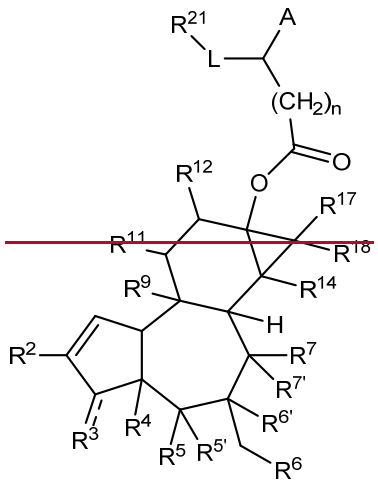
CLAIMS

What is claimed is:

1. A compound of formula (I):



(I)

or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof;

wherein

A is -OH, -C(O)OR^{1}, or -NR^{13}R$^{13'}$;

R^{1} is H or a M+ counterion;

R^{2} is a C$_{1}$-C$_{4}$alkyl;

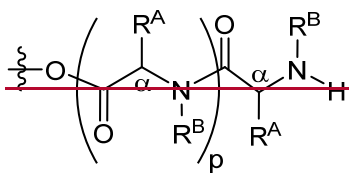
R^{3} is O double bonded to the ring carbon when (- - -) is a bond, or -OR^{a}; wherein R^{a} is H or -C(O)R^{a1}, wherein R^{a1} is C$_{1}$-C$_{6}$alkyl, C$_{2}$-C$_{6}$alkenyl, C$_{0}$-C$_{6}$alkylaryl, or C$_{0}$-C$_{6}$alkylheteroaryl;

R^{4} and R^{5} are each independently H or -OR^{b}, wherein R^{b} is H, C$_{1}$-C$_{6}$alkyl, C$_{2}$-C$_{6}$alkenyl, C$_{0}$-C$_{6}$alkylaryl, or C$_{0}$-C$_{6}$alkylheteroaryl;

R^{5}' and R^{6}' are H, or R^{5}' and R^{6}' form a bond or are bonded to a common O atom to form an epoxide ring as permitted by valency;

R^{6} is OH, halo, or -OC(O)R^{e}, wherein R^{e} is -C$_{1}$-C$_{6}$alkyl, -C$_{1}$-C$_{6}$alkyl (NR^{e1})$_{2}$ or -C$_{1}$-C$_{6}$alkylC(O)OR^{k}, R^{e1} is H, C$_{1}$-C$_{6}$alkyl, or two R^{e1} together with the N atom form a 5 to 7 membered heterocyclyl containing 1 to 3 heteroatoms selected from N, O, and S; or

R^{6} is



wherein,

each occurrence of R^A is independently selected from a side chain of a natural or non-natural amino acid, wherein each occurrence of R^A is same or different;

each occurrence of R^B is independently H, or R^B together with the adjacent R^A and the N atom to which it is attached form a heterocyclic ring of a natural or non-natural amino acid, wherein each occurrence of R^B is same or different; and

p is 0, 1, or 2;

$R^{6'}$ and $R^{7'}$ are H, or $R^{6'}$ and $R^{7'}$ form a bond or are bonded to a common O atom to form an epoxide ring, as permitted by valency;

R^7 is H or OH;

R^9 is OR^e, wherein R^e is H, C_1-C_6alkyl, or aryl;

R^{11} is C_1-C_4alkyl;

R^{12} is H, -OH, $-OC(O)R^f$, wherein R^f is C_1-C_{12}alkyl, C_2-C_{12}alkenyl, C_0-C_{12}aliphatic C_3-C_7cycloalkyl, C_0-C_{12}aliphatic heterocycloalkyl, C_0-C_{12}aliphatic aryl, or C_0-C_{12}aliphatic heteroaryl;

R^{13} and $R^{13'}$ are each independently H or C_1-C_4alkyl;

R^{14} is H or OR^g; wherein R^g is H or C_1-C_6alkyl;

R^{17} and R^{18} are each independently C_1-C_4alkyl or C_1-C_4alkyl-OR^h, wherein R^h is H or C_1-C_6alkyl;

L is absent, C_1-C_{12}alkylene, or C_2-C_{12}alkenylene, wherein the C_1-C_{12}alkylene or C_2-C_{12}alkenylene is optionally substituted with C_1-C_4alkyl;

R^{21} is H, $-S(O)_2R^j$, $-SR^j$, $-N(R^j)_2$, $-Si(R^j)_3$, C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, 5 to 12 membered bridged bicyclyl, adamantyl, or $-C(O)OR^k$, wherein the C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, bridged bicyclyl, or adamantyl is optionally substituted with 1 to 3 of J^1, and wherein optionally 1 to 2 carbon atoms of the spiroC_5-C_{12}cycloalkyl or bridged bicyclyl is replaced with a heteroatom selected from N, O and S, and optionally substituted with C_1-C_4alkyl, or when an N atom is present an N-protecting group;

each R^j is independently C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylC_3-C_7cycloalkyl, C_0-C_6alkylheterocyclyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl, wherein the C_3-C_7cycloalkyl, heterocyclyl, alkylaryl, or heteroaryl is optionally substituted with 1 to 3 of J^1;

R^k is H or M^+ counterion;

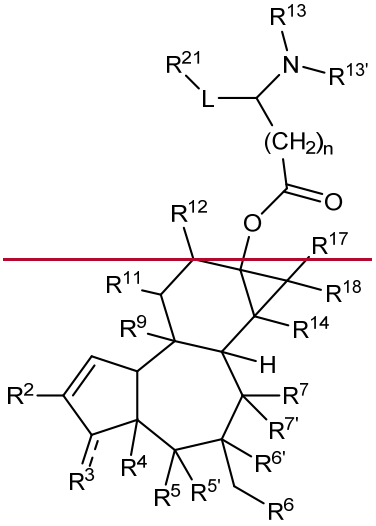
J^1 is selected from OH, CN, halo, C_1-C_4alkyl, and haloC_1-C_4alkyl; and

n is 0 or 1.

2. The compound of claim 1, wherein A is -OH.

~~3. The compound of claim 1, wherein A is $-C(O)OR^{+}$, wherein R^{+} is H or a M^{+} counterion.~~

~~4. The compound of claim 1 having the structure of formula (II):~~



~~(II)~~

~~or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof;~~

~~wherein~~

~~R^{2} is a C_1-C_4alkyl;~~

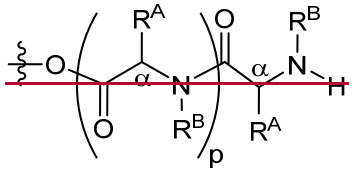
~~R^{3} is O double bonded to the ring carbon when (- - -) is a bond, or $-OR^{a}$; wherein R^{a} is H or $-C(O)R^{a1}$, wherein R^{a1} is C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;~~

~~R^{4} and R^{5} are each independently H or $-OR^{b}$, wherein R^{b} is H, C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;~~

~~$R^{5'}$ and $R^{6'}$ are H, or $R^{5'}$ and $R^{6'}$ form a bond or are bonded to a common O atom to form an epoxide ring as permitted by valency;~~

~~R^{6} is OH, halo, or $-OC(O)R^{e}$, wherein R^{e} is $-C_1$-C_6alkyl, $-C_1$-C_6alkyl $(NR^{e1})_2$ or $-C_1$-C_6alkylC(O)OR^{k}, R^{e1} is H, C_1-C_6alkyl, or two R^{e1} together with the N atom form a 5 to 7 membered heterocyclyl containing 1 to 3 heteroatoms selected from N, O, and S; or~~

~~R^{6} is~~



~~wherein,~~

~~each occurrence of R^{A} is independently selected from a side chain of a natural or non-~~

~~natural amino acid, wherein each occurrence of R^A is same or different;~~

~~each occurrence of R^B is independently H, or R^B together with the adjacent R^A and the N atom to which it is attached form a heterocyclic ring of a natural or non-natural amino acid, wherein each occurrence of R^B is same or different; and~~

~~p is 0, 1, or 2;~~

~~$R^{6'}$ and $R^{7'}$ are H, or $R^{6'}$ and $R^{7'}$ form a bond or are bonded to a common O atom to form an epoxide ring, as permitted by valency;~~

~~R^7 is H or OH;~~

~~R^9 is OR^e, wherein R^e is H, C_1-C_6alkyl, or aryl;~~

~~R^{11} is C_1-C_4alkyl;~~

~~R^{12} is H, -OH, $-OC(O)R^f$, wherein R^f is C_1-C_{12}alkyl, C_2-C_{12}alkenyl, C_0-C_{12}aliphatic-C_3-C_7cycloalkyl, C_0-C_{12}aliphatic-heterocycloalkyl, C_0-C_{12}aliphatic-aryl, or C_0-C_{12}aliphatic-heteroaryl;~~

~~R^{13} and $R^{13'}$ are each independently H or C_1-C_4alkyl;~~

~~R^{14} is H or OR^g; wherein R^g is H or C_1-C_6alkyl;~~

~~R^{17} and R^{18} are each independently C_1-C_4alkyl or C_1-C_4alkyl-OR^h, wherein R^h is H or C_1-C_6alkyl;~~

~~L is absent, C_1-C_{12}alkylene, or C_2-C_{12}alkenylene, wherein the C_1-C_{12}alkylene or C_2-C_{12}alkenylene is optionally substituted with C_1-C_4alkyl;~~

~~R^{21} is H, $-S(O)_2R^j$, $-SR^j$, $-N(R^j)_2$, $-Si(R^j)_3$, C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, 5 to 12 membered bridged bicyclyl, adamantyl, or $-C(O)OR^k$, wherein the C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, bridged bicyclyl, or adamantyl is optionally substituted with 1 to 3 of J^1, and wherein optionally 1 to 2 carbon atoms of the spiroC_5-C_{12}cycloalkyl or bridged bicyclyl is replaced with a heteroatom selected from N, O and S, and optionally substituted with C_1-C_4alkyl, or when an N atom is present an N-protecting group;~~

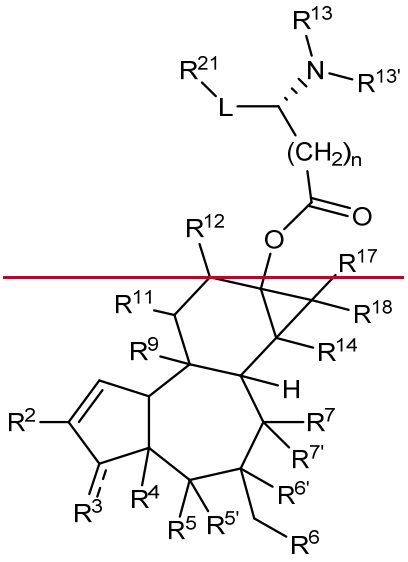
~~each R^j is independently C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylC_3-C_7cycloalkyl, C_0-C_6alkylheterocyclyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl, wherein the C_3-C_7cycloalkyl, heterocyclyl, alkylaryl, or heteroaryl is optionally substituted with 1 to 3 of J^1;~~

~~R^k is H or M^+ counterion;~~

~~J^1 is selected from OH, CN, halo, C_1-C_4alkyl, and haloC_1-C_4alkyl; and~~

~~n is 0 or 1.~~

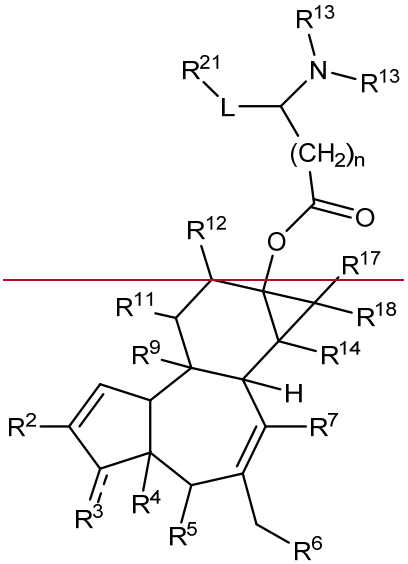
~~5. The compound of claim 4, having the structure of formula (II'):~~



(II')

or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof.

6. The compound of claim 4, having the structure of formula (IIa):



(IIa)

or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof;

wherein

R^2 is a C_1-C_4alkyl;

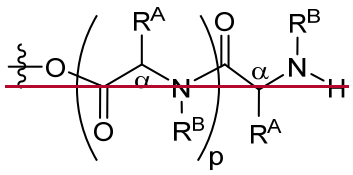
R^3 is O double bonded to the ring carbon when (- - -) is a bond, or $-OR^a$; wherein R^a is H or $-C(O)R^{a1}$, wherein R^{a1} is C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;

R^4 and R^5 are each independently H or $-OR^b$, wherein R^b is H, C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;

R^6 is OH, halo, or $-OC(O)R^e$, wherein R^e is C_1-C_6alkyl, C_1-C_6alkyl $(NR^{e1})_2$ or C_1-

C_6alkylC(O)OR^k, R^{e1} is H, C_1-C_6alkyl, or two R^{e1} together with the N atom form a 5 to 7 membered heterocyclyl containing 1 to 3 heteroatoms selected from N, O, and S; or

R^6 is



wherein,

each occurrence of R^A is independently selected from a side chain of a natural or non-natural amino acid, wherein each occurrence of R^A is same or different;

each occurrence of R^B is independently H, or R^B together with the adjacent R^A and the N atom to which it is attached form a heterocyclic ring of a natural or non-natural amino acid, wherein each occurrence of R^B is same or different; and

p is 0, 1, or 2;

R^7 is H or OH;

R^9 is OR^e, wherein R^e is H, C_1-C_6alkyl, or aryl;

R^{11} is C_1-C_4alkyl;

R^{12} is H, -OH, $-OC(O)R^f$, wherein R^f is C_1-C_{12}alkyl, C_2-C_{12}alkenyl, $-C_0$-C_{12}aliphatic-C_3-C_7cycloalkyl, $-C_0$-C_{12}aliphatic-heterocycloalkyl, $-C_0$-C_{12}aliphatic-aryl, or $-C_0$-C_{12}aliphatic-heteroaryl;

R^{13} and $R^{13'}$ are each independently H or C_1-C_4alkyl;

R^{14} is H or OR^g; wherein R^g is H or C_1-C_6alkyl;

R^{17} and R^{18} are each independently C_1-C_4alkyl or C_1-C_4alkyl-OR^h, wherein R^h is H or C_1-C_6alkyl;

L is absent, C_1-C_{12}alkylene, or C_2-C_{12}alkenylene, wherein the C_1-C_{12}alkylene or C_2-C_{12}alkenylene is optionally substituted with C_1-C_4alkyl;

R^{21} is H, $-S(O)_2R^j$, $-SR^j$, $-N(R^j)_2$, $-Si(R^j)_3$, C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, 5 to 12 membered bridged bicyclyl, adamantyl, or $-C(O)OR^k$, wherein the C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, bridged bicyclyl, or adamantyl is optionally substituted with 1 to 3 of J^1, and wherein optionally 1 to 2 carbon atoms of the spiroC_5-C_{12}cycloalkyl or bridged bicyclyl is replaced with a heteroatom selected from N, O and S, and optionally substituted with C_1-C_4alkyl, or when an N atom is present an N-protecting group;

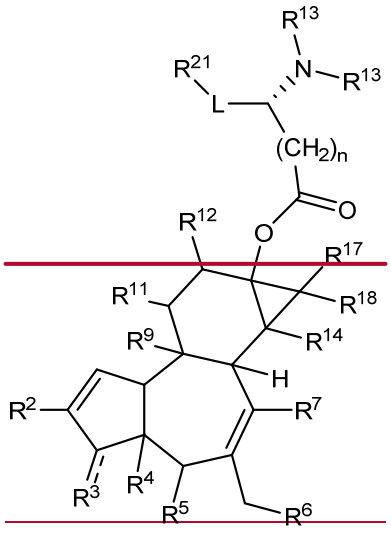
each R^j is independently C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylC_3-C_7cycloalkyl, C_0-C_6alkylheterocyclyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl, wherein the C_3-C_7cycloalkyl, heterocyclyl, alkylaryl, or heteroaryl is optionally substituted with 1 to 3 of J^1;

R^k is H or M^+ counterion;

J^1 is selected from OH, CN, halo, C_1-C_4alkyl, and haloC_1-C_4alkyl; and

n is 0 or 1.

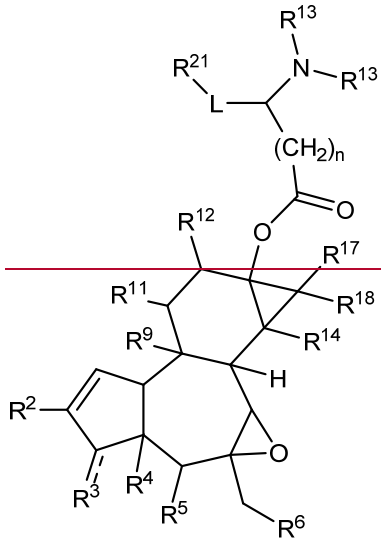
7. The compound of claim 6, having the structure of formula (IIa'):



(IIa')

or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof.

8. The compound of claim 4, having the structure of formula (IIb):



(IIb)

or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof;

wherein

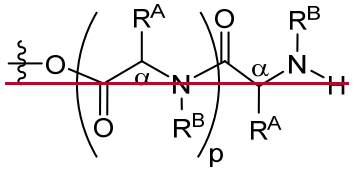
R^2 is a C_1-C_4alkyl;

R^3 is O double bonded to the ring carbon when (- - -) is a bond, or -OR^a; wherein R^a is H or -$C(O)R^{a1}$, wherein R^{a1} is C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;

R^4 and R^5 are each independently H or $-OR^b$, wherein R^b is H, C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;

R^6 is OH, halo, or $-OC(O)R^e$, wherein R^e is $-C_1$-C_6alkyl, $-C_1$-C_6alkyl $(NR^{e1})_2$ or $-C_1$-C_6alkylC(O)OR^k, R^{e1} is H, C_1-C_6alkyl, or two R^{e1} together with the N atom form a 5 to 7 membered heterocyclyl containing 1 to 3 heteroatoms selected from N, O, and S; or

R^6 is



wherein,

each occurrence of R^A is independently selected from a side chain of a natural or non-natural amino acid, wherein each occurrence of R^A is same or different;

each occurrence of R^B is independently H, or R^B together with the adjacent R^A and the N atom to which it is attached form a heterocyclic ring of a natural or non-natural amino acid, wherein each occurrence of R^B is same or different; and

p is 0, 1, or 2;

R^9 is OR^e, wherein R^e is H, C_1-C_6alkyl, or aryl;

R^{11} is C_1-C_4alkyl;

R^{12} is H, $-OH$, $-OC(O)R^f$, wherein R^f is C_1-C_{12}alkyl, C_2-C_{12}alkenyl, $-C_0$-C_{12}aliphatic-C_3-C_7cycloalkyl, $-C_0$-C_{12}aliphatic-heterocycloalkyl, $-C_0$-C_{12}aliphatic-aryl, or $-C_0$-C_{12}aliphatic-heteroaryl;

R^{13} and $R^{13'}$ are each independently H or C_1-C_4alkyl;

R^{14} is H or OR^g; wherein R^g is H or C_1-C_6alkyl;

R^{17} and R^{18} are each independently C_1-C_4alkyl or C_1-C_4alkyl OR^h, wherein R^h is H or C_1-C_6alkyl;

L is absent, C_1-C_{12}alkylene, or C_2-C_{12}alkenylene, wherein the C_1-C_{12}alkylene or C_2-C_{12}alkenylene is optionally substituted with C_1-C_4alkyl;

R^{21} is H, $-S(O)_2R^j$, $-SR^j$, $-N(R^j)_2$, $-Si(R^j)_3$, C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, 5 to 12 membered bridged bicyclyl, adamantyl, or $-C(O)OR^k$, wherein the C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, bridged bicyclyl, or adamantyl is optionally substituted with 1 to 3 of J^1, and wherein optionally 1 to 2 carbon atoms of the spiroC_5-C_{12}cycloalkyl or bridged bicyclyl is replaced with a heteroatom selected from N, O and S, and optionally substituted with C_1-C_4alkyl, or when an N atom is present an N-protecting group;

each R^j is independently C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylC_3-C_7cycloalkyl, C_0-C_6alkylheterocyclyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl, wherein the C_3-C_7cycloalkyl,

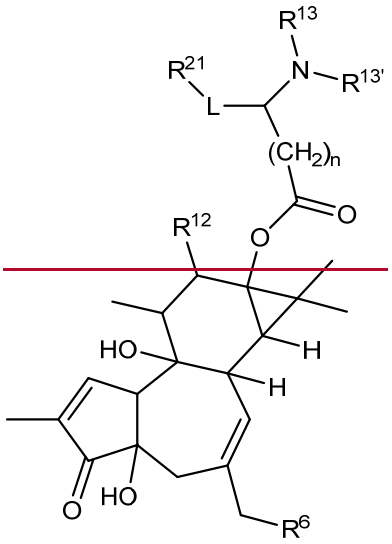
heterocyclyl, alkylaryl, or heteroaryl is optionally substituted with 1 to 3 of J^1;

R^k is H or M^+ counterion;

J^1 is selected from OH, CN, halo, C_1-C_4alkyl, and haloC_1-C_4alkyl; and

n is 0 or 1.

9. The compound of claim 6, having the structure of formula (IIc):



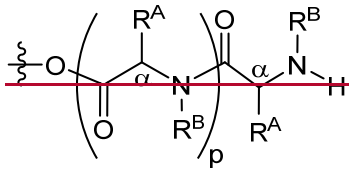
(IIc)

or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof;

wherein

R^6 is OH, halo, or $-OC(O)R^e$, wherein R^e is C_1-C_6alkyl, C_1-C_6alkyl $(NR^{e1})_2$ or C_1-C_6alkyl$C(O)OR^k$, R^{e1} is H, C_1-C_6alkyl, or two R^{e1} together with the N atom form a 5 to 7 membered heterocyclyl containing 1 to 3 heteroatoms selected from N, O, and S; or

R^6 is



wherein,

each occurrence of R^A is independently selected from a side chain of a natural or non-natural amino acid, wherein each occurrence of R^A is same or different;

each occurrence of R^B is independently H, or R^B together with the adjacent R^A and the N atom to which it is attached form a heterocyclic ring of a natural or non-natural amino acid, wherein each occurrence of R^B is same or different; and

p is 0, 1, or 2;

R^{12} is H, -OH, -OC(O)R^f, wherein R^f is C_1-C_{12}alkyl, C_2-C_{12}alkenyl, -C_0-C_{12}aliphatic-C_3-C_7cycloalkyl, -C_0-C_{12}aliphatic-heterocycloalkyl, -C_0-C_{12}aliphatic-aryl, or -C_0-C_{12}aliphatic-heteroaryl;

R^{13} and $R^{13'}$ are each independently H or C_1-C_4alkyl;

L is absent, C_1-C_{12}alkylene, or C_2-C_{12}alkenylene, wherein the C_1-C_{12}alkylene or C_2-C_{12}alkenylene is optionally substituted with C_1-C_4alkyl;

R^{21} is H, -$S(O)_2R^j$, -SR^j, -$N(R^j)_2$, -$Si(R^j)_3$, C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, 5 to 12 membered bridged bicyclyl, adamantyl, or -C(O)OR^k, wherein the C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, bridged bicyclyl, or adamantyl is optionally substituted with 1 to 3 of J^1, and wherein optionally 1 to 2 carbon atoms of the spiroC_5-C_{12}cycloalkyl or bridged bicyclyl is replaced with a heteroatom selected from N, O and S, and optionally substituted with C_1-C_4alkyl, or when an N atom is present an N-protecting group;

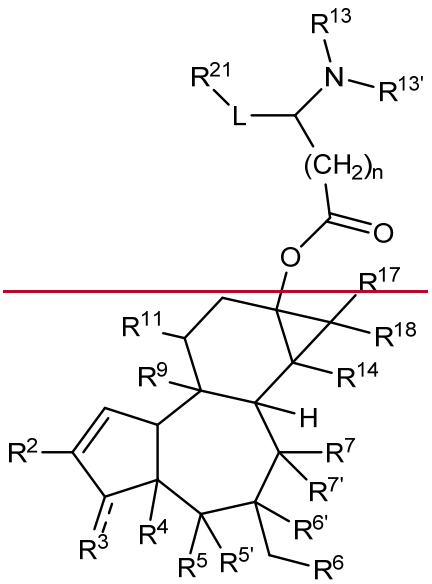
each R^j is independently C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylC_3-C_7cycloalkyl, C_0-C_6alkylheterocyclyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl, wherein the C_3-C_7cycloalkyl, heterocyclyl, alkylaryl, or heteroaryl is optionally substituted with 1 to 3 of J^1;

R^k is H or M^+ counterion;

J^1 is selected from OH, CN, halo, C_1-C_4alkyl, and haloC_1-C_4alkyl; and

n is 0 or 1.

10. The compound of claim 4 having the structure of formula (III):



(III)

or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof;

wherein

R^2 is a C_1-C_4alkyl;

R^3 is O double bonded to the ring carbon when (- - -) is a bond, or -OR^a; wherein R^a is H or -

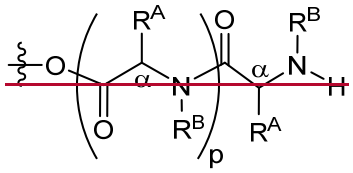
~~$C(O)R^{a1}$, wherein R^{a1} is C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;~~

~~R^4 and R^5 are each independently H or $-OR^b$, wherein R^b is H, C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;~~

~~$R^{5'}$ and $R^{6'}$ are H, or $R^{5'}$ and $R^{6'}$ form a bond or are bonded to a common O atom to form an epoxide ring as permitted by valency;~~

~~R^6 is OH, halo, or $-OC(O)R^e$, wherein R^e is $-C_1$-C_6alkyl, $-C_1$-C_6alkyl-$(NR^{e1})_2$ or $-C_1$-C_6alkylC(O)OR^k, R^{e1} is H, C_1-C_6alkyl, or two R^{e1} together with the N atom form a 5 to 7 membered heterocyclyl containing 1 to 3 heteroatoms selected from N, O, and S; or~~

~~R^6 is~~



~~wherein,~~

~~each occurrence of R^A is independently selected from a side chain of a natural or non-natural amino acid, wherein each occurrence of R^A is same or different;~~

~~each occurrence of R^B is independently H, or R^B together with the adjacent R^A and the N atom to which it is attached form a heterocyclic ring of a natural or non-natural amino acid, wherein each occurrence of R^B is same or different; and~~

~~p is 0, 1, or 2;~~

~~$R^{6'}$ and $R^{7'}$ are H, or $R^{6'}$ and $R^{7'}$ form a bond or are bonded to a common O atom to form an epoxide ring, as permitted by valency;~~

~~R^7 is H or OH;~~

~~R^9 is OR^e, wherein R^e is H, C_1-C_6alkyl, or aryl;~~

~~R^{11} is C_1-C_4alkyl;~~

~~R^{13} and $R^{13'}$ are each independently H or C_1-C_4alkyl;~~

~~R^{14} is H or OR^g; wherein R^g is H or C_1-C_6alkyl;~~

~~R^{17} and R^{18} are each independently C_1-C_4alkyl or C_1-C_4alkyl-OR^h, wherein R^h is H or C_1-C_6alkyl;~~

~~L is absent, C_1-C_{12}alkylene, or C_2-C_{12}alkenylene, wherein the C_1-C_{12}alkylene or C_2-C_{12}alkenylene is optionally substituted with C_1-C_4alkyl;~~

~~R^{21} is H, $-S(O)_2R^j$, $-SR^j$, $-N(R^j)_2$, $-Si(R^j)_3$, C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, 5 to 12 membered bridged bicyclyl, adamantyl, or $-C(O)OR^k$, wherein the C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, bridged bicyclyl, or adamantyl is optionally substituted with 1 to 3 of J^1, and wherein optionally 1 to 2 carbon atoms of the spiroC_5-~~

~~C_{12}cycloalkyl or bridged bicyclyl is replaced with a heteroatom selected from N, O and S, and optionally substituted with C_1-C_4alkyl, or when an N atom is present an N-protecting group;~~

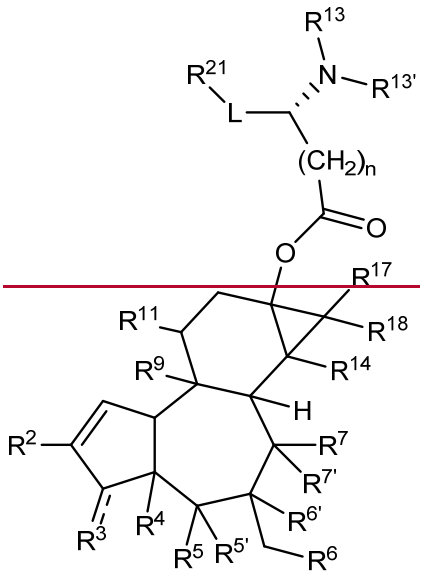
~~each R^j is independently C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylC_3-C_7cycloalkyl, C_0-C_6alkylheterocyclyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl, wherein the C_3-C_7cycloalkyl, heterocyclyl, alkylaryl, or heteroaryl is optionally substituted with 1 to 3 of J^1;~~

~~R^k is H or M^+ counterion;~~

~~J^1 is selected from OH, CN, halo, C_1-C_4alkyl, and haloC_1-C_4alkyl; and~~

~~n is 0 or 1.~~

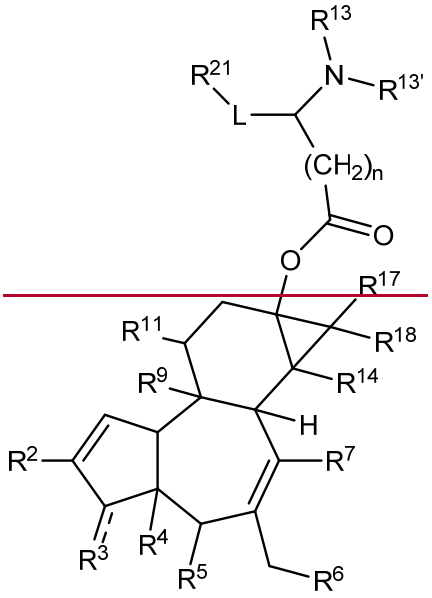
~~11. The compound of claim 10 having the structure of formula (III'):~~



~~(III')~~

~~or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof.~~

~~12. The compound of claim 10 having the structure of formula (IIIa):~~



(IIIa)

or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof;

wherein

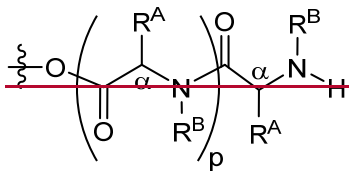
R^2 is a C_1-C_4alkyl;

R^3 is O double bonded to the ring carbon when (- - -) is a bond, or $-OR^a$; wherein R^a is H or $-C(O)R^{a1}$, wherein R^{a1} is C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;

R^4 and R^5 are each independently H or $-OR^b$, wherein R^b is H, C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;

R^6 is OH, halo, or $-OC(O)R^e$, wherein R^e is $-C_1$-C_6alkyl, $-C_1$-C_6alkyl-$(NR^{e1})_2$ or $-C_1$-C_6alkylC(O)OR^k, R^{e1} is H, C_1-C_6alkyl, or two R^{e1} together with the N atom form a 5-to-7-membered heterocyclyl containing 1 to 3 heteroatoms selected from N, O, and S; or

R^6 is



wherein,

each occurrence of R^A is independently selected from a side chain of a natural or non-natural amino acid, wherein each occurrence of R^A is same or different;

each occurrence of R^B is independently H, or R^B together with the adjacent R^A and the N atom to which it is attached form a heterocyclic ring of a natural or non-natural amino acid, wherein each occurrence of R^B is same or different; and

p is 0, 1, or 2;

~~R^7 is H or OH;~~

~~R^9 is OR^e, wherein R^e is H, C_1-C_6alkyl, or aryl;~~

~~R^{11} is C_1-C_4alkyl;~~

~~R^{13} and $R^{13'}$ are each independently H or C_1-C_4alkyl;~~

~~R^{14} is H or OR^g; wherein R^g is H or C_1-C_6alkyl;~~

~~R^{17} and R^{18} are each independently C_1-C_4alkyl or C_1-C_4alkyl-OR^h, wherein R^h is H or C_1-C_6alkyl;~~

~~L is absent, C_1-C_{12}alkylene, or C_2-C_{12}alkenylene, wherein the C_1-C_{12}alkylene or C_2-C_{12}alkenylene is optionally substituted with C_1-C_4alkyl;~~

~~R^{21} is H, $-S(O)_2R^j$, $-SR^j$, $-N(R^j)_2$, $-Si(R^j)_3$, C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, 5 to 12 membered bridged bicyclyl, adamantyl, or $-C(O)OR^k$, wherein the C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, bridged bicyclyl, or adamantyl is optionally substituted with 1 to 3 of J^1, and wherein optionally 1 to 2 carbon atoms of the spiroC_5-C_{12}cycloalkyl or bridged bicyclyl is replaced with a heteroatom selected from N, O and S, and optionally substituted with C_1-C_4alkyl, or when an N atom is present an N-protecting group;~~

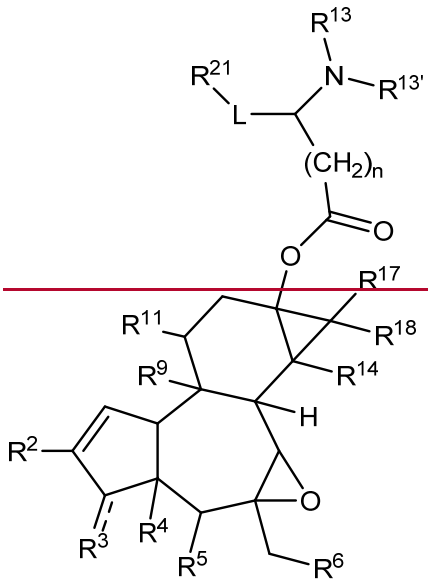
~~each R^j is independently C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylC_3-C_7cycloalkyl, C_0-C_6alkylheterocyclyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl, wherein the C_3-C_7cycloalkyl, heterocyclyl, alkylaryl, or heteroaryl is optionally substituted with 1 to 3 of J^1;~~

~~R^k is H or M^+ counterion;~~

~~J^1 is selected from OH, CN, halo, C_1-C_4alkyl, and haloC_1-C_4alkyl; and~~

~~n is 0 or 1.~~

~~13. The compound of claim 10 having structure of formula (IIIb):~~



~~(IIIb)~~

~~or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof;~~

~~wherein~~

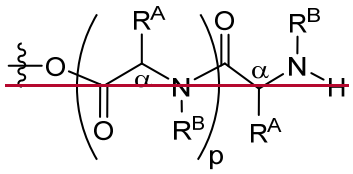
~~R^2 is a C_1-C_4alkyl;~~

~~R^3 is O double bonded to the ring carbon when (– –) is a bond, or –OR^a; wherein R^a is H or –$C(O)R^{a1}$, wherein R^{a1} is C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;~~

~~R^4 and R^5 are each independently H or –OR^b, wherein R^b is H, C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;~~

~~R^6 is OH, halo, or –$OC(O)R^e$, wherein R^e is C_1-C_6alkyl, C_1-C_6alkyl $(NR^{e1})_2$ or C_1-C_6alkyl$C(O)OR^k$, R^{e1} is H, C_1-C_6alkyl, or two R^{e1} together with the N atom form a 5-to-7-membered heterocyclyl containing 1 to 3 heteroatoms selected from N, O, and S; or~~

~~R^6 is~~



~~wherein,~~

~~each occurrence of R^A is independently selected from a side chain of a natural or non-natural amino acid, wherein each occurrence of R^A is same or different;~~

~~each occurrence of R^B is independently H, or R^B together with the adjacent R^A and the N atom to which it is attached form a heterocyclic ring of a natural or non-natural amino acid, wherein each occurrence of R^B is same or different; and~~

~~p is 0, 1, or 2;~~

~~R^9 is OR^e, wherein R^e is H, C_1-C_6alkyl, or aryl;~~

~~R^{11} is C_1-C_4alkyl;~~

~~R^{13} and $R^{13'}$ are each independently H or C_1-C_4alkyl;~~

~~R^{14} is H or OR^g; wherein R^g is H or C_1-C_6alkyl;~~

~~R^{17} and R^{18} are each independently C_1-C_4alkyl or C_1-C_4alkyl-OR^h, wherein R^h is H or C_1-C_6alkyl;~~

~~L is absent, C_1-C_{12}alkylene, or C_2-C_{12}alkenylene, wherein the C_1-C_{12}alkylene or C_2-C_{12}alkenylene is optionally substituted with C_1-C_4alkyl;~~

~~R^{21} is H, $-S(O)_2R^j$, $-SR^j$, $-N(R^j)_2$, $-Si(R^j)_3$, C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, 5-to-12-membered bridged bicyclyl, adamantyl, or –$C(O)OR^k$, wherein the C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, bridged bicyclyl, or adamantyl is optionally substituted with 1 to 3 of J^1, and wherein optionally 1 to 2 carbon atoms of the spiroC_5-C_{12}cycloalkyl or bridged bicyclyl is replaced with a heteroatom selected from N, O and S, and~~

optionally substituted with C_1-C_4alkyl, or when an N atom is present an N-protecting group;

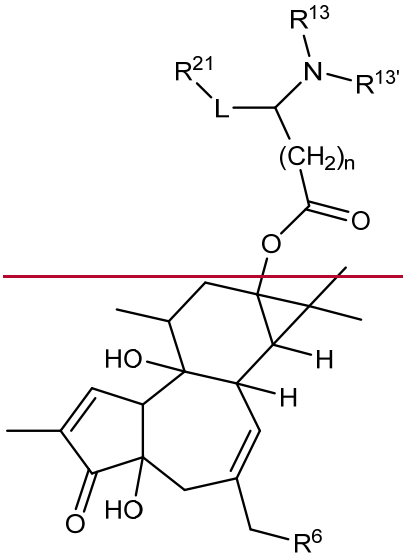
each R^j is independently C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylC_3-C_7cycloalkyl, C_0-C_6alkylheterocyclyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl, wherein the C_3-C_7cycloalkyl, heterocyclyl, alkylaryl, or heteroaryl is optionally substituted with 1 to 3 of J^1;

R^k is H or M^+ counterion;

J^1 is selected from OH, CN, halo, C_1-C_4alkyl, and haloC_1-C_4alkyl; and

n is 0 or 1.

14. The compound of claim 10 having the structure of formula (IIIc):



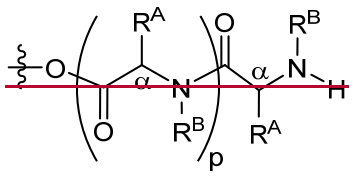
(IIIc)

or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof;

wherein

R^6 is OH, halo, or $-OC(O)R^e$, wherein R^e is C_1-C_6alkyl, C_1-C_6alkyl $(NR^{e1})_2$ or C_1-C_6alkyl$C(O)OR^k$, R^{e1} is H, C_1-C_6alkyl, or two R^{e1} together with the N atom form a 5 to 7 membered heterocyclyl containing 1 to 3 heteroatoms selected from N, O, and S; or

R^6 is



wherein,

each occurrence of R^A is independently selected from a side chain of a natural or non-natural amino acid, wherein each occurrence of R^A is same or different;

each occurrence of R^B is independently H, or R^B together with the adjacent R^A and

the N atom to which it is attached form a heterocyclic ring of a natural or non-natural amino acid, wherein each occurrence of R^B is same or different; and

p is 0, 1, or 2;

R^{13} and $R^{13'}$ are each independently H or C_1-C_4alkyl;

L is absent, C_1-C_{12}alkylene, or C_2-C_{12}alkenylene, wherein the C_1-C_{12}alkylene or C_2-C_{12}alkenylene is optionally substituted with C_1-C_4alkyl;

R^{21} is H, $-S(O)_2R^j$, $-SR^j$, $-N(R^j)_2$, $-Si(R^j)_3$, C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, 5 to 12 membered bridged bicyclyl, adamantyl, or $-C(O)OR^k$, wherein the C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, bridged bicyclyl, or adamantyl is optionally substituted with 1 to 3 of J^1, and wherein optionally 1 to 2 carbon atoms of the spiroC_5-C_{12}cycloalkyl or bridged bicyclyl is replaced with a heteroatom selected from N, O and S, and optionally substituted with C_1-C_4alkyl, or when an N atom is present an N-protecting group;

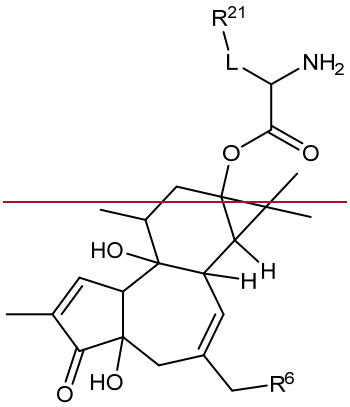
each R^j is independently C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylC_3-C_7cycloalkyl, C_0-C_6alkylheterocyclyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl, wherein the C_3-C_7cycloalkyl, heterocyclyl, alkylaryl, or heteroaryl is optionally substituted with 1 to 3 of J^1;

R^k is H or M^+ counterion;

J^1 is selected from OH, CN, halo, C_1-C_4alkyl, and haloC_1-C_4alkyl; and

n is 0 or 1.

15. The compound of claim 14 having the structure of formula (IIIe):



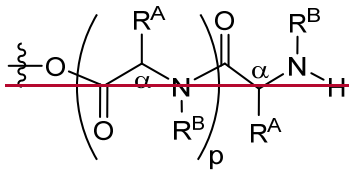
(IIIe)

or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof;

wherein

R^6 is OH, halo, or $-OC(O)R^e$, wherein R^e is $-C_1$-C_6alkyl, $-C_1$-C_6alkyl-$(NR^{e1})_2$ or $-C_1$-C_6alkyl$C(O)OR^k$, R^{e1} is H, C_1-C_6alkyl, or two R^{e1} together with the N atom form a 5 to 7 membered heterocyclyl containing 1 to 3 heteroatoms selected from N, O, and S; or

R^6 is



wherein,

each occurrence of R^A is independently selected from a side chain of a natural or non-natural amino acid, wherein each occurrence of R^A is same or different;

each occurrence of R^B is independently H, or R^B together with the adjacent R^A and the N atom to which it is attached form a heterocyclic ring of a natural or non-natural amino acid, wherein each occurrence of R^B is same or different; and

p is 0, 1, or 2;

L is absent, C_1-C_{12}alkylene, or C_2-C_{12}alkenylene, wherein the C_1-C_{12}alkylene or C_2-C_{12}alkenylene is optionally substituted with C_1-C_4alkyl;

R^{21} is H, $-S(O)_2R^j$, $-SR^j$, $-N(R^j)_2$, $-Si(R^j)_3$, C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, 5 to 12 membered bridged bicyclyl, adamantyl, or $-C(O)OR^k$, wherein the C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, bridged bicyclyl, or adamantyl is optionally substituted with 1 to 3 of J^1, and wherein optionally 1 to 2 carbon atoms of the spiroC_5-C_{12}cycloalkyl or bridged bicyclyl is replaced with a heteroatom selected from N, O and S, and optionally substituted with C_1-C_4alkyl, or when an N atom is present an N-protecting group;

each R^j is independently C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylC_3-C_7cycloalkyl, C_0-C_6alkylheterocyclyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl, wherein the C_3-C_7cycloalkyl, heterocyclyl, alkylaryl, or heteroaryl is optionally substituted with 1 to 3 of J^1;

R^k is H or M^+ counterion; and

J^1 is selected from OH, CN, halo, C_1-C_4alkyl, and haloC_1-C_4alkyl.

16. The compound of any one of claims 1 to 15, wherein R^{21} is C_3-C_7cycloalkyl, wherein the C_3-C_7cycloalkyl is optionally substituted with 1 to 3 of J^1.

17. The compound of claim 16, wherein the C_3-C_7cycloalkyl is selected from the group consisting of cyclobutyl, cyclopentyl, cyclohexyl, and cycloheptyl, wherein the C_3-C_7cycloalkyl is optionally substituted with 1 to 3 of J^1.

18. The compound of any one of claims 1 to 15, wherein R^{21} is heterocyclyl, wherein the heterocyclyl is optionally substituted with 1 to 3 of J^1.

~~19. The compound of claim 18, wherein the heterocyclyl is selected from the group consisting of oxiranyl, oxetanyl, azetidynyl, oxazolyl, thiazolidinyl, thiazolyl, morpholinyl, pyrrolidinonyl, pyrrolidinyl, piperidinyl, piperazinyl, 2,3-dihydrofuranyl, dihydropyranyl, tetrahydrofuranyl, tetrahydropyranyl, dihydropyridinyl, tetrahydropyridinyl, tetrahydropyrimidinyl, tetrahydrothiophenyl, tetrahydrothiopyranyl, and azapanyl, wherein the heterocyclyl is optionally substituted with 1 to 3 of J^1.~~

~~20. The compound of any one of claims 1 to 15, wherein R^{21} is aryl, wherein the aryl is optionally substituted with 1 to 3 of J^1.~~

~~21. The compound of claim 20, wherein R^{21} is a phenyl or naphthyl, wherein the phenyl or napthyl is optionally substituted with 1 to 3 of J^1.~~

~~22. The compound of any one of claims 1 to 15, wherein R^{21} is heteroaryl, wherein the heteroaryl is optionally substituted with 1 to 3 of J^1.~~

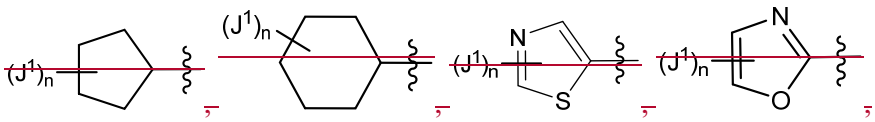
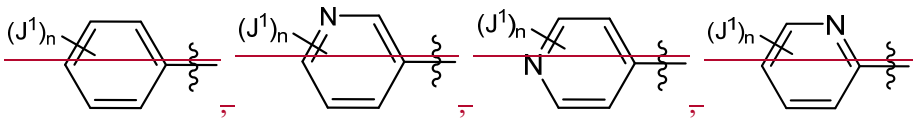
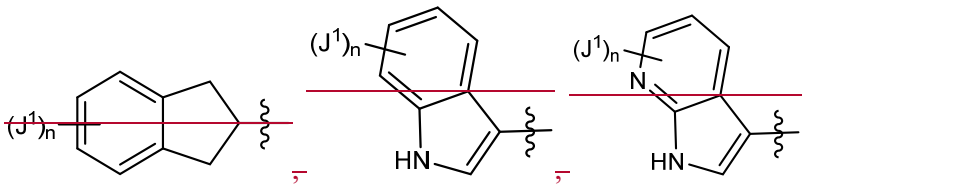
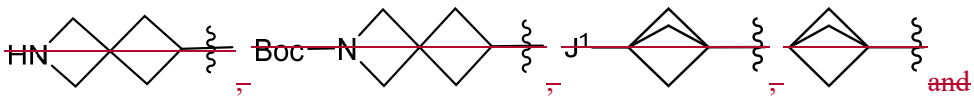
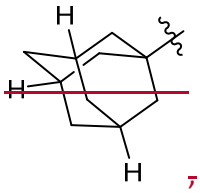
~~23. The compound of claim 22, wherein the heteroaryl is selected from the group consisting of pyrrolyl, pyrazolyl, imidazolyl, pyrazinyl, oxazolyl, isoxazolyl, thiazolyl, furyl, thienyl, pyridyl, pyrimidyl, benzoxazolyl, benzothiazolyl, purinyl, benzimidazolyl, indolyl, isoquinolyl, quinoxalinyl, and quinolyl, wherein the heteroaryl is optionally substituted with 1 to 3 of J^1.~~

~~24. The compound of any one of claims 1 to 15 wherein R^{21} is adamantyl, wherein the adamantyl is optionally substituted with OH, halo, or C_1-C_4alkyl.~~

~~25. The compound of any one of claims 1 to 15, wherein R^{21} is spiroC_5-C_{12} cycloalkyl, wherein the spiroC_5-C_{12} cycloalkyl has 0-2 carbon atoms replaced with 0-2 heteroatoms selected from N, O and S, and is optionally substituted with 1 to 3 of J^1, or when an N atom is present an N-protecting group.~~

~~26. The compound of any one of claims 1 to 15, wherein R^{21} is 5 to 12 membered bridged bicyclyl, wherein the bridged bicyclyl has 0-2 carbon atoms replaced with 0-2 heteroatoms selected from N, O or S, and is optionally substituted with 1 to 3 of J^1, or when an N atom is present an N-protecting group.~~

~~27. The compound of any one of claims 1 to 15, wherein R^{21} is selected from:~~

wherein J^1 is OH, CN, halo, C_1-C_4alkyl, and haloC_1-C_4alkyl, and n is 0-3.

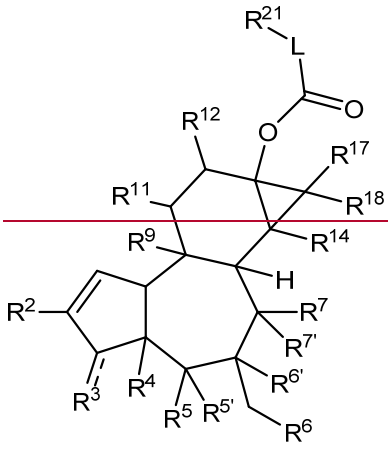
28. The compound of any one of claims 1 to 27, wherein L is C_1-C_6alkylene, C_3-C_6alkylene, or C_3-C_{12}alkylene.

29. The compound of any one of claims 1 to 27, wherein L is C_1-C_6alkenylene, C_3-C_6alkenylene, or C_3-C_{12}alkenylene.

30. The compound of any one of claims 1-29, wherein n is 0.

30. The compound of claim 1 selected from the group consisting of the compounds of **Table 1**, or an amino acid prodrug thereof.

31. A compound of formula (IV):



(IV)

or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof;

wherein

R^2 is a C_1-C_4alkyl;

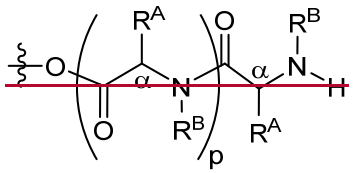
R^3 is O double bonded to the ring carbon when (- - -) is a bond, or $-OR^a$; wherein R^a is H or $-C(O)R^{a1}$, wherein R^{a1} is C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;

R^4 and R^5 are each independently H or $-OR^b$, wherein R^b is H, C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;

$R^{5'}$ and $R^{6'}$ are H, or $R^{5'}$ and $R^{6'}$ form a bond or are bonded to a common O atom to form an epoxide ring as permitted by valency;

R^6 is OH, halo, or $-OC(O)R^e$, wherein R^e is C_1-C_6alkyl, C_1-C_6alkyl-$(NR^{e1})_2$ or C_1-C_6alkylC(O)OR^k, R^{e1} is H, C_1-C_6alkyl, or two R^{e1} together with the N atom form a 5 to 7 membered heterocyclyl containing 1 to 3 heteroatoms selected from N, O, and S; or

R^6 is



wherein,

each occurrence of R^A is independently selected from a side chain of a natural or non-natural amino acid, wherein each occurrence of R^A is same or different;

each occurrence of R^B is independently H, or R^B together with R^A and the N atom to which it is attached form a heterocyclic ring of a natural or non-natural amino acid, wherein each occurrence of R^B is same or different; and

p is 0, 1, or 2;

~~$R^{6'}$ and $R^{7'}$ are H, or $R^{6'}$ and $R^{7'}$ form a bond or are bonded to a common O atom to form an epoxide ring, as permitted by valency;~~

~~R^{7} is H or OH;~~

~~R^{9} is OR^{e}, wherein R^{e} is H, C_1-C_6alkyl, or aryl;~~

~~R^{11} is C_1-C_4alkyl;~~

~~R^{12} is H, -OH, $-OC(O)R^{f}$, wherein R^{f} is C_1-C_{12}alkyl, C_2-C_{12}alkenyl, C_0-C_{12}aliphatic-C_3-C_7cycloalkyl, C_0-C_{12}aliphatic-heterocycloalkyl, C_0-C_{12}aliphatic-aryl, or C_0-C_{12}aliphatic-heteroaryl;~~

~~R^{14} is H or OR^{g}; wherein R^{g} is H or C_1-C_6alkyl;~~

~~R^{17} and R^{18} are each independently C_1-C_4alkyl or C_1-C_4alkyl-OR^{h}, wherein R^{h} is H or C_1-C_6alkyl;~~

~~L is C_0-C_6alkylarylene, C_0-C_6alkylheteroarylene, C_0-C_6alkylC_3-C_7cycloalkylene, C_1-C_{12}alkylene or C_2-C_{12}alkenylene, wherein the C_1-C_{12}alkylene or C_2-C_{12}alkenylene is optionally substituted with OH or C_1-C_4alkyl; and~~

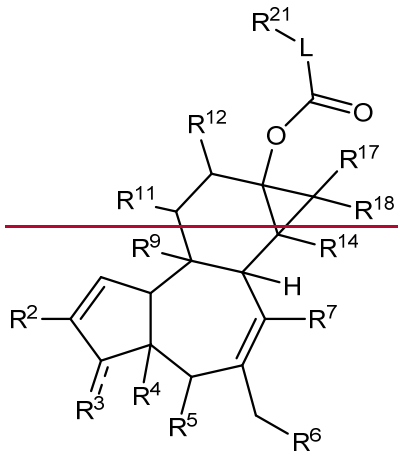
~~R^{21} is H, -OH, -SH, $-S(O)_2R^{j}$, $-SR^{j}$, $-N(R^{j})_2$, $-Si(R^{j})_3$, C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, 5 to 12 membered bridged bicyclyl, adamantyl, or $-C(O)OR^{k}$, wherein the C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, bridged bicyclyl, or adamantyl is optionally substituted with 1 to 3 of J^{1}; and wherein optionally 1 to 2 carbon atoms of the spiroC_5-C_{12}cycloalkyl or bridged bicyclyl is replaced with a heteroatom selected from N, O and S, and optionally substituted with C_1-C_4alkyl or, when an N atom is present an N-protecting group;~~

~~each R^{j} is independently C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylC_3-C_7cycloalkyl, C_0-C_6alkylheterocyclyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl, wherein the C_3-C_7cycloalkyl, heterocyclyl, alkylaryl, or heteroaryl is optionally substituted with 1 to 3 of J^{1};~~

~~J^{1} is selected from OH, CN, halo, C_1-C_4alkyl, and haloC_1-C_4alkyl; and~~

~~R^{k} is H or M^{+} counterion.~~

~~32. The compound of claim 31, having the structure of formula (IVa):~~



~~(IVa)~~

~~or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof;~~

~~wherein~~

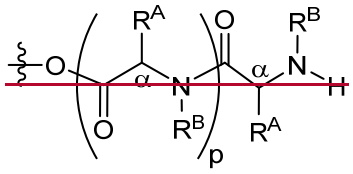
~~R^2 is a C_1-C_4alkyl;~~

~~R^3 is O double bonded to the ring carbon when (– –) is a bond, or $-OR^a$; wherein R^a is H or $-C(O)R^{a1}$, wherein R^{a1} is C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;~~

~~R^4 and R^5 are each independently H or $-OR^b$, wherein R^b is H, C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;~~

~~R^6 is OH, halo, or $-OC(O)R^e$, wherein R^e is $-C_1$-C_6alkyl, $-C_1$-C_6alkyl-$(NR^{e1})_2$ or $-C_1$-C_6alkylC(O)OR^k, R^{e1} is H, C_1-C_6alkyl, or two R^{e1} together with the N atom form a 5 to 7 membered heterocyclyl containing 1 to 3 heteroatoms selected from N, O, and S; or~~

~~R^6 is~~



~~wherein,~~

~~each occurrence of R^A is independently selected from a side chain of a natural or non-natural amino acid, wherein each occurrence of R^A is same or different;~~

~~each occurrence of R^B is independently H, or R^B together with R^A and the N atom to which it is attached form a heterocyclic ring of a natural or non-natural amino acid, wherein each occurrence of R^B is same or different; and~~

~~p is 0, 1, or 2;~~

~~R^7 is H or OH;~~

~~R^9 is OR^e, wherein R^e is H, C_1-C_6alkyl, or aryl;~~

~~R^{11} is C_1-C_4alkyl;~~

~~R^{12} is H, –OH, $-OC(O)R^f$, wherein R^f is C_1-C_{12}alkyl, C_2-C_{12}alkenyl, C_0-C_{12}aliphatic-C_3-C_7cycloalkyl, $-C_0$-C_{12}aliphatic-heterocycloalkyl, $-C_0$-C_{12}aliphatic-aryl, or $-C_0$-C_{12}aliphatic-heteroaryl;~~

~~R^{14} is H or OR^g; wherein R^g is H or C_1-C_6alkyl;~~

~~R^{17} and R^{18} are each independently C_1-C_4alkyl or C_1-C_4alkyl-OR^h, wherein R^h is H or C_1-C_6alkyl;~~

~~L is C_0-C_6alkylarylene, C_0-C_6alkylheteroarylene, C_0-C_6alkylC$_3$-C_7cycloalkylene, C_1-C_{12}alkylene or C_2-C_{12}alkenylene, wherein the C_1-C_{12}alkylene or C_2-C_{12}alkenylene is optionally substituted with OH or C_1-C_4alkyl; and~~

~~R^{21} is H, –OH, –SH, $S(O)_2R^j$, $-SR^j$, $-N(R^j)_2$, $-Si(R^j)_3$, C_3-C_7cycloalkyl, heterocyclyl, aryl,~~

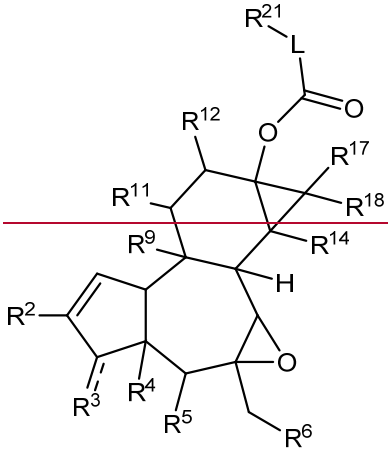
heteroaryl, spiroC_5-C_{12} cycloalkyl, 5 to 12 membered bridged bicyclyl, adamantyl, or -C(O)OR^k, wherein the C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, bridged bicyclyl, or adamantyl is optionally substituted with 1 to 3 of J^1; and wherein optionally 1 to 2 carbon atoms of the spiroC_5-C_{12}cycloalkyl or bridged bicyclyl is replaced with a heteroatom selected from N, O and S, and optionally substituted with C_1-C_4alkyl or, when an N atom is present an N-protecting group;

each R^j is independently C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylC_3-C_7cycloalkyl, C_0-C_6alkylheterocyclyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl, wherein the C_3-C_7cycloalkyl, heterocyclyl, alkylaryl, or heteroaryl is optionally substituted with 1 to 3 of J^1;

J^1 is selected from OH, CN, halo, C_1-C_4alkyl, and haloC_1-C_4alkyl; and

R^k is H or M^+ counterion.

33. The compound of claim 31, having the structure of formula (IVb)



(IVb)

or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof;

wherein

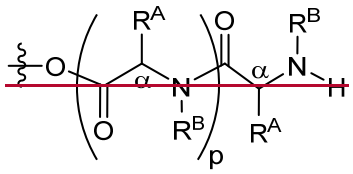
R^2 is a C_1-C_4alkyl;

R^3 is O double bonded to the ring carbon when (- - -) is a bond, or -OR^a; wherein R^a is H or -C(O)R^{a1}, wherein R^{a1} is C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;

R^4 and R^5 are each independently H or -OR^b, wherein R^b is H, C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;

R^6 is OH, halo, or -OC(O)R^e, wherein R^e is -C_1-C_6alkyl, -C_1-C_6alkyl (NR^{e1})$_2$ or -C_1-C_6alkylC(O)OR^k, R^{e1} is H, C_1-C_6alkyl, or two R^{e1} together with the N atom form a 5 to 7 membered heterocyclyl containing 1 to 3 heteroatoms selected from N, O, and S; or

R^6 is



wherein,

each occurrence of R^A is independently selected from a side chain of a natural or non-natural amino acid, wherein each occurrence of R^A is same or different;

each occurrence of R^B is independently H, or R^B together with R^A and the N atom to which it is attached form a heterocyclic ring of a natural or non-natural amino acid, wherein each occurrence of R^B is same or different; and

p is 0, 1, or 2;

R^7 is H or OH;

R^9 is OR^e, wherein R^e is H, C_1-C_6alkyl, or aryl;

R^{11} is C_1-C_4alkyl;

R^{12} is H, -OH, $-OC(O)R^f$, wherein R^f is C_1-C_{12}alkyl, C_2-C_{12}alkenyl, -C_0-C_{12}aliphatic-C_3-C_7cycloalkyl, -C_0-C_{12}aliphatic-heterocycloalkyl, -C_0-C_{12}aliphatic-aryl, or -C_0-C_{12}aliphatic-heteroaryl;

R^{14} is H or OR^g; wherein R^g is H or C_1-C_6alkyl;

R^{17} and R^{18} are each independently C_1-C_4alkyl or C_1-C_4alkyl-OR^h, wherein R^h is H or C_1-C_6alkyl;

L is C_0-C_6alkylarylene, C_0-C_6alkylheteroarylene, C_0-C_6alkylC_3-C_7cycloalkylene, C_1-C_{12}alkylene or C_2-C_{12}alkenylene, wherein the C_1-C_{12}alkylene or C_2-C_{12}alkenylene is optionally substituted with OH or C_1-C_4alkyl; and

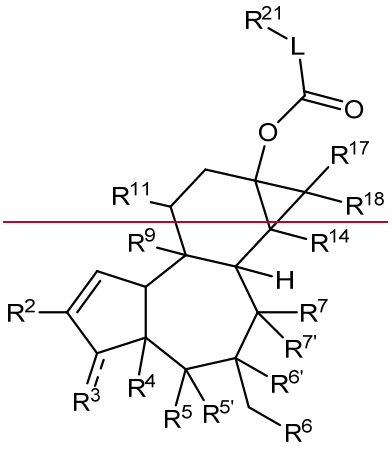
R^{21} is H, -OH, -SH, $S(O)_2R^j$, $-SR^j$, $-N(R^j)_2$, $-Si(R^j)_3$, C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, 5 to 12 membered bridged bicyclyl, adamantyl, or $-C(O)OR^k$, wherein the C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, bridged bicyclyl, or adamantyl is optionally substituted with 1 to 3 of J^1; and wherein optionally 1 to 2 carbon atoms of the spiroC_5-C_{12}cycloalkyl or bridged bicyclyl is replaced with a heteroatom selected from N, O and S, and optionally substituted with C_1-C_4alkyl or, when an N atom is present an N-protecting group;

each R^j is independently C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylC_3-C_7cycloalkyl, C_0-C_6alkylheterocyclyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl, wherein the C_3-C_7cycloalkyl, heterocyclyl, alkylaryl, or heteroaryl is optionally substituted with 1 to 3 of J^1;

J^1 is selected from OH, CN, halo, C_1-C_4alkyl, and haloC_1-C_4alkyl; and

R^k is H or M^+ counterion.

34. The compound of claim 31, having the structure of formula (V):



(V)

or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof;

wherein

R^2 is a C_1-C_4alkyl;

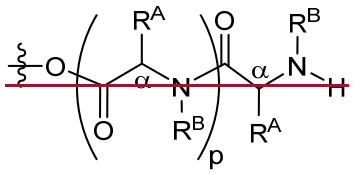
R^3 is O double bonded to the ring carbon when (- - -) is a bond, or $-OR^a$; wherein R^a is H or $-C(O)R^{a1}$, wherein R^{a1} is C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;

R^4 and R^5 are each independently H or $-OR^b$, wherein R^b is H, C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;

$R^{5'}$ and $R^{6'}$ are H, or $R^{5'}$ and $R^{6'}$ form a bond or are bonded to a common O atom to form an epoxide ring as permitted by valency;

R^6 is OH, halo, or $-OC(O)R^e$, wherein R^e is $-C_1$-C_6alkyl, $-C_1$-C_6alkyl-$(NR^{e1})_2$ or $-C_1$-C_6alkylC(O)OR^k, R^{e1} is H, C_1-C_6alkyl, or two R^{e1} together with the N atom form a 5 to 7 membered heterocyclyl containing 1 to 3 heteroatoms selected from N, O, and S; or

R^6 is



wherein,

each occurrence of R^A is independently selected from a side chain of a natural or non-natural amino acid, wherein each occurrence of R^A is same or different;

each occurrence of R^B is independently H, or R^B together with R^A and the N atom to which it is attached form a heterocyclic ring of a natural or non-natural amino acid, wherein each occurrence of R^B is same or different; and

p is 0, 1, or 2;

~~$R^{6'}$ and $R^{7'}$ are H, or $R^{6'}$ and $R^{7'}$ form a bond or are bonded to a common O atom to form an epoxide ring, as permitted by valency;~~

~~R^{7} is H or OH;~~

~~R^{9} is OR^{e}, wherein R^{e} is H, C_1-C_6alkyl, or aryl;~~

~~R^{11} is C_1-C_4alkyl;~~

~~R^{14} is H or OR^{g}; wherein R^{g} is H or C_1-C_6alkyl;~~

~~R^{17} and R^{18} are each independently C_1-C_4alkyl or C_1-C_4alkyl-OR^{h}, wherein R^{h} is H or C_1-C_6alkyl;~~

~~L is C_0-C_6alkylarylene, C_0-C_6alkylheteroarylene, C_0-C_6alkylC_3-C_7cycloalkylene, C_1-C_{12}alkylene or C_2-C_{12}alkenylene, wherein the C_1-C_{12}alkylene or C_2-C_{12}alkenylene is optionally substituted with OH or C_1-C_4alkyl; and~~

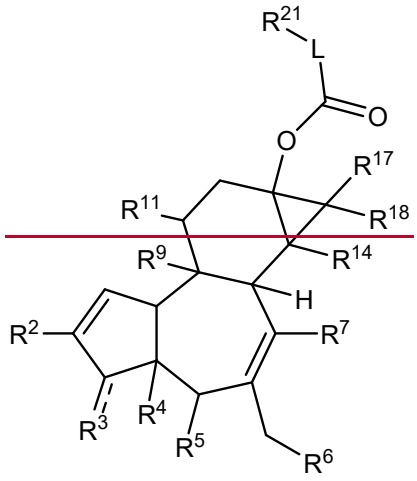
~~R^{21} is H, -OH, -SH, $S(O)_2R^{j}$, $-SR^{j}$, $-N(R^{j})_2$, $-Si(R^{j})_3$, C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, 5 to 12 membered bridged bicyclyl, adamantyl, or $-C(O)OR^{k}$, wherein the C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, bridged bicyclyl, or adamantyl is optionally substituted with 1 to 3 of J^{1}; and wherein optionally 1 to 2 carbon atoms of the spiroC_5-C_{12}cycloalkyl or bridged bicyclyl is replaced with a heteroatom selected from N, O and S, and optionally substituted with C_1-C_4alkyl or, when an N atom is present an N-protecting group;~~

~~each R^{j} is independently C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylC_3-C_7cycloalkyl, C_0-C_6alkylheterocyclyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl, wherein the C_3-C_7cycloalkyl, heterocyclyl, alkylaryl, or heteroaryl is optionally substituted with 1 to 3 of J^{1};~~

~~J^{1} is selected from OH, CN, halo, C_1-C_4alkyl, and haloC_1-C_4alkyl; and~~

~~R^{k} is H or M^{+} counterion.~~

~~35. The compound of claim 31, having the structure of formula (Va):~~



~~(Va)~~

~~or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof;~~

~~wherein~~

~~or an enantiomer or pharmaceutically acceptable salt thereof;~~

~~wherein~~

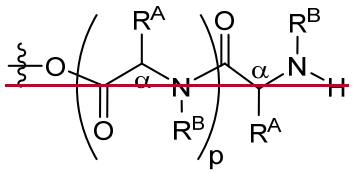
~~R^2 is a C_1-C_4alkyl;~~

~~R^3 is O double bonded to the ring carbon when (- - -) is a bond, or -OR^a; wherein R^a is H or -$C(O)R^{a1}$, wherein R^{a1} is C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;~~

~~R^4 and R^5 are each independently H or -OR^b, wherein R^b is H, C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;~~

~~R^6 is OH, halo, or -$OC(O)R^e$, wherein R^e is C_1-C_6alkyl, C_1-C_6alkyl-$(NR^{e1})_2$ or C_1-C_6alkyl$C(O)OR^k$, R^{e1} is H, C_1-C_6alkyl, or two R^{e1} together with the N atom form a 5 to 7 membered heterocyclyl containing 1 to 3 heteroatoms selected from N, O, and S; or~~

~~R^6 is~~



~~wherein,~~

~~each occurrence of R^A is independently selected from a side chain of a natural or non-natural amino acid, wherein each occurrence of R^A is same or different;~~

~~each occurrence of R^B is independently H, or R^B together with R^A and the N atom to which it is attached form a heterocyclic ring of a natural or non-natural amino acid, wherein each occurrence of R^B is same or different; and~~

~~p is 0, 1, or 2;~~

~~R^7 is H or OH;~~

~~R^9 is OR^e, wherein R^e is H, C_1-C_6alkyl, or aryl;~~

~~R^{11} is C_1-C_4alkyl;~~

~~R^{14} is H or OR^g; wherein R^g is H or C_1-C_6alkyl;~~

~~R^{17} and R^{18} are each independently C_1-C_4alkyl or C_1-C_4alkyl-OR^h, wherein R^h is H or C_1-C_6alkyl;~~

~~L is C_0-C_6alkylarylene, C_0-C_6alkylheteroarylene, C_0-C_6alkylC_3-C_7cycloalkylene, C_1-C_{12}alkylene or C_2-C_{12}alkenylene, wherein the C_1-C_{12}alkylene or C_2-C_{12}alkenylene is optionally substituted with OH or C_1-C_4alkyl; and~~

~~R^{21} is H, -OH, -SH, $S(O)_2R^j$, -SR^j, -$N(R^j)_2$, -$Si(R^j)_3$, C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, 5 to 12 membered bridged bicyclyl, adamantyl, or -$C(O)OR^k$,~~

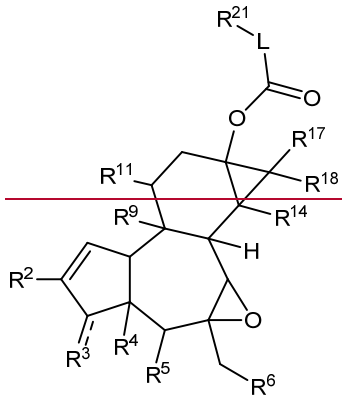
wherein the C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, bridged bicyclyl, or adamantyl is optionally substituted with 1 to 3 of J^1; and wherein optionally 1 to 2 carbon atoms of the spiroC_5-C_{12}cycloalkyl or bridged bicyclyl is replaced with a heteroatom selected from N, O and S, and optionally substituted with C_1-C_4alkyl or, when an N atom is present an N-protecting group;

each R^j is independently C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylC_3-C_7cycloalkyl, C_0-C_6alkylheterocyclyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl, wherein the C_3-C_7cycloalkyl, heterocyclyl, alkylaryl, or heteroaryl is optionally substituted with 1 to 3 of J^1;

J^1 is selected from OH, CN, halo, C_1-C_4alkyl, and haloC_1-C_4alkyl; and

R^k is H or M^+ counterion.

36. The compound of claim 31, having the structure of formula (Vb):



(Vb)

or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof;

wherein

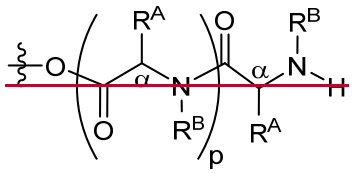
R^2 is a C_1-C_4alkyl;

R^3 is O double bonded to the ring carbon when (- - -) is a bond, or -OR^a; wherein R^a is H or -$C(O)R^{a1}$, wherein R^{a1} is C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;

R^4 and R^5 are each independently H or -OR^b, wherein R^b is H, C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;

R^6 is OH, halo, or -$OC(O)R^e$, wherein R^e is -C_1-C_6alkyl, -C_1-C_6alkyl (NR^{e1})$_2$ or -C_1-C_6alkyl$C(O)OR^k$, R^{e1} is H, C_1-C_6alkyl, or two R^{e1} together with the N atom form a 5 to 7 membered heterocyclyl containing 1 to 3 heteroatoms selected from N, O, and S; or

R^6 is



wherein,

each occurrence of R^A is independently selected from a side chain of a natural or non-natural amino acid, wherein each occurrence of R^A is same or different;

each occurrence of R^B is independently H, or R^B together with R^A and the N atom to which it is attached form a heterocyclic ring of a natural or non-natural amino acid, wherein each occurrence of R^B is same or different; and

p is 0, 1, or 2;

R^9 is OR^e, wherein R^e is H, C_1-C_6alkyl, or aryl;

R^{11} is C_1-C_4alkyl;

R^{14} is H or OR^g; wherein R^g is H or C_1-C_6alkyl;

R^{17} and R^{18} are each independently C_1-C_4alkyl or C_1-C_4alkyl-OR^h, wherein R^h is H or C_1-C_6alkyl;

L is C_0-C_6alkylarylene, C_0-C_6alkylheteroarylene, C_0-C_6alkylC_3-C_7cycloalkylene, C_1-C_{12}alkylene or C_2-C_{12}alkenylene, wherein the C_1-C_{12}alkylene or C_2-C_{12}alkenylene is optionally substituted with OH or C_1-C_4alkyl; and

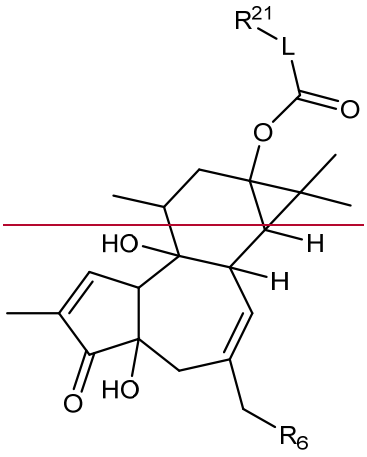
R^{21} is H, -OH, -SH, $S(O)_2R^j$, $-SR^j$, $-N(R^j)_2$, $-Si(R^j)_3$, C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, 5 to 12 membered bridged bicyclyl, adamantyl, or $-C(O)OR^k$, wherein the C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, bridged bicyclyl, or adamantyl is optionally substituted with 1 to 3 of J^1; and wherein optionally 1 to 2 carbon atoms of the spiroC_5-C_{12}cycloalkyl or bridged bicyclyl is replaced with a heteroatom selected from N, O and S, and optionally substituted with C_1-C_4alkyl or, when an N atom is present an N-protecting group;

each R^j is independently C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylC_3-C_7cycloalkyl, C_0-C_6alkylheterocyclyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl, wherein the C_3-C_7cycloalkyl, heterocyclyl, alkylaryl, or heteroaryl is optionally substituted with 1 to 3 of J^1;

J^1 is selected from OH, CN, halo, C_1-C_4alkyl, and haloC_1-C_4alkyl; and

R^k is H or M^+ counterion.

37. The compound of claim 31, having the structure formula (Ve):



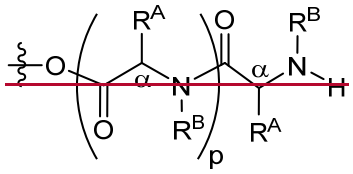
(Vc)

or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof;

wherein

R^6 is OH, halo, or $-OC(O)R^e$, wherein R^e is C_1-C_6alkyl, C_1-C_6alkyl $(NR^{e1})_2$ or C_1-C_6alkyl$C(O)OR^k$, R^{e1} is H, C_1-C_6alkyl, or two R^{e1} together with the N atom form a 5 to 7 membered heterocyclyl containing 1 to 3 heteroatoms selected from N, O, and S; or

R^6 is



wherein,

each occurrence of R^A is independently selected from a side chain of a natural or non-natural amino acid, wherein each occurrence of R^A is same or different;

each occurrence of R^B is independently H, or R^B together with R^A and the N atom to which it is attached form a heterocyclic ring of a natural or non-natural amino acid, wherein each occurrence of R^B is same or different; and

p is 0, 1, or 2;

L is C_0-C_6alkylarylene, C_0-C_6alkylheteroarylene, C_0-C_6alkylC_3-C_7cycloalkylene, C_1-C_{12}alkylene or C_2-C_{12}alkenylene, wherein the C_1-C_{12}alkylene or C_2-C_{12}alkenylene is optionally substituted with OH or C_1-C_4alkyl; and

R^{21} is H, -OH, -SH, $S(O)_2R^j$, $-SR^j$, $-N(R^j)_2$, $-Si(R^j)_3$, C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, 5 to 12 membered bridged bicyclyl, adamantyl, or $-C(O)OR^k$, wherein the C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, bridged bicyclyl, or adamantyl is optionally substituted with 1 to 3 of J^1; and wherein optionally 1 to 2 carbon atoms of the spiroC_5-C_{12}cycloalkyl or bridged bicyclyl is replaced with a heteroatom selected from N, O and S,

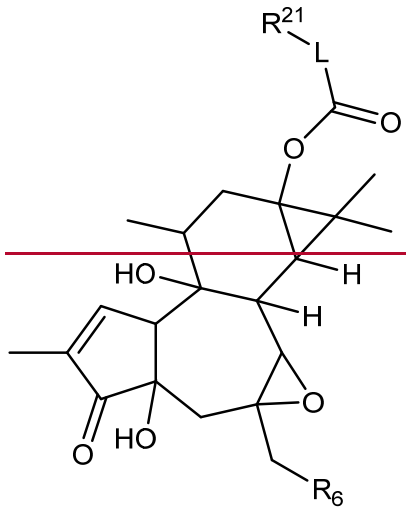
and optionally substituted with C_1-C_4alkyl or, when an N atom is present an N-protecting group;

each R^j is independently C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylC_3-C_7cycloalkyl, C_0-C_6alkylheterocyclyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl, wherein the C_3-C_7cycloalkyl, heterocyclyl, alkylaryl, or heteroaryl is optionally substituted with 1 to 3 of J^1;

J^1 is selected from OH, CN, halo, C_1-C_4alkyl, and haloC_1-C_4alkyl; and

R^k is H or M^+ counterion.

38. The compound of claim 31, having the structure of formula (Vd):



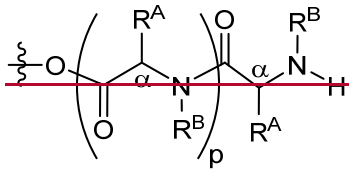
(Vd)

or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof;

wherein

R^6 is OH, halo, or -OC(O)R^e, wherein R^e is -C_1-C_6alkyl, -C_1-C_6alkyl-$(NR^{e1})_2$ or -C_1-C_6alkylC(O)OR^k, R^{e1} is H, C_1-C_6alkyl, or two R^{e1} together with the N atom form a 5 to 7 membered heterocyclyl containing 1 to 3 heteroatoms selected from N, O, and S; or

R^6 is



wherein,

each occurrence of R^A is independently selected from a side chain of a natural or non-natural amino acid, wherein each occurrence of R^A is same or different;

each occurrence of R^B is independently H, or R^B together with R^A and the N atom to which it is attached form a heterocyclic ring of a natural or non-natural amino acid, wherein each

occurrence of R^B is same or different; and

p is 0, 1, or 2;

L is C_0-C_6alkylarylene, C_0-C_6alkylheteroarylene, C_0-C_6alkylC_3-C_7cycloalkylene, C_1-C_{12}alkylene or C_2-C_{12}alkenylene, wherein the C_1-C_{12}alkylene or C_2-C_{12}alkenylene is optionally substituted with OH or C_1-C_4alkyl; and

R^{21} is H, -OH, -SH, $S(O)_2R^j$, $-SR^j$, $-N(R^j)_2$, $-Si(R^j)_3$, C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, 5 to 12 membered bridged bicyclyl, adamantyl, or $-C(O)OR^k$, wherein the C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, bridged bicyclyl, or adamantyl is optionally substituted with 1 to 3 of J^1; and wherein optionally 1 to 2 carbon atoms of the spiroC_5-C_{12}cycloalkyl or bridged bicyclyl is replaced with a heteroatom selected from N, O and S, and optionally substituted with C_1-C_4alkyl or, when an N atom is present an N-protecting group;

each R^j is independently C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylC_3-C_7cycloalkyl, C_0-C_6alkylheterocyclyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl, wherein the C_3-C_7cycloalkyl, heterocyclyl, alkylaryl, or heteroaryl is optionally substituted with 1 to 3 of J^1;

J^1 is selected from OH, CN, halo, C_1-C_4alkyl, and haloC_1-C_4alkyl; and

R^k is H or M^+ counterion.

39. The compound of any one of claims 31 to 38, wherein

R^{21} is C_3-C_7cycloalkyl, wherein the C_3-C_7cycloalkyl is optionally substituted with 1 to 3 of J^1.

40. The compound of claim 39, wherein the C_3-C_7cycloalkyl is selected from the group consisting of cyclobutyl, cyclopentyl, cyclohexyl, and cycloheptyl, wherein the C_3-C_7cycloalkyl is optionally substituted with 1 to 3 of J^1.

41. The compound of any one of claims 31 to 38, wherein

R^{21} is heterocyclyl, wherein the heterocyclyl is optionally substituted with 1 to 3 of J^1.

42. The compound of claim 41, wherein the heterocyclyl is selected from the group consisting of oxiranyl, oxetanyl, azetidynyl, oxazolyl, thiazolidinyl, thiazolyl, morpholinyl, pyrrolidinonyl, pyrrolidinyl, piperidinyl, piperazinyl, 2,3-dihydrofuranyl, dihydropyranyl, tetrahydrofuranyl, tetrahydropyranyl, dihydropyridinyl, tetrahydropyridinyl, tetrahydropyrimidinyl, tetrahydrothiophenyl, tetrahydrothiopyranyl, and azapanyl, wherein the heterocyclyl is optionally substituted with 1 to 3 of J^1.

43. The compound of any one of claims 31 to 38, wherein

R^{21} is aryl, wherein the aryl is optionally substituted with 1 to 3 of J^1.

44. The compound of claim 43, wherein

R^{21} is a phenyl or napthyl, wherein the phenyl or napthyl is optionally substituted with 1 to 3 of J^1.

45. The compound of any one of claims 31 to 38, wherein

R^{21} is heteroaryl, wherein the heteroaryl is optionally substituted with 1 to 3 of J^1.

46. The compound of claim 45, wherein the heteroaryl is selected from the group consisting of pyrrolyl, pyrazolyl, imidazolyl, pyrazinyl, oxazolyl, isoxazolyl, thiazolyl, furyl, thienyl, pyridyl, pyrimidyl, benzoxazolyl, benzothiazolyl, purinyl, benzimidazolyl, indolyl, isoquinolyl, quinoxalinyl, and quinolyl, wherein the heteroaryl is optionally substituted with 1 to 3 of J^1.

47. The compound of any one of claims 31 to 38, wherein

R^{21} is adamantyl, wherein the adamantyl is optionally substituted with 1 to 3 of J^1.

48. The compound of any one of claims 31 to 38, wherein

R^{21} is spiroC_5-C_{12} cycloalkyl, wherein the spiroC_5-C_{12} cycloalkyl has 0-2 carbon atoms replaced with 0-2 heteroatoms selected from N, O and S, and is optionally substituted with 1 to 3 of J^1, or when an N atom is present an N-protecting group.

49. The compound of any one of claims 31 to 38, wherein

R^{21} is 5 to 12 membered bridged bicyclyl, wherein the bridged bicyclyl has 0-2 carbon atoms replaced with 0-2 heteroatoms selected from N, O or S, and is optionally substituted with 1 to 3 of J^1, or when an N atom is present an N-protecting group.

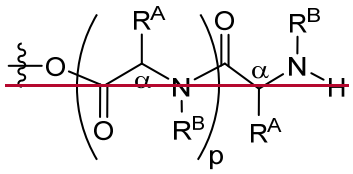
50. The compound of any one of claims 31 to 49, wherein L is C_1-C_6alkylene, C_3-C_6alkylene, or C_3-C_{12}alkylene.

51. The compound of any one of claims 31 to 49, wherein L is C_1-C_6alkenylene, C_3-C_6alkenylene, or C_3-C_{12}alkenylene.

52. The compound of claim 31 selected from the group consisting of the compounds of **Table 2** or an amino acid prodrug thereof.

53. The compound of any one of claims 1 to 52, wherein:

R^6 is



wherein,

each occurrence of R^A is independently selected from a side chain of a natural or non-natural amino acid, wherein each occurrence of R^A is same or different;

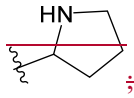
each occurrence of R^B is independently H, or R^B together with R^A and the N atom to which it is attached form a heterocyclic ring of a natural or non-natural amino acid, wherein each occurrence of R^B is same or different; and

p is 0, 1, or 2.

54. The compound of claim 53, wherein

each R^A is independently hydrogen (glycine), methyl (alanine), propan-2-yl (valine), propan-1-yl (norvaline), 2-methylpropan-1-yl (leucine), 1-methylpropan-1-yl (isoleucine), butan-1-yl (norleucine), phenyl (2-phenylglycine), benzyl (phenylalanine), p-hydroxybenzyl (tyrosine), indol-3-ylmethyl (tryptophan), imidazol-4-ylmethyl (histidine), hydroxymethyl (serine), 2-hydroxyethyl (homoserine), 1-hydroxyethyl (threonine), mercaptomethyl (cysteine), methylthiomethyl (S-methylcysteine), 2-mercaptoethyl (homocysteine), 2-methylthioethyl (methionine), carbamoylmethyl (asparagine), 2-carbamoylethyl (glutamine), carboxymethyl (aspartic acid), 2-carboxyethyl (glutamic acid), 4-aminobutan-1-yl (lysine), 4-amino-3-hydroxybutan-1-yl (hydroxylysine), 3-aminopropan-1-yl (ornithine), 3-guanidinopropan-1-yl (arginine), or 3-ureido-propan-1-yl (citrulline);

each R^B is H, or R^B together with the adjacent R_A and the N atom form a prolyl side chain:



; and

p is 0, 1 or 2.

55. The compound of claim 54, wherein:

each R^A is independently methyl (alanine), propan-2-yl (valine), 2-methylpropan-1-yl (leucine), imidazol-4-ylmethyl (histidine), hydroxymethyl (serine), 1-hydroxyethyl (threonine), carbamoylmethyl (asparagine), 2-carbamoylethyl (glutamine), 4-aminobutan-1-yl (lysine), carboxymethyl (aspartic acid), 3-guanidinopropan-1-yl (arginine), benzyl (phenylalanine), or 4-aminobutan-1-yl (lysine);

R^B is H; and

p 0, 1, or 2.

56. The compound of claim 54, wherein

each R^A is independently propan-2-yl (valine), 2-methylpropan-1-yl (leucine), carboxymethyl (aspartic acid), benzyl (phenylalanine), or 4-aminobutan-1-yl (lysine);

each R^B is H; and

p is 0, 1, or 2.

57. The compound of claim 54, wherein p is 0.

58. The compound of claim 54, wherein p is 1.

59. The compound of claim 54, wherein p is 1;

first of R^A is propan-2-yl (valine) and second of R^A is propan-2-yl (valine); and each of R^B is H (dipeptide Val-Val); or

first of R^A is 2-methylpropan-1-yl (leucine), and second of R^A is 2-methylpropan-1-yl (leucine); and each of R^B is H (dipeptide Leu-Leu); or

first of R^A is methyl (alanine) and second of R^A is methyl (alanine); and each of R^B is H (dipeptide Ala-Ala); or

first of R^A is 4-aminobutan-1-yl (lysine); second of R^A is 4-aminobutan-1-yl (lysine); and each of R^B is H (dipeptide Lys-Lys); or

first of R^A is hydrogen; second of R^A is 4-aminobutan-1-yl, and each of R^B is H (dipeptide Gly-Lys).

60. The compound of any one of claims 53 to 59, wherein each of the α-carbon of the amino acid other than glycine is in the L or D configuration.

61. A pharmaceutical composition comprising a compound of any one of claims 1 to 60, and a pharmaceutically acceptable carrier.

62. A method of activating protein kinase C, comprising contacting a mammalian cell with an effective amount of a compound of any one of claims 1 to 60.

63. The method of claim 62, wherein the cell is a cancer cell.

64. A method of treating cancer, comprising administering to a subject in need thereof an effective amount of a compound of any one of claims 1 to 60.

65. The method of claim 64, wherein the cancer is selected from the group consisting of adrenocortical cancer, anal cancer, biliary cancer, bladder cancer, bone cancer, brain cancer, breast

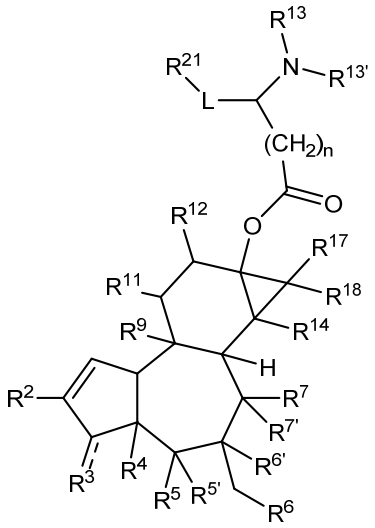
~~cancer, cervical cancer, colon cancer, endometrial cancer, esophageal cancer, head and neck cancer, intestinal cancer, liver cancer, lung cancer, oral cancer, ovarian cancer, pancreatic cancer, renal cancer, prostate cancer, salivary gland cancer, skin cancer, stomach cancer, testicular cancer, throat cancer, thyroid cancer, uterine cancer, vaginal cancer, sarcoma, and soft tissue carcinomas.~~

~~66. The method of claim 64, wherein the cancer is a hematological cancer.~~

~~67. The method of claim 66, wherein the hematological cancer is a leukemia or lymphoma.~~

~~68. The method of claim 67, wherein the hematological cancer is selected from the group consisting of acute lymphoblastic leukemia (ALL), acute myeloid leukemia (AML), lymphoma (e.g., Hodgkin's lymphoma, Non-Hodgkin's lymphoma, Burkitt's lymphoma), chronic lymphocytic leukemia (CLL), chronic myelogenous leukemia (CML), Hairy Cell chronic myelogenous leukemia (CML), and multiple myeloma.~~

1. A compound of formula (II):



(II)

or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof; wherein

R^2 is a C_1-C_4alkyl;

R^3 is O double bonded to the ring carbon when (- - -) is a bond, or $–OR^a$; wherein R^a is H or $–C(O)R^{a1}$, wherein R^{a1} is C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-

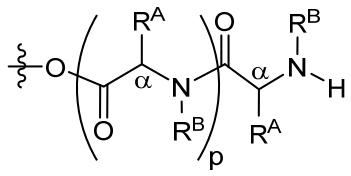
C_6alkylheteroaryl;

R^4 and R^5 are each independently H or $–OR^b$, wherein R^b is H, C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;

$R^{5'}$ and $R^{6'}$ are H, or $R^{5'}$ and $R^{6'}$ form a bond or are bonded to a common O atom to form an epoxide ring as permitted by valency;

R^6 is OH, halo, or $–OC(O)R^c$, wherein R^c is $–C_1$-C_6alkyl, -C_1-C_6alkyl-$(NR^{c1})_2$ or $–C_1$-C_6alkylC(O)OR^k, R^{c1} is H, C_1-C_6alkyl, or two R^{c1} together with the N atom form a 5 to 7 membered heterocyclyl containing 1 to 3 heteroatoms selected from N, O, and S; or

R^6 is



wherein,

each occurrence of R^A is independently selected from a side chain of a natural or non-natural amino acid, wherein each occurrence of R^A is same or different;

each occurrence of R^B is independently H, or R^B together with the adjacent R^A and the N atom to which it is attached form a heterocyclic ring of a natural or non-natural amino acid, wherein each occurrence of R^B is same or different; and

p is 0, 1, or 2;

$R^{6'}$ and $R^{7'}$ are H, or $R^{6'}$ and $R^{7'}$ form a bond or are bonded to a common O atom to form an epoxide ring, as permitted by valency;

R^7 is H or OH;

R^9 is OR^e, wherein R^e is H, C_1-C_6alkyl, or aryl;

R^{11} is C_1-C_4alkyl;

R^{12} is H, -OH, $–OC(O)R^f$, wherein R^f is C_1-C_{12}alkyl, C_2-C_{12}alkenyl, -C_0-C_{12}aliphatic-C_3-C_7cycloalkyl, -C_0-C_{12}aliphatic-heterocycloalkyl, -C_0-C_{12}aliphatic-aryl, or $–C_0$-C_{12}aliphatic-heteroaryl;

R^{13} and $R^{13'}$ are each independently H or C_1-C_4alkyl;

R^{14} is H or OR^g; wherein R^g is H or C_1-C_6alkyl;

R^{17} and R^{18} are each independently C_1-C_4alkyl or C_1-C_4alkyl-OR^h, wherein R^h is H or C_1-C_6alkyl;

L is absent, C_1-C_{12}alkylene, or C_2-C_{12}alkenylene, wherein the C_1-C_{12}alkylene or C_2-C_{12}alkenylene is optionally substituted with C_1-C_4alkyl;

R^{21} is H, $-S(O)_2R^j$, $-SR^j$, $-N(R^j)_2$, $-Si(R^j)_3$, C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, 5 to 12 membered bridged bicyclyl, adamantyl, or $-C(O)OR^k$, wherein the C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, bridged bicyclyl, or adamantyl is optionally substituted with 1 to 3 of J^1, and wherein optionally 1 to 2 carbon atoms of the spiroC_5-C_{12}cycloalkyl or bridged bicyclyl is replaced with a heteroatom selected from N, O and S, and optionally substituted with C_1-C_4alkyl, or when an N atom is present an N-protecting group;

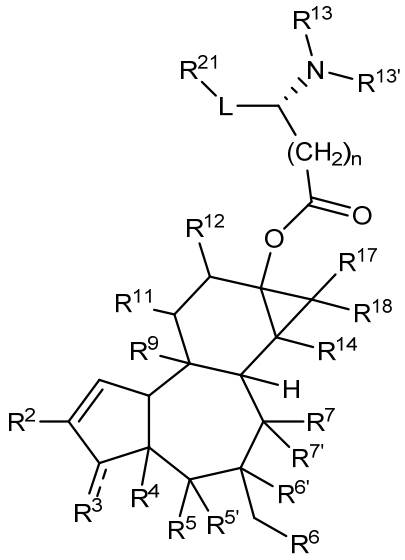
each R^j is independently C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylC_3-C_7cycloalkyl, C_0-C_6alkylheterocyclyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl, wherein the C_3-C_7cycloalkyl, heterocyclyl, alkylaryl, or heteroaryl is optionally substituted with 1 to 3 of J^1;

R^k is H or M^+ counterion;

J^1 is selected from OH, CN, halo, C_1-C_4alkyl, and haloC_1-C_4alkyl; and

n is 0 or 1.

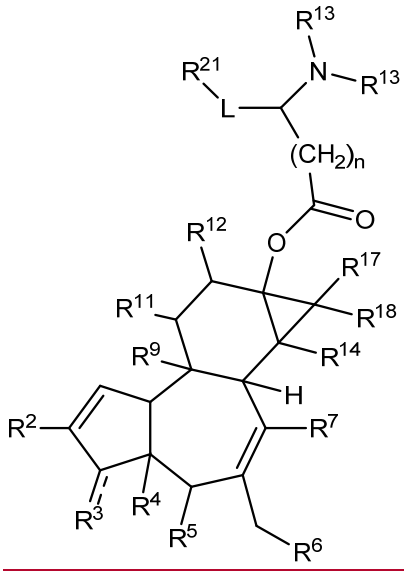
2. The compound of claim 1, having the structure of formula (II'):



(II')

or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof.

3. The compound of claim 1, having the structure of formula (IIa):



(IIa)

or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof;

wherein

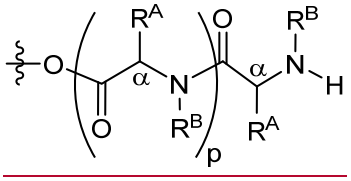
R^2 is a C_1-C_4alkyl;

R^3 is O double bonded to the ring carbon when (- - -) is a bond, or $-OR^a$; wherein R^a is H or $-C(O)R^{a1}$, wherein R^{a1} is C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;

R^4 and R^5 are each independently H or $-OR^b$, wherein R^b is H, C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;

R^6 is OH, halo, or $-OC(O)R^c$, wherein R^c is $-C_1$-C_6alkyl, $-C_1$-C_6alkyl-$(NR^{c1})_2$ or $-C_1$-C_6alkylC(O)OR^k, R^{c1} is H, C_1-C_6alkyl, or two R^{c1} together with the N atom form a 5 to 7 membered heterocyclyl containing 1 to 3 heteroatoms selected from N, O, and S; or

R^6 is



wherein,

each occurrence of R^A is independently selected from a side chain of a natural or non-natural amino acid, wherein each occurrence of R^A is same or different;

each occurrence of R^B is independently H, or R^B together with the adjacent R^A and the N atom to which it is attached form a heterocyclic ring of a natural or non-natural amino acid, wherein each occurrence of R^B is same or different; and

p is 0, 1, or 2;

R^7 is H or OH;

R^9 is OR^e, wherein R^e is H, C_1-C_6alkyl, or aryl;

R^{11} is C_1-C_4alkyl;

R^{12} is H, -OH, $–OC(O)R^f$, wherein R^f is C_1-C_{12}alkyl, C_2-C_{12}alkenyl, -C_0-C_{12}aliphatic-C_3-C_7cycloalkyl, -C_0-C_{12}aliphatic-heterocycloalkyl, -C_0-C_{12}aliphatic-aryl, or -C_0-C_{12}aliphatic-heteroaryl;

R^{13} and $R^{13'}$ are each independently H or C_1-C_4alkyl;

R^{14} is H or OR^g; wherein R^g is H or C_1-C_6alkyl;

R^{17} and R^{18} are each independently C_1-C_4alkyl or C_1-C_4alkyl-OR^h, wherein R^h is H or C_1-C_6alkyl;

L is absent, C_1-C_{12}alkylene, or C_2-C_{12}alkenylene, wherein the C_1-C_{12}alkylene or C_2-C_{12}alkenylene is optionally substituted with C_1-C_4alkyl;

R^{21} is H, $-S(O)_2R^j$, $-SR^j$, $-N(R^j)_2$, $-Si(R^j)_3$, C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, 5 to 12 membered bridged bicyclyl, adamantyl, or $–C(O)OR^k$, wherein the C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, bridged bicyclyl, or adamantyl is optionally substituted with 1 to 3 of J^1, and wherein optionally 1 to 2 carbon atoms of the spiroC_5-C_{12}cycloalkyl or bridged bicyclyl is replaced with a heteroatom selected from N, O and S, and optionally substituted with C_1-C_4alkyl, or when an N atom is present an N-protecting group;

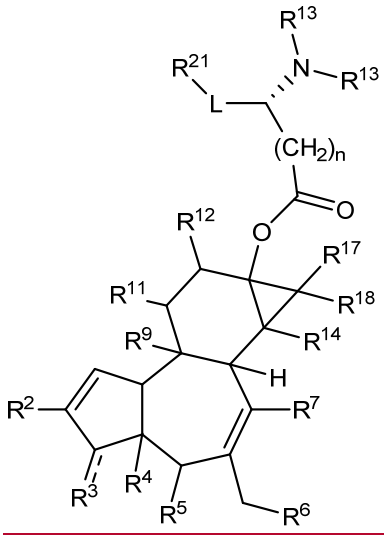
each R^j is independently C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylC_3-C_7cycloalkyl, C_0-C_6alkylheterocyclyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl, wherein the C_3-C_7cycloalkyl, heterocyclyl, alkylaryl, or heteroaryl is optionally substituted with 1 to 3 of J^1;

R^k is H or M^+ counterion;

J^1 is selected from OH, CN, halo, C_1-C_4alkyl, and haloC_1-C_4alkyl; and

n is 0 or 1.

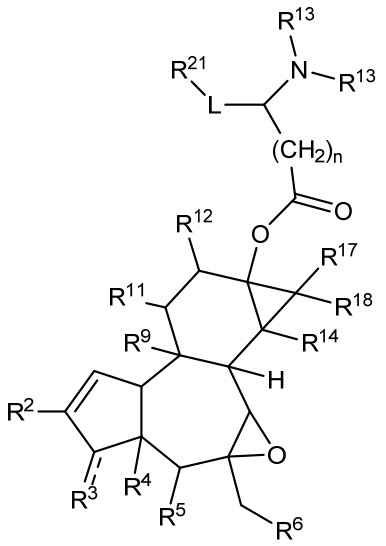
4. The compound of claim 3, having the structure of formula (IIa'):



(IIa')

or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof.

5. The compound of claim 1, having the structure of formula (IIb):



(IIb)

or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof;

wherein

R^2 is a C_1-C_4alkyl;

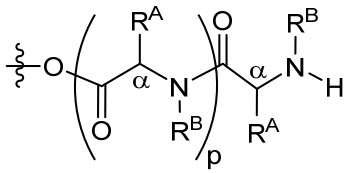
R^3 is O double bonded to the ring carbon when (- - -) is a bond, or -OR^a; wherein R^a is H or -$C(O)R^{a1}$, wherein R^{a1} is C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-

C_6alkylheteroaryl;

R^4 and R^5 are each independently H or $-OR^b$, wherein R^b is H, C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;

R^6 is OH, halo, or $-OC(O)R^c$, wherein R^c is $-C_1$-C_6alkyl, $-C_1$-C_6alkyl-$(NR^{c1})_2$ or $-C_1$-C_6alkylC(O)OR^k, R^{c1} is H, C_1-C_6alkyl, or two R^{c1} together with the N atom form a 5 to 7 membered heterocyclyl containing 1 to 3 heteroatoms selected from N, O, and S; or

R^6 is



wherein,

each occurrence of R^A is independently selected from a side chain of a natural or non-natural amino acid, wherein each occurrence of R^A is same or different;

each occurrence of R^B is independently H, or R^B together with the adjacent R^A and the N atom to which it is attached form a heterocyclic ring of a natural or non-natural amino acid, wherein each occurrence of R^B is same or different; and

p is 0, 1, or 2;

R^9 is OR^e, wherein R^e is H, C_1-C_6alkyl, or aryl;

R^{11} is C_1-C_4alkyl;

R^{12} is H, -OH, $–OC(O)R^f$, wherein R^f is C_1-C_{12}alkyl, C_2-C_{12}alkenyl, $-C_0$-C_{12}aliphatic-C_3-C_7cycloalkyl, $-C_0$-C_{12}aliphatic-heterocycloalkyl, $-C_0$-C_{12}aliphatic-aryl, or $-C_0$-C_{12}aliphatic-heteroaryl;

R^{13} and $R^{13'}$ are each independently H or C_1-C_4alkyl;

R^{14} is H or OR^g; wherein R^g is H or C_1-C_6alkyl;

R^{17} and R^{18} are each independently C_1-C_4alkyl or C_1-C_4alkyl-OR^h, wherein R^h is H or C_1-C_6alkyl;

L is absent, C_1-C_{12}alkylene, or C_2-C_{12}alkenylene, wherein the C_1-C_{12}alkylene or C_2-C_{12}alkenylene is optionally substituted with C_1-C_4alkyl;

R^{21} is H, $-S(O)_2R^j$, $-SR^j$, $-N(R^j)_2$, $-Si(R^j)_3$, C_3-C_7cycloalkyl, heterocyclyl, aryl,

heteroaryl, spiroC_5-C_{12} cycloalkyl, 5 to 12 membered bridged bicyclyl, adamantyl, or –C(O)OR^k, wherein the C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, bridged bicyclyl, or adamantyl is optionally substituted with 1 to 3 of J^1, and wherein optionally 1 to 2 carbon atoms of the spiroC_5-C_{12}cycloalkyl or bridged bicyclyl is replaced with a heteroatom selected from N, O and S, and optionally substituted with C_1-C_4alkyl, or when an N atom is present an N-protecting group;

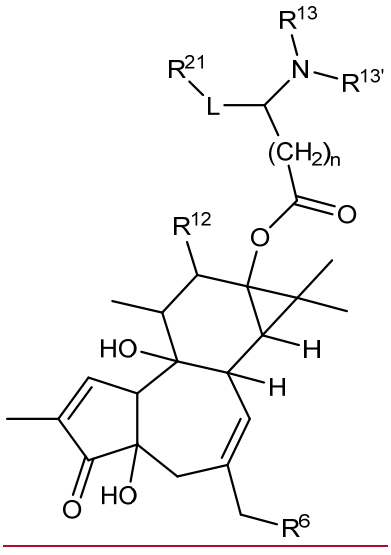
each R^j is independently C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylC_3-C_7cycloalkyl, C_0-C_6alkylheterocyclyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl, wherein the C_3-C_7cycloalkyl, heterocyclyl, alkylaryl, or heteroaryl is optionally substituted with 1 to 3 of J^1;

R^k is H or M^+ counterion;

J^1 is selected from OH, CN, halo, C_1-C_4alkyl, and haloC_1-C_4alkyl; and

n is 0 or 1.

6. The compound of claim 3, having the structure of formula (IIc):

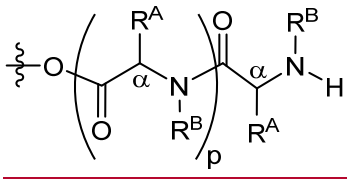


(IIc)

or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof; wherein

R^6 is OH, halo, or -OC(O)R^c, wherein R^c is -C_1-C_6alkyl, -C_1-C_6alkyl-$(NR^{c1})_2$ or -C_1-C_6alkylC(O)OR^k, R^{c1} is H, C_1-C_6alkyl, or two R^{c1} together with the N atom form a 5 to 7 membered heterocyclyl containing 1 to 3 heteroatoms selected from N, O, and S; or

R^6 is



wherein,

each occurrence of R^A is independently selected from a side chain of a natural or non-natural amino acid, wherein each occurrence of R^A is same or different;

each occurrence of R^B is independently H, or R^B together with the adjacent R^A and the N atom to which it is attached form a heterocyclic ring of a natural or non-natural amino acid, wherein each occurrence of R^B is same or different; and

p is 0, 1, or 2;

R^{12} is H, -OH, –OC(O)R^f, wherein R^f is C_1-C_{12}alkyl, C_2-C_{12}alkenyl, -C_0-C_{12}aliphatic-C_3-C_7cycloalkyl, -C_0-C_{12}aliphatic-heterocycloalkyl, -C_0-C_{12}aliphatic-aryl, or -C_0-C_{12}aliphatic-heteroaryl;

R^{13} and $R^{13'}$ are each independently H or C_1-C_4alkyl;

L is absent, C_1-C_{12}alkylene, or C_2-C_{12}alkenylene, wherein the C_1-C_{12}alkylene or C_2-C_{12}alkenylene is optionally substituted with C_1-C_4alkyl;

R^{21} is H, -$S(O)_2R^j$, -SR^j, -$N(R^j)_2$, -$Si(R^j)_3$, C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, 5 to 12 membered bridged bicyclyl, adamantyl, or –C(O)OR^k, wherein the C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, bridged bicyclyl, or adamantyl is optionally substituted with 1 to 3 of J^1, and wherein optionally 1 to 2 carbon atoms of the spiroC_5-C_{12}cycloalkyl or bridged bicyclyl is replaced with a heteroatom selected from N, O and S, and optionally substituted with C_1-C_4alkyl, or when an N atom is present an N-protecting group;

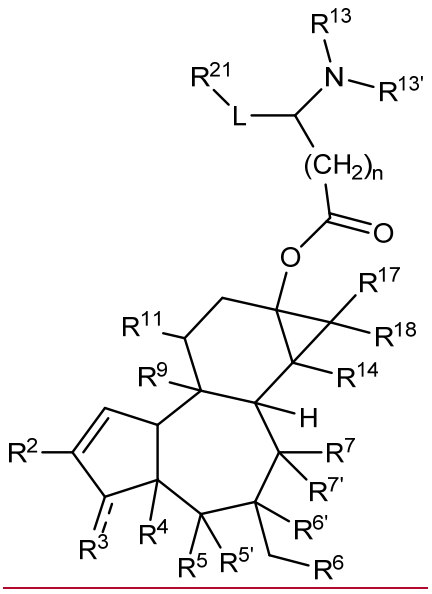
each R^j is independently C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylC_3-C_7cycloalkyl, C_0-C_6alkylheterocyclyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl, wherein the C_3-C_7cycloalkyl, heterocyclyl, alkylaryl, or heteroaryl is optionally substituted with 1 to 3 of J^1;

R^k is H or M^+ counterion;

J^1 is selected from OH, CN, halo, C_1-C_4alkyl, and haloC_1-C_4alkyl; and

n is 0 or 1.

7. The compound of claim 1 having the structure of formula (III):



(III)

or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof;

wherein

R^2 is a C_1-C_4alkyl;

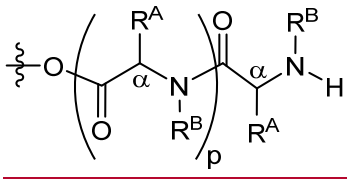
R^3 is O double bonded to the ring carbon when (- - -) is a bond, or -OR^a; wherein R^a is H or -$C(O)R^{a1}$, wherein R^{a1} is C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;

R^4 and R^5 are each independently H or -OR^b, wherein R^b is H, C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;

$R^{5'}$ and $R^{6'}$ are H, or $R^{5'}$ and $R^{6'}$ form a bond or are bonded to a common O atom to form an epoxide ring as permitted by valency;

R^6 is OH, halo, or -$OC(O)R^c$, wherein R^c is -C_1-C_6alkyl, -C_1-C_6alkyl-$(NR^{c1})_2$ or -C_1-C_6alkyl$C(O)OR^k$, R^{c1} is H, C_1-C_6alkyl, or two R^{c1} together with the N atom form a 5 to 7 membered heterocyclyl containing 1 to 3 heteroatoms selected from N, O, and S; or

R^6 is



wherein,

each occurrence of R^A is independently selected from a side chain of a natural or non-natural amino acid, wherein each occurrence of R^A is same or different;

each occurrence of R^B is independently H, or R^B together with the adjacent R^A and the N atom to which it is attached form a heterocyclic ring of a natural or non-natural amino acid, wherein each occurrence of R^B is same or different; and

p is 0, 1, or 2;

$R^{6'}$ and $R^{7'}$ are H, or $R^{6'}$ and $R^{7'}$ form a bond or are bonded to a common O atom to form an epoxide ring, as permitted by valency;

R^7 is H or OH;

R^9 is OR^e, wherein R^e is H, C_1-C_6alkyl, or aryl;

R^{11} is C_1-C_4alkyl;

R^{13} and $R^{13'}$ are each independently H or C_1-C_4alkyl;

R^{14} is H or OR^g; wherein R^g is H or C_1-C_6alkyl;

R^{17} and R^{18} are each independently C_1-C_4alkyl or C_1-C_4alkyl-OR^h, wherein R^h is H or C_1-C_6alkyl;

L is absent, C_1-C_{12}alkylene, or C_2-C_{12}alkenylene, wherein the C_1-C_{12}alkylene or C_2-C_{12}alkenylene is optionally substituted with C_1-C_4alkyl;

R^{21} is H, $-S(O)_2R^j$, $-SR^j$, $-N(R^j)_2$, $-Si(R^j)_3$, C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, 5 to 12 membered bridged bicyclyl, adamantyl, or $-C(O)OR^k$, wherein the C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, bridged bicyclyl, or adamantyl is optionally substituted with 1 to 3 of J^1, and wherein optionally 1 to 2 carbon atoms of the spiroC_5-C_{12}cycloalkyl or bridged bicyclyl is replaced with a heteroatom selected from N, O and S, and optionally substituted with C_1-C_4alkyl, or when an N atom is present an N-protecting group;

each R^j is independently C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylC_3-C_7cycloalkyl, C_0-C_6alkylheterocyclyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl, wherein the C_3-C_7cycloalkyl,

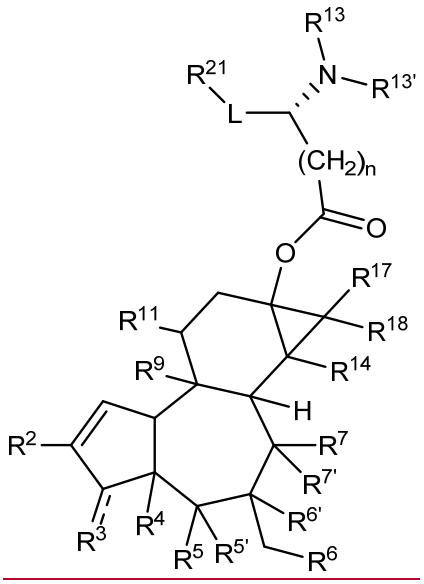
heterocyclyl, alkylaryl, or heteroaryl is optionally substituted with 1 to 3 of J^1;

R^k is H or M^+ counterion;

J^1 is selected from OH, CN, halo, C_1-C_4alkyl, and haloC_1-C_4alkyl; and

n is 0 or 1.

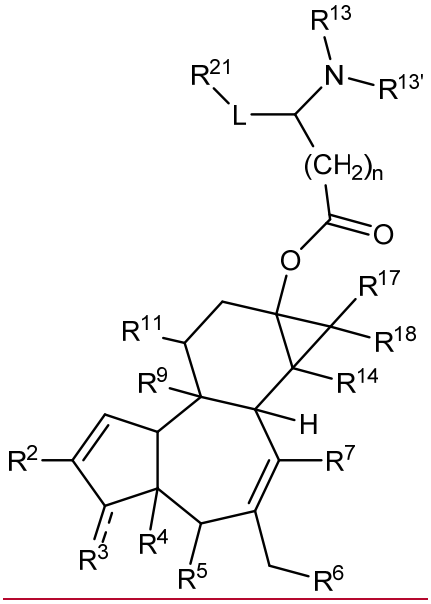
8. The compound of claim 7 having the structure of formula (III'):



(III')

or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof.

9. The compound of claim 7 having the structure of formula (IIIa):



(IIIa)

or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof;

wherein

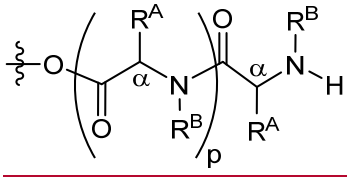
R^2 is a C_1-C_4alkyl;

R^3 is O double bonded to the ring carbon when (- - -) is a bond, or -OR^a; wherein R^a is H or -$C(O)R^{a1}$, wherein R^{a1} is C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;

R^4 and R^5 are each independently H or -OR^b, wherein R^b is H, C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;

R^6 is OH, halo, or -$OC(O)R^c$, wherein R^c is -C_1-C_6alkyl, -C_1-C_6alkyl-$(NR^{c1})_2$ or -C_1-C_6alkyl$C(O)OR^k$, R^{c1} is H, C_1-C_6alkyl, or two R^{c1} together with the N atom form a 5 to 7 membered heterocyclyl containing 1 to 3 heteroatoms selected from N, O, and S; or

R^6 is



wherein,

each occurrence of R^A is independently selected from a side chain of a natural or non-natural amino acid, wherein each occurrence of R^A is same or different;

each occurrence of R^B is independently H, or R^B together with the adjacent R^A and the N atom to which it is attached form a heterocyclic ring of a natural or non-natural amino acid, wherein each occurrence of R^B is same or different; and

p is 0, 1, or 2;

R^7 is H or OH;

R^9 is OR^e, wherein R^e is H, C_1-C_6alkyl, or aryl;

R^{11} is C_1-C_4alkyl;

R^{13} and $R^{13'}$ are each independently H or C_1-C_4alkyl;

R^{14} is H or OR^g; wherein R^g is H or C_1-C_6alkyl;

R^{17} and R^{18} are each independently C_1-C_4alkyl or C_1-C_4alkyl-OR^h, wherein R^h is H or C_1-C_6alkyl;

L is absent, C_1-C_{12}alkylene, or C_2-C_{12}alkenylene, wherein the C_1-C_{12}alkylene or C_2-C_{12}alkenylene is optionally substituted with C_1-C_4alkyl;

R^{21} is H, $-S(O)_2R^j$, $-SR^j$, $-N(R^j)_2$, $-Si(R^j)_3$, C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, 5 to 12 membered bridged bicyclyl, adamantyl, or $-C(O)OR^k$, wherein the C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, bridged bicyclyl, or adamantyl is optionally substituted with 1 to 3 of J^1, and wherein optionally 1 to 2 carbon atoms of the spiroC_5-C_{12}cycloalkyl or bridged bicyclyl is replaced with a heteroatom selected from N, O and S, and optionally substituted with C_1-C_4alkyl, or when an N atom is present an N-protecting group;

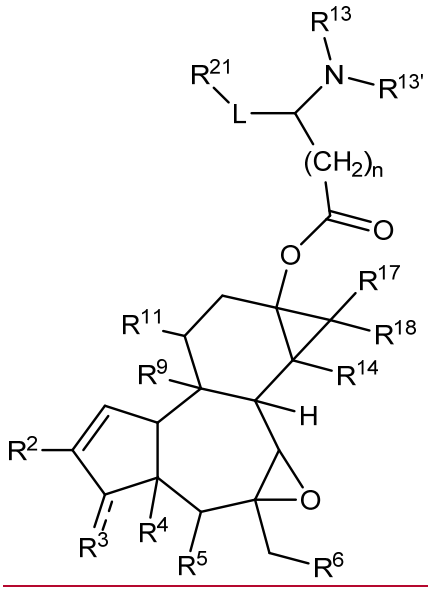
each R^j is independently C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylC_3-C_7cycloalkyl, C_0-C_6alkylheterocyclyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl, wherein the C_3-C_7cycloalkyl, heterocyclyl, alkylaryl, or heteroaryl is optionally substituted with 1 to 3 of J^1;

R^k is H or M^+ counterion;

J^1 is selected from OH, CN, halo, C_1-C_4alkyl, and haloC_1-C_4alkyl; and

n is 0 or 1.

10. The compound of claim 7 having structure of formula (IIIb):



(IIIb)

or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof;

wherein

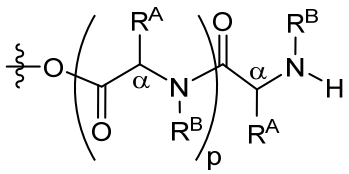
R^2 is a C_1-C_4alkyl;

R^3 is O double bonded to the ring carbon when (- - -) is a bond, or -OR^a; wherein R^a is H or -$C(O)R^{a1}$, wherein R^{a1} is C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;

R^4 and R^5 are each independently H or -OR^b, wherein R^b is H, C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl;

R^6 is OH, halo, or -$OC(O)R^c$, wherein R^c is -C_1-C_6alkyl, -C_1-C_6alkyl-$(NR^{c1})_2$ or -C_1-C_6alkyl$C(O)OR^k$, R^{c1} is H, C_1-C_6alkyl, or two R^{c1} together with the N atom form a 5 to 7 membered heterocyclyl containing 1 to 3 heteroatoms selected from N, O, and S; or

R^6 is



wherein,

each occurrence of R^A is independently selected from a side chain of a natural or non-

natural amino acid, wherein each occurrence of R^A is same or different;

each occurrence of R^B is independently H, or R^B together with the adjacent R^A and the N atom to which it is attached form a heterocyclic ring of a natural or non-natural amino acid, wherein each occurrence of R^B is same or different; and

p is 0, 1, or 2;

R^9 is OR^e, wherein R^e is H, C_1-C_6alkyl, or aryl;

R^{11} is C_1-C_4alkyl;

R^{13} and $R^{13'}$ are each independently H or C_1-C_4alkyl;

R^{14} is H or OR^g; wherein R^g is H or C_1-C_6alkyl;

R^{17} and R^{18} are each independently C_1-C_4alkyl or C_1-C_4alkyl-OR^h, wherein R^h is H or C_1-C_6alkyl;

L is absent, C_1-C_{12}alkylene, or C_2-C_{12}alkenylene, wherein the C_1-C_{12}alkylene or C_2-C_{12}alkenylene is optionally substituted with C_1-C_4alkyl;

R^{21} is H, $-S(O)_2R^j$, $-SR^j$, $-N(R^j)_2$, $-Si(R^j)_3$, C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, 5 to 12 membered bridged bicyclyl, adamantyl, or $-C(O)OR^k$, wherein the C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, bridged bicyclyl, or adamantyl is optionally substituted with 1 to 3 of J^1, and wherein optionally 1 to 2 carbon atoms of the spiroC_5-C_{12}cycloalkyl or bridged bicyclyl is replaced with a heteroatom selected from N, O and S, and optionally substituted with C_1-C_4alkyl, or when an N atom is present an N-protecting group;

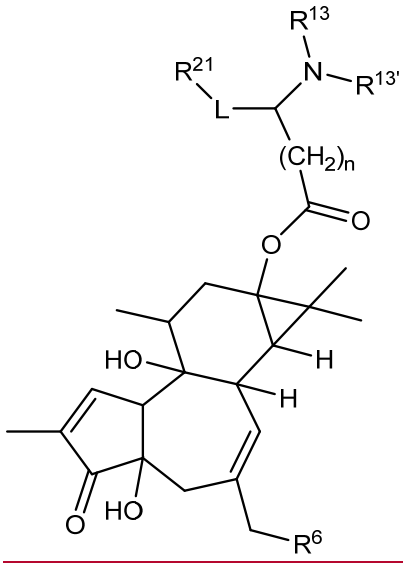
each R^j is independently C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylC_3-C_7cycloalkyl, C_0-C_6alkylheterocyclyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl, wherein the C_3-C_7cycloalkyl, heterocyclyl, alkylaryl, or heteroaryl is optionally substituted with 1 to 3 of J^1;

R^k is H or M^+ counterion;

J^1 is selected from OH, CN, halo, C_1-C_4alkyl, and haloC_1-C_4alkyl; and

n is 0 or 1.

10. The compound of claim 7 having the structure of formula (IIIc):



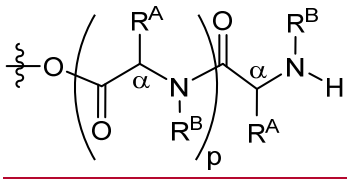
(IIIc)

or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof;

wherein

R^6 is OH, halo, or -OC(O)R^c, wherein R^c is -C_1-C_6alkyl, -C_1-C_6alkyl-(NR^{c1})$_2$ or -C_1-C_6alkylC(O)OR^k, R^{c1} is H, C_1-C_6alkyl, or two R^{c1} together with the N atom form a 5 to 7 membered heterocyclyl containing 1 to 3 heteroatoms selected from N, O, and S; or

R^6 is



wherein,

each occurrence of R^A is independently selected from a side chain of a natural or non-natural amino acid, wherein each occurrence of R^A is same or different;

each occurrence of R^B is independently H, or R^B together with the adjacent R^A and the N atom to which it is attached form a heterocyclic ring of a natural or non-natural amino acid, wherein each occurrence of R^B is same or different; and

p is 0, 1, or 2;

R^{13} and $R^{13'}$ are each independently H or C_1-C_4alkyl;

L is absent, C_1-C_{12}alkylene, or C_2-C_{12}alkenylene, wherein the C_1-C_{12}alkylene or C_2-C_{12}alkenylene is optionally substituted with C_1-C_4alkyl;

R^{21} is H, -$S(O)_2R^j$, -SR^j, -$N(R^j)_2$, -$Si(R^j)_3$, C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, 5 to 12 membered bridged bicyclyl, adamantyl, or –$C(O)OR^k$, wherein the C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, bridged bicyclyl, or adamantyl is optionally substituted with 1 to 3 of J^1, and wherein optionally 1 to 2 carbon atoms of the spiroC_5-C_{12}cycloalkyl or bridged bicyclyl is replaced with a heteroatom selected from N, O and S, and optionally substituted with C_1-C_4alkyl, or when an N atom is present an N-protecting group;

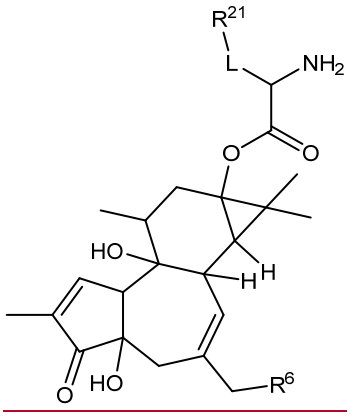
each R^j is independently C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylC_3-C_7cycloalkyl, C_0-C_6alkylheterocyclyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl, wherein the C_3-C_7cycloalkyl, heterocyclyl, alkylaryl, or heteroaryl is optionally substituted with 1 to 3 of J^1;

R^k is H or M^+ counterion;

J^1 is selected from OH, CN, halo, C_1-C_4alkyl, and haloC_1-C_4alkyl; and

n is 0 or 1.

11. The compound of claim 10 having the structure of formula (IIIe):

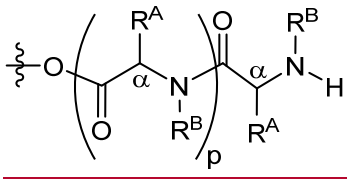


(IIIe)

or a pharmaceutically acceptable salt, tautomer, or stereoisomer thereof; wherein

R^6 is OH, halo, or -$OC(O)R^c$, wherein R^c is -C_1-C_6alkyl, -C_1-C_6alkyl-$(NR^{c1})_2$ or -C_1-C_6alkyl$C(O)OR^k$, R^{c1} is H, C_1-C_6alkyl, or two R^{c1} together with the N atom form a 5 to 7 membered heterocyclyl containing 1 to 3 heteroatoms selected from N, O, and S; or

R^6 is



wherein,

each occurrence of R^A is independently selected from a side chain of a natural or non-natural amino acid, wherein each occurrence of R^A is same or different;

each occurrence of R^B is independently H, or R^B together with the adjacent R^A and the N atom to which it is attached form a heterocyclic ring of a natural or non-natural amino acid, wherein each occurrence of R^B is same or different; and

p is 0, 1, or 2;

L is absent, C_1-C_{12}alkylene, or C_2-C_{12}alkenylene, wherein the C_1-C_{12}alkylene or C_2-C_{12}alkenylene is optionally substituted with C_1-C_4alkyl;

R^{21} is H, $-S(O)_2R^j$, $-SR^j$, $-N(R^j)_2$, $-Si(R^j)_3$, C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, 5 to 12 membered bridged bicyclyl, adamantyl, or $-C(O)OR^k$, wherein the C_3-C_7cycloalkyl, heterocyclyl, aryl, heteroaryl, spiroC_5-C_{12} cycloalkyl, bridged bicyclyl, or adamantyl is optionally substituted with 1 to 3 of J^1, and wherein optionally 1 to 2 carbon atoms of the spiroC_5-C_{12}cycloalkyl or bridged bicyclyl is replaced with a heteroatom selected from N, O and S, and optionally substituted with C_1-C_4alkyl, or when an N atom is present an N-protecting group;

each R^j is independently C_1-C_6alkyl, C_2-C_6alkenyl, C_0-C_6alkylC_3-C_7cycloalkyl, C_0-C_6alkylheterocyclyl, C_0-C_6alkylaryl, or C_0-C_6alkylheteroaryl, wherein the C_3-C_7cycloalkyl, heterocyclyl, alkylaryl, or heteroaryl is optionally substituted with 1 to 3 of J^1;

R^k is H or M^+ counterion; and

J^1 is selected from OH, CN, halo, C_1-C_4alkyl, and haloC_1-C_4alkyl.

12. The compound of any one of claims 1 to 11, wherein R^{21} is C_3-C_7cycloalkyl, wherein the C_3-C_7cycloalkyl is optionally substituted with 1 to 3 of J^1.

13. The compound of claim 12, wherein the C_3-C_7cycloalkyl is selected from the group consisting of cyclobutyl, cyclopentyl, cyclohexyl, and cycloheptyl, wherein the C_3-C_7cycloalkyl is optionally substituted with 1 to 3 of J^1.

14. The compound of any one of claims 1 to 11, wherein R^{21} is heterocyclyl, wherein the heterocyclyl is optionally substituted with 1 to 3 of J^1.

15. The compound of claim 14, wherein the heterocyclyl is selected from the group consisting of oxiranyl, oxetanyl, azetidynyl, oxazolyl, thiazolidinyl, thiazolyl, morpholinyl, pyrrolidinonyl, pyrrolidinyl, piperidinyl, piperazinyl, 2,3-dihydrofuranyl, dihydropyranyl, tetrahydrofuranyl, tetrahydropyranyl, dihydropyridinyl, tetrahydropyridinyl, tetrahydropyrimidinyl, tetrahydrothiophenyl, tetrahydrothiopyranyl, and azapanyl, wherein the heterocyclyl is optionally substituted with 1 to 3 of J^1.

16. The compound of any one of claims 1 to 11, wherein

R^{21} is aryl, wherein the aryl is optionally substituted with 1 to 3 of J^1; or

R^{21} is a phenyl or naphthyl, wherein the phenyl or napthyl is optionally substituted with 1 to 3 of J^1; or

R^{21} is heteroaryl, wherein the heteroaryl is optionally substituted with 1 to 3 of J^1.

17. The compound of claim 16, wherein the heteroaryl is selected from the group consisting of pyrrolyl, pyrazolyl, imidazolyl, pyrazinyl, oxazolyl, isoxazolyl, thiazolyl, furyl, thienyl, pyridyl, pyrimidyl, benzoxazolyl, benzothiazolyl, purinyl, benzimidazolyl, indolyl, isoquinolyl, quinoxalinyl, and quinolyl, wherein the heteroaryl is optionally substituted with 1 to 3 of J^1.

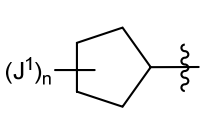
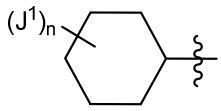
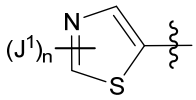
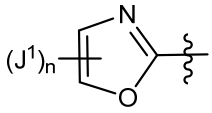
18. The compound of any one of claims 1 to 11, wherein

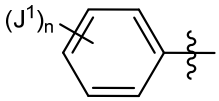
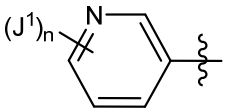
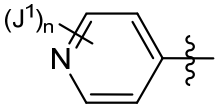
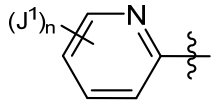
R^{21} is adamantyl, wherein the adamantyl is optionally substituted with OH, halo, or C_1-C_4alkyl or

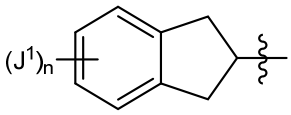
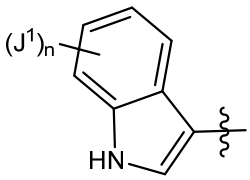
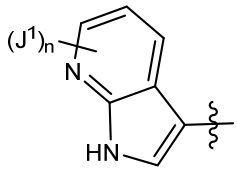
R^{21} is spiroC_5-C_{12} cycloalkyl, wherein the spiroC_5-C_{12} cycloalkyl has 0-2 carbon atoms replaced with 0-2 heteroatoms selected from N, O and S, and is optionally substituted with 1 to 3 of J^1, or when an N atom is present an N-protecting group; or

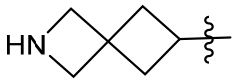
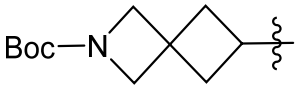
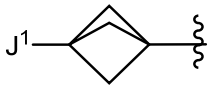
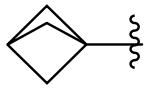
R^{21} is 5 to 12 membered bridged bicyclyl, wherein the bridged bicyclyl has 0-2 carbon atoms replaced with 0-2 heteroatoms selected from N, O or S, and is optionally substituted with 1 to 3 of J^1, or when an N atom is present an N-protecting group.

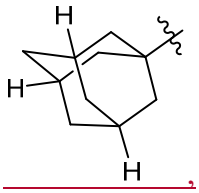
19. The compound of any one of claims 1 to 11, wherein R^{21} is selected from:

 ,  ,  ,  ,

 ,  ,  , 

 ,  , 

 ,  ,  ,  and

 ,

wherein J^1 is OH, CN, halo, C_1-C_4alkyl, and haloC_1-C_4alkyl, and n is 0-3.

20. The compound of any one of claims 1 to 19, wherein L is C_1-C_6alkylene, C_3-C_6alkylene or C_3-C_{12}alkylene.

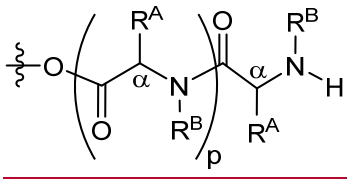
21. The compound of any one of claims 1 to 19, wherein L is C_1-C_6alkenylene, C_3-C_6alkenylene or C_3-C_{12}alkenylene.

22. The compound of any one of claims 1-21, wherein n is 0.

23. The compound of claim 1 selected from the group consisting of the compounds of Table 1, or an amino acid prodrug thereof.

24. The compound of any one of claims 1 to 23, wherein:

R^6 is



wherein,

each occurrence of R^A is independently selected from a side chain of a natural or non-natural amino acid, wherein each occurrence of R^A is same or different;

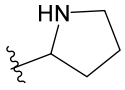
each occurrence of R^B is independently H, or R^B together with R^A and the N atom to which it is attached form a heterocyclic ring of a natural or non-natural amino acid, wherein each occurrence of R^B is same or different; and

p is 0, 1, or 2.

25. The compound of claim 24, wherein

each R^A is independently hydrogen (glycine), methyl (alanine), propan-2-yl (valine), propan-1-y1 (norvaline), 2-methylpropan-1-y1 (leucine), 1-methylpropan-1-y1 (isoleucine), butan-1-y1 (norleucine), phenyl (2-phenylglycine), benzyl (phenylalanine), p-hydroxybenzyl (tyrosine), indol-3-ylmethyl (tryptophan), imidazol-4-ylmethyl (histidine), hydroxymethyl (serine), 2-hydroxyethyl (homoserine), 1–hydroxyethyl (threonine), mercaptomethyl (cysteine), methylthiomethyl (S-methylcysteine), 2-mercaptoethyl (homocysteine), 2-methylthioethyl (methionine), carbamoylmethyl (asparagine), 2-carbamoylethyl (glutamine), carboxymethyl (aspartic acid), 2-carboxyethyl (glutamic acid), 4-aminobutan-1-y1 (lysine), 4-amino-3-hydroxybutan-1-y1 (hydroxylysine), 3-aminopropan-1-y1 (ornithine), 3-guanidinopropan-1-y1 (arginine), or 3-ureido-propan-1-yl (citrulline);

each R^B is H, or R^B together with the adjacent R_A and the N atom form a prolyl side chain:


; and

p is 0, 1 or 2.

26. The compound of claim 25, wherein:

each R^A is independently methyl (alanine), propan-2-y1 (valine), 2-methylpropan-1-

y1 (leucine), imidazol-4-ylmethyl (histidine), hydroxymethyl (serine), 1-hydroxyethyl (threonine), carbamoylmethyl (asparagine), 2-carbamoylethyl (glutamine), 4-aminobutan-1-y1 (lysine), carboxymethyl (aspartic acid), 3-guanidinopropan-1-y1 (arginine), benzyl (phenylalanine), or 4-aminobutan-1-y1 (lysine);

R^B is H; and

p 0, 1, or 2.

27. The compound of claim 25, wherein

each R^A is independently propan-2-y1 (valine), 2-methylpropan-1-y1 (leucine), carboxymethyl (aspartic acid), benzyl (phenylalanine), or 4-aminobutan-1-y1 (lysine);

each R^B is H; and

p is 0, 1, or 2.

28. The compound of claim 25, wherein p is 1;

first of R^A is propan-2-y1 (valine) and second of R^A is propan-2-y1 (valine); and each of R^B is H (dipeptide Val-Val); or

first of R^A is 2-methylpropan-1-y1 (leucine), and second of R^A is 2-methylpropan-1-y1 (leucine); and each of R^B is H (dipeptide Leu-Leu); or

first of R^A is methyl (alanine) and second of R^A is methyl (alanine); and each of R^B is H (dipeptide Ala-Ala); or

first of R^A is 4-aminobutan-1-y1 (lysine); second of R^A is 4-aminobutan-1-y1 (lysine); and each of R^B is H (dipeptide Lys-Lys); or

first of R^A is hydrogen; second of R^A is 4-aminobutan-1-y1, and each of R^B is H (dipeptide Gly-Lys).

29. The compound of any one of claims 24 to 28, wherein each of the α-carbon of the amino acid other than glycine is in the L or D configuration.

30. A pharmaceutical composition comprising a compound of any one of claims 1 to 29, and a pharmaceutically acceptable carrier.

31. A method of activating protein kinase C, comprising contacting in vitro a mammalian cell with an effective amount of a compound of any one of claims 1 to 30.

32. The method of claim 31, wherein the cell is a cancer cell.

33. Use of a compound of any one of claims 1 to 29 in the preparation of a medicament for treating cancer.

34. The use of claim 33, wherein the cancer is selected from the group consisting of adrenocortical cancer, anal cancer, biliary cancer, bladder cancer, bone cancer, brain cancer, breast cancer, cervical cancer, colon cancer, endometrial cancer, esophageal cancer, head and neck cancer, intestinal cancer, liver cancer, lung cancer, oral cancer, ovarian cancer, pancreatic cancer, renal cancer, prostate cancer, salivary gland cancer, skin cancer, stomach cancer, testicular cancer, throat cancer, thyroid cancer, uterine cancer, vaginal cancer, sarcoma, and soft tissue carcinomas.

35. The use of claim 33, wherein the cancer is a hematological cancer; or

wherein the cancer is a leukemia or lymphoma; or

wherein the cancer is selected from the group consisting of acute lymphoblastic leukemia (ALL), acute myeloid leukemia (AML), lymphoma (e.g., Hodgkin's lymphoma, Non-Hodgkin's lymphoma, Burkitt's lymphoma), chronic lymphocytic leukemia (CLL), chronic myelogenous leukemia (CML), Hairy Cell chronic myelogenous leukemia (CML), and multiple myeloma.