-2-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)ethenyl]phenoxy}azetidine-1-carboxylate

[Chemical Formula 647]



[0377]

Pyrrolidine (1.03 mL, 12.5 mmol) was added to a THF (33 mL) solution of the compound of Reference Example 1-1 (7.37 g, 13.1 mmol), and the reaction mixture was stirred for 1 hour at room temperature. 1-N-Cbz-3-hydroxyazetidine (3.26 g, 15.7 mmol) was

added to the reaction mixture, which is referred to as mixture A hereinafter.

Tri-n-butylphosphine (8.18 mL, 32.8 mmol) was added to a toluene (65.5 mL) solution of N,N,N',N'-tetramethylazodicarboxamide (6.71 g, 39.0 mmol) while cooling with ice. The reaction mixture was directly stirred for 10 minutes while cooling with ice. This is referred to as mixture B hereinafter.

Mixture A was added to mixture B while cooling with ice, and the newly produced reaction mixture was stirred for 2.5 hours at 65°C. The reaction mixture was cooled to room temperature, then the precipitate was filtered out, and the filtrate was concentrated. The resulting residue was purified by silica gel column chromatography to obtain the title compound (6.34 g).

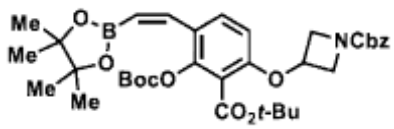
[0378]

^{1}H-NMR (400 MHZ, $CDCl_3$) δ: 7.51 (1H, d, J = 8.7 Hz), 7.34-7.26 (7H, m), 6.41 (1H, d, J = 8.7 Hz), 6.02 (1H, d, J = 18.3 Hz), 5.09 (2H, s), 4.93-4.91 (1H, m), 4.35 (2H, dd, J = 10.5, 6.4 Hz), 4.10-4.05 (2H, m), 1.54 (9H, s), 1.51 (9H, s), 1.25 (13H, s).

[0379]

Reference Example 1-3: benzyl 3-{2-(tert-butoxycarbonyl)-3-[(tert-butoxycarbonyl)oxy]-4-[(Z)-2-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)ethenyl]phenoxy}azetidine-1-carboxylate

[Chemical Formula 648]



[0380]

Tris(2-phenylpyridinato)iridium(III) (5.5 mg, 0.0084 mmol) was added to an acetonitrile (0.5 mL) solution of the compound of Reference Example 1-2 (66 mg, 0.101 mmol), and the reaction mixture was stirred for 3.5 hours at room temperature under irradiation of a blue LED light (450 nm) under a nitrogen

atmosphere. The reaction mixture was concentrated. The resulting residue was purified by silica gel column chromatography to obtain the title compound (35 mg).

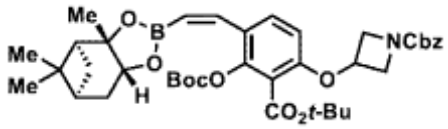
[0381]

^{1}H-NMR (400 MHZ, $CDCl_3$) δ: 7.55 (1H, d, J = 8.5 Hz), 7.34-7.29 (5H, m), 7.05 (1H, d, J = 14.6 Hz), 6.36 (1H, d, J = 8.5 Hz), 5.63 (1H, d, J = 14.6 Hz), 5.09 (2H, s), 4.93 (1H, t, J = 6.4 Hz), 4.35 (2H, dd, J = 10.1, 7.0 Hz), 4.09 (2H, dd, J = 10.4, 4.3 Hz), 1.54 (9H, s), 1.48 (9H, s), 1.22 (12H, s).

[0382]

Reference Example 1-4: benzyl 3-[2-(tert-butoxycarbonyl)-3-[(tert-butoxycarbonyl)oxy]-4-{(Z)-2-[(3aS,4S,6S,7aR)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]ethenyl}phenoxy]azetidine-1-carboxylate

[Chemical Formula 649]



[0383]

(1S,2S,3R,5R)-(+)-pinanediol (2.63 g, 15.5 mmol) was added to a THF (16.1 mL) solution of the compound of Reference Example 1-3 (2.52 g, 3.87 mmol), and the reaction mixture was stirred for 48 hours at room temperature. The reaction mixture was concentrated. The resulting residue was purified by silica gel column chromatography to obtain the title compound (1.76 g).

[0384]

^{1}H-NMR (400 MHZ, $CDCl_3$) δ: 7.56 (1H, d, J = 8.7 Hz), 7.35-7.30 (5H, m), 7.08 (1H, d, J = 14.6 Hz), 6.36 (1H, d, J = 8.7 Hz), 5.67 (1H, d, J = 14.6 Hz), 5.09 (2H, s), 4.95-4.91 (1H, m), 4.35 (2H, dd, J = 10.1, 6.4 Hz), 4.24 (1H, dd, J = 8.9, 2.1 Hz), 4.10-4.06 (2H, m), 2.29-2.24 (1H, m), 2.19-2.14 (1H, m), 2.00 (1H, t, J = 5.5 Hz), 1.89-1.85 (1H, m), 1.82-1.78 (1H, m), 1.54 (9H, s), 1.48 (9H, s),

1.35 (3H, s), 1.26 (3H, s), 1.19 (1H, d, J = 11.0 Hz), 0.81 (3H, s).

[0385]

Reference Example 1-5: benzyl 3-[2-(tert-butoxycarbonyl)-3-hydroxy-4-{2-[(3aS,4S,6S,7aR)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}phenoxy]azetidine-1-carboxylate (diastereo mixture of diastereomer 1-5-1 and diastereomer 1-5-2)

[Chemical Formula 650]



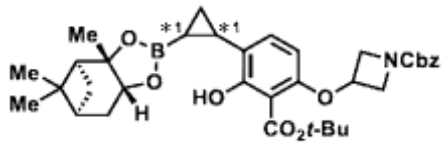
[0386]

A hexane (20.5 mL) solution of diethylzinc (20.5 mmol) (concentration: 1 mol/L) was dissolved in dichloromethane (14.7 mL), and diiodomethane (2.5 mL, 31.0 mmol) was slowly added at -78°C. The reaction mixture was stirred for 5 minutes while cooling with ice, then cooled again to -78°C. A dichloromethane (6 mL) solution of the compound of Reference Example 1-4 (1.76 g, 2.49 mmol) was added dropwise. The reaction mixture was stirred for 10 minutes at -78°C, then warmed to room temperature, and stirred for 2.5 hours at room temperature. An aqueous saturated ammonium chloride solution was added to the reaction mixture, which was extracted with ethyl acetate. The organic layer was washed with saturated saline, then dried with anhydrous sodium sulfate, and filtered, and the filtrate was concentrated. The resulting residue was purified by silica gel column chromatography to obtain the title compound (847 mg) as a diastereo mixture of diastereomer 1-5-1 and diastereomer 1-5-2. The ratio of mixture of both isomers (1-5-1:1-5-2) was about 3:1 (according to ^{1}H-NMR integration ratio).

[0387]

Reference Example 1-5-1: benzyl 3-[2-(tert-butoxycarbonyl)-3-hydroxy-4-{2-[(3aS,4S,6S,7aR)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}phenoxy]azetidine-1-carboxylate (diastereomer 1-5-1)

[Chemical Formula 651]



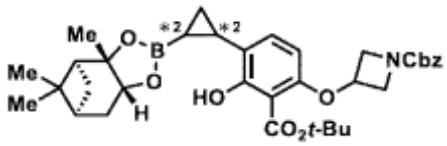
[0388]

^{1}H-NMR (400 MHZ, $CDCl_3$) δ: 11.71 (1H, s), 7.33-7.29 (5H, m), 7.12 (1H, d, J = 8.6 Hz), 5.89 (1H, d, J = 8.6 Hz), 5.10 (2H, s), 4.88-4.85 (1H, m), 4.36-4.30 (2H, m), 4.10-4.07 (2H, m), 4.01-3.97 (2H, m), 2.30-2.23 (1H, m), 2.06-1.98 (1H, m), 1.87 (1H, t, J = 5.8 Hz), 1.75-1.73 (1H, m), 1.66-1.61 (1H, m), 1.46 (9H, s), 1.19 (3H, s), 1.10 (3H, s), 1.09-1.05 (2H, m), 0.79 (1H, d, J = 11.0 Hz), 0.70 (3H, s), 0.52-0.45 (1H, m).

[0389]

Reference Example 1-5-2: benzyl 3-[2-(tert-butoxycarbonyl)-3-hydroxy-4-{2-[(3aS,4S,6S,7aR)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}phenoxy]azetidine-1-carboxylate(diastereomer 1-5-2)

[Chemical Formula 652]



[0390]

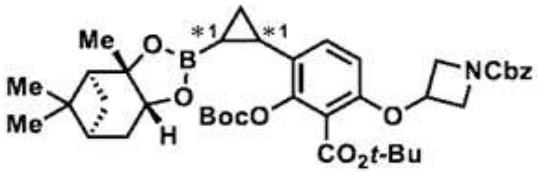
^{1}H-NMR (400 MHZ, $CDCl_3$) δ: 11.67 (1H, s), 7.33-7.29 (5H, m), 7.09 (1H, d, J = 8.6 Hz), 5.85 (1H, d, J = 8.6 Hz), 5.11 (2H, s), 4.88-4.85 (1H, m), 4.36-4.30 (2H, m), 4.08-4.04 (2H, m), 4.01-3.97 (1H, m), 3.95-3.90 (1H, m), 2.30-2.23 (1H, m), 2.20-2.13 (1H, m), 1.87 (1H, t, J = 5.8 Hz), 1.75-1.73 (1H, m), 1.66-1.61 (1H, m), 1.46 (9H, s), 1.19 (3H, s), 1.10 (3H, s), 1.09-1.05 (2H, m), 0.79 (1H, d, J = 11.0 Hz), 0.71 (3H, s), 0.51-0.44 (1H, m).

[0391]

Reference Example 1-6-1: benzyl 3-[2-(tert-butoxycarbonyl)-3-[(tert-butoxycarbonyl)oxy]-4-{2-[(3aS,4S,6S,7aR)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}phenoxy]azetidine-1-carboxylate (diastereomer 1-6-1), and

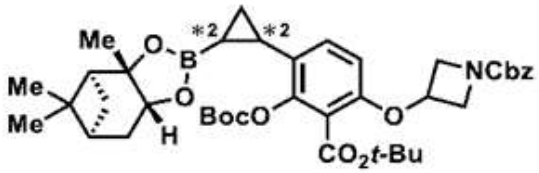
Reference Example 1-6-2: benzyl 3-[2-(tert-butoxycarbonyl)-3-[(tert-butoxycarbonyl)oxy]-4-{2-[(3aS,4S,6S,7aR)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}phenoxy]azetidine-1-carboxylate (diastereomer 1-6-2)

[Chemical Formula 653]



Reference Example 1-6-1

+



Reference Example 1-6-2

[0392]

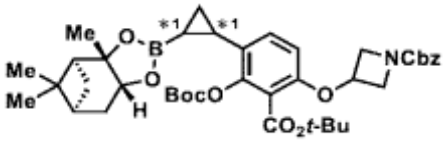
Di-tert-butyl dicarbonate (0.637 mL, 2.74 mmol), triethylamine (0.382 mL, 2.74 mmol), and 4-dimethylaminopyridine (20.2 mg, 0.165 mmol) were added to a dichloromethane (5 mL) solution of the compound of Reference Example 1-5 (diastereo mixture) (847 mg, 1.37 mmol). The reaction mixture was stirred for 48 hours at room temperature. The reaction mixture was concentrated, the residue was dissolved in dichloromethane (5 mL), and di-tert-butyl dicarbonate (2.25 g, 10.3 mmol) and 4-dimethylaminopyridine (0.3 g, 2.46 mmol) were added. The reaction mixture was stirred for 4 hours at room temperature and 3 hours at 40°C. The reaction mixture was concentrated. The resulting residue was purified by silica gel column chromatography to separate and obtain the compound of Reference Example 1-6-1 (identified by TLC (silica gel plate) Rf value: 0.46 (hexane/ethyl acetate = 2/1)) (285 mg) and the compound of Reference Example 1-6-2 (identified

by TLC Rf value: 0.52 under the same condition as above) (95.3 mg) as different diastereomer 1-6-1 and diastereomer 1-6-2, respectively.

[0393]

Reference Example 1-6-1: benzyl 3-[2-(tert-butoxycarbonyl)-3-[(tert-butoxycarbonyl)oxy]-4-{2-[(3aS,4S,6S,7aR)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}phenoxy]azetidine-1-carboxylate (diastereomer 1-6-1)

[Chemical Formula 654]



[0394]

LCMS: $[M-Boc]^+$/Rt = 617.6/1.433 min[B]

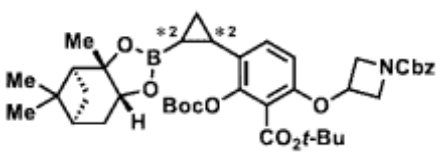
[0395]

^{1}H-NMR (400 MHZ, $CDCl_3$) δ: 7.34-7.28 (5H, m), 7.17 (1H, d, J = 8.5 Hz), 6.33 (1H, d, J = 8.5 Hz), 5.08 (2H, s), 4.90-4.85 (1H, m), 4.33-4.28 (2H, m), 4.07-3.99 (3H, m), 2.15-2.04 (3H, m), 1.85 (1H, t, J = 5.5 Hz), 1.76-1.72 (1H, m), 1.52 (9H, s), 1.51 (9H, s), 1.34-1.29 (1H, m), 1.19 (3H, s), 1.13-1.01 (2H, m), 1.06 (3H, s), 0.99 (1H, d, J = 11.0 Hz), 0.70 (3H, s), 0.39 (1H, td, J = 9.6, 6.9 Hz).

[0396]

Reference Example 1-6-2: benzyl 3-[2-(tert-butoxycarbonyl)-3-[(tert-butoxycarbonyl)oxy]-4-{2-[(3aS,4S,6S,7aR)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}phenoxy]azetidine-1-carboxylate (diastereomer 1-6-2)

[Chemical Formula 655]



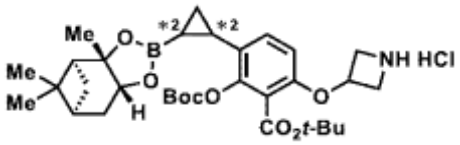
[0397]

^{1}H-NMR (400 MHZ, $CDCl_3$) δ: 7.33-7.28 (5H, m), 7.14 (1H, d, J = 8.5 Hz), 6.31 (1H, d, J = 8.5 Hz), 5.09 (2H, s), 4.91-4.86 (1H, m), 4.35-4.28 (2H, m), 4.13-3.99 (2H, m), 3.93 (1H, dd, J = 8.9, 2.1 Hz), 2.14-2.07 (1H, m), 1.95-1.90 (1H, m), 1.81 (2H, t, J = 5.5 Hz), 1.76-1.73 (1H, m), 1.65 (1H, d, J = 16.5 Hz), 1.53 (9H, s), 1.52 (9H, s), 1.18 (3H, s), 1.12-0.97 (2H, m), 1.07 (3H, s), 0.80 (1H, d, J = 11.0 Hz), 0.71 (3H, s), 0.42-0.33 (1H, m).

[0398]

Reference Example 1-7: tert-butyl 6-[(azetidin-3-yl)oxy]-2-[(tert-butoxycarbonyl)oxy]-3-{2-[(3aS,4S,6S,7aR)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}benzoate hydrochloride (diastereomer derived from diastereomer 1-5-2)

[Chemical Formula 656]



[0399]

Palladium/carbon (Pd: 10%, wetted with ca. 55% water, 37.8 mg) and an aqueous 1 mol/L hydrochloric acid solution (0.133 mL, 0.133 mmol) were added to a methanol (3 mL) solution of the compound of Reference Example 1-6-2 (95.3 mg, 0.133 mmol), and the reaction mixture was stirred at room temperature for 1.5 hours under a hydrogen atmosphere. The reaction mixture was filtered through celite, and the filtrate was concentrated. The resulting residue was purified by silica gel column chromatography to obtain the title compound (82 mg).

[0400]

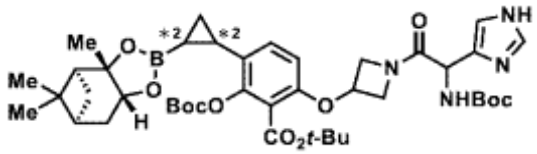
LCMS: $[M+H]^+$/Rt = 584.5/1.099 min^B

[0401]

Reference Example 1: tert-butyl 6-[(1-{[(tert-butoxycarbonyl)amino](1H-imidazol-4-yl)acetyl}azetidin-3-yl)oxy]-

2-[(tert-butoxycarbonyl)oxy]-3-{2-[(3aS,4S,6S,7aR)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}benzoate (derived from diastereomer 1-5-2; diastereo mixture)

[Chemical Formula 657]



[0402]

1-hydroxybenzotriazole (44.7 mg, 0.331 mmol), triethylamine (0.0461 mL, 0.331 mmol), and 1-(3-dimethylaminopropyl)-3-ethylcarbodiimide hydrochloride (63.4 mg, 0.331 mmol) were added to a DMF (2 mL) solution of [(tert-butoxycarbonyl)amino]-2-(1H-imidazol-4-yl)acetate (racemate) (50.6 mg, 0.210 mmol) while cooling with ice. The reaction mixture was stirred for 25 minutes while cooling with ice, then the compound of Reference Example 1-7 (82 mg, 0.132 mmol), triethylamine (0.02 mL), and 4-dimethylaminopyridine (4.8 mg, 0.039 mmol) were added. The reaction mixture was stirred for 16 hours at room temperature, then an aqueous saturated sodium hydrogen carbonate solution was added. The reaction mixture was extracted with ethyl acetate. The organic layer was washed with saturated saline, then dried with anhydrous sodium sulfate, and filtered, and the filtrate was concentrated. The resulting residue was purified by silica gel column chromatography to obtain the title compound (73.7 mg) as a diastereo mixture comprising two types of diastereomers due to the reagent used, i.e., [(tert-butoxycarbonyl)amino]—2-(1H-imidazol-4-yl) acetate, being a racemate and having an asymmetric center derived from diastereomer 1-5-2.

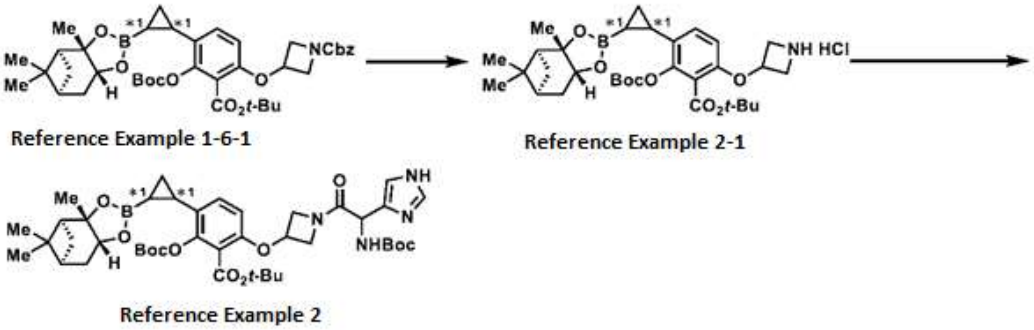
[0403]

LCMS: $[M+H]^+$/Rt = 807.6/1.228 min[A]

[0404]

Reference Example 2: tert-butyl 6-[(1-{[(tert-butoxycarbonyl)amino](1H-imidazol-4-yl)acetyl}azetidin-3-yl)oxy]-2-[(tert-butoxycarbonyl)oxy]-3-{2-[(3aS,4S,6S,7aR)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}benzoate (derived from diastereomer 1-5-1; diastereo mixture)

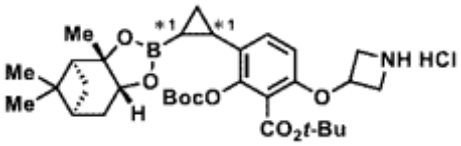
[Chemical Formula 658]



[0405]

Reference Example 2-1: tert-butyl 6-[(azetidin-3-yl)oxy]-2-[(tert-butoxycarbonyl)oxy]-3-{2-[(3aS,4S,6S,7aR)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}benzoate hydrochloride (diastereomer derived from diastereomer 1-5-1)

[Chemical Formula 659]



The compound of Reference Example 1-6-1 (101 mg) was used as a raw material, and a reaction and post-processing were performed in accordance with the same method as the method described in Reference Example 1-7 to obtain the title compound (81.8 mg).

[0406]

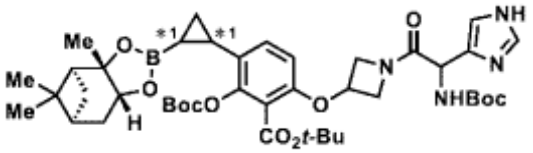
LCMS: $[M+H]^+$/Rt = 584.6/1.095 min[B]

[0407]

Reference Example 2: tert-butyl 6-[(1-{[(tert-butoxycarbonyl)amino](1H-imidazol-4-yl)acetyl}azetidin-3-yl)oxy]-

2-[(tert-butoxycarbonyl)oxy]-3-{2-[(3aS,4S,6S,7aR)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}benzoate (derived from diastereomer 1-5-1; diastereo mixture)

[Chemical Formula 660]



[0408]

The compound of Reference Example 2-1 (81.8 mg) was used as a raw material, and a reaction and post-processing were performed in accordance with the same method as the method described in Reference Example 1 to obtain the title compound (91.1 mg) as a diastereo mixture comprising two types of diastereomers due to the reagent used, i.e., [(tert-butoxycarbonyl)amino]-2-(1H-imidazol-4-yl) acetate, being a racemate and having an asymmetric center derived from diastereomer 1-5-1.

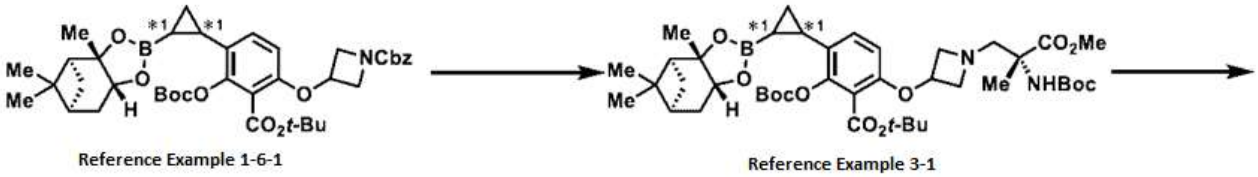
[0409]

LCMS: $[M+H]^+$/Rt = 807.7/1.261 min[A]

[0410]

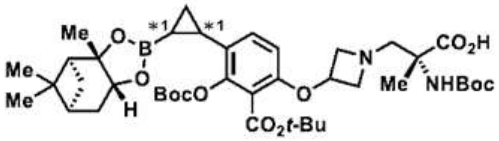
Reference Example 3: (2R)-2-[(tert-butoxycarbonyl)amino]-3-{3-[2-(tert-butoxycarbonyl)-3-[(tert-butoxycarbonyl)oxy]-4-{2-[(3aS,4S,6S,7aR)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}phenoxy]azetidin-1-yl}-2-methylpropanoate (diastereomer derived from diastereomer 1-5-1)

[Chemical Formula 661]



Reference Example 1-6-1

Reference Example 3-1

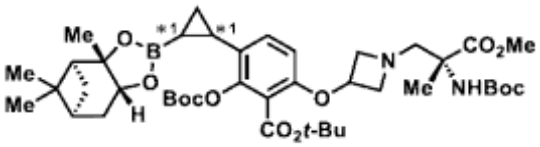


Reference Example 3

[0411]

Reference Example 3-1: tert-butyl 6-[(1-{(2R)-2-[(tert-butoxycarbonyl)amino]-3-methoxy-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-2-[(tert-butoxycarbonyl)oxy]-3-{2-[(3aS,4S,6S,7aR)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}benzoate (diastereomer derived from diastereomer 1-5-1)

[Chemical Formula 662]



[0412]

Palladium/carbon (Pd content: 10%, wetted with ca. 55% water, 36.7 mg) was added to a methanol (3 mL) solution of the compound of Reference Example 1-6-1 (108.5 mg, 0.151 mmol), and the reaction mixture was stirred for 1 hour under a hydrogen atmosphere at room temperature. The reaction mixture was filtered through celite, and the filtrate was concentrated. The resulting residue was dissolved in dichloromethane (2.5 mL), and methyl (2R)-2-[(tert-butoxycarbonyl)amino]-2-methyl-3-oxopropanoate (110 mg, 0.476 mmol), copper sulfate (13.1 mg, 0.082 mmol), and acetic acid (0.020 mL, 0.345 mmol) were added. The reaction mixture was stirred for 1 hour at room temperature. The reaction mixture was added with sodium triacetoxyborohydride (112 mg, 0.529 mmol) and stirred for 1 hour at room temperature. An aqueous saturated

sodium hydrogen carbonate solution was added to the reaction mixture, which was extracted with ethyl acetate. The organic layer was washed with saturated saline, then dried with anhydrous sodium sulfate, and filtered, and the filtrate was concentrated. The resulting residue was purified by silica gel column chromatography to obtain the title compound (102.7 mg).

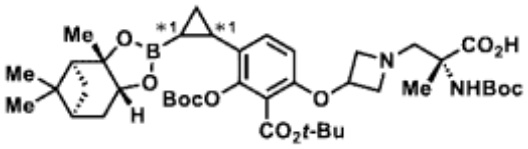
[0413]

LCMS: $[M+H]^+$/Rt = 799.45/1.154 min[B]

[0414]

Reference Example 3: (2R)-2-[(tert-butoxycarbonyl)amino]-3-{3-[2-(tert-butoxycarbonyl)-3-[(tert-butoxycarbonyl)oxy]-4-{2-[(3aS,4S,6S,7aR)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}phenoxy]azetidin-1-yl}-2-methylpropanoate (diastereomer derived from diastereomer 1-5-1)

[Chemical Formula 663]



[0415]

An aqueous 1 mol/L lithium hydroxide solution (0.77 mL, 0.77 mmol) was added to a THF (0.74 mL)-water (0.33 mL) mixture of the compound of Reference Example 3-1 (102.7 mg, 0.129 mmol) while cooling with ice, and the reaction mixture was stirred for 40 hours at room temperature. An aqueous 2 mol/L hydrochloric acid solution was added to the reaction mixture to achieve a pH near 4.0, and the reaction mixture was extracted with ethyl acetate. The organic layer was washed with saturated saline, dried with anhydrous sodium sulfate, and filtered, and the filtrate was concentrated to obtain the title compound (21.1 mg).

[0416]

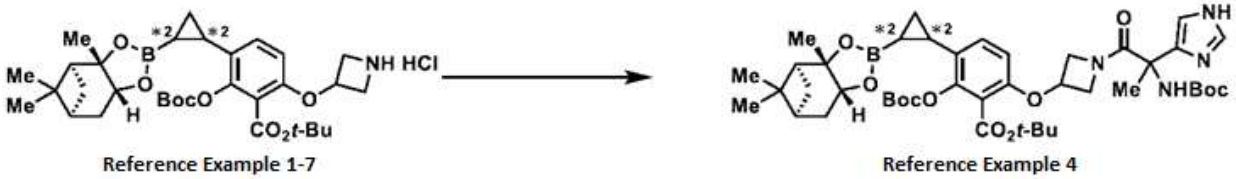
^{1}H-NMR (400 MHZ, $CDCl_3$) δ: 7.16 (1H, d, J = 8.5 Hz), 6.41 (1H, d, J = 8.5 Hz), 6.34 (1H, br s), 4.96-4.91 (1H, m), 4.86-4.79 (1H, m), 4.72-4.65 (1H, m), 4.02-3.90 (2H, m), 3.82 (1H, d, J = 12.2 Hz),

3.73-3.67 (1H, m), 3.57 (1H, d, J = 12.2 Hz), 2.12-2.03 (4H, m), 1.84 (1H, t, J = 5.5 Hz), 1.75-1.72 (1H, m), 1.53 (9H, s), 1.51 (9H, s), 1.40 (9H, s), 1.33-1.27 (1H, m), 1.20 (3H, d, J = 2.4 Hz), 1.11-1.02 (4H, m), 1.05 (3H, s), 1.00 (1H, d, J = 11.0 Hz), 0.71 (3H, s), 0.37 (1H, td, J = 9.6, 6.9 Hz).

[0417]

Reference Example 4: tert-butyl 6-[(1-{[(tert-butoxycarbonyl)amino](1H-imidazol-4-yl)propanoyl}azetidin-3-yl)oxy]-2-[(tert-butoxycarbonyl)oxy]-3-{2-[(3aS,4S,6S,7aR)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}benzoate (derived from diastereomer 1-5-2; diastereo mixture)

[Chemical Formula 664]



[0418]

The compound of Reference Example 1-7 (25.7 mg) was used as a raw material, and [(tert-butoxycarbonyl)amino]-2-(1H-imidazol-4-yl)propionate (racemate) was used instead of [(tert-butoxycarbonyl)amino]-2-(1H-imidazol-4-yl)acetate (racemate), and a reaction and post-processing were performed in accordance with the same method as the method described in Reference Example 1 to obtain the title compound (13.8 mg) as a diastereo mixture comprising two types of diastereomers due to the reagent used, i.e., [(tert-butoxycarbonyl)amino]-2-(1H-imidazol-4-yl) propionate, being a racemate and having an asymmetric center derived from diastereomer 1-5-2.

[0419]

LCMS: $[M+H]^+$/Rt = 821.63/1.295 min[A]

[0420]

Reference Example 5: tert-butyl 6-[(1-{[(tert-butoxycarbonyl)amino](1H-imidazol-4-yl)propanoyl}azetidin-3-yl)oxy]-2-[(tert-butoxycarbonyl)oxy]-3-{2-[(3aS,4S,6S,7aR)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}benzoate (derived from diastereomer 1-5-1; diastereo mixture)

[Chemical Formula 665]



[0421]

The compound of Reference Example 2-1 (27 mg) was used as a raw material, and [(tert-butoxycarbonyl)amino]-2-(1H-imidazol-4-yl)propionate (racemate) was used instead of [(tert-butoxycarbonyl)amino]-2-(1H-imidazol-4-yl) acetate (racemate), and a reaction and post-processing were performed in accordance with the same method as the method described in Reference Example 1 to obtain the title compound (11.8 mg) as a diastereo mixture comprising two types of diastereomers due to the reagent used, i.e., [(tert-butoxycarbonyl)amino]-2-(1H-imidazol-4-yl) propionate, being a racemate and having an asymmetric center derived from diastereomer 1-5-1.

[0422]

LCMS: $[M+H]^+$/Rt = 821.54/1.244 min[A]

[0423]

For example, the compounds of Reference Examples 1, 2, 4, and 5 that are diastereo mixtures can be optically resolved by chiral chromatography under the following condition. Accordingly, intermediates of Reference Examples can be further fractionated and identified to create and identify any of each diastereomer for the diastereo mixture of the compounds of the Examples described below.

[0424]

Column: CHIRALPAK IG 20 mmφ x 250 mm (Daicel Corporation)

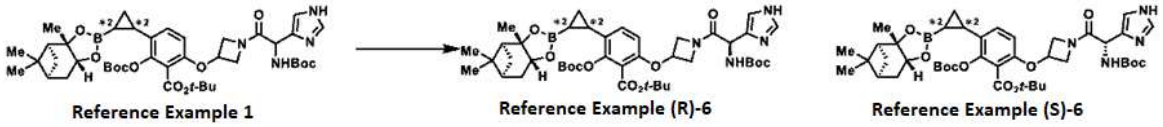
Mobile phase: diethylamine/ethyl acetate (diethylamine: 0.1%)

[0425]

Reference Example (R)-6: tert-butyl 6-({1-[(2R)-2-[(tert-butoxycarbonyl)amino]-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-2-[(tert-butoxycarbonyl)oxy]-3-{(2-[(3aS,4S,6S)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}benzoate

Reference Example (S)-6: tert-butyl 6-({1-[(2S)-2-[(tert-butoxycarbonyl)amino]-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-2-[(tert-butoxycarbonyl)oxy]-3-{(2-[(3aS,4S,6S)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}benzoate

[Chemical Formula 666]



[0426]

The compound of Reference Example 1 (amount loaded per injection: 6.17 mg) was dissolved in 0.300 mL of ethyl acetate. Isomers were obtained by optical resolution through chiral chromatography under the following conditions.

Column: CHIRALPAK IC 20 mmφ x 250 mm (Daicel Corporation)

Mobile phase: hexane/ethanol (1:1)

Flow rate: 10 mL/min

Temperature: 40°C

Column retention times for both optical isomers were as follows.

Reference Example (R)-6: 9.25 min

Reference Example (S)-6: 13.04 min

[0427]

Reference Example 7: tert-butyl 2-[(tert-butoxycarbonyl)oxy]-6-({1-[(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-3-{2-

[(3aS,4S,6S)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}benzoate

[Chemical Formula 667]



N,N-diisopropylethylamine (0.199 mL, 0.684 mmol) was added to a THF solution (0.9 mL) of the compound of Reference Example 1-7 (106 mg, 0.171 mmol), and 2-(1H-imidazol-4-yl)acetic acid hydrochloride (36 mg, 0.222 mmol) and pyBOP (133 mg, 0.256 mmol) were added in an ice bath. After confirming completion of the reaction by TLC, an aqueous saturated sodium hydrogen carbonate solution was added. The reaction mixture was extracted with ethyl acetate. The organic layer was washed with saturated saline, then dried with anhydrous sodium sulfate, and filtered, and the filtrate was concentrated. The resulting residue was purified by silica gel column chromatography (chloroform/methanol) to obtain the title compound (110 mg).

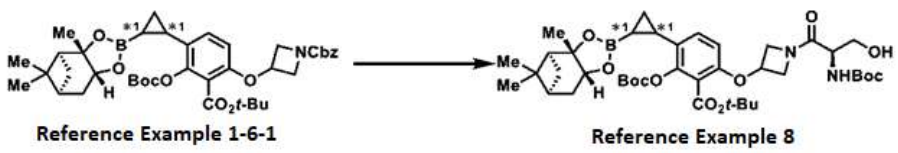
[0428]

LCMS: $[M+H]^+$/Rt = 692.40/0.686 min[C]

[0429]

Reference Example 8: tert-butyl 2-[(tert-butoxycarbonyl)oxy]-6-({1-[N-(tert-butoxycarbonyl)-D-seryl]azetidin-3-yl}oxy)-3-{2-[(3aS,4S,6S)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}benzoate

[Chemical Formula 668]



Palladium/carbon (Pd: 10%, wetted with ca. 55% water, 10 mg) was added to a methanol (2 mL) solution of the compound of Reference Example 1-6-1 (100 mg, 0.139 mmol), and the reaction

mixture was stirred for 30 minutes under a hydrogen atmosphere at room temperature. The reaction mixture was filtered through celite, and the filtrate was concentrated. The resulting residue was dissolved in DMF (1 mL) as solution A.

DMT-MM (46.3 mg, 0.167 mmol) was added to a methanol solution (1 mL) of N-tert-butoxycarbonyl-D-serine (43 mg, 0.209 mmol), and the reaction mixture was stirred for 15 minutes at room temperature. Solution A was added, and the reaction mixture was stirred for 1 hour at room temperature. Saturated saline was added to the reaction mixture, which was extracted with ethyl acetate. The organic layer was washed with saturated saline, then dried with anhydrous sodium sulfate, and filtered, and the filtrate was concentrated. The resulting residue was purified by silica gel column chromatography (dichloromethane/methanol) to obtain the title compound (112 mg) as a colorless amorphous compound.

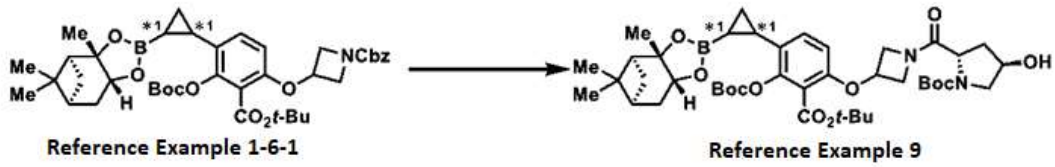
[0430]

^{1}H-NMR (270 MHz, CDCl3) δ: 7.24-7.19 (1H, m), 6.39-6.35 (1H, m), 5.56-5.45 (1H, m), 4.97-4.91 (1H, m), 4.75-4.56 (1H, m), 4.44-4.22 (3H, m), 4.09-4.03 (2H, m), 3.88-3.82 (1H, m), 3.74-3.67 (1H, m), 2.19-2.03 (3H, m), 1.91-1.85 (1H, m), 1.80-1.74 (1H, m), 1.63-1.48 (19H, m), 1.45-1.22 (11H, m), 1.17-0.84 (7H, m), 0.73 (3H, s), 0.46-0.36 (1H, m).

[0431]

Reference Example 9: tert-butyl (2S,4R)-2-{3-[2-(tert-butoxycarbonyl)-3-[(tert-butoxycarbonyl)oxy]-4-{2-[(3aS,4S,6S)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}phenoxy]azetidine-1-carbonyl}-4-hydroxypyrrolidine-1-carboxylic acid

[Chemical Formula 669]



Reference Example 1-6-1 Reference Example 9

[0432]

The compound of Reference Example 1-6-1 (100 mg, 0.139 mmol) and trans-N-(tert-butoxycarbonyl)-4-hydroxy-L-proline (48.3 mg, 0.209 mmol) were used as a raw material, and a reaction and post-processing were performed in accordance with the same method as the method described in Reference Example 8 to obtain the title compound (110 mg) as a colorless amorphous compound.

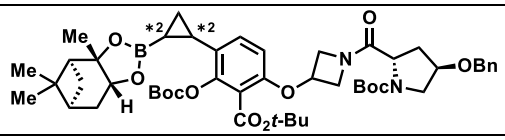
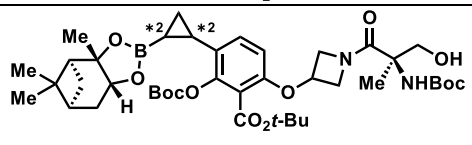
[0433]

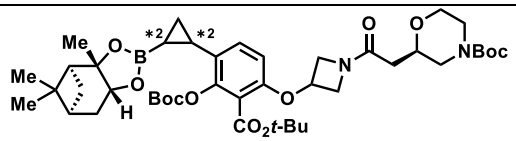
^{1}H-NMR (270 MHz, CDCl3) δ: 9.27-8.66 (1H, m), 7.26-7.23 (1H, m), 6.38-6.35 (1H, m), 5.48-5.27 (1H, m), 5.04-4.87 (1H, m), 4.58-4.29 (4H, m), 4.23-3.95 (3H, m), 3.70-3.42 (2H, m), 2.18-2.04 (6H, m), 1.90-1.41 (23H, m), 1.37-1.22 (7H, m), 1.16-1.00 (6H, m), 0.73 (3H, s), 0.46-0.36 (1H, m).

[0434]

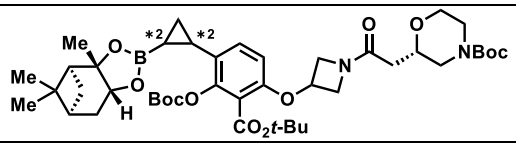
Each of Reference Example compounds 10 to 13 shown in Table 4 was obtained by performing a reaction, post-processing, and purification in accordance with the same method as the method described in Reference Example 1 while using the compound of Reference Example 1-7 and carboxylic acid corresponding to each of the following Reference Examples as a raw material.

[Table 4-1]

Reference Example	Structural formula	LCMS and/or NMR
10		LCMS:$[M+H]^+$/Rt=887.46/1.386min^C
11		LCMS:$[M+H]^+$/Rt=785.37/1.410min^A ^{1}H-NMR ($CDCl_3$) δ: 7.16 (1H, d, *J* = 8.5 Hz), 6.32 (1H, d, *J* = 8.5 Hz), 5.09-4.96 (1H, m), 4.91-4.86 (1H, m), 4.67-4.60 (1H, m), 4.42-4.28 (2H, m), 4.12-3.97 (2H, m), 3.92 (1H, dd, *J* = 8.5, 1.8 Hz), 3.53-3.44 (1H, m), 2.16-2.07 (2H, m), 1.99-1.91 (1H, m), 1.85-1.80 (1H, m), 1.78-1.74 (1H, m), 1.66-1.62 (1H, m), 1.53 (9H, s), 1.51 (9H, s), 1.44-1.39 (12H, m), 1.25 (3H, s), 1.19 (3H, s), 1.11-1.06 (1H, m), 1.02-0.97 (1H, m), 0.87-0.80 (1H, m), 0.72 (3H, s), 0.38-0.34 (1H, m).

12		LCMS:$[M+H]^+$/RT=811.39/1.479min^A ^{1}H-NMR ($CDCl_3$) δ: 7.15 (1H, d, *J* = 8.5 Hz), 6.33 (1H, d, *J* = 8.5 Hz), 4.93-4.88 (1H, m), 4.54-4.22 (3H, m), 4.14-4.02 (2H, m), 3.96-3.90 (2H, m), 3.85-3.79 (2H, m), 3.56-3.48 (1H, m), 3.39-3.30 (1H, m), 2.90-2.82 (1H, m), 2.66-2.59 (1H, m), 2.33-2.26 (1H, m), 2.18-2.08 (2H, m), 1.96-1.91 (1H, m), 1.84-1.80 (1H, m), 1.78-1.74 (1H, m), 1.68-1.61 (1H, m), 1.54 (9H, s), 1.52 (9H, s), 1.44 (9H, s), 1.27-1.24 (3H, m), 1.19 (3H, s), 1.11-1.05 (1H, m), 1.03-0.98 (1H, m), 0.85-0.79 (1H, m), 0.72 (3H, s), 0.39-0.34 (1H, m).

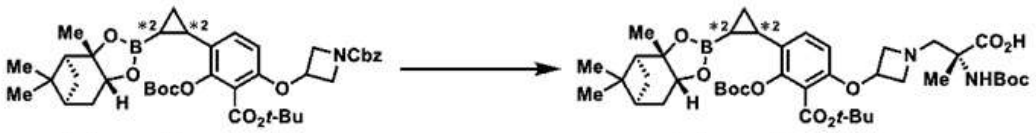
[Table 4-2]

13		LCMS:$[M+H]^+$/RT=811.20/2.60min^A

[0435]

Reference Example 14: (2R)-2-[(tert-butoxycarbonyl)amino]-3-{3-[2-(tert-butoxycarbonyl)-3-[(tert-butoxycarbonyl)oxy]-4-{2-[(3aS,4S,6S)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}phenoxy]azetidin-1-yl}-2-methylpropanoate

[Chemical Formula 670]



[0436]

The compound of Reference Example 1-6-2 (0.183 g, 0.255 mmol) was used as a raw material, and a reaction and post-processing were performed in accordance with the same method as the method described in Reference Example 3 to obtain the title compound (109 mg).

[0437]

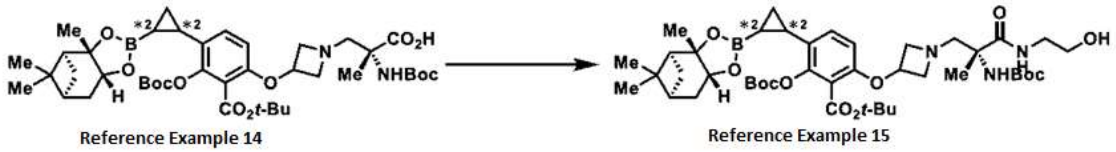
LCMS: $[M+H]^+$/RT = 785/2.067 min^D

[0438]

Reference Example 15: tert-butyl 6-[(1-{(2R)-2-[(tert-butoxycarbonyl)amino]-3-[(2-hydroxyethyl)amino]-2-methyl-3-

oxopropyl}azetidin-3-yl)oxy]-2-[(tert-butoxycarbonyl)oxy]-3-{2-[(3aS,4S,6S)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}benzoate

[Chemical Formula 671]



1-hydroxybenzotriazole (50.1 mg, 0.371 mmol), triethylamine (0.0517 mL, 0.371 mmol), and 1-(3-dimethylaminopropyl)-3-ethylcarbodiimide hydrochloride (71.1 mg, 0.371 mmol) were added to a DMF solution (1.2 mL) of the compound of Reference Example 14 (116 mg, 0.148 mmol) in an ice bath. The reaction mixture was stirred for 30 minutes at room temperature, and then 2-aminoethanol (0.020 mL, 0.331) was added in an ice bath. The reaction mixture was stirred for 6 hours at room temperature, and then an aqueous saturated sodium hydrogen carbonate solution was added. The reaction mixture was extracted with ethyl acetate. The organic layer was washed with saturated saline, then dried with anhydrous sodium sulfate, and filtered, and the filtrate was concentrated. The resulting residue was purified by silica gel column chromatography to obtain the title compound as a diastereo mixture (37.6 mg).

[0439]

LCMS: $[M+H]^+$/RT = 828.51/1.195 min^A

[0440]

Reference Example 16: tert-butyl 6-[(1-{(2R)-3-[(2-amino-2-oxoethyl)amino]-2-[(tert-butoxycarbonyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-2-[(tert-butoxycarbonyl)oxy]-3-{2-[(3aS,4S,6S)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}benzoate

[Chemical Formula 672]



Reference Example 14 Reference Example 16

Glycinamide hydrochloride (69 mg, 0.624 mmol), N,N-diisopropylethylamine (0.322 mL, 1.85 mmol), and TBTU (201.7 mg, 0.628 mmol) were added to a dichloromethane solution (8.2 mL) of the compound of Reference Example 14 (322.4 mg, 0.411 mmol) in an ice bath. The reaction mixture was stirred for 30 minutes in an ice bath, and then the reaction mixture was stirred for 4 hours at room temperature. An aqueous saturated sodium hydrogen carbonate solution was added to the reaction mixture, which was extracted with ethyl acetate. The organic layer was washed with saturated saline, then dried with anhydrous sodium sulfate, and filtered, and the filtrate was concentrated. The resulting residue was purified by silica gel column chromatography to obtain the title compound (323.4 mg) as a white solid.

[0441]

LCMS: $[M+H]^+$/RT = 841.67/1.117 min[A]

[0442]

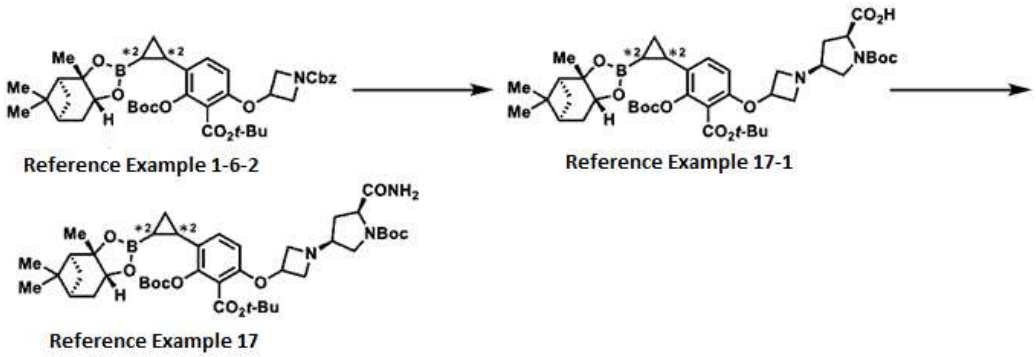
^{1}H-NMR (CD_3OD) δ: 7.20 (1H, d, J = 8.5 Hz), 6.58 (1H, d, J = 8.5 Hz), 4.00 (1H, dd, J = 8.5, 1.8 Hz), 3.89-3.85 (2H, m), 3.82-3.76 (2H, m), 3.26-3.22 (1H, m), 3.20-3.17 (1H, m), 2.95 (2H, dd, J = 18.0, 13.1 Hz), 2.21-2.15 (1H, m), 2.08 (1H, dd, J = 15.6, 7.6 Hz), 1.97-1.91 (1H, m), 1.89 (1H, s), 1.76 (2H, d, J = 6.1 Hz), 1.67 (1H, d, J = 12.8 Hz), 1.56 (9H, s), 1.53 (9H, s), 1.44 (9H, s), 1.40 (3H, s), 1.27 (3H, s), 1.22 (3H, s), 1.12 (1H, td, J = 8.9, 3.9 Hz), 1.06-1.01 (1H, m), 0.77 (3H, s), 0.75 (1H, d, J = 11.0 Hz), 0.35 (1H, td, J = 9.6, 7.1 Hz).

[0443]

Reference Example 17: tert-butyl (2S,4S)-4-{3-[2-(tert-butoxycarbonyl)-3-[(tert-butoxycarbonyl)oxy]-4-{2-[(3aS,4S,6S)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-

yl]cyclopropyl}phenoxy]azetidin-1-yl}-2-carbamoylpyrrolidine-1-carboxylic acid

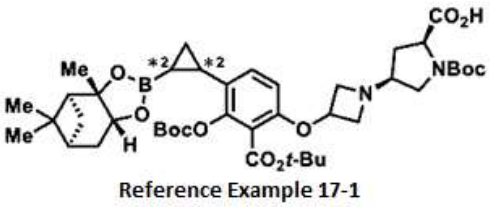
[Chemical Formula 673]



[0444]

Reference Example 17-1: (4S)-1-(tert-butoxycarbonyl)-4-{3-[2-(tert-butoxycarbonyl)-3-[(tert-butoxycarbonyl)oxy]-4-{2-[(3aS,4S,6S)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}phenoxy]azetidin-1-yl}-L-proline

[Chemical Formula 674]



The compound of Reference Example 1-6-2 (0.145 g, 0.248 mmol) and N-tert-butoxycarbonyl-4-oxo-L-proline methyl ester (0.090 g, 0.372 mmol) were used as a raw material, and a reaction and post-processing were performed in accordance with the same method as the method described in Reference Example 3 to obtain the title compound (84.8 mg).

[0445]

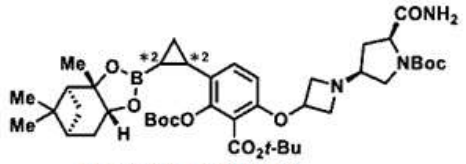
LCMS: $[M+H]^+$/RT = 797/2.072 min[D]

[0446]

Reference Example 17: tert-butyl (2S,4S)-4-{3-[2-(tert-butoxycarbonyl)-3-[(tert-butoxycarbonyl)oxy]-4-{2-[(3aS,4S,6S)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-

yl]cyclopropyl}phenoxy]azetidin-1-yl}-2-carbamoylpyrrolidine-1-carboxylic acid

[Chemical Formula 675]



[0447]

HATU (0.061 g, 0.160 mmol) was added to a dichloromethane solution (1.5 mL) of the compound of Reference Example 17-1 (84.8 mg, 0.106 mmol) and N,N-diisopropylethylamine (0.093 mL, 0.532 mmol). The reaction mixture was stirred for 5 minutes at room temperature, and then ammonium chloride (0.017 g, 0.319 mmol) was added. After stirring for 2.5 hours at room temperature, an aqueous saturated ammonium chloride solution was added, and the reaction mixture was extracted with ethyl acetate. The organic layer was washed with an aqueous saturated sodium hydrogen carbonate solution followed by saturated saline, then dried with anhydrous sodium sulfate, and filtered, and the filtrate was concentrated. The resulting residue was purified by silica gel column chromatography (ethyl acetate/methanol) to obtain the title compound (31.6 mg).

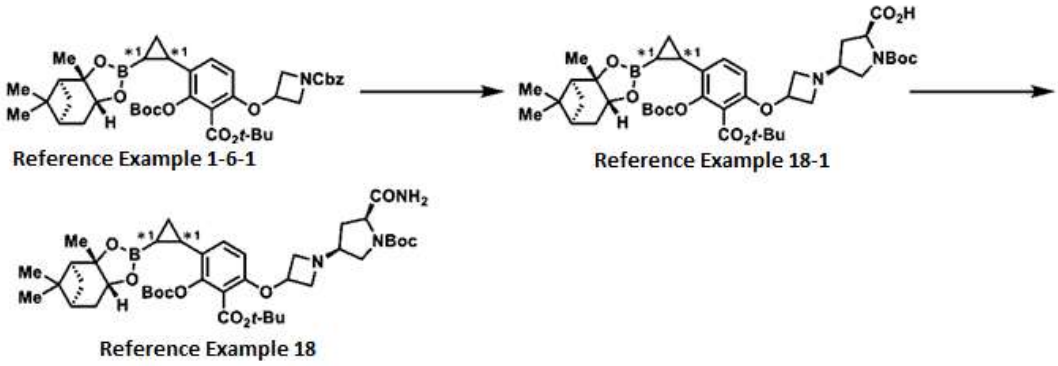
[0448]

LCMS: $[M+H]^+$/RT = 796/2.067 min[D]

[0449]

Reference Example 18: tert-butyl (2S,4S)-4-{3-[2-(tert-butoxycarbonyl)-3-[(tert-butoxycarbonyl)oxy]-4-{2-[(3aS,4S,6S)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}phenoxy]azetidin-1-yl}-2-carbamoylpyrrolidine-1-carboxylic acid

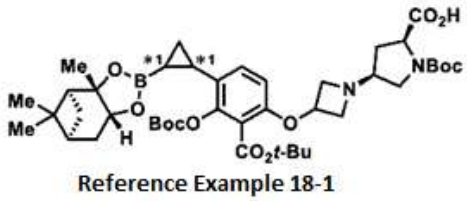
[Chemical Formula 676]



[0450]

Reference Example 18-1: (4S)-1-(tert-butoxycarbonyl)-4-{3-[2-(tert-butoxycarbonyl)-3-[(tert-butoxycarbonyl)oxy]-4-{2-[(3aS,4S,6S)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}phenoxy]azetidin-1-yl}-L-proline

[Chemical Formula 677]



The compound of Reference Example 1-6-1 (100 g, 0.139 mmol) was used as a raw material, and a reaction and post-processing were performed in accordance with the same method as the method described in Reference Example 17-1 to obtain the title compound (49.2 mg) as a colorless solid.

[0451]

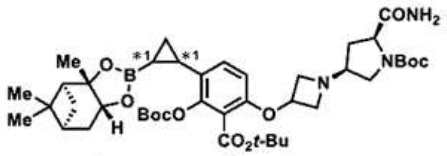
^{1}H-NMR (270 MHz, CDCl3) δ: 7.22 (1H, d, J = 8.1 Hz), 6.42 (1H, d, J = 8.1 Hz), 4.82-4.78 (1H, m), 4.26-4.22 (1H, m), 4.07-3.94 (3H, m), 3.65-3.60 (1H, m), 3.35-3.25 (4H, m), 2.25-1.99 (5H, m), 1.91-1.87 (1H, m), 1.80-1.74 (1H, m), 1.61-1.39 (19H, m), 1.33-1.27 (9H, m), 1.17-1.00 (6H, m), 0.94-0.83 (3H, m), 0.74 (3H, s), 0.45-0.36 (1H, m).

[0452]

Reference Example 18: tert-butyl (2S,4S)-4-{3-[2-(tert-butoxycarbonyl)-3-[(tert-butoxycarbonyl)oxy]-4-{2-[(3aS,4S,6S)-

3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}phenoxy]azetidin-1-yl}-2-carbamoylpyrrolidine-1-carboxylic acid

[Chemical Formula 678]



Reference Example 18

[0453]

The compound of Reference Example 18-1 (49.2 mg, 0.0618 mmol) was dissolved in dichloromethane (1 mL), and TBTU (21.8 mg, 0.0679 mmol) and N,N-diisopropylethylamine (0.0315 mL, 0.185 mmol) were added. The reaction mixture was stirred for 15 minutes at room temperature, and ammonium (0.5 mol/L dioxane solution, 0.247 mL, 0.124 mmol) was added. The reaction mixture was stirred for 15 minutes at room temperature. A saturated sodium hydrogen carbonate solution and saturated saline were added to the reaction mixture, which was extracted with ethyl acetate. The organic layer was washed with saturated saline, then dried with anhydrous sodium sulfate, and filtered, and the filtrate was concentrated. The resulting residue was purified by silica gel column chromatography (chloroform/methanol) to obtain the title compound (41.3 mg) as a colorless oily substance.

[0454]

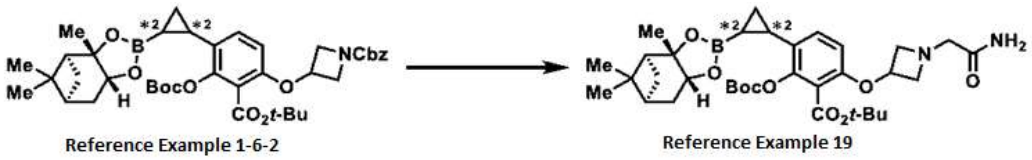
^{1}H-NMR (270 MHz, CDCl3) δ: 7.62 (1H, br), 7.26-7.17 (2H, m), 6.41 (1H, d, J = 8.1 Hz), 5.24 (1H, br), 4.71-4.67 (1H, m), 4.23-4.04 (2H, m), 3.80-3.60 (2H, m), 3.48-3.43 (1H, m), 3.33-3.27 (1H, m), 3.15-3.00 (3H, m), 2.25-1.96 (4H, m), 1.90-1.86 (1H, m), 1.79-1.73 (1H, m), 1.60-1.22 (28H, m), 1.15-0.94 (9H, m), 0.74 (3H, s), 0.44-0.35 (1H, m).

[0455]

Reference Example 19: tert-butyl 6-{[1-(2-amino-2-oxoethyl)azetidin-3-yl]oxy}-2-[(tert-butoxycarbonyl)oxy]-3-{2-

[(3aS,4S,6S)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}benzoate

[Chemical Formula 679]



Palladium/carbon (Pd: 10%, wetted with ca. 55% water, 20 mg) was added to a methanol (5 mL) solution of the compound of Reference Example 1-6-2 (200 mg, 0.279 mmol), and the reaction mixture was stirred for 2 hours under a hydrogen atmosphere at room temperature. The reaction mixture was filtered through celite, and the filtrate was concentrated. The resulting residue was dissolved in DMF (5 mL), and 2-iodoacetamide (77 mg, 0.418 mmol) and cesium carbonate (182 mg, 0.557 mmol) were added while cooling with ice. The reaction mixture was stirred for 1 hour at a reaction temperature of 0 to 5°C. Water was added to the reaction mixture, which was extracted with ethyl acetate. The organic layer was washed with saturated saline, then dried with anhydrous sodium sulfate, and filtered, and the filtrate was concentrated. The resulting residue was purified by silica gel column chromatography (chloroform/methanol) to obtain the title compound (70 mg).

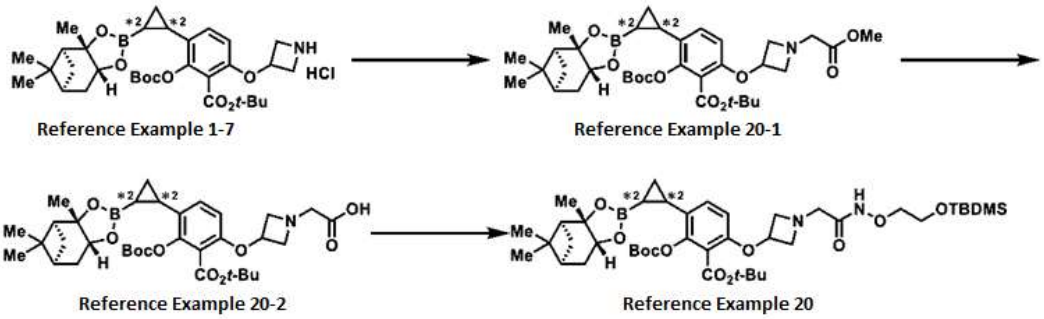
[0456]

LCMS: $[M+H]^+$/Rt = 641.65/1.186 min[H]

[0457]

Reference Example 20: tert-butyl 2-[(tert-butoxycarbonyl)oxy]-6-{[1-(8,8,9,9-tetramethyl-2-oxo-4,7-dioxa-3-aza-8-siladecan-1-yl)azetidin-3-yl]oxy}-3-{2-[(3aS,4S,6S)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}benzoate

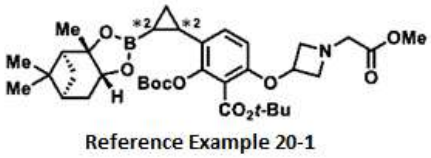
[Chemical Formula 680]



[0458]

Reference Example 20-1: tert-butyl 2-[(tert-butoxycarbonyl)oxy]-6-{[1-(2-methoxy-2-oxoethyl)azetidin-3-yl]oxy}-3-{(2-[(3aS,4S,6S)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}benzoate

[Chemical Formula 681]



Triethylamine (0.049 mL, 0.352 mmol), methyl bromoacetate (0.020 mL, 0.211 mmol) and cesium carbonate (182 mg,0.557 mmol) were added to a THF (0.7 mL) solution of the compound of Reference Example 1-7 (87.4 mg, 0.141 mmol) while cooling with ice, and the reaction mixture was stirred for 14 hours at room temperature. The reaction mixture was concentrated. The resulting residue was purified by silica gel column chromatography to obtain the title compound (33.6 mg) as a colorless oil substance.

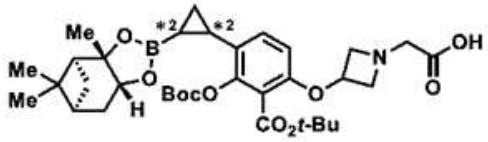
[0459]

^{1}H-NMR ($CDCl_3$) δ: 7.14 (1H, d, J = 8.5 Hz), 6.40 (1H, d, J = 8.5 Hz), 4.90-4.85 (1H, m), 4.17-4.12 (2H, m), 3.95-3.93 (1H, m), 3.72 (3H, s), 3.61 (1H, d, J = 7.9 Hz), 3.47-3.43 (1H, m), 3.33-3.27 (1H, m), 2.15-2.07 (3H, m), 1.95-1.89 (1H, m), 1.81 (1H, t, J = 5.5 Hz), 1.78-1.74 (1H, m), 1.67-1.63 (1H, m), 1.55 (9H, s), 1.52 (9H, s), 1.26 (3H, s), 1.19 (3H, s), 1.10-1.05 (1H, m), 1.03-0.98 (1H, m), 0.80 (1H, d, J = 11.0 Hz), 0.72 (3H, s), 0.36 (1H, td, J = 9.6, 7.1 Hz).

[0460]

Reference Example 20-2: {3-[2-(tert-butoxycarbonyl)-3-[(tert-butoxycarbonyl)oxy]-4-{2-[(3aS,4S,6S)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}phenoxy]azetidin-1-yl}acetate

[Chemical Formula 682]



Reference Example 20-2

The compound of Reference Example 20-1 (33.6 mg, 0.051 mmol) was used as a raw material, and a reaction and post-processing were performed in accordance with the same method as the method described in Reference Example 3 to obtain the title compound (28 mg).

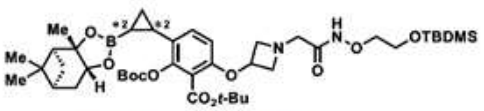
[0461]

LCMS: $[M+H]^+$/Rt = 642.4/1.090 min[B]

[0462]

Reference Example 20: tert-butyl 2-[(tert-butoxycarbonyl)oxy]-6-{[1-(8,8,9,9-tetramethyl-2-oxo-4,7-dioxa-3-aza-8-siladecan-1-yl)azetidin-3-yl]oxy}-3-{2-[(3aS,4S,6S)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}benzoate

[Chemical Formula 683]



Reference Exmaple 20

The compound of Reference Example 20-2 (28 mg, 0.044 mmol) and O-[2-{(tert-butyldimethylsilyl)oxy}ethyl]hydroxylamine hydrochloride (22 mg, 0.097 mmol) were used as a raw material, and a reaction and post-processing were performed in accordance with the same method as the method described in Reference Example 17 to obtain the title compound (45.1 mg).

[0463]

LCMS: $[M+H]^+$/Rt = 815.49/1.26 min[A]

[0464]

Reference Example 21: tert-butyl 6-{[1-({5-[(tert-butoxycarbonyl)amino]-2,2-dimethyl-1,3-dioxa-5-yl}methyl)azetidin-3-yl]oxy}-2-[(tert-butoxycarbonyl)oxy]-3-{2-[(3aS,4S,6S)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}benzoate

[Chemical Formula 684]



Palladium/carbon (Pd: 10%, wetted with ca. 55% water, 50 mg) was added to a methanol (5 mL) solution of the compound of Reference Example 1-6-2 (0.100 g, 0.139 mmol), and the reaction mixture was stirred for 1 hour under a hydrogen atmosphere at room temperature. The reaction mixture was filtered through celite, and the filtrate was concentrated. The resulting residue was dissolved in dichloromethane (1 mL), and tert-butyl(5-formyl-2,2-dimethyl-1,3-dioxan-5-yl)carbamate (72.1 mg, 0.278 mmol) and acetic acid (0.00836 mL, 0.146 mmol) were added. The reaction mixture was stirred for 1 hour at room temperature. Sodium triacetoxyborohydride (88 mg, 0.417 mmol) was added to the reaction mixture, which was stirred at room temperature. After completion of the reaction, an aqueous saturated sodium hydrogen carbonate solution was added to the reaction mixture, which was extracted with ethyl acetate. The organic layer was washed with saturated saline, then dried with anhydrous sodium sulfate, and filtered, and the filtrate was concentrated. The resulting residue was purified by silica gel column chromatography (hexane/ethyl acetate) to obtain the title compound (81.4 mg).

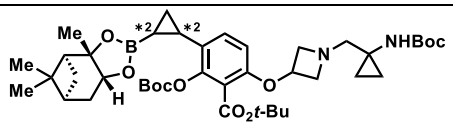
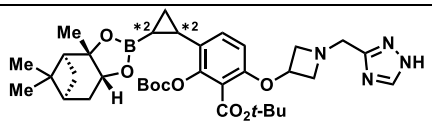
[0465]

LCMS: $[M+H]^+$/RT = 827/2.283 min[D]

[0466]

The compound of Reference Example 1-6-1 and aldehyde corresponding to each of the following Reference Examples were used as the starting materials, and a reaction, post-processing, and purification were performed in accordance with the same method as the method described in Reference Example 21 to obtain each of Reference Compounds 22 and 23 shown in Table 5.

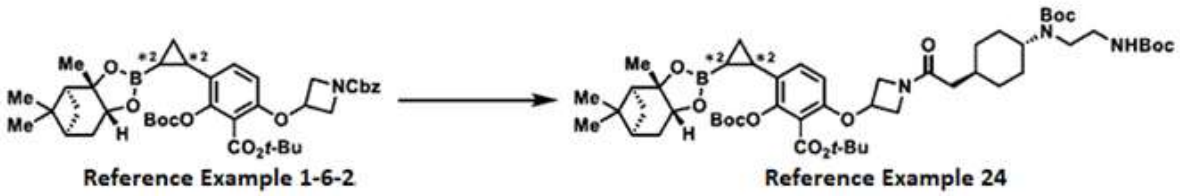
[Table 5]

Reference Example	Structural formula	LCMS and/or NMR
Reference Example 22		LCMS: $[M+H]^+$/RT=753/2.179 min[D]
Reference Example 23		LCMS: $[M+H]^+$/RT=665/1.908 min[D]

[0467]

Reference Example 24: tert-butyl 6-{[1-({(1r,4r)-4-[(tert-butoxycarbonyl){2-[(tert-butoxycarbonyl)amino]ethyl}amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-2-[(tert-butoxycarbonyl)oxy]-3-{2-[(3aS,4S,6S)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}benzoate

[Chemical Formula 685]



Reference Example 1-6-2 → Reference Example 24

Palladium/carbon (Pd: 10%, wetted with ca. 55% water, 270 mg) was added to a methanol (5 mL) solution of the compound of Reference Example 1-6-2 (0.327 g, 0.456 mmol), and the reaction mixture was stirred for 1 hour under a hydrogen atmosphere at room temperature. The reaction mixture was filtered through celite, and the filtrate was concentrated.

HATU (0.290 g, 0.762 mmol) was added to a DMF (0.8 mL) solution of 2-[(1r,4r)-4-{[(tert-butoxy)carbonyl](2-{[(tert-butoxy)carbonyl]amino}ethyl)amino}cyclohexyl]acetate (0.305 g, 0.762 mmol) and triethylamine (0.222 mL, 1.596 mmol) in a known document (e.g., J. Med. Chem. 2019, 62, 8544., etc.), and the reaction mixture was stirred for 45 minutes at room temperature. The reaction mixture was added with a DMF (1.6 mL) solution of the residue obtained from the catalytic hydrogenation reaction described above and stirred at room temperature. After 1.5 hours, an aqueous saturated ammonium chloride solution was added to the reaction mixture, which was extracted with ethyl acetate. The organic layer was washed with an aqueous saturated sodium hydrogen carbonate solution followed by saturated saline, then dried with anhydrous sodium sulfate, and filtered, and the filtrate was concentrated under reduced pressure. The resulting residue was purified by silica gel column chromatography (hexane/ethyl acetate) to obtain the title compound (182.2 mg).

[0468]

LCMS: $[M+H]^+$/RT = 966/2.052 min[E]

[0469]

Reference Example 25: tert-butyl 6-[(1-{(2R)-3-[(2-aminoethyl)amino]-2-[(tert-butoxycarbonyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-2-[(tert-butoxycarbonyl)oxy]-3-{2-[(3aS,4S,6S)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}benzoate

[Chemical Formula 686]



The compound of Reference Example 14 (130 mg, 0.166 mmol) and ethylenediamine (0.017 mL, 0.248 mmol) were used as a raw material, and a reaction and post-processing were performed in accordance

with the same method as the method described in Reference Example 16 to obtain the title compound (30 mg).

[0470]

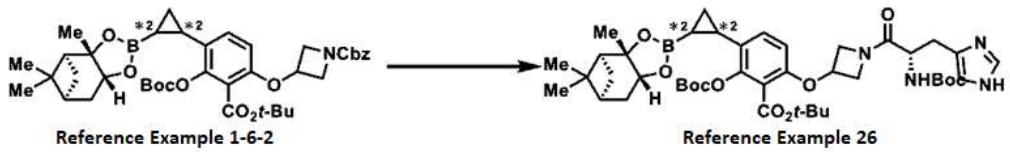
LCMS: $[M+H]^+$/RT = 419/1.167 min^F

1H-NMR (400 MHz, D_2O) δ: 7.06 (1H, d, J = 8.5 Hz), 6.12 (1H, d, J = 8.5 Hz), 3.79 (2H, m), 3.65 (1H, m), 3.55 (3H, m), 3.21 (2H, m), 3.04 (1H, d, J = 12.8 Hz), 2.75 (1H, d, J = 12.8 Hz), 1.84 (1H, td, J = 8.0, 4.4 Hz), 1.35 (3H, s), 0.86 (1H, td, J = 8.0, 2.4 Hz). 0.34 (3H, m)

[0471]

Reference Example 26: tert-butyl 6-({1-[N-(tert-butoxycarbonyl)-L-histidinyl]azetidin-3-yl}oxy)-2-[(tert-butoxycarbonyl)oxy]-3-{(2-[(3aS,4S,6S,7aR)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}benzoate

[Chemical Formula 687]



[0472]

The compound of Reference Example 1-6-2 (100 mg, 0.139 mmol) and N^{α}-(tert-butoxycarbonyl)-L-histidine (53.4 mg, 0.209 mmol) were used as a raw material, and a reaction and post-processing were performed in accordance with the same method as the method described in Reference Example 8 to obtain the title compound (68.3 mg) as a colorless solid.

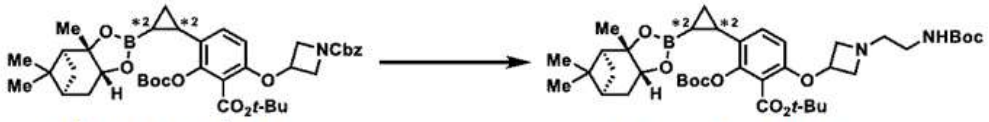
[0473]

^{1}H-NMR (270 MHz, CDCl3) δ: 7.21-6.90 (2H,m), 6.78-6.73 (1H, m), 6.00-5.96 (1H, m), 5.30-5.22 (1H, m), 4.73-4.63 (1H, m), 4.40-3.92 (6H, m), 3.18-2.76 (2H, m), 2.25-2.05 (3H, m), 1.99-1.95 (1H, m), 1.88-0.97 (37H, m), 0.75 (3H, s), 0.48-0.35 (1H, m).

[0474]

Reference Example 27: tert-butyl 6-[(1-{2-[(tert-butoxycarbonyl)amino]ethyl}azetidin-3-yl)oxy]-2-[(tert-butoxycarbonyl)oxy]-3-{2-[(3aS,4S,6S,7aR)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}benzoate

[Chemical Formula 688]



Palladium/carbon (Pd: 10%, wetted with ca. 55% water, 20 mg) and N-(tert-butoxycarbonyl)-2-aminoacetaldehyde (48.8 mg, 0.307 mmol) were added to a methanol (3 mL) solution of the compound of Reference Example 1-6-2 (200 mg, 0.279 mmol), and the reaction mixture was stirred for 4 hours under a hydrogen atmosphere at room temperature. The reaction mixture was filtered through celite, and the filtrate was concentrated. The resulting residue was purified by silica gel column chromatography (dichloromethane/methanol) to obtain the title compound (115 mg) as a colorless oily substance.

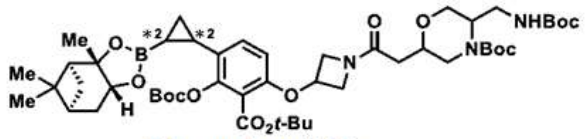
[0475]

^{1}H-NMR (270 MHz, CDCl3) δ: 7.15 (1H, d, J = 8.1 Hz), 6.41 (1H, d, J = 8.1 Hz), 4.90 (1H, br), 4.82-4.73 (1H, m), 3.98-3.94 (1H, m), 3.84-3.79 (2H, m), 3.13-3.06 (4H, m), 2.60 (2H, t, J = 5.4Hz), 2.19-2.03 (2H, m), 1.99-1.75 (2H, m), 1.70-1.21 (32H, m), 1.13-0.99 (3H, m), 0.92-0.79 (2H, m), 0.74 (3H, s), 0.42-0.33 (1H, m).

[0476]

Reference Example 28: tert-butyl 5-{[(tert-butoxycarbonyl)amino]methyl}-2-(2-{3-[2-(tert-butoxycarbonyl)-3-[(tert-butoxycarbonyl)oxy]-4-{2-[(3aS,4S,6S,7aR)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}phenoxy]azetidin-1-yl}-2-oxoethyl)morpholine-4-carboxylic acid

[Chemical Formula 689]



Reference Example 28

[0477]

Reference Example 28-1: [4-(tert-butoxycarbonyl)-5-{[(tert-butoxycarbonyl)amino]methyl}morpholin-2-yl]acetic acid

[Chemical Formula 690]



Reference Example 28-1

An aqueous 2 mol/L sodium hydroxide solution (3.5 mL) and di-tert-butyl dicarbonate (0.163 mL, 0.707 mmol) were added to a THF solution (3.5 mL) of methyl 2-(5-[{(tert-butoxycarbonyl)amino}methyl]morpholin-2-yl)acetic acid (102 mg, 0.354 mmol) in a known document (e.g., Bioorg. Med. Chem. Lett., 1996, 6, 1529, etc.), and the reaction mixture was stirred for 4 hours at room temperature. Water (50 mL) and 2 mol/L hydrochloric acid (5 mL) were added to the reaction mixture, which was extracted with ethyl acetate. The organic layer was washed with an aqueous saturated sodium hydrogen carbonate solution followed by saturated saline, then dried with anhydrous sodium sulfate, and filtered, and the filtrate was concentrated under reduced pressure. The resulting residue was purified by silica gel column chromatography (dichloromethane/methanol) to obtain the title compound (99.7 mg) as a colorless oily substance.

[0478]

LCMS: $[M+H]^+$/Rt = 375.6/1.75 min, 375.6/1.80 min^G (diastereomer mixture)

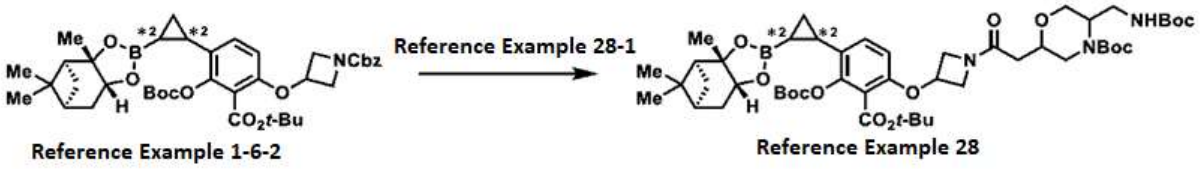
[0479]

1H-NMR (270 MHz, CDCl3) δ: 4.86-4.62 (1H, m), 4.32-4.25 (1H, m), 4.14-3.97 (1H, m), 3.92-3.41 (5H, m), 3.28-3.08 (1H, m), 3.00-2.76 (1H, m), 2.66-2.45 (1H, m), 1.47-1.43 (18H, m).

[0480]

Reference Example 28: tert-butyl 5-{[(tert-butoxycarbonyl)amino]methyl}-2-(2-{3-[2-(tert-butoxycarbonyl)-3-[(tert-butoxycarbonyl)oxy]-4-{2-[(3aS,4S,6S,7aR)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}phenoxy]azetidin-1-yl}-2-oxoethyl)morpholine-4-carboxylic acid

[Chemical Formula 691]



Palladium/carbon (Pd: 10%, wetted with ca. 55% water, 17 mg) was added to a methanol (3 mL) solution of the compound of Reference Example 1-6-2 (170 mg, 0.237 mmol), and the reaction mixture was stirred for 30 minutes under a hydrogen atmosphere at room temperature. The reaction mixture was filtered through celite, and the filtrate was concentrated. The resulting residue was dissolved in DMF (1 mL) as solution A.

HATU (94.6 mg, 0.249 mmol) and triethylamine (0.0719 mL, 0.261 mmol) were added to a DMF solution of the compound of Reference Example 28-1 (97.6 mg, 0.261 mmol). The reaction mixture was stirred for 30 minutes at room temperature. Solution A was added, and the reaction mixture was stirred for 2 hours at room temperature. Saturated saline was added to the reaction mixture, which was extracted with ethyl acetate. The organic layer was washed with saturated saline, then dried with anhydrous sodium sulfate, and filtered, and the filtrate was concentrated. The resulting residue was purified by silica gel column chromatography (hexane/ethyl acetate) to obtain the title compound (150 mg) as a colorless amorphous compound.

[0481]

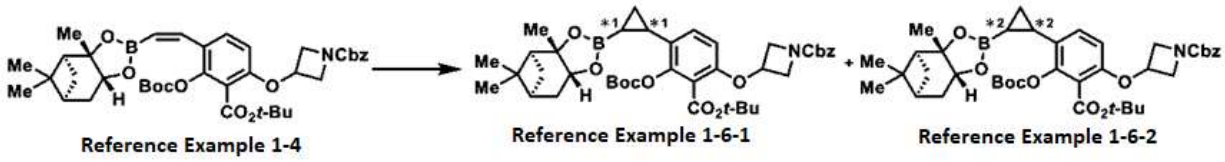
1H-NMR (270 MHz, CDCl3) δ: 7.20-7.15 (1H, m), 6.35 (1H, d, J = 8.1 Hz), 4.94-3.21 (15H, m), 2.57-2.34 (2H, m), 2.19-2.08 (2H, m),

2.01-1.92 (1H, m), 1.88-1.76 (2H, m), 1.69-0.98 (39H, m), 0.91-0.81 (6H, m), 0.74 (3H, s), 0.44-0.35 (1H, m).

[0482]

Reference Example 29: Synthesis of Reference Example 1-6-2 (1g scale)

[Chemical Formula 692]



A 1 mol/L hexane (11.4 mL, 11.4 mmol) solution of diethylzinc was dissolved in dichloromethane (8.4 mL) under a nitrogen atmosphere at -78°C, and diiodomethane (1.37 mL, 17.4 mmol) was slowly added. The reaction mixture was stirred for 5 minutes at -20°C and then cooled again to -78°C, and a dichloromethane (4 mL) solution of the compound of Reference Example 1-4 (999 mg, 1.42 mmol) was added dropwise. The reaction mixture was stirred for 5 minutes at -78°C, then stirred for 30 minutes at -20°C, and then stirred for 22 hours at -5°C. The reaction mixture was added with a dichloromethane (2 mL) solution of di-tert-butyl dicarbonate (2.97 mL, 12.8 mmol), a dichloromethane (2 mL) solution of 4-dimethylaminopyridine (0.173 g, 1.42 mmol), and triethylamine (3.96 mL, 28.4 mmol) and stirred for 15 minutes at -5°C and warmed to room temperature. An aqueous saturated ammonium chloride solution was added to the reaction mixture, which was extracted with chloroform. The organic layer was washed with saturated saline, then dried with anhydrous sodium sulfate, and filtered, and the filtrate was concentrated (crude product comprises a diastereomer mixture of the compound of Reference Example 1-6-1 and the compound of Reference Example 1-6-2, and the mixture ratio (1-6-1:1-6-2) was about 1:3 (according to ^{1}H-NMR integration ratio)). The resulting residue was purified by silica gel column chromatography to obtain the compound of Reference Example 1-6-2 (identified by TLC (silica gel plate) Rf value: 0.52 (hexane/ethyl

acetate = 2/1)) (473 mg) as a colorless amorphous compound. The compound of Reference Example 1-6-1 (identified by TLC (silica gel plate) Rf value: 0.46 (hexane/ethyl acetate = 2/1)) was not isolated.

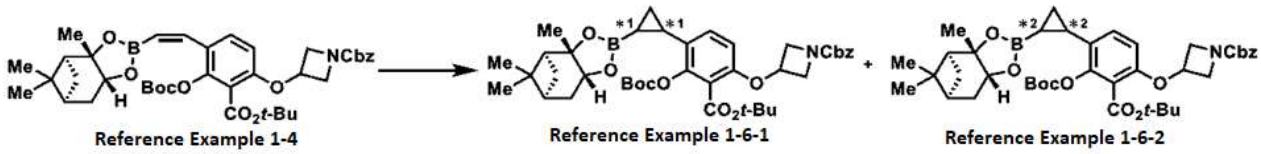
[0483]

^{1}H-NMR ($CDCl_3$) δ: 7.35-7.27 (5H, m), 7.14 (1H, d, J = 8.5 Hz), 6.31 (1H, d, J = 8.5 Hz), 5.09 (2H, s), 4.92-4.86 (1H, m), 4.35-4.30 (2H, m), 4.06 (2H, dd, J = 9.8, 4.3 Hz), 3.93 (1H, d, J = 8.6 Hz), 2.16-2.08 (2H, m), 1.99 (2H, s), 1.94-1.90 (1H, m), 1.81 (1H, t, J = 5.5 Hz), 1.77-1.74 (1H, m), 1.66-1.62 (1H, m), 1.53 (9H, s), 1.52 (9H, s), 1.25 (3H, s), 1.18 (3H, s), 1.10-1.05 (1H, m), 1.02-0.98 (1H, m), 0.80 (1H, d, J = 10.4 Hz), 0.71 (3H, s), 0.39-0.32 (1H, m).

[0484]

Reference Example 30: Synthesis of Reference Example 1-6-2 (4.5 g scale)

[Chemical Formula 693]



Reference Example 1-4 | Reference Example 1-6-1 | Reference Example 1-6-2

1 mol/L hexane (49.7 mL, 49.7 mmol) solution of diethylzinc was dissolved in dichloromethane (49.7 mL) under a nitrogen atmosphere at -20°C, and diiodomethane (6.88 mL, 85 mmol) was slowly added. After stirring the reaction mixture for 20 minutes at -20°C, a dichloromethane (5 mL) solution of the compound of Reference Example 1-4 (4.55 g, 6.47 mmol) was added dropwise. The reaction mixture was stirred for 30 minutes at -20°C and then stirred for 22.5 hours at -5°C. To the reaction mixture, a dichloromethane (15 mL) solution of di-tert-butyl dicarbonate (14.85 mL, 64.0 mmol), a dichloromethane (15 mL) solution of 4-dimethylaminopyridine (0.868 g, 7.11 mmol), and triethylamine (19.8 mL, 142 mmol) were added and stirred for 30 minutes at -5°C, and then the reaction mixture was warmed to room temperature and stirred for 30 minutes. At 0°C,

an aqueous saturated ammonium chloride solution was added to the reaction mixture, which was extracted with chloroform. The organic layer was washed with saturated saline, then dried with anhydrous sodium sulfate, and filtered, and the filtrate was concentrated. The resulting residue was purified by silica gel column chromatography to obtain the compound of Reference Example 1-6-2 (identified by TLC (silica gel plate) Rf value: 0.52 (hexane/ethyl acetate = 2/1)) (2.537 g) as a colorless amorphous compound. The compound of Reference Example 1-6-1 (identified by TLC (silica gel plate) Rf value: 0.46 (hexane/ethyl acetate = 2/1)) was not isolated.

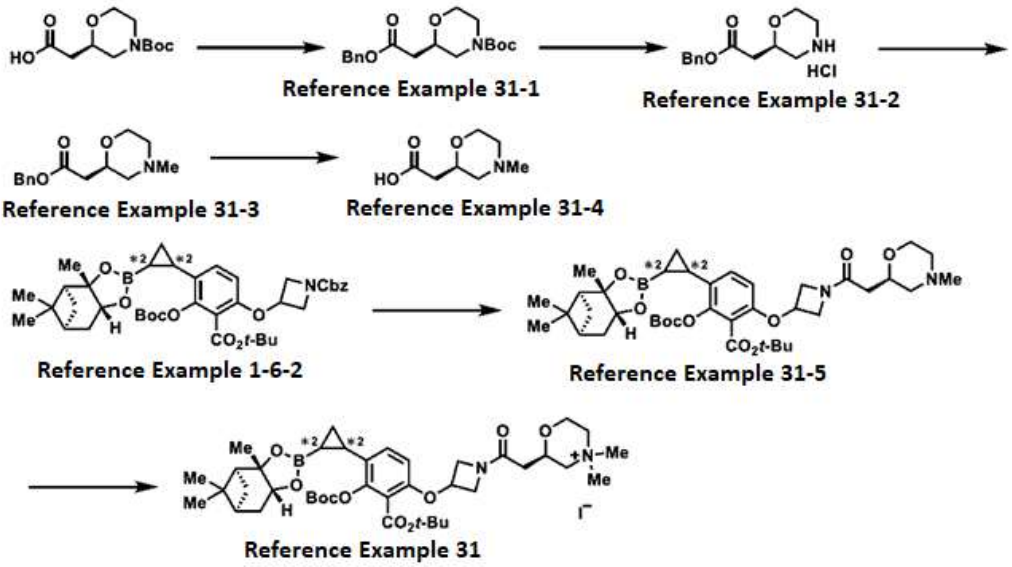
[0485]

^{1}H-NMR ($CDCl_3$) δ: 7.35-7.27 (5H, m), 7.14 (1H, d, J = 8.5 Hz), 6.31 (1H, d, J = 8.5 Hz), 5.09 (2H, s), 4.92-4.86 (1H, m), 4.35-4.30 (2H, m), 4.06 (2H, dd, J = 9.8, 4.3 Hz), 3.93 (1H, d, J = 8.6 Hz), 2.16-2.08 (2H, m), 1.99 (2H, s), 1.94-1.90 (1H, m), 1.81 (1H, t, J = 5.5 Hz), 1.77-1.74 (1H, m), 1.66-1.62 (1H, m), 1.53 (9H, s), 1.52 (9H, s), 1.25 (3H, s), 1.18 (3H, s), 1.10-1.05 (1H, m), 1.02-0.98 (1H, m), 0.80 (1H, d, J = 10.4 Hz), 0.71 (3H, s), 0.39-0.32 (1H, m).

[0486]

Reference Example 31: (2R)-2-(2-{3-[2-(tert-butoxycarbonyl)-3-[(tert-butoxycarbonyl)oxy]-4-{2-[(3aS,4S,6S,7aR)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}phenoxy]azetidin-1-yl}-2-oxoethyl)-4,4-dimethylmorpholin-4-ium iodide

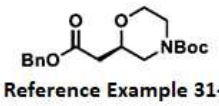
[Chemical Formula 694]



[0487]

Reference Example 31-1: tert-butyl (2R)-2-[2-(benzyloxy)-2-oxoethyl]morpholine-4-carboxylate

[Chemical Formula 695]



Benzylbromide (916 mg, 5.35 mmol) was added to a DMF (13.7 mL) mixture of [(2R)-4-(tert-butoxycarbonyl)morpholin-2-yl]acetic acid (1.01 g, 4.12 mmol) and cesium carbonate (2.01 g, 6.18 mmol). The reaction mixture was stirred for 3 hours at room temperature. An aqueous saturated ammonium chloride solution was added to the reaction mixture, which was extracted with ethyl acetate. The organic layer was washed twice with an aqueous saturated ammonium chloride solution and with saturated saline, then dried with anhydrous magnesium sulfate, filtered, and concentrated under reduced pressure. The resulting residue was purified by silica gel column chromatography (hexane/ethyl acetate) to obtain the title compound (1.33 g).

[0488]

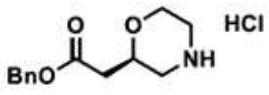
^{1}H-NMR (400 MHz, $CDCl_3$) δ: 7.37-7.28 (5H, m), 5.16 (1H, d, J = 12.2 Hz), 5.11 (1H, d, J =12.2 Hz), 3.91-3.82 (4H, m), 3.54-3.48

(1H, m), 2.93-2.90 (1H, m), 2.65 (1H, brs), 2.58-2.52 (1H, m), 2.48-2.43 (1H, m), 1.44 (9H, s).

[0489]

Reference Example 31-2: benzyl [(2R)-morpholin-2-yl]acetate hydrochloride

[Chemical Formula 696]



Reference Example 31-2

A mixture of the compound of Reference Example 31-1 (1.33 g, 3.95 mmol) and 4 mol/L hydrochloric acid/4-methyltetrahydropyran (19.8 mL, 79 mmol) was stirred at room temperature. After 2 hours, the reaction mixture was concentrated under reduced pressure to obtain the title compound (1.20 g).

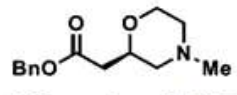
[0490]

^{1}H-NMR (400 MHz, DMSO-d_6) δ: 7.46-7.37 (5H, m), 5.20 (1H, d, J = 12.2 Hz), 5.16 (1H, d, J = 12.2 Hz), 4.23-4.16 (1H, m), 4.01-3.97 (1H, m), 3.83-3.76 (1H, m), 3.29 (1H, d, J = 12.8 Hz), 3.21 (1H, d, J = 12.8 Hz), 3.00-2.93 (1H, m), 2.90-2.77 (2H, m), 2.60-2.53 (1H, m).

[0491]

Reference Example 31-3: benzyl [(2R)-4-methylmorpholin-2-yl]acetate

[Chemical Formula 697]



Reference Example 31-3

Diisopropylethylamine (4.14 mL, 23.70 mmol) and iodomethane (0.37 mL, 5.93 mmol) were added to a tetrahydrofuran (13 mL) mixture of the compound of Reference Example 31-2 (1.07 g, 3.95 mmol), and the reaction mixture was stirred for 6 hours at 60°C. In an ice bath, water was added to the reaction mixture, which was extracted with chloroform/ethanol (4:1). The organic layer was

dried with anhydrous magnesium sulfate, filtered, and concentrated under reduced pressure. The resulting residue was purified by silica gel column chromatography (chloroform/methanol) to obtain the title compound (866.2 mg).

[0492]

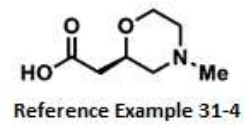
LCMS: $[M+H]^+$/Rt = 250/1.433 min[F]

^{1}H-NMR (400 MHz, $CDCl_3$) δ: 7.36-7.27 (5H, m), 5.15 (1H, d, J = 12.2 Hz), 5.10 (1H, d, J = 12.2 Hz), 4.02-3.97 (1H, m), 3.86-3.83 (1H, m), 3.72-3.66 (1H, m), 2.76 (1H, d, J = 11.6 Hz), 2.65 (1H, d, J = 11.6 Hz), 2.59-2.53 (1H, m), 2.47-2.42 (1H, m), 2.28 (3H, s), 2.14-2.11 (1H, m), 1.91 -1.86 (1H, m).

[0493]

Reference Example 31-4: [(2R)-4-methylmorpholin-2-yl]acetic acid

[Chemical Formula 698]



Reference Example 31-4

Palladium/carbon (Pd: 10%, wetted with ca. 55% water, 540 mg) was added to a methanol (17 mL) solution of the compound of Reference Example 31-3 (838 mg, 3.36 mmol), and the reaction mixture was stirred for 1.5 hours under a hydrogen atmosphere at room temperature. The reaction mixture was filtered through celite. The filtrate was concentrated under reduced pressure to obtain the title compound (568.6 mg).

[0494]

^{1}H-NMR (400 MHz, CD_3OD) δ: 4.03-3.92 (2H, m), 3.76-3.69 (1H, m), 3.20 (1H, d, J = 12.2 Hz), 3.04 (1H, d, J = 12.2 Hz), 2.63-2.56 (4H, m), 2.48-2.33 (3H, m).

[0495]

Reference Example 31-5: tert-butyl 2-[(tert-butoxycarbonyl)oxy]-6-[(1-{[(2R)-4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]-3-{2-[(3aS,4S,6S,7aR)-3a,5,5-

trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}benzoate

[Chemical Formula 699]



Palladium/carbon (Pd: 10%, wetted with ca. 55% water, 618 mg) was added to a methanol (10 mL) solution of the compound of Reference Example 1-6-2 (508.5 mg, 0.709 mmol), and the reaction mixture was stirred for 1.5 hours under a hydrogen atmosphere at room temperature. The reaction mixture was filtered through celite, and the filtrate was concentrated under reduced pressure. The resulting residue was dissolved in dichloromethane (7 mL) as solution A.

1-hydroxybenzotriazole (326 mg, 2.13 mmol) and 1-(3-dimethylaminopropyl)-3-ethylcarbodiimide hydrochloride (407 mg, 2.13 mmol) were added to a dichloromethane (3 mL) mixture of the compound of Reference Example 31-4 (568.6 mg, 3.57 mmol) and diisopropylethylamine (0.619 mL, 3.54 mmol), and the reaction mixture was stirred for 30 minutes at room temperature. The reaction mixture was added with solution A described above and stirred for 3 hours at room temperature. An aqueous saturated ammonium chloride solution was then added to the reaction mixture, which was extracted with chloroform/ethanol (4:1). The organic layer was washed with an aqueous saturated sodium hydrogen carbonate solution, then dried with anhydrous magnesium sulfate, filtered, and concentrated under reduced pressure. The resulting residue was purified by silica gel column chromatography (chloroform/methanol) to obtain the title compound (258 mg).

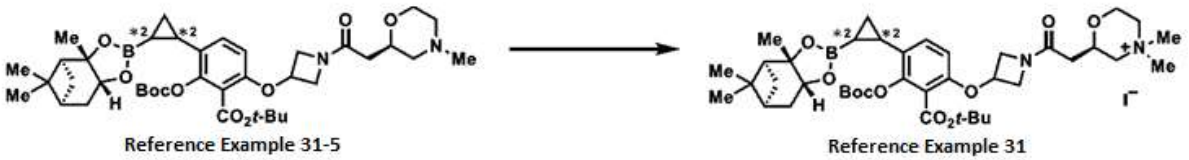
[0496]

LCMS: $[M+H]^+$/Rt = 725/1.692 min[I]

[0497]

Reference Example 31-5: (2R)-2-(2-{3-[2-(tert-butoxycarbonyl)-3-[(tert-butoxycarbonyl)oxy]-4-{2-[(3aS,4S,6S,7aR)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}phenoxy]azetidin-1-yl}-2-oxoethyl)-4,4-dimethylmorpholin-4-ium iodide

[Chemical Formula 700]



Iodomethane (0.019 mL, 0.304 mmol) was added to a dichloromethane (0.5 mL) solution of the compound of Reference Example 31-5 (142.6 mg, 0.197 mmol). After stirring overnight at room temperature, the reaction solution was concentrated under reduced pressure to obtain the title compound (170.6 mg).

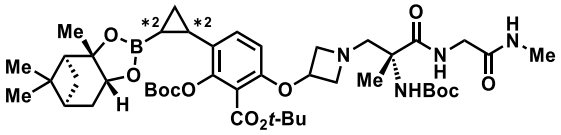
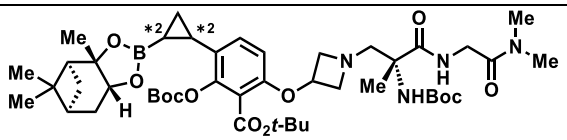
[0498]

LCMS: $[M+H]^+$/Rt = 739/1.933 min^D

[0499]

The compound of Reference Example 14 and amine corresponding to each of the following Reference Examples were used as a starting material, and a reaction, post-processing, and purification were performed in accordance with the same method as the method described in Reference Example 16 to obtain each of Reference Example compounds 32 and 33 shown in Table 6.

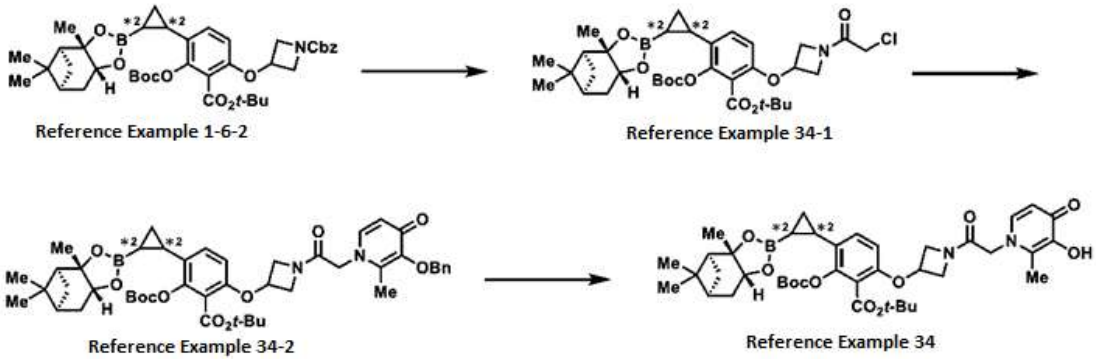
[Table 6]

Reference Example	Structural formula	LCMS and/or NMR
32		LCMS: $[M+H]^+$/Rt = 855/1.983 min^D
33		LCMS: $[M+H]^+$/Rt = 869/2.067 min^D

[0500]

Reference Example 34: tert-butyl 2-[(tert-butoxycarbonyl)oxy]-6-({1-[(3-hydroxy-2-methyl-4-oxopyridin-1(4H)-yl)acetyl]azetidin-3-yl}oxy)-3-{2-[(3aS,4S,6S,7aR)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}benzoate

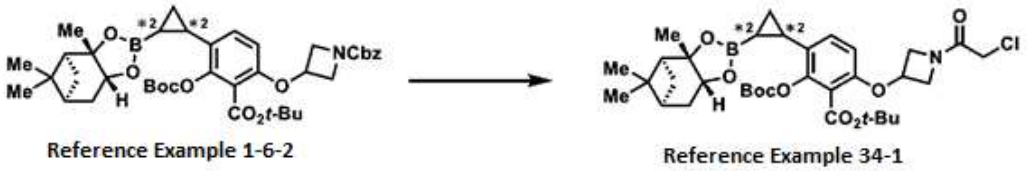
[Chemical Formula 701]



[0501]

Reference Example 34-1: tert-butyl 2-[(tert-butoxycarbonyl)oxy]-6-{[1-(chloroacetyl)azetidin-3-yl]oxy}-3-{2-[(3aS,4S,6S,7aR)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}benzoate

[Chemical Formula 702]



Palladium/carbon (Pd: 10%, wetted with ca. 55% water, 150 mg) was added to a methanol (25 mL) solution of the compound of Reference Example 1-6-2 (650.0 mg, 0.906 mmol), and the reaction mixture was stirred for 4 hours under a hydrogen atmosphere at room temperature. The reaction mixture was filtered through celite, and the filtrate was concentrated under reduced pressure. The resulting residue was dissolved in chloroform (18 mL) as solution A.

Solution A was cooled with ice, and chloroacetyl chloride (133.0 mg, 1.177 mmol) and triethylamine (275 mg, 2.72 mmol) were added. The reaction mixture was then stirred for 12 hours at room

temperature. Water was added to the reaction mixture, which was extracted with chloroform/ethanol (4:1). The organic layer was dried with anhydrous magnesium sulfate, filtered, and concentrated under reduced pressure. The resulting residue was purified by silica gel column chromatography (hexane/ethyl acetate) to obtain the title compound (360 mg).

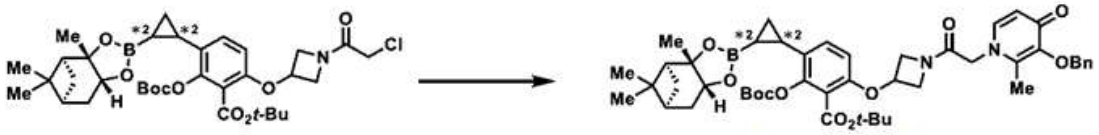
[0502]

^{1}H-NMR (400 MHz, $CDCl_3$) δ: 7.16-7.08 (1H, m), 6.34-6.24 (1H, m), 4.96-4.87 (1H, m), 4.60-4.50 (1H, m), 4.40-4.33 (1H, m), 4.30-4.21 (1H, m), 4.11-4.03 (1H, m), 3.89-3.84 (1H, m), 3.82 (2H, s), 2.14-2.01 (2H, m), 1.97-1.84 (1H, m), 1.80-1.68 (1H, m), 1.65-1.55 (1H, m), 1.50 (9H, s), 1.46 (9H, s), 1.23-1.19 (3H, m), 1.14 (3H, s), 1.08-1.00 (1H, m), 0.99-0.92 (1H, m), 0.90-0.84 (1H, m), 0.81-0.74 (1H, m), 0.68 (3H, s), 0.37-0.28 (1H, m)

[0503]

Reference Example 34-2: tert-butyl 6-[(1-{[3-(benzyloxy)-2-methyl-4-oxopyridin-1(4H)-yl]acetyl}azetidin-3-yl)oxy]-2-[(tert-butoxycarbonyl)oxy]-3-{2-[(3aS,4S,6S,7aR)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}benzoate

[Chemical Formula 703]



Reference Example 34-1 Reference Example 34-2

A THF (15 mL) solution of 3-benzyloxy-2-methylpyridin-4-one (137 mg, 0.363 mmol) was cooled with ice, and 60% sodium hydride (27.6 mg, 0.689 mmol) was added. The reaction mixture was stirred for 20 minutes. A THF (3 mL) solution of the compound of Reference Example 34-1 (350 mg, 0.530 mmol) was added, and the reaction mixture was then stirred for 14 hours at room temperature. The reaction mixture was further heated to 60°C and stirred for 2 hours. Water was added to the reaction mixture, which was

extracted with chloroform/ethanol (4:1). The organic layer was dried with anhydrous sodium sulfate, filtered, and concentrated under reduced pressure. The resulting residue was purified by silica gel column chromatography (ethyl acetate/methanol) to obtain the title compound (150 mg).

[0504]

LCMS: $[M+H]^+$/Rt = 839/2.35 min[D]

[0505]

Reference Example 34: tert-butyl 2-[(tert-butoxycarbonyl)oxy]-6-({1-[(3-hydroxy-2-methyl-4-oxopyridin-1(4H)-yl)acetyl]azetidin-3-yl}oxy)-3-{2-[(3aS,4S,6S,7aR)-3a,5,5-trimethylhexahydro-2H-4,6-methano-1,3,2-benzodioxaborol-2-yl]cyclopropyl}benzoate

[Chemical Formula 704]



Palladium/carbon (Pd: 10%, wetted with ca. 55% water, 35 mg) was added to a methanol (8 mL) solution of the compound of Reference Example 34-2 (150.0 mg, 0.179 mmol), and the reaction mixture was stirred for 4 hours under a hydrogen atmosphere at room temperature. The reaction mixture was filtered through celite, and the filtrate was concentrated under reduced pressure to obtain the title compound (115 mg).

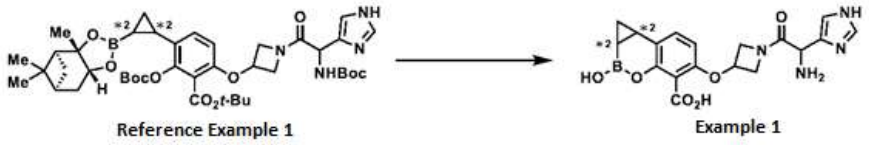
[0506]

LCMS: $[M+H]^+$/Rt = 749.54/1.289 min[H]

[0507]

Example 1: 5-({1-[amino(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid (derived from diastereomer 1-5-2; diastereo mixture)

[Chemical Formula 705]



Reference Example 1 Example 1

[0508]

The compound of Reference Example 1 (diastereo mixture comprising two types of diastereomer) (73.7 mg, 0.091 mmol) was dissolved in 1 mol/L hydrochloric acid/acetic acid solution (0.91 mL), and phenylboronic acid (33.4 mg, 0.274 mmol) was added. The reaction mixture was stirred for 1 hour at room temperature. The reaction mixture was concentrated. The resulting residue was washed with acetonitrile, then dissolved in methanol/water and purified by reversed phase column chromatography (column: YMC-Actus Triart C18, eluent: solution A: water, solution B: acetonitrile) to obtain the title compound (23.6 mg) as a diastereo mixture comprising two types of diastereomers.

[0509]

LCMS: $[M+H]^+$/Rt = 399.3/0.405 min[A]

[0510]

^{1}H-NMR (400 MHZ, 0.02N HCl in CD_3OD) δ: 8.86 (0.5H, s), 8.84 (0.5H, s), 7.77 (0.5H, s), 7.75 (0.5H, s), 7.29 (1H, d, J = 8.5 Hz), 6.41 (0.5H, dd, J = 8.5, 1.8 Hz), 6.38 (0.5H, d, J = 8.5 Hz), 5.52 (0.5H, s), 5.46 (0.5H, d, J = 1.8 Hz), 5.13-5.09 (0.5H, m), 5.03-4.99 (0.5H, m), 4.70-4.65 (0.5H, m), 4.54 (0.5H, dd, J = 11.0, 6.7 Hz), 4.44 (0.5H, dd, J = 11.0, 6.7 Hz), 4.33-4.28 (0.5H, m), 4.25-4.20 (0.5H, m), 4.14-4.09 (0.5H, m), 4.07-4.02 (0.5H, m), 3.76-3.71 (0.5H, m), 2.26-2.21 (1H, m), 1.34-1.28 (1H, m), 0.58-0.52 (1H, m), 0.32-0.25 (1H, m).

[0511]

The compound of Example 1, which is a diastereo mixture, was separated into the first peak (Rt = 3.465 min) and the second peak (Rt = 4.491 min) by the following chiral chromatography. Accordingly, each of two types of diastereomers contained in the compound of Example 1 can be further fractionated and identified.

[0512]

Column: CROWNPAK CR-I(+) (0.30 cmI.D. × 15 cmL) (Daicel Corporation)

Mobile phase: aqueous perchloric acid solution (pH 1.0)/acetonitrile (85/15 <v/v>)

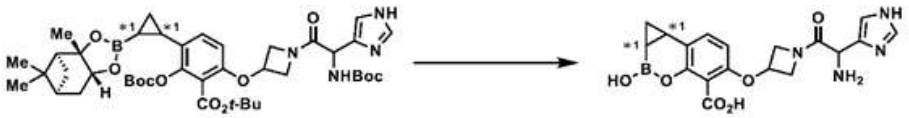
Flow rate: 0.5 mL/min

Temperature: 25°C

[0513]

Example 2: 5-({1-[amino(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid (derived from diastereomer 1-5-1; diastereo mixture)

[Chemical Formula 706]



Reference Example 2 Example 2

[0514]

The compound of Reference Example 2 (diastereo mixture comprising two types of diastereomers) (82.5 mg, 0.102 mmol) was used as a raw material, and a reaction and post-processing were performed in accordance with the same method as the method described in Example 1 to obtain the title compound (25.1 mg) as a diastereo mixture comprising two types of diastereomers.

[0515]

LCMS: $[M+H]^+$/Rt = 399.14/0.413 min[A]

[0516]

^{1}H-NMR (400 MHZ, D_2O) δ: 7.49-7.47 (1H, m), 7.05 (0.5H, s), 7.03 (0.5H, s), 6.82 (0.51H, d, J = 8.5 Hz), 6.81 (0.5H, d, J = 8.5 Hz), 5.90 (0.5H, d, J = 8.5 Hz), 5.90 (0.5H, d, J = 8.5 Hz), 4.95 (0.5H, s), 4.94 (0.5H, s), 4.69-4.64 (0.5H, m), 4.58-4.53 (0.5H, m), 4.21-4.11 (1H, m), 4.08-4.04 (0.5H, m), 3.87-3.83 (0.5H, m), 3.79-3.71 (1H, m), 3.60-3.56 (0.5H, m), 3.29-3.25 (0.5H, m), 1.86-1.81 (1H, m), 0.91-0.86 (1H, m), 0.19-0.12 (1H, m), 0.02-0.02 (1H, m).

[0517]

The compound of Example 2, which is a diastereomer mixture, was separated into the first peak (Rt = 3.446 min) and the second peak (Rt = 4.508 min) by the following chiral chromatography. Accordingly, each of two types of diastereomers contained in the compound of Example 2 can be further fractionated and identified.

[0518]

Column: CROWNPAK CR-I(+) (0.30 cmI.D. × 15 cmL) (Daicel Corporation)

Mobile phase: aqueous perchloric acid solution (pH 1.0)/acetonitrile (85/15 <v/v>)

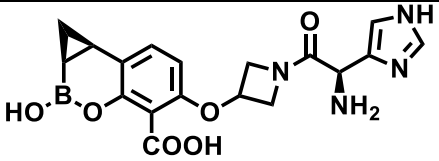
Flow rate: 0.5 mL/min

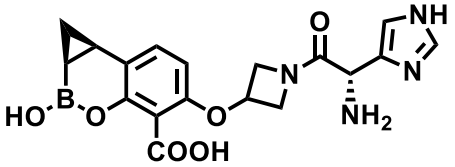
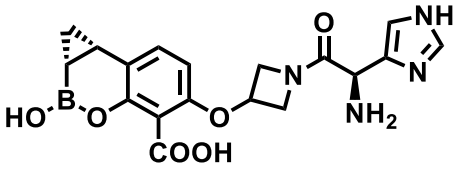
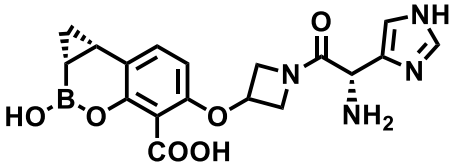
Temperature: 25°C

[0519]

The compound of Example 1 and the compound of Example 2 are diastereo mixtures comprising two types of diastereomers that are different from each other, collectively consisting of four different diastereomers A1 to A4 shown in the following Table. They can be prepared separately or fractionated through chiral chromatography as described above. Specifically, the four types of diastereomers were substantially synthesized. A1 and A2 or A3 and A4 always form a pair to constitute a diastereo mixture of either Example 1 or Example 2. If Example 1 is a mixture consisting of one of the pairs, Example 2 is a mixture consisting of the other pair.

[Chemical Formula 707]

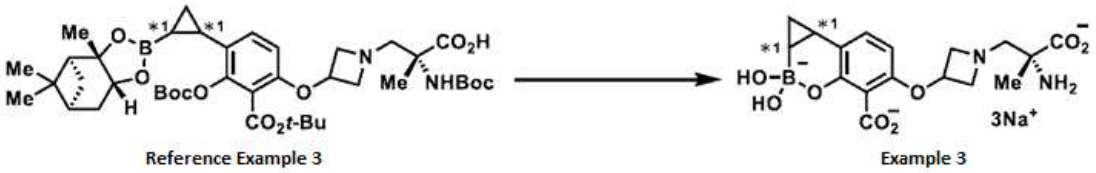
Serial number	Chemical structure of diastereomer [abbreviation based on configuration]	Chemical name
A1	 [(1aS,7bR,2R)-isomer]	(1aS,7bR)-5-({1-[(2R)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

A2	 [(1aS,7bR,2S)-isomer]	(1aS,7bR)-5-({1-[(2S)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid
A3	 [(1aR,7bS,2R)-isomer]	(1aR,7bS)-5-({1-[(2R)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid
A4	 [(1aR,7bS,2S)-isomer]	(1aR,7bS)-5-({1-[(2S)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

[0520]

Example 3: 9-[1-(propyl 2-amino-2-carboxylate)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate trisodium salt (derived from diastereomer 1-5-1; single diastereomer)

[Chemical Formula 708]



[0521]

An aqueous 6 mol/L hydrochloric acid solution (0.085 mL) and phenylboronic acid (2.9 mg, 0.024 mmol) were added to a cyclopentyl methyl ether solution (0.127 mL) of the compound of Reference Example 3 (20 mg, 0.025 mmol), and the reaction mixture was stirred for 14 hours at room temperature. The supernatant solution of the reaction solution was removed, and the remaining solid was washed three times by decantation with cyclopentyl methyl ether. The resulting residue was added with an aqueous 2 mol/l sodium hydroxide solution (0.064 mL, 0.127 mmol) and purified by reversed phase column chromatography (Column: YMC-

Actus Triart C18, eluent: solution A: water, solution B: acetonitrile) to obtain the title compound (4.9 mg) as a single diastereomer.

[0522]

LCMS: $[M+H]^+$/Rt = 377.15/0.369 min[A]

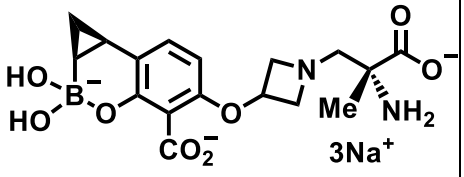
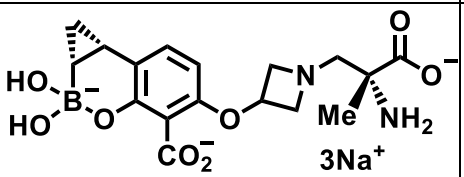
[0523]

^{1}H-NMR (400 MHZ, D_2O) δ: 7.00 (1H, d, J = 8.7 Hz), 6.10 (1H, d, J = 8.2 Hz), 4.73-4.67 (1H, m), 3.77 (2H, q, J = 7.3 Hz), 3.32-3.24 (2H, m), 2.90 (1H, d, J = 12.5 Hz), 2.65 (1H, d, J = 12.5 Hz), 1.80-1.75 (1H, m), 1.16 (3H, s), 0.81-0.76 (1H, m), 0.28-0.25 (1H, m), 0.20 (1H, td, J = 9.1, 6.4 Hz).

[0524]

The compound of Example 3 is a single diastereomer, which is one of the two types of different diastereomers B1 and B2 shown in the following table. The other isomer can also be synthesized in the same manner as Reference Example 3 and Example 3 by using the compound of Reference Example 1-6-2 instead of the compound of Reference Example 1-6-1 in Reference Example 3-1.

[Chemical Formula 709]

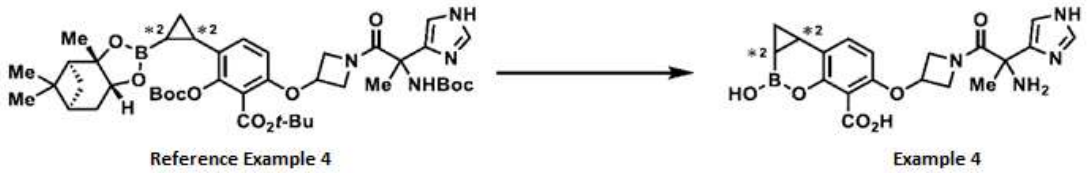
Serial number	Chemical structure of diastereomer [abbreviation based on configuration]	Chemical name
B1	 [(2R,4S,2R)-isomer]	(2R,4S)-9-[1-[propyl (2R)-2-amino-2-carboxylate]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylate trisodium salt
B2	 [(2S,4R,2R)-isomer]	(2S,4R)-9-[1-[propyl (2R)-2-amino-2-carboxylate]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylate trisodium salt

[0525]

Example 4: 5-({1-[2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-

tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid (derived from diastereomer 1-5-2; diastereo mixture)

[Chemical Formula 710]



Reference Example 4 Example 4

The compound of Reference Example 4 (diastereo mixture comprising two types of diastereomers) (13.5 mg, 0.016 mmol) was dissolved in a 1 mol/L hydrochloric acid/acetic acid solution (0.32 mL), and phenylboronic acid (6.2 mg, 0.051 mmol) was added. The reaction mixture was stirred for 3 hours at room temperature. The reaction mixture was concentrated. The resulting residue was washed with acetonitrile, then dissolved in triethylamine (0.01 mL)/water (0.5 mL) and purified by reversed phase column chromatography (Column: YMC-Actus Triart C18, eluent: solution A: water, solution B: acetonitrile). The eluent was lyophilized after adding triethylamine (0.01 mL) to obtain the title compound (6.5 mg) as a diastereo mixture comprising two types of diastereomers and a triethylamine containing substance.

[0526]

LCMS: $[M+H]^+$/Rt = 413.17/0.423 min^A

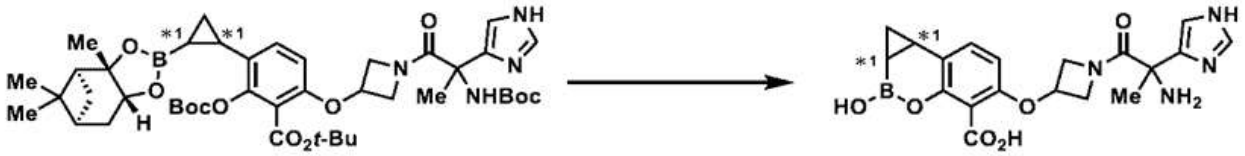
[0527]

^{1}H-NMR (400 MHZ, CD_3OD) δ: 7.81 (0.5H, s), 7.78 (0.5H, s), 7.35 (0.5H, s) 7.33 (0.5H, s), 7.09 (1H, d, J = 8.5 Hz), 6.06-6.03 (1H, m), 4.79-4.76 (1H, m), 4.40-4.27 (2H, m), 4.10-3.98 (2H, m), 1.92-1.85 (1H, m), 1.84 (3H, s), 0.97-0.93 (1H, m), 0.37-0.32 (2H, m).

[0528]

Example 5: 5-({1-[2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid (derived from diastereomer 1-5-1; diastereo mixture)

[Chemical Formula 711]



Reference Example 5 Example 5

The compound of Reference Example 5 (diastereo mixture comprising two types of diastereomers) (11.8 mg, 0.014 mmol) was used as a raw material, and a reaction and post-processing were performed in accordance with the same method as the method described in Example 4 to obtain the title compound (4.7 mg) as a diastereo mixture comprising two types of diastereomers and a triethylamine containing substance (containing about 0.3 mol ratio of triethylamine with respect to the compound of Reference Example 5 according to NMR integration ratio).

[0529]

LCMS: $[M+H]^+$/Rt = 413.24/0.435 min[A]

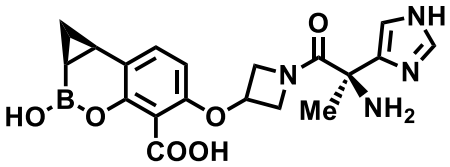
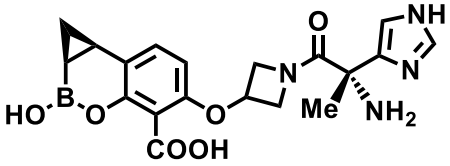
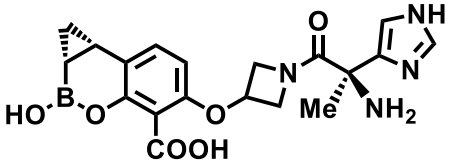
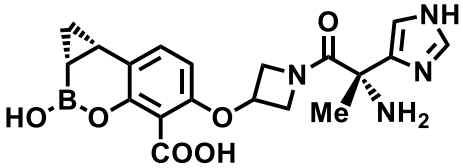
[0530]

^{1}H-NMR (400 MHZ, CD_3OD) δ: 7.81 (0.5H, s), 7.78 (0.5H, s), 7.34 (0.5H, s), 7.31 (0.5H, s), 7.08 (1H, d, J = 8.5 Hz), 6.05-6.02 (1H, m), 4.80-4.75 (1H, m), 4.40-4.26 (2H, m), 4.07-4.00 (2H, m), 1.92-1.85 (1H, m), 1.83 (3H, s), 0.99-0.92 (1H, m), 0.38-0.31 (2H, m).

[0531]

The compound of Example 4 and the compound of Example 5 are diastereo mixtures comprising two types of diastereomers that are different from each other, collectively consisting of four different diastereomers C1 to C4 shown in the following Table. They can be prepared separately or fractionated through chiral chromatography as described above. Specifically, the four types of diastereomers were substantially synthesized. C1 and C2 or C3 and C4 always form a pair to constitute a diastereo mixture of either Example 4 or Example 5. If Example 4 is a mixture consisting of one of the pairs, Example 5 is a mixture consisting of the other pair.

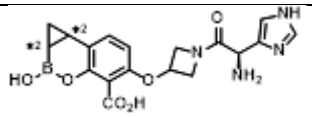
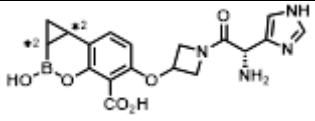
[Chemical Formula 712]

Serial number	Chemical structure of diastereomer [abbreviation based on configuration]	Chemical name
C1	 [(1aS,7bR,2R)-isomer]	(1aS,7bR)-5-({1-[(2R)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid
C2	 [(1aS,7bR,2S)-isomer]	(1aS,7bR)-5-({1-[(2S)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid
C3	 [(1aR,7bS,2R)-isomer]	(1aR,7bS)-5-({1-[(2R)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid
C4	 [(1aR,7bS,2S)-isomer]	(1aR,7bS)-5-({1-[(2S)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

[0532]

The compounds of Reference Examples (R)-6 and (S)-6 were used as a raw material, and reaction, post-processing, and purification were performed in accordance with the same method as the method described in Example 1 to obtain the following Example compounds 6 and 7.

[Table 7]

Example	Raw Material	Structural formula	NMR and/or LCMS
6	Reference Example (R)-6		^{1}H-NMR (D_2O) δ: 7.50 (1H, br s), 7.02 (1H, br s), 6.75 (1H, d, J = 8.5 Hz), 5.77 (1H, d, J = 8.5 Hz), 4.74-4.69 (1H, m), 4.65-4.60 (1H, m), 4.34-4.25 (0.5H, m), 4.22-4.15 (0.5H, m), 4.14-4.08 (0.5H, m), 4.01-3.95 (0.5H, m), 3.88-3.83 (1H, m), 3.81-3.75 (0.5H, m), 3.60 -3.51 (0.5H, m), 1.56-1.51 (1H, m), 0.58-0.53 (1H, m), 0.01--0.07 (2H, m). (rotamer)
7	Reference Example (S)-6		^{1}H-NMR (D_2O) δ: 7.50-7.47 (1H, m), 7.07-7.03 (1H, m), 6.81 (0.5 H, d, J = 8.5 Hz), 6.80 (0.5H, d, J = 8.5 Hz), 5.89 (0.5H, d, J = 8.5 H z), 5.88 (0.5H, d, J = 8.5 Hz), 4.96-4.94 (1H, m), 4.69-4.65 (0.5H, m), 4.59-4.55 (0.5H, m), 4.21-4.12 (1H, m), 4.09-4.04 (0.5H, m), 3.90-3.85 (0.5H, m), 3.80-3.73 (1H, m), 3.62-3.57 (0.5H, m), 3.31-3.27 (0.5H, m), 1.82-1.76 (1H, m), 0.86-0.80 (1H, m), 0.16-0.09 (1 H, m), 0.02--0.02 (1H, m). (rotamer)

[0533]

The column retention times of the compound of Example 6 and the compound of Example 7 in chiral chromatography were the following.

Column: CROWNPAK CR-I(-) (0.30 cmI.D. × 15 cmL) (Daicel Corporation)

Mobile phase: solution A/solution B = 85/15

Solution A: aqueous perchloric acid solution (70% perchloric acid/water = 1/100 VV)

Solution B: acetonitrile

Flow rate: 0.5 mL/min

Temperature: 25°C

Rt of compound of Example 6: 6.300 min

Rt of compound of Example 7: 4.235 min

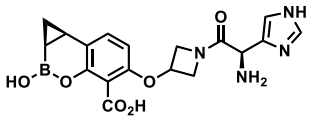
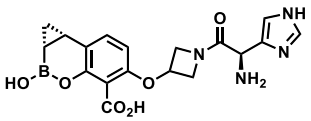
Optical purity of Example 6 (computed by HPLC area percentage value): 99.3%ee

Optical purity of Example 7 (computed by HPLC area percentage value): 97.8%ee

[0534]

The compound of Example 6 is a single diastereomer, which is one of the two types of different diastereomers 6A and 6B shown in the following table. The other isomer can also be synthesized in the same manner as Reference Example 1, Reference Example (R)-6, and Example 6 by using the compound of Reference Example 1-6-1 instead of the compound of Reference Example 1-6-2 in Reference Example 1-7.

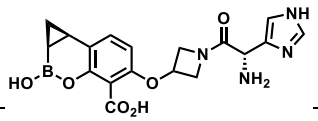
[Chemical Formula 713]

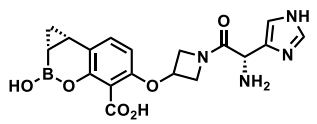
Serial number	Chemical structure of diastereomer [abbreviation based on configuration]	Chemical name
6A	 [(1aS,7bR,2R)-isomer]	(1aS,7bR)-5-({1-[(2R)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid
6B	 [(1aR,7bS,2S)-isomer]	(1aR,7bS)-5-({1-[(2R)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

[0535]

The compound of Example 7 is a single diastereomer, which is one of the two types of different diastereomers 7A and 7B shown in the following table. The other isomer can also be synthesized in the same manner as Reference Example 1, Reference Example (S)-6, and Example 7 by using the compound of Reference Example 1-6-1 instead of the compound of Reference Example 1-6-2 in Reference Example 1-7.

[Chemical Formula 714]

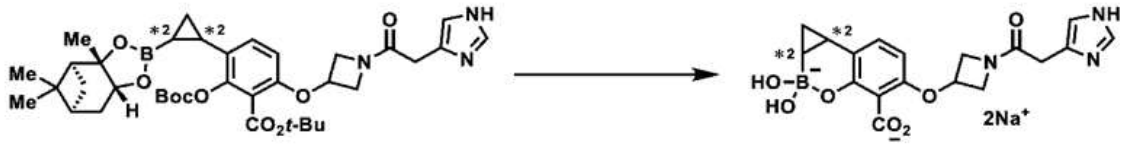
Serial number	Chemical structure of diastereomer [abbreviation based on configuration]	Chemical name
7A		(1aS,7bR)-5-({1-[(2S)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

	[(1aS,7bR,2S)-isomer]	
7B	 [(1aR,7bS,2S)-isomer]	(1aR,7bS)-5-({1-[(2S)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

[0536]

Example 8: 5,5-dihydroxy-9-{1-[(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid disodium salt

[Chemical Formula 715]



Reference Example 7 Example 8

The compound of Reference Example 7 (110 mg, 0.159 mmol) was dissolved in a 1 mol/L hydrochloric acid/acetic acid solution (1.59 mL) while cooling with ice, and phenylboronic acid (58 mg, 0.477 mmol) was added. After stirring for 2 hours at room temperature, reaction mixture was concentrated. The resulting residue was washed with acetonitrile and then dissolved in water (2 mL). An aqueous 2 mol/L sodium hydroxide solution (0.318 mL) was added while cooling with ice. The reaction mixture was purified by reversed phase column chromatography (Column: YMC-Actus Triart C18, solution A: water, solution B: acetonitrile) and lyophilized to obtain the title compound (46 mg).

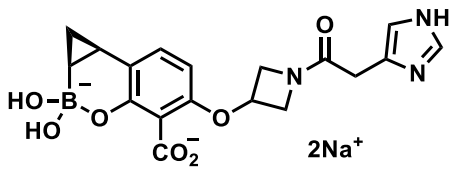
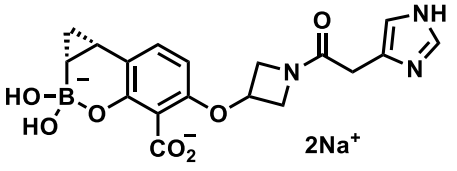
[0537]

^{1}H-NMR (D_2O) δ: 7.73 (1H, s), 7.05 (1H, d, J = 8.6 Hz), 6.11 (1H, d, J = 8.6 Hz), 5.04-4.94 (1H, m), 4.63-4.59 (1H, m), 4.43-4.38 (1H, m), 4.33-4.28 (1H, m), 4.10-4.05 (1H, m), 3.36 (2H, s), 1.84-1.78 (1H, m), 0.84-0.79 (1H, m), 0.31-0.21 (2H, m)

[0538]

The compound of Example 8 is a single diastereomer, which is one of the two types of different diastereomers 8A and 8B shown in the following table. The other isomer can also be synthesized in the same manner as Reference Example 7 and Example 8 by using the compound of Reference Example 1-6-1 instead of the compound of Reference Example 1-6-2 in Reference Example 7.

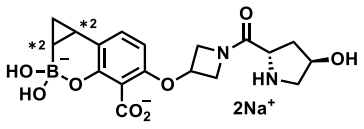
[Chemical Formula 716]

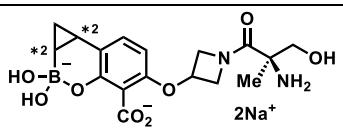
Serial number	Chemical structure of diastereomer [abbreviation based on configuration]	Chemical name
8A	 [(2R,4S)-isomer]	(2R,4S)-5,5-dihydroxy-9-{1-[(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid disodium salt
8B	 [(2S,4R)-isomer]	(2S,4R)-5,5-dihydroxy-9-{1-[(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid disodium salt

[0539]

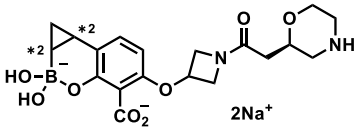
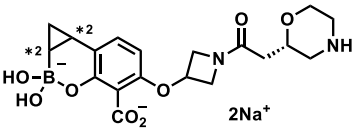
The compounds of Reference Example 10 to 13 were used as a raw material, and a reaction, post-processing, and purification were performed in accordance with the same method as the method described in Example 8 to obtain the following Example compounds 9 to 12.

[Table 8-1]

Example	Raw material	Structural formula	NMR and/or LCMS
9	Reference Example 10		^{1}H-NMR (D2O) δ: 7.73 (1H, brs), 7.05 (1H, d, J = 8.0 Hz), 6.12 (1H, d, J = 8.0 Hz), 5.09-5.00 (1H, m), 4.69--4.61 (1H, m), 4.47-4.29 (2H, m), 4.12-4.07 (1H, m), 3.36-3.29 (1H, m), 3.17-3.09 (1H, m), 2.34-2.26 (1H, m), 2.09-2.02 (1H, m), 1.91-1.79 (1H, m), 0.85-0.80 (1H, m), 0.31-0.20 (2H, m)

10	Reference Example 11		LCMS: $[M+H]^+$/RT=377.17/0.305min[B] ^{1}H-NMR (D2O) δ: 6.81 (1H, d, J = 8.5 Hz), 5.87 (1 H, d, J = 8.5 Hz), 4.79-4.74 (1H, m), 4.67-4.61 (1H, m), 4.33-4.28 (1H, m), 4.20-4.14 (1H, m), 3.88-3. 82 (1H, m), 3.57 (1H, dd, J = 11.6, 7.3 Hz), 3.30 (1 H, dd, J = 11.9, 3.4 Hz), 1.57 (1H, td, J = 8.2, 3.9 H z), 1.09 (3H, s), 0.60-0.55 (1H, m), 0.07--0.04 (2H, m).

[Table 8-2]

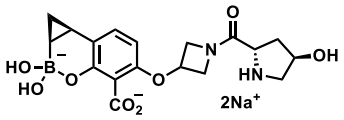
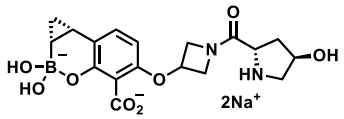
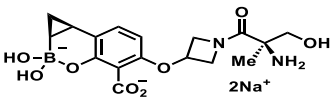
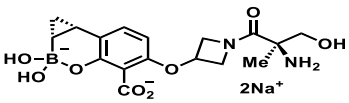
11	Reference Example 12		LCMS: $[M+H]^+$/RT=403.21/0.338min[B] ^{1}H-NMR (D_2O) δ: 6.81 (1H, d, J = 8.5 Hz), 5.88 (0. 5H, d, J = 8.5 Hz), 5.88 (0.5H, d, J = 8.5 Hz), 4.80-4.73 (1H, m), 4.40-4.34 (1H, m), 4.17-4.11 (1H, m), 4.09-4.04 (1H, m), 3.84-3.72 (3H, m), 3.54-3.4 7 (1H, m), 2.93-2.88 (1H, m), 2.86-2.81 (1H, m), 2. 73 (1H, t, J = 12.2 Hz), 2.55 (1H, t, J = 11.9 Hz), 2.2 7-2.12 (2H, m), 1.60-1.54 (1H, m), 0.60-0.55 (1H, m), 0.07--0.05 (2H, m). (rotamer)
12	Reference Example 13		^{1}H-NMR (D_2O) δ: 6.82-6.80 (1H, m), 5.86 (1H, d, J=15.5), 4.81-4.72 (1H, m), 4.42-4.34 (1H, m), 4.19-4.01 (2H, m), 3.86-3.77 (1H, m), 3.73-3.60 (2H, m), 3.47-3.35 (1H, m), 2.76-2.67 (1H, m), 2.66-2.50 (2H, m), 2.41-2.31 (1H, m), 2.24-2.06 (2H, m), 1.61-1.53 (1H, m), 0.62-0.54 (1H, m), 0.08--0.05 (2H, m)

[0540]

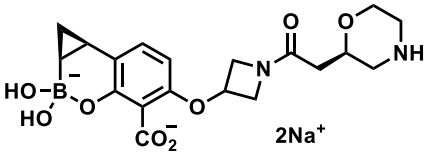
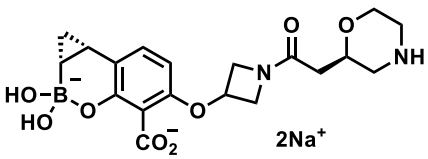
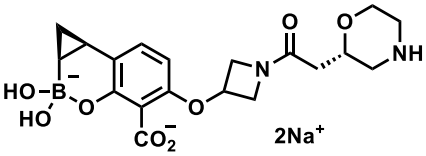
The compounds of Examples 9 to 12 are single diastereomers, which are one of the two types of different diastereomers shown in the following table. The other isomer can also be synthesized in the same manner as the corresponding Reference Example and Example by using the compound of Reference Example 1-6-1 instead of the compound of Reference Example 1-6-2 in Reference Examples 10 to 13.

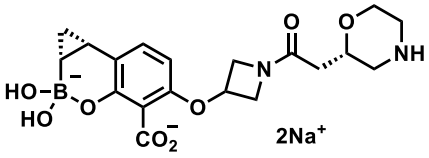
[Chemical Formula 717-1]

Example	Serial number	Chemical structure of diastereomer [abbreviation based on configuration]	Chemical name

9	9A	 [(2R,4S)-isomer]	(2R,4S)-5,5-dihydroxy-9-{1-[(4R)-4-hydroxy-L-prolyl]azetidin-3-yl}oxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid disodium salt
	9B	 [(2S,4R)-isomer]	(2S,4R)-5,5-dihydroxy-9-{1-[(4R)-4-hydroxy-L-prolyl]azetidin-3-yl}oxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid disodium salt
10	10A	 [(2R,4S)-isomer]	(2R,4S)-5,5-dihydroxy-9-[1-(2-methyl-D-seryl)azetidin-3-yl]oxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid disodium salt
	10B	 [(2S,4R)-isomer]	(2S,4R)-5,5-dihydroxy-9-[1-(2-methyl-D-seryl)azetidin-3-yl]oxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid disodium salt

[Chemical Formula 717-2]

11	11A	 [(2R,4S,2R)-isomer]	(2R,4S)-5,5-dihydroxy-9-(1-{[(2R)-morpholin-2-yl]acetyl}azetidin-3-yl)oxy-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid disodium salt
	11B	 [(2S,4R,2R)-isomer]	(2S,4R)-5,5-dihydroxy-9-(1-{[(2R)-morpholin-2-yl]acetyl}azetidin-3-yl)oxy-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid disodium salt
12	12A	 [(2R,4S,2S)-isomer]	(2R,4S)-5,5-dihydroxy-9-(1-{[(2S)-morpholin-2-yl]acetyl}azetidin-3-yl)oxy-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid disodium salt

	12B	 [(2S,4R,2S)-isomer]	(2S,4R)-5,5-dihydroxy-9-(1-{[(2S)-morpholin-2-yl]acetyl}azetidin-3-yl)oxy-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid disodium salt

[0541]

Example 13: 2-hydroxy-5-[(1-D-serylazetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

[Chemical Formula 718]



Reference Example 8 Example 13

Phenylboronic acid (16.8 mg, 0.138 mmol), hexane (2 mL), and 4 mol/L hydrochloric acid/cyclopentyl methyl ether solution (1.09 mL) were added to an acetonitrile solution (1 mL) of the compound of Reference Example 8 (112 mg, 0.145 mmol), and the reaction mixture was stirred for 3.5 hours at room temperature. After leaving the reaction mixture standing, the supernatant (top layer) from the reaction mixture separated into two layers was removed, and the remaining bottom layer was washed with hexane (the washing step removes the supernatant after leaving the reaction mixture standing). The bottom layer was concentrated, and the resulting residual was purified by reversed phase column chromatography (Column: YMC-Actus Triart C18, solution A: water, solution B: acetonitrile) and lyophilized. Acetonitrile (1 mL) was added to the resulting residue. A solid was filtered out and dried under reduced pressure to obtain the title compound (7.0 mg) as a white solid.

[0542]

LCMS: $[M+H]^+$/Rt = 363.2/0.75 min^G

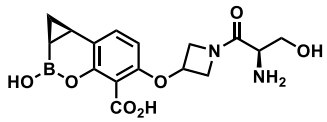
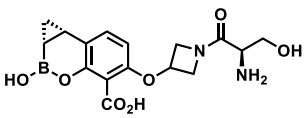
^{1}H-NMR (270 MHz, D2O) δ: 7.00 (1H, d, J = 8.1 Hz), 6.07 (1H, d, J = 8.1 Hz), 5.00-4.59 (2H, m), 4.42-4.28 (2H, m), 4.06-4.00 (1H, m),

3.68-3.56 (3H, m), 1.80-1.70 (1H, m), 0.80-0.73 (1H, m), 0.21-0.16 (2H, m).

[0543]

The compound of Example 13 is a single diastereomer, which is one of the two types of different diastereomers 13A and 13B shown in the following table. The other isomer can also be synthesized in the same manner as Reference Example 8 and Example 13 by using the compound of Reference Example 1-6-2 instead of the compound of Reference Example 1-6-1 in Reference Example 8.

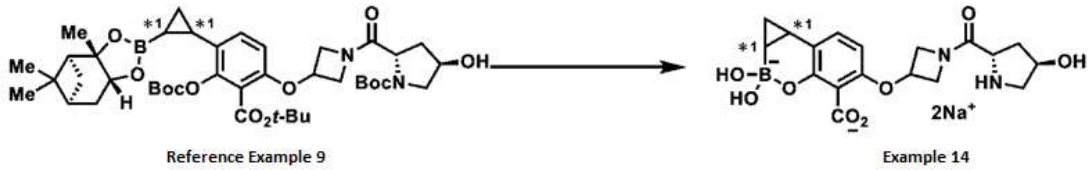
[Chemical Formula 719]

Serial number	Chemical structure of diastereomer [abbreviation based on configuration]	Chemical name
13A	 [(1aS,7bR)-isomer]	(1aS,7bR)-2-hydroxy-5-[(1-D-serylazetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid
13B	 [(1aR,7bS)-isomer]	(1aR,7bS)-2-hydroxy-5-[(1-D-serylazetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

[0544]

Example 14: 5,5-dihydroxy-9-{1-[(4R)-4-hydroxy-L-prolyl]azetidin-3-yl}oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid disodium salt

[Chemical Formula 720]



Reference Example 9 Example 14

Phenylboronic acid (6.5 mg, 0.054 mmol) and a 4 mol/L hydrochloric acid/cyclopentyl methyl ether solution (0.424 mL) were added to an acetic acid solution (0.56 mL) of the compound of Reference Example 8 (45 mg, 0.056 mmol), and the reaction mixture

was stirred for 2 hours at room temperature. After leaving the reaction mixture standing, the supernatant (top layer) from the reaction mixture separated into two layers was removed, and the remaining bottom layer was washed with hexane (the washing step removes the supernatant after leaving the reaction mixture standing). The bottom layer was concentrated. The resulting residue was washed with acetonitrile, and an aqueous 2 mol/L sodium hydroxide solution (0.1 mL) was added while cooling with ice. The reaction mixture was purified by reversed phase column chromatography (Column: YMC-Actus Triart C18, solution A: water, solution B: acetonitrile) and lyophilized to obtain the title compound (8.2 mg).

[0545]

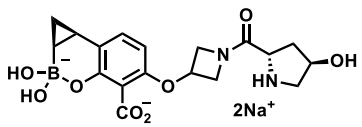
LCMS: $[M+H]^+$/Rt = 389.4/0.88 min[G]

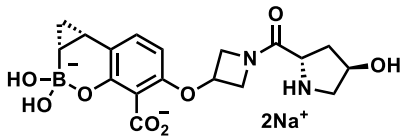
^{1}H-NMR (270 MHz, D2O) δ: 7.02 (1H, d, J = 8.1 Hz), 6.10-6.06 (1H, m), 5.08-4.96 (1H, m), 4.65-4.55 (2H, m), 4.44-4.02 (4H, m), 3.31-3.22 (1H, m), 3.08-2.99 (1H, m), 2.27-2.17 (1H, m), 2.04-1.93 (1H, m), 1.82-1.75 (1H, m), 0.82 (1H, t. J = 8.1 Hz), 0.28-0.15 (2H, m).

[0546]

The compound of Example 14 is a single diastereomer, which is one of the two types of different diastereomers 14A and 14B shown in the following table. The other isomer can also be synthesized in the same manner as Reference Example 9 and Example 14 by using the compound of Reference Example 1-6-2 instead of the compound of Reference Example 1-6-1 in Reference Example 9.

[Chemical Formula 721]

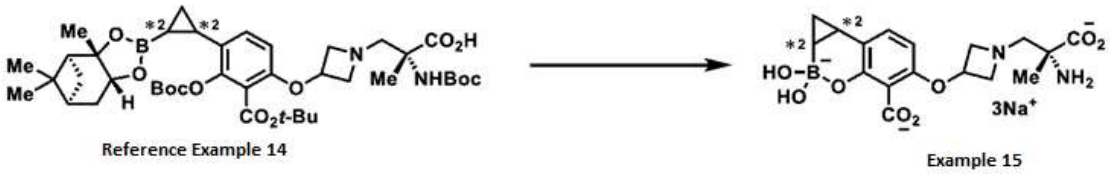
Serial number	Chemical structure of diastereomer [abbreviation based on configuration]	Chemical name
14A	 [(2R,4S)-isomer]	(2R,4S)-5,5-dihydroxy-9-{1-[(4R)-4-hydroxy-L-prolyl]azetidin-3-yl}oxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid disodium salt

14B	 [(2S,4R)-isomer]	(2S,4R)-5,5-dihydroxy-9-{1-[(4R)-4-hydroxy-L-prolyl]azetidin-3-yl}oxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid disodium salt

[0547]

Example 15: 9-[1-[propyl (2R)-2-amino-2-carboxylate]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid trisodium salt

[Chemical Formula 722]



The compound of Reference Example 14 (108.8 mg, 0.139 mmol) was dissolved in 1 mol/L hydrochloric acid/acetic acid solution (2 mL), and phenylboronic acid (51 mg, 0.416 mmol) and water (0.2 mL) were added. The reaction mixture was stirred for 4 hours at room temperature. Cyclopentyl methyl ether was added to the reaction mixture. After leaving the reaction mixture standing, the supernatant (top layer) from the reaction mixture separated into two layers was removed, and the remaining bottom layer was washed with cyclopentyl methyl ether (the washing step removes the supernatant after leaving the reaction mixture standing). The bottom layer was concentrated. The resulting residue was washed with acetonitrile, and an aqueous 4 mol/L sodium hydroxide solution (0.174 mL) was added while cooling with ice. The reaction mixture was purified by reversed phase column chromatography (Column: YMC-Actus Triart C18, solution A: water, solution B: acetonitrile) and lyophilized to obtain the title compound (18.9 mg).

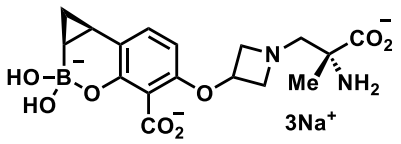
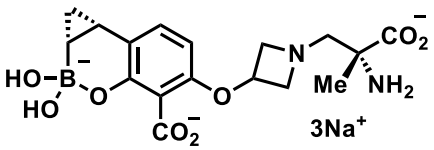
[0548]

^{1}H-NMR (D_2O) δ: 6.85 (1H, d, J = 8.5 Hz), 5.94 (1H, d, J = 8.5 Hz), 4.61-4.58 (1H, m), 3.70-3.66 (2H, m), 3.30-3.24 (2H, m), 2.93 (1H, d, J = 13.4 Hz), 2.69 (1H, d, J = 13.4 Hz), 1.65-1.60 (1H, m), 1.22 (3H, s), 0.66-0.61 (1H, m), 0.13-0.02 (2H, m).

[0549]

The compound of Example 15 is a single diastereomer, which is one of the two types of different diastereomers 15A and 15B shown in the following table. The other isomer can also be synthesized in the same manner as Reference Example 14 and Example 15 by using the compound of Reference Example 1-6-1 instead of the compound of Reference Example 1-6-2 in Reference Example 14.

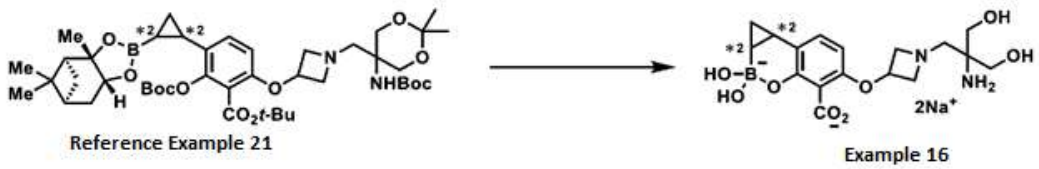
[Chemical Formula 723]

Serial number	Chemical structure of diastereomer [abbreviation based on configuration]	Chemical name
15A	 [(2R,4S)-isomer]	(2R,4S)-9-[1-[propyl (2R)-2-amino-2-carboxylate]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid trisodium salt
15B	 [(2S,4R)-isomer]	(2S,4R)-9-[1-[propyl (2R)-2-amino-2-carboxylate]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid trisodium salt

[0550]

Example 16: 9-{1-[2-amino-3-hydroxy-2-(hydroxymethyl)propyl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid disodium salt

[Chemical Formula 724]



Reference Example 21

Example 16

The compound of Reference Example 21 (81.4 mg, 0.098 mmol) was used as a raw material, and a reaction, post-processing, and purification were performed in accordance with the same method as the method described in Example 15 to obtain the title compound (21.8 mg).

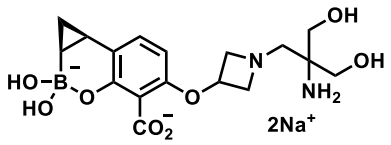
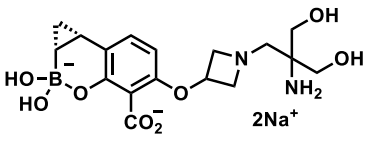
[0551]

^{1}H-NMR (D_2O) δ: 6.86 (1H, d, J = 7.9 Hz), 5.95 (1H, d, J = 7.9 Hz), 4.67-4.63 (1H, m), 3.74 (2H, brs), 3.61-3.21 (8H, m), 1.65-1.61 (1H, m), 0.65-0.63 (1H, m), 0.32-0.00 (2H, m).

[0552]

The compound of Example 16 is a single diastereomer, which is one of the two types of different diastereomers 16A and 16B shown in the following table. The other isomer can also be synthesized in the same manner as Reference Example 21 and Example 16 by using the compound of Reference Example 1-6-1 instead of the compound of Reference Example 1-6-2 in Reference Example 21.

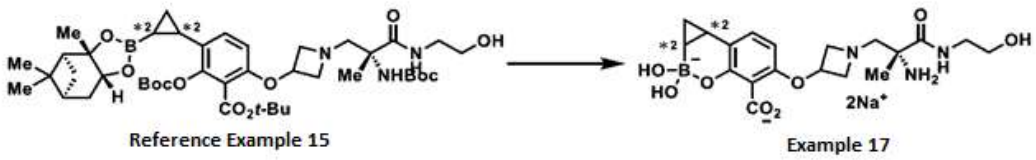
[Chemical Formula 725]

Serial number	Chemical structure of diastereomer [abbreviation based on configuration]	Chemical name
16A	 [(2R,4S)-isomer]	(2R,4S)-9-{1-[2-amino-3-hydroxy-2-(hydroxymethyl)propyl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid disodium salt
16B	 [(2S,4R)-isomer]	(2S,4R)-9-{1-[2-amino-3-hydroxy-2-(hydroxymethyl)propyl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid disodium salt

[0553]

Example 17: 9-(1-{(2R)-2-amino-3-[(2-hydroxyethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid disodium salt

[Chemical Formula 726]



Reference Example 15 Example 17

The compound of Reference Example 15 (37.6 mg, 0.045 mmol) was dissolved in a 1 mol/L hydrochloric acid/acetic acid solution (0.454 mL), and phenylboronic acid (5.7 mg, 0.047 mmol) and water (0.02 mL) were added. The reaction mixture was stirred for 1.5 hours at room temperature. The reaction mixture was concentrated. The resulting residue was washed with cyclopentyl methyl ether, and then an aqueous 2 mol/L sodium hydroxide solution (0.091 mL) was added while cooling with ice. The reaction mixture was purified by reversed phase column chromatography (Column: YMC-Actus Triart C18, solution A: water, solution B: acetonitrile) and lyophilized to obtain the title compound (6.4 mg).

[0554]

LCMS: $[M+H]^+$/RT = 420.20/0.425 min[A]

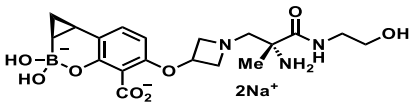
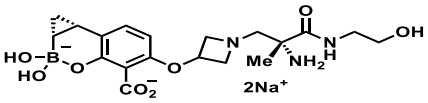
[0555]

^{1}H-NMR (D_2O) δ: 6.86 (1H, d, J = 7.9 Hz), 5.94 (1H, d, J = 7.9 Hz), 4.60-4.54 (1H, m), 3.64-3.58 (2H, m), 3.53 (2H, t, J = 5.5 Hz), 3.23-3.15 (4H, m), 2.83 (1H, d, J = 12.9 Hz), 2.55 (1H, d, J = 12.9 Hz), 1.63 (1H, td, J = 8.2, 3.7 Hz), 1.09 (3H, s), 0.67-0.62 (1H, m), 0.14-0.03 (2H, m).

[0556]

The compound of Example 17 is a single diastereomer, which is one of the two types of different diastereomers 17A and 17B shown in the following table. The other isomer can also be synthesized in the same manner as Reference Examples 14 and 15 and Example 17 by using the compound of Reference Example 1-6-1 instead of the compound of Reference Example 1-6-2 in Reference Example 14.

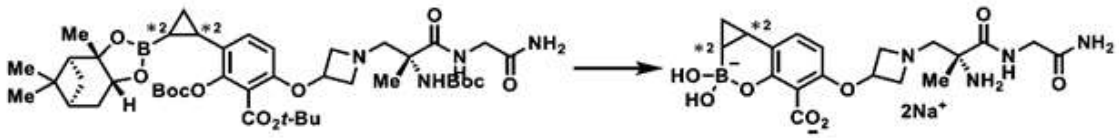
[Chemical Formula 727]

Serial number	Chemical structure of diastereomer [abbreviation based on configuration]	Chemical name
17A	 [(2R,4S,2R)-isomer]	(2R,4S)-9-(1-{(2R)-2-amino-3-[(2-hydroxyethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid disodium salt
17B	 [(2S,4R,2R)-isomer]	(2S,4R)-9-(1-{(2R)-2-amino-3-[(2-hydroxyethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid disodium salt

[0557]

Example 18: 9-(1-{(2R)-2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid disodium salt

[Chemical Formula 728]



Reference Example 16 Example 18

Water (0.678 mL), trifluoroacetic acid (6.8 mL, 89 mmol), and triethylsilane (0.341 mL, 2.13 mmol) were added to a mixture of the compound of Reference Example 16 (299.1 mg, 0.356 mmol) and phenylboronic acid (130 mg, 1.067 mmol) while cooling with ice, and the reaction mixture was stirred for 2 hours at room temperature. Cyclopentyl methyl ether and water were added to the reaction mixture while cooling with ice. After leaving the reaction mixture, the supernatant (top layer) from the reaction mixture separated into two layers was removed, and the remaining bottom layer was washed with cyclopentyl methyl ether (the washing step removes the supernatant after leaving the reaction mixture standing). The bottom layer was concentrated, and the resulting

residual was washed with acetonitrile, and then an aqueous 2 mol/L sodium hydroxide solution (0.89 mL) was added while cooling with ice. The reaction mixture was purified by reversed phase column chromatography (Column: YMC-Actus Triart C18, solution A: water, solution B: acetonitrile) and lyophilized to obtain the title compound (6.4 mg).

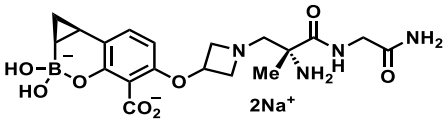
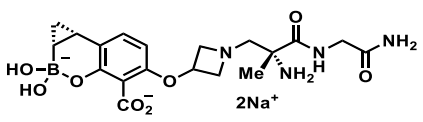
[0558]

^{1}H-NMR (D_2O) δ: 6.87 (1H, d, J = 8.5 Hz), 5.94 (1H, d, J = 8.5 Hz), 4.61-4.57 (1H, m), 3.79 (2H, s), 3.67-3.59 (2H, m), 3.26-3.22 (2H, m), 2.84 (1H, d, J = 12.8 Hz), 2.60 (1H, d, J = 12.8 Hz), 1.67-1.62 (1H, m), 1.13 (3H, s), 0.69-0.63 (1H, m), 0.15-0.02 (2H, m).

[0559]

The compound of Example 18 is a single diastereomer, which is one of the two types of different diastereomers 18A and 18B shown in the following table. The other isomer can also be synthesized in the same manner as Reference Examples 14 and 16 and Example 18 by using the compound of Reference Example 1-6-1 instead of the compound of Reference Example 1-6-2 in Reference Example 14.

[Chemical Formula 729]

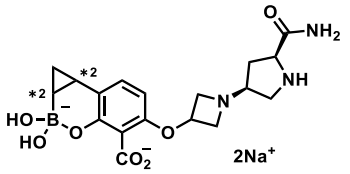
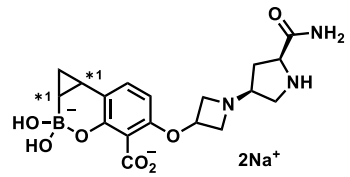
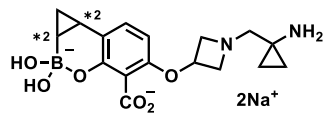
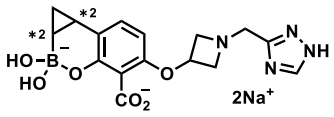
Serial number	Chemical structure of diastereomer [abbreviation based on configuration]	Chemical name
18A	 [(2R,4S,2R)-isomer]	(2R,4S)-9-(1-{(2R)-2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid disodium salt
18B	 [(2S,4R,2R)-isomer]	(2S,4R)-9-(1-{(2R)-2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid disodium salt

[0560]

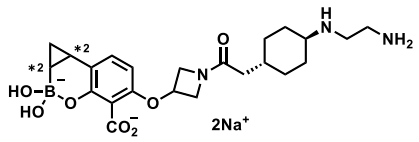
The compounds of Reference Examples 17, 18, and 22 to 25 were used as a raw material, and a reaction, post-processing, and purification were performed in accordance with the same method as

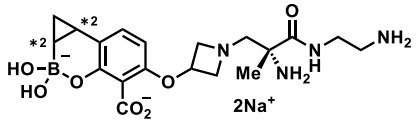
the method described in Example 18 to obtain the following Example compounds 19 to 24.

[Table 9-1]

Example	Raw Material	Structural formula	NMR and/or LCMS
19	Reference Example 17		^{1}H-NMR (D2O) δ: 7.01 (1H, d, J = 8.5 Hz), 6.12 (1H, d, J = 8.5 Hz), 4.83-4.73 (1H, m), 3.82-3.70 (3H, m), 3.37-3.24 (3H, m), 3.08-3.02 (1H, m), 2.76-2.72 (1H, m), 2.53-2.39 (1H, m), 1.81-1.75 (1H, m), 1.71-1.50 (1H, m), 0.82-0.77 (1H, m), 0.29-0.17 (2H, m).
20	Reference Example 18		LCMS: $[M+H]^+$/Rt=388.3/0.38min^G ^{1}H-NMR (270 MHz, D2O) δ: 6.99 (1H, d, J = 8.1 Hz), 6.00 (1H, d, J = 8.1 Hz), 4.89-4.71 (1H, m), 3.82-3.76 (3H, m), 3.39-3.25 (3H, m), 3.06-3.00 (1H, m), 2.76-2.70 (1H, m), 2.46-2.35 (1H, m), 1.80-1.72 (1H, m), 1.58-1.47 (1H, m), 0.76 (1H, t. J = 8.1 Hz), 0.27-0.14 (2H, m).
21	Reference Example 22		^{1}H-NMR (D2O) δ: 7.05 (1H, d, J = 7.9 Hz), 6.13 (1H, d, J = 7.9 Hz), 4.95-4.88 (1H, m), 4.10-4.06 (2H, m), 3.69-3.64 (2H, m), 2.87 (2H, s), 1.83-1.78 (1H, m), 0.84-0.79 (1H, m), 0.69-0.62 (4H, m), 0.32-0.18 (2H, m).
22	Reference Example 23		^{1}H-NMR (D2O) δ: 8.36 (1H, s), 7.04 (1H, d, J = 8.5 Hz), 6.13 (1H, d, J = 8.5 Hz), 4.88-4.83 (2H, m), 4.06 (2H, s), 4.02-3.98 (2H, m), 3.63-3.62 (2H, m), 1.86-1.81 (1H, m), 0.86-0.83 (1H, m), 0.30-0.26 (2H, m).

[Table 9-2]

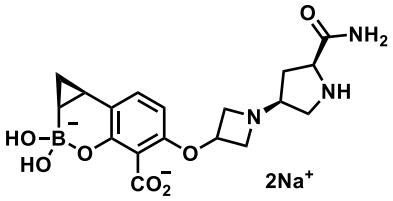
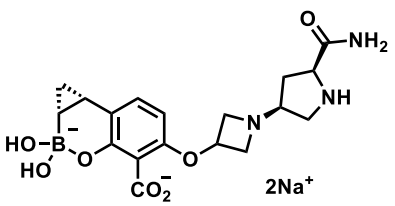
23	Reference Example 24		^{1}H-NMR (D2O) δ: 7.04 (1H, d, J = 8.5 Hz), 6.10 (1H, d, J = 8.5 Hz), 5.00-4.96 (1H, m), 4.61-4.57 (1H, m), 4.39-4.35 (1H, m), 4.27-4.25 (1H, m), 4.04-3.99 (1H, m), 3.33-2.87 (5H, m), 2.17-2.03 (4H, m), 1.87-1.78 (3H, m), 1.71-1.65 (1H, m), 1.42-1.24 (2H, m),

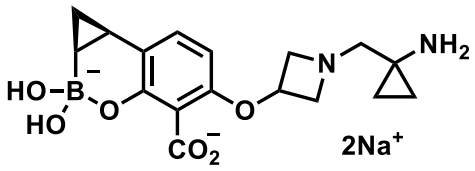
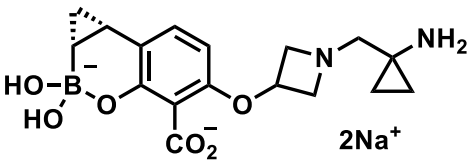
			1.17-1.04 (2H, m), 0.84-0.79 (1H, m), 0.29-0.19 (2H, m).
24	Reference Example 25		LCMS: $[M+H]^+$/RT=419.10/1.167min[F] ^{1}H-NMR (400 MHz, D2O) δ: 7.06 (1H, d, J = 8.5 Hz), 6.12 (1H, d, J = 8.5 Hz), 3.79 (2H, m), 3.65 (1H, m), 3.55 (3H, m), 3.21 (2H, m), 3.04 (1H, d, J = 12.8 Hz), 2.75 (1H, d, J = 12.8 Hz), 1.84 (1H, td, J = 8.0, 4.4 Hz), 1.35 (3H, s), 0.86 (1H, td, J = 8.0, 2.4 Hz). 0.34 (3H, m)

[0561]

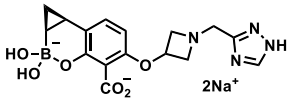
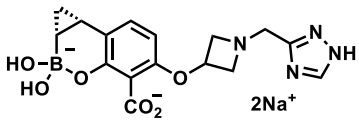
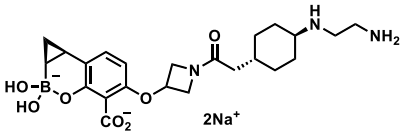
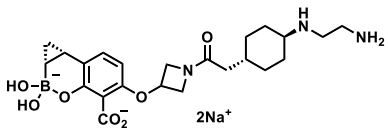
The compounds of Examples 19 to 24 are single diastereomers, which are one of the two types of different diastereomers shown in the following table. The other isomer can also be synthesized in the same manner as a corresponding Reference Example and an Example by using the compound of Reference Example 1-6-1 instead of the compound of Reference Example 1-6-2 in Reference Examples 17 and 22 to 25, or by using the compound of Reference Example 1-6-2 instead of the compound of Reference Example 1-6-1 in Reference Example 18.

[Chemical Formula 730-1]

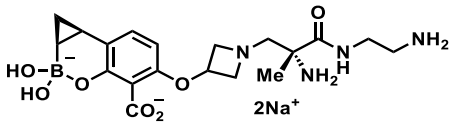
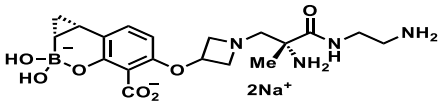
Example	Serial number	Chemical structure of diastereomer [abbreviation based on configuration]	Chemical name
19 and 20	D1	 [(2R,4S,3S,5S)-isomer]	(2R,4S)-9-{1-[(3S,5S)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid disodium salt
	D2	 [(2S,4R,3S,5S)-isomer]	(2S,4R)-9-{1-[(3S,5S)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid disodium salt

21	21A	 [(2R,4S)-isomer]	(2R,4S)-9-{1-[(1-aminocyclopropyl)methyl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid disodium salt
	21B	 [(2S,4R)-isomer]	(2S,4R)-9-{1-[(1-aminocyclopropyl)methyl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid disodium salt

[Chemical Formula 730-2]

22	22A	 [(2R,4S)-isomer]	(2R,4S)-5,5-dihydroxy-9-{1-[(1H-1,2,4-triazol-3-yl)methyl]azetidin-3-yl}oxy-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid disodium salt
	22B	 [(2S,4R)-isomer]	(2S,4R)-5,5-dihydroxy-9-{1-[(1H-1,2,4-triazol-3-yl)methyl]azetidin-3-yl}oxy-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid disodium salt
23	23A	 [(2R,4S)-isomer]	(2R,4S)-9-[1-({(1r,4r)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid disodium salt
	23B	 [(2S,4R)-isomer]	(2S,4R)-9-[1-({(1r,4r)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid disodium salt

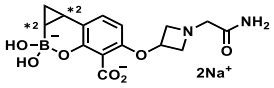
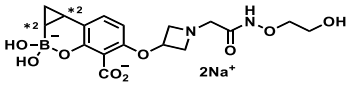
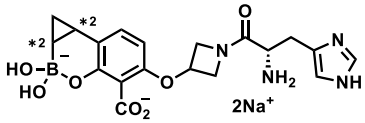
[Chemical Formula 730-3]

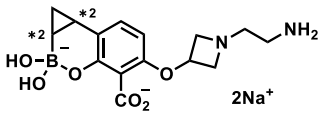
24	24A	 [(2R,4S,2R)-isomer]	(2R,4S)-9-(1-{(2R)-2-amino-3-[(2-aminoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid disodium salt
	24B	 [(2S,4R,2R)-isomer]	(2S,4R)-9-(1-{(2R)-2-amino-3-[(2-aminoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid disodium salt

[0562]

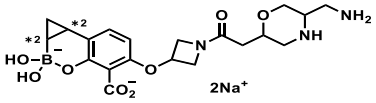
The compounds of Reference Examples 19, 20, and 26 to 28 were used as a raw material, and a reaction, post-processing, and purification were performed in accordance with the same method as the method described in Example 13 to obtain the following Example compounds 25 to 29.

[Table 10-1]

Example	Raw Material	Structural formula	NMR and/or LCMS
25	Reference Example 19		LCMS: $[M+H]^+$/RT=333.22/0.356 min^H
26	Reference Example 20		^{1}H-NMR (D2O) δ: 6.95 (1H, d, J = 8.5 Hz), 6.04 (1H, d, J = 8.5 Hz), 4.77 (1H, t, J = 5.5 Hz), 3.94-3.90 (2H, m), 3.87 (2H, t, J = 4.6 Hz), 3.70-3.68 (2H, m), 3.52-3.46 (2H, m), 3.22 (2H, s), 1.74-1.69 (1H, m), 0.75-0.70 (1H, m), 0.22-0.19 (1H, m), 0.17-0.09 (1H, m).
27	Reference Example 26		LCMS: $[M+H]^+$/Rt=413.6/0.31min^G ^{1}H-NMR (270 MHz, D2O) δ: 7.71-7.45 (1H, m), 7.03-6.99 (1H, m), 6.95-6.91 (1H, m), 6.03-5.88 (1H, m), 4.89-4.70 (1H, m), 4.43-4.14 (2H, m), 4.04-2.99 (3H, m), 2.91-2.72 (2H, m), 1.83-1.76 (1H, m), 0.84-0.78 (1H, m), 0.31-0.17 (2H, m).

28	Reference Example 27		LCMS: [M+H]+/Rt = 319.4/0.30min[G] 1H-NMR (270 MHz, D2O) δ: 7.02 (1H, d, J = 8.1 Hz), 6.14 (1H, d, J = 8.1 Hz), 4.90-4.70 (1H, m), 3.76-3.71 (2H, m), 3.29-3.23 (2H, m), 2.69-2.58 (4H, m), 1.83-1.75 (1H, m), 0.80 (1H, t, J = 8.1 Hz), 0.30-0.17 (2H, m).

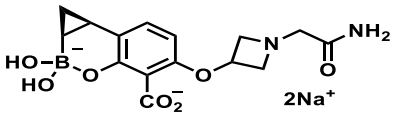
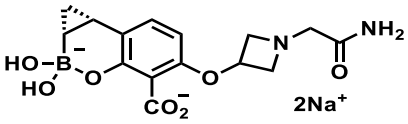
[Table 10-2]

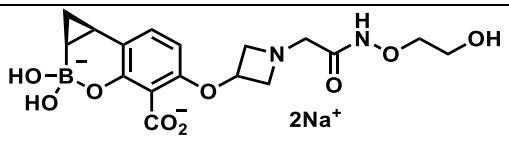
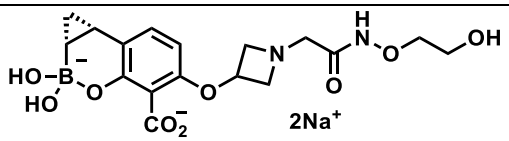
29	Reference Example 28		LCMS: [M+H]+/Rt = 432.5/0.43min[G] 1H-NMR (270 MHz, D2O) δ: 7.05 (1H, d, J = 8.1 Hz), 6.11 (1H, d, J = 8.1 Hz), 5.04-4.96 (1H, m), 4.65-4.58 (1H, m), 4.41-4.27 (2H, m), 4.06-3.24 (4H, m), 2.98-2.30 (7H, m), 1.84-1.76 (1H, m), 0.81 (1H, t, J = 8.1 Hz), 0.31-0.13 (2H, m).

[0563]

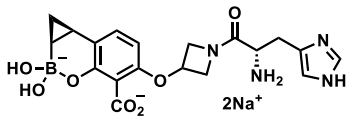
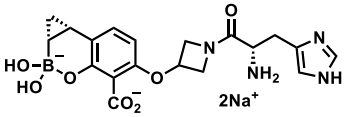
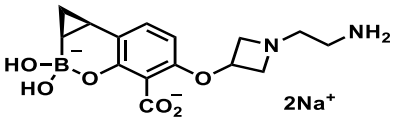
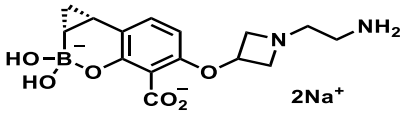
The compounds of Examples 25 to 29 are single diastereomers, which are one of the two types of different diastereomers shown in the following table. The other isomer can also be synthesized in the same manner as a corresponding Reference Example and an Example by using the compound of Reference Example 1-6-1 instead of the compound of Reference Example 1-6-2 in Reference Examples 19, 20, and 26 to 28.

[Chemical Formula 731-1]

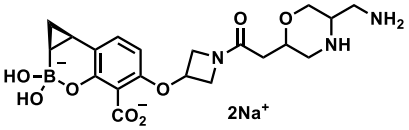
Example	Serial number	Chemical structure of diastereomer [abbreviation based on configuration]	Chemical name
25	25A	 [(2R,4S)-isomer]	(2R,4S)-9-[1-(2-amino-2-oxoethyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid disodium salt
	25B	 [(2S,4R)-isomer]	(2S,4R)-9-[1-(2-amino-2-oxoethyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid disodium salt

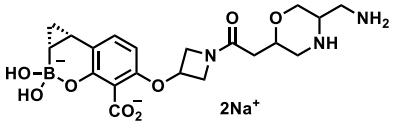
26	26A	 [(2R,4S)-isomer]	(2R,4S)-5,5-dihydroxy-9-(1-{2-[(2-hydroxyethoxy)amino]-2-oxoethyl}azetidin-3-yl)oxy-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid disodium salt
	26B	 [(2S,4R)-isomer]	(2S,4R)-5,5-dihydroxy-9-(1-{2-[(2-hydroxyethoxy)amino]-2-oxoethyl}azetidin-3-yl)oxy-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid disodium salt

[Chemical Formula 731-2]

27	27A	 [(2R,4S)-isomer]	(2R,4S)-9-(1-L-histidylazetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid disodium salt
	27B	 [(2S,4R)-isomer]	(2S,4R)-9-(1-L-histidylazetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid disodium salt
28	28A	 [(2R,4S)-isomer]	(2R,4S)-9-[1-(2-aminoethyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid disodium salt
	28B	 [(2S,4R)-isomer]	(2S,4R)-9-[1-(2-aminoethyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid disodium salt

[Chemical Formula 731-3]

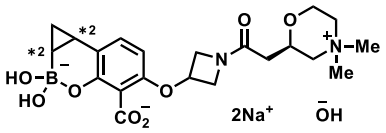
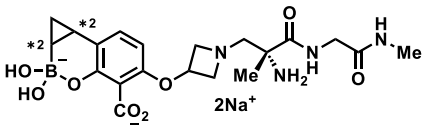
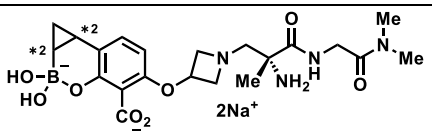
29	29A	 [(2R,4S)-isomer]	(2R,4S)-9-(1-{[5-(aminomethyl)morpholin-2-yl]acetyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid disodium salt

	29B	 [(2S,4R)-isomer]	(2S,4R)-9-(1-{[5-(aminomethyl)morpholin-2-yl]acetyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid disodium salt

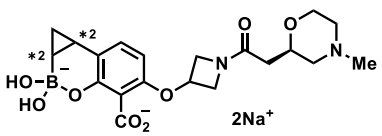
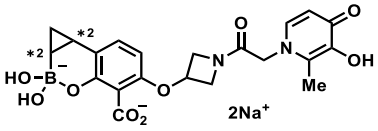
[0564]

The compounds of Reference Examples 31 to 34 were used as a raw material, and a reaction, post-processing, and purification were performed in accordance with the same method as the method described in Example 18 to obtain the following Example compounds 30 to 34.

[Table 11-1]

Example	Raw Material	Structural formula	NMR and/or LCMS
30	Reference Example 31		^{1}H-NMR (400 MHz, D_2O) δ: 6.89 (1H, d, *J* = 8.5 Hz), 5.97-5.94 (1H, m), 4.87-4.82 (1H, m), 4.47-4.42 (1H, m), 4.28-4.21 (2H, m), 4.17-4.11 (1H, m), 3.97-3.87 (3H, m), 3.41-3.33 (3H, m), 3.20-3.16 (1H, m), 3.13 (3H, s), 3.10 (3H, s), 2.41-2.24 (2H, m), 1.67-1.62 (1H, m), 0.68-0.63 (1H, m), 0.14-0.01 (2H, m).
31	Reference Example 32		^{1}H-NMR (400 MHz, D_2O) δ: 6.85 (1H, d, *J* = 8.5 Hz), 5.92 (1H, d, *J* = 8.5 Hz), 4.62-4.56 (1H, m), 3.73 (2H, s), 3.65-3.58 (2H, m), 3.21-3.17 (2H, m), 2.83 (1H, d, *J* = 13.4 Hz), 2.59-2.55 (4H, m), 1.65-1.60 (1H, m), 1.10 (3H, s), 0.66-0.61 (1H, m), 0.13-0.02 (2H, m).
32	Reference Example 33		^{1}H-NMR (400 MHz, D_2O) δ: 6.85 (1H, d, *J* = 8.5 Hz), 5.94 (1H, d, *J* = 8.5 Hz), 4.60-4.55 (1H, m), 4.00-3.90 (2H, m), 3.65-3.58 (2H, m), 3.18-3.15 (2H, m), 2.91 (3H, s), 2.83 (1H, d, *J* = 13.4 Hz), 2.80 (3H, s), 2.57 (1H, d, *J* = 13.4 Hz), 1.65-1.60 (1H, m), 1.11 (3H, s), 0.66-0.61 (1H, m), 0.13-0.00 (2H, m).

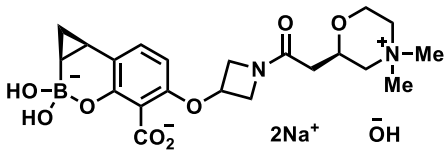
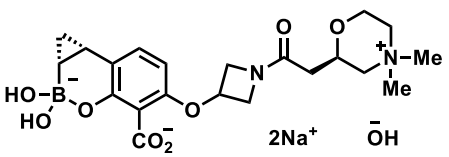
[Table 11-2]

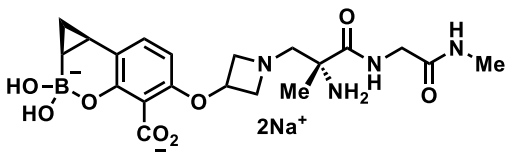
33	Reference Example 31-5		^{1}H-NMR (400 MHz, D_2O) δ: 6.82 (1H, d, *J* = 8.0 Hz), 5.88 (1H, d, *J* = 8.4 Hz), 4.78-4.71 (1H, m), 4.38 (1H, m), 4.14 (1H, m), 4.07 (1H, m), 3.81 (1H, m), 3.68 (2H, m), 3.40 (1H, m), 2.06 (1H, d, *J* = 13.6 Hz), 2.52 (1H,d, *J* = 11.2 Hz), 2.19 (1H, m), 2.03 (3H, s), 1.78(2H, m), 1.68 (1H, m), 0.57 (1H, m), 0.05-0.01 (2H, m).
34			LCMS: $[M+H]^+$/Rt=441.3/0.584min^H ^{1}H-NMR (400 MHz, D_2O) δ: 7.38-7.27 (1H, m), 6.87-6.78 (1H, m), 6.33-6.24 (1H, m), 5.93-5.84 (1H, m), 4.90-4.81 (1H, m), 4.74-4.66 (2H, s), 4.49-4.37 (1H, m), 4.29-4.21 (1H, m), 4.20-4.08 (1H, m), 3.97-3.86 (1H, m), 2.12-2.02 (3H, s), 1.62-1.51 (1H, m), 0.62-0.52 (1H, m), 0.09-0.04 (2H, m)

[0565]

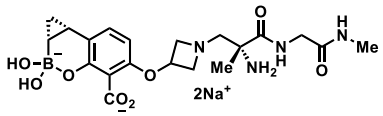
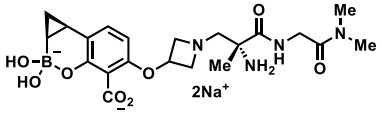
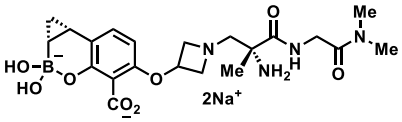
The compounds of Examples 30 to 34 are single diastereomers, which are one of the two types of different diastereomers shown in the following table. The other isomer can also be synthesized in the same manner as a corresponding Reference Example and an Example by using the compound of Reference Example 1-6-1 instead of the compound of Reference Example 1-6-2 in Reference Examples 31 to 34.

[Chemical Formula 732-1]

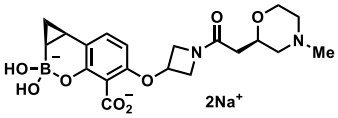
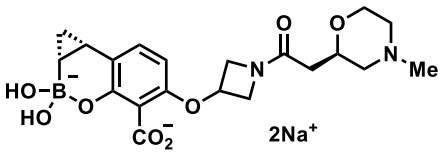
Example	Serial number	Chemical structure of diastereomer [abbreviation based on configuration]	Chemical name
30	30A	 [(2R,4S,2R)-isomer]	(2R,4S)-9-[1-[2-[(2R)-4,4-dimethylmorpholin-4-ium-2-yl]acetyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylate hydroxide disodium salt
	30B	 [(2S,4R,2R)-isomer]	(2S,4R)-9-[1-[2-[(2R)-4,4-dimethylmorpholin-4-ium-2-yl]acetyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylate hydroxide disodium salt

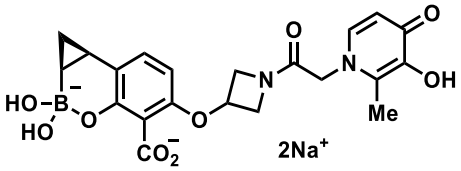
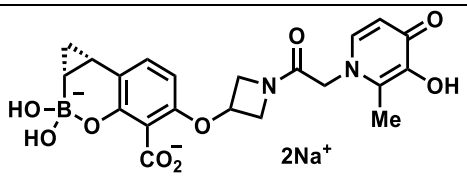
31	31A	 [(2R,4S,2R)-isomer]	(2R,4S)-9-[1-[(2R)-2-amino-2-methyl-3-[[2-(methylamino)-2-oxoethyl]amino]-3-oxopropyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylate disodium salt

[Chemical Formula 732-2]

	31B	 [(2S,4R,2R)-isomer]	(2S,4R)-9-[1-[(2R)-2-amino-2-methyl-3-[[2-(methylamino)-2-oxoethyl]amino]-3-oxopropyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylate disodium salt
32	32A	 [(2R,4S,2R)-isomer]	(2R,4S)-9-[1-[(2R)-2-amino-3-[[2-(dimethylamino)-2-oxoethyl]amino]-2-methyl-3-oxopropyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylate disodium salt
	32B	 [(2S,4R,2R)-isomer]	(2S,4R)-9-[1-[(2R)-2-amino-3-[[2-(dimethylamino)-2-oxoethyl]amino]-2-methyl-3-oxopropyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylate disodium salt

[Chemical Formula 732-3]

33	33A	 [(2R,4S,2R)-isomer]	(2R,4S)-5,5-dihydroxy-9-[(1-{[(2R)-4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid disodium salt
	33B	 [(2S,4R,2R)-isomer]	(2S,4R)-5,5-dihydroxy-9-[(1-{[(2R)-4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid disodium salt

34	34A	 [(2R,4S)-isomer]	(2R,4S)-5,5-dihydroxy-9-({1-[(3-hydroxy-2-methyl-4-oxopyridin-1(4H)-yl)acetyl]azetidin-3-yl}oxy)-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid disodium salt
	34B	 [(2S,4R)-isomer]	(2S,4R)-5,5-dihydroxy-9-({1-[(3-hydroxy-2-methyl-4-oxopyridin-1(4H)-yl)acetyl]azetidin-3-yl}oxy)-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid disodium salt

[0566]

Test Example 1: To evaluate the β-lactamase inhibitory activity of test compounds evaluated for the minimum inhibitory concentration (MIC) of MEPM against β-lactamase producing bacteria, the effect of concomitant use of the test compound and a β-lactam agent against β-lactamase producing bacteria was evaluated. Meropenem (MEPM) was used as a β-lactam antimicrobial agent. The minimum inhibitory concentration (MIC) of MEPM against β-lactamase producing bacteria when a test compound was added at a fixed concentration (4 μg/ mL) was measured by broth microdilution method (common ratio: 2).

The numerical values of (MIC of MEPM in combination with a test compound)/(MIC of MEPM alone) are shown below.

[0567]

Pharmacological testing methods and results thereof for representative compounds of the invention are shown hereinafter, but the present invention is not limited to the Test Examples.

[0568]

Test Example 1: Evaluation of minimum inhibitory concentration (MIC) of MEPM against β-lactamase producing bacteria

To evaluate the β-lactamase inhibitory activity of test compounds, the effect of combination of a test compound and a β-lactam agent against β-lactamase producing bacteria was evaluated. Meropenem (MEPM) was used as a β-lactam antimicrobial agent. The

minimum inhibitory concentration (MIC) of MEPM against β-lactamase producing bacteria when a test compound was added at a fixed concentration (4 μg/ mL) was measured by broth microdilution method (common ratio: 2).

The numerical values of (MIC of MEPM in combination with a test compound)/(MIC of MEPM alone) are shown below.

[Table 3-1]

Example number	K. pneumoniae ATCC BAA-2344 (KPC)	K. pneumoniae ATCC BAA-2524 (OXA-48)
1	≤ 0.063/32	≤ 0.063/2
2	0.125/32	≤ 0.063/2
3	≤ 0.063/32	≤ 0.063/2
4	≤ 0.063/32	≤ 0.063/2
5	≤ 0.063/32	≤ 0.063/2

[Table 3-2]

Example number	**K. pneumoniae ATCC BAA-2344 (KPC)**	**K. pneumoniae ATCC BAA-2524 (OXA-48)**
6	0.031/32	0.063/2
7	0.031/32	0.063/2
8	0.031/32	0.031/2
9	0.031/32	0.063/2
10	0.031/32	0.063/2
11	0.031/32	0.063/2
12	0.125/32	0.031/1
13	0.031/32	0.031/2
14	0.031/32	0.031/2
15	0.031/32	0.031/2

16	0.031/32	0.031/2
17	0.031/32	0.031/1
18	0.063/32	0.063/2
19	0.031/32	0.031/2
20	0.031/32	0.031/2
21	0.031/32	0.031/2
22	0.031/32	0.031/2
23	0.25/32	0.031/2
24	0.031/32	0.063/1
25	0.063/32	0.063/2
26	0.031/32	0.063/2
27	0.031/32	0.031/2
28	0.031/32	0.031/1
29	0.063/32	0.031/2
30	0.031/32	0.031/2
31	0.031/32	0.031/2
32	0.031/32	0.031/2
33	0.031/32	0.031/2

[0569]

Test Example 2: Evaluation of minimum inhibitory concentration (MIC) of MEPM against β-lactamase producing bacteria

In the same manner as Test Example 1, E. coli ATCC BAA-2340 (KPC), E. coli ATCC BAA-2469 (NDM-1), K. pneumomiae ATCC BAA-2470 (NDM-1), K. pneumomiae NCTC 13439 (VIM-1), K. pneumomiae NCTC 13440 (VIM-1), E. coli NCTC 13476 (IMP), and the like can be used to evaluate metallo-β-lactamase inhibitory activity of test compounds.

[0570]

As disclosed above, the present invention is exemplified by the use of its preferred embodiments. However, it is understood that the scope of the present invention should be interpreted

based solely on the Claims. The present application claims priority to Japanese Patent Application No. 2019-194753 (filed on October 25, 2019). The entire content thereof is incorporated herein by reference. It is also understood that any patent, any patent application, and any other references cited herein should be incorporated herein by reference in the same manner as the contents are specifically described herein.

[Industrial Applicability]

[0571]

The compound of the invention exhibits a potent inhibitory action against β-lactamase and is useful as a therapeutic agent and/or prophylactic agent for sepsis, febrile neutropenia, bacterial meningitis, bacterial endocarditis, otitis media, sinusitis, pneumonia, lung abscess, empyema, secondary infection of a chronic respiratory disease, pharyngolaryngitis, tonsillitis, osteomyelitis, arthritis, peritonitis, intraperitoneal abscess, cholecystitis, cholangitis, liver abscess, deep skin infection, lymphangitis/lymphadenitis, secondary infection of trauma, burn injury, surgical wound, or the like, urinary tract infection, genital infection, eye infection, or odontogenic infection.

[Claims]

[Claim 1]

A compound represented by formula (1a) or (1b):

[Chemical Formula 733]



(1a) (1b)

or a pharmaceutically acceptable salt thereof

wherein

G is an oxygen atom, a sulfur atom, or $-NR^{a1}-$,

X is a hydroxyl group, an optionally substituted alkoxy group, or $-NR^{a2}R^{b1}$,

R^{a1}, R^{a2}, and R^{b1} are the same or different, each independently a hydrogen atom, a hydroxyl group, an optionally substituted hydrocarbyl group, or an optionally substituted heterohydrocarbyl group,

wherein R^{a2} and R^{b1} together may form an optionally substituted nitrogen-containing non-aryl heterocycle,

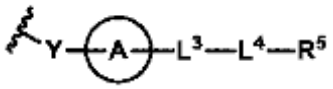
L^1 is a single bond, an oxygen atom, a sulfur atom, -SO-, $-SO_2-$, an optionally substituted hydrocarbylene group, or an optionally substituted heterohydrocarbylene group,

L^2 is a single bond or an optionally substituted hydrocarbylene group,

Z is a hydrogen atom, a hydroxyl group, an optionally substituted hydrocarbyl group, or an optionally substituted heterohydrocarbyl group,

one of R^1, R^2, and R^3 is represented by formula (2):

[Chemical Formula 734]



(2)

wherein

Y is an oxygen atom, a sulfur atom, or $-NR^j-$, and R^j is a hydrogen atom, a hydroxyl group, or an optionally substituted hydrocarbyl group,

ring A is an optionally substituted non-aryl heterocycle,

L^3 is an oxygen atom, a sulfur atom, an optionally substituted hydrocarbylene group, an optionally substituted heterohydrocarbylene group, optionally substituted -NH-, optionally substituted $-NH-SO_2-$, $-S(=O)-$, or $-S(=O)_2-$,

L^4 is a single bond, an optionally substituted hydrocarbylene group, an optionally substituted heterohydrocarbylene group, or $-C(=N-OR^{h1})-$,

R^{h1} is

1) a hydrogen atom,

2) a C_{1-6} alkyl group,

3) a C_{3-10} alicyclic group,

4) C_{6-10} aryl,

5) 5- or 6-membered heteroaryl, or

6) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 2) to 6) is optionally substituted),

R^5 is a hydrogen atom, a hydroxyl group, an optionally substituted hydrocarbyl group, an optionally substituted heterohydrocarbyl group, optionally substituted -NHOH, a sulfo group (sulfonic acid group), optionally substituted $-SO_2H$, optionally substituted $-SO_2-NH_2$, optionally substituted $-S(=O)(=NH)H$, optionally substituted $-NH-SO_2-H$, optionally substituted $-NH-SO_2-NH_2$, optionally substituted $-N=S(=O)H_2$, or optionally substituted $-NH_2$,

the remaining two (without the structure of formula (2) among R^1, R^2, and R^3) are the same or different, each independently a

hydrogen atom, halogen, a hydroxyl group, an optionally substituted hydrocarbyl group, or an optionally substituted heterohydrocarbyl group,

R^4 is

1) $-C(=O)R^8$,

2) $-SO_2-L^6-R^8$,

(wherein R^8 in 1) and 2) is a hydroxyl group, an optionally substituted hydrocarbyl group, or an optionally substituted heterohydrocarbyl group, and L^6 is a single bond or an optionally substituted hydrocarbylene group),

3) $-NR^{a4}R^{b3}$,

4) $-B(OR^{m1})_2$,

5) $-PO(OR^{m1})(OR^{m2})$,

6) optionally substituted heteroaryl,

7) an optionally substituted non-aryl heterocycle, or

8) a bioisostere of one of 1) to 7),

(wherein the formulas of 1), 2), 4), 5), and 6) include a carboxylic acid isostere, and 8) may include them in duplicates),

R^{a4} and R^{b3} are the same or different, each independently having the same definition as R^{a1}, R^{a2}, and R^{b1}, wherein a combination of R^{a4} and R^{b3}, when attached to the same nitrogen atom, together may form an optionally substituted nitrogen-containing non-aryl heterocycle,

R^{m1} is a hydrogen atom or an optionally substituted hydrocarbyl group,

wherein if R^{m1} is attached to a boron atom via an oxygen atom, two R^{m1}, as alkylene, together with the boron atom and two oxygen atoms, may form a non-aryl heterocycle (wherein an alkylene moiety is optionally substituted in the non-aryl heterocycle),

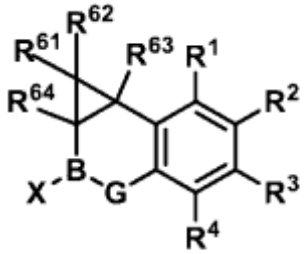
R^{m2} is a hydrogen atom or an optionally substituted hydrocarbyl group, and

R^{61}, R^{62}, R^{63}, and R^{64} are each independently a hydrogen atom, halogen, an optionally substituted alkyl group, or $-L^1-L^2-Z$.

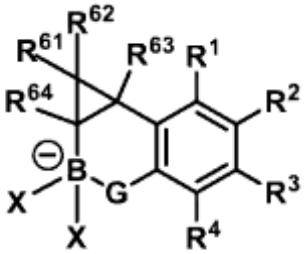
[Claim 2]

A compound represented by formula (1a) or (1b):

[Chemical Formula 735]



(1a)



(1b)

or a pharmaceutically acceptable salt thereof

wherein

G is an oxygen atom, a sulfur atom, or $-NR^{a1}-$,

X is a hydroxyl group, an optionally substituted alkoxy group, or $-NR^{a2}R^{b1}$,

R^{a1}, R^{a2}, and R^{b1} are the same or different, each independently a hydrogen atom, a hydroxyl group, an optionally substituted hydrocarbyl group, or an optionally substituted heterohydrocarbyl group,

wherein R^{a2} and R^{b1} together may form an optionally substituted nitrogen-containing non-aryl heterocycle,

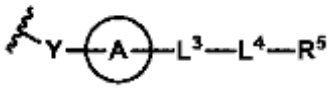
L^1 is a single bond, an oxygen atom, a sulfur atom, -SO-, $-SO_2-$, an optionally substituted hydrocarbylene group, or an optionally substituted heterohydrocarbylene group,

L^2 is a single bond or an optionally substituted hydrocarbylene group,

Z is a hydrogen atom, a hydroxyl group, an optionally substituted hydrocarbyl group, or an optionally substituted heterohydrocarbyl group,

one of R^1, R^2, and R^3 is represented by formula (2):

[Chemical Formula 736]



(2)

wherein

Y is an oxygen atom, a sulfur atom, or $-NR^j-$, and R^j is a hydrogen atom, a hydroxyl group, or an optionally substituted hydrocarbyl group,

ring A is an optionally substituted non-aryl heterocycle,

L^3 is an oxygen atom, a sulfur atom, an optionally substituted hydrocarbylene group, an optionally substituted heterohydrocarbylene group, $-S(=O)-$, or $-S(=O)_2-$,

L^4 is a single bond, an optionally substituted hydrocarbylene group, or $-C(=N-OR^{h1})-$,

R^{h1} is

1) a hydrogen atom,

2) a C_{1-6} alkyl group,

3) a C_{3-10} alicyclic group,

4) C_{6-10} aryl,

5) 5- or 6-membered heteroaryl, or

6) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 2) to 6) is optionally substituted),

R^5 is a hydrogen atom, a hydroxyl group, an optionally substituted hydrocarbyl group, or an optionally substituted heterohydrocarbyl group,

the remaining two (without the structure of formula (2) among R^1, R^2, and R^3) are the same or different, each independently a hydrogen atom, halogen, a hydroxyl group, an optionally substituted hydrocarbyl group, or an optionally substituted heterohydrocarbyl group,

R^4 is

1) $-C(=O)R^8$,

2) $-SO_2-L^6-R^8$,

(wherein R^8 in 1) and 2) is a hydroxyl group, an optionally substituted hydrocarbyl group, or an optionally substituted heterohydrocarbyl group, and L^6 is a single bond or an optionally substituted hydrocarbylene,

3) $-NR^{a4}R^{b3}$,

4) $-B(OR^{m1})_2$,

5) $-PO(OR^{m1})(OR^{m2})$,

6) optionally substituted heteroaryl,

7) an optionally substituted non-aryl heterocycle, or

8) a bioisostere of one of 1) to 7),

(wherein the formulas of 1), 2), 4), 5), and 6) include a carboxylic acid isostere, and 8) may include them in duplicates),

R^{a4} and R^{b3} are the same or different, each independently having the same definition as R^{a1}, R^{a2}, and R^{b1}, wherein a combination of R^{a4} and R^{b3}, when attached to the same nitrogen atom, together may form an optionally substituted nitrogen-containing non-aryl heterocycle,

R^{m1} is a hydrogen atom or an optionally substituted hydrocarbyl group,

wherein if R^{m1} is attached to a boron atom via an oxygen atom, two R^{m1}, as alkylene, together with the boron atom and two oxygen atoms, may form a non-aryl heterocycle (wherein an alkylene moiety is optionally substituted in the non-aryl heterocycle),

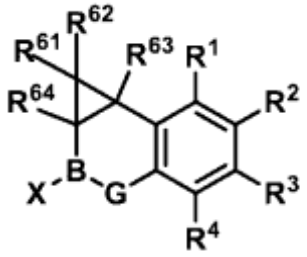
R^{m2} is a hydrogen atom or an optionally substituted hydrocarbyl group, and

R^{61}, R^{62}, R^{63}, and R^{64} are each independently a hydrogen atom, halogen, an optionally substituted alkyl group, or $-L^1-L^2-Z$.

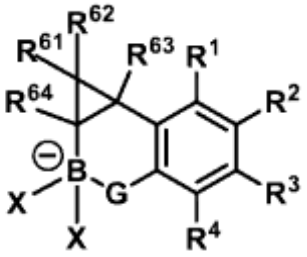
[Claim 3]

The compound or the pharmaceutically acceptable salt thereof according to claim 1 or 2, represented by formula (1a) or (1b):

[Chemical Formula 737]



(1a)



(1b)

wherein

G is an oxygen atom, a sulfur atom, or $-NR^{a1}-$,

X is a hydroxyl group, an optionally substituted C_{1-6} alkoxy group, or $-NR^{a2}R^{b1}$,

R^{a1}, R^{a2}, and R^{b1} are the same or different, each independently

1) a hydrogen atom,

2) a C_{1-6} alkyl group,

3) a C_{3-10} alicyclic group,

4) C_{6-10} aryl,

5) 5- or 6-membered heteroaryl,

6) a 4- to 10-membered non-aryl heterocycle,

7) a C_{1-6} alkylcarbonyl group,

8) a C_{3-10} alicyclic carbonyl group,

9) a C_{6-10} arylcarbonyl group,

10) a 5- or 6-membered heteroarylcarbonyl group,

11) a C_{1-6} alkylsulfonyl group,

12) a C_{3-10} alicyclic sulfonyl group,

13) a C_{6-10} arylsulfonyl group,

14) a 5- or 6-membered heteroarylsulfonyl group, or

15) $-OR^{c1}$,

(wherein each substituent from 2) to 14) is optionally substituted),

wherein R^{a2} and R^{b1} together may form an optionally substituted 4- to 10-membered nitrogen-containing non-aryl heterocycle,

R^{c1} is

1) a hydrogen atom,
2) a C_{1-6} alkyl group,
3) a C_{3-10} alicyclic group,
4) C_{6-10} aryl,
5) 5- or 6-membered heteroaryl, or
6) a 4- to 10-membered non-aryl heterocycle,
(wherein each substituent from 2) to 6) is optionally substituted),

L^1 is a single bond, an oxygen atom, a sulfur atom, -SO-, -SO_2-, -NR^{d1}-, -$NR^{d1}C(=O)$-, or -$NR^{d1}SO_2$-,

L^2 is a single bond or an optionally substituted C_{1-6} alkylene group,

Z is
1) a hydrogen atom,
2) a hydroxyl group,
3) a cyano group,
4) a carboxyl group,
5) a C_{3-10} alicyclic group,
6) C_{6-10} aryl,
7) 5- or 6-membered heteroaryl,
8) a 4- to 10-membered non-aryl heterocycle,
9) a C_{1-6} alkoxy group,
10) a C_{3-10} alicyclic oxy group,
11) a C_{6-10} aryloxy group,
12) a 5- or 6-membered heteroaryloxy group,
13) a 4- to 10-membered non-aryl heterocyclyl oxy group,
14) a C_{1-6} alkylthio group,
15) a C_{3-10} alicyclic thio group,
16) a C_{6-10} arylthio group,
17) a 5- or 6-membered heteroarylthio group,
18) a 4- to 10-membered non-aryl heterocyclyl thio group,
(wherein each substituent from 5) to 18) is optionally substituted),
19) -SO_2-$NR^{e1}R^{f1}$,

20) $-NR^{e1}-C(=O)OR^{f1}$,

21) $-NR^{g1}-C(=O)NR^{e1}R^{f1}$,

22) $-NR^{e1}-C(=S)R^{f1}$,

23) $-NR^{e1}-C(=S)OR^{f1}$,

24) $-NR^{g1}-C(=S)NR^{e1}R^{f1}$,

25) $-NR^{g1}-CR^{e1}(=NR^{f1})$,

26) $-NR^{g1}-CR^{e1}(=N-OR^{f1})$,

27) $-NR^{h1}-C(=NR^{g1})NR^{e1}R^{f1}$,

28) $-NR^{h1}-C(=N-OR^{g1})NR^{e1}R^{f1}$,

29) $-NR^{i1}-C(=NR^{h1})NR^{g1}-NR^{e1}R^{f1}$,

30) $-NR^{i1}-C(=N-OR^{h1})NR^{g1}-NR^{e1}R^{f1}$,

31) $-NR^{e1}-SO_2-R^{f1}$,

32) $-NR^{g1}-SO_2-NR^{e1}R^{f1}$,

33) $-C(=O)OR^{e1}$,

34) $-C(=S)OR^{e1}$,

35) $-C(=S)NR^{e1}R^{f1}$,

36) $-C(=S)NR^{e1}OR^{f1}$,

37) $-C(=S)NR^{g1}-NR^{e1}R^{f1}$,

38) $-C(=NR^{e1})R^{f1}$,

39) $-C(=N-OR^{e1})R^{f1}$,

40) $-C(=NR^{h1})NR^{g1}-NR^{e1}R^{f1}$,

41) $-C(=N-OR^{h1})NR^{g1}-NR^{e1}R^{f1}$,

42) $-NR^{e1}R^{f1}$,

43) $-NR^{g1}-NR^{e1}R^{f1}$,

44) $-NR^{e1}OR^{f1}$,

45) $-NR^{e1}-C(=O)R^{f1}$,

46) $-C(=O)NR^{e1}R^{f1}$,

47) $-C(=O)NR^{e1}OR^{f1}$,

48) $-C(=O)NR^{g1}-NR^{e1}R^{f1}$,

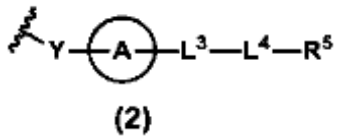
49) $-C(=O)R^{e1}$,

50) $-C(=NR^{g1})NR^{e1}R^{f1}$, or

51) $-C(=N-OR^{h1})NR^{e1}R^{f1}$,

one of R^1, R^2, and R^3 is a group represented by formula (2):

[Chemical Formula 738]



(2)

wherein

Y is an oxygen atom, a sulfur atom, or $-NR^j-$,

ring A is an optionally substituted 4- to 20-membered non-aryl heterocycle,

L^3 is

1) an oxygen atom,

2) a sulfur atom,

3) $-NR^{d2}-$,

4) $-NR^{d2}C(=O)-$,

5) $-NR^{d2}SO_2-$,

6) a C_{1-6} alkylene group,

7) a C_{3-10} cycloalkylene group,

8) a 4- to 10-membered non-aryl heterocyclylene group,

(wherein each substituent from 6) to 8) is optionally substituted),

9) $-C(=O)-$,

10) $-S(=O)-$, or

11) $-S(=O)_2-$,

L^4 is

1) a single bond,

2) a C_{1-6} alkylene group,

3) a C_{3-10} cycloalkylene group,

4) a C_{6-10} arylene group,

5) a 5- or 6-membered heteroarylene group,

6) a 4- to 10-membered non-aryl heterocyclylene group,

(wherein each substituent from 2) to 6) is optionally substituted), or

7) $-C(=N-OR^{h1})-$,

R^5 is

1) a hydrogen atom,

2) a C_{1-6} alkyl group,

3) a C_{3-10} alicyclic group,

4) a 4- to 10-membered non-aryl heterocycle,

5) C_{6-10} aryl,

6) 5- to 10-membered heteroaryl,

7) a C_{1-6} alkylthio group,

(wherein each substituent from 2) to 7) is optionally substituted, and if two substituents further substituted with the substituent of 1), 2), or 3) are each substituted on adjacent atoms within a ring, the two substituents together may further form a condensed ring structure),

8) $-NR^{e1}OH$,

9) a carboxyl group (-C(=O)OH),

10) a carboxylic acid isostere (wherein the carboxylic acid isostere comprises an ester group-$C(=O)OR^{20a}$),

11) a sulfo group (sulfonic acid group),

12) $-SO_2R^{e1}$,

13) $-SO_2-NR^{e1}R^{f1}$,

14) $-S(=O)(=NR^{f1})R^{e1}$,

15) $-NR^{e1}-C(=O)R^{f1}$,

16) $-NR^{e1}-C(=O)OR^{f1}$,

17) $-NR^{g1}-C(=O)NR^{e1}R^{f1}$,

18) $-NR^{e1}-SO_2-R^{f1}$,

19) $-NR^{g1}-SO_2-NR^{e1}R^{f1}$,

20) $-N=S(=O)R^{e1}R^{f1}$,

21) $-C(=O)NR^{50}R^{51}$, or

22) $-NR^{e1}R^{f1}$ (wherein if R^5 is the substituent of 22), $-L^3-L^4-R^5$ is not $-(CH_2)_{1-4}NR^{e1}R^{f1}$ (wherein R^{e1} and R^{f1} are a hydrogen atom, optionally substituted C_{1-4} alkyl, an optionally substituted C_{3-7} alicyclic group, an optionally substituted 4- to 10-membered non-aryl heterocyclic group, optionally substituted C_{6-10} aryl, or optionally substituted 5- to 10-membered heteroaryl)),

R^{20a} is

1) a C_{1-6} alkyl group,
2) a C_{3-10} alicyclic group,
3) C_{6-10} aryl,
4) 5- or 6-membered heteroaryl, or
5) a 4- to 10-membered non-aryl heterocycle,
(wherein each substituent from 1) to 5) is optionally substituted),

R^{50} represents
1) a hydrogen atom,
2) a C_{1-6} alkyl group,
3) a hydroxyl group,
4) C_{1-6} alkoxy group,
5) a C_{3-6} cycloalkoxy group,
6) a C_{3-6} alicyclic group,
7) a 4- to 6-membered non-aryl heterocycle,
8) C_{6-10} aryl,
9) 5- to 10-membered heteroaryl,
10) 4- to 6-membered non-aryl heterocyclyl oxy,
11) C_{6-10} aryloxy,
12) 5- to 10-membered heteroaryloxy,
13) a C_{1-6} alkylsulfonyl group,
14) a C_{3-6} cycloalkoxysulfonyl group, or
15) a 4- to 6-membered non-aryl heterocyclyl sulfonyl group,
(wherein each substituent of 2) and 4) to 15) is optionally substituted),

R^{51} represents
1) a hydrogen atom,
2) a C_{1-6} alkyl group,
3) a C_{3-6} alicyclic group,
4) a 4- to 6-membered non-aryl heterocycle,
5) C_{6-10} aryl, or
6) 5- to 10-membered heteroaryl,
(wherein each substituent from 2) to 6) is optionally substituted), or

R^{50} and R^{51} together may form optionally substituted 4- to 7-membered nitrogen-containing non-aryl heterocycle,

the remaining two (without the structure of formula (2) among R^1, R^2, and R^3) are the same or different, each independently a hydrogen atom, a halogen atom, an optionally substituted C_{1-6} alkyl group, an optionally substituted C_{1-6} alkoxy group, an optionally substituted C_{1-6} alkylthio group, optionally substituted 5- or 6-membered heteroaryl, or $-NR^{a3}R^{b2}$,

R^{d1}, R^{d2}, R^{e1}, R^{f1}, R^{g1}, R^{h1}, R^{i1}, and R^j are the same or different, each independently

1) a hydrogen atom,

2) a C_{1-6} alkyl group,

3) a C_{3-10} alicyclic group,

4) C_{6-10} aryl,

5) 5- or 6-membered heteroaryl, or

6) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 2) to 6) is optionally substituted),

a combination of R^{e1} and R^{f1}, when attached to the same nitrogen atom, together may form an optionally substituted 4- to 10-membered nitrogen-containing non-aryl heterocycle,

R^4 is

1) $-C(=O)R^8$,

2) $-SO_2-L^6-R^8$,

(wherein R^8 in 1) and 2) is $-NR^{a5}R^{b4}$, $-NR^{a5}-L^7-B(OR^{m1})_2$, $-OR^{m1}$, or an optionally substituted C_{1-6} alkyl group, and L^6 is a single bond or $-NR^{a6}-$),

3) $-NR^{a4}R^{b3}$,

4) $-B(OR^{m1})_2$,

5) $-PO(OR^{m1})(OR^{m2})$,

6) optionally substituted 5-membered heteroaryl,

7) an optionally substituted 5-membered non-aryl heterocycle, or

8) a bioisostere of one of 1) to 7),

(wherein the formulas of 2), 4), 5), and 6) include a carboxylic acid isostere, and 8) may include them in duplicates),

R^{a3}, R^{a4}, R^{a5}, R^{a6}, R^{b2}, R^{b3}, and R^{b4} are the same or different, each independently having the same definition as R^{a1}, R^{a2}, and R^{b1}, wherein a combination of R^{a3} and R^{b2}, R^{a4} and R^{b3}, or R^{a5} and R^{b4}, when attached to the same nitrogen atom, together may form an optionally substituted 4- to 10-membered nitrogen-containing non-aryl heterocycle,

R^{m1} is

1) a hydrogen atom,
2) a C_{1-6} alkyl group,
3) a C_{3-10} alicyclic group,
4) C_{6-10} aryl,
5) 5- or 6-membered heteroaryl, or
6) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 2) to 6) is optionally substituted),

wherein if R^{m1} is attached to a boron atom via an oxygen atom, two R^{m1}, as C_{2-4} alkylene, together with the boron atom and two oxygen atoms, may form a 5- to 7-membered non-aryl heterocycle (wherein an alkylene moiety is optionally substituted in the non-aryl heterocycle),

R^{m2} is a hydrogen atom, an optionally substituted C_{1-6} alkyl group, or an optionally substituted C_{3-10} alicyclic group,

L^7 is an optionally substituted C_{1-3} alkylene group,

R^{61}, R^{62}, and R^{63} are each independently a hydrogen atom, halogen, or an optionally substituted C_{1-6} alkyl group, and

R^{64} is a hydrogen atom, halogen, an optionally substituted C_{1-6} alkyl group, or $-L^1-L^2-Z$.

[Claim 4]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 3, wherein L^3 is

1) a C_{1-6} alkylene group,
2) a C_{3-10} cycloalkylene group, or

3) a 4- to 10-membered non-aryl heterocyclylene group,
(wherein each substituent from 1) to 3) is optionally substituted), and

L^4 is a single bond or an optionally substituted C_{1-5} alkylene group.

[Claim 5]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 4, wherein

L^3 is an optionally substituted C_{1-4} alkylene group, and

L^4 is a single bond or an optionally substituted C_{1-3} alkylene group.

[Claim 6]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 5, wherein

L^3 is $-(CR^{30}R^{31})_{n1}-$,

R^{30} and R^{31} are each independently, or if there are multiple instances of each of them, all of them independently represent
1) a hydrogen atom,
2) $-NR^{a7}R^{a8}$,
3) a C_{1-4} alkyl group,
4) C_{6-10} aryl,
5) 5- to 10-membered heteroaryl,
6) a C_{3-6} alicyclic group,
7) a 4- to 10-membered non-aryl heterocycle,
(wherein each substituent from 3) to 7) is optionally substituted), or
8) $-OR^{c2}$, or

R^{30} and R^{31}, together with the carbon atom to which they are attached, form a C_{3-6} alicyclic group or a 4- to 6-membered non-aryl heterocycle,

R^{a7} and R^{a8} are the same or different, each independently
1) a hydrogen atom,
2) a C_{1-6} alkyl group,

3) a C_{3-10} alicyclic group,
4) C_{6-10} aryl,
5) 5- or 6-membered heteroaryl,
6) a 4- to 10-membered non-aryl heterocycle,
7) a C_{1-6} alkylcarbonyl group,
8) a C_{3-10} alicyclic carbonyl group,
9) a C_{6-10} arylcarbonyl group,
10) a 5- or 6-membered heteroarylcarbonyl group,
11) a C_{1-6} alkylsulfonyl group,
12) a C_{3-10} alicyclic sulfonyl group,
13) a C_{6-10} arylsulfonyl group,
14) a 5- or 6-membered heteroarylsulfonyl group, or
15) $-OR^{c3}$,
(wherein each substituent from 2) to 14) is optionally substituted),

wherein R^{a7} and R^{a8} together may form an optionally substituted 4- to 10-membered nitrogen-containing non-aryl heterocycle,

R^{c2} and R^{c3} are each independently
1) a hydrogen atom,
2) a C_{1-6} alkyl group,
3) a C_{3-10} alicyclic group,
4) C_{6-10} aryl,
5) 5- or 6-membered heteroaryl, or
6) a 4- to 10-membered non-aryl heterocycle,
(wherein each substituent from 2) to 6) is optionally substituted),

n1 is an integer 1, 2, 3, or 4,

L^4 is $-(CR^{40}R^{41})_{n2}-$,

R^{40} and R^{41} each independently, or if there are multiple instances of each of them, all of them independently represent
1) a hydrogen atom,
2) $-NR^{a9}R^{a10}$,
3) a C_{1-4} alkyl group,

4) C_{6-10} aryl,

5) 5- to 10-membered heteroaryl,

6) a C_{3-6} alicyclic group,

7) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 3) to 7) is optionally substituted), or

8) $-OR^{c4}$, or

R^{40} and R^{41}, together with the carbon atom to which they are attached, form a C_{3-6} alicyclic group or a 4- to 6-membered non-aryl heterocycle,

R^{a9} and R^{a10} are the same or different, each independently

1) a hydrogen atom,

2) a C_{1-6} alkyl group,

3) a C_{3-10} alicyclic group,

4) C_{6-10} aryl,

5) 5- or 6-membered heteroaryl,

6) a 4- to 10-membered non-aryl heterocycle,

7) a C_{1-6} alkylcarbonyl group,

8) a C_{3-10} alicyclic carbonyl group,

9) a C_{6-10} arylcarbonyl group,

10) a 5- or 6-membered heteroarylcarbonyl group,

11) a C_{1-6} alkylsulfonyl group,

12) a C_{3-10} alicyclic sulfonyl group,

13) a C_{6-10} arylsulfonyl group,

14) a 5- or 6-membered heteroarylsulfonyl group,

(wherein each substituent from 2) to 14) is optionally substituted), or

15) $-OR^{c5}$,

wherein R^{a9} and R^{a10} together may form an optionally substituted 4- to 10-membered nitrogen-containing non-aryl heterocycle,

R^{c4} and R^{c5} are each independently defined the same as R^{c2} and R^{c3}, and

n2 is an integer 0 (i.e., when L^4 is a single bond), 1, 2, or 3.

[Claim 7]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 6, wherein

$-L^3-L^4-$ is an optionally substituted C_{1-2} alkylene group.

[Claim 8]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 7, wherein $-L^3-L^4-$ is a C_{1-2} alkylene group optionally substituted with a C_{1-3} alkyl group, an amino group, or a hydroxymethyl group, or a plurality of the same or different groups thereamong (wherein two C_{1-3} alkyl groups, when attached to the same carbon atom, together with the carbon atom to which they are attached, may form a C_{3-6} alicyclic group).

[Claim 9]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 8, wherein

R^5 is

1) a C_{3-10} alicyclic group,

2) C_{6-10} aryl,

3) 5- to 10-membered heteroaryl,

4) a C_{1-6} alkylthio group,

(wherein each substituent from 1) to 4) is optionally substituted, and if two substituents further substituted with the substituent of 2) or 3) are each substituted on adjacent atoms within a ring, the two substituents together may further form a condensed ring structure),

5) $-NR^{e1}OH$,

6) $-C(=O)NR^{50}R^{51}$,

7) $-SO_2-NR^{e1}R^{f1}$,

8) $-NR^{e1}-SO_2-R^{f1}$,

9) $-C(=O)OR^{20}$, or

10) $-NR^{e1}R^{f1}$ (wherein if R^5 is the substituent of 10), L^3 and/or L^4 is a C_{1-6} alkylene group that is necessarily substituted with one or more groups other than a hydrogen atom (wherein L^3 or L^4, together with said substituent, may form a C_{3-10} alicyclic group or a 4- to 10-membered non-aryl heterocycle)), and

R^{20} is

1) a hydrogen atom,

2) a C_{1-6} alkyl group,

3) a C_{3-10} alicyclic group,

4) C_{6-10} aryl,

5) 5- or 6-membered heteroaryl, or

6) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 2) to 6) is optionally substituted).

[Claim 10]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 9, wherein

R^5 is

1) C_{6-10} aryl,

2) 5- to 10-membered heteroaryl,

3) $-C(=O)NR^{50}R^{51}$,

4) $-C(=O)OR^{20}$, or

5) $-NR^{e1}R^{f1}$ (wherein if R^5 is the substituent of 5), L^3 and/or L^4 is a C_{1-6} alkylene group that is necessarily substituted with one or more groups other than a hydrogen atom, and together with said substituent forms at least one C_{3-10} alicyclic group or 4- to 10-membered non-aryl heterocycle),

(wherein each substituent from 1) to 2) is optionally substituted, and any two groups thereof, when each is attached to adjacent atoms within a ring, together may further form a condensed ring structure).

[Claim 11]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 10, wherein $Z\text{-}L^2\text{-}L^1$ is an optionally substituted $C_{1\text{-}6}$ alkylthio group.

[Claim 12]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 11, wherein R^{61}, R^{62}, R^{63}, and R^{64} are each independently a hydrogen atom, a fluorine atom, or a $C_{1\text{-}3}$ alkyl group optionally substituted with a fluorine atom.

[Claim 13]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 12, wherein R^{61}, R^{62}, R^{63}, and R^{64} are each independently a hydrogen atom or a fluorine atom.

[Claim 14]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 13, wherein G is an oxygen atom.

[Claim 15]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 14, wherein X is a hydroxyl group or an optionally substituted $C_{1\text{-}6}$ alkoxy group.

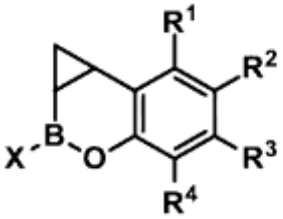
[Claim 16]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 15, wherein X is a hydroxyl group.

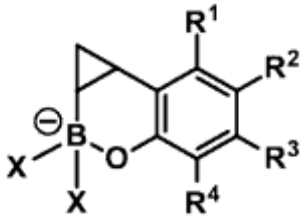
[Claim 17]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 16, wherein the compounds of formulas (1a) and (1b) are represented by formulas (3a) and (3b), respectively:

[Chemical Formula 739]



(3a)



(3b)

wherein X, R^1, R^2, and R^3 are defined the same as any one of claims 1 to 16, and

R^4 is selected from the group consisting of

1) $-C(=O)OR^{m1}$ (wherein R^{m1} is a hydrogen atom, a C_{1-6} alkyl group, a C_{3-10} alicyclic group, C_{6-10} aryl, 5- or 6-membered heteroaryl, or a 4- to 10-membered non-aryl heterocycle, wherein the C_{1-6} alkyl group, the C_{3-10} alicyclic group, the C_{6-10} aryl, the 5- or 6-membered heteroaryl, and the 4- to 10-membered non-aryl heterocycle are each optionally substituted), and

2) a bioisostere of 1).

[Claim 18]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 17, wherein R^4 is

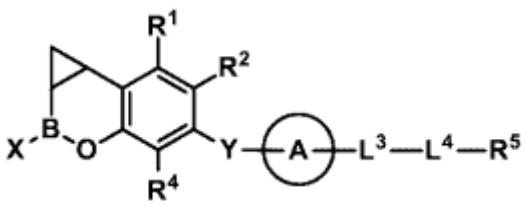
1) $-C(=O)OH$ (i.e., a carboxyl group), or

2) a carboxylic acid isostere.

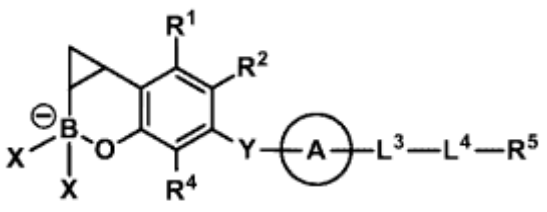
[Claim 19]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 18, wherein the compounds of formulas (1a) and (1b) or the compounds of formulas (3a) and (3b) are represented by formulas (4a) and (4b), respectively:

[Chemical Formula 740]



(4a)



(4b)

wherein X, R^4, Y, ring A, L^3, L^4, and R^5 are defined the same as any one of claims 1 to 18, and

R^1 and R^2 are the same or different, each independently a hydrogen atom, a halogen atom, a C_{1-6} alkyl group, a C_{1-6} alkoxy group, or a C_{1-6} alkylthio group (wherein the C_{1-6} alkyl group, C_{1-6} alkoxy group, and C_{1-6} alkylthio group are optionally substituted).

[Claim 20]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 19, wherein ring A is an optionally substituted 4- to 10-membered non-aryl heterocycle.

[Claim 21]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 20, wherein ring A is an optionally substituted 4- to 7-membered non-aryl heterocycle.

[Claim 22]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 21, wherein Y is an oxygen atom or a sulfur atom.

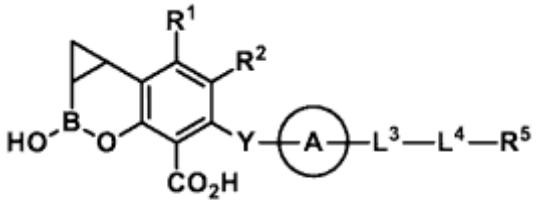
[Claim 23]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 22, wherein Y is an oxygen atom.

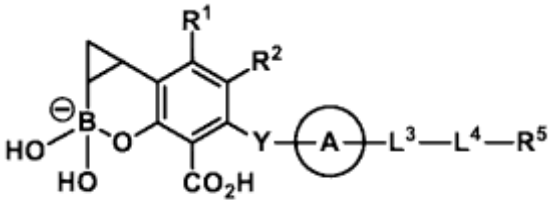
[Claim 24]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 23, wherein the compounds of formulas (1a) and (1b), the compounds of formulas (3a) and (3b), or the compounds of formulas (4a) and (4b) are represented by formulas (5a) and (5b), respectively:

[Chemical Formula 741]



(5a)



(5b)

wherein R^1, R^2, Y, L^3, L^4, and R^5 are defined the same as any one of claims 1 to 23, and ring A is an optionally substituted 4- to 6-membered nitrogen-containing non-aryl heterocycle.

[Claim 25]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 3 and 11 to 24, wherein L^3 is -C(=O)- or $-S(=O)_2-$.

[Claim 26]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 3 and 11 to 25, wherein L^3 is -C(=O)-.

[Claim 27]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 3 and 11 to 26, wherein L^4 is a single bond, $-C(=N-OR^{h1})-$, or an optionally substituted C_{1-6} alkylene group, wherein R^{h1} is an optionally substituted C_{1-6} alkyl group.

[Claim 28]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 27, wherein R^1 and R^2 are the same or different, each independently selected from the group consisting of

1) a hydrogen atom,
2) a halogen atom,
3) a C_{1-6} alkyl group,
4) a C_{1-6} alkoxy group, and
5) a C_{1-6} alkylthio group,

(wherein each substituent from 3) to 5) is optionally substituted).

[Claim 29]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 28, wherein R^1 and R^2 are the same or different, each independently selected from the group consisting of

1) a hydrogen atom,

2) a halogen atom,

3) a C_{1-6} alkyl group,

4) a C_{1-6} alkoxy group, and

5) a C_{1-6} alkylthio group,

(wherein each substituent from 3) to 5) is optionally substituted with a halogen atom).

[Claim 30]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 29, wherein R^1 and R^2 are the same or different, each independently selected from the group consisting of

1) a hydrogen atom,

2) a halogen atom, and

3) a C_{1-6} alkyl group optionally substituted with a halogen atom.

[Claim 31]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 30, wherein R^1 and R^2 are the same or different, each independently selected from the group consisting of

1) a hydrogen atom,

2) a fluorine atom, and

3) a C_{1-3} alkyl group optionally substituted with a fluorine atom.

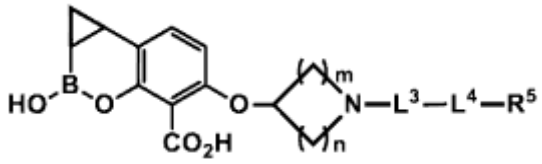
[Claim 32]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 31, wherein R^1 and R^2 are both hydrogen atoms.

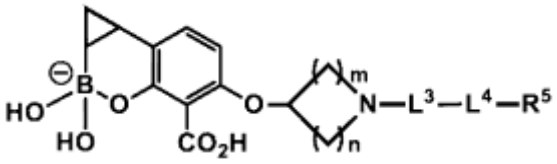
[Claim 33]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 32, wherein the compounds of formulas (1a) and (1b), the compounds of formulas (3a) and (3b), the compounds of formulas (4a) and (4b), or the compounds of formulas (5a) and (5b) are represented by formulas (6a) and (6b), respectively:

[Chemical Formula 742]



(6a)



(6b)

wherein

L^3, L^4, and R^5 are defined the same as any one of claims 1 to 32,

m is an integer 1, 2, or 3,

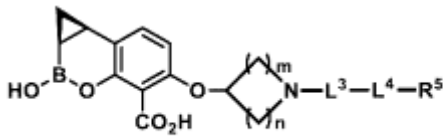
n is an integer 1, 2, or 3, and

m + n is 2, 3, or 4.

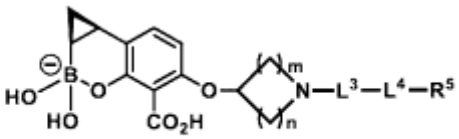
[Claim 34]

The compound or the pharmaceutically acceptable salt thereof according to claim 33, wherein the compounds of formulas (6a) and (6b) are enantiomers represented by formulas (7a) and (7b):

[Chemical Formula 743]



(7a)

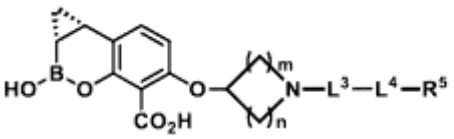


(7b)

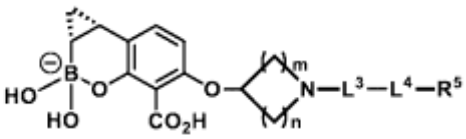
or

formulas (8a) and (8b):

[Chemical Formula 744]



(8a)



(8b)

, respectively,

wherein

L^3, L^4, and R^5 are defined the same as any one of claims 1 to 33, and

m and n are defined the same as claim 33.

[Claim 35]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 34, wherein m is 1 or 2, n is 1 or 2, and m + n is 2 or 3.

[Claim 36]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 35, wherein m is 1, and n is 1.

[Claim 37]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 6, 9 to 24, and 28 to 36, wherein

L^3 is $-(CR^{30}R^{31})_{n1}-$ or 4- to 10-membered non-aryl heterocyclylene,

R^{30} and R^{31} each independently, or if there are multiple instances of each of them, all of them independently represent

1) a hydrogen atom,

2) an optionally substituted C_{1-4} alkyl group, or

3) optionally substituted C_{6-10} aryl,

n1 is 1, 2, or 3,

L^4 is a single bond or $-(CR^{40}R^{41})_{n2}-$,

R^{40} and R^{41} each independently, or if there are multiple instances of each of them, all of them independently represent

1) a hydrogen atom,

2) $-NR^{a9}R^{a10}$,

3) an optionally substituted C_{1-4} alkyl group, or

4) $-OR^{c4}$ or

R^{40} and R^{41}, together with the carbon atom to which they are attached, form a C_{3-6} alicyclic group or a 4- to 6-membered non-aryl heterocycle,

R^{a9}, R^{a10}, and R^{c4} are the same or different, each independently

1) a hydrogen atom,

2) an optionally substituted C_{1-6} alkyl group, or

3) an optionally substituted C_{3-10} alicyclic group,

wherein R^{a9} and R^{a10} together may form an optionally substituted 4- to 10-membered nitrogen-containing non-aryl heterocycle, and

n2 is 0, 1, or 2.

[Claim 38]

The compound or the pharmaceutically acceptable salt thereof according to claim 37, wherein n1 is 1 or 2, and n2 is 0 or 1.

[Claim 39]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 6, 9 to 24, and 28 to 38, wherein

L^3 is $-CR^{30}R^{31}-$ or 4- to 10-membered non-aryl heterocyclylene,

R^{30} and R^{31} each independently represent,

1) a hydrogen atom,

2) a C_{1-4} alkyl group (wherein the group is optionally substituted with halogen, $-NR^{a11}R^{a12}$, or $-OR^{c6}$), or

3) C_6 aryl (wherein the group is optionally substituted with halogen, $-NR^{a13}R^{a14}$, $-OR^{c7}$, or a C_{1-3} alkyl group (wherein the group is optionally substituted with halogen, $-NR^{a15}R^{a16}$, or $-OR^{c8}$)),

L^4 is a single bond or $-(CR^{40}R^{41})_{n2}-$,

R^{40} and R^{41} each independently represent

1) a hydrogen atom,

2) $-NR^{a9}R^{a10}$,

3) a C_{1-4} alkyl group (wherein the group is optionally substituted with halogen, $-NR^{a17}R^{a18}$, or $-OR^{c9}$), or

4) $-OR^{c4}$, or

R^{40} and R^{41}, together with the carbon atom to which they are attached, form a C_{3-6} alicyclic group,

R^{a9}, R^{a10}, R^{a11}, R^{a12}, R^{a13}, R^{a14}, R^{a15}, R^{a16}, R^{a17}, R^{a18}, R^{c4}, R^{c6}, R^{c7}, R^{c8}, and R^{c9} are the same or different, each independently representing

1) a hydrogen atom, or

2) a C_{1-4} alkyl group (wherein the group is optionally substituted with halogen, $-NR^{a19}R^{a20}$, or $-OR^{c10}$),

R^{a19}, R^{a20}, and R^{c10} are the same or different, each independently representing

1) a hydrogen atom, or

2) a C_{1-4} alkyl group (wherein the group is optionally substituted with halogen),

wherein each combination of R^{a9} and R^{a10}, R^{a11} and R^{a12}, R^{a13} and R^{a14}, R^{a15} and R^{a16}, R^{a17} and R^{a18}, or R^{a19} and R^{a20} together may form an optionally substituted 4- to 7-membered nitrogen-containing non-aryl heterocycle, and

n2 is 0 or 1.

[Claim 40]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 6, 9 to 24, and 28 to 39, wherein

L^3 is $-CH_2-$, $-CH(CH_2NH_2)-$, or $-CH(CH_2OH)-$, and

L^4 is a single bond, $-CH_2-$, $-CH(NH_2)-$, $-CMe(NH_2)-$, $-CEt(NH_2)-$, $-C(iso\text{-}Pr)(NH_2)-$, $-CH(CH_2NH_2)-$, $-CH(OH)-$, $-CH(CH_2OH)-$, $-C(CH_2OH)_2-$, or

[Chemical Formula 745]



.

[Claim 41]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 6, 9 to 24, and 28 to 39, wherein L^3 is 4- to 10-membered non-aryl heterocyclylene.

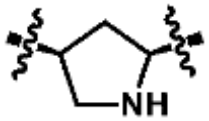
[Claim 42]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 6, 9 to 24, 28 to 39, and 41, wherein L^3 is 5-membered non-aryl heterocyclylene.

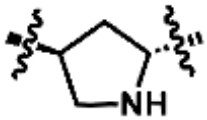
[Claim 43]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 6, 9 to 24, 28 to 39, and 41 to 42, wherein L^3 is

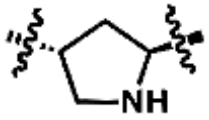
[Chemical Formula 746]



[Chemical Formula 747]

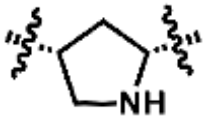


[Chemical Formula 748]



or

[Chemical Formula 749]



.

[Claim 44]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 6, 9 to 24, 28 to 39, and 41 to 43, wherein L^4 is a single bond.

[Claim 45]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 24 and 28 to 40, wherein R^5 is

1) C_{6-10} aryl, or

2) 5- to 10-membered heteroaryl,

(wherein each substituent from 1) to 2) is optionally substituted, and if two substituents further substituted with the substituent of 1) or 2) are each substituted on adjacent atoms within a ring, the two substituents together may further form a condensed ring structure).

[Claim 46]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 24 and 28 to 45, wherein

R^5 is C_6 aryl (i.e., phenyl) or 5-membered, 6-membered, 9-membered, or 10-membered heteroaryl,

each group of R^5 is optionally substituted with each of R^{6a} or R^{6b} at all chemically substitutable positions on a carbon atom or a nitrogen atom within a ring thereof,

wherein R^{6a}, which are substituents on the carbon atom, if there are multiple instances on the same ring, are all independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) a cyano group,

4) halogen,

5) a C_{1-4} alkyl group,

6) a C_{3-10} alicyclic group,

7) a C_{1-4} alkoxy group,

8) a C_{3-10} alicyclic oxy group,

9) a C_{6-10} aryloxy group,

10) a 5- or 6-membered heteroaryloxy group,

11) a 4- to 10-membered non-aryl heterocyclyl oxy group,

(wherein each substituent from 5) and 11) is optionally substituted),

12) $-SO_2-NR^{e2}R^{f2}$,

13) $-NR^{g2}-CR^{e2}(=NR^{f2})$,

14) $-NR^{g2}-CR^{e2}(=N-OR^{f2})$,

15) $-NR^{h2}-C(=NR^{g2})NR^{e2}R^{f2}$,

16) $-NR^{h2}-C(=N-OR^{g2})NR^{e2}R^{f2}$,

17) $-NR^{i2}-C(=NR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

18) $-NR^{i2}-C(=N-OR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

19) $-C(=NR^{e2})R^{f2}$,

20) $-C(=N-OR^{e2})R^{f2}$,

21) $-C(=NR^{h2})-NR^{e2}R^{f2}$,

22) $-C(=NR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

23) $-C(=N-OR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

24) $-NR^{e2}R^{f2}$,

25) $-NR^{g2}-NR^{e2}R^{f2}$,

26) $-NR^{e2}OR^{f2}$,

27) $-NR^{e2}-C(=O)R^{f2}$,

28) $-C(=O)NR^{e2}R^{f2}$,

29) $-C(=O)NR^{e2}OR^{f2}$,

30) $-C(=O)NR^{g2}-NR^{e2}R^{f2}$,

31) $-C(=O)R^{e2}$,

32) $-C(=O)OR^{e2}$, and

33) $-C(=N-OR^{h2})NR^{e2}R^{f2}$,

R^{6b}, which are substituents on the nitrogen atom, if there are multiple instances on the same ring, are all independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted),

4) a C_{3-10} alicyclic group

(wherein the alicyclic group is optionally substituted),

5) $-C(=NR^{e2})R^{f2}$,

6) $-C(=N-OR^{e2})R^{f2}$,

7) $-SO_2-NR^{e2}R^{f2}$,

8) $-C(=NR^{h2})-NR^{e2}R^{f2}$,

9) $-C(=NR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

10) $-C(=N-OR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

11) $-C(=O)NR^{e2}R^{f2}$,

12) $-C(=O)NR^{e2}OR^{f2}$,

13) $-C(=O)NR^{g2}-NR^{e2}R^{f2}$,

14) $-C(=O)R^{e2}$, and

15) $-C(=N-OR^{h2})NR^{e2}R^{f2}$, or

if a combination of two R^{6a} or R^{6a} and R^{6b} are each substituted on adjacent atoms within a ring, the two substituents together may form an optionally substituted 5- to 6-membered heteroaryl ring or an optionally substituted 5- to 7-membered non-aryl heterocycle, which further fuses to an attachment moiety between the adjacent atoms within the ring,

R^{e2}, R^{f2}, R^{g2}, R^{h2}, and R^{i2} are the same or different, each independently

1) a hydrogen atom,

2) a C_{1-6} alkyl group,

3) a C_{3-10} alicyclic group,

4) C_{6-10} aryl,

5) 5- or 6-membered heteroaryl, or

6) a 4- to 10-membered non-aryl heterocycle,

(wherein each substituent from 2) to 6) is optionally substituted), and

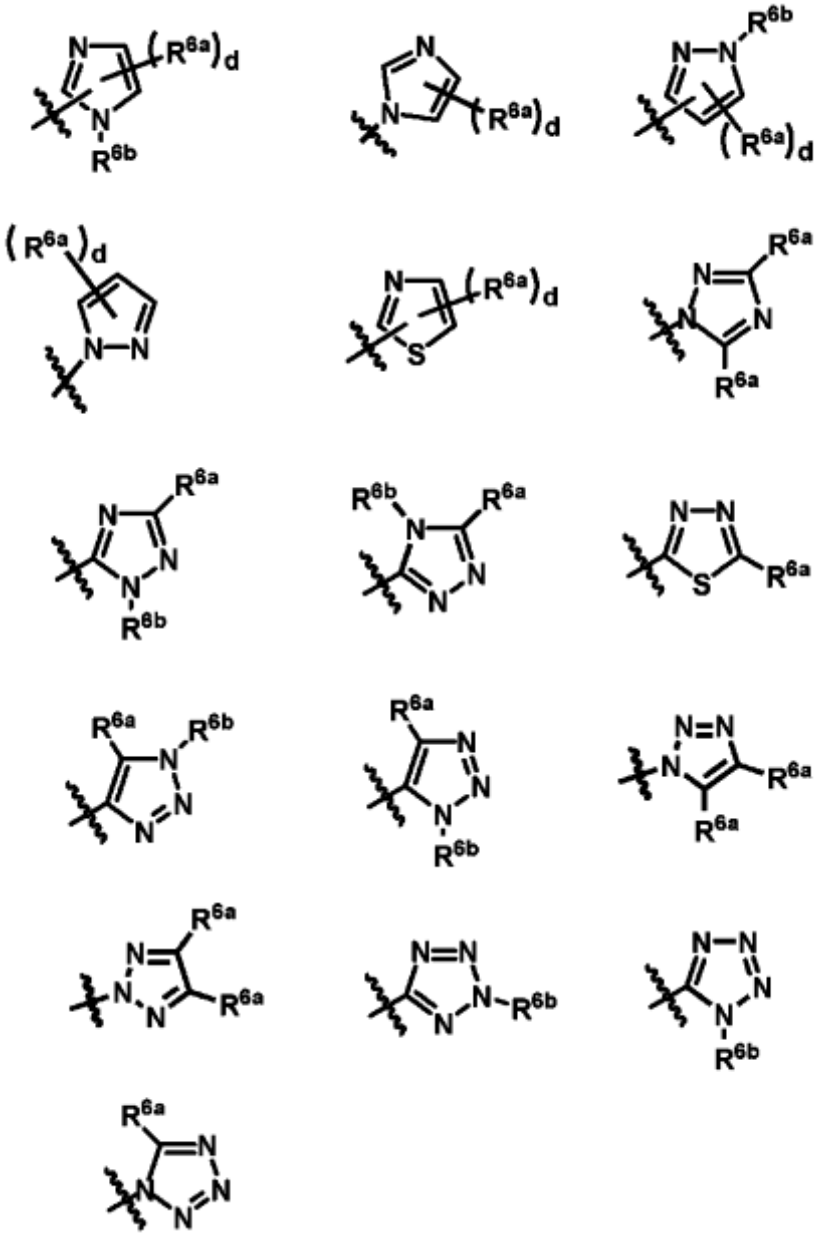
a combination of R^{e2} and R^{f2}, when attached to the same nitrogen atom, together may form an optionally substituted 4- to 10-membered nitrogen-containing non-aryl heterocycle.

[Claim 47]

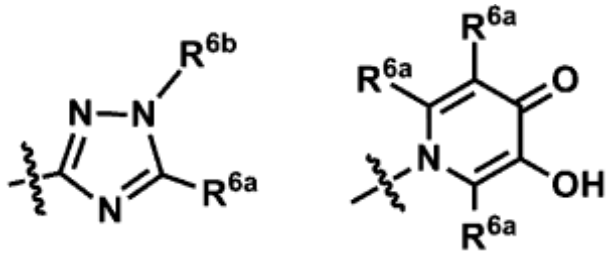
The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 24 and 28 to 46, wherein

R^5 is C_6 aryl or 5-membered, 6-membered, 9-membered, or 10-membered heteroaryl selected from the group consisting of

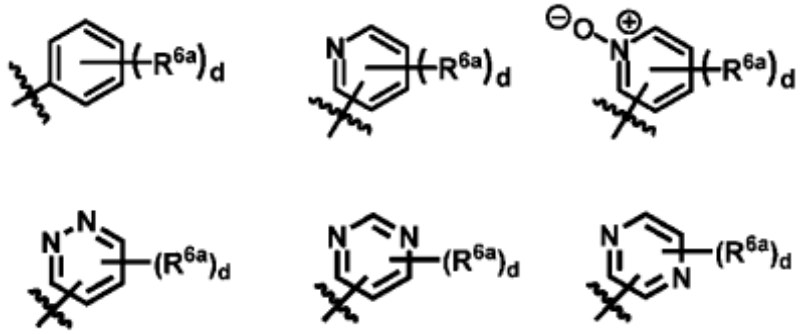
[Chemical Formula 750]



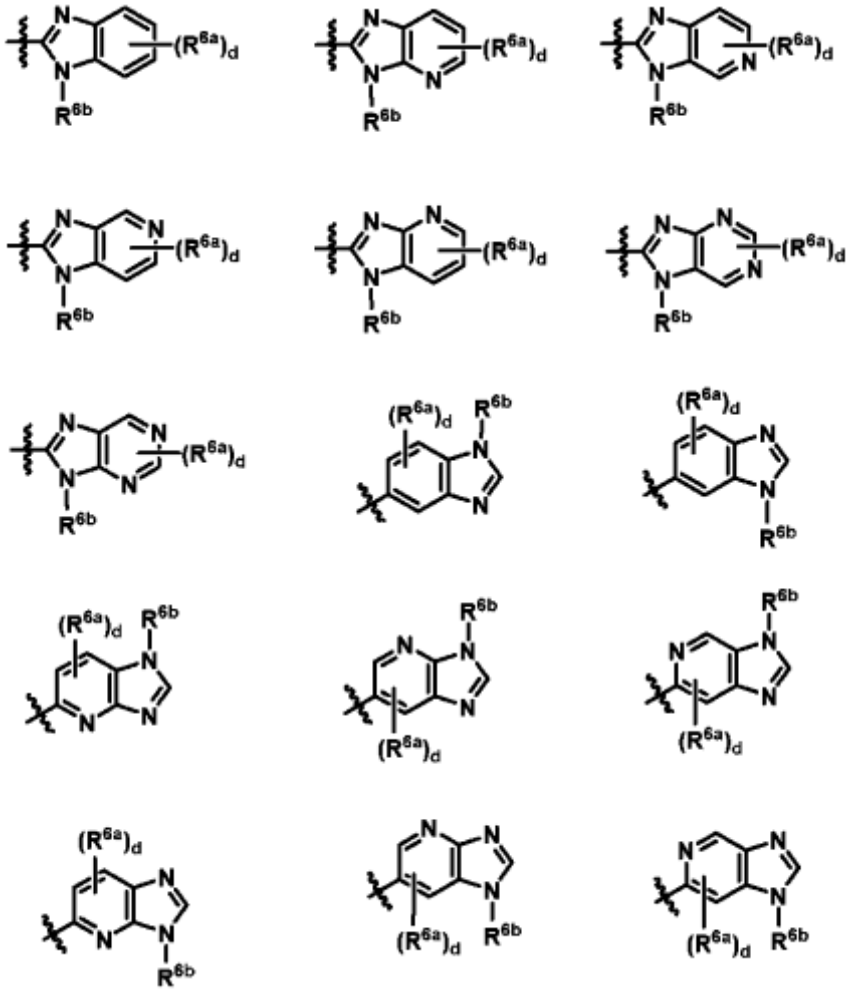
[Chemical Formula 751]



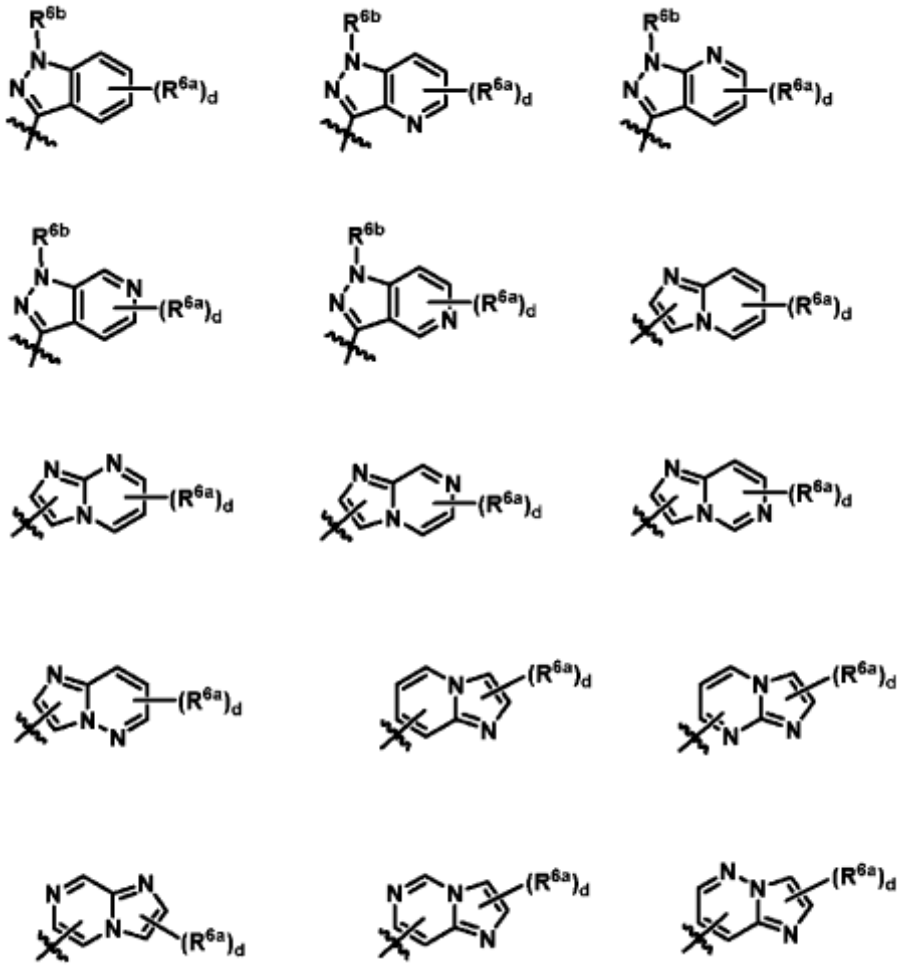
[Chemical Formula 752]



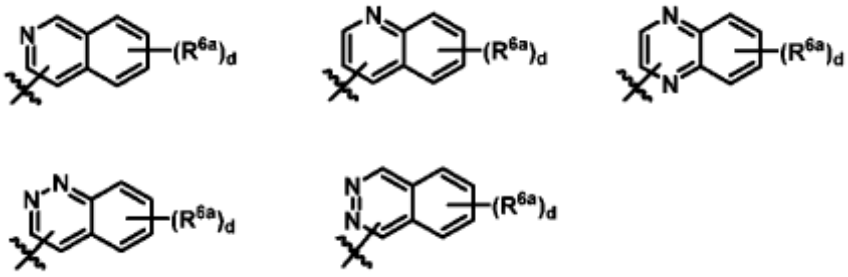
[Chemical Formula 753]



[Chemical Formula 754]



[Chemical Formula 755]



d is the number of chemically substitutable positions on a ring of each group by R^{6a}, and

each R^{6a} and each R^{6b} are defined the same as claim 46.

[Claim 48]

The compound or the pharmaceutically acceptable salt thereof according to claim 46 or 47, wherein

R^{6a}, if there are multiple instances on the same ring, are all independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) halogen,

4) a C_{1-4} alkyl group,

(wherein the alkyl group is optionally substituted with $NR^{e2}R^{f2}$, $-C(=O)OR^{f2}$, $-C(=O)NR^{e2}R^{f2}$, $-C(=O)NR^{e2}(OR^{f2})$, or a hydroxyl group),

5) a C_{1-4} alkoxy group,

6) $-NR^{e2}R^{f2}$,

7) $-C(=O)NR^{e2}R^{f2}$, and

8) $-C(=O)OR^{e2}$, and

each of R^{6b}, if there are multiple instances on the same ring, are all independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group, and

3) a C_{1-4} alkyl group,

(wherein the alkyl group is optionally substituted with $NR^{e2}R^{f2}$, $-C(=O)OR^{f2}$, $-C(=O)NR^{e2}R^{f2}$, $-C(=O)NR^{e2}(OR^{f2})$, or a hydroxyl group).

[Claim 49]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 24 and 28 to 48, wherein R^{e2} and R^{f2} are the same or different, each independently a hydrogen atom, an optionally substituted C_{1-6} alkyl group, or an optionally substituted C_{3-10} alicyclic group.

[Claim 50]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 24 and 28 to 49, wherein R^{e2} and R^{f2} are the same or different, each independently a hydrogen atom or an optionally substituted C_{1-6} alkyl group.

[Claim 51]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 24 and 28 to 50, wherein R^{e2} and R^{f2} are hydrogen atoms.

[Claim 52]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 46 to 51, wherein R^{6a} is $-NR^{e2}R^{f2}$, and one of R^{e2} and R^{f2} is a hydrogen atom and the other is a C_{1-4} alkyl group (wherein the alkyl group is optionally substituted with an amino group or a hydroxyl group).

[Claim 53]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 24 and 28 to 44, wherein R^5 is $-C(=O)NR^{50}R^{51}$.

[Claim 54]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 24, 28 to 40, and 53, wherein

R^{50} represents

1) a hydrogen atom,
2) an optionally substituted C_{1-4} alkyl group,
3) a hydroxyl group,
4) an optionally substituted C_{1-4} alkoxy group, or
5) an optionally substituted C_{1-6} alkylsulfonyl group,

R^{51} represents

1) a hydrogen atom, or
2) an optionally substituted C_{1-4} alkyl group, or

R^{50} and R^{51} together may form a 4- to 6-membered nitrogen-containing non-aryl heterocycle.

[Claim 55]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 24, 28 to 40, and 53 to 54, wherein

R^{50} represents

1) a hydrogen atom,

2) a C_{1-4} alkyl group (wherein the group is optionally substituted with halogen, a C_{3-6} alicyclic group, $-NR^{a21}R^{a22}$, or $-OR^{c11}$),

3) a hydroxyl group,

4) a C_{1-4} alkoxy group (wherein the group is optionally substituted with halogen, a C_{3-6} alicyclic group, $-NR^{a23}R^{a24}$, or $-OR^{c12}$), or

5) a C_{1-4} alkylsulfonyl group (wherein the group is optionally substituted with halogen, a C_{3-6} alicyclic group, $-NR^{a21}R^{a22}$, or $-OR^{c11}$),

R^{a21}, R^{a22}, R^{a23}, R^{a24}, R^{c11}, and R^{c12} are the same or different, each independently representing

1) a hydrogen atom, or

2) a C_{1-4} alkyl group (wherein the group is optionally substituted with halogen),

wherein each combination of R^{a21} and R^{a22} or R^{a23} and R^{a24} together may form an optionally substituted 4- to 7-membered nitrogen-containing non-aryl heterocycle, and

R^{51} is a hydrogen atom or C_{1-4} alkyl (wherein the group is optionally substituted with halogen).

[Claim 56]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 24, 28 to 40, and 53 to 55, wherein

R^{50} represents

1) a hydrogen atom,

2) a C_{1-4} alkyl group (wherein the group is optionally substituted with a cyclopropyl group, $-NH_2$, -NHMe, $-C(=O)NH_2$, $-C(=O)NHMe$, $-C(=O)NMe_2$, or a -hydroxyl group),

3) a hydroxyl group,

4) a C_{1-4} alkoxy group (wherein the group is optionally substituted with a cyclopropyl group, $-NH_2$, -NHMe, or a -hydroxyl group), or

5) a C_{1-4} alkylsulfonyl group, and

R^{51} is a hydrogen atom.

[Claim 57]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 24 and 28 to 40, wherein R^5 is $-C(=O)OR^{20}$.

[Claim 58]

The compound or the pharmaceutically acceptable salt thereof according to claim 57, wherein R^{20} is

1) a hydrogen atom, or

2) an optionally substituted C_{1-4} alkyl group.

[Claim 59]

The compound or the pharmaceutically acceptable salt thereof according to claim 56 or 58, wherein

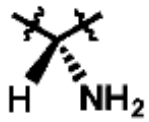
L^3 is $-CH_2-$, and

L^4 is a single bond, $-CH(NH_2)-$, or $-CMe(NH_2)-$.

[Claim 60]

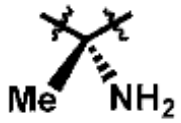
The compound or the pharmaceutically acceptable salt thereof according to claim 59, wherein L^4 is

[Chemical Formula 756]



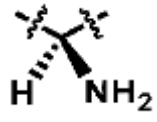
,

[Chemical Formula 757]



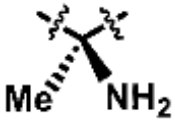
,

[Chemical Formula 758]



, or

[Chemical Formula 759]

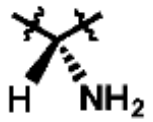


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[Claim 61]

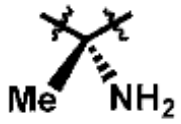
The compound or the pharmaceutically acceptable salt thereof according to claim 59 or 60, wherein L^4 is

[Chemical Formula 760]



or

[Chemical Formula 761]



.

[Claim 62]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 57 to 61, wherein R^{20} is a hydrogen atom.

[Claim 63]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 24 and 28 to 40, wherein

R^5 is $-NR^{e1}R^{f1}$,

L^3 is $-CH_2-$,

L^4 is $-CR^{40}R^{41}-$, and

R^{40} and R^{41} are each independently a C_{1-4} alkyl group substituted with a hydroxyl group, or together with the carbon atom to which they are attached, form a C_{3-6} alicyclic group.

[Claim 64]

The compound or the pharmaceutically acceptable salt thereof according to claim 63, wherein

R^{e1} and R^{f1} are the same or different, each independently

1) a hydrogen atom, or

2) an optionally substituted C_{1-3} alkyl group, and

L^4 is

[Chemical Formula 762]



.

[Claim 65]

The compound or the pharmaceutically acceptable salt thereof according to claim 63, wherein

R^{e1} and R^{f1} are the same or different, each independently

1) a hydrogen atom, or

2) an optionally substituted C_{1-3} alkyl group, and

L^4 is a C_{1-4} alkylene group substituted with a hydroxyl group.

[Claim 66]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 3 and 11 to 36, wherein L^4 is a single bond, or a C_{1-6} alkylene group optionally substituted with $-NR^{21}R^{22}$ or $=NOR^{23}$, wherein R^{21}, R^{22}, and R^{23} are each independently a hydrogen atom, an optionally substituted C_{1-6} alkyl group, or an optionally substituted 4- to 10-membered non-aryl heterocyclyl carbonyl group.

[Claim 67]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 3, 11 to 36, and 66, wherein L^4 is a single bond, $-CH_2-$, $-CH(NH_2)-$, $-CMe(NH_2)-$, $-CH(NHMe)-$, $-CD(NH_2)-$(wherein D represents a heavy hydrogen atom), $-CH_2CH_2-$, or $-CH(NH_2)-CH_2-$, wherein if an amino group is present in L^4, carbon that attaches to the amino group attaches to L^3.

[Claim 68]

The compound or the pharmaceutically acceptable salt thereof according to claim 67, wherein

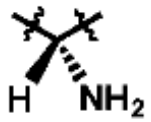
L^3 is $-C(=O)-$, and

L^4 is a single bond, $-CH_2-$, $-CH(NH_2)-$, $-CMe(NH_2)-$, or $-CH(NH_2)-CH_2-$.

[Claim 69]

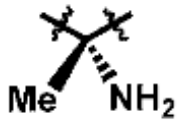
The compound or the pharmaceutically acceptable salt thereof according to claim 68, wherein L^4 is one of the following isomeric structures:

[Chemical Formula 763]



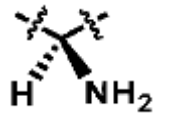
,

[Chemical Formula 764]



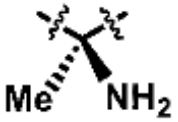
,

[Chemical Formula 765]



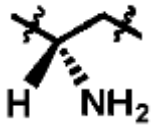
,

[Chemical Formula 766]



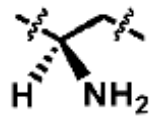
,

[Chemical Formula 767]



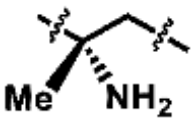
,

[Chemical Formula 768]



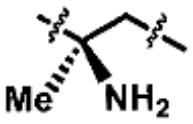
,

[Chemical Formula 769]



, or

[Chemical Formula 770]

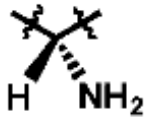


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[Claim 70]

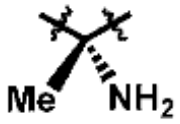
The compound or the pharmaceutically acceptable salt thereof according to claim 68 or 69, wherein L^4 is

[Chemical Formula 771]



or

[Chemical Formula 772]

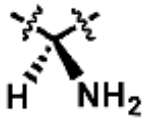


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[Claim 71]

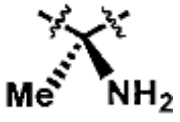
The compound or the pharmaceutically acceptable salt thereof according to claim 68 or 69, wherein L^4 is

[Chemical Formula 773]



or

[Chemical Formula 774]

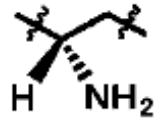


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[Claim 72]

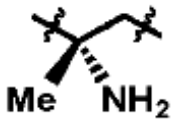
The compound or the pharmaceutically acceptable salt thereof according to claim 68 or 69, wherein L^4 is

[Chemical Formula 775]



or

[Chemical Formula 776]

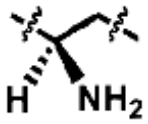


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[Claim 73]

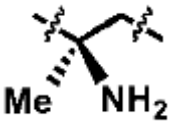
The compound or the pharmaceutically acceptable salt thereof according to claim 68 or 69, wherein L^4 is

[Chemical Formula 777]



or

[Chemical Formula 778]



.

[Claim 74]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 3, 11 to 36, and 66 to 73, wherein R^5 is a hydrogen atom, an optionally substituted C_{1-6} alkyl group, an optionally substituted C_{3-10} alicyclic group, an optionally substituted 4- to 10-membered non-aryl heterocycle, optionally substituted C_{6-10} aryl, optionally substituted 5- or 6-membered heteroaryl, an optionally substituted C_{1-6} alkylthio group, or $-NR^{e1}OH$, wherein R^{e1} is a hydrogen atom or an optionally substituted C_{1-6} alkyl group.

[Claim 75]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 3, 11 to 36, and 66 to 74, wherein R^5 is optionally substituted 5- or 6-membered heteroaryl or optionally substituted C_{6-10} aryl.

[Claim 76]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 3, 11 to 36, and 66 to 75, wherein R^5 is optionally substituted 5- or 6-membered heteroaryl.

[Claim 77]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 3, 11 to 36, and 66 to 76, wherein R^5 is an optionally substituted C_{4-10} alicyclic group or an optionally substituted 4- to 10-membered non-aryl heterocycle.

[Claim 78]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 3, 11 to 36, and 66 to 74, wherein L^4 is a single bond and R^5 is $-NR^{e1}OH$, wherein R^{e1} is a hydrogen atom or an optionally substituted C_{1-6} alkyl group.

[Claim 79]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 3 and 11 to 36, wherein

L^4 is

1) $-(CH_2)_p-CR^{10}(NHR^{11})-$,

2) $-(CH_2)_q-CR^{12}R^{13}-$, or

3) $-(CH_2)_p-CR^{10}(NHR^{11})-(CH_2)_q-CR^{12}R^{13}-$ (wherein p and q are independently 0 or 1),

R^{10} is

1) a hydrogen atom,

2) a carboxyl group, or

3) $-C(=O)NR^{10a}R^{10b}$,

R^{11} is

1) a hydrogen atom,

2) $-C(=O)R^{11a}$, or

3) an optionally substituted 5- or 6-membered non-aryl heterocyclyl carbonyl group,

wherein if R^{10} is $-C(=O)NR^{10a}R^{10b}$, R^{10b} and R^{11} together may form $-CH_2CH_2-$,

R^{12} is

1) a hydrogen atom, or

2) an optionally substituted C_{1-4} alkyl group,

R^{13} is

1) a hydrogen atom,
2) a hydroxyl group,
3) an optionally substituted C_{1-4} alkyl group,
4) a sulfanyl group,
5) a carboxyl group,
6) an optionally substituted C_{1-4} alkylthio group,
7) $-NR^{13a}R^{13b}$,
8) $-NR^{13a}-C(=O)R^{13b}$,
9) an optionally substituted 5- or 6-membered non-aryl heterocyclyl carbonylamino group,
10) $-NR^{13a}-C(=O)NR^{13b}R^{13c}$,
11) $-C(=O)NR^{13a}R^{13b}$,
12) $-C(=O)NR^{13a}OR^{13b}$,
13) $-S(=O)_2-R^{13a}$,
14) $-S(=O)_2-NR^{13a}R^{13b}$,
15) $-C(=O)NR^{13a}-S(=O)_2-R^{13b}$, or
16) $-C(=O)NR^{13a}-S(=O)_2-NR^{13b}R^{13c}$, and

R^{10a}, R^{10b}, R^{11a}, R^{13a}, R^{13b}, and R^{13c} are each independently a hydrogen atom or an optionally substituted C_{1-4} alkyl group.

[Claim 80]

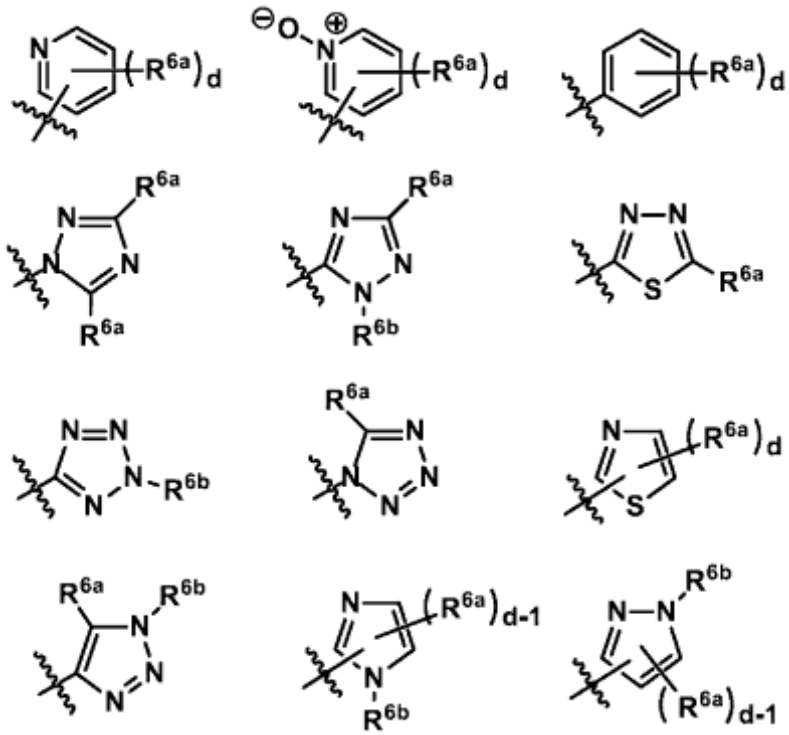
The compound or the pharmaceutically acceptable salt thereof according to claim 79, wherein R^5 is a hydrogen atom or an optionally substituted C_{1-4} alkyl group.

[Claim 81]

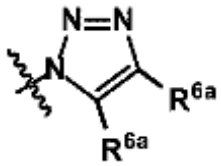
The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 3, 11 to 36, and 66 to 76, wherein

R^5 is selected from the group consisting of

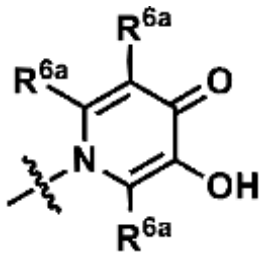
[Chemical Formula 779]



[Chemical Formula 780]



[Chemical Formula 781]



,

subscript d is the number of substitutable positions on a ring of R^5,

each R^{6a} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) a cyano group,

4) a nitro group,

5) halogen,

6) a C_{1-4} alkyl group,

7) a C_{3-10} alicyclic group,

8) a C_{1-4} alkoxy group,

9) a C_{3-10} alicyclic oxy group,

10) a C_{6-10} aryloxy group,

11) a 5- or 6-membered heteroaryloxy group,

12) a 4- to 10-membered non-aryl heterocyclyl oxy group,

(wherein each substituent from 6) to 12) is optionally substituted),

13) $-SO_2-NR^{e2}R^{f2}$,

14) $-NR^{g2}-CR^{e2}(=NR^{f2})$,

15) $-NR^{g2}-CR^{e2}(=N-OR^{f2})$,

16) $-NR^{h2}-C(=NR^{g2})NR^{e2}R^{f2}$,

17) $-NR^{h2}-C(=N-OR^{g2})NR^{e2}R^{f2}$,

18) $-NR^{i2}-C(=NR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

19) $-NR^{i2}-C(=N-OR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

20) $-C(=NR^{e2})R^{f2}$,

21) $-C(=N-OR^{e2})R^{f2}$,

22) $-C(=NR^{h2})-NR^{e2}R^{f2}$,

23) $-C(=NR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

24) $-C(=N-OR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

25) $-NR^{e2}R^{f2}$,

26) $-NR^{g2}-NR^{e2}R^{f2}$,

27) $-NR^{e2}OR^{f2}$,

28) $-NR^{e2}-C(=O)R^{f2}$,

29) $-C(=O)NR^{e2}R^{f2}$,

30) $-C(=O)NR^{e2}OR^{f2}$,

31) $-C(=O)NR^{g2}-NR^{e2}R^{f2}$,

32) $-C(=O)R^{e2}$,

33) $-C(=O)OR^{e2}$, and

34) $-C(=N-OR^{h2})NR^{e2}R^{f2}$, and

each R^{6b} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted),

4) a C_{3-10} alicyclic group

(wherein the alicyclic group is optionally substituted),

5) $-C(=NR^{e2})R^{f2}$,

6) $-C(=N-OR^{e2})R^{f2}$,

7) $-SO_2-NR^{e2}R^{f2}$,

8) $-C(=NR^{h2})-NR^{e2}R^{f2}$,

9) $-C(=NR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

10) $-C(=N-OR^{h2})NR^{g2}-NR^{e2}R^{f2}$,

11) $-C(=O)NR^{e2}R^{f2}$,

12) $-C(=O)NR^{e2}OR^{f2}$,

13) $-C(=O)NR^{g2}-NR^{e2}R^{f2}$,

14) $-C(=O)R^{e2}$, and

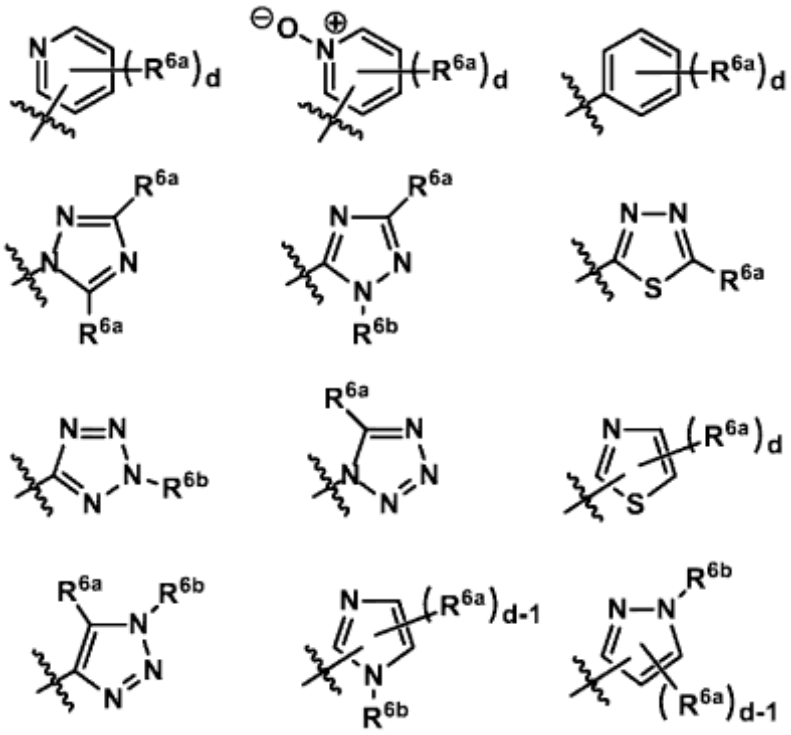
15) $-C(=N—OR^{h2})NR^{e2}R^{f2}$.

[Claim 82]

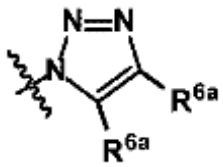
The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 3, 11 to 36, 66 to 76, and 81, wherein

R^5 is 5- or 6-membered aryl or heteroaryl selected from the group consisting of

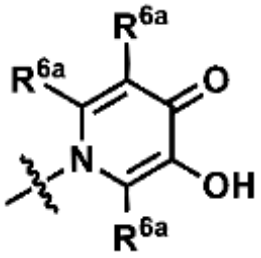
[Chemical Formula 782]



[Chemical Formula 783]



[Chemical Formula 784]



,

subscript d is the number of substitutable positions on a ring of R^5,

each R^{6a} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) halogen,

4) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted with $NR^{e2}R^{f2}$, a 5- or 6-membered non-aryl heterocycle, $-C(=O)OR^{f2}$, or a hydroxyl group),

5) a C_{1-4} alkoxy group,

6) $-NR^{e2}R^{f2}$, and

7) $-C(=O)OR^{e2}$, and

each R^{6b} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group, and

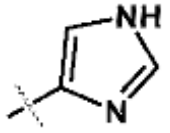
3) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted with $NR^{e2}R^{f2}$, $-C(=O)NR^{e2}R^{f2}$, $-C(=O)OR^{f2}$, or a hydroxyl group).

[Claim 83]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 3, 11 to 36, 66 to 76, and 81 to 82, wherein R^5 is

[Chemical Formula 785]



.

[Claim 84]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 3, 11 to 36, 66 to 76, and 81 to 82, wherein R^{e2} and R^{f2} are the same or different, each independently a hydrogen atom, an optionally substituted C_{1-6} alkyl group, or an optionally substituted C_{3-10} alicyclic group.

[Claim 85]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 3, 11 to 36, 66 to 76, 81 to 82, and 84, wherein R^{e2} and R^{f2} are the same or different, each independently a hydrogen atom or an optionally substituted C_{1-6} alkyl group.

[Claim 86]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 3, 11 to 36, 66 to 76, 81 to 82, and 84 to 85, wherein R^{e2} and R^{f2} are hydrogen atoms.

[Claim 87]

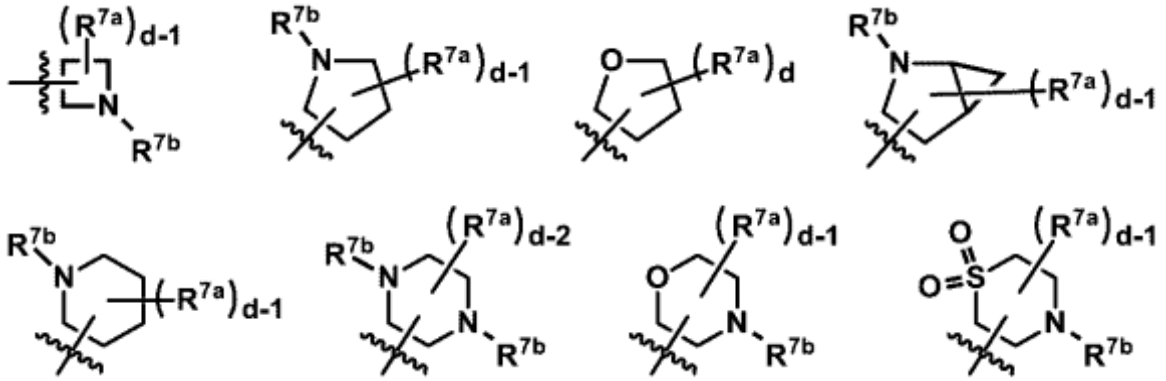
The compound or the pharmaceutically acceptable salt thereof according to any one of claims 81 to 82 and 84 to 85, wherein R^{6a} is $-NR^{e2}R^{f2}$, and one of R^{e2} and R^{f2} is a hydrogen atom and the other is a C_{1-4} alkyl group (wherein the alkyl group is optionally substituted with an amino group or a hydroxyl group).

[Claim 88]

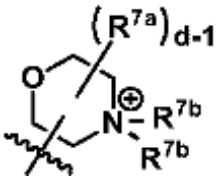
The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 3, 11 to 36, 66 to 74, and 77, wherein

R^5 is a 4- to 6-membered non-aryl heterocycle selected from the group consisting of

[Chemical Formula 786]



[Chemical Formula 787]



,

subscript d is the number of substitutable positions on a ring of R^5,

each R^{7a} is independently selected from the group consisting of

1) a hydrogen atom,
2) a hydroxyl group,
3) a cyano group,
4) halogen,
5) a C_{1-4} alkyl group,
6) a C_{3-10} alicyclic group,
7) a C_{1-4} alkoxy group,
8) a C_{3-10} alicyclic oxy group,
9) a C_{6-10} aryloxy group,
10) a 5- or 6-membered heteroaryloxy group,
11) a 4- to 10-membered non-aryl heterocyclyl oxy group,
(wherein each substituent from 5) and 11) is optionally substituted),
12) $-SO_2-NR^{e3}R^{f3}$,
13) $-NR^{g2}-CR^{e3}(=NR^{f3})$,
14) $-NR^{g2}-CR^{e3}(=N-OR^{f3})$,
15) $-NR^{h2}-C(=NR^{g2})NR^{e3}R^{f3}$,
16) $-NR^{h2}-C(=N-OR^{g2})NR^{e3}R^{f3}$,
17) $-NR^{i2}-C(=NR^{h2})NR^{g2}-NR^{e3}R^{f3}$,
18) $-NR^{i2}-C(=N-OR^{h2})NR^{g2}-NR^{e3}R^{f3}$,
19) $-C(=NR^{e3})R^{f3}$,
20) $-C(=N-OR^{e3})R^{f3}$,
21) $-C(=NR^{h2})-NR^{e3}R^{f3}$,
22) $-C(=NR^{h2})NR^{g2}-NR^{e3}R^{f3}$,
23) $-C(=N-OR^{h2})NR^{g2}-NR^{e3}R^{f3}$,
24) $-NR^{e3}R^{f3}$,
25) $-NR^{g2}-NR^{e3}R^{f3}$,
26) $-NR^{e3}OR^{f3}$,
27) $-NR^{e3}-C(=O)R^{f3}$,
28) $-C(=O)NR^{e3}R^{f3}$,
29) $-C(=O)NR^{e3}OR^{f3}$,
30) $-C(=O)NR^{g2}-NR^{e3}R^{f3}$,
31) $-C(=O)R^{e3}$,

32) $-C(=O)OR^{e3}$, and

33) $-C(=N-OR^{h2})NR^{e3}R^{f3}$,

each R^{7b} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted),

4) a C_{3-10} alicyclic group

(wherein the alicyclic group is optionally substituted),

5) $-C(=NR^{e3})R^{f3}$,

6) $-C(=N-OR^{e3})R^{f3}$,

7) $-SO_2-NR^{e3}R^{f3}$,

8) $-C(=NR^{h2})-NR^{e3}R^{f3}$,

9) $-C(=NR^{h2})NR^{g2}-NR^{e3}R^{f3}$,

10) $-C(=N-OR^{h2})NR^{g2}-NR^{e3}R^{f3}$,

11) $-C(=O)NR^{e3}R^{f3}$,

12) $-C(=O)NR^{e3}OR^{f3}$,

13) $-C(=O)NR^{g2}-NR^{e3}R^{f3}$,

14) $-C(=O)R^{e3}$, and

15) $-C(=N-OR^{h2})NR^{e3}R^{f3}$, and

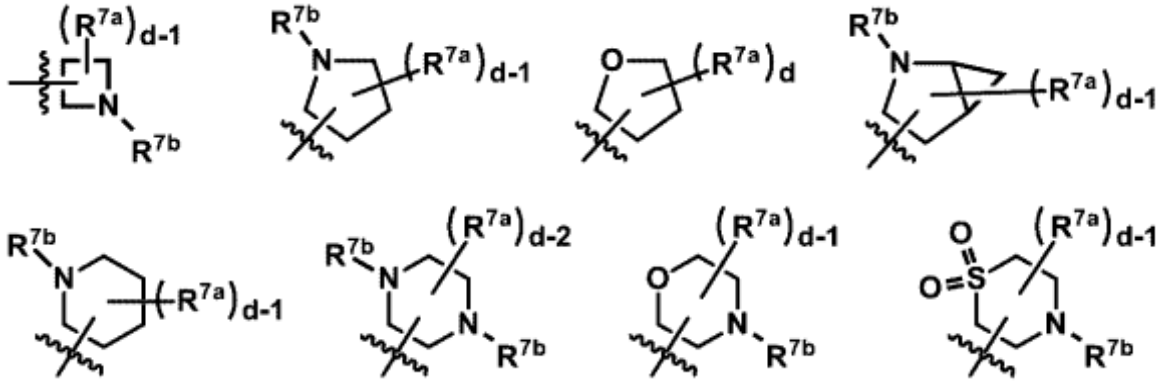
R^{e3}, R^{f3}, R^{g2}, R^{h2}, and R^{i2} are defined the same as R^{e2}, R^{f2}, R^{g2}, R^{h2}, and R^{i2} according to claim 3.

[Claim 89]

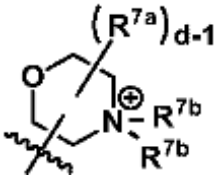
The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 3, 11 to 36, 66 to 74, 77, and 88, wherein

R^5 is a 4- to 6-membered non-aryl heterocycle selected from the group consisting of

[Chemical Formula 788]



[Chemical Formula 789]



,

subscript d is the number of substitutable positions on a ring of R^5,

each R^{7a} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) halogen,

4) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted with $NR^{e3}R^{f3}$, a 5- or 6-membered non-aryl heterocycle, $-C(=O)OR^{f3}$, or a hydroxyl group),

5) a C_{1-4} alkoxy group,

6) $-NR^{e3}R^{f3}$,

7) $-C(=O)OR^{e3}$,

8) C_{6-10} aryl, and

9) $-C(=O)NR^{e3}R^{f3}$,

each R^{7b} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group, and

3) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted with $NR^{e3}R^{f3}$, $-C(=O)OR^{f3}$, or a hydroxyl group), and

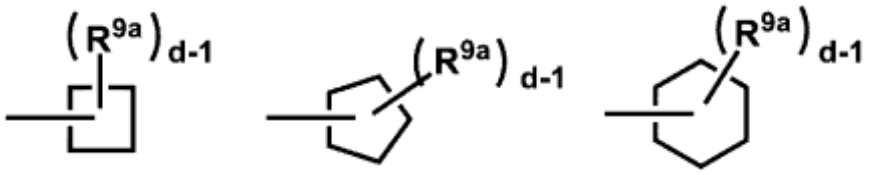
R^{e3} and R^{f3} are defined the same as R^{e2} and R^{f2} according to any one of claims 84 to 86.

[Claim 90]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 3, 11 to 36, 66 to 74, and 77, wherein

R^5 is C_{4-6} cycloalkyl selected from the group consisting of

[Chemical Formula 790]



,

subscript d is the number of substitutable positions on a ring of R^5,

each R^{9a} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) a cyano group,

4) halogen,

5) a C_{1-4} alkyl group,

6) a C_{3-10} alicyclic group,

7) a C_{1-4} alkoxy group,

8) a C_{3-10} alicyclic oxy group,

9) a C_{6-10} aryloxy group,

10) a 5- or 6-membered heteroaryloxy group,

11) a 4- to 10-membered non-aryl heterocyclyl oxy group,

(wherein each substituent from 5) and 11) is optionally substituted),

12) $-SO_2-NR^{e3}R^{f3}$,

13) $-NR^{g2}-CR^{e3}(=NR^{f3})$,

14) $-NR^{g2}-CR^{e3}(=N-OR^{f3})$,

15) $-NR^{h2}-C(=NR^{g2})NR^{e3}R^{f3}$,

16) $-NR^{h2}-C(=N-OR^{g2})NR^{e3}R^{f3}$,

17) $-NR^{i2}-C(=NR^{h2})NR^{g2}-NR^{e3}R^{f3}$,

18) $-NR^{i2}-C(=N-OR^{h2})NR^{g2}-NR^{e3}R^{f3}$,

19) $-C(=NR^{e3})R^{f3}$,

20) $-C(=N-OR^{e3})R^{f3}$,

21) $-C(=NR^{h2})-NR^{e3}R^{f3}$,

22) $-C(=NR^{h2})NR^{g2}-NR^{e3}R^{f3}$,

23) $-C(=N-OR^{h2})NR^{g2}-NR^{e3}R^{f3}$,

24) $-NR^{e3}R^{f3}$,

25) $-NR^{g2}-NR^{e3}R^{f3}$,

26) $-NR^{e3}OR^{f3}$,

27) $-NR^{e3}-C(=O)R^{f3}$,

28) $-C(=O)NR^{e3}R^{f3}$,

29) $-C(=O)NR^{e3}OR^{f3}$,

30) $-C(=O)NR^{g2}-NR^{e3}R^{f3}$,

31) $-C(=O)R^{e3}$,

32) $-C(=O)OR^{e3}$, and

33) $-C(=N-OR^{h2})NR^{e3}R^{f3}$, and

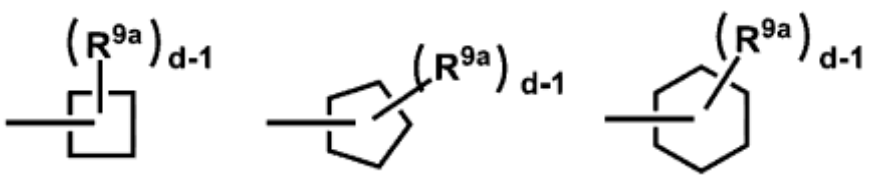
R^{e3}, R^{f3}, R^{g2}, R^{h2}, and R^{i2} are defined the same as R^{e2} and R^{f2} according to claim 3.

[Claim 91]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 3, 11 to 36, 66 to 74, 77, and 90, wherein

R^5 is C_{4-6} cycloalkyl selected from the group consisting of

[Chemical Formula 791]



,

subscript d is the number of substitutable positions on a ring of R^5,

each R^{9a} is independently selected from the group consisting of

1) a hydrogen atom,

2) a hydroxyl group,

3) halogen,

4) a C_{1-4} alkyl group

(wherein the alkyl group is optionally substituted with $NR^{e3}R^{f3}$, a 5- or 6-membered non-aryl heterocycle, $-C(=O)OR^{f3}$, or a hydroxyl group),

5) a C_{1-4} alkoxy group,

6) $-NR^{e3}R^{f3}$,

7) $-C(=O)OR^{e3}$,

8) C_{6-10} aryl, and

9) $-C(=O)NR^{e3}R^{f3}$, and

R^{e3} and R^{f3} are defined the same as R^{e2} and R^{f2} according to any one of claims 75 to 77.

[Claim 92]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 3, 11 to 36, and 79 to 80, wherein

L^4 is $-CH(NH_2)-CHR^{13}-$, wherein carbon that attaches to the NH_2 attaches to L^3,

R^5 is a hydrogen atom, and

R^{13} is

1) $-NH-C(=O)CH_3$,

2) $-NH-C(=O)NH_2$,

3) $-NH-C(=O)CH(NH_2)-CH_2C(=O)NH_2$,

4) $-NH-C(=O)CH_2-NH_2$,

5) $-NH-C(=O)CH(NH_2)-CH_2OH$, or

6) a pyrrolidin-2-ylcarbonylamino group.

[Claim 93]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 3, 11 to 36, and 79 to 80, wherein L^4 is $-CH(NH_2)-CR^{12}R^{13}-$, wherein carbon that attaches to the NH_2 attaches to L^3,

R^5 is a hydrogen atom or methyl,

R^{12} is a hydrogen atom or methyl, and

R^{13} is a benzylthio group or a sulfanyl group.

[Claim 94]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 3, 11 to 36, and 79 to 80, wherein

L^4 is $-CH(NH_2)-(CH_2)_q-CHR^{13}-$, wherein q is 0 or 1, and carbon that attaches to the NH_2 attaches to L^3,

R^5 is a hydrogen atom, and

R^{13} is

1) a carboxyl group,
2) $-C(=O)NH_2$,
3) $-C(=O)NH(CH_3)$,
4) $-C(=O)N(CH_3)_2$,
5) $-C(=O)NH-(CH_2)_2-OH$,
6) $-C(=O)NH-(CH_2)_2-NH_2$,
7) $-C(=O)NH-S(=O)_2-CH_3$,
8) $-C(=O)NHOH$,
9) $-S(=O)_2-NH_2$,
10) $-S(=O)_2-CH_3$, or
11) a hydroxyl group.

[Claim 95]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 3, 11 to 36, and 79 to 80, wherein

L^4 is $-CH(NHR^{11})-CH_2-$, wherein carbon that attaches to the NHR^{11} attaches to L^3,

R^5 is hydrogen, and

R^{11} is

1) $-C(=O)CH(NH_2)-CH_2C(=O)NH_2$,

2) $-C(=O)CH_2-NH_2$,

3) $-C(=O)CH(CH_3)-NH_2$,

4) $-C(=O)CH(NH_2)-CH_2OH$, or

5) pyrrolidin-2-ylcarbonyl.

[Claim 96]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 3, 11 to 36, and 79 to 80, wherein

L^4 is $-CH(NHR^{11})-CH(COOH)-$, wherein carbon that attaches to the NHR^{11} attaches to L^3,

R^5 is hydrogen, and

R^{11} is

1) $-C(=O)CH(NH_2)-CH_2C(=O)NH_2$,

2) $-C(=O)CH_2-NH_2$,

3) $-C(=O)CH(CH_3)-NH_2$,

4) $-C(=O)CH(NH_2)-CH_2OH$, or

5) pyrrolidin-2-ylcarbonyl.

[Claim 97]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 3, 11 to 36, and 79 to 80, wherein

L^4 is $-CHR^{13}-$ or $-CH_2-CHR^{13}-$,

R^5 is hydrogen, and

R^{13} is $-C(=O)NH_2$ or $-C(=O)NHOH$.

[Claim 98]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 3, 11 to 36, and 79 to 80, wherein

L^4 is $-CH_2-CR^{10}(NH_2)-$, wherein the CH_2 group attaches to L^3,

R^5 is hydrogen, and

R^{10} is a carboxy group or $-C(=O)NH_2$.

[Claim 99]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 3, 11 to 36, and 79 to 80, wherein

L^4 is $-(CH_2)_p-CR^{10}(NHR^{11})-(CH_2)_q-CHR^{13}-$ or $-CHR^{13}-(CH_2)_q-CR^{10}(NHR^{11})-(CH_2)_p-$, wherein q is 0 or 1,

R^5 is hydrogen,

(1) if L^4 is $-CHR^{13}-(CH_2)_q-CR^{10}(NHR^{11})-(CH_2)_p-$,

carbon of the $-CHR^{13}-$ group attaches to L^3,

p is 0,

R^{10} is a hydrogen atom, a carboxyl group, or $-C(=O)NHR^{10b}$,

R^{11} is a hydrogen atom,

R^{10b} is a hydrogen atom,

wherein if R^{10} is $-C(=O)NHR^{10b}$, R^{10b} and R^{11} together may form $-CH_2CH_2-$, and

R^{13} is a hydrogen atom,

(2) if L^4 is $-(CH_2)_p-CR^{10}(NHR^{11})-(CH_2)_q-CHR^{13}-$,

carbon of the $-(CH_2)_p-$ group attaches to L^3,

p is 1,

R^{10} and R^{11} are both hydrogen atoms,

R^{13} is a carboxyl group or $-C(=O)NR^{13a}R^{13b}$, and

R^{13a} and R^{13b} are each independently a hydrogen atom or an optionally substituted C_{1-4} alkyl group.

[Claim 100]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 3, 11 to 36, and 79 to 80, wherein

L^4 is $-CR^{12}(NH_2)-$,

R^{12} is a hydrogen atom or a methyl group, and

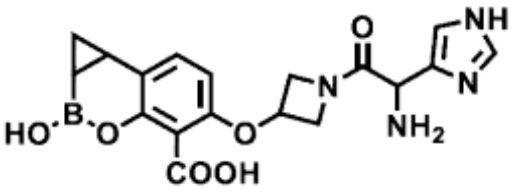
R^5 is a C_{1-4} alkyl group optionally substituted with a hydroxyl group.

[Claim 101]

The compound or the pharmaceutically acceptable salt thereof according to claim 1 or 2, selected from the group consisting of the compounds represented by the following names or structural formulas:

5-({1-[amino(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

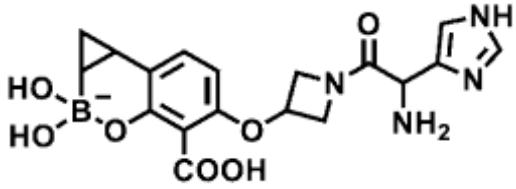
[Chemical Formula 792]



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9-[1-[2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

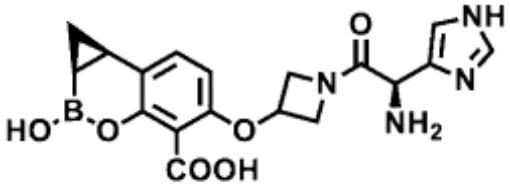
[Chemical Formula 793]



,

(1aS,7bR)-5-({1-[(2R)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

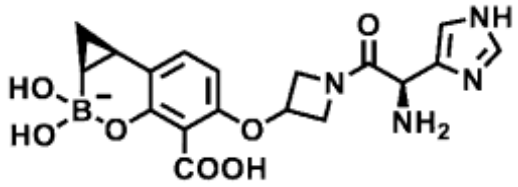
[Chemical Formula 794]



,

(2R,4S)-9-[1-[(2R)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

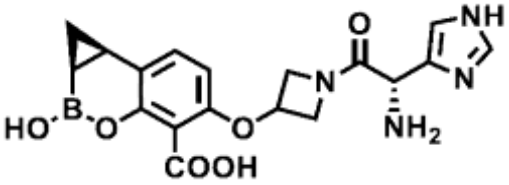
[Chemical Formula 795]



,

(1aS,7bR)-5-({1-[(2S)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

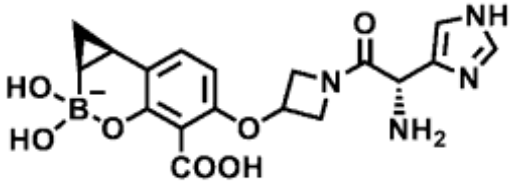
[Chemical Formula 796]



,

(2R,4S)-9-[1-[(2S)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

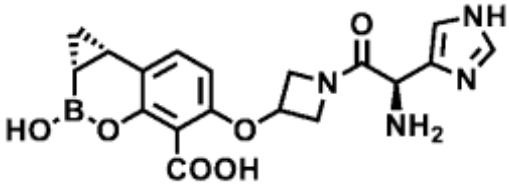
[Chemical Formula 797]



,

(1aR,7bS)-5-({1-[(2R)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

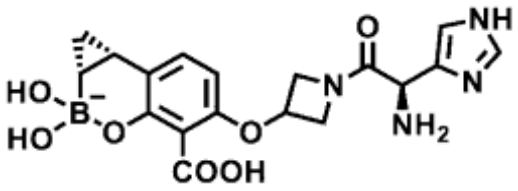
[Chemical Formula 798]



,

(2S,4R)-9-[1-[(2R)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

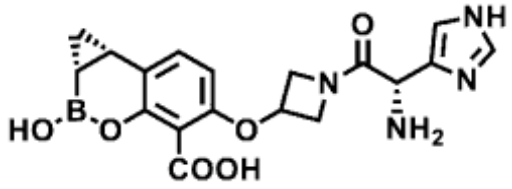
[Chemical Formula 799]



,

(1aR,7bS)-5-({1-[(2S)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

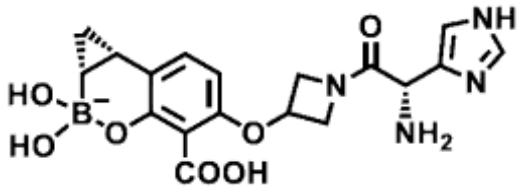
[Chemical Formula 800]



,

(2S,4R)-9-[1-[(2S)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

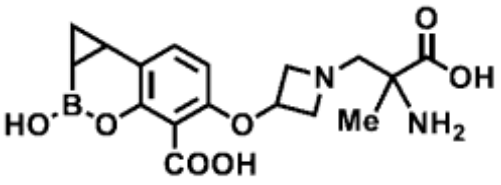
[Chemical Formula 801]



,

5-({1-(2-amino-2-carboxypropyl)azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

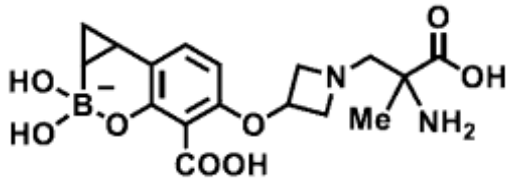
[Chemical Formula 802]



,

9-[1-(propyl 2-amino-2-carboxylate)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

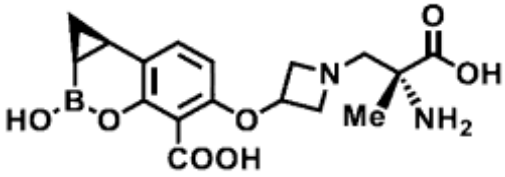
[Chemical Formula 803]



,

(1aS,7bR)-5-({1-[(2R)-2-amino-2-carboxypropyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

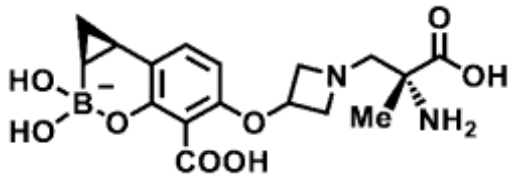
[Chemical Formula 804]



,

(2R,4S)-9-[1-[propyl (2R)-2-amino-2-carboxylate]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

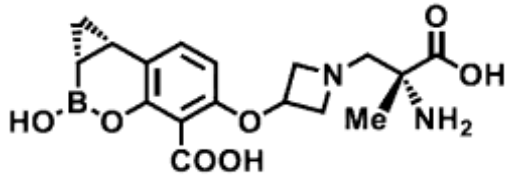
[Chemical Formula 805]



,

(1aR,7bS)-5-({1-[(2R)-2-amino-2-carboxypropyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

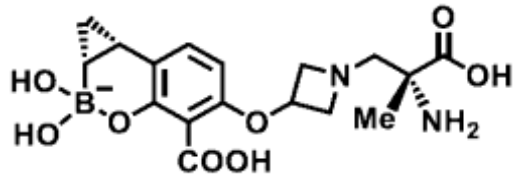
[Chemical Formula 806]



,

(2S,4R)-9-[1-[propyl (2R)-2-amino-2-carboxylate]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

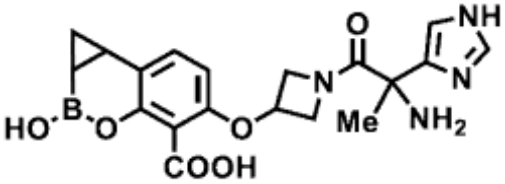
[Chemical Formula 807]



,

5-({1-[2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

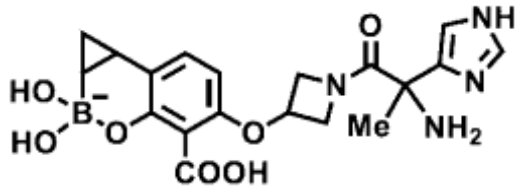
[Chemical Formula 808]



,

9-[1-[2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

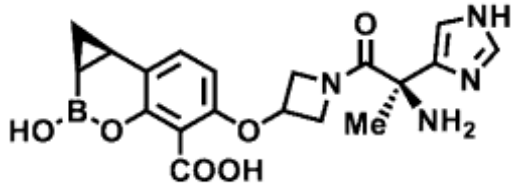
[Chemical Formula 809]



,

(1aS,7bR)-5-({1-[(2R)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

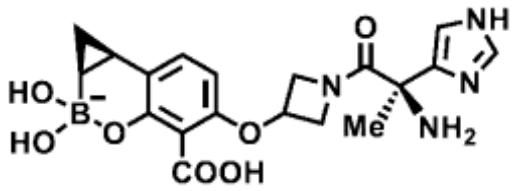
[Chemical Formula 810]



,

(2R,4S)-9-[1-[(2R)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

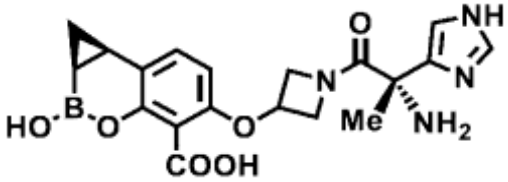
[Chemical Formula 811]



,

(1aS,7bR)-5-({1-[(2S)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

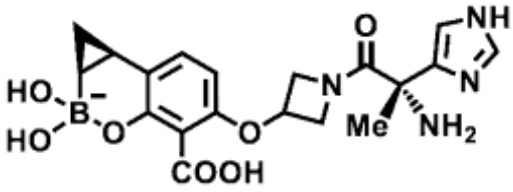
[Chemical Formula 812]



,

(2R,4S)-9-[1-[(2S)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

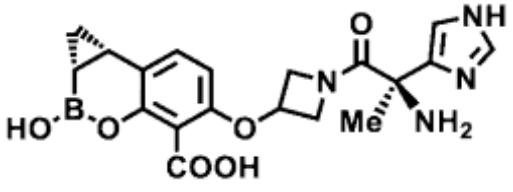
[Chemical Formula 813]



,

(1aR,7bS)-5-({1-[(2R)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

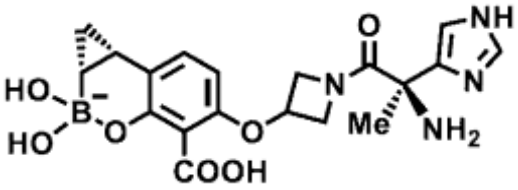
[Chemical Formula 814]



,

(2S,4R)-9-[1-[(2R)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

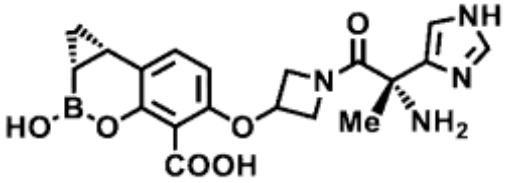
[Chemical Formula 815]



,

(1aR,7bS)-5-({1-[(2S)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

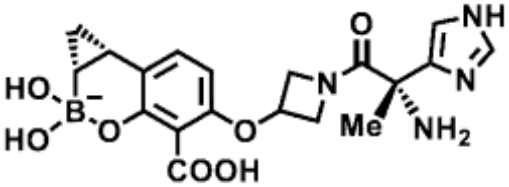
[Chemical Formula 816]



, and

(2S,4R)-9-[1-[(2S)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

[Chemical Formula 817]



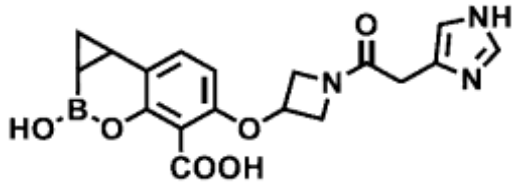
.

[Claim 102]

The compound or the pharmaceutically acceptable salt thereof according to claim 1 or 2, selected from the group consisting of the compounds represented by the following names or structural formulas:

2-hydroxy-5-({1-[(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

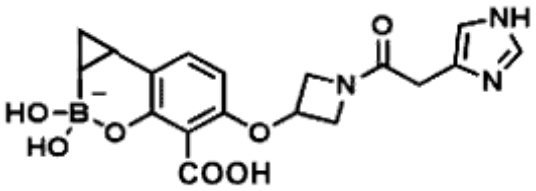
[Chemical Formula 818]



,

5,5-dihydroxy-9-{1-[(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

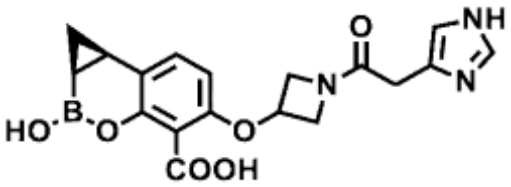
[Chemical Formula 819]



,

(1aS,7bR)-2-hydroxy-5-({1-[(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

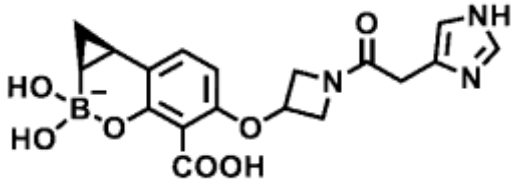
[Chemical Formula 820]



,

(2R,4S)-5,5-dihydroxy-9-{1-[(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

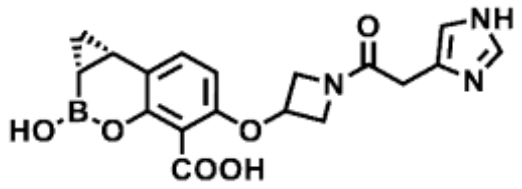
[Chemical Formula 821]



,

(1aR,7bS)-2-hydroxy-5-({1-[(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

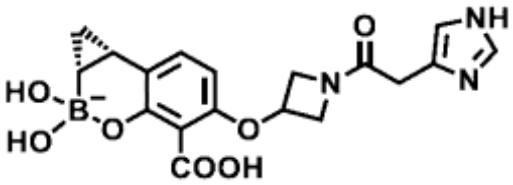
[Chemical Formula 822]



,

(2S,4R)-5,5-dihydroxy-9-{1-[(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid

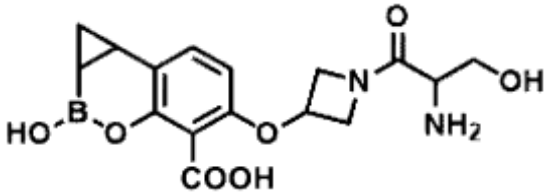
[Chemical Formula 823]



,

2-hydroxy-5-[(1-serylazetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

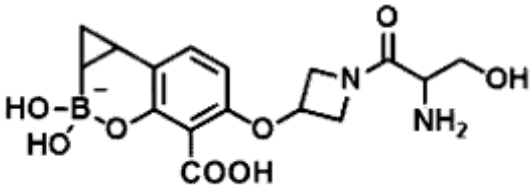
[Chemical Formula 824]



,

5,5-dihydroxy-9-(1-serylazetidin-3-yl)oxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid

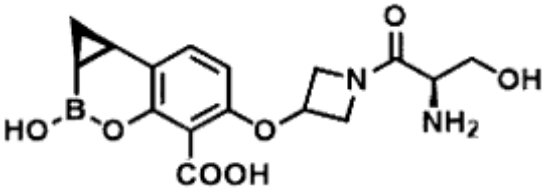
[Chemical Formula 825]



,

(1aS,7bR)-2-hydroxy-5-[(1-D-serylazetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

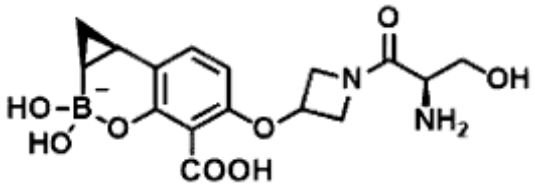
[Chemical Formula 826]



,

(2R,4S)-5,5-dihydroxy-9-(1-D-serylazetidin-3-yl)oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

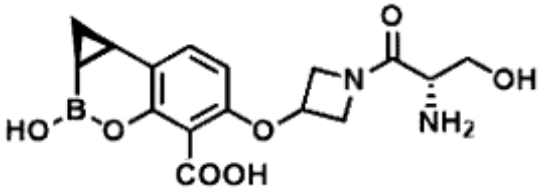
[Chemical Formula 827]



,

(1aS,7bR)-2-hydroxy-5-[(1-L-serylazetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

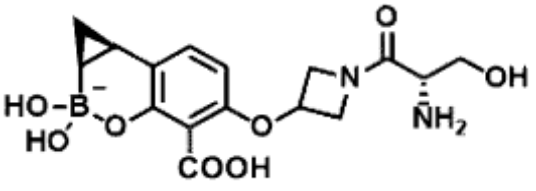
[Chemical Formula 828]



,

(2R,4S)-5,5-dihydroxy-9-(1-L-serylazetidin-3-yl)oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

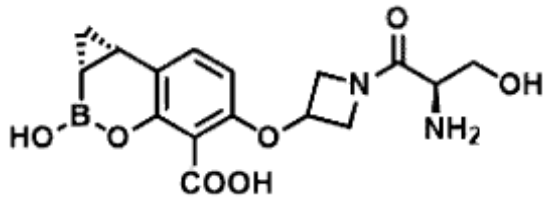
[Chemical Formula 829]



,

(1aR,7bS)-2-hydroxy-5-[(1-D-serylazetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

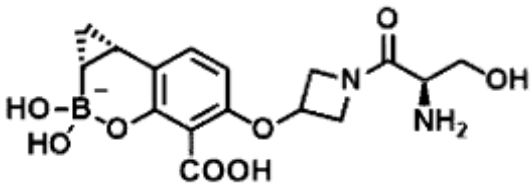
[Chemical Formula 830]



,

(2S,4R)-5,5-dihydroxy-9-(1-D-serylazetidin-3-yl)oxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid

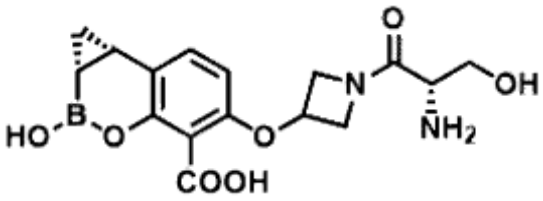
[Chemical Formula 831]



,

(1aR,7bS)-2-hydroxy-5-[(1-L-serylazetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

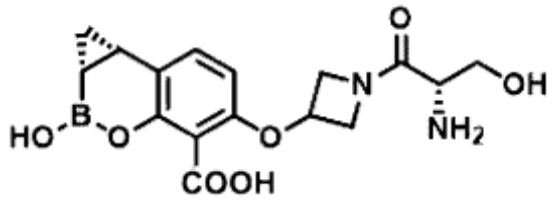
[Chemical Formula 832]



,

(2S,4R)-5,5-dihydroxy-9-(1-L-serylazetidin-3-yl)oxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid

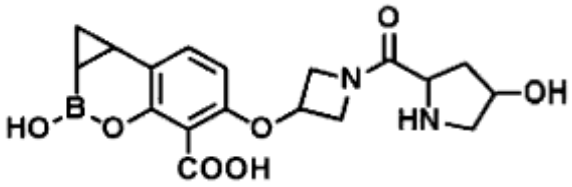
[Chemical Formula 833]



,

2-hydroxy-5-({1-[4-hydroxy-prolyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

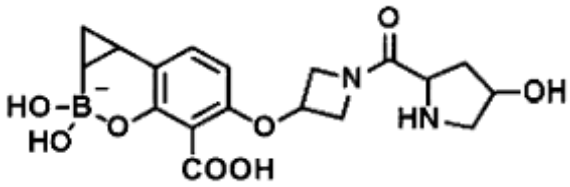
[Chemical Formula 834]



,

5,5-dihydroxy-9-{1-[4-hydroxy-prolyl]azetidin-3-yl}oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

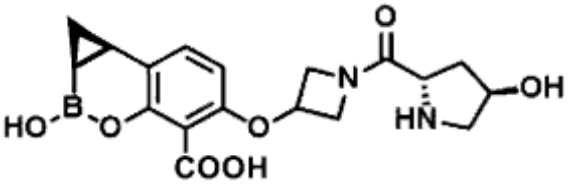
[Chemical Formula 835]



,

(1aS,7bR)-2-hydroxy-5-({1-[(4R)-4-hydroxy-L-prolyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

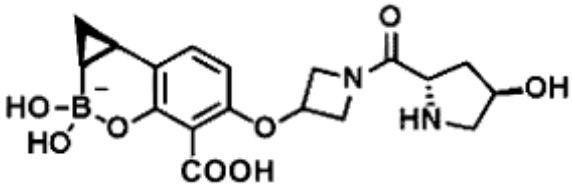
[Chemical Formula 836]



,

(2R,4S)-5,5-dihydroxy-9-{1-[(4R)-4-hydroxy-L-prolyl]azetidin-3-yl}oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

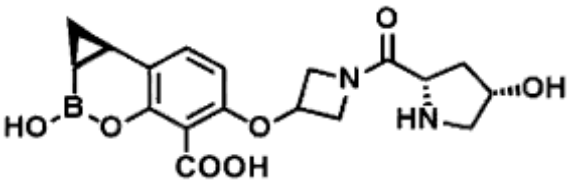
[Chemical Formula 837]



,

(1aS,7bR)-2-hydroxy-5-({1-[(4S)-4-hydroxy-L-prolyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

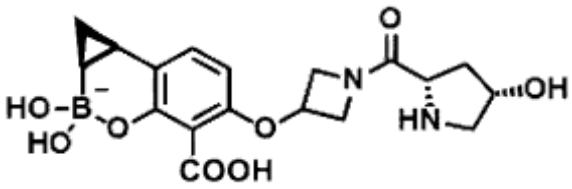
[Chemical Formula 838]



,

(2R,4S)-5,5-dihydroxy-9-{1-[(4S)-4-hydroxy-L-prolyl]azetidin-3-yl}oxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid

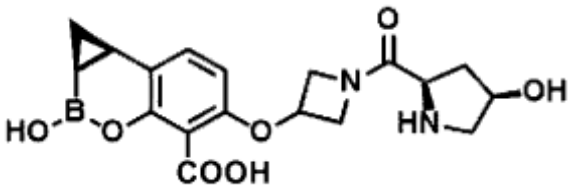
[Chemical Formula 839]



,

(1aS,7bR)-2-hydroxy-5-({1-[(4R)-4-hydroxy-D-prolyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

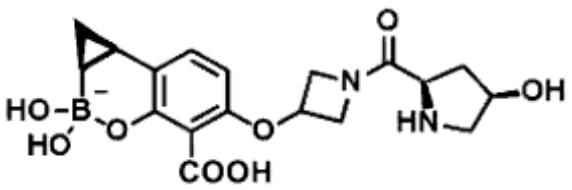
[Chemical Formula 840]



,

(2R,4S)-5,5-dihydroxy-9-{1-[(4R)-4-hydroxy-D-prolyl]azetidin-3-yl}oxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid

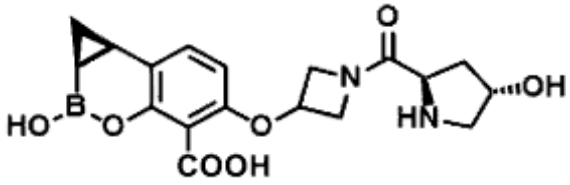
[Chemical Formula 841]



,

(1aS,7bR)-2-hydroxy-5-({1-[(4S)-4-hydroxy-D-prolyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

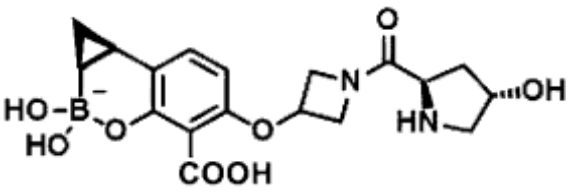
[Chemical Formula 842]



,

(2R,4S)-5,5-dihydroxy-9-{1-[(4S)-4-hydroxy-D-prolyl]azetidin-3-yl}oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

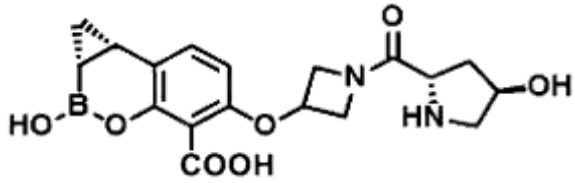
[Chemical Formula 843]



,

(1aR,7bS)-2-hydroxy-5-({1-[(4R)-4-hydroxy-L-prolyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

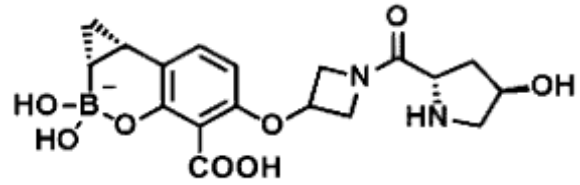
[Chemical Formula 844]



,

(2S,4R)-5,5-dihydroxy-9-{1-[(4R)-4-hydroxy-L-prolyl]azetidin-3-yl}oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

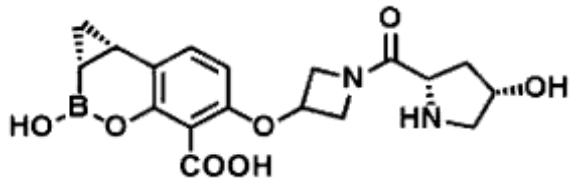
[Chemical Formula 845]



,

(1aR,7bS)-2-hydroxy-5-({1-[(4S)-4-hydroxy-L-prolyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

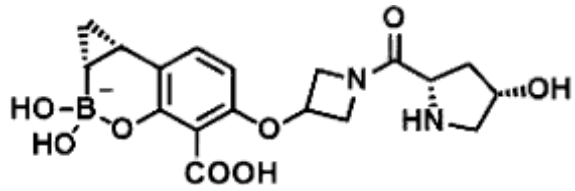
[Chemical Formula 846]



,

(2S,4R)-5,5-dihydroxy-9-{1-[(4S)-4-hydroxy-L-prolyl]azetidin-3-yl}oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

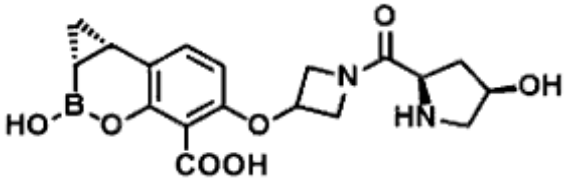
[Chemical Formula 847]



,

(1aS,7bR)-2-hydroxy-5-({1-[(4R)-4-hydroxy-D-prolyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

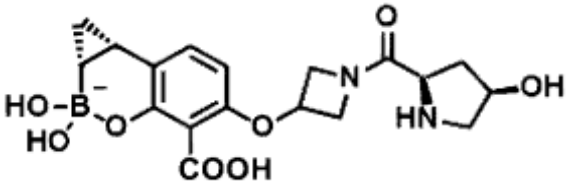
[Chemical Formula 848]



,

(2S,4R)-5,5-dihydroxy-9-{1-[(4R)-4-hydroxy-D-prolyl]azetidin-3-yl}oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

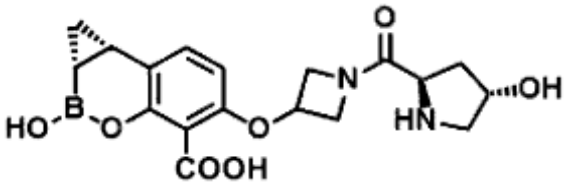
[Chemical Formula 849]



,

(1aR,7bS)-2-hydroxy-5-({1-[(4S)-4-hydroxy-D-prolyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

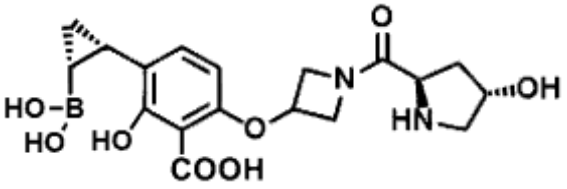
[Chemical Formula 850]



,

(2S,4R)-5,5-dihydroxy-9-{1-[(4S)-4-hydroxy-D-prolyl]azetidin-3-yl}oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

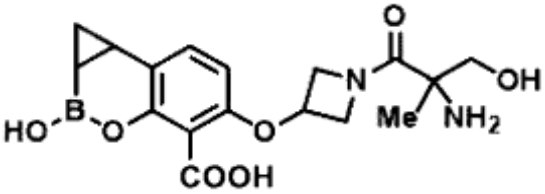
[Chemical Formula 851]



,

2-hydroxy-5-{[1-(2-methyl-seryl)azetidin-3-yl]oxy}-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

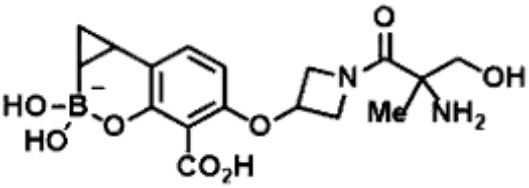
[Chemical Formula 852]



,

5,5-dihydroxy-9-[1-(2-methyl-seryl)azetidin-3-yl]oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

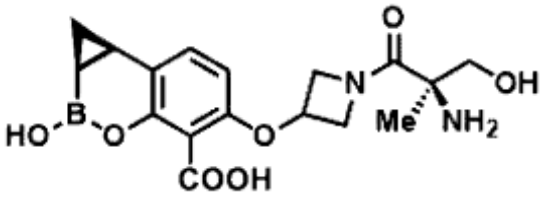
[Chemical Formula 853]



,

(1aS,7bR)-2-hydroxy-5-{[1-(2-methyl-D-seryl)azetidin-3-yl]oxy}-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

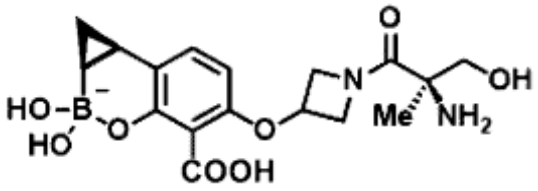
[Chemical Formula 854]



,

(2R,4S)-5,5-dihydroxy-9-[1-(2-methyl-D-seryl)azetidin-3-yl]oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

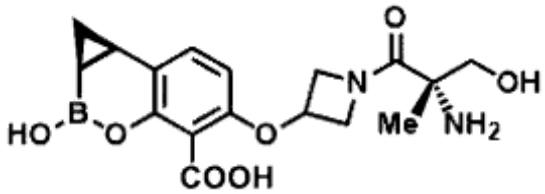
[Chemical Formula 855]



,

(1aS,7bR)-2-hydroxy-5-{[1-(2-methyl-L-seryl)azetidin-3-yl]oxy}-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

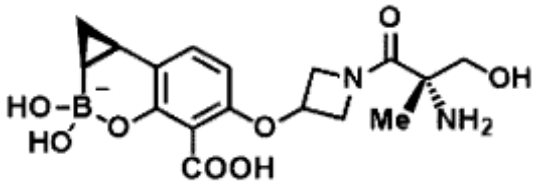
[Chemical Formula 856]



,

(2R,4S)-5,5-dihydroxy-9-[1-(2-methyl-L-seryl)azetidin-3-yl]oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

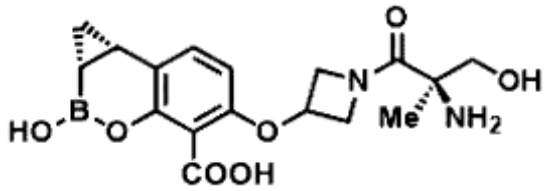
[Chemical Formula 857]



,

(1aR,7bS)-2-hydroxy-5-{[1-(2-methyl-D-seryl)azetidin-3-yl]oxy}-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

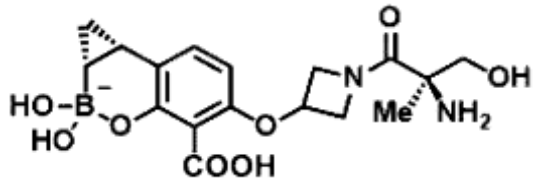
[Chemical Formula 858]



,

(2S,4R)-5,5-dihydroxy-9-[1-(2-methyl-D-seryl)azetidin-3-yl]oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

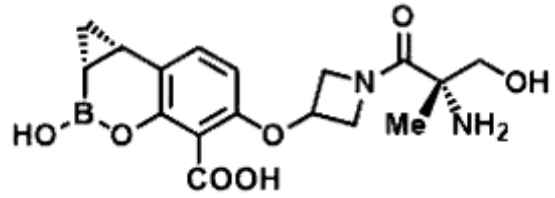
[Chemical Formula 859]



,

(1aR,7bS)-2-hydroxy-5-{[1-(2-methyl-L-seryl)azetidin-3-yl]oxy}-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

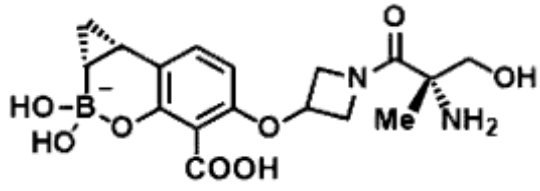
[Chemical Formula 860]



,

(2S,4R)-5,5-dihydroxy-9-[1-(2-methyl-L-seryl)azetidin-3-yl]oxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

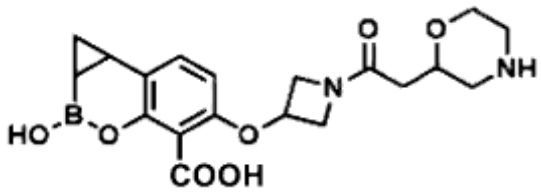
[Chemical Formula 861]



,

2-hydroxy-5-[(1-{[morpholin-2-yl]acetyl}azetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

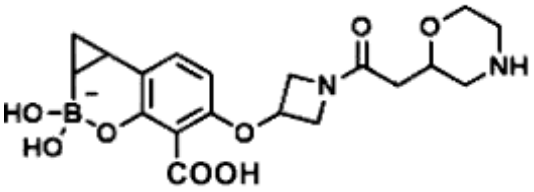
[Chemical Formula 862]



,

5,5-dihydroxy-9-(1-{[morpholin-2-yl]acetyl}azetidin-3-yl)oxy-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid

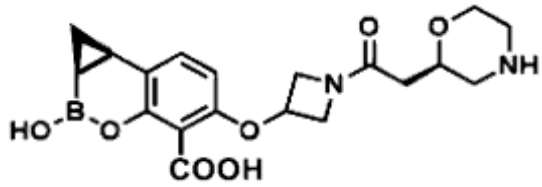
[Chemical Formula 863]



,

(1aS,7bR)-2-hydroxy-5-[(1-{[(2R)-morpholin-2-yl]acetyl}azetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

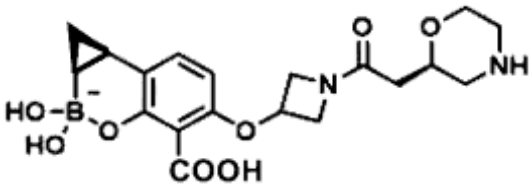
[Chemical Formula 864]



,

(2R,4S)-5,5-dihydroxy-9-(1-{[(2R)-morpholin-2-yl]acetyl}azetidin-3-yl)oxy-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid

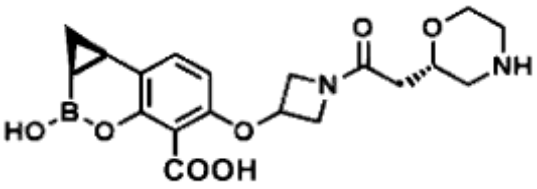
[Chemical Formula 865]



,

(1aS,7bR)-2-hydroxy-5-[(1-{[(2S)-morpholin-2-yl]acetyl}azetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

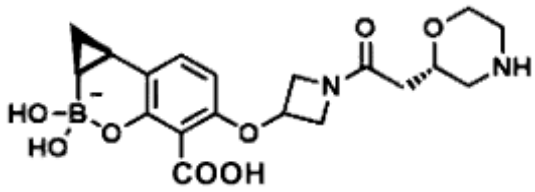
[Chemical Formula 866]



,

(2S,4R)-5,5-dihydroxy-9-(1-{[(2R)-morpholin-2-yl]acetyl}azetidin-3-yl)oxy-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

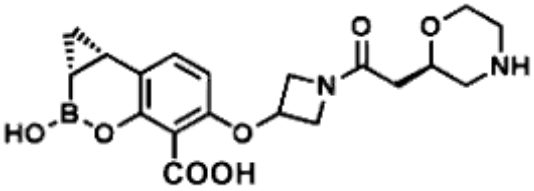
[Chemical Formula 867]



,

(1aR,7bS)-2-hydroxy-5-[(1-{[(2R)-morpholin-2-yl]acetyl}azetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

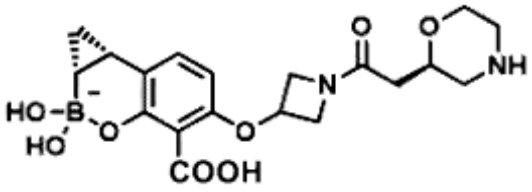
[Chemical Formula 868]



,

(2S,4R)-5,5-dihydroxy-9-(1-{[(2R)-morpholin-2-yl]acetyl}azetidin-3-yl)oxy-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

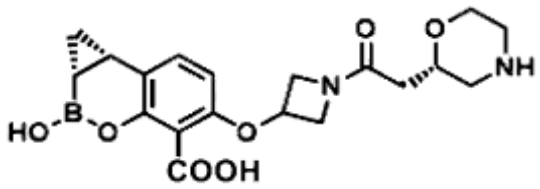
[Chemical Formula 869]



,

(1aR,7bS)-2-hydroxy-5-[(1-{[(2S)-morpholin-2-yl]acetyl}azetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

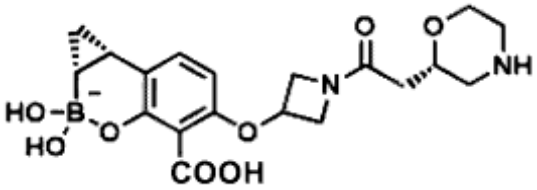
[Chemical Formula 870]



,

(2S,4R)-5,5-dihydroxy-9-(1-{[(2S)-morpholin-2-yl]acetyl}azetidin-3-yl)oxy-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid

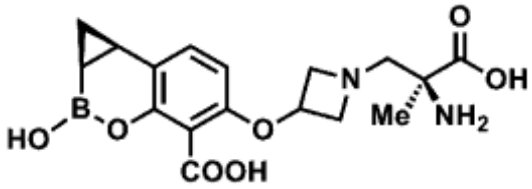
[Chemical Formula 871]



,

(1aS,7bR)-5-({1-[(2S)-2-amino-2-carboxypropyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

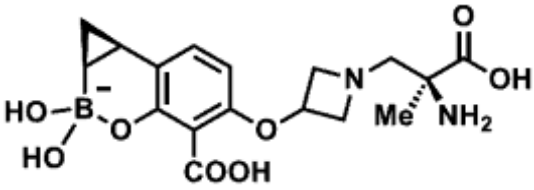
[Chemical Formula 872]



,

(2R,4S)-9-[1-[propyl (2S)-2-amino-2-carboxylate]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylate

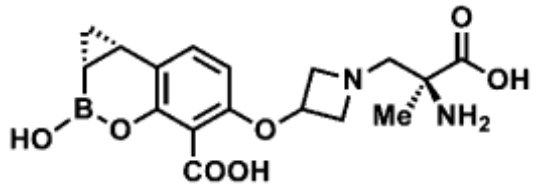
[Chemical Formula 873]



,

(1aR,7bS)-5-({1-[(2S)-2-amino-2-carboxypropyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

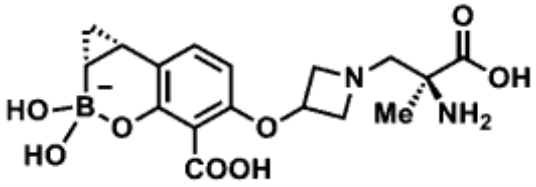
[Chemical Formula 874]



,

(2S,4R)-9-[1-[propyl (2S)-2-amino-2-carboxylate]azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

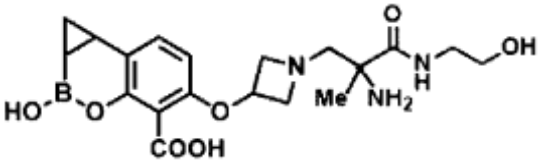
[Chemical Formula 875]



,

5-({1-[2-amino-2-carboxypropyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

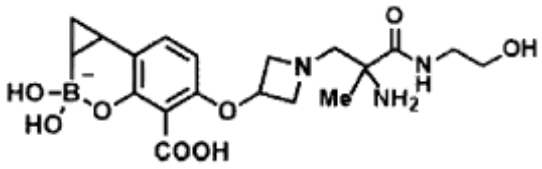
[Chemical Formula 876]



,

9-(1-{2-amino-3-[(2-hydroxyethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

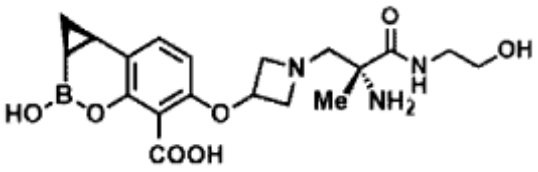
[Chemical Formula 877]



,

(1aS,7bR)-5-[(1-{(2R)-2-amino-3-[(2-hydroxyethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

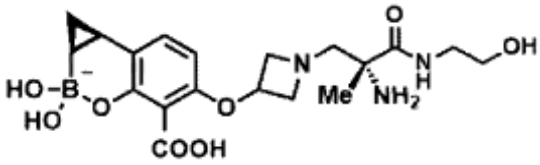
[Chemical Formula 878]



,

(2R,4S)-9-(1-{(2R)-2-amino-3-[(2-hydroxyethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylate

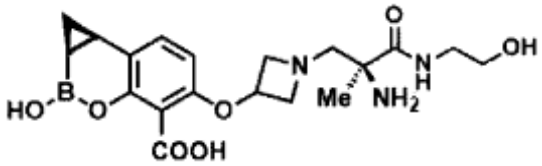
[Chemical Formula 879]



,

(1aS,7bR)-5-[(1-{(2S)-2-amino-3-[(2-hydroxyethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

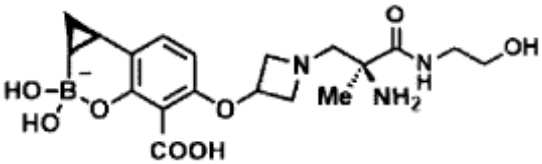
[Chemical Formula 880]



,

(2R,4S)-9-(1-{(2S)-2-amino-3-[(2-hydroxyethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylate

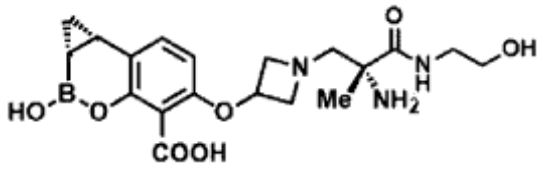
[Chemical Formula 881]



,

(1aR,7bS)-5-[(1-{(2R)-2-amino-3-[(2-hydroxyethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

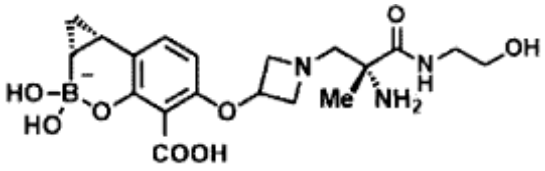
[Chemical Formula 882]



,

(2S,4R)-9-(1-{(2R)-2-amino-3-[(2-hydroxyethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

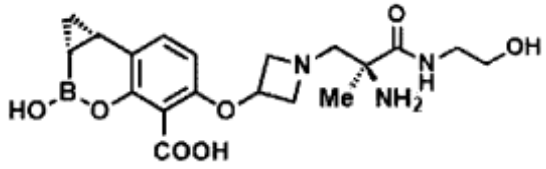
[Chemical Formula 883]



,

(1aR,7bS)-5-[(1-{(2S)-2-amino-3-[(2-hydroxyethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

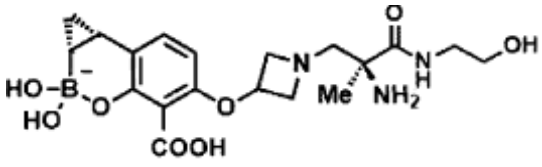
[Chemical Formula 884]



,

(2S,4R)-9-(1-{(2S)-2-amino-3-[(2-hydroxyethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

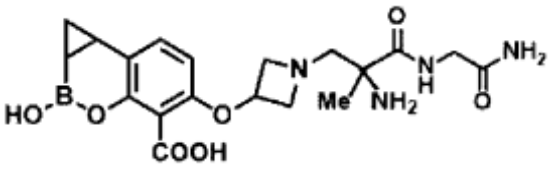
[Chemical Formula 885]



,

5-[(1-{2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

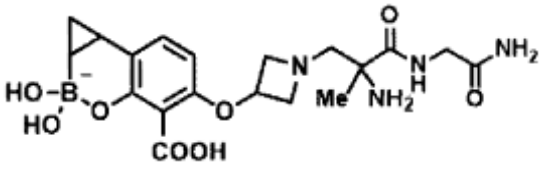
[Chemical Formula 886]



,

9-(1-{2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

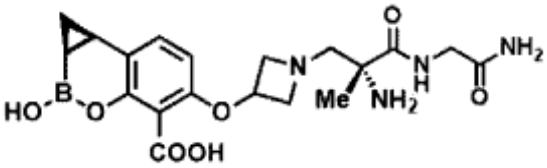
[Chemical Formula 887]



,

(1aS,7bR)-5-[(1-{(2R)-2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

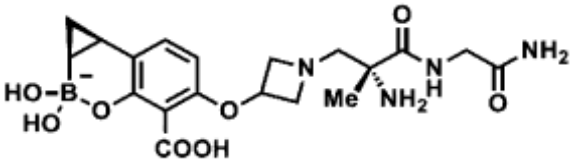
[Chemical Formula 888]



,

(2R,4S)-9-(1-{(2R)-2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

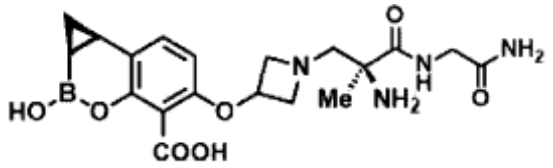
[Chemical Formula 889]



,

(1aS,7bR)-5-[(1-{(2S)-2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

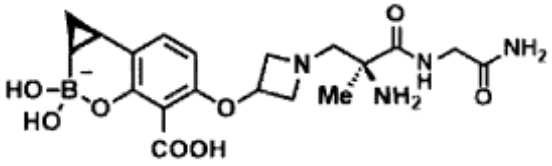
[Chemical Formula 890]



,

(2R,4S)-9-(1-{(2S)-2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

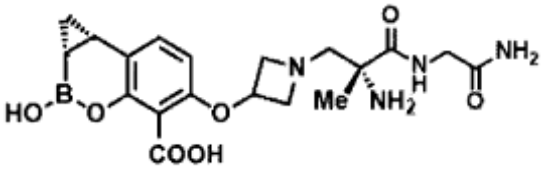
[Chemical Formula 891]



,

(1aR,7bS)-5-[(1-{(2R)-2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

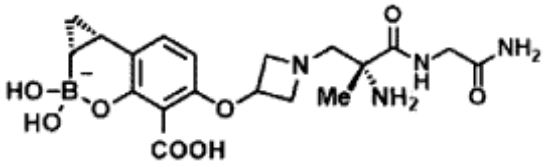
[Chemical Formula 892]



,

(2S,4R)-9-(1-{(2R)-2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

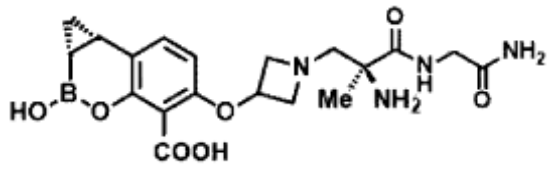
[Chemical Formula 893]



,

(1aR,7bS)-5-[(1-{(2S)-2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

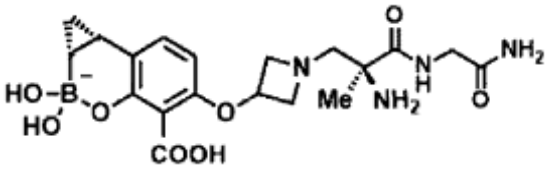
[Chemical Formula 894]



,

(2S,4R)-9-(1-{(2S)-2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

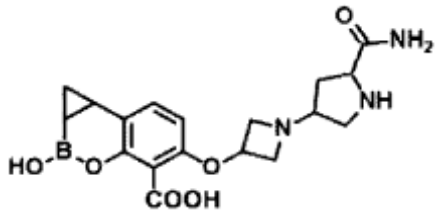
[Chemical Formula 895]



,

5-({1-[5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

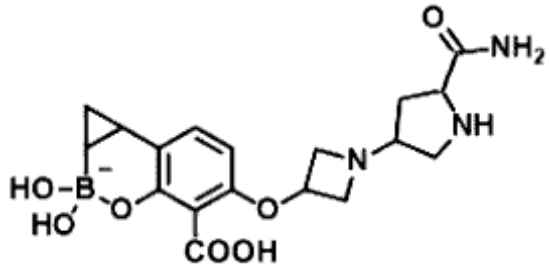
[Chemical Formula 896]



,

9-{1-[5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

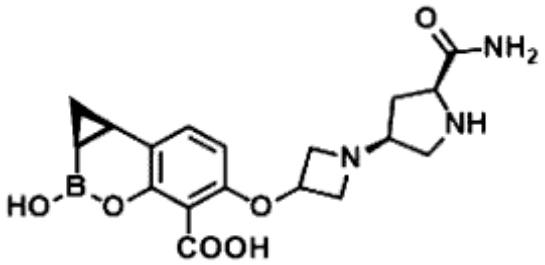
[Chemical Formula 897]



,

(1aS,7bR)-5-({1-[(3S,5S)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

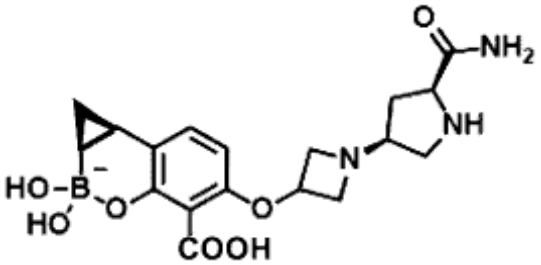
[Chemical Formula 898]



,

(2R,4S)-9-{1-[(3S,5S)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

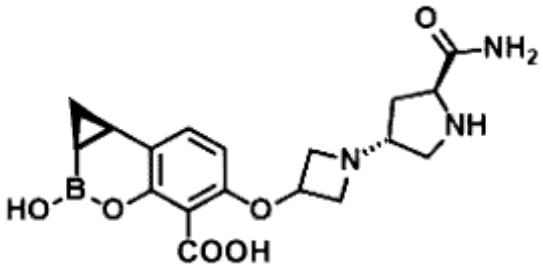
[Chemical Formula 899]



,

(1aS,7bR)-5-({1-[(3R,5S)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

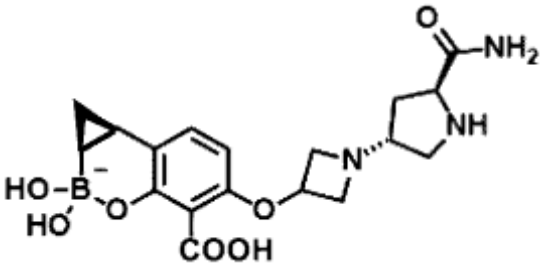
[Chemical Formula 900]



,

(2R,4S)-9-{1-[(3R,5S)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

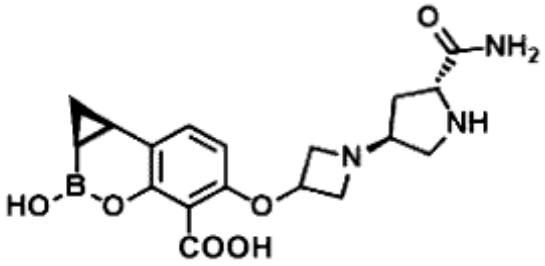
[Chemical Formula 901]



,

(1aS,7bR)-5-({1-[(3S,5R)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

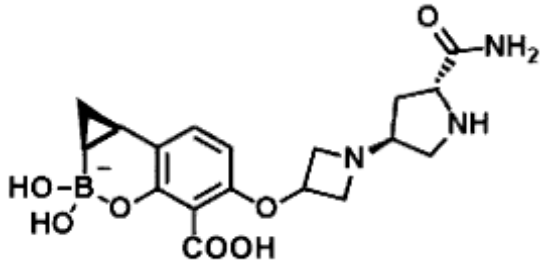
[Chemical Formula 902]



,

(2R,4S)-9-{1-[(3S,5R)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

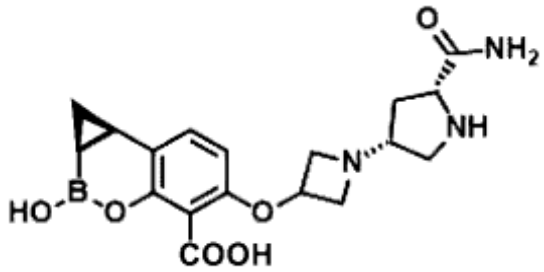
[Chemical Formula 903]



,

(1aS,7bR)-5-({1-[(3R,5R)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

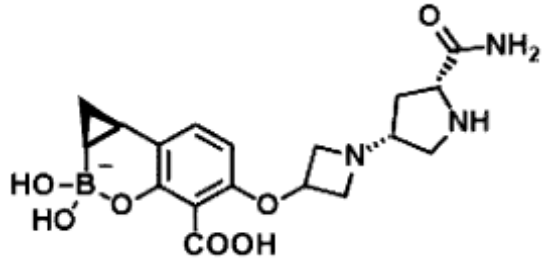
[Chemical Formula 904]



,

(2R,4S)-9-{1-[(3R,5R)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

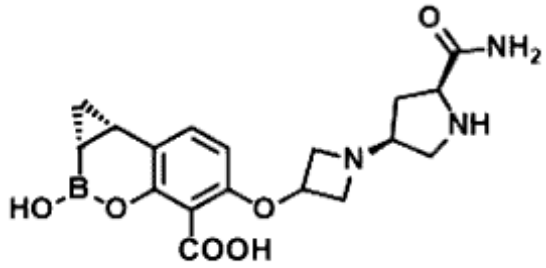
[Chemical Formula 905]



,

(1aR,7bS)-5-({1-[(3S,5S)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

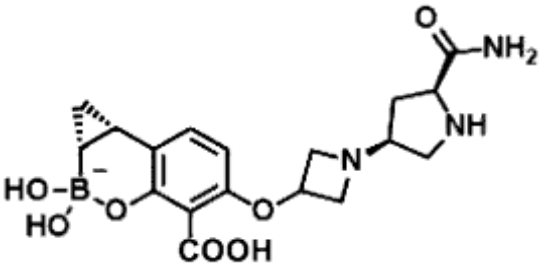
[Chemical Formula 906]



,

(2S,4R)-9-{1-[(3S,5S)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

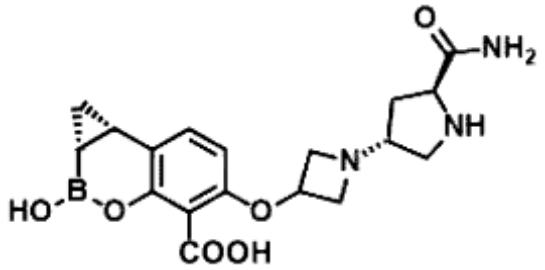
[Chemical Formula 907]



,

(1aR,7bS)-5-({1-[(3R,5S)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

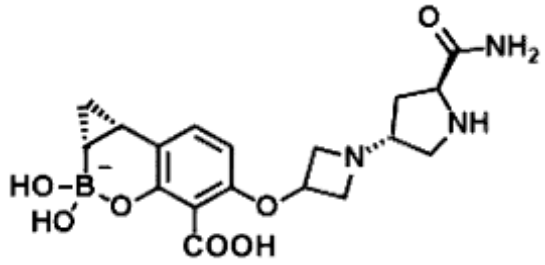
[Chemical Formula 908]



,

(2S,4R)-9-{1-[(3R,5S)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

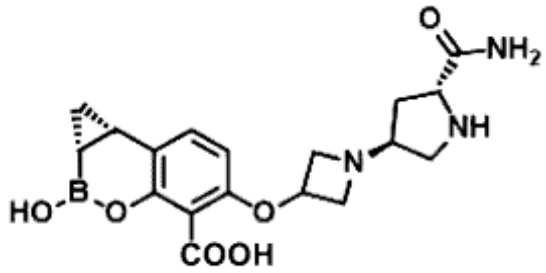
[Chemical Formula 909]



,

(1aR,7bS)-5-({1-[(3S,5R)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

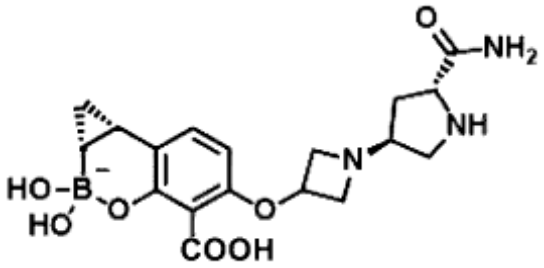
[Chemical Formula 910]



,

(2S,4R)-9-{1-[(3S,5R)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

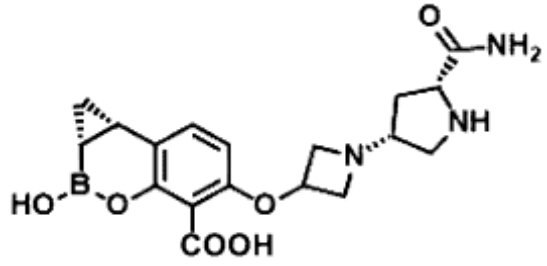
[Chemical Formula 911]



,

(1aR,7bS)-5-({1-[(3R,5R)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

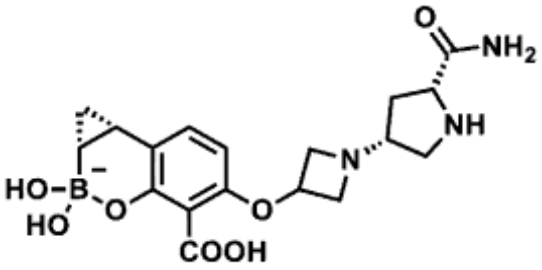
[Chemical Formula 912]



,

(2S,4R)-9-{1-[(3R,5R)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

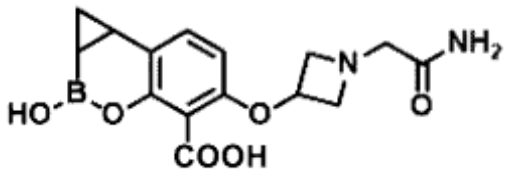
[Chemical Formula 913]



,

5-{[1-(2-amino-2-oxoethyl)azetidin-3-yl]oxy}-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

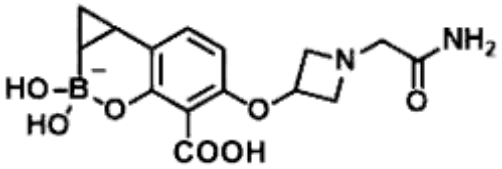
[Chemical Formula 914]



,

9-[1-(2-amino-2-oxoethyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

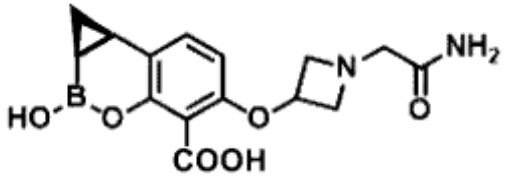
[Chemical Formula 915]



,

(1aS,7bR)-5-{[1-(2-amino-2-oxoethyl)azetidin-3-yl]oxy}-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

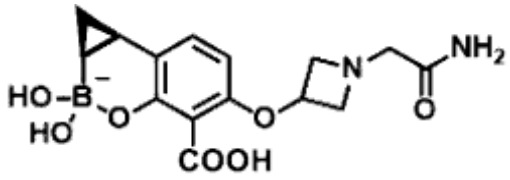
[Chemical Formula 916]



,

(2R,4S)-9-[1-(2-amino-2-oxoethyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

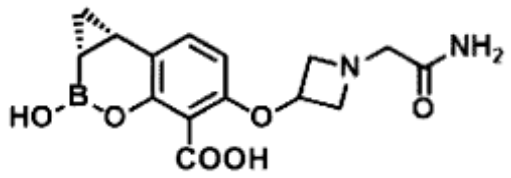
[Chemical Formula 917]



,

(1aR,7bS)-5-{[1-(2-amino-2-oxoethyl)azetidin-3-yl]oxy}-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

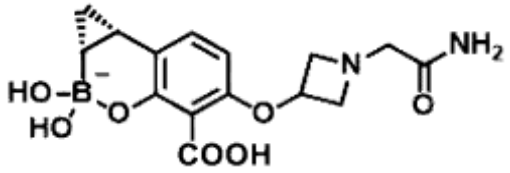
[Chemical Formula 918]



,

(2S,4R)-9-[1-(2-amino-2-oxoethyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

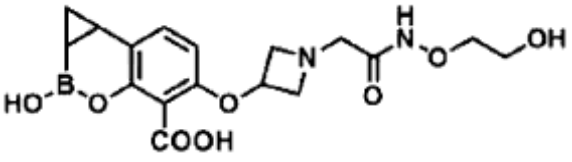
[Chemical Formula 919]



,

2-hydroxy-5-[(1-{2-[(2-hydroxyethoxy)amino]-2-oxoethyl}azetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

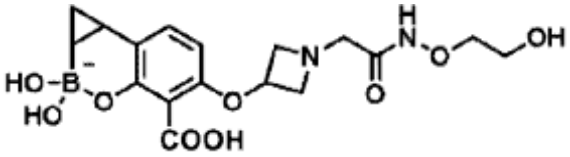
[Chemical Formula 920]



,

5,5-dihydroxy-9-(1-{2-[(2-hydroxyethoxy)amino]-2-oxoethyl}azetidin-3-yl)oxy-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

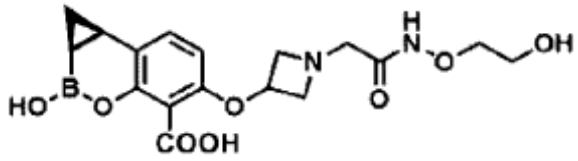
[Chemical Formula 921]



,

(1aS,7bR)-2-hydroxy-5-[(1-{2-[(2-hydroxyethoxy)amino]-2-oxoethyl}azetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

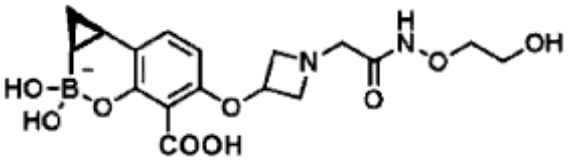
[Chemical Formula 922]



,

(2R,4S)-5,5-dihydroxy-9-(1-{2-[(2-hydroxyethoxy)amino]-2-oxoethyl}azetidin-3-yl)oxy-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

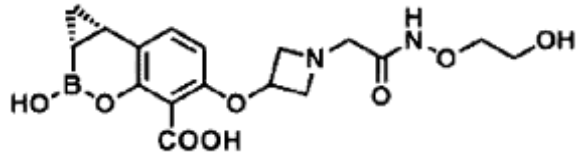
[Chemical Formula 923]



,

(1aR,7bS)-2-hydroxy-5-[(1-{2-[(2-hydroxyethoxy)amino]-2-oxoethyl}azetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

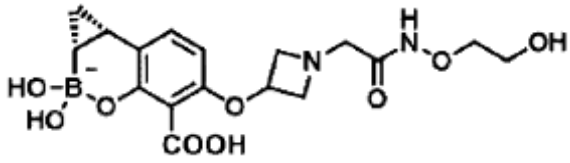
[Chemical Formula 924]



,

(2S,4R)-5,5-dihydroxy-9-(1-{2-[(2-hydroxyethoxy)amino]-2-oxoethyl}azetidin-3-yl)oxy-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

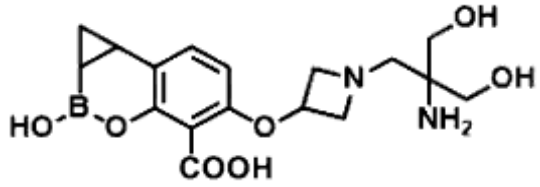
[Chemical Formula 925]



,

5-({1-[2-amino-3-hydroxy-2-(hydroxymethyl)propyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

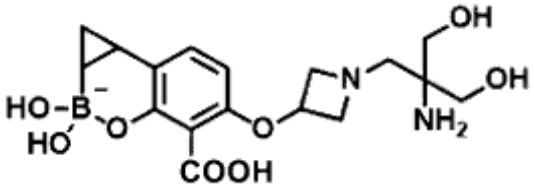
[Chemical Formula 926]



,

9-{1-[2-amino-3-hydroxy-2-(hydroxymethyl)propyl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

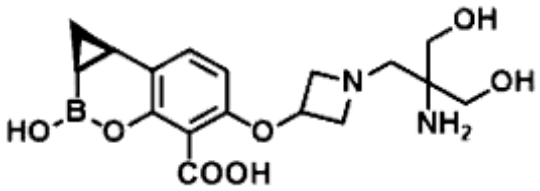
[Chemical Formula 927]



,

(1aS,7bR)-5-({1-[2-amino-3-hydroxy-2-(hydroxymethyl)propyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

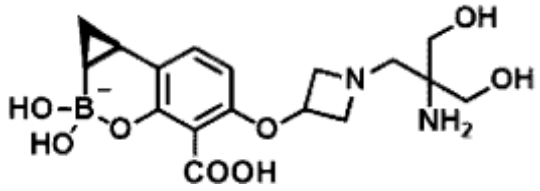
[Chemical Formula 928]



,

(2R,4S)-9-{1-[2-amino-3-hydroxy-2-(hydroxymethyl)propyl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

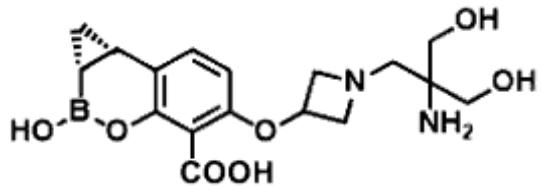
[Chemical Formula 929]



,

(1aR,7bS)-5-({1-[2-amino-3-hydroxy-2-(hydroxymethyl)propyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

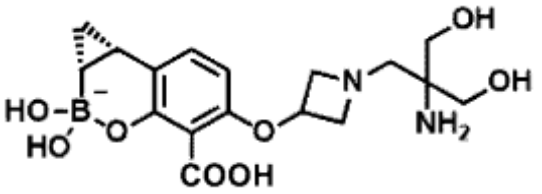
[Chemical Formula 930]



,

(2S,4R)-9-{1-[2-amino-3-hydroxy-2-(hydroxymethyl)propyl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

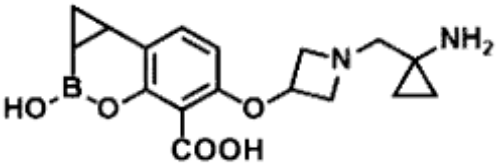
[Chemical Formula 931]



,

5-({1-[(1-aminocyclopropyl)methyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

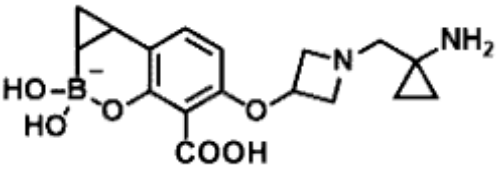
[Chemical Formula 932]



,

9-{1-[(1-aminocyclopropyl)methyl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

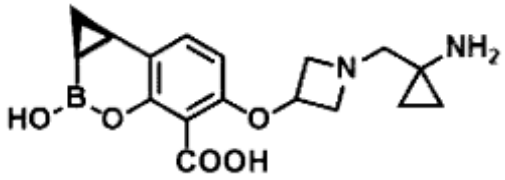
[Chemical Formula 933]



,

(1aS,7bR)-5-({1-[(1-aminocyclopropyl)methyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

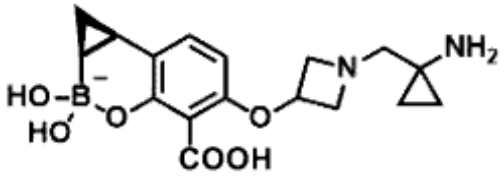
[Chemical Formula 934]



,

(2R,4S)-9-{1-[(1-aminocyclopropyl)methyl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

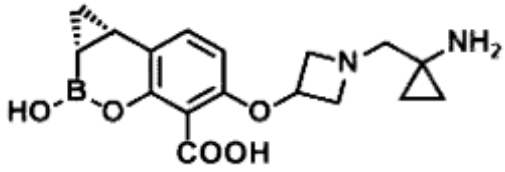
[Chemical Formula 935]



,

(1aR,7bS)-5-({1-[(1-aminocyclopropyl)methyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

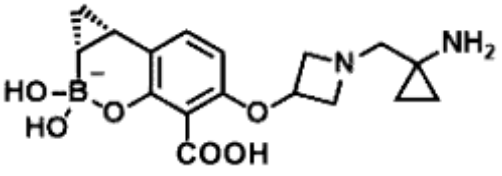
[Chemical Formula 936]



,

(2S,4R)-9-{1-[(1-aminocyclopropyl)methyl]azetidin-3-yl}oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

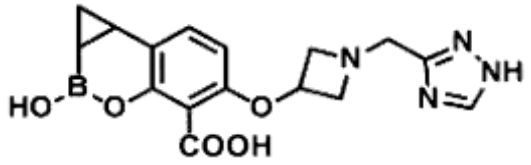
[Chemical Formula 937]



,

2-hydroxy-5-({1-[(1H-1,2,4-triazol-3-yl)methyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

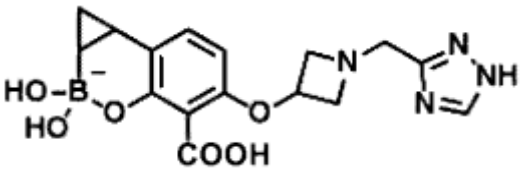
[Chemical Formula 938]



,

5,5-dihydroxy-9-{1-[(1H-1,2,4-triazol-3-yl)methyl]azetidin-3-yl}oxy-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

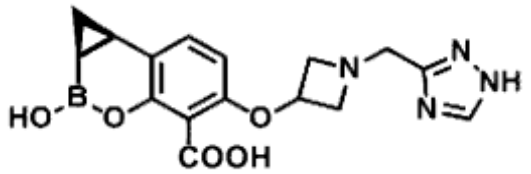
[Chemical Formula 939]



,

(1aS,7bR)-2-hydroxy-5-({1-[(1H-1,2,4-triazol-3-yl)methyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

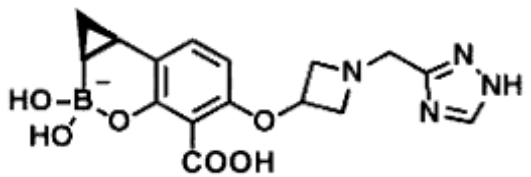
[Chemical Formula 940]



,

(2R,4S)-5,5-dihydroxy-9-{1-[(1H-1,2,4-triazol-3-yl)methyl]azetidin-3-yl}oxy-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

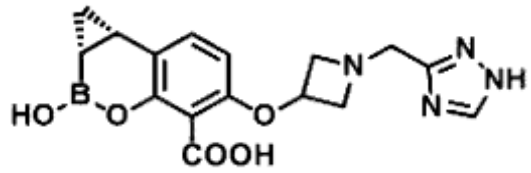
[Chemical Formula 941]



,

(1aR,7bS)-2-hydroxy-5-({1-[(1H-1,2,4-triazol-3-yl)methyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

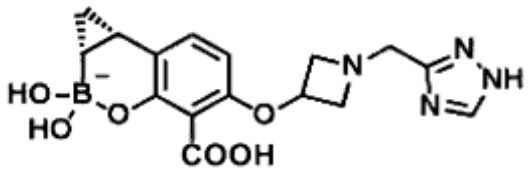
[Chemical Formula 942]



,

(2S,4R)-5,5-dihydroxy-9-{1-[(1H-1,2,4-triazol-3-yl)methyl]azetidin-3-yl}oxy-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

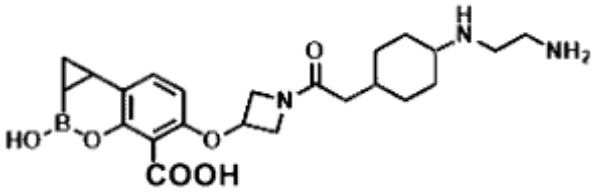
[Chemical Formula 943]



,

5-{[1-({4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

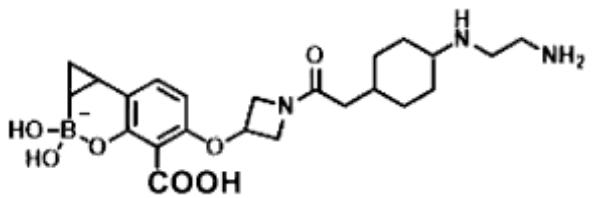
[Chemical Formula 944]



,

9-[1-({4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

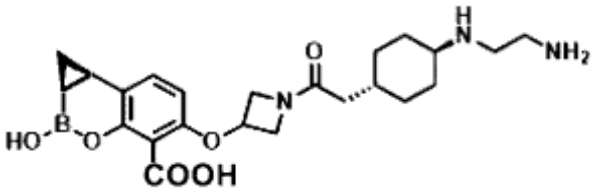
[Chemical Formula 945]



,

(1aS,7bR)-5-{[1-({(1r,4r)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

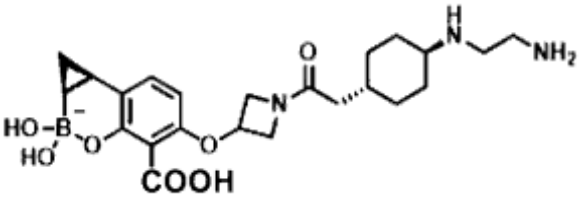
[Chemical Formula 946]



,

(2R,4S)-9-[1-({(1r,4r)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

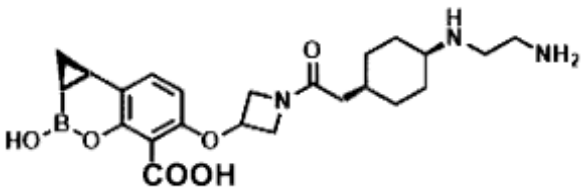
[Chemical Formula 947]



,

(1aS,7bR)-5-{[1-({(1s,4r)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

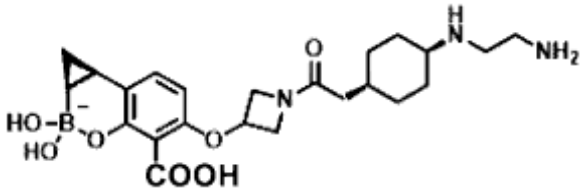
[Chemical Formula 948]



,

(2R,4S)-9-[1-({(1s,4r)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

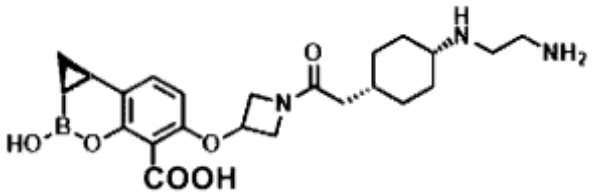
[Chemical Formula 949]



,

(1aS,7bR)-5-{[1-({(1r,4s)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

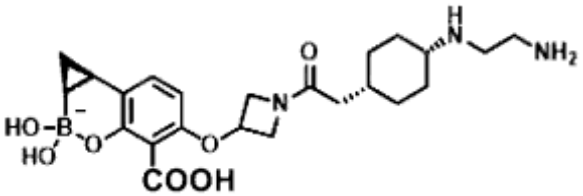
[Chemical Formula 950]



,

(2R,4S)-9-[1-({(1r,4s)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

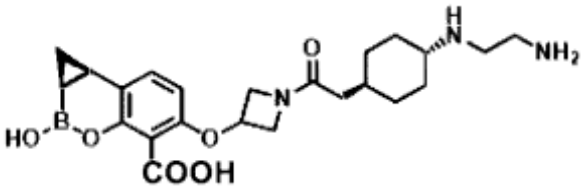
[Chemical Formula 951]



,

(1aS,7bR)-5-{[1-({(1s,4s)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

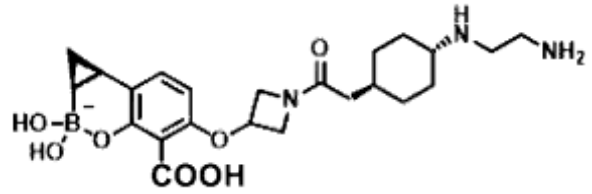
[Chemical Formula 952]



,

(2R,4S)-9-[1-({(1s,4s)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

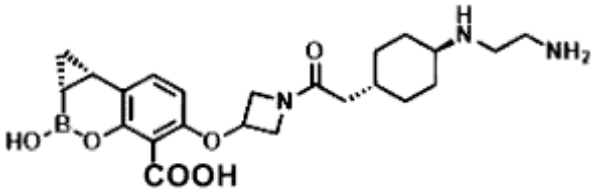
[Chemical Formula 953]



,

(1aR,7bS)-5-{[1-({(1r,4r)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

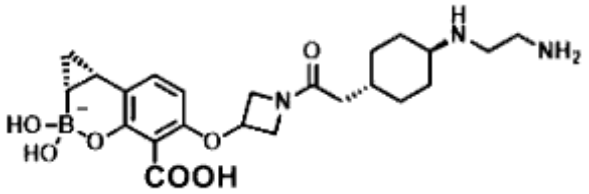
[Chemical Formula 954]



,

(2S,4R)-9-[1-({(1r,4r)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

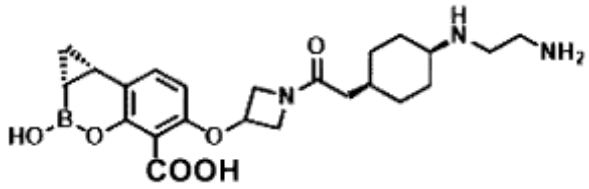
[Chemical Formula 955]



,

(1aR,7bS)-5-{[1-({(1s,4r)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

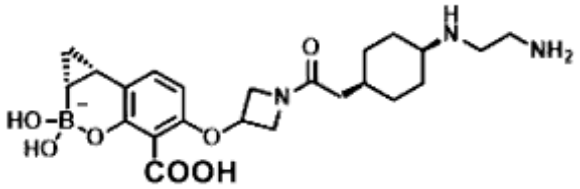
[Chemical Formula 956]



,

(2S,4R)-9-[1-({(1s,4r)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

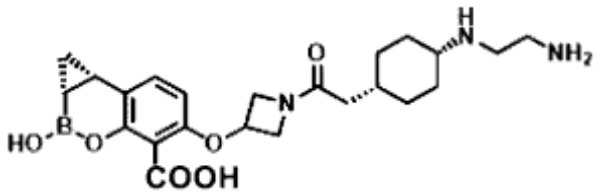
[Chemical Formula 957]



,

(1aR,7bS)-5-{[1-({(1r,4s)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

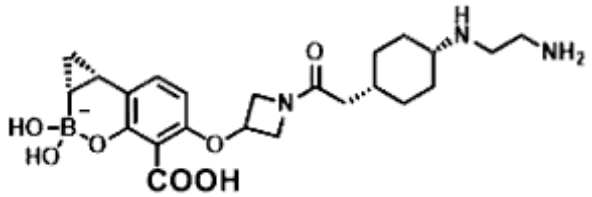
[Chemical Formula 958]



,

(2S,4R)-9-[1-({(1r,4s)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

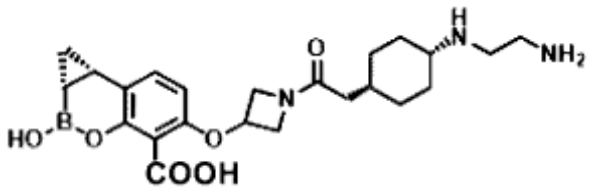
[Chemical Formula 959]



,

(1aR,7bS)-5-{[1-({(1s,4s)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

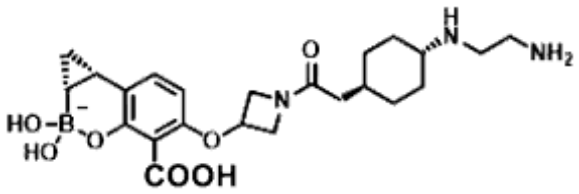
[Chemical Formula 960]



,

(2S,4R)-9-[1-({(1s,4s)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

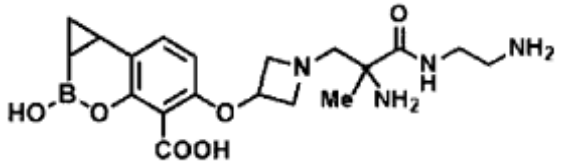
[Chemical Formula 961]



,

5-[(1-{2-amino-3-[(2-aminoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

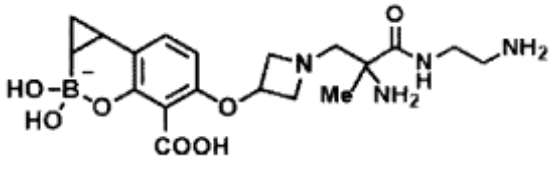
[Chemical Formula 962]



,

9-(1-{2-amino-3-[(2-aminoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

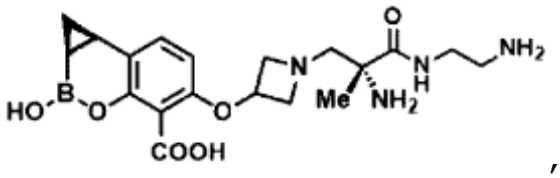
[Chemical Formula 963]



,

(1aS,7bR)-5-[(1-{(2R)-2-amino-3-[(2-aminoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

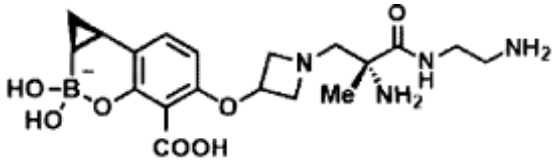
[Chemical Formula 964]



,

(2R,4S)-9-(1-{(2R)-2-amino-3-[(2-aminoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

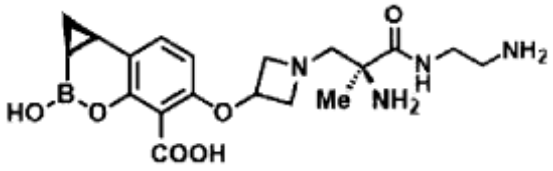
[Chemical Formula 965]



,

(1aS,7bR)-5-[(1-{(2S)-2-amino-3-[(2-aminoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

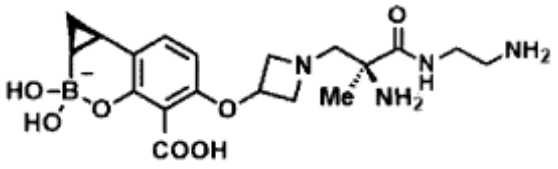
[Chemical Formula 966]



,

(2R,4S)-9-(1-{(2S)-2-amino-3-[(2-aminoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

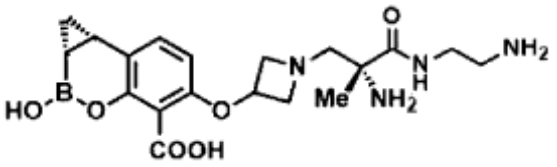
[Chemical Formula 967]



,

(1aR,7bS)-5-[(1-{(2R)-2-amino-3-[(2-aminoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

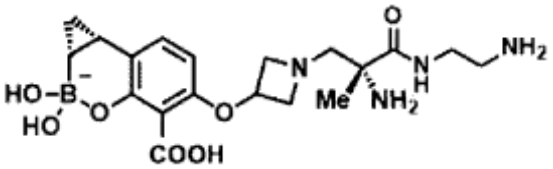
[Chemical Formula 968]



,

(2S,4R)-9-(1-{(2R)-2-amino-3-[(2-aminoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

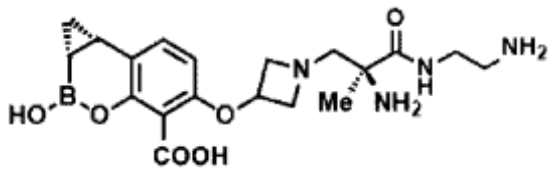
[Chemical Formula 969]



,

(1aR,7bS)-5-[(1-{(2S)-2-amino-3-[(2-aminoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

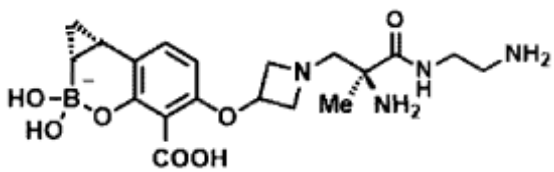
[Chemical Formula 970]



,

(2S,4R)-9-(1-{(2S)-2-amino-3-[(2-aminoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylate

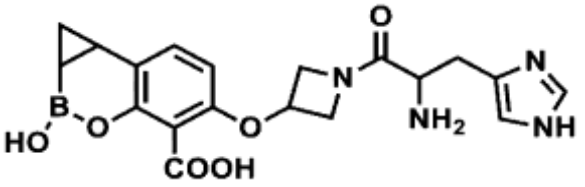
[Chemical Formula 971]



,

5-[(1-histidylazetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

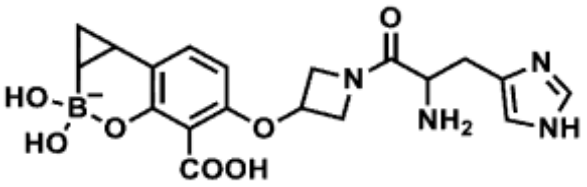
[Chemical Formula 972]



,

9-(1-histidylazetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

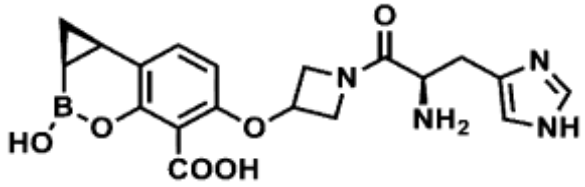
[Chemical Formula 973]



,

(1aS,7bR)-5-[(1-D-histidylazetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

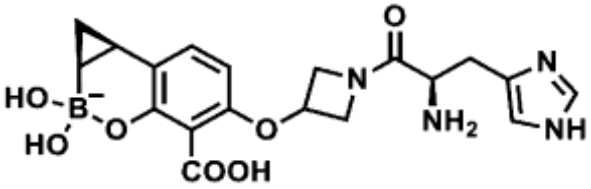
[Chemical Formula 974]



,

(2R,4S)-9-(1-D-histidylazetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

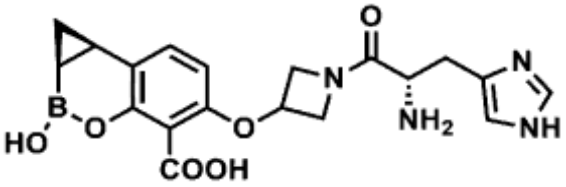
[Chemical Formula 975]



,

(1aS,7bR)-5-[(1-L-histidylazetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

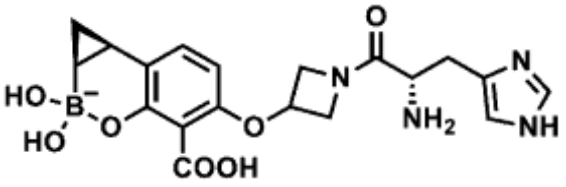
[Chemical Formula 976]



,

(2R,4S)-9-(1-L-histidylazetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

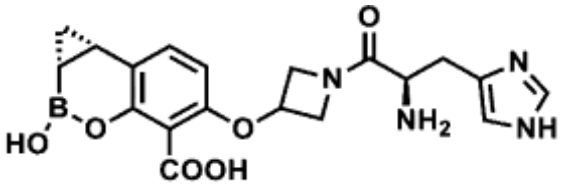
[Chemical Formula 977]



,

(1aR,7bS)-5-[(1-D-histidylazetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

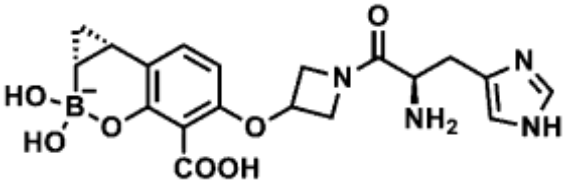
[Chemical Formula 978]



,

(2S,4R)-9-(1-D-histidylazetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

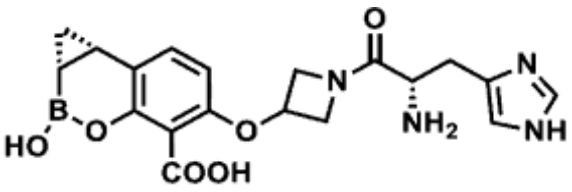
[Chemical Formula 979]



,

(1aR,7bS)-5-[(1-L-histidylazetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

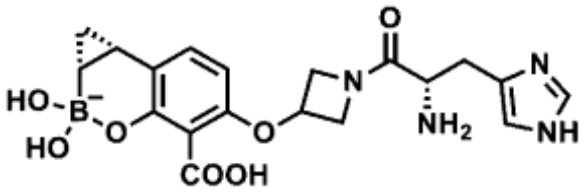
[Chemical Formula 980]



,

(2S,4R)-9-(1-L-histidylazetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid

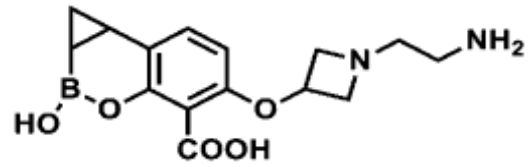
[Chemical Formula 981]



,

5-{[1-(2-aminoethyl)azetidin-3-yl]oxy}-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

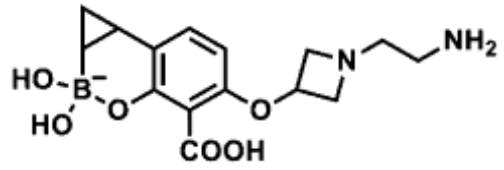
[Chemical Formula 982]



,

9-[1-(2-aminoethyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid

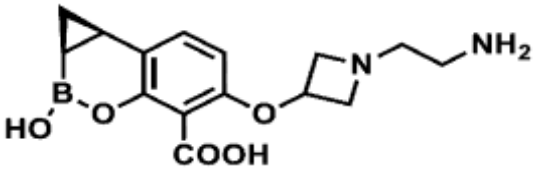
[Chemical Formula 983]



,

(1aS,7bR)-5-{[1-(2-aminoethyl)azetidin-3-yl]oxy}-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

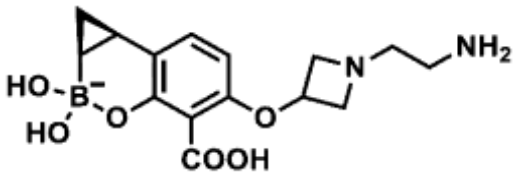
[Chemical Formula 984]



,

(2R,4S)-9-[1-(2-aminoethyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid

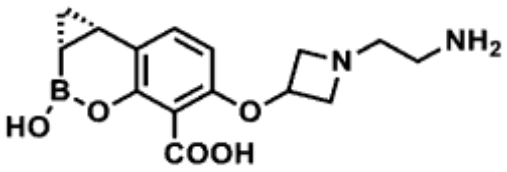
[Chemical Formula 985]



,

(1aR,7bS)-5-{[1-(2-aminoethyl)azetidin-3-yl]oxy}-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

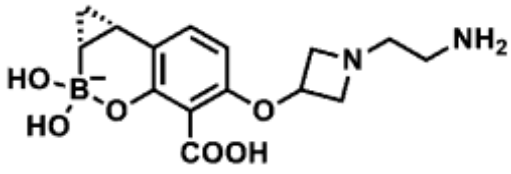
[Chemical Formula 986]



,

(2S,4R)-9-[1-(2-aminoethyl)azetidin-3-yl]oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid

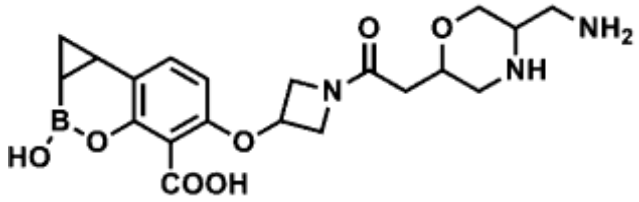
[Chemical Formula 987]



,

5-[(1-{[5-(aminomethyl)morpholin-2-yl]acetyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

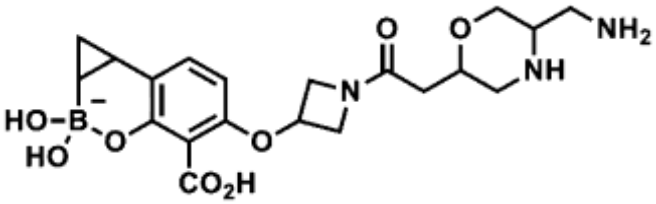
[Chemical Formula 988]



,

9-(1-{[5-(aminomethyl)morpholin-2-yl]acetyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

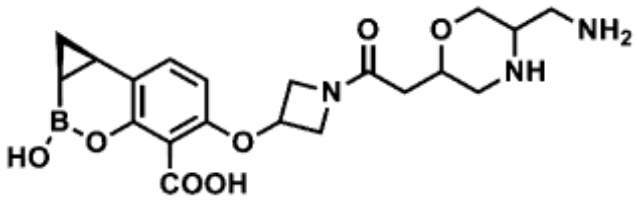
[Chemical Formula 989]



,

(1aS,7bR)-5-[(1-{[5-(aminomethyl)morpholin-2-yl]acetyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

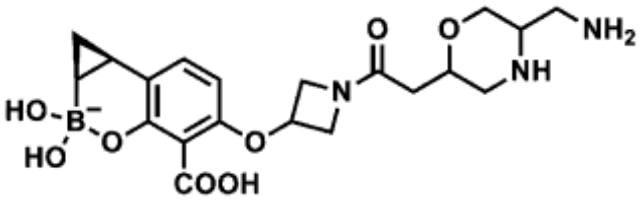
[Chemical Formula 990]



,

(2R,4S)-9-(1-{[5-(aminomethyl)morpholin-2-yl]acetyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

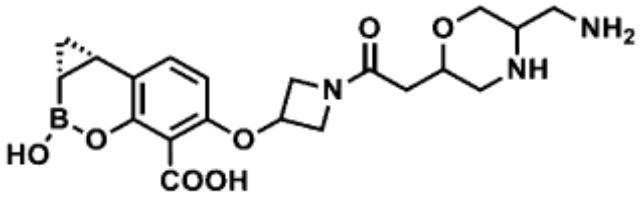
[Chemical Formula 991]



,

(1aR,7bS)-5-[(1-{[5-(aminomethyl)morpholin-2-yl]acetyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

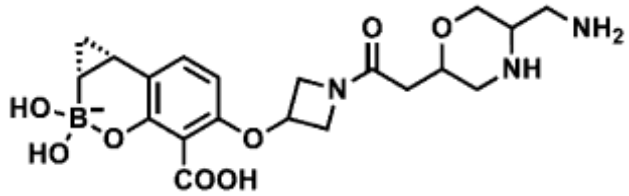
[Chemical Formula 992]



,

(2S,4R)-9-(1-{[5-(aminomethyl)morpholin-2-yl]acetyl}azetidin-3-yl)oxy-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid

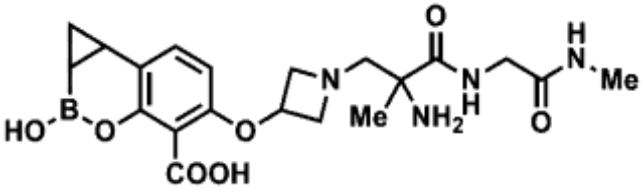
[Chemical Formula 993]



,

5-({1-[2-amino-2-methyl-3-{[2-(methylamino)-2-oxoethyl]amino}-3-oxopropyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

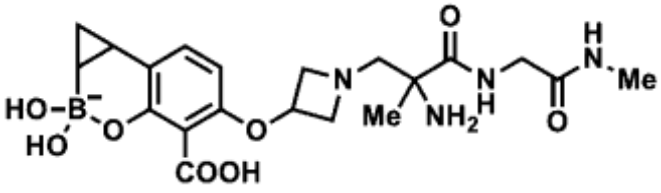
[Chemical Formula 994]



,

9-({1-[2-amino-2-methyl-3-{[2-(methylamino)-2-oxoethyl]amino}-3-oxopropyl]azetidin-3-yl}oxy)-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid

[Chemical Formula 995]

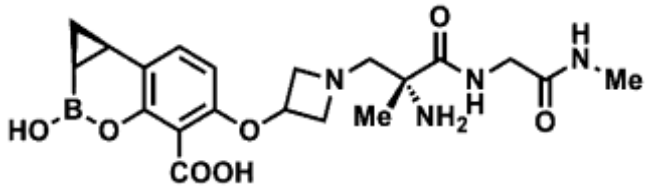


,

(1aS,7bR)-5-({1-[(2R)-2-amino-2-methyl-3-{[2-(methylamino)-2-oxoethyl]amino}-3-oxopropyl]azetidin-3-yl}oxy)-2-hydroxy-

1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

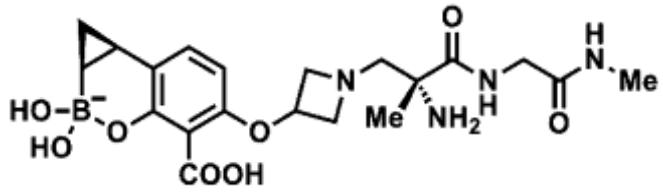
[Chemical Formula 996]



,

(2R,4S)-9-({1-[(2R)-2-amino-2-methyl-3-{[2-(methylamino)-2-oxoethyl]amino}-3-oxopropyl]azetidin-3-yl}oxy)-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

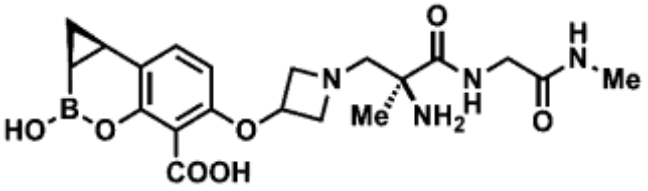
[Chemical Formula 997]



,

(1aS,7bR)-5-({1-[(2S)-2-amino-2-methyl-3-{[2-(methylamino)-2-oxoethyl]amino}-3-oxopropyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

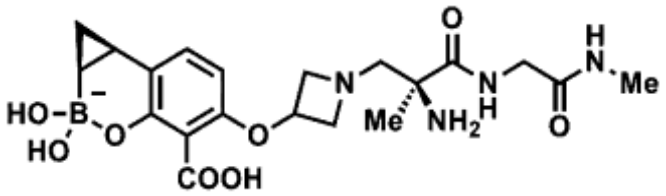
[Chemical Formula 998]



,

(2R,4S)-9-({1-[(2S)-2-amino-2-methyl-3-{[2-(methylamino)-2-oxoethyl]amino}-3-oxopropyl]azetidin-3-yl}oxy)-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

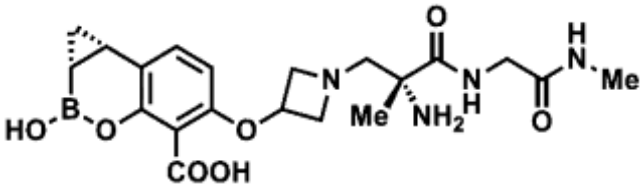
[Chemical Formula 999]



,

(1aR,7bS)-5-({1-[(2R)-2-amino-2-methyl-3-{[2-(methylamino)-2-oxoethyl]amino}-3-oxopropyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

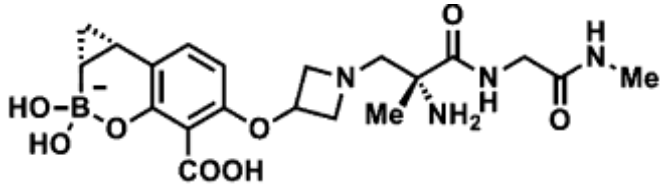
[Chemical Formula 1000]



,

(2S,4R)-9-({1-[(2R)-2-amino-2-methyl-3-{[2-(methylamino)-2-oxoethyl]amino}-3-oxopropyl]azetidin-3-yl}oxy)-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

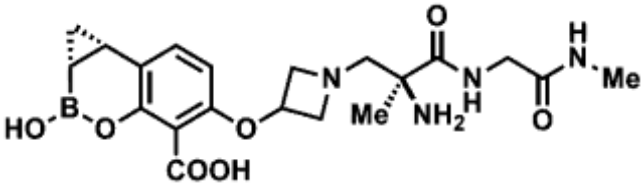
[Chemical Formula 1001]



,

(1aR,7bS)-5-({1-[(2S)-2-amino-2-methyl-3-{[2-(methylamino)-2-oxoethyl]amino}-3-oxopropyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

[Chemical Formula 1002]

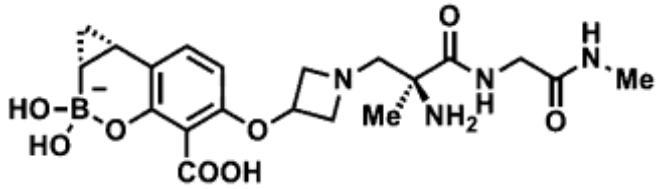


,

(2S,4R)-9-({1-[(2S)-2-amino-2-methyl-3-{[2-(methylamino)-2-oxoethyl]amino}-3-oxopropyl]azetidin-3-yl}oxy)-5,5-dihydroxy-6-

oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid

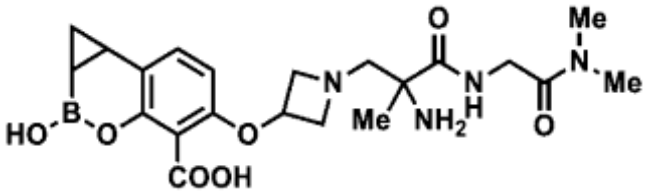
[Chemical Formula 1003]



,

5-({1-[2-amino-3-{[2-(dimethylamino)-2-oxoethyl]amino}-2-methyl-3-oxopropyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

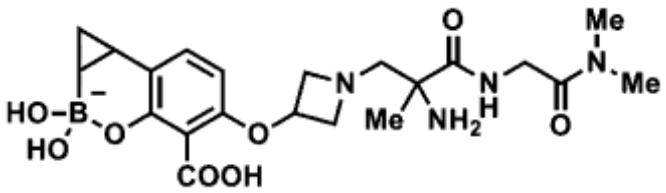
[Chemical Formula 1004]



,

9-({1-[2-amino-3-{[2-(dimethylamino)-2-oxoethyl]amino}-2-methyl-3-oxopropyl]azetidin-3-yl}oxy)-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid

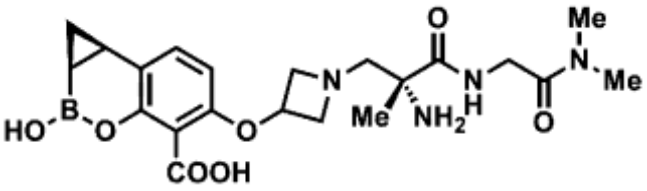
[Chemical Formula 1005]



,

(1aS,7bR)-5-({1-[(2R)-2-amino-3-{[2-(dimethylamino)-2-oxoethyl]amino}-2-methyl-3-oxopropyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

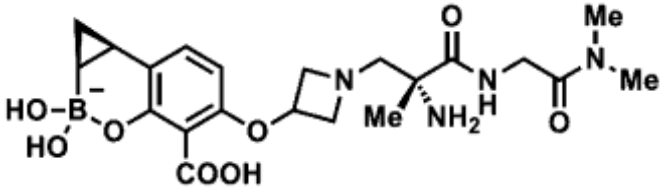
[Chemical Formula 1006]



,

(2R,4S)-9-({1-[(2R)-2-amino-3-{[2-(dimethylamino)-2-oxoethyl]amino}-2-methyl-3-oxopropyl]azetidin-3-yl}oxy)-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

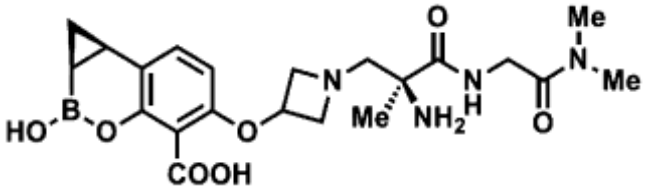
[Chemical Formula 1007]



,

(1aS,7bR)-5-({1-[(2S)-2-amino-3-{[2-(dimethylamino)-2-oxoethyl]amino}-2-methyl-3-oxopropyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

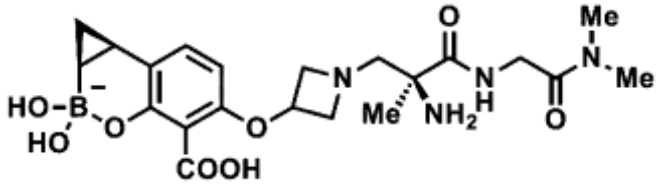
[Chemical Formula 1008]



,

(2R,4S)-9-({1-[(2S)-2-amino-3-{[2-(dimethylamino)-2-oxoethyl]amino}-2-methyl-3-oxopropyl]azetidin-3-yl}oxy)-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

[Chemical Formula 1009]

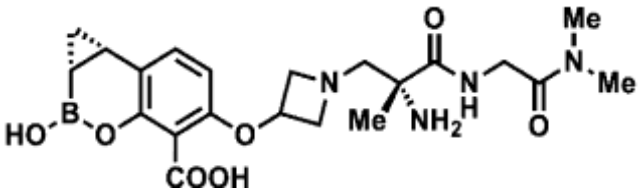


,

(1aR,7bS)-5-({1-[(2R)-2-amino-3-{[2-(dimethylamino)-2-oxoethyl]amino}-2-methyl-3-oxopropyl]azetidin-3-yl}oxy)-2-hydroxy-

1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

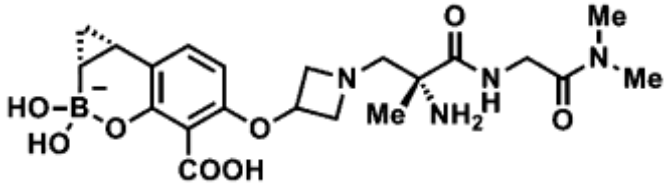
[Chemical Formula 1010]



,

(2S,4R)-9-({1-[(2R)-2-amino-3-{[2-(dimethylamino)-2-oxoethyl]amino}-2-methyl-3-oxopropyl]azetidin-3-yl}oxy)-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

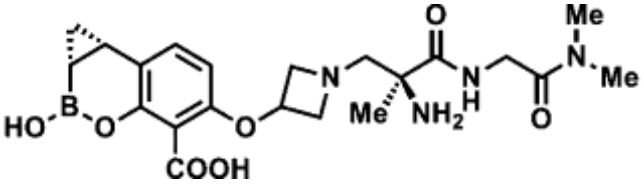
[Chemical Formula 1011]



,

(1aR,7bS)-5-({1-[(2S)-2-amino-3-{[2-(dimethylamino)-2-oxoethyl]amino}-2-methyl-3-oxopropyl]azetidin-3-yl}oxy)-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

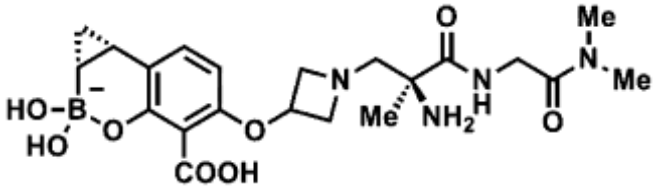
[Chemical Formula 1012]



,

(2S,4R)-9-({1-[(2S)-2-amino-3-{[2-(dimethylamino)-2-oxoethyl]amino}-2-methyl-3-oxopropyl]azetidin-3-yl}oxy)-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

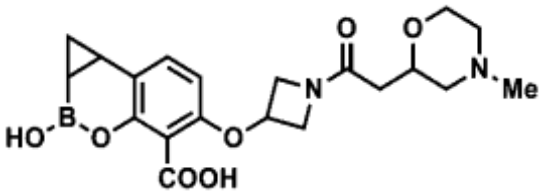
[Chemical Formula 1013]



,

2-hydroxy-5-[(1-{[4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

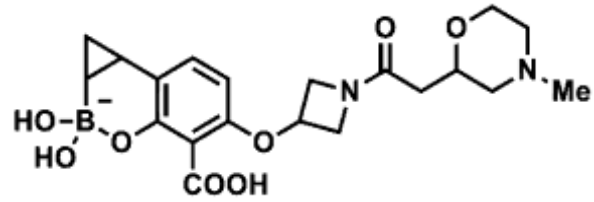
[Chemical Formula 1014]



,

5,5-dihydroxy-9-[(1-{[(4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

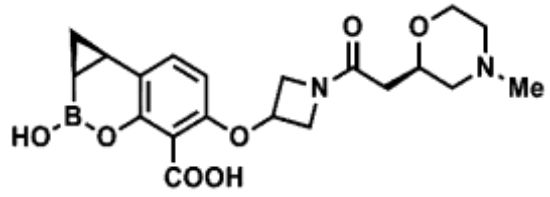
[Chemical Formula 1015]



,

(1aS,7bR)-2-hydroxy-5-[(1-{[(2R)-4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

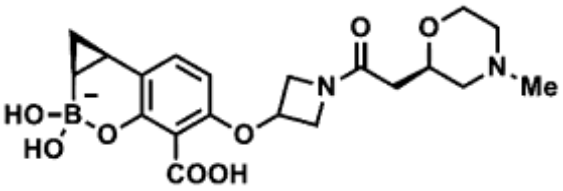
[Chemical Formula 1016]



,

(2R,4S)-5,5-dihydroxy-9-[(1-{[(2R)-4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

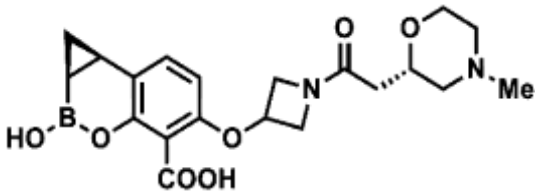
[Chemical Formula 1017]



,

(1aS,7bR)-2-hydroxy-5-[(1-{[(2S)-4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

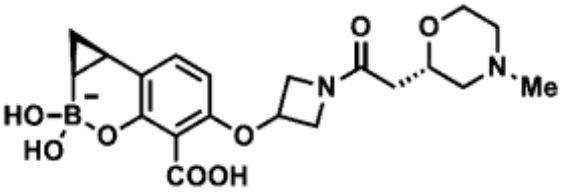
[Chemical Formula 1018]



,

(2R,4S)-5,5-dihydroxy-9-[(1-{[(2S)-4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

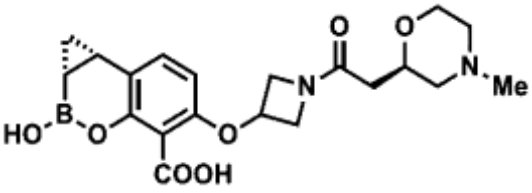
[Chemical Formula 1019]



,

(1aR,7bS)-2-hydroxy-5-[(1-{[(2R)-4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

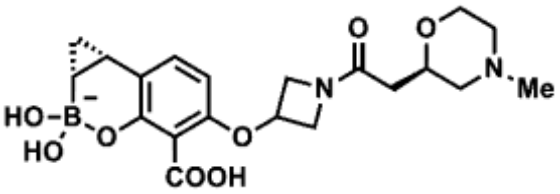
[Chemical Formula 1020]



,

(2S,4R)-5,5-dihydroxy-9-[(1-{[(2R)-4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

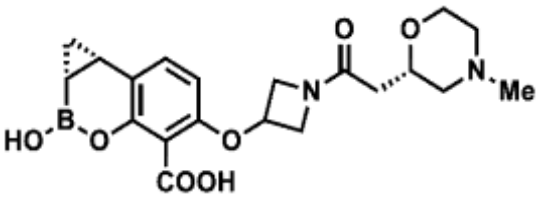
[Chemical Formula 1021]



,

(1aR,7bS)-2-hydroxy-5-[(1-{[(2S)-4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

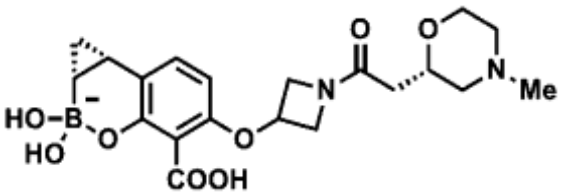
[Chemical Formula 1022]



,

(2S,4R)-5,5-dihydroxy-9-[(1-{[(2R)-4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(11),7,9-triene-8-carboxylic acid

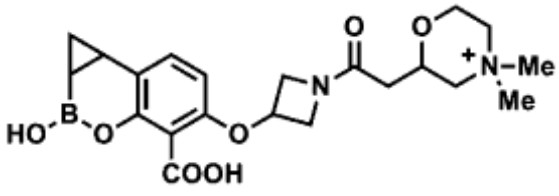
[Chemical Formula 1023]



,

5-[(1-{[4,4-dimethylmorpholin-4-ium-2-yl]acetyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylate

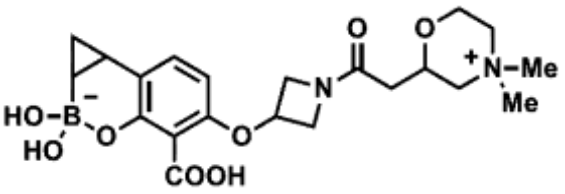
[Chemical Formula 1024]



,

9-[(1-{[4,4-dimethylmorpholin-4-ium-2-yl]acetyl}azetidin-3-yl)oxy]-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

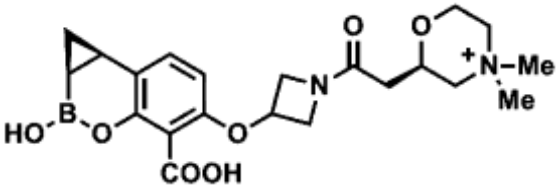
[Chemical Formula 1025]



,

(1aS,7bR)-5-[(1-{[(2R)-4,4-dimethylmorpholin-4-ium-2-yl]acetyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylate

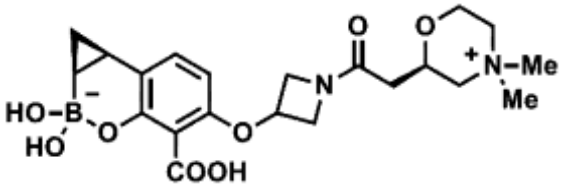
[Chemical Formula 1026]



,

(2R,4S)-9-[(1-{[(2R)-4,4-dimethylmorpholin-4-ium-2-yl]acetyl}azetidin-3-yl)oxy]-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

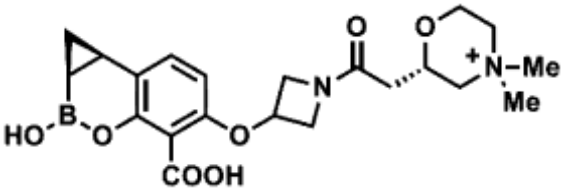
[Chemical Formula 1027]



,

(1aS,7bR)-5-[(1-{[(2S)-4,4-dimethylmorpholin-4-ium-2-yl]acetyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylate

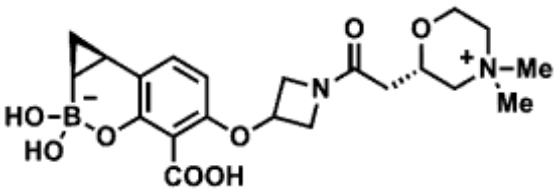
[Chemical Formula 1028]



,

(2R,4S)-9-[(1-{[(2S)-4,4-dimethylmorpholin-4-ium-2-yl]acetyl}azetidin-3-yl)oxy]-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

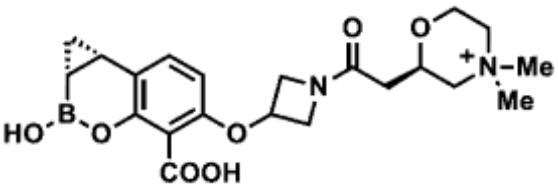
[Chemical Formula 1029]



,

(1aR,7bS)-5-[(1-{[(2R)-4,4-dimethylmorpholin-4-ium-2-yl]acetyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylate

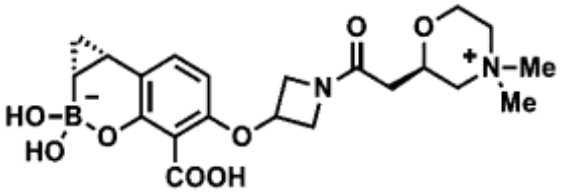
[Chemical Formula 1030]



,

(2S,4R)-9-[(1-{[(2R)-4,4-dimethylmorpholin-4-ium-2-yl]acetyl}azetidin-3-yl)oxy]-5,5-dihydroxy-6-oxa-5-boranuidatricyclo[5.4.0.$0^{2,4}$]undeca-1(7),8,10-triene-8-carboxylic acid

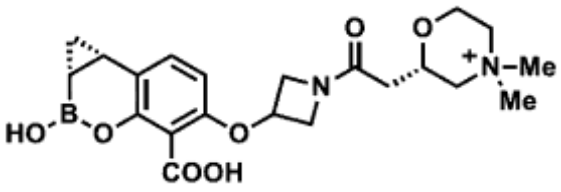
[Chemical Formula 1031]



,

(1aR,7bS)-5-[(1-{[(2S)-4,4-dimethylmorpholin-4-ium-2-yl]acetyl}azetidin-3-yl)oxy]-2-hydroxy-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylate

[Chemical Formula 1032]

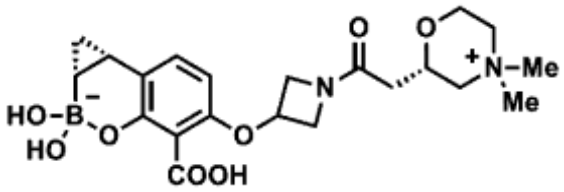


,

(2S,4R)-9-[(1-{[(2S)-4,4-dimethylmorpholin-4-ium-2-yl]acetyl}azetidin-3-yl)oxy]-5,5-dihydroxy-6-oxa-5-

boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(7),8,10-triene-8-carboxylic acid

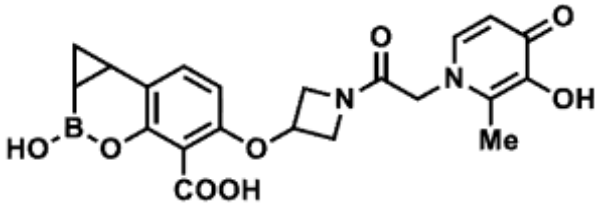
[Chemical Formula 1033]



,

(1aR,7bS)-2-hydroxy-5-({1-[(3-hydroxy-2-methyl-4-oxopyridin-1(4H)-yl)acetyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

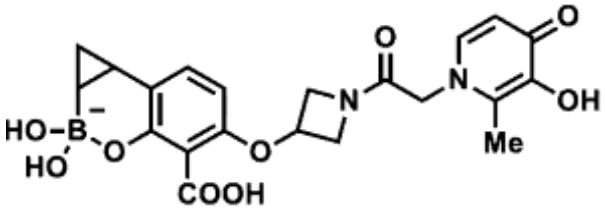
[Chemical Formula 1034]



,

5,5-dihydroxy-9-({1-[(3-hydroxy-2-methyl-4-oxopyridin-1(4H)-yl)acetyl]azetidin-3-yl}oxy)-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid

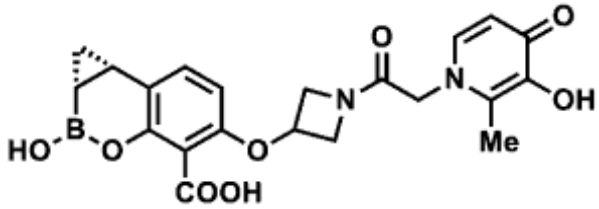
[Chemical Formula 1035]



,

(1aR,7bS)-2-hydroxy-5-({1-[(3-hydroxy-2-methyl-4-oxopyridin-1(4H)-yl)acetyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

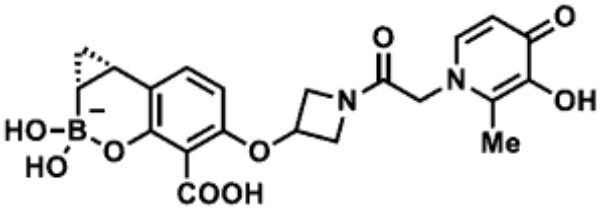
[Chemical Formula 1036]



,

(2S,4R)-5,5-dihydroxy-9-({1-[(3-hydroxy-2-methyl-4-oxopyridin-1(4H)-yl)acetyl]azetidin-3-yl}oxy)-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid

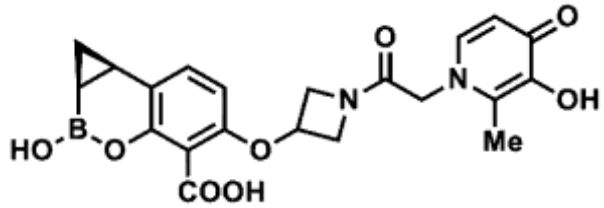
[Chemical Formula 1037]



,

(1aS,7bR)-2-hydroxy-5-({1-[(3-hydroxy-2-methyl-4-oxopyridin-1(4H)-yl)acetyl]azetidin-3-yl}oxy)-1,1a,2,7b-tetrahydrocyclopropa[c][1,2]benzoxaborinine-4-carboxylic acid

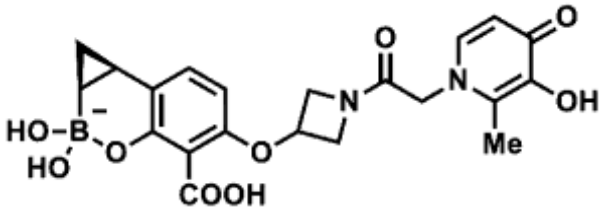
[Chemical Formula 1038]



, and

(2R,4S)-5,5-dihydroxy-9-({1-[(3-hydroxy-2-methyl-4-oxopyridin-1(4H)-yl)acetyl]azetidin-3-yl}oxy)-5-boranuidatricyclo[5.4.0.0^{2,4}]undeca-1(11),7,9-triene-8-carboxylic acid

[Chemical Formula 1039]

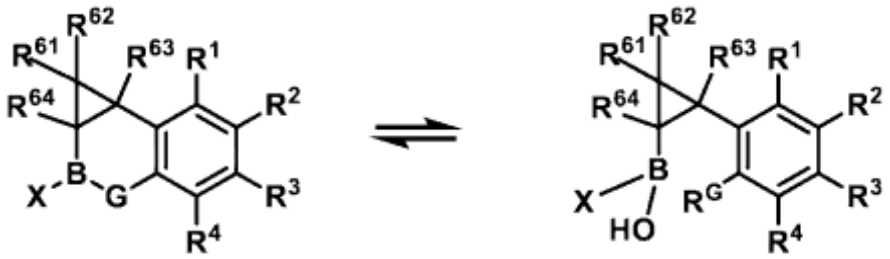


.

[Claim 103]

A compound represented by formula (11):

[Chemical Formula 1040]



(1a) (11)

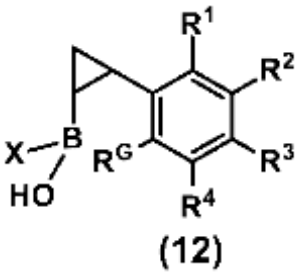
or a pharmaceutically acceptable salt thereof,

wherein R^G is a hydroxyl group, a thiol group, or $-NHR^{a1}$, R^{a1}, X, R^1, R^2, R^3, R^4, R^{61}, R^{62}, R^{63}, and R^{64} are defined the same as the definition according to any of claims 1 to 16, and formula (1a) is defined the same as claim 1 or 2.

[Claim 104]

The compound or the pharmaceutically acceptable salt thereof according to claim 103, wherein the compound of formula (11) is represented by formula (12):

[Chemical Formula 1041]



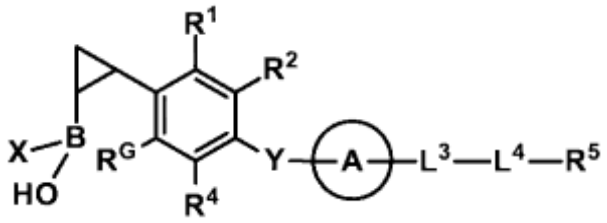
(12)

wherein X, R^1, R^2, R^3, and R^4 are defined the same as the definition according to claim 17 or 18.

[Claim 105]

The compound or the pharmaceutically acceptable salt thereof according to claim 103 or 104, wherein the compound of formula (11) or formula (12) is represented by formula (13):

[Chemical Formula 1042]



(13)

wherein X, Y, ring A, L^3, L^4, R^1, R^2, R^4, and R^5 are defined the same as the definition according to any of claims 19 to 23 and 29 to 32.

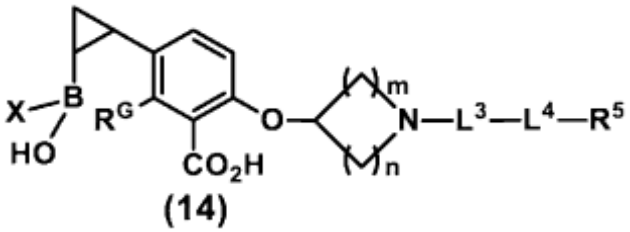
[Claim 106]

The compound or the pharmaceutically acceptable salt thereof according to claim 105, wherein X and R^G are hydroxyl groups, R^4 is a carboxyl group, and ring A is an optionally substituted 4- to 6-membered nitrogen-containing non-aryl heterocycle.

[Claim 107]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 103 to 106, wherein the compound of formula (11), formula (12), or formula (13) is represented by formula (14):

[Chemical Formula 1043]



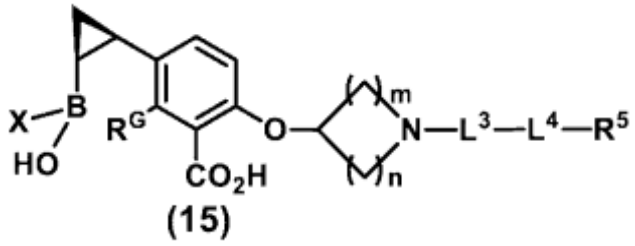
(14)

wherein X, L^3, L^4, m, n, and R^5 are defined the same as the definition according to any one of claims 33 to 64.

[Claim 108]

The compound or the pharmaceutically acceptable salt thereof according to claim 107, wherein the compound of formula (14) is one of the enantiomers represented by formula (15):

[Chemical Formula 1044]

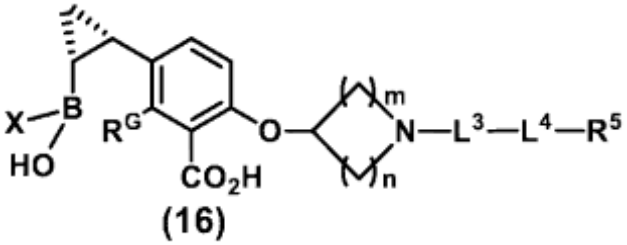


(15)

and

formula (16):

[Chemical Formula 1045]



(16)

wherein X, L^3, L^4, m, n, and R^5 are defined the same as the definition according to any one of claims 33 to 64.

[Claim 109]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 103 to 108, wherein R^G is a hydroxyl group or a thiol group.

[Claim 110]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 103 to 109, wherein R^G is a hydroxyl group.

[Claim 111]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 103 to 110, wherein X is a hydroxyl group or a C_{1-6} alkoxy group.

[Claim 112]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 103 to 111, wherein X is a hydroxyl group.

[Claim 113]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 107 to 112, wherein m is 1 or 2, n is 1 or 2, and m + n is 2 or 3.

[Claim 114]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 107 to 113, wherein m is 1, and n is 1.

[Claim 115]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 103 to 114, wherein L^3 is defined the same as the definition according to claim 25 or 26.

[Claim 116]

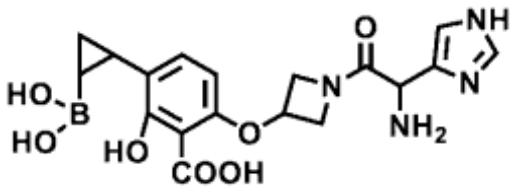
The compound or the pharmaceutically acceptable salt thereof according to any one of claims 103 to 115, wherein L^4 and R^5 are defined the same as the definition according to any one of claims 27 and 66 to 100.

[Claim 117]

The compound or the pharmaceutically acceptable salt thereof according to claim 104, selected from the group consisting of the compounds represented by the following names or structural formulas:

6-({1-[amino(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-3-(2-boronocyclopropyl)-2-hydroxybenzoic acid

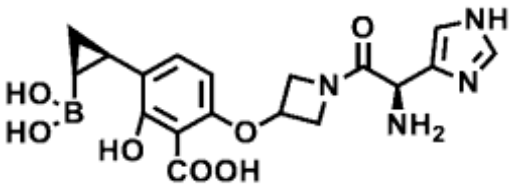
[Chemical Formula 1046]



,

6-({1-[(2R)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

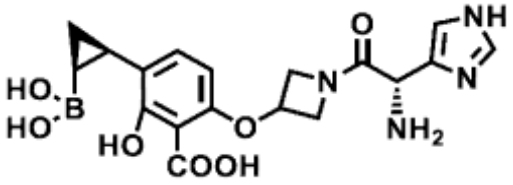
[Chemical Formula 1047]



,

6-({1-[(2S)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

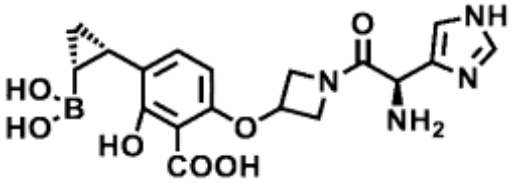
[Chemical Formula 1048]



,

6-({1-[(2R)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

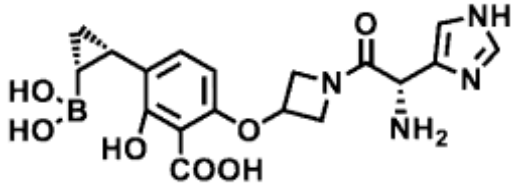
[Chemical Formula 1049]



,

6-({1-[(2S)-2-amino-2-(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

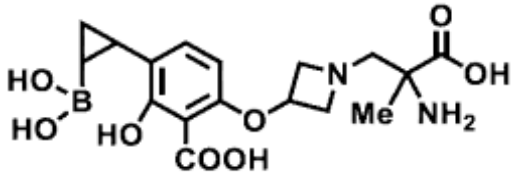
[Chemical Formula 1050]



,

6-({1-(2-amino-2-carboxypropyl)azetidin-3-yl}oxy)-3-(2-boronocyclopropyl)-2-hydroxybenzoic acid

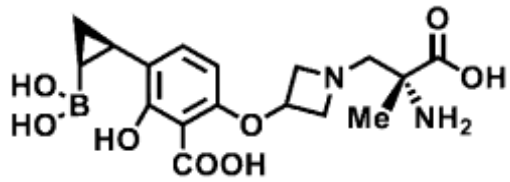
[Chemical Formula 1051]



,

6-({1-[(2R)-2-amino-2-carboxypropyl]azetidin-3-yl}oxy)-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

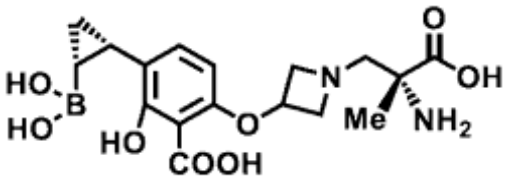
[Chemical Formula 1052]



,

6-({1-[(2R)-2-amino-2-carboxypropyl]azetidin-3-yl}oxy)-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

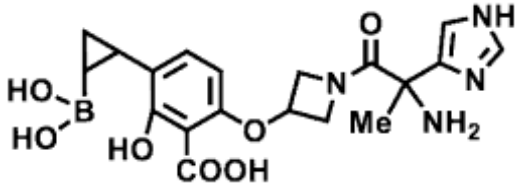
[Chemical Formula 1053]



,

6-({1-[2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-3-(2-boronocyclopropyl)-2-hydroxybenzoic acid

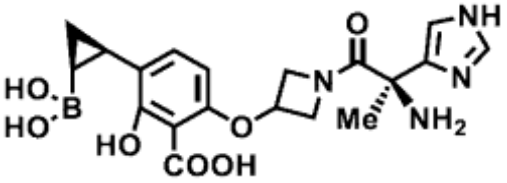
[Chemical Formula 1054]



,

6-({1-[(2R)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

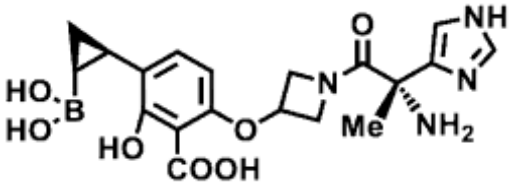
[Chemical Formula 1055]



,

6-({1-[(2S)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

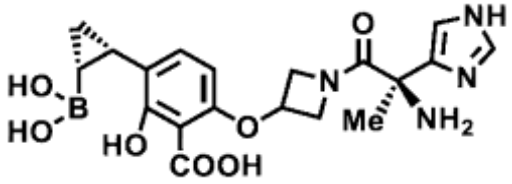
[Chemical Formula 1056]



,

6-({1-[(2R)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

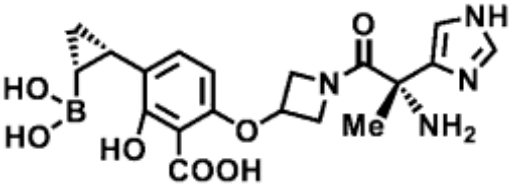
[Chemical Formula 1057]



, and

6-({1-[(2S)-2-amino-2-(1H-imidazol-4-yl)propanoyl]azetidin-3-yl}oxy)-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

[Chemical Formula 1058]



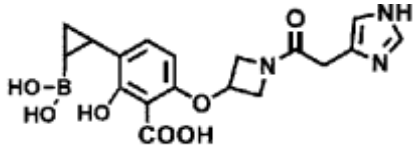
.

[Claim 118]

The compound or the pharmaceutically acceptable salt thereof according to claim 104, selected from the group consisting of the compounds represented by the following names or structural formulas:

2-boronocyclopropyl]-2-hydroxy-6-({1-[(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)benzoic acid

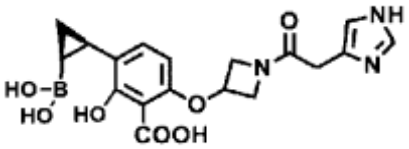
[Chemical Formula 1059]



,

3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxy-6-({1-[(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)benzoic acid

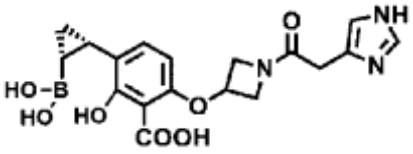
[Chemical Formula 1060]



,

3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxy-6-({1-[(1H-imidazol-4-yl)acetyl]azetidin-3-yl}oxy)benzoic acid

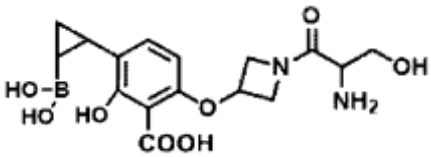
[Chemical Formula 1061]



,

3-[2-boronocyclopropyl]-2-hydroxy-6-[(1-serylazetidin-3-yl)oxy]benzoic acid

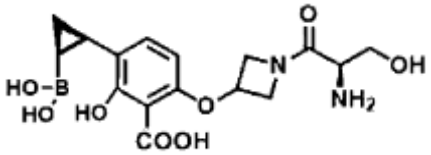
[Chemical Formula 1062]



,

3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxy-6-[(1-D-serylazetidin-3-yl)oxy]benzoic acid

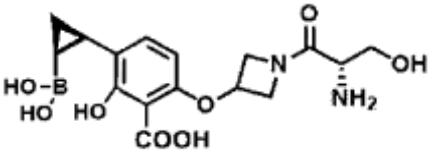
[Chemical Formula 1063]



,

3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxy-6-[(1-L-serylazetidin-3-yl)oxy]benzoic acid

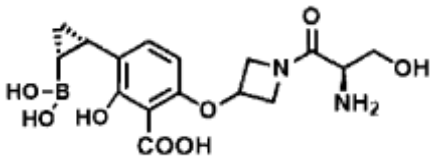
[Chemical Formula 1064]



,

3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxy-6-[(1-D-serylazetidin-3-yl)oxy]benzoic acid

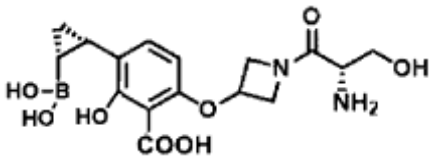
[Chemical Formula 1065]



,

3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxy-6-[(1-L-serylazetidin-3-yl)oxy]benzoic acid

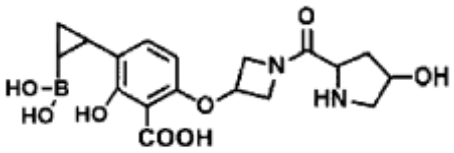
[Chemical Formula 1066]



,

3-[2-boronocyclopropyl]-2-hydroxy-6-({1-[4-hydroxy-L-prolyl]azetidin-3-yl}oxy)benzoic acid

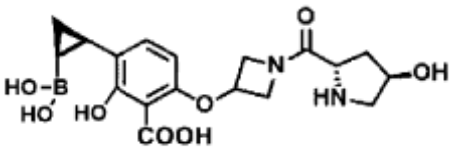
[Chemical Formula 1067]



,

3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxy-6-({1-[(4R)-4-hydroxy-L-prolyl]azetidin-3-yl}oxy)benzoic acid

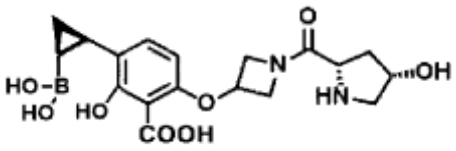
[Chemical Formula 1068]



,

3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxy-6-({1-[(4S)-4-hydroxy-L-prolyl]azetidin-3-yl}oxy)benzoic acid

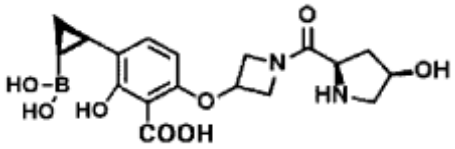
[Chemical Formula 1069]



,

3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxy-6-({1-[(4R)-4-hydroxy-D-prolyl]azetidin-3-yl}oxy)benzoic acid

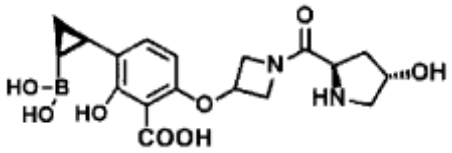
[Chemical Formula 1070]



,

3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxy-6-({1-[(4S)-4-hydroxy-D-prolyl]azetidin-3-yl}oxy)benzoic acid

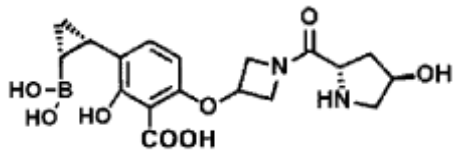
[Chemical Formula 1071]



,

3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxy-6-({1-[(4R)-4-hydroxy-L-prolyl]azetidin-3-yl}oxy)benzoic acid

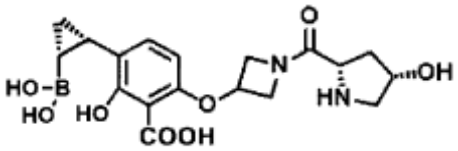
[Chemical Formula 1072]



,

3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxy-6-({1-[(4S)-4-hydroxy-L-prolyl]azetidin-3-yl}oxy)benzoic acid

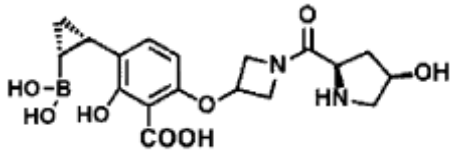
[Chemical Formula 1073]



,

3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxy-6-({1-[(4R)-4-hydroxy-D-prolyl]azetidin-3-yl}oxy)benzoic acid

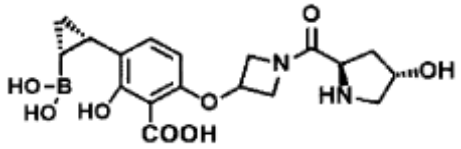
[Chemical Formula 1074]



,

3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxy-6-({1-[(4S)-4-hydroxy-D-prolyl]azetidin-3-yl}oxy)benzoic acid

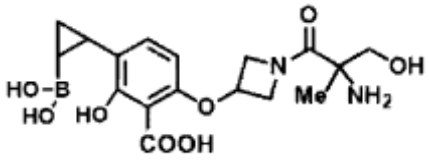
[Chemical Formula 1075]



,

3-[2-boronocyclopropyl]-2-hydroxy-6-{[1-(2-methyl-seryl)azetidin-3-yl]oxy}benzoic acid

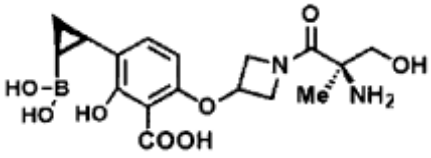
[Chemical Formula 1076]



,

3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxy-6-{[1-(2-methyl-D-seryl)azetidin-3-yl]oxy}benzoic acid

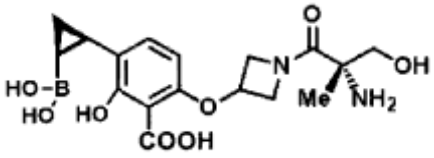
[Chemical Formula 1077]



,

3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxy-6-{[1-(2-methyl-L-seryl)azetidin-3-yl]oxy}benzoic acid

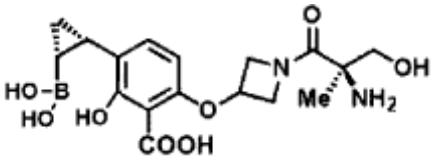
[Chemical Formula 1078]



,

3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxy-6-{[1-(2-methyl-D-seryl)azetidin-3-yl]oxy}benzoic acid

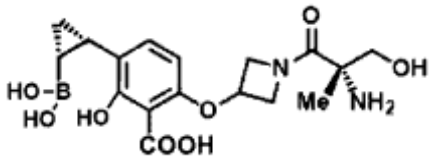
[Chemical Formula 1079]



,

3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxy-6-{[1-(2-methyl-L-seryl)azetidin-3-yl]oxy}benzoic acid

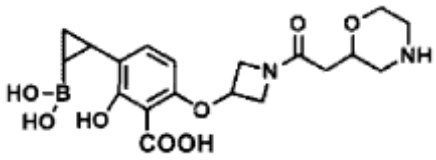
[Chemical Formula 1080]



,

3-[(2-boronocyclopropyl]-2-hydroxy-6-[(1-{[morpholin-2-yl]acetyl}azetidin-3-yl)oxy]benzoic acid

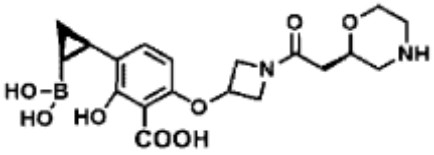
[Chemical Formula 1081]



,

3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxy-6-[(1-{[(2R)-morpholin-2-yl]acetyl}azetidin-3-yl)oxy]benzoic acid

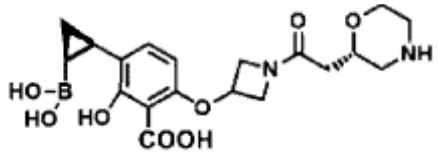
[Chemical Formula 1082]



,

3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxy-6-[(1-{[(2S)-morpholin-2-yl]acetyl}azetidin-3-yl)oxy]benzoic acid

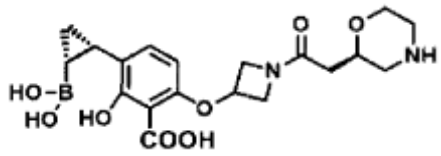
[Chemical Formula 1083]



,

3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxy-6-[(1-{[(2R)-morpholin-2-yl]acetyl}azetidin-3-yl)oxy]benzoic acid

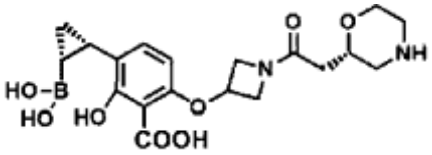
[Chemical Formula 1084]



,

3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxy-6-[(1-{[(2S)-morpholin-2-yl]acetyl}azetidin-3-yl)oxy]benzoic acid

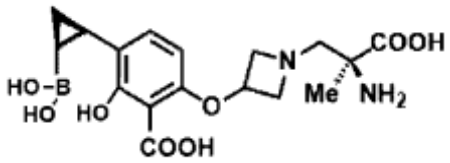
[Chemical Formula 1085]



,

6-({1-[(2S)-2-amino-2-carboxypropyl]azetidin-3-yl}oxy)-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

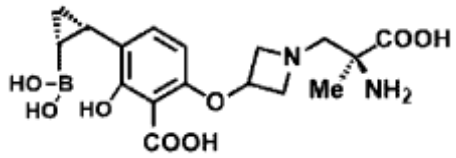
[Chemical Formula 1086]



,

6-({1-[(2S)-2-amino-2-carboxypropyl]azetidin-3-yl}oxy)-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

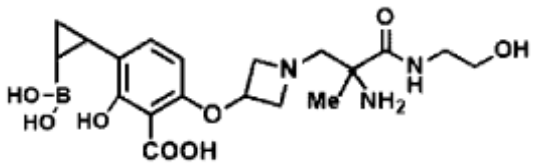
[Chemical Formula 1087]



,

6-[(1-{2-amino-3-[(2-hydroxyethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-3-[2-boronocyclopropyl]-2-hydroxybenzoic acid

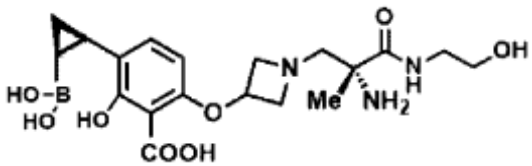
[Chemical Formula 1088]



,

6-[(1-{(2R)-2-amino-3-[(2-hydroxyethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

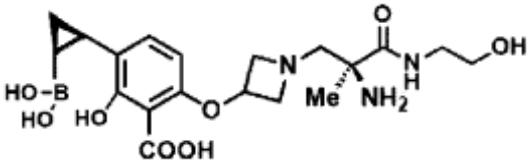
[Chemical Formula 1089]



,

6-[(1-{(2S)-2-amino-3-[(2-hydroxyethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

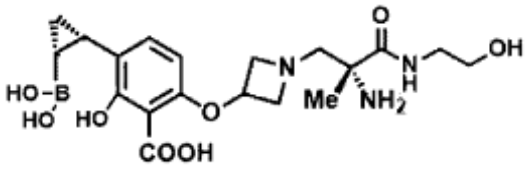
[Chemical Formula 1090]



,

6-[(1-{(2R)-2-amino-3-[(2-hydroxyethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

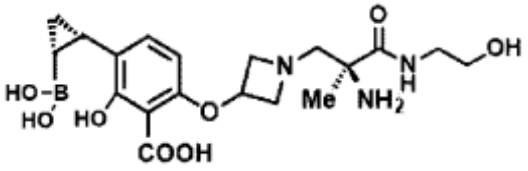
[Chemical Formula 1091]



,

6-[(1-{(2S)-2-amino-3-[(2-hydroxyethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

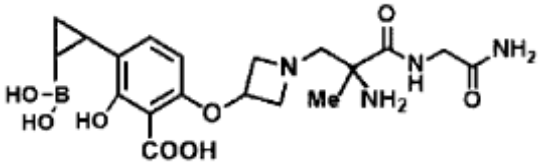
[Chemical Formula 1092]



,

6-[(1-{2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-3-[2-boronocyclopropyl]-2-hydroxybenzoic acid

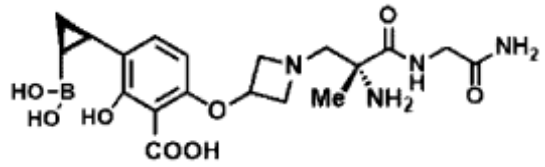
[Chemical Formula 1093]



,

6-[(1-{(2R)-2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

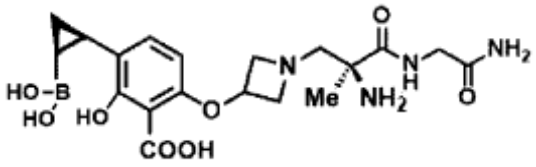
[Chemical Formula 1094]



,

6-[(1-{(2S)-2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

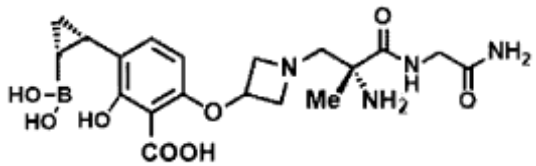
[Chemical Formula 1095]



,

6-[(1-{(2R)-2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

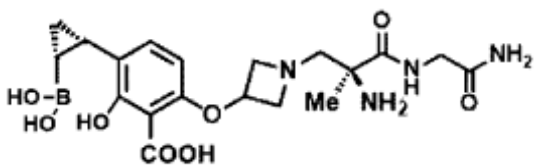
[Chemical Formula 1096]



,

6-[(1-{(2S)-2-amino-3-[(2-amino-2-oxoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

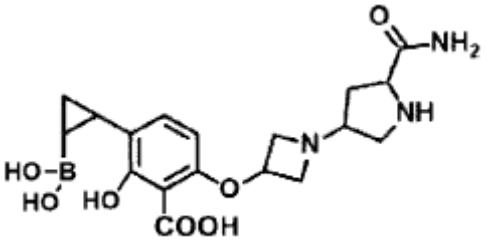
[Chemical Formula 1097]



,

3-[2-boronocyclopropyl]-6-({1-[(5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxybenzoic acid

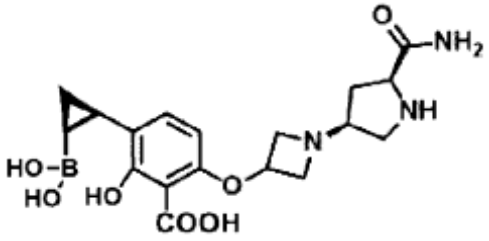
[Chemical Formula 1098]



,

3-[(1R,2S)-2-boronocyclopropyl]-6-({1-[(3S,5S)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxybenzoic acid

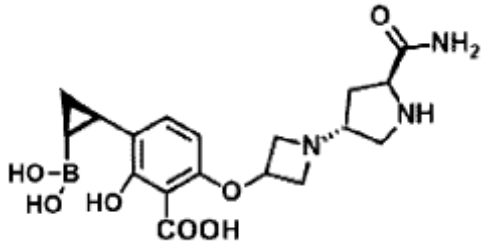
[Chemical Formula 1099]



,

3-[(1R,2S)-2-boronocyclopropyl]-6-({1-[(3R,5S)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxybenzoic acid

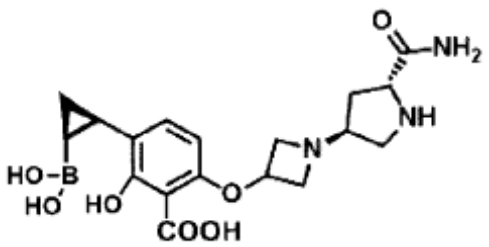
[Chemical Formula 1100]



,

3-[(1R,2S)-2-boronocyclopropyl]-6-({1-[(3S,5R)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxybenzoic acid

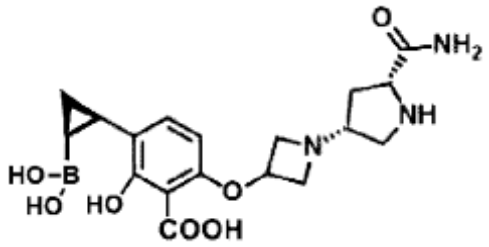
[Chemical Formula 1101]



,

3-[(1R,2S)-2-boronocyclopropyl]-6-({1-[(3R,5R)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxybenzoic acid

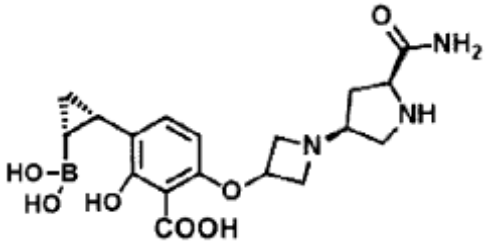
[Chemical Formula 1102]



,

3-[(1S,2R)-2-boronocyclopropyl]-6-({1-[(3S,5S)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxybenzoic acid

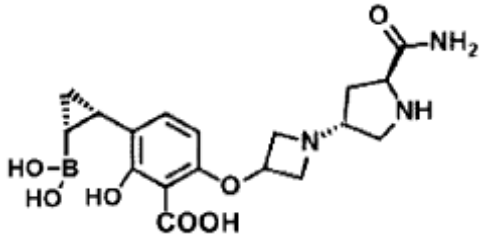
[Chemical Formula 1103]



,

3-[(1S,2R)-2-boronocyclopropyl]-6-({1-[(3R,5S)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxybenzoic acid

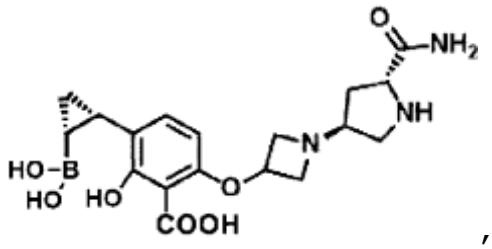
[Chemical Formula 1104]



,

3-[(1S,2R)-2-boronocyclopropyl]-6-({1-[(3S,5R)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxybenzoic acid

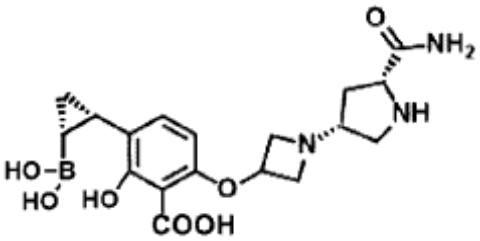
[Chemical Formula 1105]



,

3-[(1S,2R)-2-boronocyclopropyl]-6-({1-[(3R,5R)-5-carbamoylpyrrolidin-3-yl]azetidin-3-yl}oxy)-2-hydroxybenzoic acid

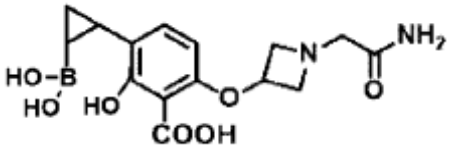
[Chemical Formula 1106]



,

6-{[1-(2-amino-2-oxoethyl)azetidin-3-yl]oxy}-3-[2-boronocyclopropyl]-2-hydroxybenzoic acid

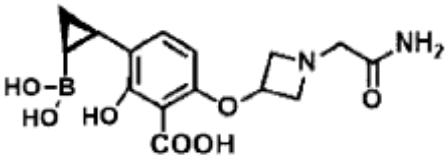
[Chemical Formula 1107]



,

6-{[1-(2-amino-2-oxoethyl)azetidin-3-yl]oxy}-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

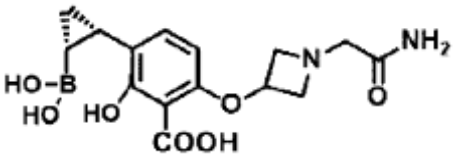
[Chemical Formula 1108]



,

6-{[1-(2-amino-2-oxoethyl)azetidin-3-yl]oxy}-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

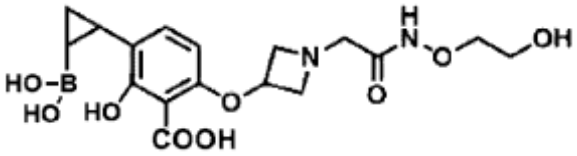
[Chemical Formula 1109]



,

3-[(2-boronocyclopropyl]-2-hydroxy-6-[(1-{2-[(2-hydroxyethoxy)amino]-2-oxoethyl}azetidin-3-yl)oxy]benzoic acid

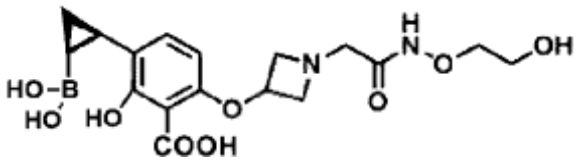
[Chemical Formula 1110]



,

3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxy-6-[(1-{2-[(2-hydroxyethoxy)amino]-2-oxoethyl}azetidin-3-yl)oxy]benzoic acid

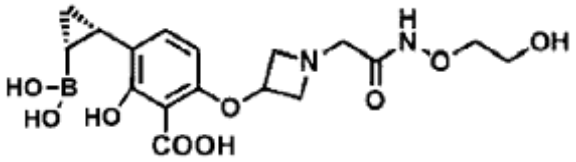
[Chemical Formula 1111]



,

3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxy-6-[(1-{2-[(2-hydroxyethoxy)amino]-2-oxoethyl}azetidin-3-yl)oxy]benzoic acid

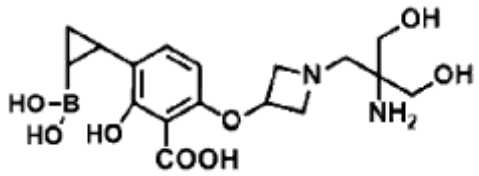
[Chemical Formula 1112]



,

6-({1-[2-amino-3-hydroxy-2-(hydroxymethyl)propyl]azetidin-3-yl}oxy)-3-[2-boronocyclopropyl]-2-hydroxybenzoic acid

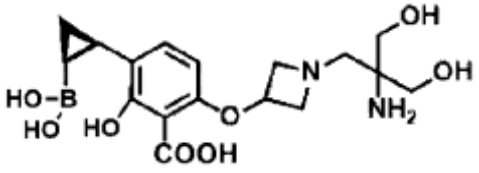
[Chemical Formula 1113]



,

6-({1-[2-amino-3-hydroxy-2-(hydroxymethyl)propyl]azetidin-3-yl}oxy)-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

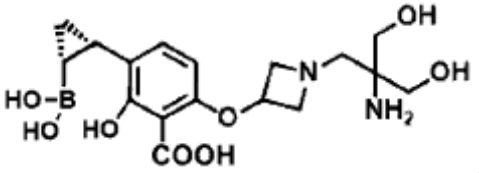
[Chemical Formula 1114]



,

6-({1-[2-amino-3-hydroxy-2-(hydroxymethyl)propyl]azetidin-3-yl}oxy)-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

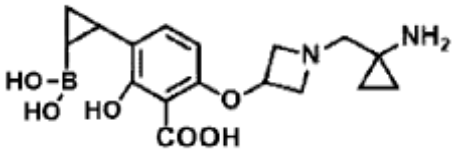
[Chemical Formula 1115]



,

6-({1-[(1-aminocyclopropyl)methyl]azetidin-3-yl}oxy)-3-[2-boronocyclopropyl]-2-hydroxybenzoic acid

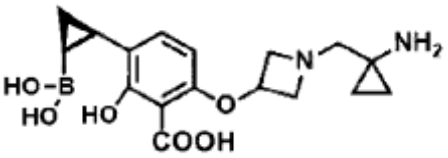
[Chemical Formula 1116]



,

6-({1-[(1-aminocyclopropyl)methyl]azetidin-3-yl}oxy)-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

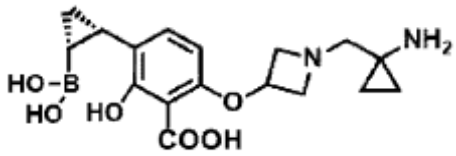
[Chemical Formula 1117]



,

6-({1-[(1-aminocyclopropyl)methyl]azetidin-3-yl}oxy)-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

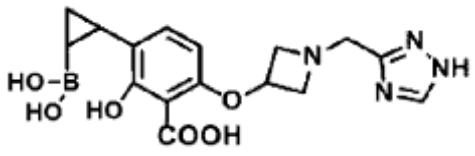
[Chemical Formula 1118]



,

3-[2-boronocyclopropyl]-2-hydroxy-6-({1-[(1H-1,2,4-triazol-3-yl)methyl]azetidin-3-yl}oxy)benzoic acid

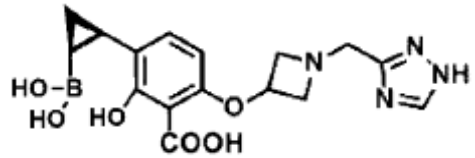
[Chemical Formula 1119]



,

3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxy-6-({1-[(1H-1,2,4-triazol-3-yl)methyl]azetidin-3-yl}oxy)benzoic acid

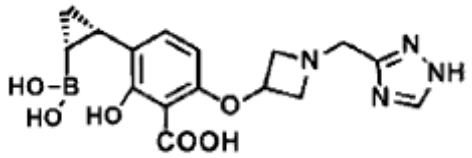
[Chemical Formula 1120]



,

3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxy-6-({1-[(1H-1,2,4-triazol-3-yl)methyl]azetidin-3-yl}oxy)benzoic acid

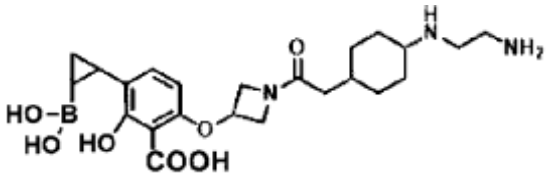
[Chemical Formula 1121]



,

6-{[1-({4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-3-[2-boronocyclopropyl]-2-hydroxybenzoic acid

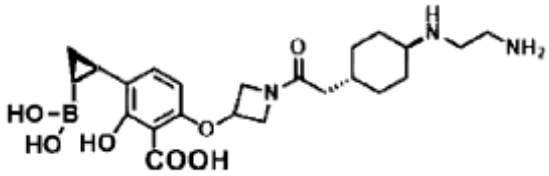
[Chemical Formula 1122]



,

6-{[1-({(1r,4r)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

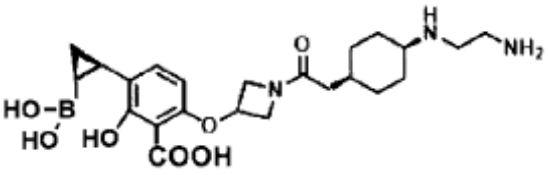
[Chemical Formula 1123]



,

6-{[1-({(1s,4r)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

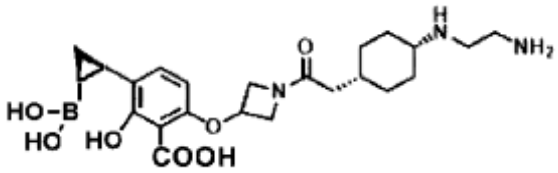
[Chemical Formula 1124]



,

6-{[1-({(1r,4s)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

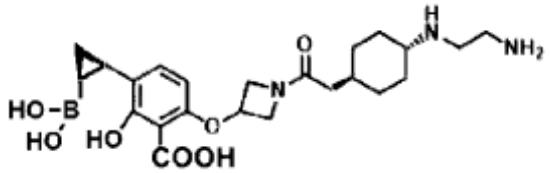
[Chemical Formula 1125]



,

6-{[1-({(1s,4s)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

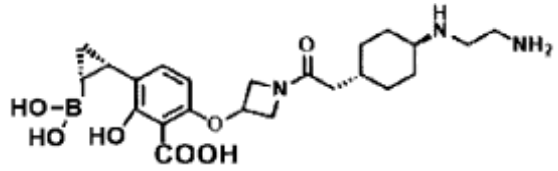
[Chemical Formula 1126]



,

6-{[1-({(1r,4r)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

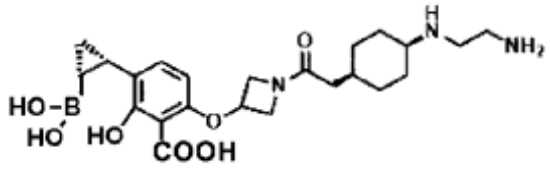
[Chemical Formula 1127]



,

6-{[1-({(1s,4r)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

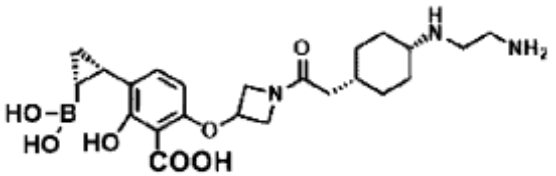
[Chemical Formula 1128]



,

6-{[1-({(1r,4s)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

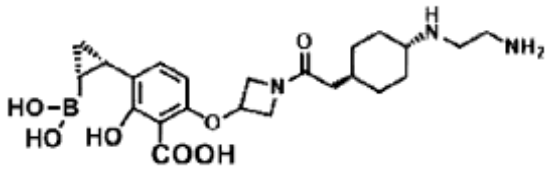
[Chemical Formula 1129]



,

6-{[1-({(1s,4s)-4-[(2-aminoethyl)amino]cyclohexyl}acetyl)azetidin-3-yl]oxy}-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

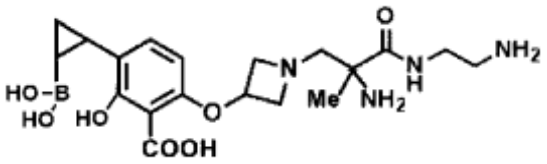
[Chemical Formula 1130]



,

6-[(1-{2-amino-3-[(2-aminoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-3-[2-boronocyclopropyl]-2-hydroxybenzoic acid

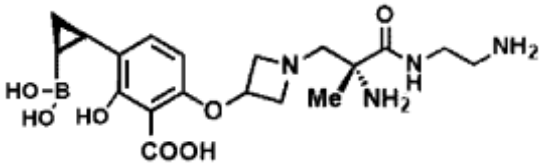
[Chemical Formula 1131]



,

6-[(1-{(2R)-2-amino-3-[(2-aminoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

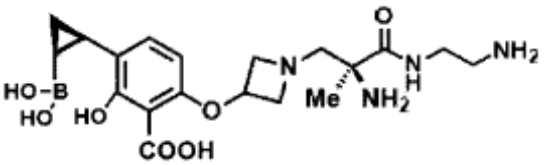
[Chemical Formula 1132]



,

6-[(1-{(2S)-2-amino-3-[(2-aminoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

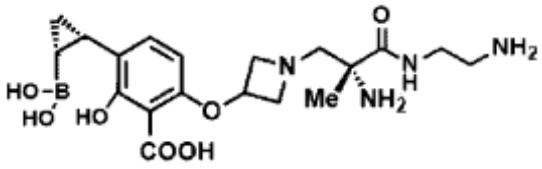
[Chemical Formula 1133]



,

6-[(1-{(2R)-2-amino-3-[(2-aminoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

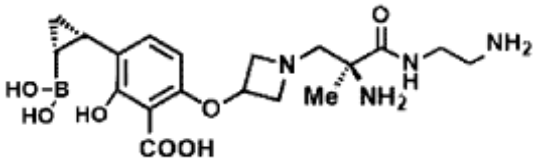
[Chemical Formula 1134]



,

6-[(1-{(2S)-2-amino-3-[(2-aminoethyl)amino]-2-methyl-3-oxopropyl}azetidin-3-yl)oxy]-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

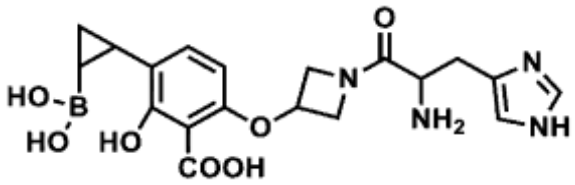
[Chemical Formula 1135]



,

3-(2-boronocyclopropyl)-6-[(1-histidylazetidin-3-yl)oxy]-2-hydroxybenzoic acid

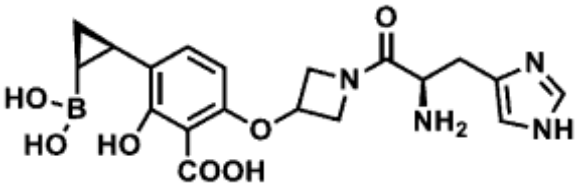
[Chemical Formula 1136]



,

3-[(1R,2S)-2-boronocyclopropyl]-6-[(1-D-histidylazetidin-3-yl)oxy]-2-hydroxybenzoic acid

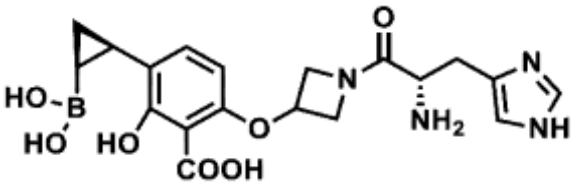
[Chemical Formula 1137]



,

3-[(1R,2S)-2-boronocyclopropyl]-6-[(1-L-histidylazetidin-3-yl)oxy]-2-hydroxybenzoic acid

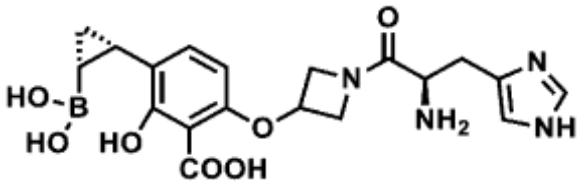
[Chemical Formula 1138]



,

3-[(1S,2R)-2-boronocyclopropyl]-6-[(1-D-histidylazetidin-3-yl)oxy]-2-hydroxybenzoic acid

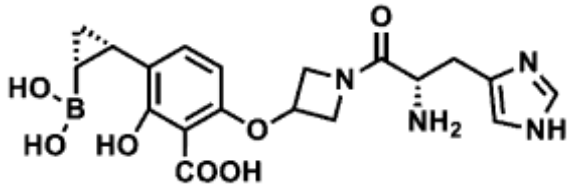
[Chemical Formula 1139]



,

3-[(1S,2R)-2-boronocyclopropyl]-6-[(1-L-histidylazetidin-3-yl)oxy]-2-hydroxybenzoic acid

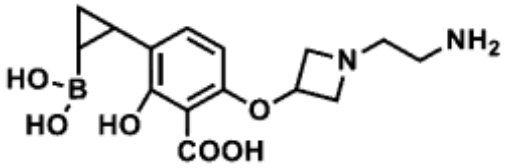
[Chemical Formula 1140]



,

6-{[1-(2-aminoethyl)azetidin-3-yl]oxy}-3-(2-boronocyclopropyl)-2-hydroxybenzoic acid

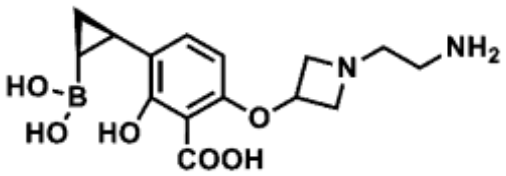
[Chemical Formula 1141]



,

6-{[1-(2-aminoethyl)azetidin-3-yl]oxy}-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

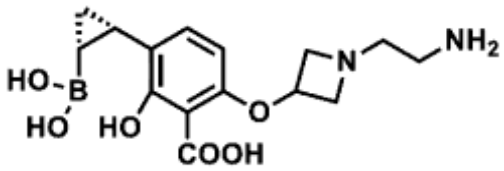
[Chemical Formula 1142]



,

6-{[1-(2-aminoethyl)azetidin-3-yl]oxy}-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

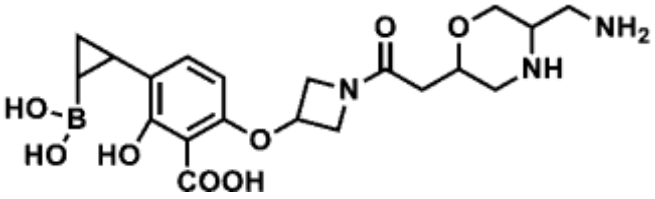
[Chemical Formula 1143]



,

6-[(1-{[5-(aminomethyl)morpholin-2-yl]acetyl}azetidin-3-yl)oxy]-3-(2-boronocyclopropyl)-2-hydroxybenzoic acid

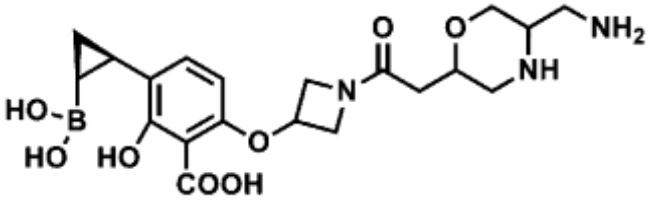
[Chemical Formula 1144]



,

6-[(1-{[5-(aminomethyl)morpholin-2-yl]acetyl}azetidin-3-yl)oxy]-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

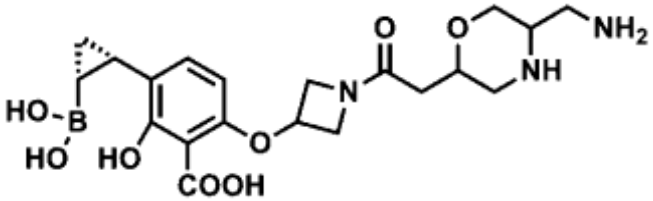
[Chemical Formula 1145]



,

6-[(1-{[5-(aminomethyl)morpholin-2-yl]acetyl}azetidin-3-yl)oxy]-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

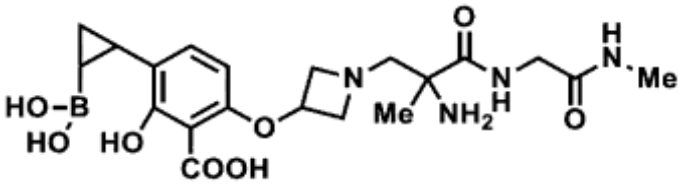
[Chemical Formula 1146]



,

6-({1-[2-amino-2-methyl-3-{[2-(methylamino)-2-oxoethyl]amino}-3-oxopropyl]azetidin-3-yl}oxy)-3-[2-boronocyclopropyl]-2-hydroxybenzoic acid

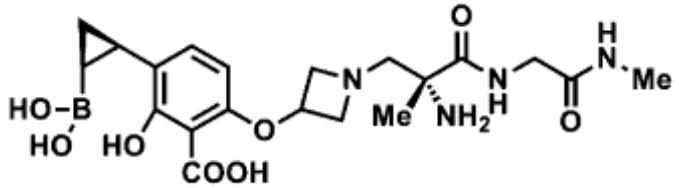
[Chemical Formula 1147]



,

6-({1-[(2R)-2-amino-2-methyl-3-{[2-(methylamino)-2-oxoethyl]amino}-3-oxopropyl]azetidin-3-yl}oxy)-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

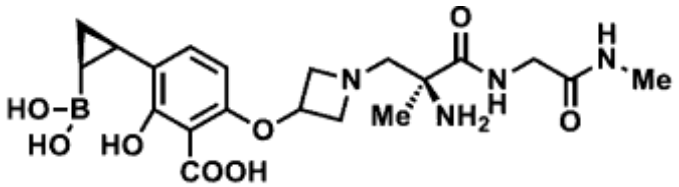
[Chemical Formula 1148]



,

6-({1-[(2S)-2-amino-2-methyl-3-{[2-(methylamino)-2-oxoethyl]amino}-3-oxopropyl]azetidin-3-yl}oxy)-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

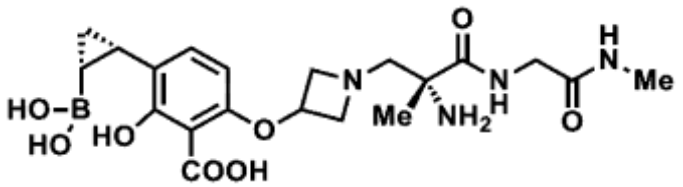
[Chemical Formula 1149]



,

6-({1-[(2R)-2-amino-2-methyl-3-{[2-(methylamino)-2-oxoethyl]amino}-3-oxopropyl]azetidin-3-yl}oxy)-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

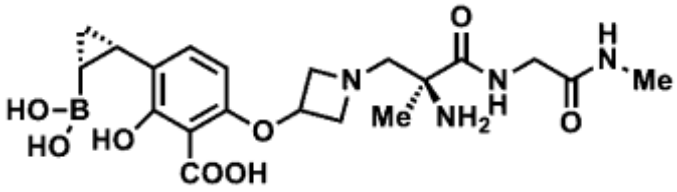
[Chemical Formula 1150]



,

6-({1-[(2S)-2-amino-2-methyl-3-{[2-(methylamino)-2-oxoethyl]amino}-3-oxopropyl]azetidin-3-yl}oxy)-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

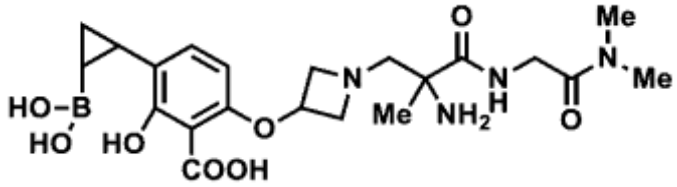
[Chemical Formula 1151]



,

6-({1-[2-amino-3-{[2-(dimethylamino)-2-oxoethyl]amino}-2-methyl-3-oxopropyl]azetidin-3-yl}oxy)-3-[2-boronocyclopropyl]-2-hydroxybenzoic acid

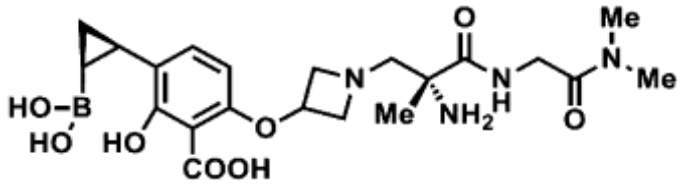
[Chemical Formula 1152]



,

6-({1-[(2R)-2-amino-3-{[2-(dimethylamino)-2-oxoethyl]amino}-2-methyl-3-oxopropyl]azetidin-3-yl}oxy)-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

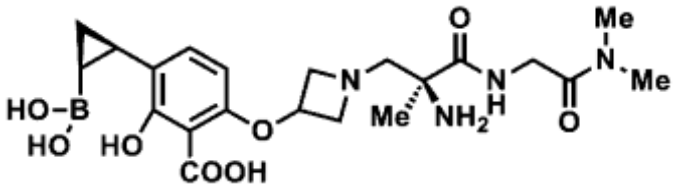
[Chemical Formula 1153]



,

6-({1-[(2S)-2-amino-3-{[2-(dimethylamino)-2-oxoethyl]amino}-2-methyl-3-oxopropyl]azetidin-3-yl}oxy)-3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxybenzoic acid

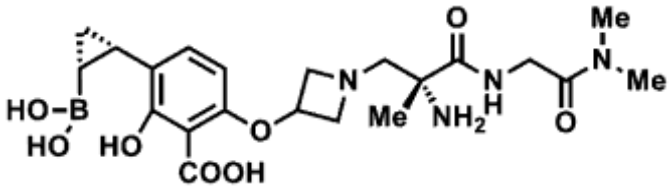
[Chemical Formula 1154]



,

6-({1-[(2R)-2-amino-3-{[2-(dimethylamino)-2-oxoethyl]amino}-2-methyl-3-oxopropyl]azetidin-3-yl}oxy)-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

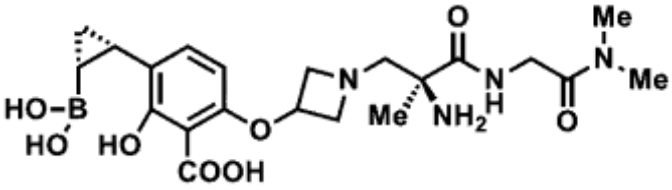
[Chemical Formula 1155]



,

6-({1-[(2S)-2-amino-3-{[2-(dimethylamino)-2-oxoethyl]amino}-2-methyl-3-oxopropyl]azetidin-3-yl}oxy)-3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxybenzoic acid

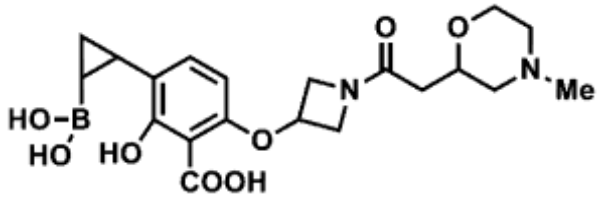
[Chemical Formula 1156]



,

3-[2-boronocyclopropyl]-2-hydroxy-6-[(1-{[4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]benzoic acid

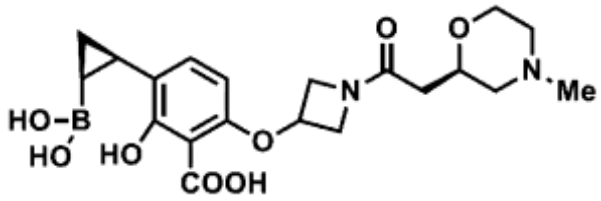
[Chemical Formula 1157]



,

3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxy-6-[(1-{[(2R)-4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]benzoic acid

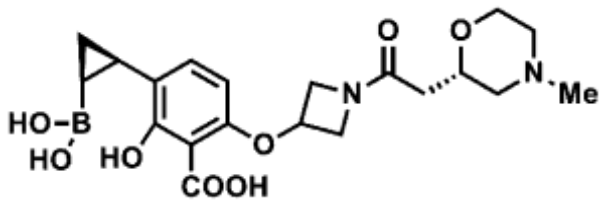
[Chemical Formula 1158]



,

3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxy-6-[(1-{[(2S)-4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]benzoic acid

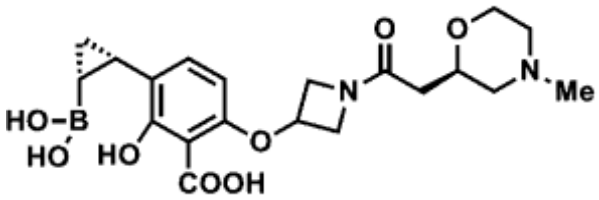
[Chemical Formula 1159]



,

3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxy-6-[(1-{[(2R)-4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]benzoic acid

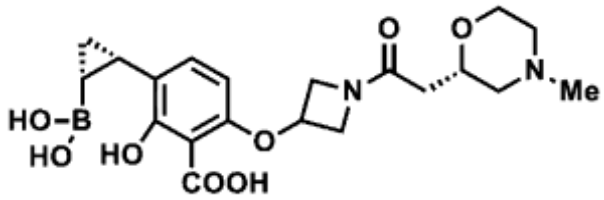
[Chemical Formula 1160]



,

3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxy-6-[(1-{[(2S)-4-methylmorpholin-2-yl]acetyl}azetidin-3-yl)oxy]benzoic acid

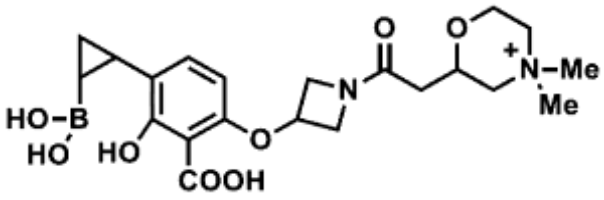
[Chemical Formula 1161]



,

3-[2-boronocyclopropyl]-6-[(1-{[4,4-dimethylmorpholin-4-ium-2-yl]acetyl}azetidin-3-yl)oxy]-2-hydroxybenzoate

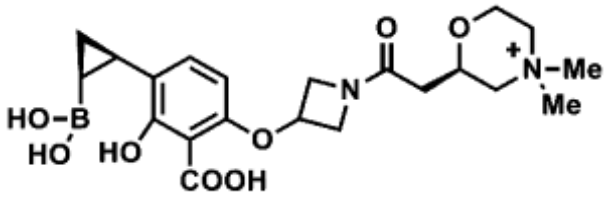
[Chemical Formula 1162]



,

3-[(1R,2S)-2-boronocyclopropyl]-6-[(1-{[(2R)-4,4-dimethylmorpholin-4-ium-2-yl]acetyl}azetidin-3-yl)oxy]-2-hydroxybenzoate

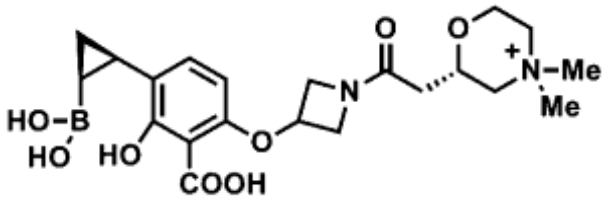
[Chemical Formula 1163]



,

3-[(1R,2S)-2-boronocyclopropyl]-6-[(1-{[(2S)-4,4-dimethylmorpholin-4-ium-2-yl]acetyl}azetidin-3-yl)oxy]-2-hydroxybenzoate

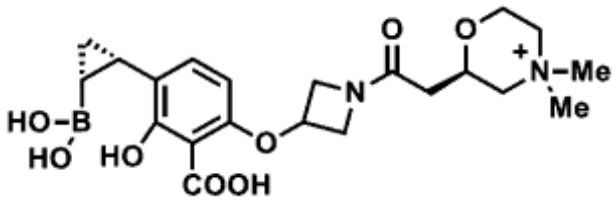
[Chemical Formula 1164]



,

3-[(1S,2R)-2-boronocyclopropyl]-6-[(1-{[(2R)-4,4-dimethylmorpholin-4-ium-2-yl]acetyl}azetidin-3-yl)oxy]-2-hydroxybenzoate

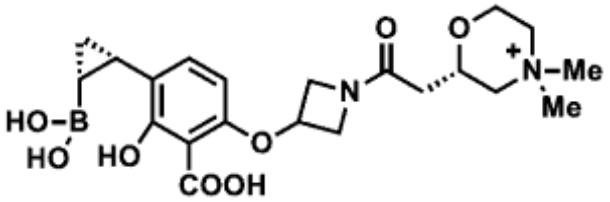
[Chemical Formula 1165]



,

3-[(1S,2R)-2-boronocyclopropyl]-6-[(1-{[(2S)-4,4-dimethylmorpholin-4-ium-2-yl]acetyl}azetidin-3-yl)oxy]-2-hydroxybenzoate

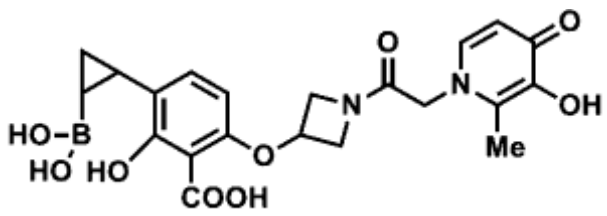
[Chemical Formula 1166]



,

3-(2-boronocyclopropyl)-2-hydroxy-6-({1-[(3-hydroxy-2-methyl-4-oxopyridin-1(4H)-yl)acetyl]azetidin-3-yl}oxy)benzoic acid

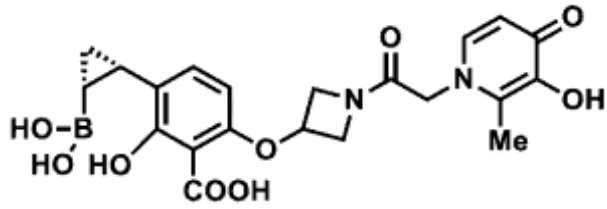
[Chemical Formula 1167]



,

3-[(1S,2R)-2-boronocyclopropyl]-2-hydroxy-6-({1-[(3-hydroxy-2-methyl-4-oxopyridin-1(4H)-yl)acetyl]azetidin-3-yl}oxy)benzoic acid

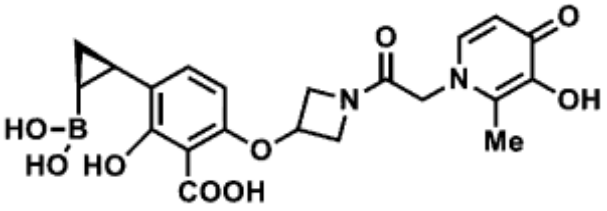
[Chemical Formula 1168]



, and

3-[(1R,2S)-2-boronocyclopropyl]-2-hydroxy-6-({1-[(3-hydroxy-2-methyl-4-oxopyridin-1(4H)-yl)acetyl]azetidin-3-yl}oxy)benzoic acid

[Chemical Formula 1169]



.

[Claim 119]

A medicament comprising the compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to claim 118.

[Claim 120]

The medicament according to claim 119, which is a therapeutic drug or a prophylactic drug for a bacterial infection.

[Claim 121]

An agent for inhibiting β-lactamase, comprising the compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 118 as an active ingredient.

[Claim 122]

A pharmaceutical composition comprising the compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 118 and a pharmaceutically acceptable carrier.

[Claim 123]

The pharmaceutical composition according to claim 122, further comprising an additional agent.

[Claim 124]

The pharmaceutical composition according to claim 123, wherein the additional agent is selected from the group consisting of an antibacterial agent, an antifungal agent, an antiviral agent, an anti-inflammatory agent, and an anti-allergic agent.

[Claim 125]

The pharmaceutical composition according to claim 123 or 124, wherein the additional agent is a β-lactam agent.

[Claim 126]

The pharmaceutical composition according to claim 124 or 125, wherein a β-lactam agent, which is the additional agent, is selected from the group consisting of amoxicillin, ampicillin (pivampicillin, hetacillin, bacampicillin, metampicillin, and talampicillin), epicillin, carbenicillin (carindacillin), ticarcillin, temocillin, azlocillin, piperacillin, mezlocillin, mecillinam (pivmecillinam), sulbenicillin, benzylpenicillin (G), clometocillin, benzathine benzylpenicillin, procaine benzylpenicillin, azidocillin, penamecillin, phenoxymethyl penicillin (V), propicillin, benzathine phenoxymethylpenicillin, phenethicillin, cloxacillin (dicloxacillin and flucloxacillin), oxacillin, methicillin, nafcillin, faropenem, biapenem, doripenem, ertapenem, imipenem, meropenem, panipenem, tomopenem, razupenem, cefazolin, cefacetrile, cefadroxil, cephalexin, cefaloglycin, cefalonium, cefaloridine, cephalothin, cephapirin, cefatrizine, cefazedone, cefazaflur, cefradine, cefroxadine, ceftezole, cefaclor, cefamandole, cefminox, cefonicide, ceforanide, cefotiam, cefprozil, cefbuperazone, cefuroxime, cefuzonam, cefoxitin,

cefotetan, cefmetazole, loracarbef, cefixime, ceftazidime, ceftriaxone, cefcapene, cefdaloxime, cefdinir, cefditoren, cefetamet, cefmenoxime, cefodizime, cefoperazone, cefotaxime, cefpimizole, cefpiramide, cefpodoxime, cefsulodin, cefteram, ceftibuten, ceftiolene, ceftizoxime, flomoxef, latamoxef, cefepime, cefozopran, cefpirome, cefquinome, ceftobiprole, ceftaroline, CXA-101, RWJ-54428, MC-04546, ME1036, BAL30072, SYN2416, ceftiofur, cefquinome, cefovecin, aztreonam, tigemonam, carumonam, RWJ-442831, RWJ-333441, and RWJ-333442.

[Claim 127]

The pharmaceutical composition according to claim 125 or 126, wherein the β-lactam agent is selected from ceftazidime, biapenem, doripenem, ertapenem, imipenem, meropenem, or panipenem.

[Claim 128]

The pharmaceutical composition according to claim 125 or 126, wherein the β-lactam agent is selected from aztreonam, tigemonam, BAL30072, SYN2416, or carumonam.

[Claim 129]

The pharmaceutical composition according to claim 122, characterized in that an additional agent is concomitantly administered.

[Claim 130]

The pharmaceutical composition according to claim 129, wherein the additional agent is selected from an antibacterial agent, an antifungal agent, an antiviral agent, an anti-inflammatory agent, or an anti-allergic agent.

[Claim 131]

The pharmaceutical composition according to claim 129 or 130, wherein the additional agent is a β-lactam agent.

[Claim 132]

The pharmaceutical composition according to claim 130 or 131, wherein a β-lactam agent, which is the additional agent, is selected from the group consisting of amoxicillin, ampicillin

(pivampicillin, hetacillin, bacampicillin, metampicillin, and talampicillin), epicillin, carbenicillin (carindacillin), ticarcillin, temocillin, azlocillin, piperacillin, mezlocillin, mecillinam (pivmecillinam), sulbenicillin, benzylpenicillin (G), clometocillin, benzathine benzylpenicillin, procaine benzylpenicillin, azidocillin, penamecillin, phenoxymethyl penicillin (V), propicillin, benzathine phenoxymethylpenicillin, phenethicillin, cloxacillin (dicloxacillin and flucloxacillin), oxacillin, methicillin, nafcillin, faropenem, biapenem, doripenem, ertapenem, imipenem, meropenem, panipenem, tomopenem, razupenem, cefazolin, cefacetrile, cefadroxil, cephalexin, cefaloglycin, cefalonium, cefaloridine, cephalothin, cephapirin, cefatrizine, cefazedone, cefazaflur, cefradine, cefroxadine, ceftezole, cefaclor, cefamandole, cefminox, cefonicide, ceforanide, cefotiam, cefprozil, cefbuperazone, cefuroxime, cefuzonam, cefoxitin, cefotetan, cefmetazole, loracarbef, cefixime, ceftazidime, ceftriaxone, cefcapene, cefdaloxime, cefdinir, cefditoren, cefetamet, cefmenoxime, cefodizime, cefoperazone, cefotaxime, cefpimizole, cefpiramide, cefpodoxime, cefsulodin, cefteram, ceftibuten, ceftiolene, ceftizoxime, flomoxef, latamoxef, cefepime, cefozopran, cefpirome, cefquinome, ceftobiprole, ceftaroline, CXA-101, RWJ-54428, MC-04546, ME1036, BAL30072, SYN2416, ceftiofur, cefquinome, cefovecin, aztreonam, tigemonam, carumonam, RWJ-442831, RWJ-333441, and RWJ-333442.

[Claim 133]

The pharmaceutical composition according to claim 131 or 132, wherein the β-lactam agent is selected from the group consisting of ceftazidime, biapenem, doripenem, ertapenem, imipenem, meropenem, and panipenem.

[Claim 134]

The pharmaceutical composition according to claim 131 or 132, wherein the β-lactam agent is selected from the group consisting of aztreonam, tigemonam, BAL30072, SYN2416, and carumonam.

[Claim 135]

The compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 118 for use in treating a bacterial infection.

[Claim 136]

The compound or the pharmaceutically acceptable salt thereof according to claim 135, wherein the bacterial infection is a bacterial infection in which a bacteria that can have a β-lactamase is involved.

[Claim 137]

The compound or the pharmaceutically acceptable salt thereof according to claim 135 or 136, wherein the bacterial infection is sepsis, febrile neutropenia, bacterial meningitis, bacterial endocarditis, otitis media, sinusitis, pneumonia, lung abscess, empyema, secondary infection of a chronic respiratory disease, pharyngolaryngitis, tonsillitis, osteomyelitis, arthritis, peritonitis, intraperitoneal abscess, cholecystitis, cholangitis, liver abscess, a deep skin infection, lymphangitis/lymphadenitis, secondary infection of trauma, burn injury, surgical wound, or the like, a urinary tract infection, a genital infection, an eye infection, or an odontogenic infection.

[Claim 138]

A medicament comprised of a combination of the compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 118 and at least one agent selected from the group consisting of therapeutic agents for sepsis, febrile neutropenia, bacterial meningitis, bacterial endocarditis, otitis media, sinusitis, pneumonia, lung abscess, empyema, secondary infection of a chronic respiratory disease, pharyngolaryngitis, tonsillitis, osteomyelitis, arthritis, peritonitis, intraperitoneal abscess, cholecystitis, cholangitis, liver abscess, a deep skin infection, lymphangitis/lymphadenitis, secondary infection of trauma, burn

injury, surgical wound, or the like, a urinary tract infection, a genital infection, an eye infection, and an odontogenic infection.

[Claim 139]

A pharmaceutical composition comprising a β-lactam agent, wherein the pharmaceutical composition is administered with the compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 118.

[Claim 140]

A method for treating a bacterial infection, characterized in that a therapeutically effective amount of the compound or the pharmaceutically acceptable salt thereof according to any one of claims 1 to 118 is administered to a patient in need thereof.

[Claim 141]

The method according to claim 140, wherein the bacterial infection is a bacterial infection in which a bacteria that can have a β-lactamase is involved.

[Claim 142]

The method according to claim 140 or 141, wherein the bacterial infection is sepsis, febrile neutropenia, bacterial meningitis, bacterial endocarditis, otitis media, sinusitis, pneumonia, lung abscess, empyema, secondary infection of a chronic respiratory disease, pharyngolaryngitis, tonsillitis, osteomyelitis, arthritis, peritonitis, intraperitoneal abscess, cholecystitis, cholangitis, liver abscess, a deep skin infection, lymphangitis/lymphadenitis, secondary infection of trauma, burn injury, surgical wound, or the like, a urinary tract infection, a genital infection, an eye infection, or an odontogenic infection.

[Claim 143]

The method according to any one of claims 140 to 142, characterized in that an additional agent is concomitantly administered.