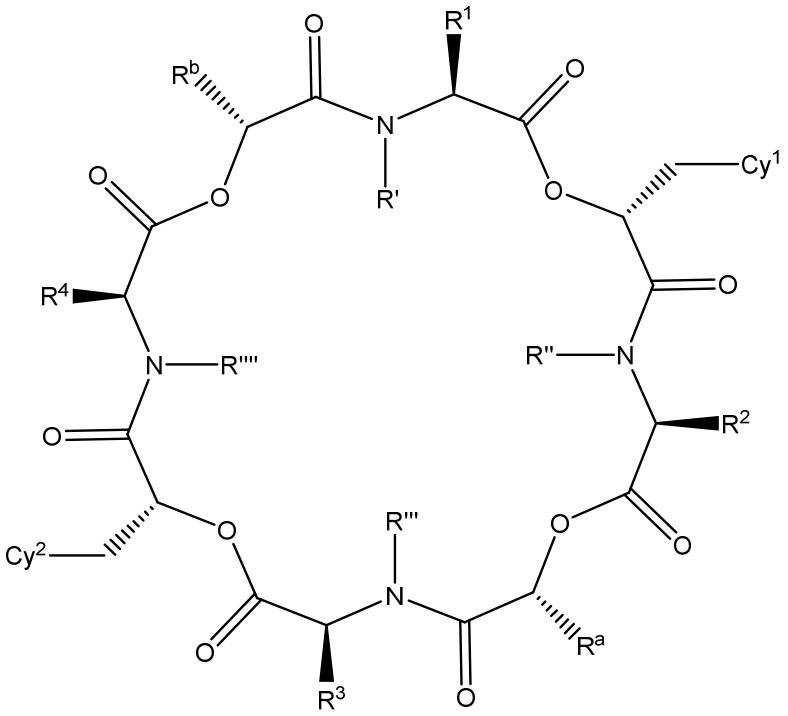
CLAIMS

WHAT IS CLAIMED IS:

1. An anthelmintic cyclic depsipeptide compound of formula (I), or a pharmaceutically or veterinarily acceptable salt thereof:



(I)

wherein:

Cy^1 and Cy^2 are independently aryl, carbocyclic, heteroaryl or heterocyclic optionally substituted with one or more substituents selected from the group consisting of halogen, hydroxy, alkoxy, haloalkoxy, alkylthio, haloalkylthio, thioamido, amino, alkylamino, dialkylamino, alkyl, haloalkyl, alkenyl, haloalkenyl, alkynyl, haloalkynyl, SF_5, $R^5S(O)$-, $R^5S(O)_2$-, $R^5C(O)$-, $R^5R^6NC(O)$-, $R^5R^6NC(O)NR^5$-, $R^5OC(O)$-, $R^5C(O)O$-, $R^5C(O)NR^6$-, -CN, -NO_2, cycloalkyl, heteroalkyl, heterocyclyl, aryl, heteroaryl, -*O*-heteroaryl, -*S*-heteroaryl, -*O*-heterocyclyl or -*S*-heterocyclyl, wherein each cycloalkyl, heterocyclyl, aryl or heteroaryl is optionally further substituted with one or more substituents selected from the group consisting of halogen, hydroxy, alkoxy, haloalkoxy, alkylthio, haloalkylthio, thioamido, amino, alkylamino,

dialkylamino, alkyl, haloalkyl, alkenyl, haloalkenyl, alkynyl, haloalkynyl, SF_5, $R^5S(O)$-, $R^5S(O)_2$-, $R^5C(O)$-, $R^5R^6NC(O)$-, $R^5OC(O)$-, $R^5C(O)O$-, $R^5C(O)NR^6$-, -CN and $-NO_2$;

R^5 and R^6 are independently hydrogen, alkyl, haloalkyl, thioalkyl, alkylthioalkyl, hydroxyalkyl, alkoxyalkyl, alkenyl, haloalkenyl, alkynyl, haloalkynyl, or the group $-CH_2C(O)NHCH_2CF_3$; or R^5 and R^6 together with the atom(s) to which they are bonded form a C_3-C_6 cyclic group;

R', R'', R''' and R'''' are each independently hydrogen or C_1-C_3alkyl;

R^a and R^b are independently hydrogen, C_1-C_3alkyl or C_1-C_3haloalkyl; and

(a) R^1 and R^2 are each independently C_1-C_8 alkyl substituted by one or more halogen; and

R^3 and R^4 are each independently C_1-C_8 alkyl; or

(b) R^1 and R^3 are each independently C_1-C_8 alkyl substituted by one or more halogen; and

R^2 and R^4 are each independently C_1-C_8 alkyl; or

(c) R^1 and R^4 are each independently C_1-C_8 alkyl substituted by one or more halogen; and

R^2 and R^3 are each independently C_1-C_8 alkyl; or

(d) R^2 and R^4 are each independently C_1-C_8 alkyl substituted by one or more halogen; and

R^1 and R^3 are each independently C_1-C_8 alkyl; or

(e) R^2 and R^3 are each independently C_1-C_8 alkyl substituted by one or more halogen; and

R^1 and R^4 are each independently C_1-C_8 alkyl; or

(f) R^3 and R^4 are each independently C_1-C_8 alkyl substituted by one or more halogen; and

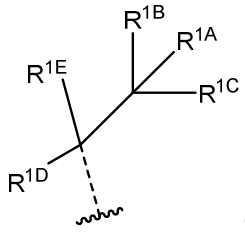
R^1 and R^2 are each independently C_1-C_8 alkyl.

2. The anthelmintic cyclic depsipeptide compound of claim 1, wherein R^1 and R^3 are C_1-C_8 alkyl substituted by halogen.

3. The anthelmintic cyclic depsipeptide compound of claim 1, wherein R^2 and R^4 are C_1-C_8 alkyl substituted by halogen.

4. The anthelmintic cyclic depsipeptide compound of claim 2 or 3, wherein halogen is fluoro.

5. The anthelmintic cyclic depsipeptide compound of claim 1, wherein two of R^1, R^2, R^3 and R^4 are G-1:



G-1;

wherein R^{1A}, R^{1B}, R^{1C}, R^{1D} and R^{1E} are independently hydrogen, halogen, C_{1-3}alkyl or C_{1-3}haloalkyl.

6. The anthelmintic cyclic depsipeptide compound of claim 5, wherein:
R^{1A} is fluoro or trifluoromethyl; R^{1B} and R^{1C} are independently hydrogen or methyl; and
R^{1D} and R^{1E} are independently hydrogen or methyl.

7. The anthelmintic cyclic depsipeptide compound of claim 6, wherein R^{1A} is fluoro; and R^{1D} and R^{1E} are hydrogen.

8. The anthelmintic cyclic depsipeptide compound of claim 6, wherein:
R^{1A} is fluoro; R^{1B} and R^{1C} are methyl; and
R^{1D} and R^{1E} are independently hydrogen or fluoro.

9. The anthelmintic cyclic depsipeptide compound of claim 1, wherein two of R^1, R^2, R^3 and R^4 are independently CH_2F, CHF_2 or CF_3.

10. The anthelmintic cyclic depsipeptide compound of any one of claims 1, 2-3 and 5-9, wherein Cy^1 and Cy^2 are independently phenyl, a 5-membered heteroaryl or a 6-membered heteroaryl, wherein said phenyl, 5-membered heteroaryl or 6-membered heteroaryl is optionally substituted with halogen, hydroxy, alkoxy, haloalkoxy, alkylthio, haloalkylthio, thioamido, amino, alkylamino, dialkylamino, alkyl, haloalkyl, alkenyl, haloalkenyl, alkynyl, haloalkynyl, SF_5, $R^5S(O)$-, $R^5S(O)_2$-, $R^5C(O)$-, $R^5R^6NC(O)$-, $R^5R^6NC(O)NR^5$-, $R^5OC(O)$-, $R^5C(O)O$-, $R^5C(O)NR^6$-, -CN, $-NO_2$, cycloalkyl, heteroalkyl, heterocyclyl, aryl, heteroaryl, -*O*-heteroaryl, -*S*-heteroaryl, -*O*-heterocyclyl or -*S*-heterocyclyl, and wherein each cycloalkyl, heteroalkyl, aryl or heteroaryl substituent is optionally further substituted with one or more substituents selected from the group consisting of halogen, hydroxy, alkoxy, haloalkoxy, alkylthio, haloalkylthio,

thioamido, amino, alkylamino, dialkylamino, alkyl, haloalkyl, alkenyl, haloalkenyl, alkynyl, haloalkynyl, SF_5, $R^5S(O)$-, $R^5S(O)_2$-, $R^5C(O)$-, $R^5R^6NC(O)$-, $R^5R^6NC(O)NR^5$-, $R^5OC(O)$-, $R^5C(O)O$-, $R^5C(O)NR^6$-, -CN and $-NO_2$.

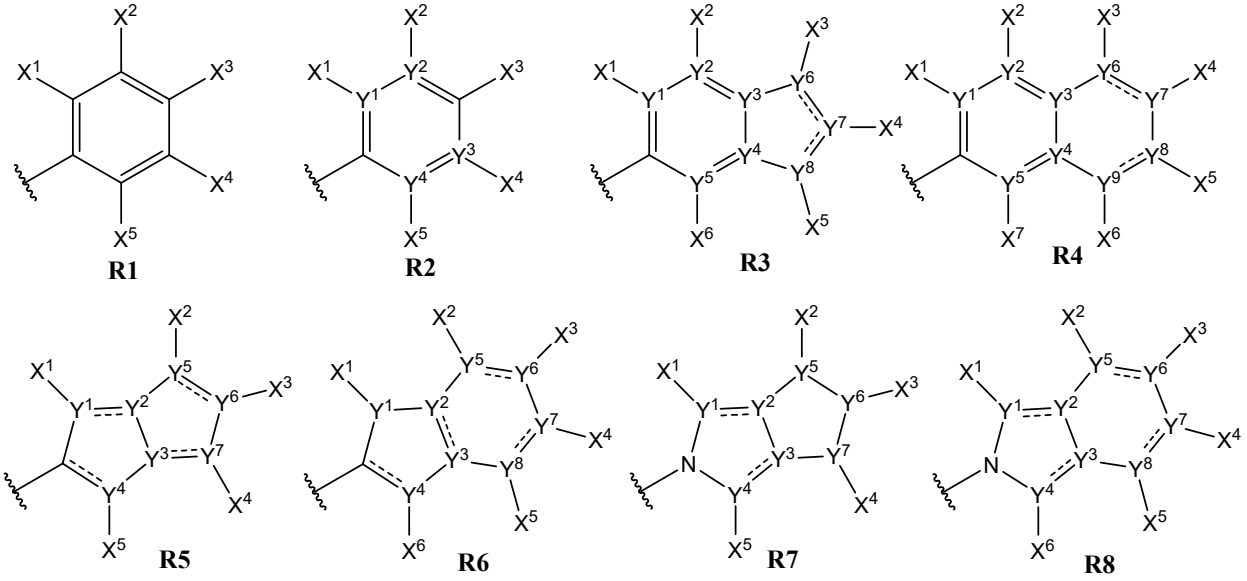
11. The anthelmintic cyclic depsipeptide compound of claim 10, wherein Cy^1 and Cy^2 are independently phenyl, a 5-membered heteroaryl or a 6-membered heteroaryl; wherein said phenyl, 5-membered heteroaryl or 6-membered heteroaryl is independently substituted with halogen, -CN, alkyl, cycloalkyl, haloalkyl, alkoxy, haloalkoxy, alkylthio, haloalkylthio, $R^5R^6NC(O)$- or heterocyclyl.

12. The anthelmintic cyclic depsipeptide compound of claim 11, wherein Cy^1 and Cy^2 are independently phenyl, a 5-membered heteroaryl or a 6-membered heteroaryl substituted with *t*-butyl, cyclohexyl, heterocyclyl, fluoro, trifluoromethyl, trifluoromethoxy or cyano.

13. The anthelmintic cyclic depsipeptide compound of claim 12, wherein Cy^1 and Cy^2 are independently phenyl, a 5-membered heteroaryl or pyridinyl substituted with pyrrolidinyl, morpholinyl, tetrahydropyranyl, tetrazolyl or -*S*-tetrazolyl.

14. The anthelmintic cyclic depsipeptide compound of claim 11, wherein Cy^1 and Cy^2 are independently phenyl, thienyl, oxazolyl, isothiazolyl, 1,3-4-thiadazolyl, pyrazolyl, furyl, imidazolyl, pyrrolyl, pyridinyl, pyridazinyl, pyrimidinyl, pyrazinyl or tetrazinyl, each independently optionally substituted with $R^5R^6NC(O)$-, wherein R^5 and R^6 are independently hydrogen or $-CH_2C(O)NHCH_2CF_3$; or R^5 and R^6 together with the nitrogen atom to which they are bonded together form a C_3-C_6 cyclic amine.

15. The anthelmintic cyclic depsipeptide compound of claim 1, wherein Cy^1 and Cy^2 are independently R1 to R8:



wherein Y^1, Y^2, Y^3, Y^4, Y^5, Y^6, Y^7, Y^8 and Y^9 are each independently C, CH or N; and X^1, X^2, X^3, X^4, X^5, X^6 and X^7 are independently hydrogen, halogen, hydroxy, alkoxy, haloalkoxy, alkylthio, haloalkylthio, thioamido, amino, alkylamino, dialkylamino, alkyl, haloalkyl, alkenyl, haloalkenyl, alkynyl, haloalkynyl, SF_5, $R^5S(O)$-, $R^5S(O)_2$-, $R^5C(O)$-, $R^5R^6NC(O)$-, $R^5R^6NC(O)NR^5$-, $R^5OC(O)$-, $R^5C(O)O$-, $R^5C(O)NR^6$-, -CN, $-NO_2$, cycloalkyl, heteroalkyl, heterocyclyl, aryl or heteroaryl, wherein each cycloalkyl, heteroalkyl, heterocyclyl, aryl or heteroaryl is optionally further independently substituted with one or more substituents selected from the group consisting of halogen, hydroxy, alkoxy, haloalkoxy, alkylthio, haloalkylthio, thioamido, amino, alkylamino, dialkylamino, alkyl, haloalkyl, alkenyl, haloalkenyl, alkynyl, haloalkynyl, SF_5, $R^5S(O)$-, $R^5S(O)_2$-, $R^5C(O)$-, $R^5R^6NC(O)$-, $R^5R^6NC(O)NR^5$-, $R^5OC(O)$-, $R^5C(O)O$-, $R^5C(O)NR^6$-, -CN and $-NO_2$.

16. The anthelmintic cyclic depsipeptide compound of claim 15, wherein X^1, X^2, X^3, X^4, X^5, X^6 and X^7 are independently hydrogen, halogen, hydroxy, alkoxy, haloalkoxy, alkylthio, haloalkylthio, $R^5R^6NC(O)$-, $R^5R^6NC(O)NR^5$-, thioamido, amino, alkylamino or dialkylamino.

17. The anthelmintic cyclic depsipeptide compound of claim 15, wherein X^1, X^2, X^3, X^4, X^5, X^6 and X^7 are independently hydrogen, alkyl, haloalkyl, alkenyl, haloalkenyl, alkynyl or haloalkynyl.

18. The anthelmintic cyclic depsipeptide compound of claim 15, wherein X^1, X^2, X^3, X^4, X^5, X^6 and X^7 are independently hydrogen, methyl, ethyl, propyl, isopropyl, butyl, isobutyl, *tert*-butyl, CF_3, $-CH_2CF_3$, $-CHFCF_3$ or CF_2CF_3.

19. The anthelmintic cyclic depsipeptide compound of claim 15, wherein X^1, X^2, X^3, X^4, X^5, X^6 and X^7 are independently hydrogen, hydroxy, methoxy, trifluoromethoxy, $-OCH_2CF_3$, $-OCHFCF_3$, $-OCF_2CF_3$, methylthio, trifluoromethylthio, $-SCH_2CF_3$, $-SCHFCF_3$ or $-SCF_2CF_3$.

20. An anthelmintic veterinary composition comprising the anthelmintic cyclic depsipeptide compound of claim 1, or a pharmaceutically or veterinarily acceptable salt thereof, in combination with a veterinarily acceptable carrier.

21. An anthelmintic veterinary composition comprising the anthelmintic cyclic depsipeptide compound of claim 1, or a pharmaceutically or veterinarily acceptable salt thereof, in combination with a second parasiticidal active agent and a veterinarily acceptable carrier.

22. The anthelmintic cyclic depsipeptide compound of claim 1, wherein R^a and R^b are independently hydrogen or C_1-C_3alkyl.

23. The anthelmintic cyclic depsipeptide compound of claim 22, wherein R^a and R^b are methyl.

24. The anthelmintic cyclic depsipeptide compound of claim 1, wherein R', R'', R''' and R'''' are independently C_1-C_3alkyl.

25. The anthelmintic cyclic depsipeptide compound of claim 24, wherein R', R'', R''' and R'''' are methyl.

26. The anthelmintic cyclic depsipeptide compound of claim 11, wherein:

Cy^1 and Cy^2 are independently phenyl substituted with alkyl, cycloalkyl, heterocyclyl, halogen, haloalkyl, haloalkoxy, haloalkylthio or cyano;

R^a and R^b are independently hydrogen or C_1-C_3alkyl;

R', R'', R''' and R'''' are independently C_1-C_3alkyl; and

(a) R^1 and R^2 are each independently C_1-C_8 alkyl substituted by one or more fluoro; and

R^3 and R^4 are each independently C_1-C_8 alkyl; or

(b) R^1 and R^3 are each independently C_1-C_8 alkyl substituted by one or more fluoro; and R^2 and R^4 are each independently C_1-C_8 alkyl; or

(c) R^1 and R^4 are each independently C_1-C_8 alkyl substituted by one or more fluoro; and R^2 and R^3 are each independently C_1-C_8 alkyl; or

(d) R^2 and R^4 are each independently C_1-C_8 alkyl substituted by one or more fluoro; and R^1 and R^3 are each independently C_1-C_8 alkyl; or

(e) R^2 and R^3 are each independently C_1-C_8 alkyl substituted by one or more fluoro; and R^1 and R^4 are each independently C_1-C_8 alkyl; or

(f) R^3 and R^4 are each independently C_1-C_8 alkyl substituted by one or more fluoro; and R^1 and R^2 are each independently C_1-C_8 alkyl.

27. The anthelmintic cyclic depsipeptide compound of claim 26, wherein (b) R^1 and R^3 are each independently C_1-C_8 alkyl substituted by one or more fluoro; and R^2 and R^4 are each independently C_1-C_8 alkyl.

28. The anthelmintic cyclic depsipeptide compound of claim 26, wherein (a) R^2 and R^4 are each independently C_1-C_8 alkyl substituted by one or more fluoro; and R^1 and R^3 are each independently C_1-C_8 alkyl.

29. The anthelmintic cyclic depsipeptide compound of claim 27, wherein R^1 and R^3 are each $-CH_2CF(CH_3)_2$; and R^2 and R^4 are independently 2-methylpropyl or 2,2-dimethylpropyl.

30. The anthelmintic cyclic depsipeptide compound of claim 28, wherein R^2 and R^4 are each $-CH_2CF(CH_3)_2$; and R^1 and R^3 are independently 2-methylpropyl or 2,2-dimethylpropyl.

31. The anthelmintic cyclic depsipeptide compound of claim 27, wherein Cy^1 and Cy^2 are independently phenyl substituted by *t*-butyl, fluoro, trifluoromethyl, trifluoromethoxy, cyano, morpholinyl or tetrahydropyranyl.

32. The anthelmintic cyclic depsipeptide compound of claim 28, wherein Cy^1 and Cy^2 are independently phenyl substituted by *t*-butyl, fluoro, trifluoromethyl, trifluoromethoxy, cyano, morpholinyl or tetrahydropyranyl.

33. The anthelmintic cyclic depsipeptide compound of claim 29, wherein Cy^1 and Cy^2 are independently phenyl substituted by *t*-butyl, fluoro, trifluoromethyl, trifluoromethoxy, cyano, morpholinyl or tetrahydropyranyl.

34. The anthelmintic cyclic depsipeptide compound of claim 30, wherein Cy^1 and Cy^2 are independently phenyl substituted by *t*-butyl, fluoro, trifluoromethyl, trifluoromethoxy, cyano, morpholinyl or tetrahydropyranyl.

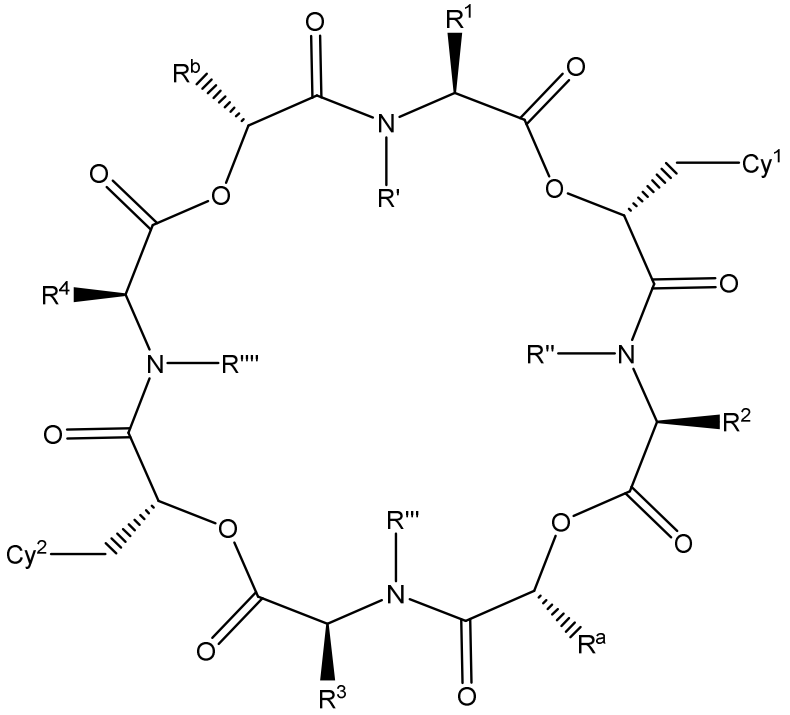
35. The anthelmintic cyclic depsipeptide compound of claim 31, wherein:
R^a and R^b are each methyl; and
R', R'', R''' and R'''' are methyl.

36. The anthelmintic cyclic depsipeptide compound of claim 32, wherein:
R^a and R^b are reach methyl; and
R', R'', R''' and R'''' are each methyl.

37. The anthelmintic cyclic depsipeptide compound of claim 33, wherein:
R^a and R^b are each methyl; and
R', R'', R''' and R'''' are methyl.

38. The anthelmintic cyclic depsipeptide compound of claim 34, wherein:
R^a and R^b are reach methyl; and
R', R'', R''' and R'''' are each methyl.

39. An anthelmintic cyclic depsipeptide compound of formula (I), or a pharmaceutically or veterinarily acceptable salt thereof:



(I)

wherein:

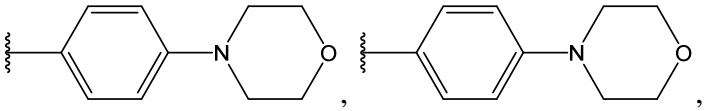
R^1 and R^3 are each $-CH_2CF(CH_3)_2$; and R^2 and R^4 are independently 2-methylpropyl or 2,2-dimethylpropyl; or

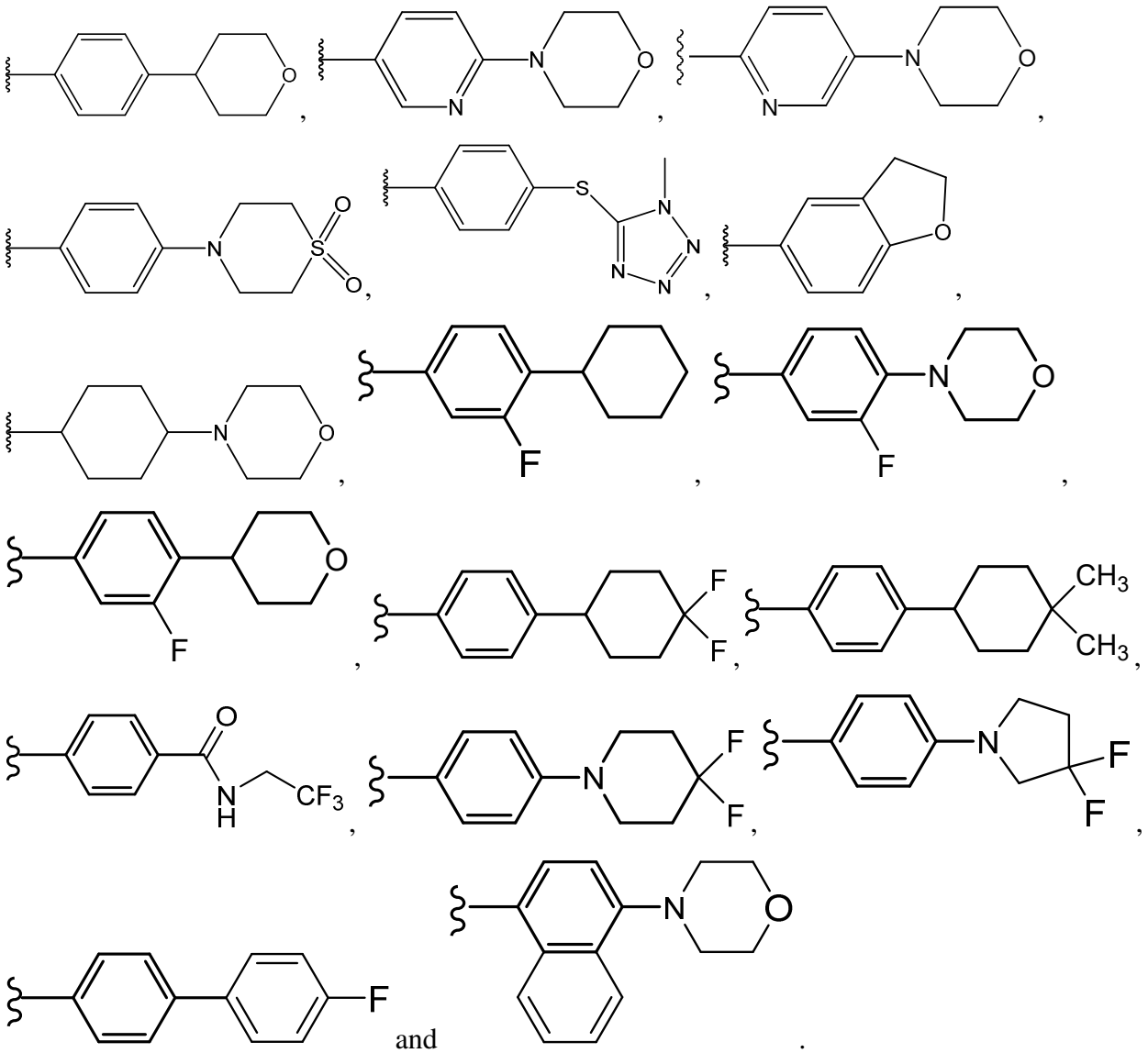
R^2 and R^4 are each $-CH_2CF(CH_3)_2$; and R^1 and R^3 are independently 2-methylpropyl or 2,2-dimethylpropyl;

R^a and R^b are each methyl;

R', R'', R''' and R'''' are each methyl; and

Cy^1 and Cy^2 are independently selected from the group consisting of:

para-fluorophenyl, *para*-trifluoromethoxyphenyl, *para*-trifluoromethylphenyl, 3,4,5-trifluorophenyl, *para*-iodophenyl, *para*-bromophenyl, *p*-nitrophenyl, *p-tert*-butylphenyl, *para*-SF_5-phenyl, *para*-aminophenyl, ,



and