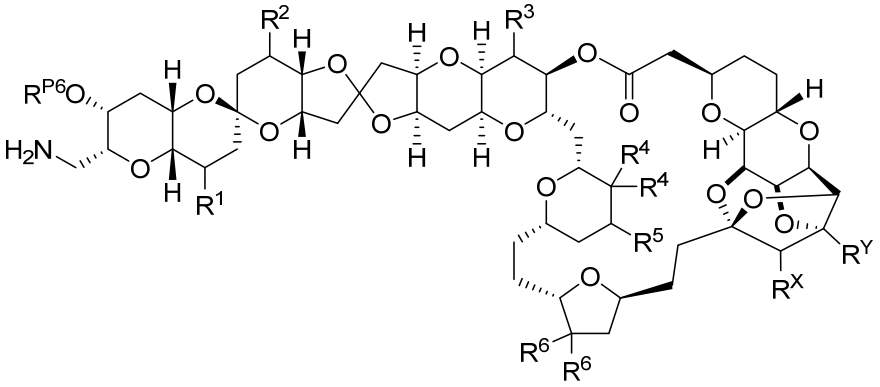
CLAIMS

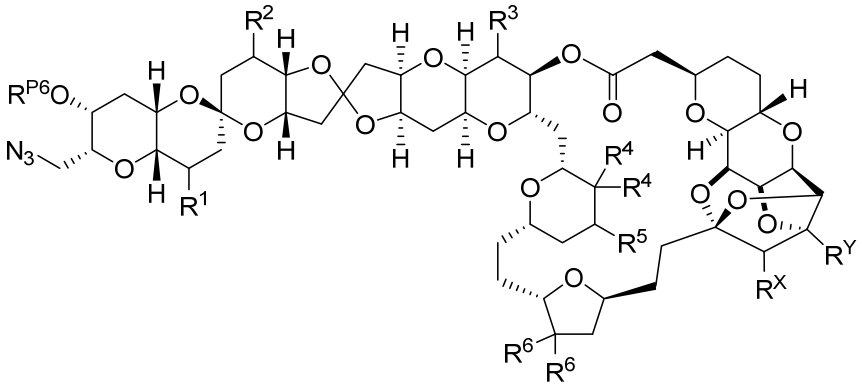
What is claimed is:

1. A method of preparing a compound of Formula (**H3-A**):



(**H3-A**),

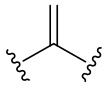
or a salt thereof, the method comprising reducing a compound of Formula (**H3-N3**):

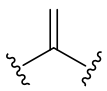


(**H3-N3**),

or a salt thereof, wherein:

R^1, R^2, R^3, and R^5 are each independently hydrogen, halogen, or optionally substituted alkyl;

each instance of R^4 is independently hydrogen, halogen, or optionally substituted alkyl, or two R^4 groups are taken together to form: ;

each instance of R^6 is independently hydrogen, halogen, or optionally substituted alkyl, or two R^6 groups are taken together to form: ;

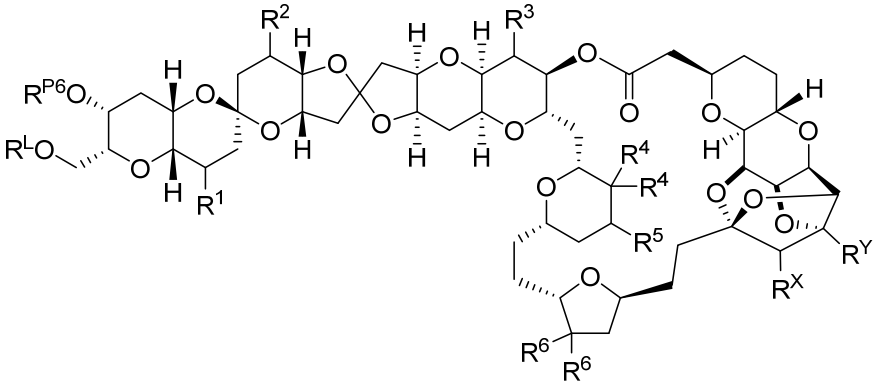
R^{P6} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group;

R^X is hydrogen or $–OR^{Xa}$, wherein R^{Xa} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; and

R^Y is hydrogen or $–OR^{Ya}$, wherein R^{Ya} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group;

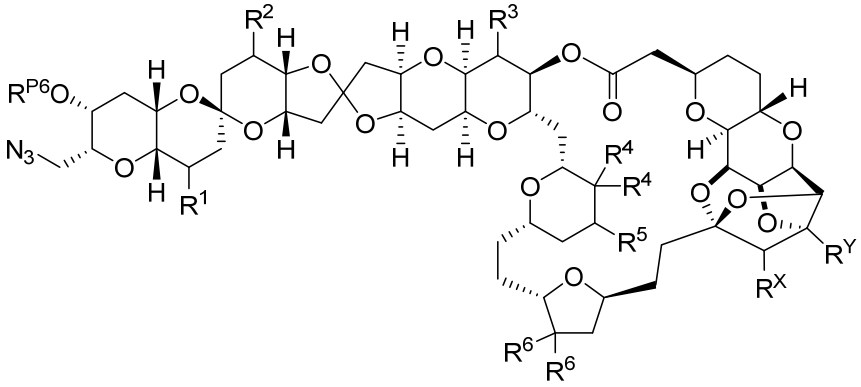
optionally wherein R^{Xa} and R^{Ya} are joined together with their intervening atoms to form optionally substituted heterocyclyl.

2. The method of claim 1 further comprising a step of reacting a compound of Formula (**H3-L**):



(**H3-L**),

or a salt thereof, in the presence of an azide, to yield a compound of Formula (**H3-N3**):

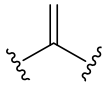


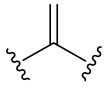
(**H3-N3**),

or a salt thereof, wherein:

R^L is optionally substituted sulfonyl, optionally substituted sulfinyl, optionally substituted phosphoryl, or optionally substituted acyl;

R^1, R^2, R^3, and R^5 are each independently hydrogen, halogen, or optionally substituted alkyl;

each instance of R^4 is independently hydrogen, halogen, or optionally substituted alkyl, or two R^4 groups are taken together to form: ;

each instance of R^6 is independently hydrogen, halogen, or optionally substituted alkyl, or two R^6 groups are taken together to form: ;

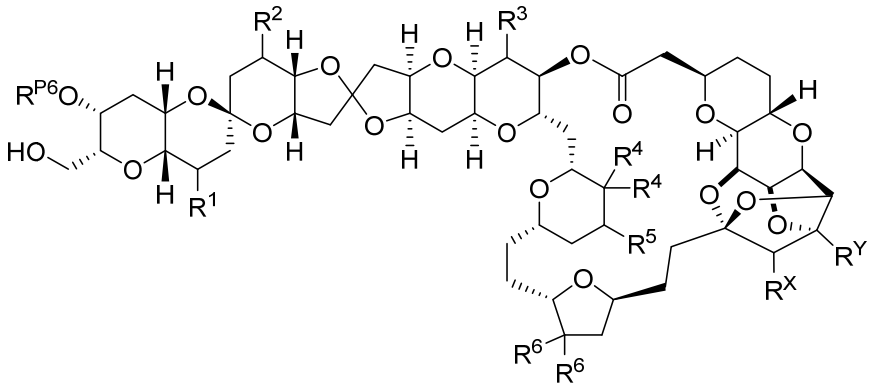
R^{P6} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group;

R^X is hydrogen or $–OR^{Xa}$, wherein R^{Xa} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; and

R^Y is hydrogen or $–OR^{Ya}$, wherein R^{Ya} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group;

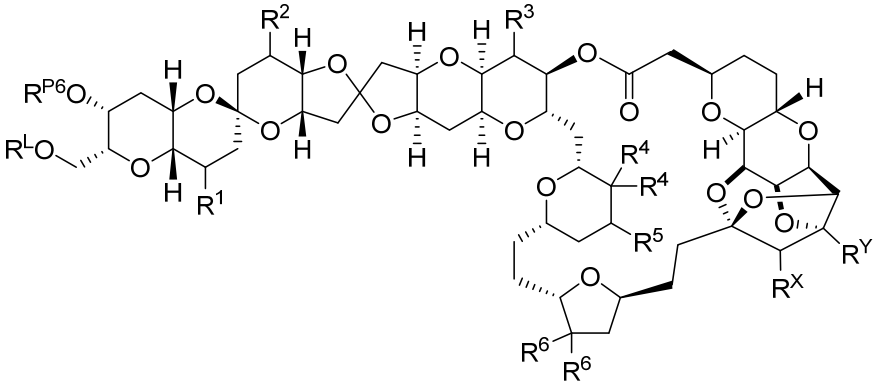
optionally wherein R^{Xa} and R^{Ya} are joined together with their intervening atoms to form optionally substituted heterocyclyl.

3. The method of claim 2 further comprising a step of reacting a compound of Formula (**H3-OH**):



(**H3-OH**),

or a salt thereof, in the presence of a reagent of the formula: X^L-R^L, to yield a compound of Formula (**H3-L**):



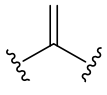
(**H3-L**),

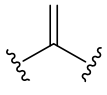
or a salt thereof, wherein:

R^L is optionally substituted sulfonyl, optionally substituted sulfinyl, optionally substituted phosphoryl, or optionally substituted acyl;

X^L is halogen or a leaving group;

R^1, R^2, R^3, and R^5 are each independently hydrogen, halogen, or optionally substituted alkyl;

each instance of R^4 is independently hydrogen, halogen, or optionally substituted alkyl, or two R^4 groups are taken together to form: ;

each instance of R^6 is independently hydrogen, halogen, or optionally substituted alkyl, or two R^6 groups are taken together to form: ;

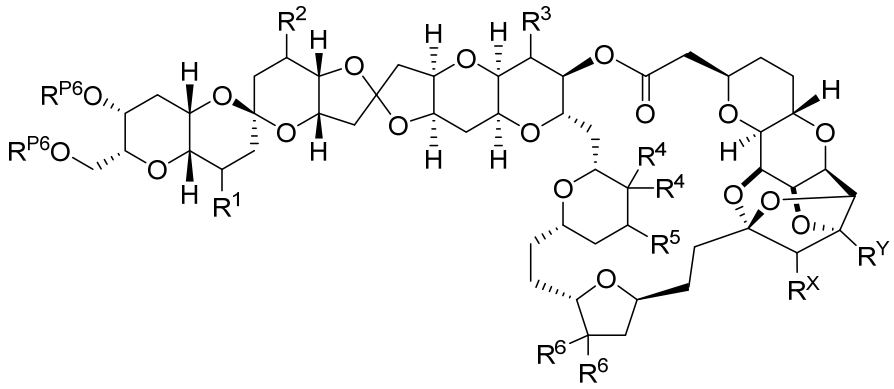
R^{P6} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group;

R^X is hydrogen or $–OR^{Xa}$, wherein R^{Xa} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; and

R^Y is hydrogen or $–OR^{Ya}$, wherein R^{Ya} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group;

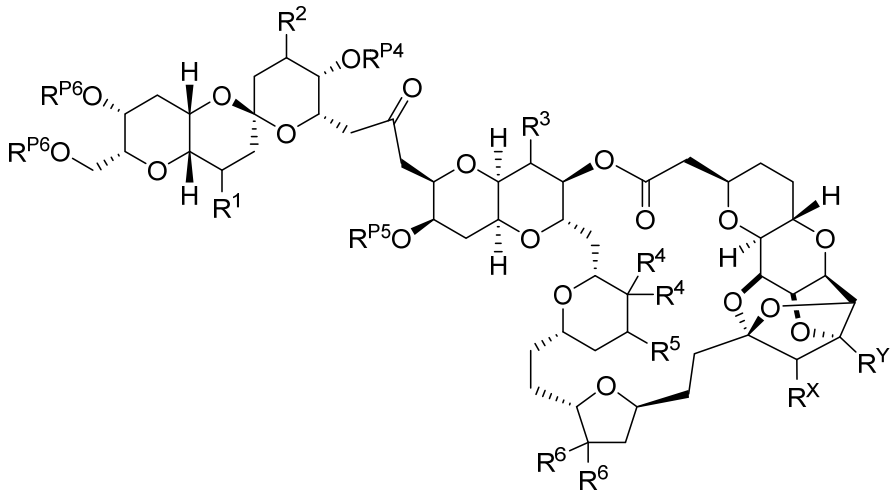
optionally wherein R^{Xa} and R^{Ya} are joined together with their intervening atoms to form optionally substituted heterocyclyl.

4. A method of preparing a compound of Formula (**H3-2-I**):



(**H3-2-I**),

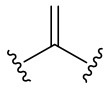
or a salt thereof, the method comprising cyclizing a compound of Formula (**H3-2-II**):

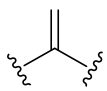


(**H3-2-II**),

or a salt thereof, wherein:

R^1, R^2, R^3, and R^5 are each independently hydrogen, halogen, or optionally substituted alkyl;

each instance of R^4 is independently hydrogen, halogen, or optionally substituted alkyl, or two R^4 groups are taken together to form: ;

each instance of R^6 is independently hydrogen, halogen, or optionally substituted alkyl, or two R^6 groups are taken together to form: ;

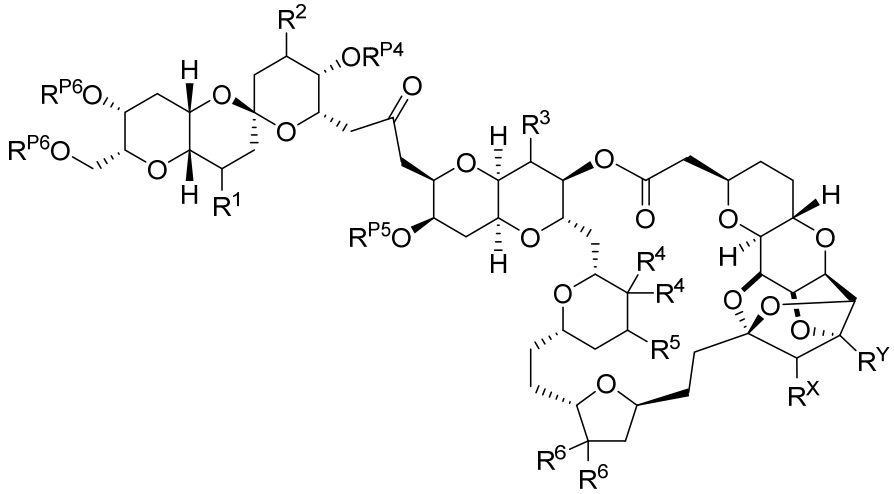
R^{P4}, R^{P5}, and R^{P6} are each independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P6} are joined with the intervening atoms to form optionally substituted heterocyclyl;

R^X is hydrogen or $–OR^{Xa}$, wherein R^{Xa} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; and

R^Y is hydrogen or $–OR^{Ya}$, wherein R^{Ya} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group;

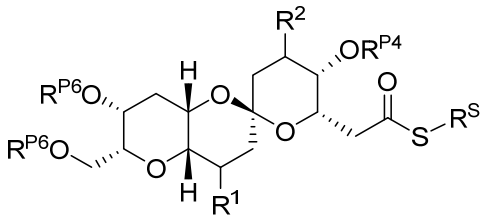
optionally wherein R^{Xa} and R^{Ya} are joined together with their intervening atoms to form optionally substituted heterocyclyl.

5. A method of preparing a compound of Formula (**H3-2-II**):



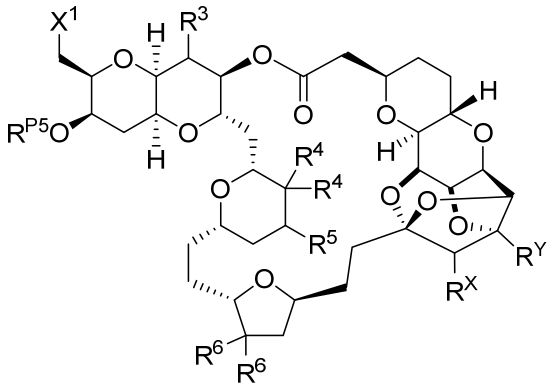
(**H3-2-II**),

or a salt thereof, comprising coupling a compound of Formula (**L-2-6**):



(**L-2-6**),

or a salt thereof, with a compound of Formula (**R-2-I**):



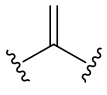
(**R-2-I**),

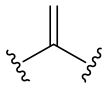
or a salt thereof, to yield a compound of Formula (**H3-2-II**), or a salt thereof, wherein:

R^S is optionally substituted alkyl, optionally substituted carbocyclyl, optionally substituted aryl, optionally substituted heterocyclyl, or optionally substituted heteroaryl;

X^1 is halogen or a leaving group;

R^1, R^2, R^3, and R^5 are each independently hydrogen, halogen, or optionally substituted alkyl;

each instance of R^4 is independently hydrogen, halogen, or optionally substituted alkyl, or two R^4 groups are taken together to form: ;

each instance of R^6 is independently hydrogen, halogen, or optionally substituted alkyl, or two R^6 groups are taken together to form: ;

R^{P4}, R^{P5}, and R^{P6} are each independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P6} are joined with the intervening atoms to form optionally substituted heterocyclyl;

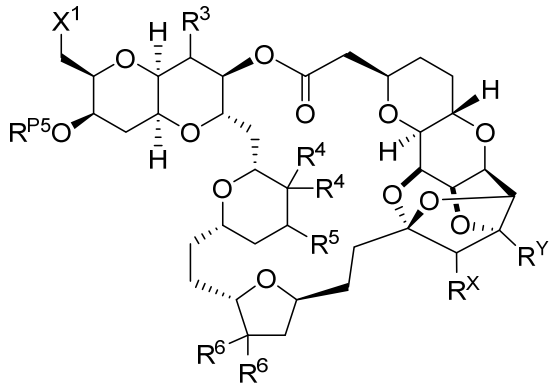
R^X is hydrogen or $–OR^{Xa}$, wherein R^{Xa} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; and

R^Y is hydrogen or $–OR^{Ya}$, wherein R^{Ya} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group;

optionally wherein R^{Xa} and R^{Ya} are joined together with their intervening atoms to form optionally substituted heterocyclyl.

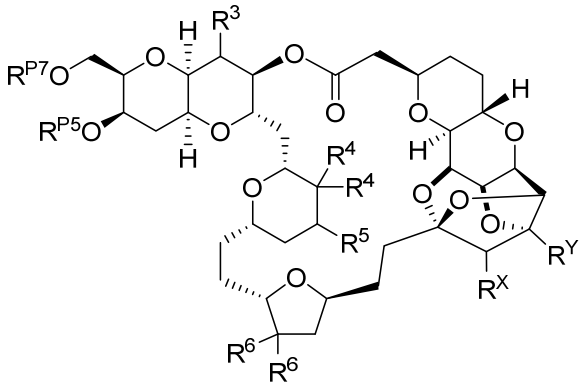
6. The method of claim 5 further comprising a step of deprotecting one or more oxygen atoms of the compound of Formula (**H3-2-II**), or a salt thereof.

7. A method of preparing a compound of Formula (**R-2-I**):



(**R-2-I**),

or a salt thereof, the method comprising reacting a compound of Formula (**R-4-11B**):



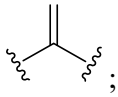
(**R-4-11B**),

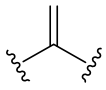
or a salt thereof, in the presence of a nucleophile, thereby substituting the group $-OR^{P7}$ with the group $-X^1$; wherein:

X^1 is halogen or a leaving group;

R^3 and R^5 are each independently hydrogen, halogen, or optionally substituted alkyl;

each instance of R^4 is independently hydrogen, halogen, or optionally substituted alkyl,

or two R^4 groups are taken together to form: ;

each instance of R^6 is independently hydrogen, halogen, or optionally substituted alkyl, or two R^6 groups are taken together to form: ;

R^{P5} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group;

R^{P7} is optionally substituted sulfonyl, optionally substituted sulfinyl, optionally substituted phosphoryl, optionally substituted acyl, or an oxygen protecting group;

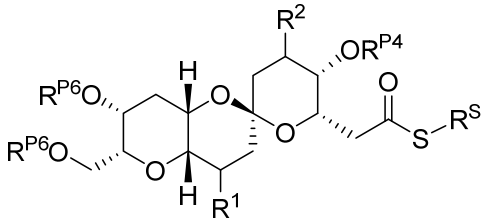
optionally wherein R^{P5} and R^{P7} are joined with the intervening atoms to form optionally substituted heterocyclyl;

R^X is hydrogen or $–OR^{Xa}$, wherein R^{Xa} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; and

R^Y is hydrogen or $–OR^{Ya}$, wherein R^{Ya} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group;

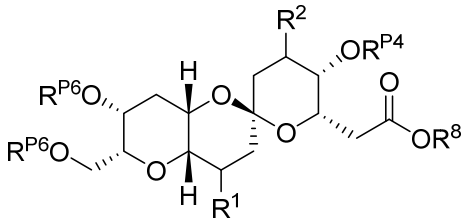
optionally wherein R^{Xa} and R^{Ya} are joined together with their intervening atoms to form optionally substituted heterocyclyl.

8. A method of preparing a compound of Formula (**L-2-6**):



(**L-2-6**),

or a salt thereof, the method comprising reacting a compound of Formula (**L-5-7B**):



(**L-5-7B**),

or a salt thereof, in the presence of a thiolating agent; wherein:

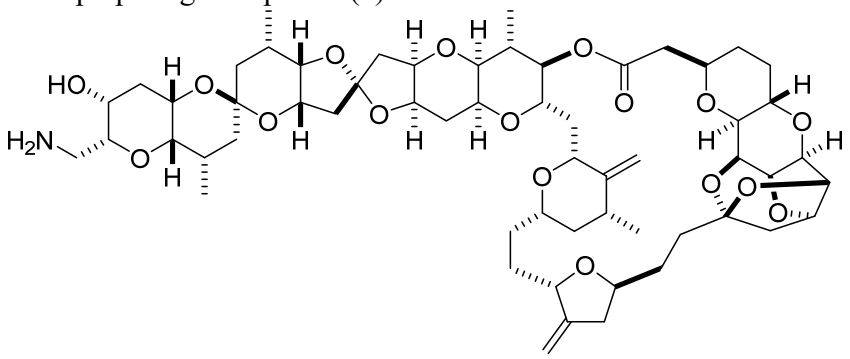
R^S is optionally substituted alkyl, optionally substituted carbocyclyl, optionally substituted aryl, optionally substituted heterocyclyl, or optionally substituted heteroaryl;

R^1 and R^2 are independently hydrogen, halogen, or optionally substituted alkyl;

each instance of R^{P4} and R^{P6} are independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P6} are joined with the intervening atoms to form optionally substituted heterocyclyl; and

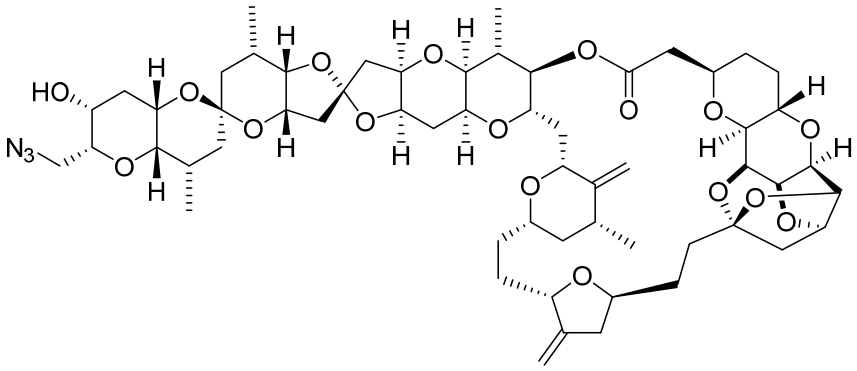
R^8 is hydrogen, optionally substituted alkyl, optionally substituted carbocyclyl, optionally substituted aryl, optionally substituted heterocyclyl, optionally substituted heteroaryl, optionally substituted acyl, or an oxygen protecting group.

9. A method of preparing Compound (1):



Compound (1),

or a salt thereof, the method comprising reducing a compound of Formula (B):



(B),

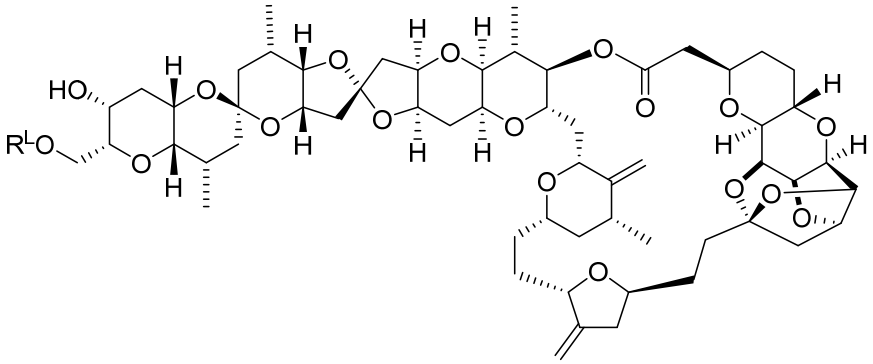
or a salt thereof.

10. The method of claim 1 or 9, wherein the step of reducing is carried out in the presence of a phosphine reagent; optionally
wherein the phosphine reagent is triphenylphosphine (Ph_3P); optionally
wherein the phosphine reagent is polymer-bound triphenylphosphine; and optionally
wherein at least one equivalent of the phosphine reagent is present.

11. The method of any one of claims 1, 9, and 10, wherein the step of reducing is carried out in the presence of THF and water.

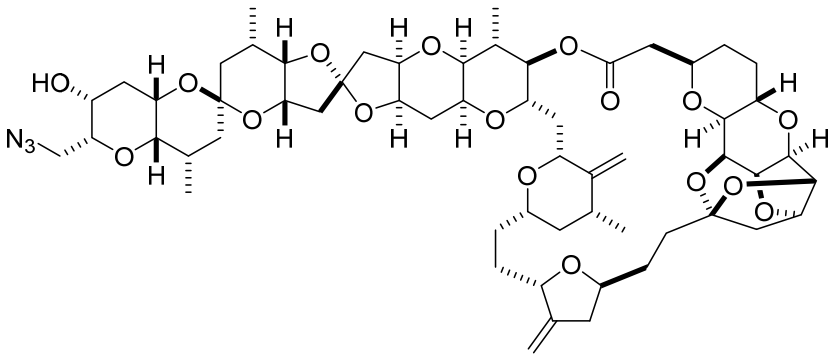
12. The method of any one of claims 1 and 9-11, wherein the compound of Formula (**H3-A**), Compound (1), or salt thereof, is purified and isolated by precipitation.

13. The method of any one of claims 9-12 further comprising a step of reacting a compound of Formula (A):



(A),

or a salt thereof, in the presence of an azide, to yield a compound of Formula (B):



(B),

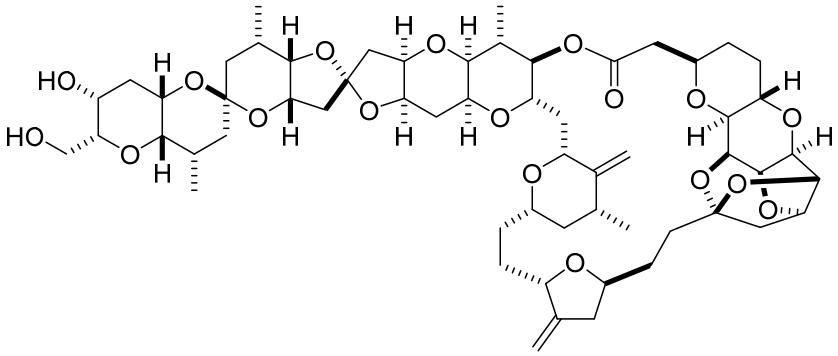
or a salt thereof, wherein:

R^L is optionally substituted sulfonyl, optionally substituted sulfinyl, optionally substituted phosphoryl, or optionally substituted acyl.

14. The method of claim 2 or 13, wherein the azide is sodium azide, potassium azide, or a tetraalkylammonium azide salt; optionally
wherein the azide is a tetraalkylammonium azide; and optionally
wherein the azide is tetrabutylammonium azide ([*n*-Bu_4N]N_3).

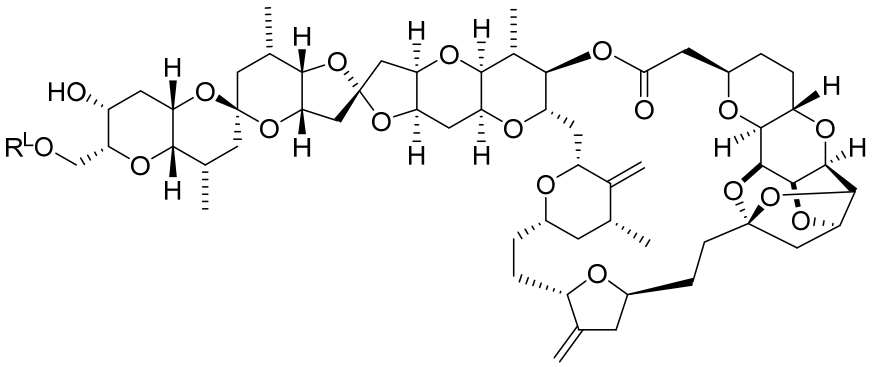
15. The method of any one of claims 2, 13, or 14, wherein the reaction is carried out in toluene.

16. The method of any one of claims 13-15 further comprising a step of reacting Compound (2):



Compound (2),

or a salt thereof, in the presence of a reagent of the formula X^L-R^L, to yield a compound of Formula (A):



(A),

or a salt thereof, wherein:

X^L is halogen or a leaving group; and

R^L is optionally substituted sulfonyl, optionally substituted sulfinyl, optionally substituted phosphoryl, or optionally substituted acyl.

17. The method of claim 3 or 16, wherein the reagent of the formula X^L-R^L is a sulfonyl halide; R^L is optionally substituted sulfonyl; and X^L is halogen; optionally
wherein reagent of the formula X^L-R^L is a sulfonyl chloride; and R^L is optionally substituted sulfonyl; and optionally
wherein reagent of the formula X^L-R^L is tosyl chloride (TsCl).

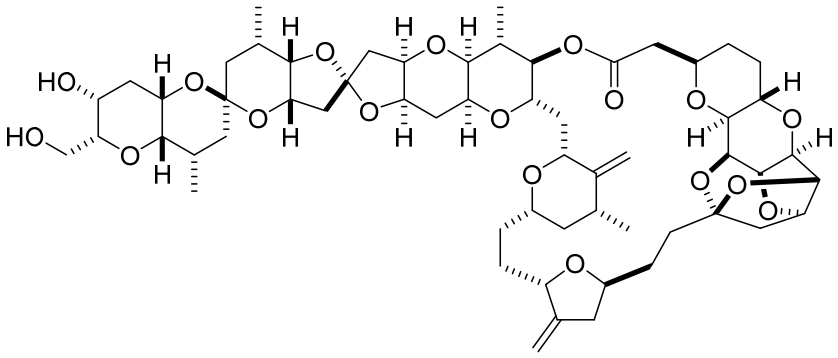
18. The method of any one of claims 3, 16, or 17, wherein the reaction is carried out in the presence of a base; optionally
wherein the base is a trialkylamine base, a pyridine base, or an imidazole base; optionally
wherein the base is a trialkylamine base; and optionally
wherein the base is triethylamine (TEA).

19. The method of any one of claims 3 and 16-18, wherein the reaction is carried out in the presence of a Lewis acid; and optionally
wherein the reaction is carried out in the presence of dibutyltin oxide.

20. The method of any one of claims 3 and 16-19, wherein the reaction is carried out in the presence of TsCl, TEA, and dibutyltin oxide.

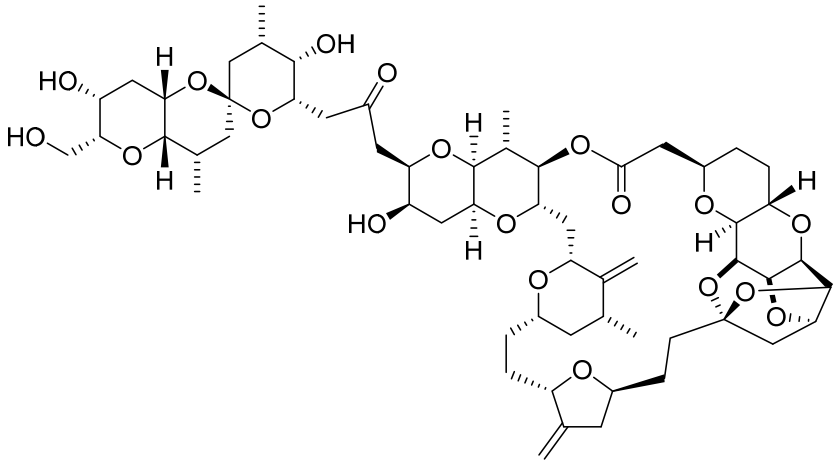
21. The method of any one of claims 3 and 16-20, wherein the reaction is carried out in dichloromethane (DCM)

22. A method of preparing Compound (2):



Compound (2),

or a salt thereof, the method comprising cyclizing a compound of the formula:



Compound (C),

or a salt thereof.

23. The method of claim 4 or 22, wherein the step of cyclizing is carried out in the presence of an acid; optionally

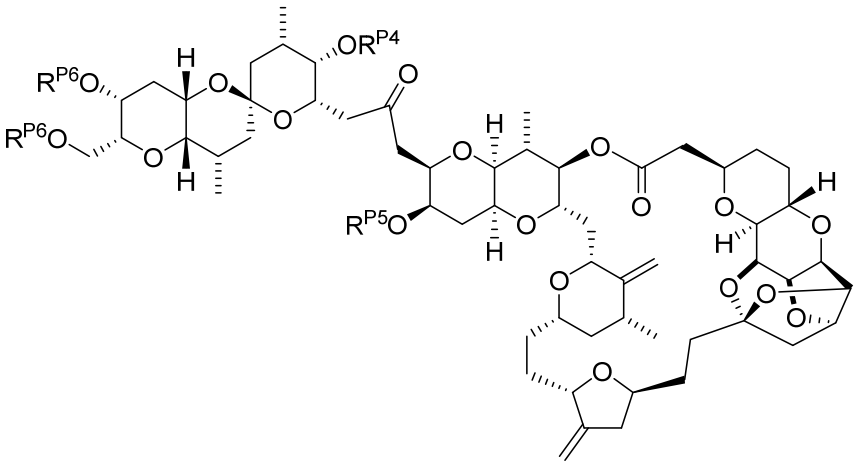
wherein the acid is a pyridinium salt; and optionally

wherein the acid is pyridinium *p*-toluenesulfonate (PPTS).

24. The method of any one of claims 4, 22, and 23, wherein the step of cyclizing is carried out in dichloromethane (DCM).

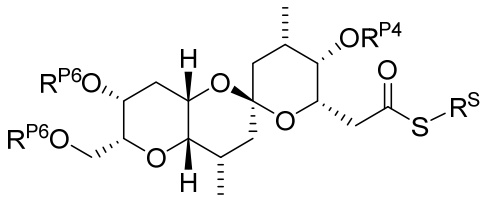
25. The method of any one of claims 22-24, optionally wherein one or more free hydroxyl groups is substituted with an oxygen protecting group; and optionally
wherein the one or more oxygen protecting groups are silyl protecting groups.

26. A method of preparing a compound of Formula (**E-1**):



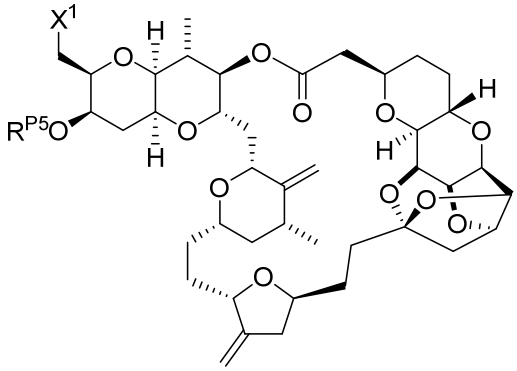
(**E-1**),

or a salt thereof, comprising coupling a compound of the formula (**E-L**):



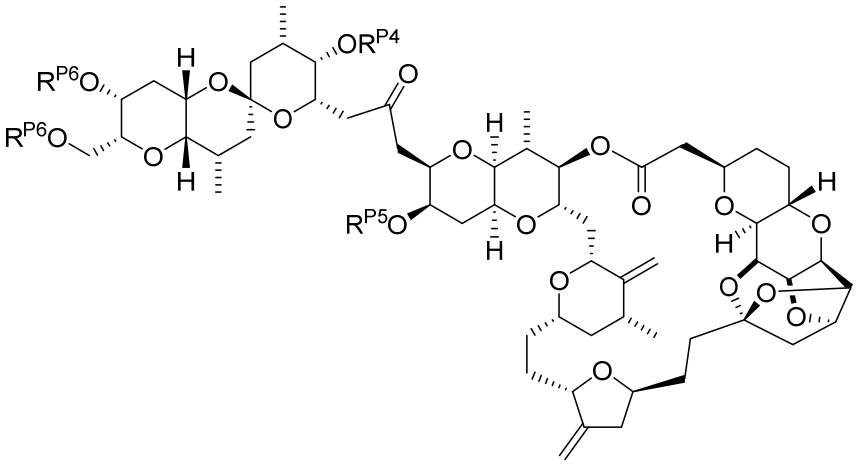
(**E-L**),

or a salt thereof, with a compound of the formula (**E-R**):



(**E-R**),

or a salt thereof, to yield a compound of the formula (**E-1**):



(**E-1**),

or a salt thereof, wherein:

R^S is optionally substituted alkyl, optionally substituted carbocyclyl, optionally substituted aryl, optionally substituted heterocyclyl, or optionally substituted heteroaryl;

X^1 is halogen or a leaving group; and

R^{P4}, R^{P5}, and R^{P6} are each independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P6} are joined with the intervening atoms to form optionally substituted heterocyclyl.

27. The method of claim 5 or 26, wherein the step of coupling is carried out in the presence of nickel and zirconium.

28. The method of claim 27, wherein the nickel is a nickel complex; optionally

wherein the nickel is a nickel(II) or nickel(0) complex; optionally

wherein the nickel complex is of the formula: NiX_2•(ligand), wherein X is halogen, and "ligand" is a bidentate ligand; optionally

wherein the nickel complex is used after complexation of a nickel source and the "ligand" in solution; optionally

wherein the nickel source is $NiCl_2$, the "ligand" is 4,4′-di-tert-butyl-2,2′-dipyridyl (tbbpy), and the nickel complex is of the formula $NiCl_2$•(tbbpy); optionally

wherein the nickel source is $NiBr_2$, the "ligand" is 4,4′-di-tert-butyl-2,2′-dipyridyl (tbbpy), and the nickel complex is of the formula $NiBr_2$•(tbbpy); optionally
wherein the nickel is present in a catalytic amount; optionally
wherein the nickel is present in from 1-50 mol%; and optionally
wherein the nickel is present in from 1-10 mol%.

29. The method of claim 27 or 28, wherein the zirconium is a zirconium complex; optionally wherein the zirconium complex is of the formula: $(ligand)_nZrX_2$, wherein n 0, 1, 2, 3, or 4, and X is halogen; optionally
wherein the zirconium complex is Cp_2ZrCl_2; optionally
wherein the zirconium is present in stoichiometric or excess amount; and optionally
wherein the zirconium is present in about 1 to about 4 equivalents.

30. The method of any one of claims 5 and 26-29, wherein the step of coupling is carried out in the presence of zinc or manganese; optionally
wherein the reaction is carried out in the presence of manganese metal; and optionally
wherein the manganese is present in an excess amount.

31. The method of any one of claims 5 and 26-30, wherein the step of coupling is carried out in the presence of triethylsilyl chloride (TESCl).

32. The method of any one of claims 5 and 26-31, wherein the step of coupling is carried out in the presence of a base or proton scavenger.

33. The method of any one of claims 5 and 26-32, wherein the step of coupling is carried out in the presence of $NiBr_2$•(tbbpy), Cp_2ZrCl_2, and manganese metal.

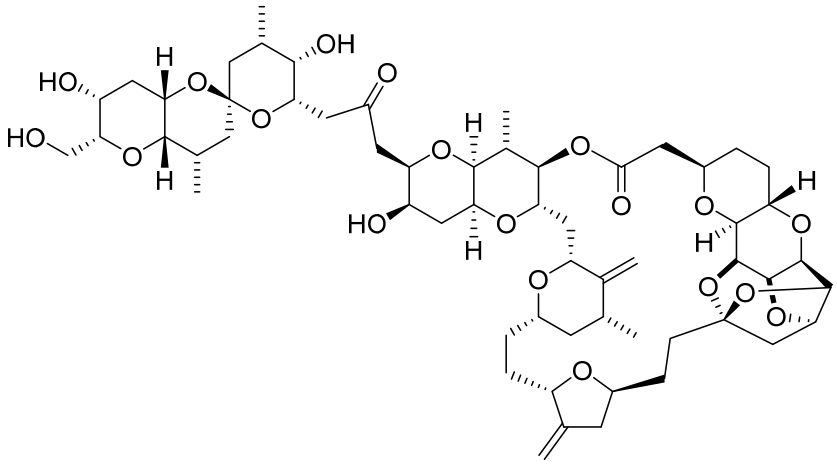
34. The method of claim 33, wherein the step of coupling is carried out by mixing a compound of Formula (**L-2-6**), or a salt thereof, with a compound of Formula (**R-2-I**), or a salt thereof, Cp_2ZrCl_2, and manganese metal in a solution; followed by addition of $NiBr_2$•(tbbpy).

35. The method of claim 33, wherein the step of coupling is carried out by mixing a compound of Formula (**E-L**), or a salt thereof, with a compound of Formula (**E-R**), or a salt thereof, Cp_2ZrCl_2, and manganese metal in a solution; followed by addition of $NiBr_2$•(tbbpy).

36. The method of any one of claims 5 and 26-35, wherein the step of coupling is carried out in one or more solvents; and optionally
wherein the step of coupling is carried out in 1,3-dimethyl-2-imidazolidinone (DMI).

37. The method of any one of claims 5 and 26-36, wherein the step of coupling is carried out at or around room temperature; or
wherein the step of coupling is carried out at above room temperature; and optionally
wherein the step of coupling is carried out at approximately 30 °C.

38. The method of any one of claims 26-37 further comprising a step of deprotecting a compound of Formula (**E-1**), or a salt thereof, to yield a compound of the formula:



Compound (C),

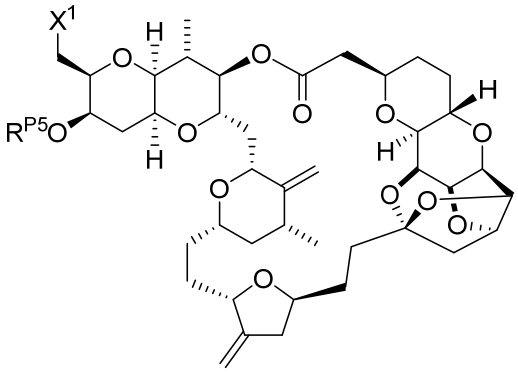
or a salt thereof.

39. The method of claim 6 or 38, wherein R^{P6}, R^{P5}, and R^{P4} are silyl protecting groups; and the step of deprotecting is carried out in the presence of a fluoride source; and optionally
wherein the fluoride source is tetrabutylammonium fluoride (TBAF).

40. The method of any one of claims 6, 38, and 39, wherein the step of deprotecting is carried out in the presence of imidazole hydrochloride.

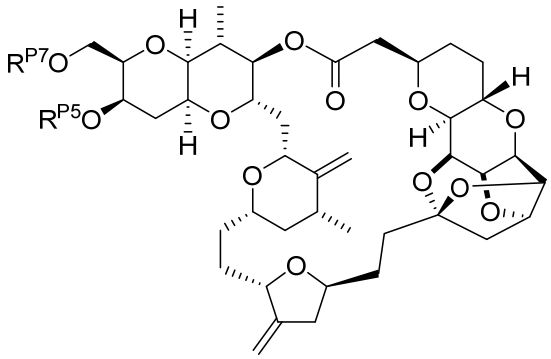
41. The method of any one of claims 6 and 38-40, wherein the step of deprotecting is carried out in THF.

42. A method of preparing a compound of Formula (**E-R**):



(**E-R**),

or a salt thereof, the method comprising reacting a compound of Formula (**E-R-1**):



(**E-R-1**),

or a salt thereof, in the presence of a nucleophile, thereby substituting the group $-OR^{P7}$ with the group $-X^1$; wherein:

X^1 is halogen or a leaving group;

R^{P5} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; and

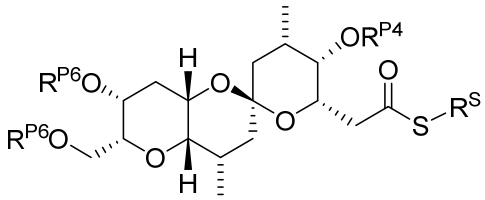
R^{P7} is optionally substituted sulfonyl, optionally substituted sulfinyl, optionally substituted phosphoryl, optionally substituted acyl, or an oxygen protecting group;

optionally wherein R^{P5} and R^{P7} are joined with the intervening atoms to form optionally substituted heterocyclyl.

43. The method of claim 7 or 42, wherein X^1 is –I; and the reaction is carried out in the presence of an iodide salt; and optionally
wherein the iodide salt is sodium iodide (NaI).

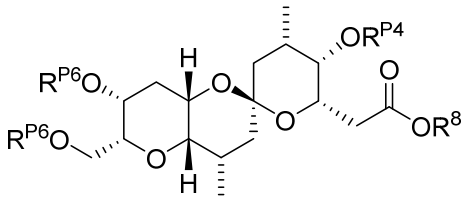
44. The method of any one of claims 7, 42, and 43, wherein the reaction is carried out in DMI.

45. A method of preparing a compound of Formula (**E-L**):



(**E-L**),

or a salt thereof, the method comprising a step of thiolating a compound of Formula (**E-L-1**):



(**E-L-1**),

or a salt thereof, in the presence of a thiolating agent; wherein:

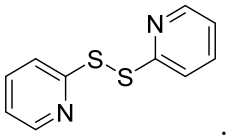
R^S is optionally substituted alkyl, optionally substituted carbocyclyl, optionally substituted aryl, optionally substituted heterocyclyl, or optionally substituted heteroaryl;

each instance of R^{P4} and R^{P6} are independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P6} are joined with the intervening atoms to form optionally substituted heterocyclyl; and

R^8 is hydrogen, optionally substituted alkyl, optionally substituted carbocyclyl, optionally substituted aryl, optionally substituted heterocyclyl, optionally substituted heteroaryl, optionally substituted acyl, or an oxygen protecting group.

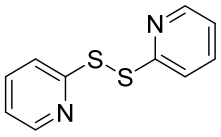
46. The method of claim 8 or 45, wherein the thiolating agent is of the formula $(R^SS)_2$; optionally

wherein the thiolating agent is of the formula (pyridine-S)$_2$; and optionally

wherein the thiolating agent is: .

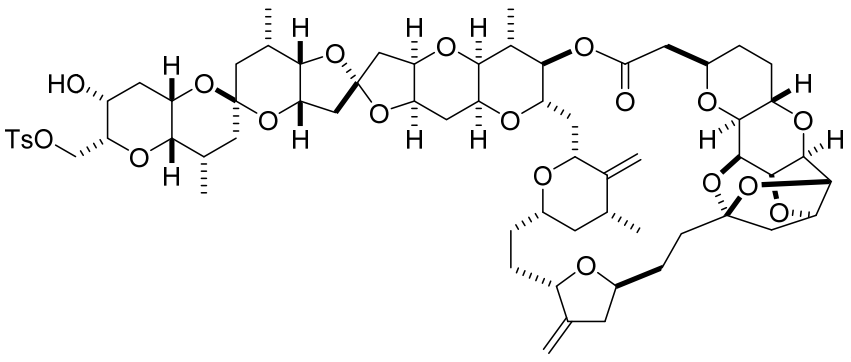
47. The method of any one of claims 8, 45, and 46, wherein the step of thiolating is carried out in the presence of a phosphine reagent; and optionally

wherein the phosphine is triphenylphosphine (Ph_3P).

48. The method of any one of claims 8 and 45-47, wherein the step of thiolating is carried out in the presence of the thiolating agent:  and PPh_3.

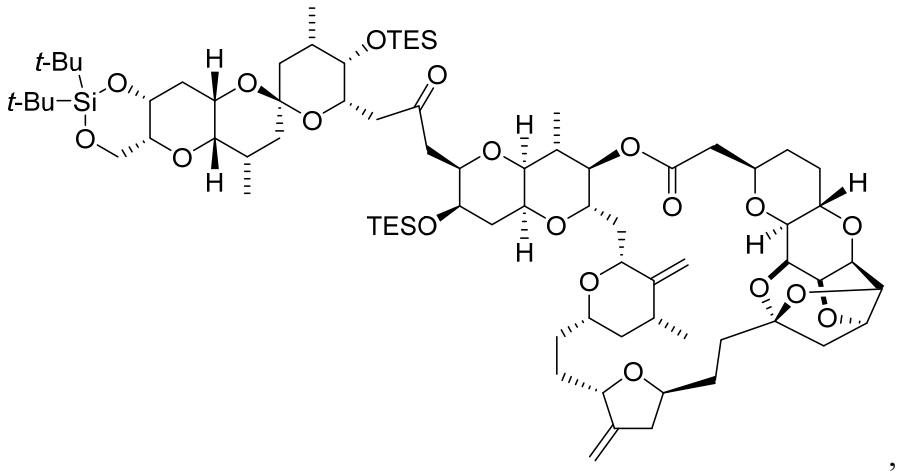
49. The method of any one of claims 8 and 45-48, wherein the step of thiolating is carried out in the presence of acetonitrile (MeCN).

50. The method of any one of the preceding claims, wherein the compound of Formula (A) is the following:

,

or a salt thereof.

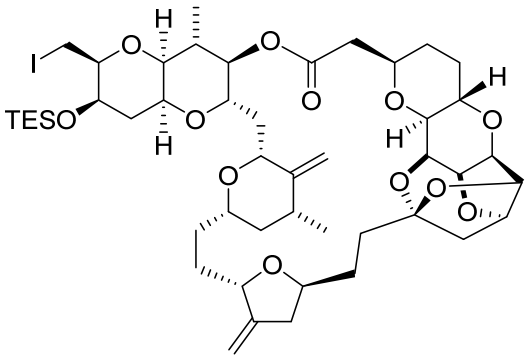
51. The method of any one of the preceding claims, wherein the compound of Formula (**E-1**) is the following:



,

or a salt thereof.

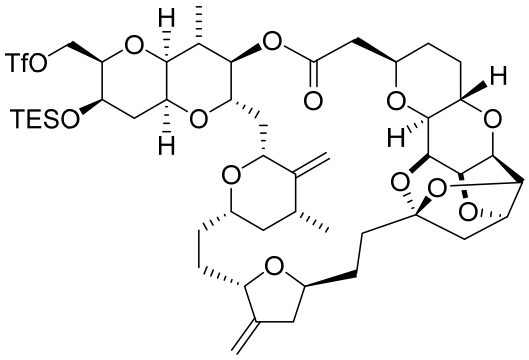
52. The method of any one of the preceding claims, wherein the compound of the formula (**E-R**) is the following:



,

or a salt thereof.

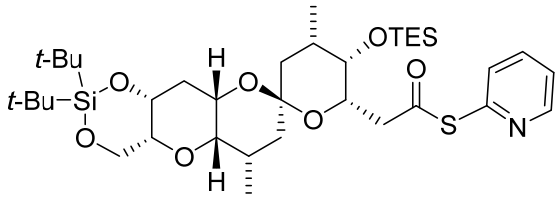
53. The method of any one of the preceding claims, wherein the compound of Formula (**E-R-1**) is the following:



,

or a salt thereof.

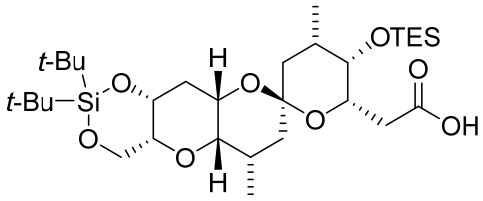
54. The method of any one of the preceding claims, wherein the compound of Formula (**E-L**) is the following:



,

or a salt thereof.

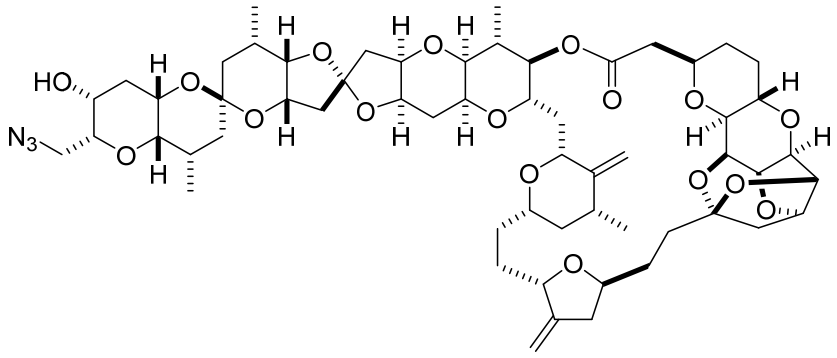
55. The method of any one of the preceding claims, wherein the compound of Formula (**E-L-1**) is the following:



,

or a salt thereof.

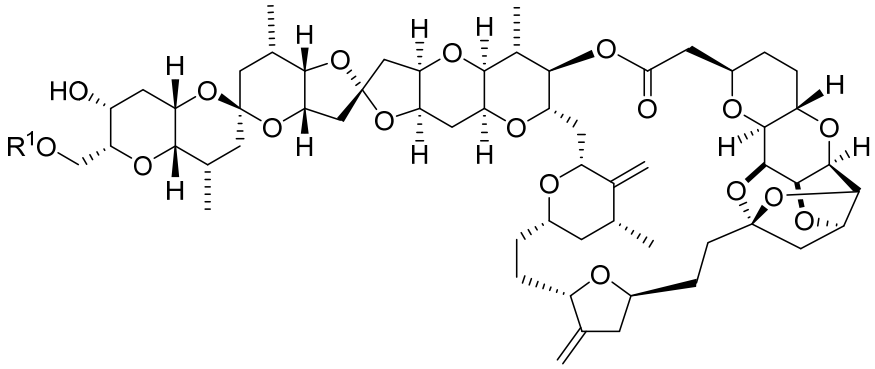
56. A compound of the formula:



Compound (B),

or a salt thereof.

57. A compound of the formula:

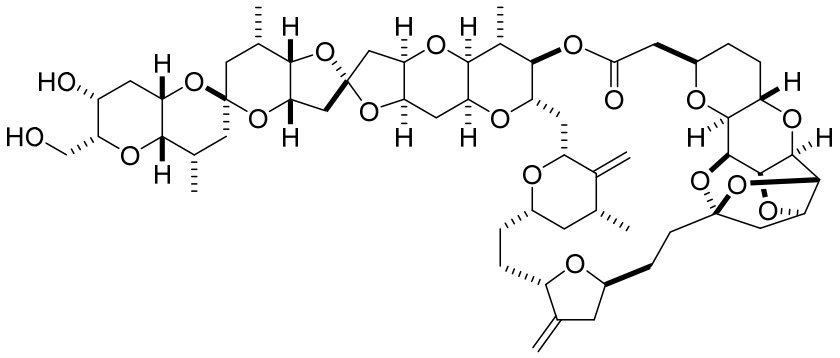


Compound (A),

or a salt thereof, wherein:

R^1 is optionally substituted sulfonyl, optionally substituted sulfinyl, optionally substituted phosphoryl, or optionally substituted acyl.

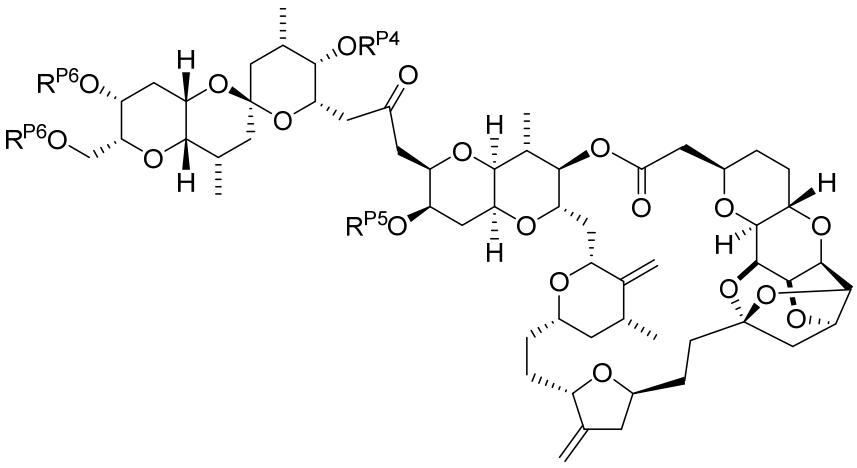
58. A compound of the formula:



Compound (2),

or a salt thereof.

59. A compound of Formula (**E-1**):

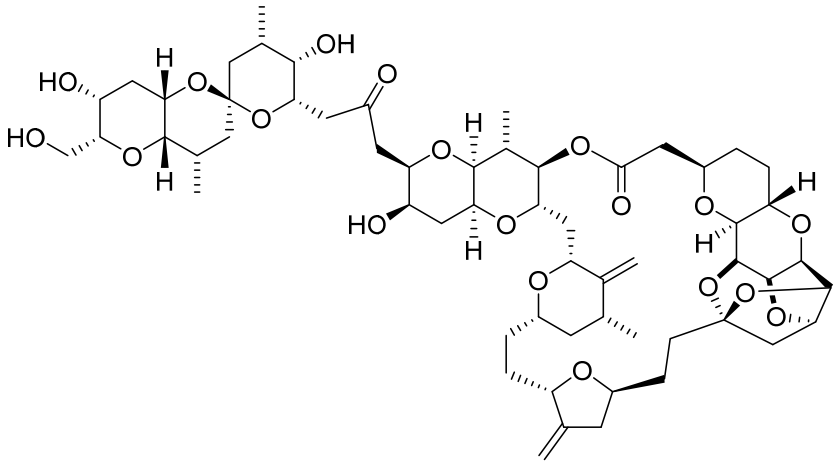


(**E-1**),

or a salt thereof, wherein:

R^{P4}, R^{P5}, and R^{P6} are each independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P6} are joined with the intervening atoms to form optionally substituted heterocyclyl.

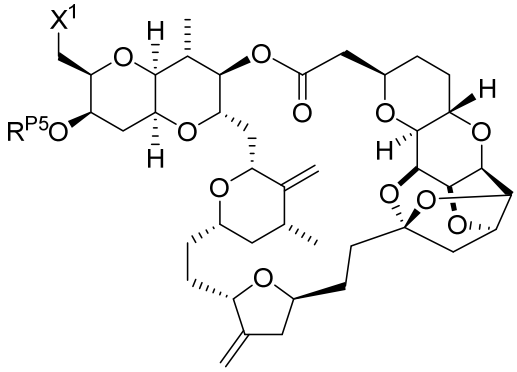
60. The compound of claim 59, wherein the compound is of the formula:



Compound (C),

or a salt thereof.

61. A compound of Formula (**E-R**):



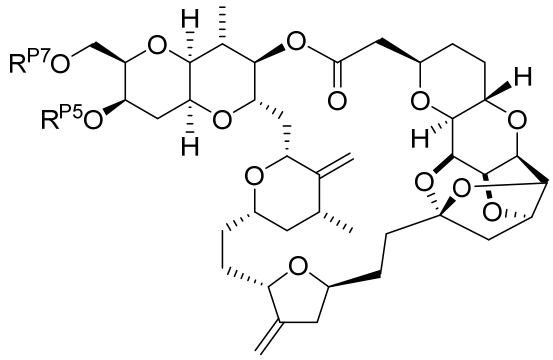
(**E-R**),

or a salt thereof, wherein:

X^1 is halogen or a leaving group; and

R^{P5} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group.

62. A compound of Formula (**E-R-1**):



(**E-R-1**),

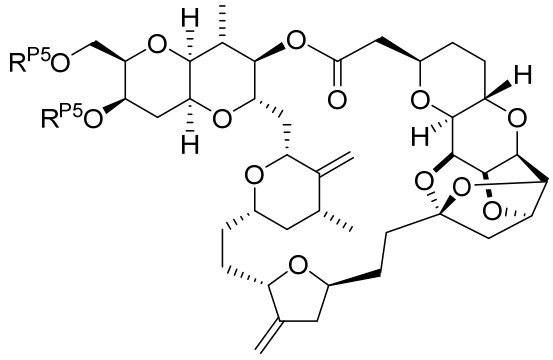
or a salt thereof, wherein:

R^{P5} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; and

R^{P7} is optionally substituted sulfonyl, optionally substituted sulfinyl, optionally substituted phosphoryl, optionally substituted acyl, or an oxygen protecting group; and

optionally wherein R^{P5} and R^{P7} are joined with the intervening atoms to form optionally substituted heterocyclyl.

63. A compound of Formula (**E-R-2**):

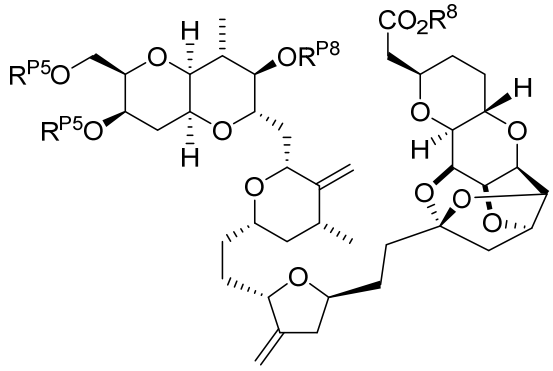


(**E-R-2**),

or a salt thereof, wherein:

each instance of R^{P5} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P5} groups are joined together with the intervening atoms to form optionally substituted heterocyclyl ring.

64. A compound of Formula (**E-R-7**):



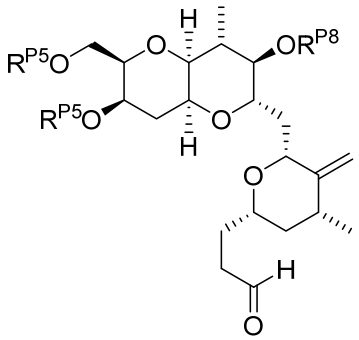
(**E-R-7**),

or a salt thereof, wherein:

each instance of R^{P5} is independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P5} groups are joined together with the intervening atoms to form an optionally substituted heterocyclyl ring; and

R^8 is hydrogen, optionally substituted alkyl, optionally substituted carbocyclyl, optionally substituted aryl, optionally substituted heterocyclyl, optionally substituted heteroaryl, optionally substituted acyl, or an oxygen protecting group.

65. A compound of Formula (**E-R-4**):

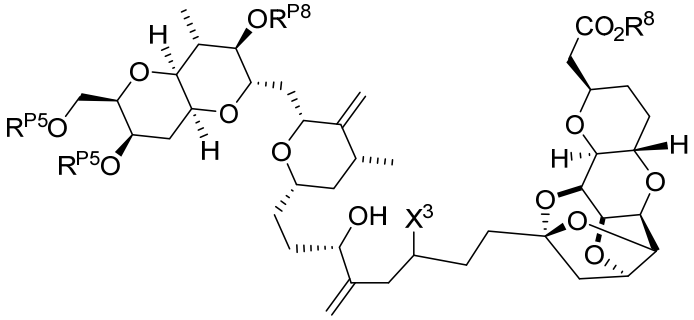


(**E-R-4**),

or a salt thereof, wherein:

each instance of R^{P5} and R^{P8} is independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P5} groups are joined together with the intervening atoms to form an optionally substituted heterocyclyl ring.

66. A compound of Formula (**E-R-6**):



(**E-R-6**),

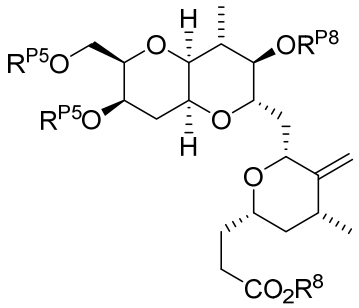
or a salt thereof, wherein:

X^3 is halogen or a leaving group;

each instance of R^{P5} and R^{P8} is independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P5} groups are joined together with the intervening atoms to form an optionally substituted heterocyclyl ring; and

R^8 is hydrogen, optionally substituted alkyl, optionally substituted carbocyclyl, optionally substituted aryl, optionally substituted heterocyclyl, optionally substituted heteroaryl, optionally substituted acyl, or an oxygen protecting group.

67. A compound of Formula (**E-R-8**):



(**E-R-8**),

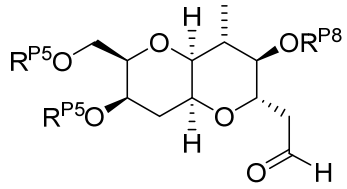
or a salt thereof, wherein:

each instance of R^{P5} and R^{P8} is independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P5} groups

are joined together with the intervening atoms to form an optionally substituted heterocyclyl ring; and

R^8 is hydrogen, optionally substituted alkyl, optionally substituted carbocyclyl, optionally substituted aryl, optionally substituted heterocyclyl, optionally substituted heteroaryl, optionally substituted acyl, or an oxygen protecting group.

68. A compound of Formula (**E-R-9**):

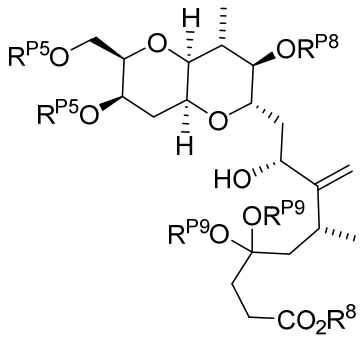


(**E-R-9**),

or a salt thereof, wherein:

each instance of R^{P5} and R^{P8} is independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P5} groups are joined together with the intervening atoms to form an optionally substituted heterocyclyl ring.

69. A compound of Formula (**E-R-11**):



(**E-R-11**),

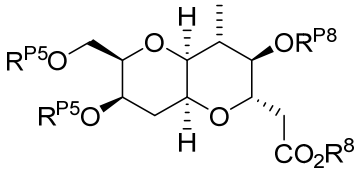
or a salt thereof, wherein:

each instance of R^{P5}, R^{P8}, and R^{P9} is independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P5} groups are joined together with the intervening atoms to form an optionally substituted heterocyclyl

ring; optionally wherein two R^{P9} groups are joined together with the intervening atoms to form an optionally substituted heterocyclyl ring; and

R^8 is hydrogen, optionally substituted alkyl, optionally substituted carbocyclyl, optionally substituted aryl, optionally substituted heterocyclyl, optionally substituted heteroaryl, optionally substituted acyl, or an oxygen protecting group.

70. A compound of Formula (**E-R-15**):



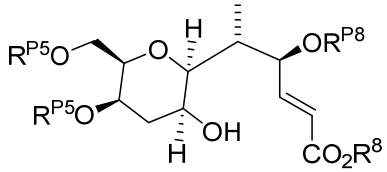
(**E-R-15**),

or a salt thereof, wherein:

each instance of R^{P5} and R^{P8} is independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P5} groups are joined together with the intervening atoms to form an optionally substituted heterocyclyl ring; and

R^8 is hydrogen, optionally substituted alkyl, optionally substituted carbocyclyl, optionally substituted aryl, optionally substituted heterocyclyl, optionally substituted heteroaryl, optionally substituted acyl, or an oxygen protecting group.

71. A compound of Formula (**E-R-16**):



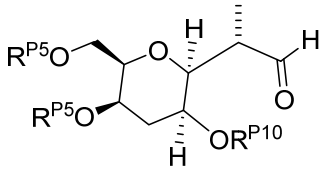
(**E-R-16**),

or a salt thereof, wherein:

each instance of R^{P5} and R^{P8} is independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P5} groups are joined together with the intervening atoms to form an optionally substituted heterocyclyl ring; and

R^8 is hydrogen, optionally substituted alkyl, optionally substituted carbocyclyl, optionally substituted aryl, optionally substituted heterocyclyl, optionally substituted heteroaryl, optionally substituted acyl, or an oxygen protecting group.

72. A compound of Formula (**E-R-17**):

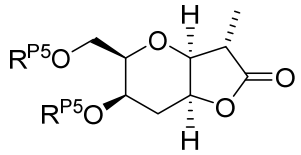


(**E-R-17**),

or a salt thereof, wherein:

each instance of R^{P5} and R^{P10} is independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P5} groups are joined together with the intervening atoms to form an optionally substituted heterocyclyl ring.

73. A compound of Formula (**E-R-19**):

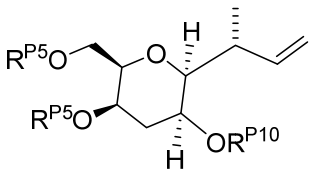


(**E-R-19**),

or a salt thereof, wherein:

each instance of R^{P5} is independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P5} groups are joined together with the intervening atoms to form an optionally substituted heterocyclyl ring.

74. A compound of Formula (**E-R-22**):

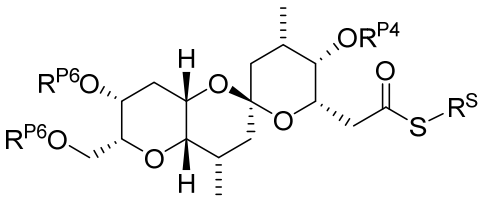


(**E-R-22**),

or a salt thereof, wherein:

each instance of R^{P5} and R^{P10} is independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P5} groups are joined together with the intervening atoms to form an optionally substituted heterocyclyl ring.

75. A compound of the Formula (**E-L**):

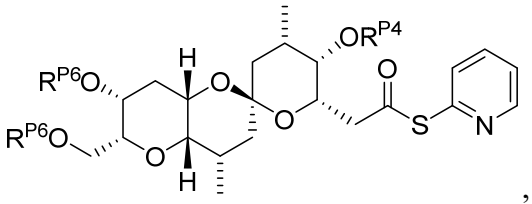


(**E-L**),

or a salt thereof, wherein:

R^S is optionally substituted alkyl, optionally substituted carbocyclyl, optionally substituted aryl, optionally substituted heterocyclyl, or optionally substituted heteroaryl; and each instance of R^{P4} and R^{P6} are independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P6} are joined with the intervening atoms to form optionally substituted heterocyclyl.

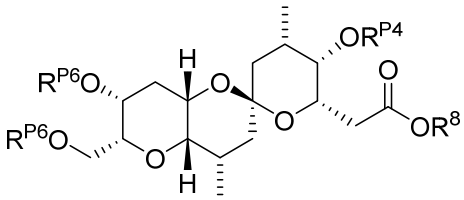
76. The compound of claim 75, wherein the compound is of the formula:



,

or a salt thereof.

77. A compound of Formula (**E-L-1**):



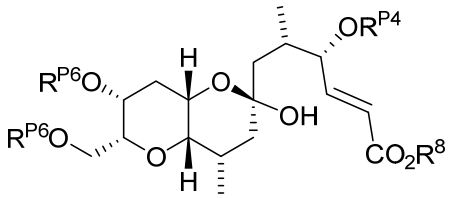
(**E-L-1**),

or a salt thereof, wherein:

each instance of R^{P4} and R^{P6} are independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P6} are joined with the intervening atoms to form optionally substituted heterocyclyl; and

R^8 is hydrogen, optionally substituted alkyl, optionally substituted carbocyclyl, optionally substituted aryl, optionally substituted heterocyclyl, optionally substituted heteroaryl, optionally substituted acyl, or an oxygen protecting group.

78. A compound of Formula (**E-L-2**):



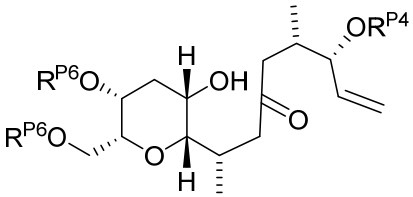
(**E-L-2**),

or a salt thereof, wherein:

each instance of R^{P4} and R^{P6} are independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P6} are joined with the intervening atoms to form optionally substituted heterocyclyl; and

R^8 is hydrogen, optionally substituted alkyl, optionally substituted carbocyclyl, optionally substituted aryl, optionally substituted heterocyclyl, optionally substituted heteroaryl, optionally substituted acyl, or an oxygen protecting group.

79. A compound of Formula (**E-L-5**):

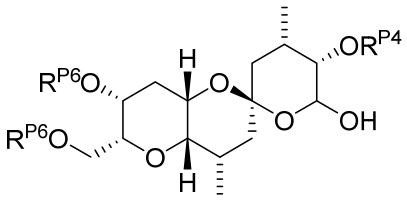


(**E-L-5**),

or a salt thereof, wherein:

each instance of R^{P4} and R^{P6} are independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P6} are joined with the intervening atoms to form optionally substituted heterocyclyl.

80. A compound of Formula (**E-L-6**):

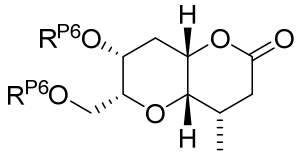


(**E-L-6**),

or a salt thereof, wherein:

each instance of R^{P4} and R^{P6} are independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P6} are joined with the intervening atoms to form optionally substituted heterocyclyl.

81. A compound of Formula (**E-L-7**):

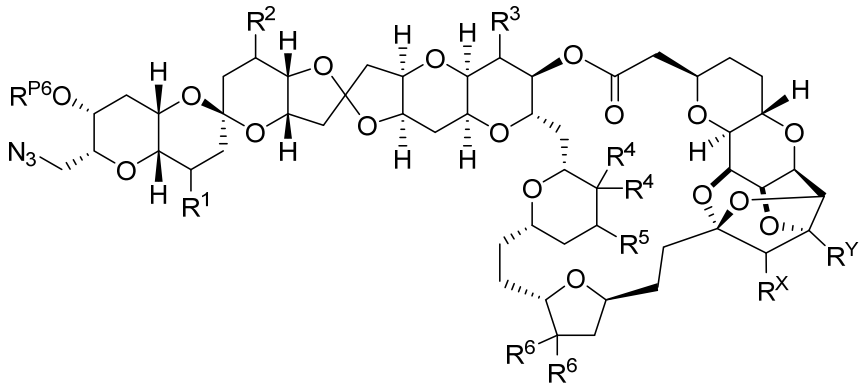


(**E-L-7**),

or a salt thereof, wherein:

each instance of R^{P6} are independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P6} are joined with the intervening atoms to form optionally substituted heterocyclyl.

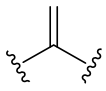
82. A compound of Formula (**H3-N3**):

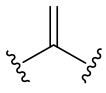


(**H3-N3**),

or a salt thereof, wherein:

R^1, R^2, R^3, and R^5 are each independently hydrogen, halogen, or optionally substituted alkyl;

each instance of R^4 is independently hydrogen, halogen, or optionally substituted alkyl, or two R^4 groups are taken together to form: ;

each instance of R^6 is independently hydrogen, halogen, or optionally substituted alkyl, or two R^6 groups are taken together to form: ;

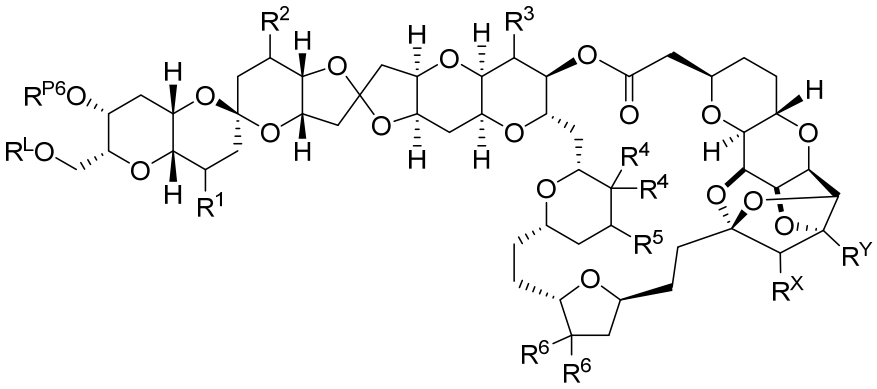
R^{P6} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group;

R^X is hydrogen or $–OR^{Xa}$, wherein R^{Xa} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; and

R^Y is hydrogen or $–OR^{Ya}$, wherein R^{Ya} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group;

optionally wherein R^{Xa} and R^{Ya} are joined together with their intervening atoms to form optionally substituted heterocyclyl.

83. A compound of Formula (**H3-L**):

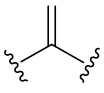


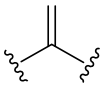
(**H3-L**),

or a salt thereof, wherein:

R^L is optionally substituted sulfonyl, optionally substituted sulfinyl, optionally substituted phosphoryl, or optionally substituted acyl;

R^1, R^2, R^3, and R^5 are each independently hydrogen, halogen, or optionally substituted alkyl;

each instance of R^4 is independently hydrogen, halogen, or optionally substituted alkyl, or two R^4 groups are taken together to form: ;

each instance of R^6 is independently hydrogen, halogen, or optionally substituted alkyl, or two R^6 groups are taken together to form: ;

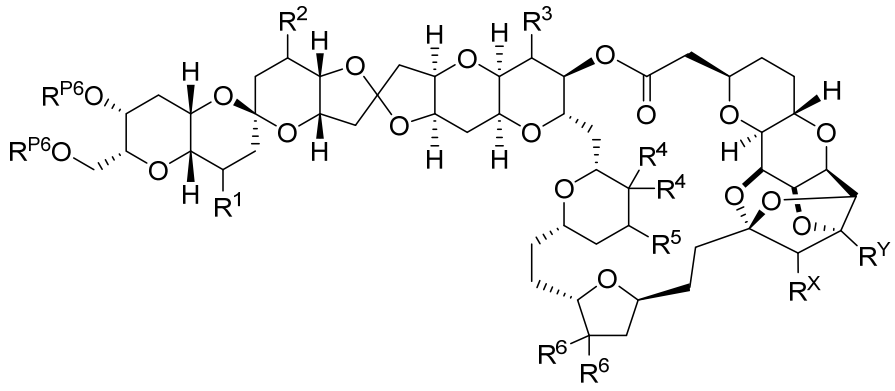
R^{P4}, R^{P5}, and R^{P6} are each independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group;

R^X is hydrogen or $–OR^{Xa}$, wherein R^{Xa} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; and

R^Y is hydrogen or $–OR^{Ya}$, wherein R^{Ya} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group;

optionally wherein R^{Xa} and R^{Ya} are joined together with their intervening atoms to form optionally substituted heterocyclyl.

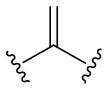
84. A compound of Formula (**H3-2-I**):

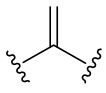


(**H3-2-I**),

or a salt thereof, wherein:

R^1, R^2, R^3, and R^5 are each independently hydrogen, halogen, or optionally substituted alkyl;

each instance of R^4 is independently hydrogen, halogen, or optionally substituted alkyl, or two R^4 groups are taken together to form: ;

each instance of R^6 is independently hydrogen, halogen, or optionally substituted alkyl, or two R^6 groups are taken together to form: ;

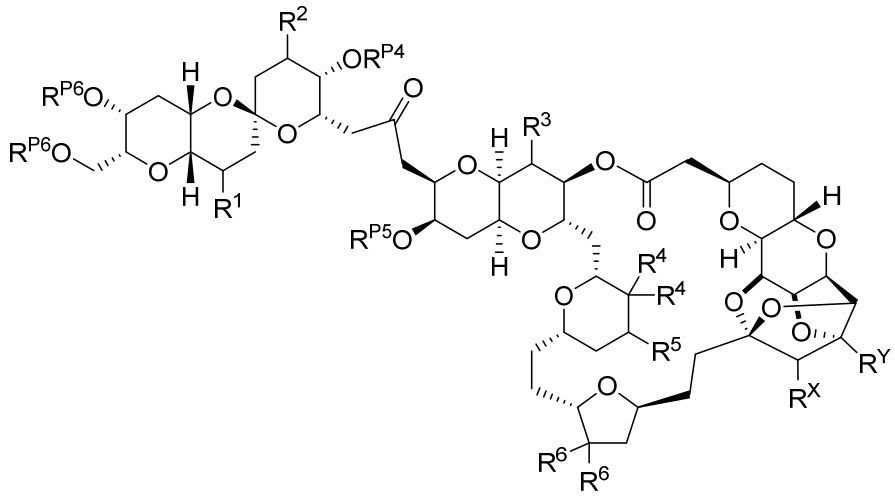
each instance of R^{P6} is independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P6} are joined with the intervening atoms to form optionally substituted heterocyclyl;

R^X is hydrogen or $–OR^{Xa}$, wherein R^{Xa} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; and

R^Y is hydrogen or $–OR^{Ya}$, wherein R^{Ya} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group;

optionally wherein R^{Xa} and R^{Ya} are joined together with their intervening atoms to form optionally substituted heterocyclyl.

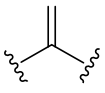
85. A compound of Formula (**H3-2-II**):

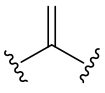


(**H3-2-II**),

or a salt thereof, wherein:

R^1, R^2, R^3, and R^5 are each independently hydrogen, halogen, or optionally substituted alkyl;

each instance of R^4 is independently hydrogen, halogen, or optionally substituted alkyl, or two R^4 groups are taken together to form: ;

each instance of R^6 is independently hydrogen, halogen, or optionally substituted alkyl, or two R^6 groups are taken together to form: ;

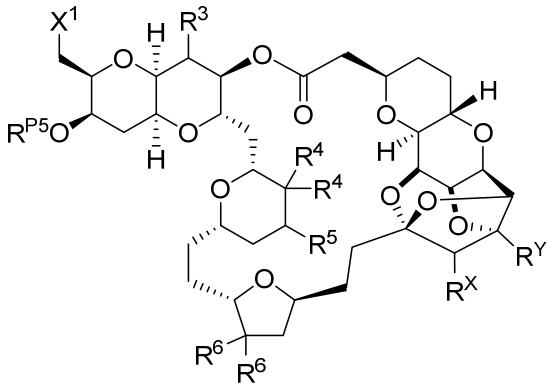
R^{P4}, R^{P5}, and R^{P6} are each independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P6} are joined with the intervening atoms to form optionally substituted heterocyclyl;

R^X is hydrogen or $–OR^{Xa}$, wherein R^{Xa} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; and

R^Y is hydrogen or $–OR^{Ya}$, wherein R^{Ya} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group;

optionally wherein R^{Xa} and R^{Ya} are joined together with their intervening atoms to form optionally substituted heterocyclyl.

86. A compound of Formula (**R-2-I**):

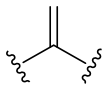


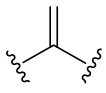
(**R-2-I**),

or a salt thereof, wherein:

X^1 is halogen or a leaving group;

R^3 and R^5 are each independently hydrogen, halogen, or optionally substituted alkyl;

each instance of R^4 is independently hydrogen, halogen, or optionally substituted alkyl, or two R^4 groups are taken together to form: ;

each instance of R^6 is independently hydrogen, halogen, or optionally substituted alkyl, or two R^6 groups are taken together to form: ;

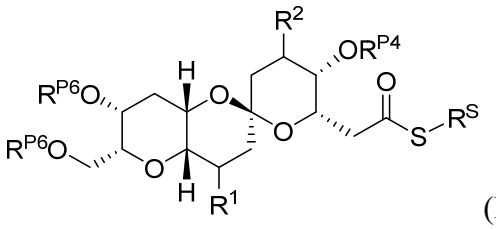
R^{P5} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group;

R^X is hydrogen or $–OR^{Xa}$, wherein R^{Xa} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; and

R^Y is hydrogen or $–OR^{Ya}$, wherein R^{Ya} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group;

optionally wherein R^{Xa} and R^{Ya} are joined together with their intervening atoms to form optionally substituted heterocyclyl.

87. A compound of Formula (**L-2-6**):



(**L-2-6**),

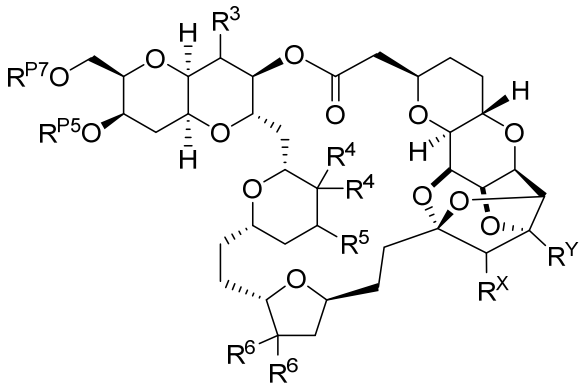
or a salt thereof, wherein:

R^S is optionally substituted alkyl, optionally substituted carbocyclyl, optionally substituted aryl, optionally substituted heterocyclyl, or optionally substituted heteroaryl;

R^1 and R^2 are each independently hydrogen, halogen, or optionally substituted alkyl; and

R^{P4} and R^{P6} are each independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P6} are joined with the intervening atoms to form optionally substituted heterocyclyl.

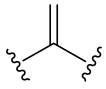
88. A compound of Formula (**R-4-11B**):

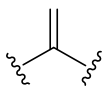


(**R-4-11B**),

or a salt thereof, wherein:

R^3 and R^5 are each independently hydrogen, halogen, or optionally substituted alkyl;

each instance of R^4 is independently hydrogen, halogen, or optionally substituted alkyl, or two R^4 groups are taken together to form: ;

each instance of R^6 is independently hydrogen, halogen, or optionally substituted alkyl, or two R^6 groups are taken together to form: ;

R^{P5} and R^{P7} are each independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group;

R^{P7} is optionally substituted sulfonyl, optionally substituted sulfinyl, optionally substituted phosphoryl, optionally substituted acyl, or an oxygen protecting group;

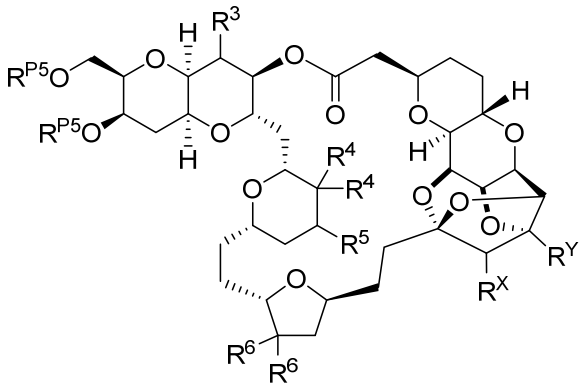
optionally wherein R^{P5} and R^{P7} are joined with the intervening atoms to form optionally substituted heterocyclyl;

R^X is hydrogen or $–OR^{Xa}$, wherein R^{Xa} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; and

R^Y is hydrogen or $–OR^{Ya}$, wherein R^{Ya} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group;

optionally wherein R^{Xa} and R^{Ya} are joined together with their intervening atoms to form optionally substituted heterocyclyl.

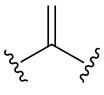
89. A compound of Formula (**R-4-11A**):

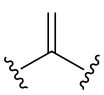


(**R-4-11A**),

or a salt thereof, wherein:

R^3 and R^5 are each independently hydrogen, halogen, or optionally substituted alkyl;

each instance of R^4 is independently hydrogen, halogen, or optionally substituted alkyl, or two R^4 groups are taken together to form: ;

each instance of R^6 is independently hydrogen, halogen, or optionally substituted alkyl, or two R^6 groups are taken together to form: ;

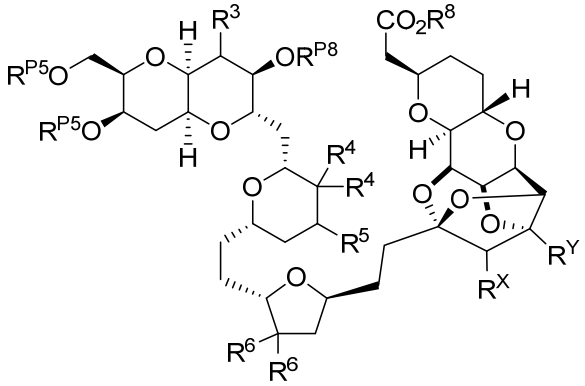
each instance of R^{P5} is independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P5} groups are joined together with the intervening atoms to form an optionally substituted heterocyclyl ring;

R^X is hydrogen or $–OR^{Xa}$, wherein R^{Xa} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; and

R^Y is hydrogen or $–OR^{Ya}$, wherein R^{Ya} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group;

optionally wherein R^{Xa} and R^{Ya} are joined together with their intervening atoms to form optionally substituted heterocyclyl.

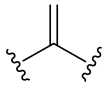
90. A compound of Formula (**R-4-10**):

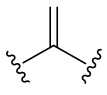


(**R-4-10**),

or a salt thereof, wherein:

R^3 and R^5 are each independently hydrogen, halogen, or optionally substituted alkyl;

each instance of R^4 is independently hydrogen, halogen, or optionally substituted alkyl, or two R^4 groups are taken together to form: ;

each instance of R^6 is independently hydrogen, halogen, or optionally substituted alkyl, or two R^6 groups are taken together to form: ;

each instance of R^{P5} and R^{P8} is independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P5} groups

are joined together with the intervening atoms to form an optionally substituted heterocyclyl ring;

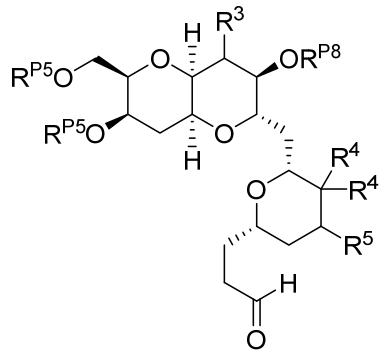
R^8 is hydrogen, optionally substituted alkyl, optionally substituted carbocyclyl, optionally substituted aryl, optionally substituted heterocyclyl, optionally substituted heteroaryl, optionally substituted acyl, or an oxygen protecting group;

R^X is hydrogen or $–OR^{Xa}$, wherein R^{Xa} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; and

R^Y is hydrogen or $–OR^{Ya}$, wherein R^{Ya} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group;

optionally wherein R^{Xa} and R^{Ya} are joined together with their intervening atoms to form optionally substituted heterocyclyl.

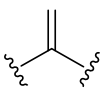
91. A compound of Formula (**R-4-8**):



(**R-4-8**),

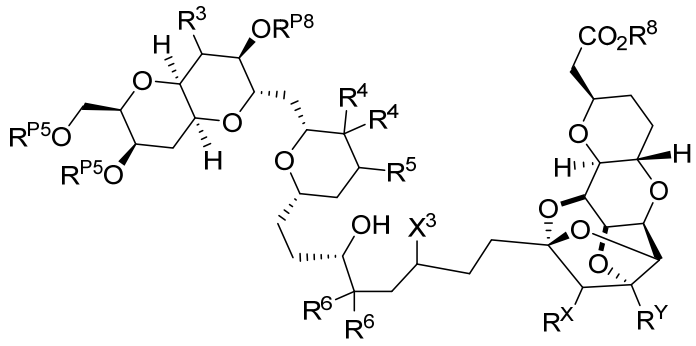
or a salt thereof, wherein:

R^3 and R^5 are each independently hydrogen, halogen, or optionally substituted alkyl;

each instance of R^4 is independently hydrogen, halogen, or optionally substituted alkyl, or two R^4 groups are taken together to form:  ; and

each instance of R^{P5} and R^{P8} is independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P5} groups are joined together with the intervening atoms to form an optionally substituted heterocyclyl ring.

92. A compound of Formula (**R-4-10B**):

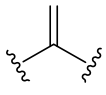


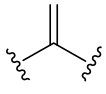
(**R-4-10B**),

or a salt thereof, wherein:

X^3 is halogen or a leaving group;

R^3 and R^5 are each independently hydrogen, halogen, or optionally substituted alkyl;

each instance of R^4 is independently hydrogen, halogen, or optionally substituted alkyl, or two R^4 groups are taken together to form: ;

each instance of R^6 is independently hydrogen, halogen, or optionally substituted alkyl, or two R^6 groups are taken together to form: ;

each instance of R^{P5} and R^{P8} is independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P5} groups are joined together with the intervening atoms to form an optionally substituted heterocyclyl ring;

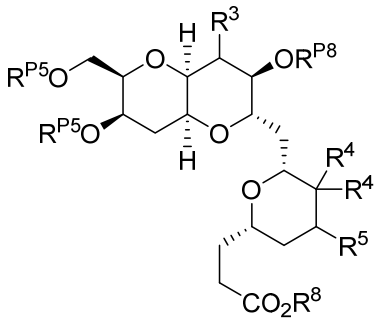
R^8 is hydrogen, optionally substituted alkyl, optionally substituted carbocyclyl, optionally substituted aryl, optionally substituted heterocyclyl, optionally substituted heteroaryl, optionally substituted acyl, or an oxygen protecting group;

R^X is hydrogen or $–OR^{Xa}$, wherein R^{Xa} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; and

R^Y is hydrogen or $–OR^{Ya}$, wherein R^{Ya} is hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group;

optionally wherein R^{Xa} and R^{Ya} are joined together with their intervening atoms to form optionally substituted heterocyclyl.

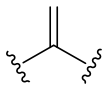
93. A compound of Formula (**R-4-7**):



(**R-4-7**),

or a salt thereof, wherein:

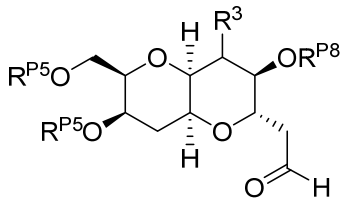
R^3 and R^5 are each independently hydrogen, halogen, or optionally substituted alkyl;

each instance of R^4 is independently hydrogen, halogen, or optionally substituted alkyl, or two R^4 groups are taken together to form: ;

each instance of R^{P5} and R^{P8} is independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P5} groups are joined together with the intervening atoms to form an optionally substituted heterocyclyl ring; and

R^8 is hydrogen, optionally substituted alkyl, optionally substituted carbocyclyl, optionally substituted aryl, optionally substituted heterocyclyl, optionally substituted heteroaryl, optionally substituted acyl, or an oxygen protecting group.

94. A compound of Formula (**R-4-5B**):



(**R-4-5B**),

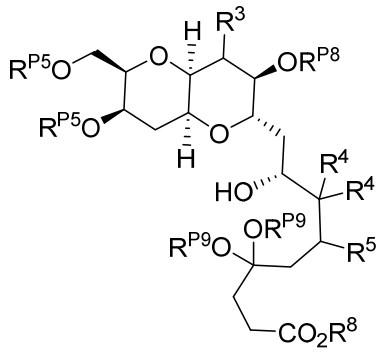
or a salt thereof, wherein:

R^3 is hydrogen, halogen, or optionally substituted alkyl; and

each instance of R^{P5} and R^{P8} is independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P5} groups

are joined together with the intervening atoms to form an optionally substituted heterocyclyl ring.

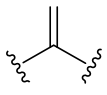
95. A compound of Formula (**R-4-7A**):



(**R-4-7A**),

or a salt thereof; wherein:

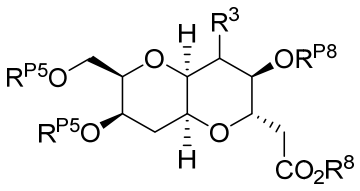
R^3 and R^5 are each independently hydrogen, halogen, or optionally substituted alkyl;

each instance of R^4 is independently hydrogen, halogen, or optionally substituted alkyl, or two R^4 groups are taken together to form: ;

each instance of R^{P5}, R^{P8}, and R^{P9} is independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P5} groups are joined together with the intervening atoms to form an optionally substituted heterocyclyl ring; and optionally wherein two R^{P9} groups are joined together with the intervening atoms to form an optionally substituted heterocyclyl ring; and

R^8 is hydrogen, optionally substituted alkyl, optionally substituted carbocyclyl, optionally substituted aryl, optionally substituted heterocyclyl, optionally substituted heteroaryl, optionally substituted acyl, or an oxygen protecting group.

96. A compound of Formula (**R-4-5A**):



(**R-4-5A**),

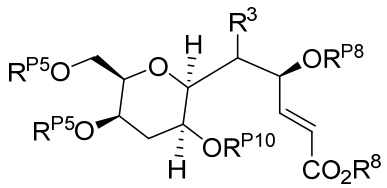
or a salt thereof, wherein:

R^3 is hydrogen, halogen, or optionally substituted alkyl;

each instance of R^{P5} and R^{P8} is independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P5} groups are joined together with the intervening atoms to form an optionally substituted heterocyclyl ring; and

R^8 is hydrogen, optionally substituted alkyl, optionally substituted carbocyclyl, optionally substituted aryl, optionally substituted heterocyclyl, optionally substituted heteroaryl, optionally substituted acyl, or an oxygen protecting group.

97. A compound of Formula (**R-4-4**):



(**R-4-4**),

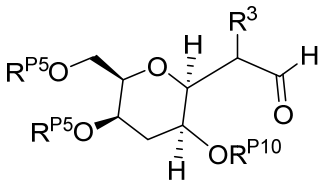
or salts thereof, wherein:

R^3 is hydrogen, halogen, or optionally substituted alkyl;

each instance of R^{P5}, R^{P8}, and R^{P10} is independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P5} groups are joined together with the intervening atoms to form an optionally substituted heterocyclyl ring; and

R^8 is hydrogen, optionally substituted alkyl, optionally substituted carbocyclyl, optionally substituted aryl, optionally substituted heterocyclyl, optionally substituted heteroaryl, optionally substituted acyl, or an oxygen protecting group.

98. A compound of Formula (**R-4-2**):



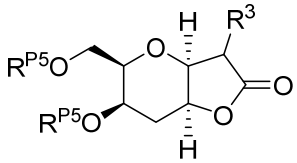
(**R-4-2**),

or salt thereof, wherein:

R^3 is hydrogen, halogen, or optionally substituted alkyl; and

each instance of R^{P5} and R^{P10} is independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P5} groups are joined together with the intervening atoms to form an optionally substituted heterocyclyl ring.

99. A compound of Formula (**R-4-1**):



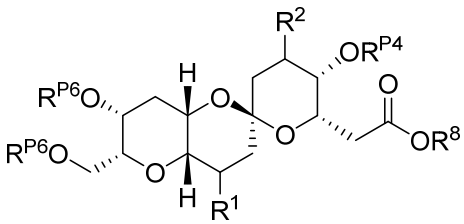
(**R-4-1**),

or salts thereof, wherein:

R^3 is hydrogen, halogen, or optionally substituted alkyl; and

R^{P5} is independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P5} groups are joined together with the intervening atoms to form an optionally substituted heterocyclyl ring.

100. A compound of Formula (**L-5-7B**):



(**L-5-7B**),

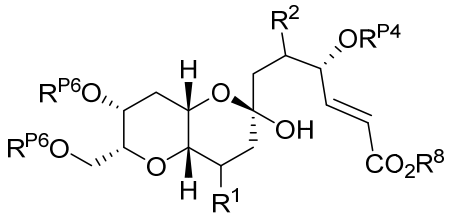
or a salt thereof; wherein:

R^1 and R^2 are each independently hydrogen, halogen, or optionally substituted alkyl;

each instance of R^{P4} and R^{P6} are independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P6} are joined with the intervening atoms to form optionally substituted heterocyclyl; and

R^8 is hydrogen, optionally substituted alkyl, optionally substituted carbocyclyl, optionally substituted aryl, optionally substituted heterocyclyl, optionally substituted heteroaryl, optionally substituted acyl, or an oxygen protecting group.

101. A compound of Formula (**L-5-7A**):



(**L-5-7A**),

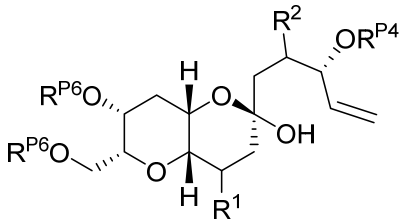
or a salt thereof; wherein:

R^1 and R^2 are each independently hydrogen, halogen, or optionally substituted alkyl;

each instance of R^{P4} and R^{P6} are independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P6} are joined with the intervening atoms to form optionally substituted heterocyclyl; and

R^8 is hydrogen, optionally substituted alkyl, optionally substituted carbocyclyl, optionally substituted aryl, optionally substituted heterocyclyl, optionally substituted heteroaryl, optionally substituted acyl, or an oxygen protecting group.

102. A compound of Formula (**L-5-6A**):



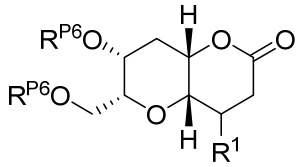
(**L-5-6A**),

or a salt thereof; wherein:

R^1 and R^2 are each independently hydrogen, halogen, or optionally substituted alkyl; and

each instance of R^{P4} and R^{P6} are independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P6} are joined with the intervening atoms to form optionally substituted heterocyclyl.

103. A compound of Formula (**L-5-4**):



(**L-5-4**),

or a salt thereof, wherein:

R^1 is independently hydrogen, halogen, or optionally substituted alkyl; and

each R^{P6} is independently hydrogen, optionally substituted alkyl, optionally substituted acyl, or an oxygen protecting group; optionally wherein two R^{P6} are joined with the intervening atoms to form optionally substituted heterocyclyl.