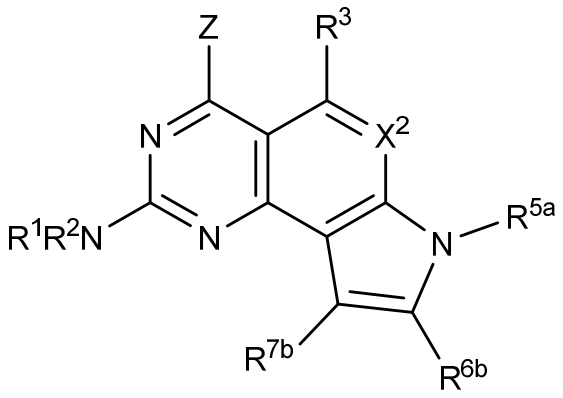
CLAIMS

1. A compound of formula Ii:



Ii

wherein;

R^1 is hydrogen, $(C_1\text{-}C_6)$alkyl, $(C_3\text{-}C_7)$carbocyclyl or aryl$(C_1\text{-}C_6)$alkyl-, wherein the $(C_1\text{-}C_6)$alkyl, $(C_3\text{-}C_7)$carbocyclyl, or aryl$(C_1\text{-}C_6)$alkyl, is optionally substituted with one or more (e.g., 1, 2, 3, 4, or 5) groups independently selected from the group consisting of halo, -OH, -NO_2, -CN, $(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$haloalkyl, $(C_1\text{-}C_4)$alkoxy, $(C_1\text{-}C_4)$haloalkoxy, $-N(R^a)_2$, $-NR^aC(=NR^a)N(R^a)_2$, $-C(=NR^a)N(R^a)_2$, phenyl, and $-OP(=O)(OH)_2$, wherein phenyl is optionally substituted with one or more halo, -OH, -NO_2, -CN, $(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$haloalkyl, $(C_1\text{-}C_4)$alkoxy, or $(C_1\text{-}C_4)$haloalkoxy; and

R^2 is hydrogen or $(C_1\text{-}C_6)$alkyl;

Z is $-N(R^c)_2$;

X^2 is CR^4 or N;

R^3 is hydrogen, halo, or $(C_1\text{-}C_6)$alkyl;

R^4 is hydrogen, halo, or $(C_1\text{-}C_6)$alkyl;

R^{5a} is $(C_1\text{-}C_{10})$alkyl, $(C_2\text{-}C_{10})$alkenyl, -W-$(C_3\text{-}C_7)$carbocyclyl, -W-aryl, W-heterocyclyl, - or W-heteroaryl, wherein the $(C_1\text{-}C_{10})$alkyl, $(C_2\text{-}C_{10})$alkenyl, -W-$(C_3\text{-}C_7)$carbocyclyl, -W-aryl, W-heterocyclyl, -W-heteroaryl, is optionally substituted with one or more (e.g., 1, 2, 3, 4, or 5) groups independently selected from Q;

R^{6b} and R^{7b} are each independently hydrogen, halo, or $(C_1\text{-}C_6)$alkyl;

W is absent, $(C_1\text{-}C_{10})$alkyl, or $(C_2\text{-}C_6)$alkynyl wherein the $(C_1\text{-}C_{10})$alkyl or $(C_2\text{-}C_6)$alkynyl is optionally substituted with one or more (e.g., 1, 2, 3, 4, or 5) oxo (=O) and wherein one more of the carbons of the $(C_1\text{-}C_{10})$alkyl is optionally replaced with one or more (e.g., 1, 2, 3, 4, or 5) -O- or $-NR^w$-;

each Q is independently halo, -OH, -NO_2, -CN, (C_1-C_6)alkyl, (C_2-C_6)alkenyl, (C_2-C_6)alkynyl, (C_1-C_6)haloalkyl, (C_1-C_6)alkoxy, (C_1-C_6)haloalkoxy, C(=O)R^q,-C(=O)N(R^q)$_2$, -N(R^q)$_2$, -S(=O)$_2$N(R^q)$_2$, aryl, -O-aryl, heteroaryl, or -O-heteroaryl, wherein the (C_1-C_6)alkyl, (C_2-C_6)alkenyl, (C_2-C_6)alkynyl, (C_1-C_6)haloalkyl, (C_1-C_6)alkoxy, (C_1-C_6)haloalkoxy, aryl, -Oaryl, heteroaryl, or -Oheteroaryl is optionally substituted with one or more (e.g., 1, 2, 3, 4, or 5) groups independently selected from the group consisting of halo, -OH, -NO_2, -CN, (C_1-C_4)alkyl, (C_1-C_4)haloalkyl, (C_1-C_4)alkoxy, (C_1-C_4)haloalkoxy, C(=O)R^q, -C(=O)O(R^q), -C(=O)N(R^q)$_2$, -S(=O)$_2$N(R^q)$_2$, aryl and heteroaryl, wherein the aryl or heteroaryl is optionally substituted with one or more (e.g., 1, 2, 3, 4, or 5) Q^1;

each Q^1 is independently halo, -OH, -NO_2, -CN, (C_1-C_4)alkyl, (C_1-C_4)haloalkyl, (C_1-C_4)alkoxy, or (C_1-C_4)haloalkoxy;

each R^a, and R^c is independently hydrogen, (C_1-C_6)alkyl, (C_2-C_6)alkenyl, (C_1-C_6)haloalkyl, (C_3-C_7)carbocyclyl, or aryl;

each R^w is independently hydrogen or (C_1-C_6)alkyl;

R^q is hydrogen, (C_1-C_6)alkyl, (C_2-C_6)alkenyl, (C_1-C_6)haloalkyl (C_3-C_7)carbocyclyl or aryl, wherein the aryl is optionally substituted with one or more (e.g., 1, 2, 3, 4, or 5) groups independently selected from the group consisting of halo, -OH, -NO_2, -CN, (C_1-C_4)alkyl, (C_1-C_4)haloalkyl, (C_1-C_4)alkoxy, (C_1-C_4)haloalkoxy, C(=O)R^{q1}, -C(=O)O(R^{q1}), -C(=O)N(R^{q1})$_2$, and -S(=O)$_2$N(R^{q1})$_2$; and

each R^{q1} is independently hydrogen, (C_1-C_6)alkyl, (C_2-C_6)alkenyl, (C_1-C_6)haloalkyl, (C_3-C_7)carbocyclyl, or aryl;

or a salt thereof.

2. The compound of claim 1 wherein: R^1 is hydrogen, (C_1-C_6)alkyl, (C_3-C_7)carbocyclyl or aryl(C_1-C_6)alkyl-, wherein the (C_1-C_6)alkyl (C_3-C_7)carbocyclyl or aryl(C_1-C_6)alkyl is optionally substituted with one or more (e.g., 1, 2, 3, 4, or 5) groups independently selected from the group consisting of halo, -OH, -NO_2, -CN, (C_1-C_4)alkyl, (C_1-C_4)haloalkyl, (C_1-C_4)alkoxy, (C_1-C_4)haloalkoxy, -N(R^a)$_2$, -NR^aC(=NR^a)N(R^a)$_2$, -C(=NR^a)N(R^a)$_2$, and -OP(=O)(OH)$_2$; and

R^2 is hydrogen or (C_1-C_6)alkyl;

Z is -N(R^c)$_{22}$;

X^2 is CR^4 or N;

R^3 is hydrogen, halo, -OH, or (C_1-C_6)alkyl;

R^4 is hydrogen, halo, or (C_1-C_6)alkyl;

R^{5a} is $(C_1\text{-}C_{10})$alkyl, $(C_1\text{-}C_{10})$alkenyl, -W-$(C_3\text{-}C_7)$carbocyclyl, -W-aryl, W-heterocyclyl, - or W-heteroaryl, wherein the $(C_1\text{-}C_{10})$alkyl, $(C_1\text{-}C_{10})$alkenyl, -W-$(C_3\text{-}C_7)$carbocyclyl, -W-aryl, W-heterocyclyl, -W-heteroaryl, is optionally substituted with one or more (e.g., 1, 2, 3, 4, or 5) groups independently selected from Q;

R^{6b} and R^{7b} are each independently hydrogen, halo, -OH, $-NO_2$, -CN, $(C_1\text{-}C_6)$alkoxy, $(C_1\text{-}C_6)$alkyl, $(C_1\text{-}C_6)$alkenyl, $-C(=O)R^f$,- $C(=O)N(R^f)_2$, $-S(=O)_2N(R^f)_2$, $-NR^fC(=NR^f)N(R^f)_2$, $-C(=NR^f)N(R^f)_2$, or $-N(R^f)_2$, wherein the $(C_1\text{-}C_6)$alkoxy, $(C_1\text{-}C_6)$alkyl, or $(C_1\text{-}C_6)$alkenyl is optionally substituted with one or more (e.g., 1, 2, 3, 4, or 5) groups independently selected from the group consisting of halo, -OH, $-NO_2$, -CN, $(C_1\text{-}C_4)$alkoxy, $(C_1\text{-}C_4)$haloalkoxy, $-N(R^f)_2$, $-NR^fC(=NR^f)N(R^f)_2$, $-C(=NR^f)N(R^f)_2$, and $-OP(=O)(OH)_2$;

W is absent or $(C_1\text{-}C_{10})$alkyl, wherein the $(C_1\text{-}C_{10})$alkyl is optionally substituted with one or more (e.g., 1, 2, 3, 4, or 5) oxo (=O) and wherein one more of the carbons of the $(C_1\text{-}C_{10})$alkyl is optionally replaced with one or more (e.g., 1, 2, 3, 4, or 5) -O- or $-NR^w$-;

each Q is independently halo, -OH, $-NO_2$, -CN, $(C_1\text{-}C_6)$alkyl, $(C_1\text{-}C_6)$haloalkyl, $(C_1\text{-}C_6)$alkoxy, $(C_1\text{-}C_6)$haloalkoxy, $C(=O)R^q$,$-C(=O)N(R^q)_2$, $-N(R^q)_2$, $-S(=O)_2N(R^a)_2$, aryl, -O-aryl, heteroaryl, or -O-heteroaryl, wherein the $(C_1\text{-}C_6)$alkyl, $(C_1\text{-}C_6)$haloalkyl, $(C_1\text{-}C_6)$alkoxy, $(C_1\text{-}C_6)$haloalkoxy, aryl, -Oaryl, heteroaryl, or -Oheteroaryl is optionally substituted with one or more (e.g., 1, 2, 3, 4, or 5) groups independently selected from the group consisting of halo, -OH, $-NO_2$, -CN, $(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$haloalkyl, $(C_1\text{-}C_4)$alkoxy, $(C_1\text{-}C_4)$haloalkoxy, $C(=O)R^q$, $-C(=O)O(R^q)$, $-C(=O)N(R^q)_2$, $-S(=O)_2N(R^q)_2$, aryl and heteroaryl, wherein the aryl or heteroaryl is optionally substituted with one or more (e.g., 1, 2, 3, 4, or 5) Q^1;

each Q^1 is independently halo, -OH, $-NO_2$, -CN, $(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$haloalkyl, $(C_1\text{-}C_4)$alkoxy, or $(C_1\text{-}C_4)$haloalkoxy;

each R^a and R^c is independently hydrogen, $(C_1\text{-}C_6)$alkyl, $(C_1\text{-}C_6)$alkenyl, $(C_1\text{-}C_6)$haloalkyl, $(C_3\text{-}C_7)$carbocyclyl, or aryl;

each R^w is independently hydrogen or $(C_1\text{-}C_6)$alkyl;

R^q is hydrogen, $(C_1\text{-}C_6)$alkyl, $(C_1\text{-}C_6)$alkenyl, $(C_1\text{-}C_6)$haloalkyl $(C_3\text{-}C_7)$carbocyclyl or aryl, wherein the aryl is optionally substituted with one or more (e.g., 1, 2, 3, 4, or 5) groups independently selected from the group consisting of halo, -OH, $-NO_2$, -CN, $(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$haloalkyl, $(C_1\text{-}C_4)$alkoxy, $(C_1\text{-}C_4)$haloalkoxy, $C(=O)R^{q1}$, $-C(=O)O(R^{q1})$, $-C(=O)N(R^{q1})_2$, and $-S(=O)_2N(R^{q1})_2$; and

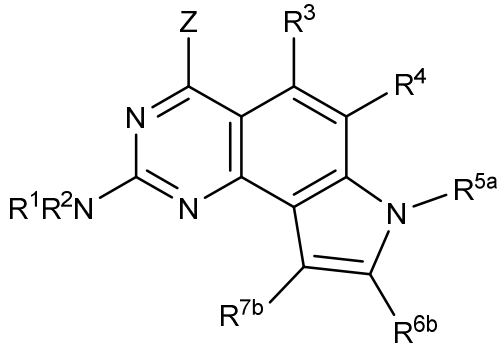
each R^{q1} is independently hydrogen, $(C_1\text{-}C_6)$alkyl, $(C_1\text{-}C_6)$alkenyl, $(C_1\text{-}C_6)$haloalkyl, $(C_3\text{-}C_7)$carbocyclyl, or aryl;

or a salt thereof.

3. The compound or salt of any one of claims 1-2, wherein X^2 is CR^4.

4. The compound or salt of any one of claims 1-2, wherein X^2 is N.

5. The compound or salt of claim 1, wherein the compound of formula I is a compound of formula Id:



Id

or a salt thereof.

6. The compound or salt of any one of claims 1-5, wherein R^3 is hydrogen or halo.

7. The compound or salt of any one of claims 1-5, wherein R^3 is hydrogen.

8. The compound or salt of any one of claims 1-7, wherein R^4 is hydrogen.

9. The compound or salt of any one of claims 1-8, wherein R^1 is hydrogen, $(C_1\text{-}C_6)$alkyl, or aryl$(C_1\text{-}C_6)$alkyl-, wherein the $(C_1\text{-}C_6)$alkyl or aryl$(C_1\text{-}C_6)$alkyl is optionally substituted with one or more (e.g., 1, 2, 3, 4, or 5) groups independently selected from the group consisting of halo, -OH, $-NO_2$, -CN, $(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$haloalkyl, $(C_1\text{-}C_4)$alkoxy, $(C_1\text{-}C_4)$haloalkoxy, $-N(R^a)_2$, $-NR^aC(=NR^a)N(R^a)_2$, $-C(=NR^a)N(R^a)_2$, phenyl, and $-OP(=O)(OH)_2$; wherein phenyl is optionally substituted with one or more halo, -OH, $-NO_2$, -CN, $(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$haloalkyl, $(C_1\text{-}C_4)$alkoxy, or $(C_1\text{-}C_4)$haloalkoxy.

10. The compound or salt of any one of claims 1-8, wherein R^1 is hydrogen, $(C_1\text{-}C_6)$alkyl, or aryl$(C_1\text{-}C_6)$alkyl-, wherein the $(C_1\text{-}C_6)$alkyl or aryl$(C_1\text{-}C_6)$alkyl is optionally substituted with one or more (e.g., 1, 2, 3, 4, or 5) groups independently selected from the group consisting of halo

and phenyl, wherein phenyl is optionally substituted with one or more halo, -OH, -NO_2, -CN, (C_1-C_4)alkyl, (C_1-C_4)haloalkyl, (C_1-C_4)alkoxy, or (C_1-C_4)haloalkoxy.

11. The compound or salt of any one of claims 1-8, wherein R^1 is hydrogen.

12. The compound or salt of any one of claims 1-8, wherein R^2 is hydrogen.

13. The compound or salt of any one of claims 1-9, wherein Z is -NH_2.

14. The compound or salt of any one of claims 1-13, wherein R^{7b} is hydrogen.

15. The compound or salt of any one of claims 1-14, wherein R^{6b} is hydrogen or (C_1-C_6)alkyl.

16. The compound or salt of any one of claims 1-15, wherein R^{5a} is (C_1-C_{10})alkyl, (C_2-C_{10})alkenyl, -W-(C_3-C_7)carbocyclyl, -W-aryl, or -W-heteroaryl, wherein the C_1-C_{10})alkyl, (C_2-C_{10})alkenyl, -W-(C_3-C_7)carbocyclyl, -W-aryl, or -W-heteroaryl, is optionally substituted with one or more groups independently selected from Q.

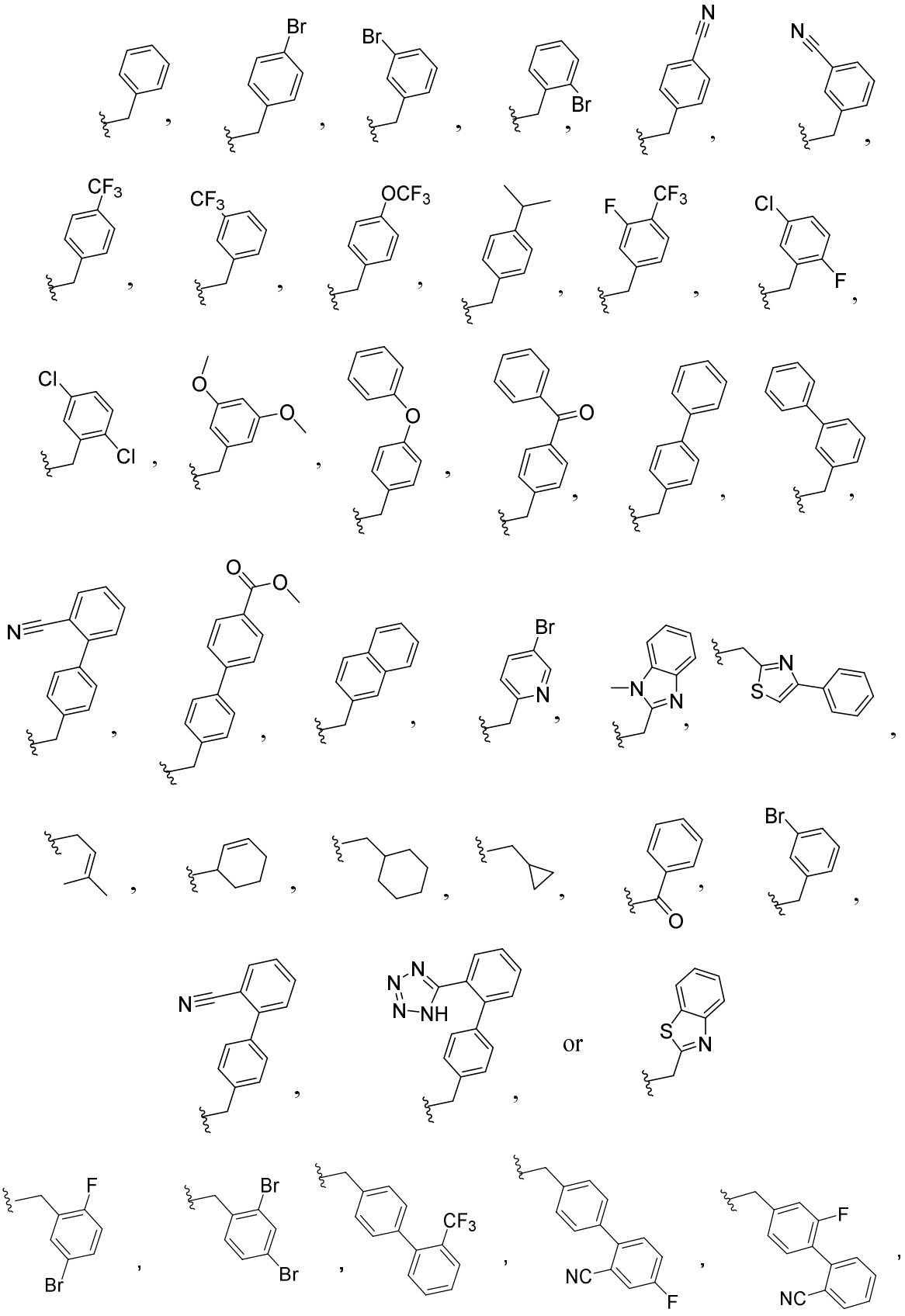
17. The compound or salt of any one of claims 1-15, wherein R^{5a} is (C_2-C_{10})alkenyl, -W-(C_3-C_7)carbocyclyl, -W-aryl, or -W-heteroaryl, wherein the (C_2-C_{10})alkenyl, -W-(C_3-C_7)carbocyclyl, -W-aryl, or -W-heteroaryl, is optionally substituted with one or more groups independently selected from Q.

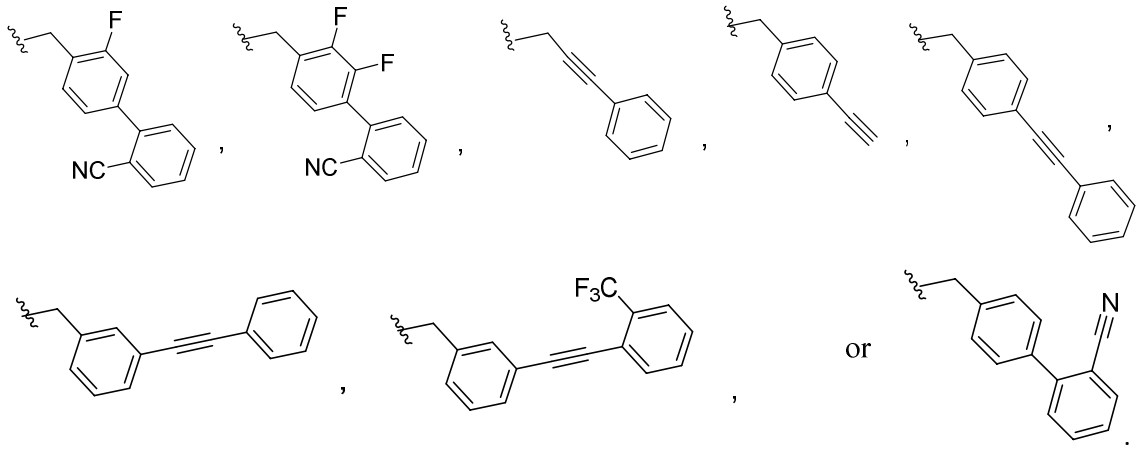
18. The compound or salt of any one of claims 1-17, wherein W is absent, (C_1-C_{10})alkyl, or (C_2-C_6)alkynyl wherein the (C_1-C_{10})alkyl or (C_2-C_6)alkynyl is optionally substituted with one or more (e.g., 1, 2, 3, 4, or 5) oxo (=O).

19. The compound or salt of any one of claims 1-17, wherein W is absent, -CH_2-, -C(=O)-, or propyne.

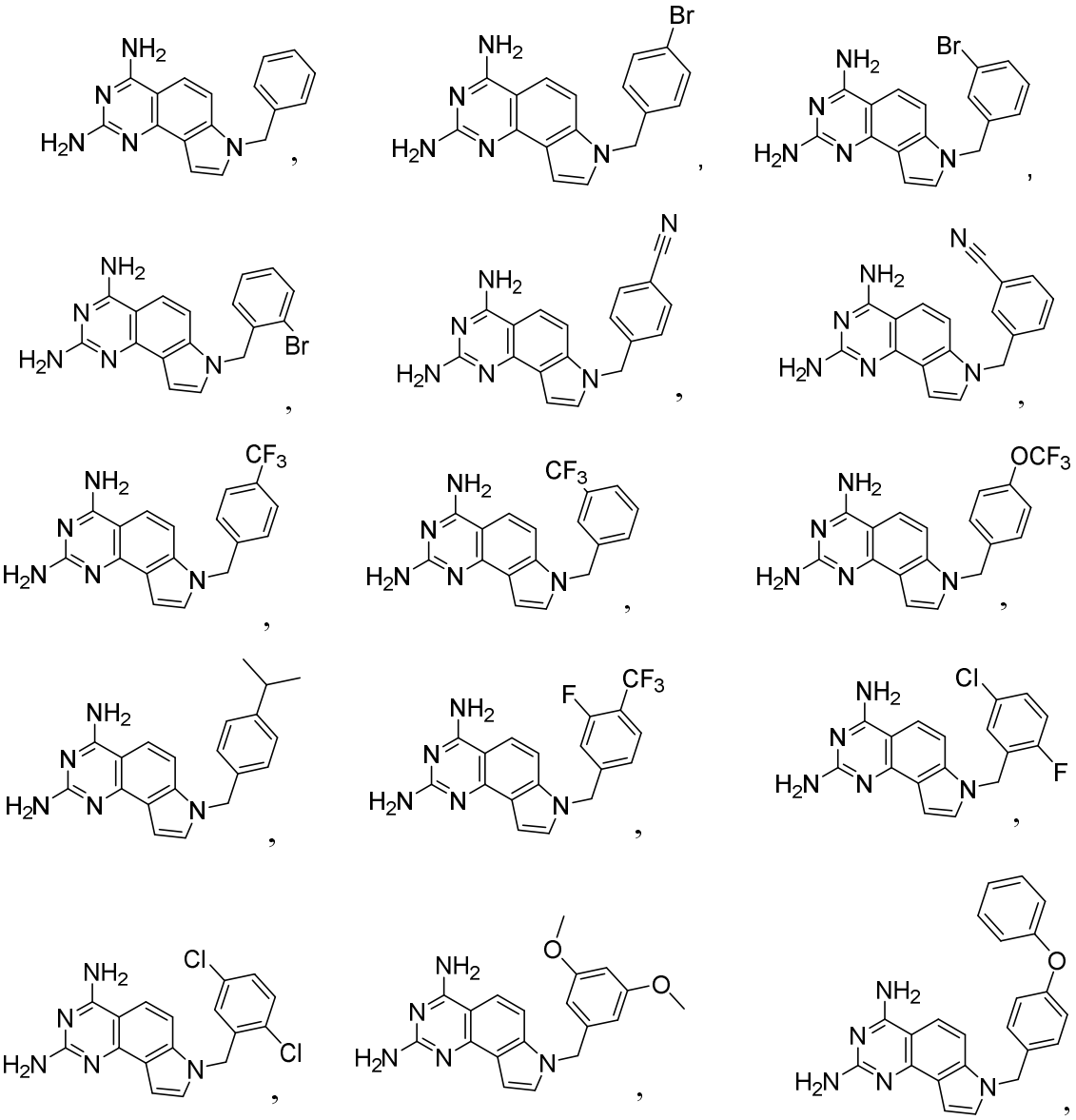
20. The compound or salt of any one of claims 1-17, wherein W is absent, -CH_2-, or -C(=O)-.

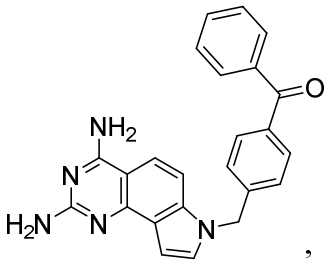
21. The compound or salt of any one of claims 1-20, wherein R^{5a} is:





22. The compound of claim 1 that is:

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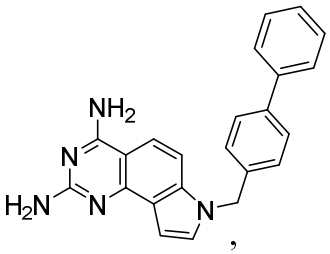
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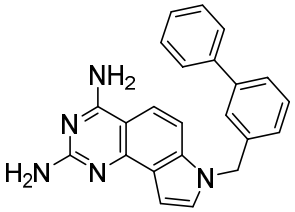
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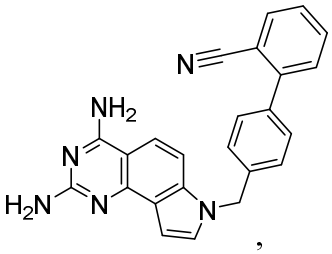
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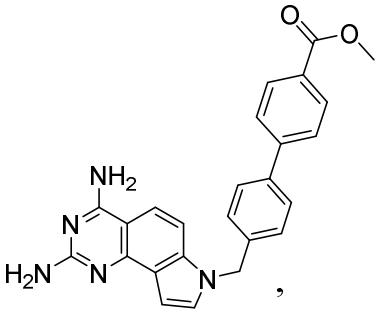
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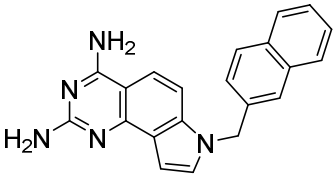
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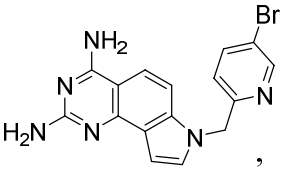
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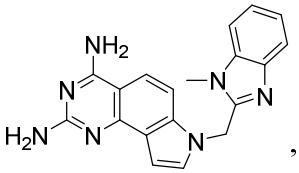
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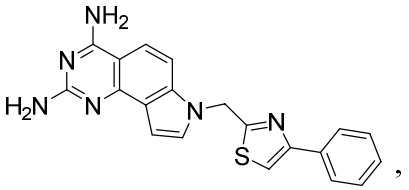
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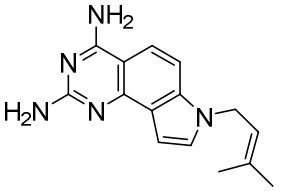
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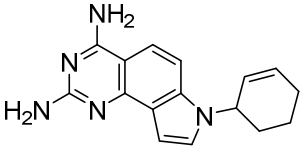
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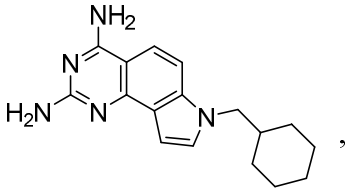
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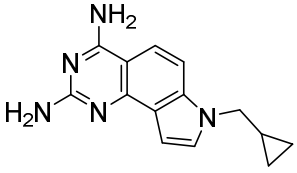
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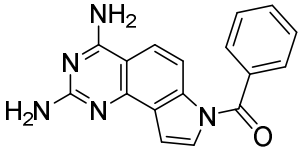
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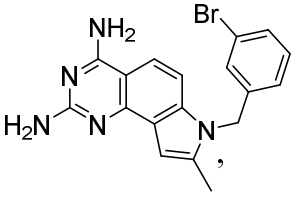
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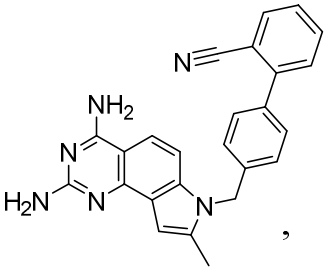
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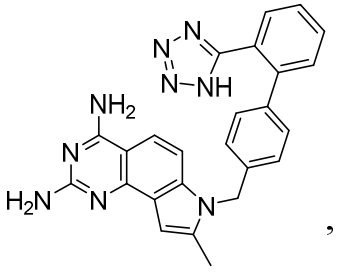
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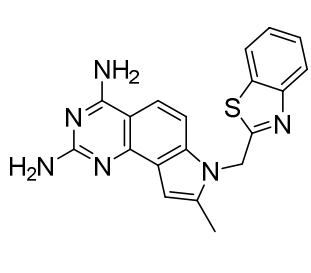
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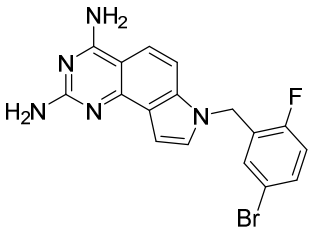
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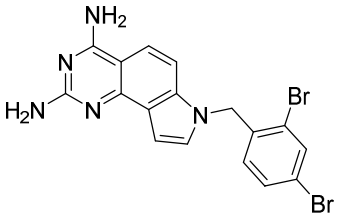
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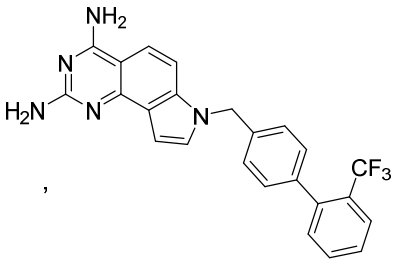
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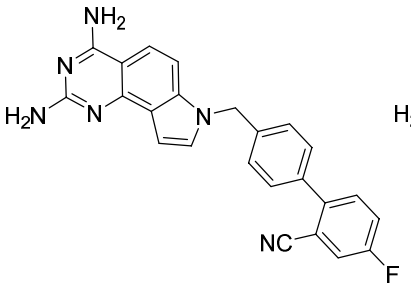
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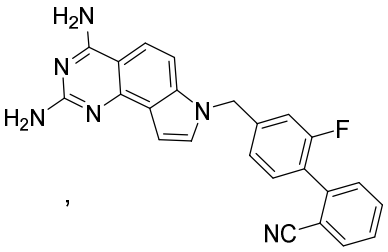
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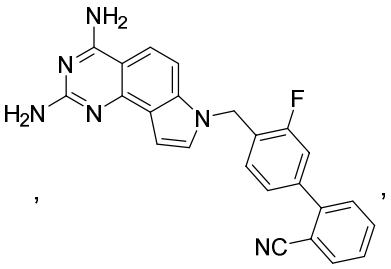
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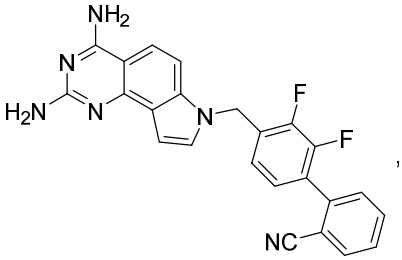
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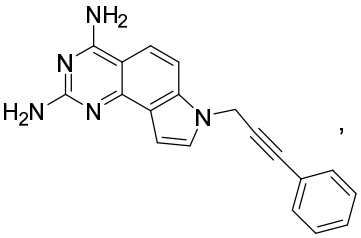
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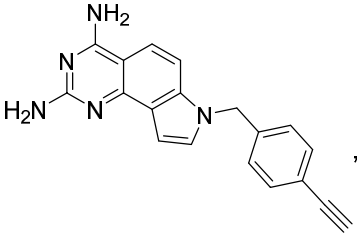
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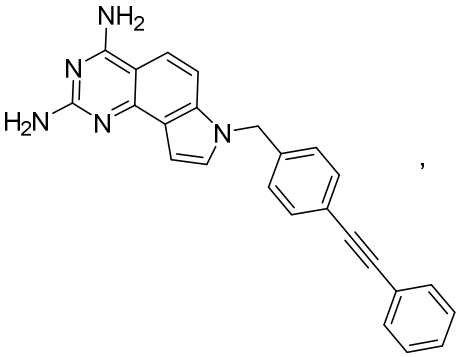
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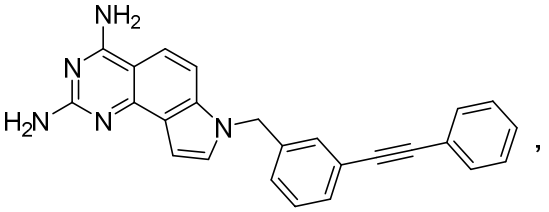
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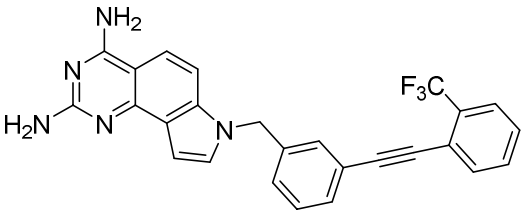
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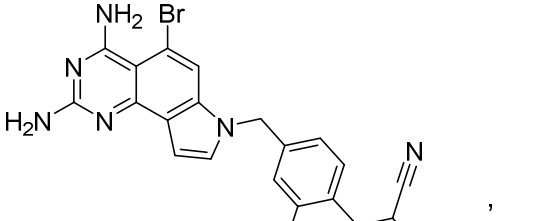
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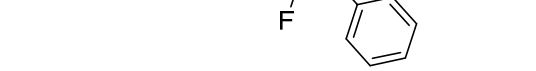
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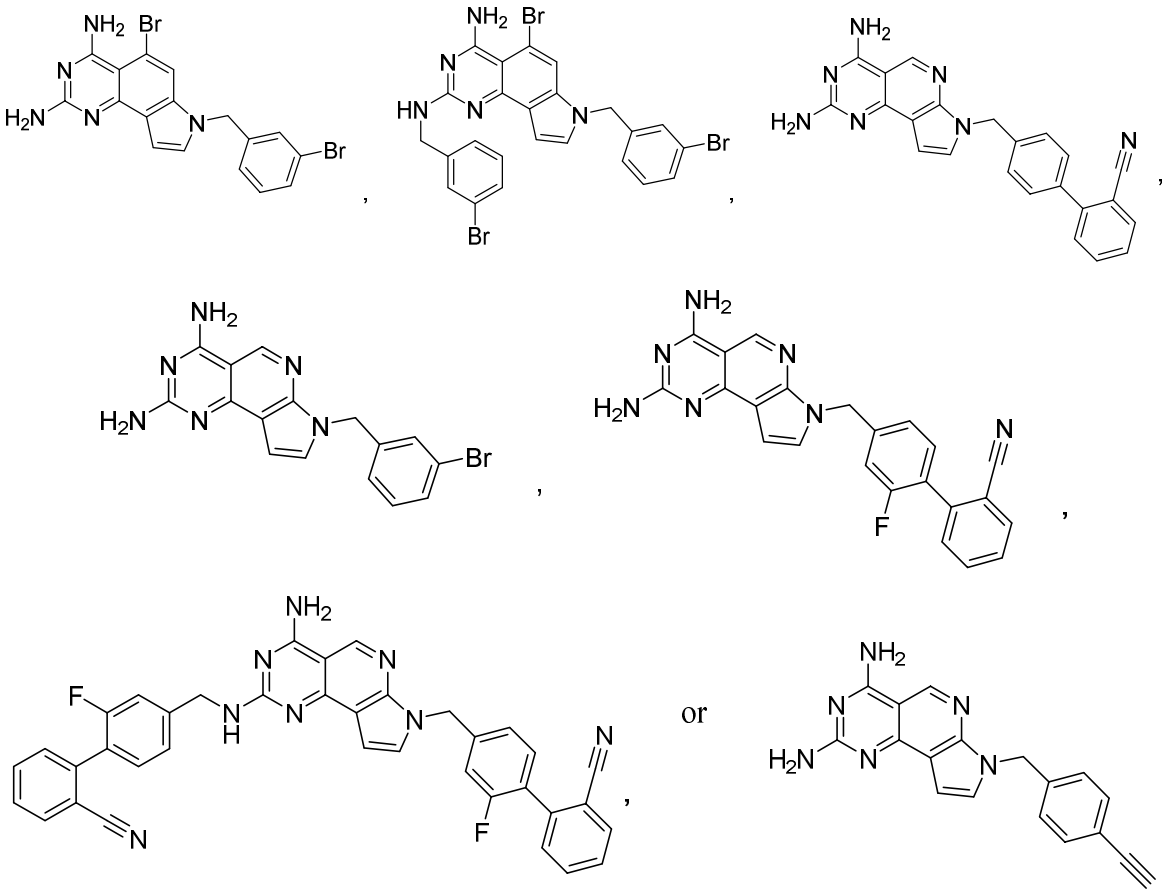

or a salt thereof.

23. A pharmaceutical composition comprising a compound as described in any one of claims 1-22 or a pharmaceutically acceptable salt thereof, and a pharmaceutically acceptable excipient.

24. A compound as described in any one of claims 1-22 or a pharmaceutically acceptable salt thereof for use in medical treatment.

25. A compound as described in any one of claims 1-22 or a pharmaceutically acceptable salt thereof for the prophylactic or therapeutic treatment of a bacterial infection.

26. Use of a compound as described in any one of claims 1-22 or a pharmaceutically acceptable salt thereof for the preparation of a medicament for the prophylactic or therapeutic treatment of a bacterial infection in an animal.

27. The use of claim 26, wherein the bacterial infection is a *N. gonorrhoeae, P. aeruginosa, A. baumannii, E. coli, K. pneumoniae, S. sonnei, P. mirabilis,* MSSA or MRSA infection.

28. The use of claim 26, wherein the bacterial infection is a Gram-negative bacterial strain infection.

29. The use of claim 26, wherein the bacterial infection is a Gram-positive bacterial strain infection.