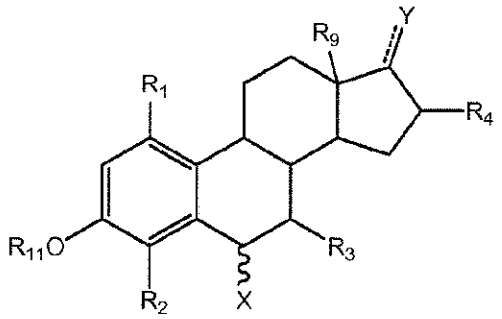
We Claim:

1. A compound of formula:



wherein

R_1, R_2, R_3 and R_4 are independently selected from hydrogen, C_1-C_6 alkyl, halo, a sulfate, a glucuronide, -OH, a bulky group, aryl, cycloalkyl, heteroaryl, heterocycloalkyl, $-N(CH_2)_n$, a phosphate group, and a phosphinate group;

R_9 is selected from hydrogen, halogen or alkyl;

R_{11} is selected from H, C_1-C_6 alkyl, halogen, a sulfate, a glucoronide, $-SO_2NH_2$, -COOH, -CN, $-CH_2CN$-, -NHCN-, -CHO, $=CHOCH_3$, -COO salt, $-OSO_2$alkyl, $-NH_2$, and $-NHCO(CH_2)_n$;

R_{12} is selected from H, a C_1-C_6 alkyl, a sulfate, a glucoronide, a bulky group, aryl, cycloalkyl, heteroaryl and heterocycloalkyl;

X is selected from C_1-C_{12} alkyl, C_2-C_{12} alkenyl, C_2-C_{12} alkynyl, halogen, a glucoronide, $-NH_2$, $-SO_2NH_2$, -COOH, -CN, $-CH_2CN$, -NHCN, -CHO, -COOsalt, $-OSO_2$alkyl, -SH, $-SCH_3$, $-CH[(CH_2)_nCH_3]COOCH_3$, $-(CH_2)_mCOOCH_3$, $-(CH_2)_m-O-CH_3$, $-(CH_2)_m-O-(CH_2)_nCH_3$, $(CH_2)_m-S-CH_3$, $-(CH_2)_m-S-(CH_2)_nCH_3$, $-(CH_2)_m-NH-(CH_2)_nCH_3$, $-C_2$-C_8 alkenyl-O-$(CH_2)_nCH_3$, $-C_2$-C_8 alkenyl-S-$(CH_2)_nCH_3$, $-C_2$-C_8 alkenyl-N-$(CH_2)_nCH_3$, $-C_2$-C_8 alkynyl-O-$(CH_2)_nCH_3$, $-C_2$-C_8 alkynyl-S-$(CH_2)_nCH_3$, $-C_2$-C_8

alkynyl-N-$(CH_2)_nCH_3$, $-(CH_2)_m-OH$, $-(CH_2)_m-O-NH_2$, $-(CH_2)_m-S-NH_2$, $-NH(CH_2)_mCH_3$, $-NH(CH_2)_mOCH_3$, $-NH(CH_2)_mCHOH-COOH$, $-N(CH_3)_2$, $-(CH_2)_m(NH)CH_2OH$, $-NHCOOH$, $-(CH_2)_mNHCOOH$, $-NO_2$, $-SCN$, $-SO_2$alkyl, $-B(OH)_2$, $-(CH_2)_m N(CH_3)-SO_2-NH_3$, $-(CH_2)_m-NH-SO_2-NH_2$, $-NHC(=S)CH_3$, and $-NHNH_2$;

Y is selected from hydrogen, =O, $-OCO(R_6)$ and -OH;

m is an integer between 0-20;

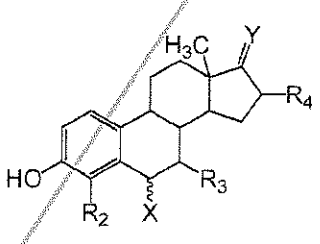
n is an integer between 0-8;

the ---- symbol represents either a single or a double bond capable of forming a keto group at position 3 or 17; and

the ~~~ symbol represents any type of bond regardless of the stereochemistry;

and the respective enantiomers, stereochemical isomers, hydrates, solvates, tautomers and pharmaceutically acceptable salts thereof.

2. A compound according to claim 1 having the formula:



3. A compound according to claim 2 wherein

Y is selected from =O or -OH;

R_4 is selected from hydrogen, halo and C_1-C_6 alkyl;

R_2 is selected from hydrogen, -OH and halo;

R_3 is selected from hydrogen, halo and -OH;

X is selected from C_1-C_{12} alkyl, C_2-C_{12} alkenyl, $-(CH_2)_nCOOCH_3$, $-(CH_2)_m-O-CH_3$, $-(CH_2)_m-O-(CH_2)_nCH_3$, $(CH_2)_m-S-CH_3$, $-(CH_2)_m-S-(CH_2)_nCH_3$, $-(CH_2)_m-N-(CH_2)_nCH_3$, $-C_2$-C_8 alkenyl-O-$(CH_2)_nCH_3$, $-C_2$-C_8 alkenyl-S-$(CH_2)_nCH_3$, $-C_2$-C_8

~~alkenyl-N-$(CH_2)_nCH_3$, -C_2-C_8 alkynyl-O-$(CH_2)_nCH_3$, -C_2-C_8~~ alkynyl-S-$(CH_2)_nCH_3$, -C_2-C_8 alkynyl-N-$(CH_2)_nCH_3$, -$(CH_2)_m$-OH, -$(CH_2)_m$-O-NH_2, -$(CH_2)_m$-S-NH_2, -$NH(CH_2)_mCH_3$, -$NH(CH_2)_mOCH_3$, -$NH(CH_2)_mCHOH$-COOH, -$(CH_2)_m(NH)CH_2OH$, -$(CH_2)_m$NHCOOH, -$(CH_2)_m N(CH_3)$-SO_2-NH_3, and -$(CH_2)_m$-NH-SO_2-NH_2;

m is an integer from 1-20;

n is an integer from 0-8; and

the ---- symbol represents either a single or a double bond.

4. A compound according to claim 3 wherein

Y is (*S*)-configured -OH;

R_4 is selected from hydrogen and alkyl;

R_2 and R_3 are hydrogen;

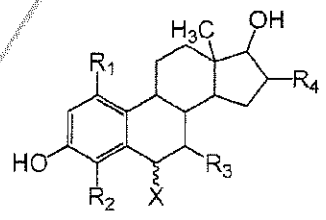
X is selected from C_1-C_{12} alkyl, C_2-C_{12} alkenyl, -$(CH_2)_m$-O-CH_3, -$(CH_2)_m$-O-$(CH_2)_nCH_3$, $(CH_2)_m$-S-CH_3, and -$(CH_2)_m$-S-$(CH_2)_nCH_3$;

m is an integer from 1-6;

n is an integer from 0-3; and

the C-13 methyl group is (*S*)-configured.

5. A compound according to claim 1 having the formula:



6. A compound according to claim 5 wherein:

R_1 is selected from hydrogen, -OH and halo;

R_4 is selected from hydrogen, halo or C_1-C_6 alkyl;

R_2 is selected from hydrogen and halo;

~~R_3 is selected from hydrogen, halo and -OH;~~

X is selected from C_1-C_{12} alkyl, C_2-C_{12} alkenyl, $-(CH_2)_mCOOCH_3$, $-(CH_2)_m-O-CH_3$, $-(CH_2)_m-O-(CH_2)_nCH_3$, $(CH_2)_m-S-CH_3$, $-(CH_2)_m-S-(CH_2)_nCH_3$, $-(CH_2)_m-N-(CH_2)_nCH_3$, $-C_2-C_8$ alkenyl-$O-(CH_2)_nCH_3$, $-C_2-C_8$ alkenyl-$S-(CH_2)_nCH_3$, $-C_2-C_8$ alkenyl-$N-(CH_2)_nCH_3$, $-C_2-C_8$ alkynyl-$O-(CH_2)_nCH_3$, $-C_2-C_8$ alkynyl-$S-(CH_2)_nCH_3$, $-C_2-C_8$ alkynyl-$N-(CH_2)_nCH_3$, $-(CH_2)_m-OH$, $-(CH_2)_m-O-NH_2$, $-(CH_2)_m-S-NH_2$, $-NH(CH_2)_mCH_3$, $NH(CH_2)_mOCH_3$, $-NH(CH_2)_mCHOH-COOH$, $-(CH_2)_m(NH)CH_2OH$, $-(CH_2)_mNHCOOH$, $-(CH_2)_m N(CH_3)-SO_2-NH_3$, and $-(CH_2)_m-NH-SO_2-NH_2$;

m is an integer from 1-20; and

n is an integer from 0-8.

7. A compound according to claim 6 wherein:

R_1 is hydrogen;

R_4 is selected from hydrogen or alkyl;

R_2 and R_3 are hydrogen;

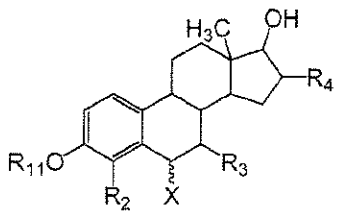
X is selected from C_1-C_{12} alkyl, C_2-C_{12} alkenyl, $-(CH_2)_m-O-CH_3$, $-(CH_2)_m-O-(CH_2)_nCH_3$, $(CH_2)_m-S-CH_3$, and $-(CH_2)_m-S-(CH_2)_nCH_3$;

m is an integer from 1-12; and

n is an integer from 0-4,

wherein both the C-13 methyl and C-17 hydroxyl are (*S*)-configured.

8. A compound according to claim 1 having the formula:



9. A compound according to claim 8 wherein:

~~R_{11} is selected from hydrogen and C_1-C_6 alkyl;~~

R_4 is selected from hydrogen, halo and C_1-C_6 alkyl;

R_2 is selected from hydrogen and halo;

R_3 is selected from hydrogen, halo and -OH;

X is selected from C_1-C_{12} alkyl, C_2-C_{12} alkenyl, $-(CH_2)_mCOOCH_3$, $-(CH_2)_m-O-CH_3$, $-(CH_2)_m-O-(CH_2)_nCH_3$, $(CH_2)_m-S-CH_3$, $-(CH_2)_m-S-(CH_2)_nCH_3$, $-(CH_2)_m-N-(CH_2)_nCH_3$, $-C_2-C_8$ alkenyl-O-$(CH_2)_nCH_3$, $-C_2-C_8$ alkenyl-S-$(CH_2)_nCH_3$, $-C_2-C_8$ alkenyl-N-$(CH_2)_nCH_3$, $-C_2-C_8$ alkynyl-O-$(CH_2)_nCH_3$, $-C_2-C_8$ alkynyl-S-$(CH_2)_nCH_3$, $-C_2-C_8$ alkynyl-N-$(CH_2)_nCH_3$, $-(CH_2)_m-OH$, $-(CH_2)_m-O-NH_2$, $-(CH_2)_m-S-NH_2$, $-NH(CH_2)_mCH_3$, $NH(CH_2)_mOCH_3$, $-NH(CH_2)_mCHOH-COOH$, $-(CH_2)_m(NH)CH_2OH$, $-(CH_2)_mNHCOOH$, $-(CH_2)_m N(CH_3)-SO_2-NH_3$, and $-(CH_2)_m-NH-SO_2-NH_2$;

m is an integer from 1-20; and

n is an integer from 0-8.

10. A compound according to claim 9 wherein:

R_{11} is hydrogen;

R_4 is selected from hydrogen or alkyl;

R_2 and R_3 are hydrogen;

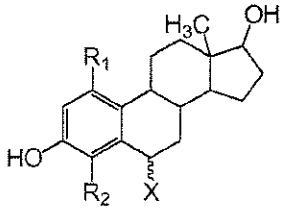
X is selected from C_1-C_{12} alkyl, C_2-C_{12} alkenyl, $-(CH_2)_m-O-CH_3$, $-(CH_2)_m-O-(CH_2)_nCH_3$, $(CH_2)_m-S-CH_3$, and $-(CH_2)_m-S-(CH_2)_nCH_3$;

m is an integer from 1-12; and

n is an integer from 0-4,

wherein both the C-13 methyl and C-17 hydroxyl are (*S*)-configured.

11. A compound according to claim 1 having the formula:



12. A compound according to claim 11 wherein:

R_1 is selected from hydrogen, -OH and halo;

R_2 is selected from hydrogen and halo;

X is selected from C_1-C_{12} alkyl, C_2-C_{12} alkenyl, $-(CH_2)_mCOOCH_3$, $-(CH_2)_m-O-CH_3$, $-(CH_2)_m-O-(CH_2)_nCH_3$, $(CH_2)_m-S-CH_3$, $-(CH_2)_m-S-(CH_2)_nCH_3$, $-(CH_2)_m-N-(CH_2)_nCH_3$, $-C_2-C_8$ alkenyl-$O-(CH_2)_nCH_3$, $-C_2-C_8$ alkenyl-$S-(CH_2)_nCH_3$, $-C_2-C_8$ alkenyl-$N-(CH_2)_nCH_3$, $-C_2-C_8$ alkynyl-$O-(CH_2)_nCH_3$, $-C_2-C_8$ alkynyl-$S-(CH_2)_nCH_3$, $-C_2-C_8$ alkynyl-$N-(CH_2)_nCH_3$, $-(CH_2)_m-OH$, $-(CH_2)_m-O-NH_2$, $-(CH_2)_m-S-NH_2$, $-NH(CH_2)_mCH_3$, $NH(CH_2)_mOCH_3$, $-NH(CH_2)_mCHOH-COOH$, $-(CH_2)_m(NH)CH_2OH$, $-(CH_2)_mNHCOOH$, $-(CH_2)_m N(CH_3)-SO_2-NH_3$, and $-(CH_2)_m-NH-SO_2-NH_2$;

m is an integer from 1-20; and

n is an integer from 0-8.

13. A compound of claim 12 wherein

R_1 and R_2 are hydrogen;

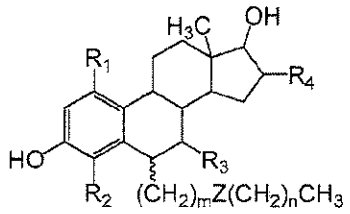
X is selected from C_1-C_{12} alkyl, C_2-C_{12} alkenyl, $-(CH_2)_m-O-CH_3$, $-(CH_2)_m-O-(CH_2)_nCH_3$, $(CH_2)_m-S-CH_3$, and $-(CH_2)_m-S-(CH_2)_nCH_3$;

m is an integer from 1-12; and

n is an integer from 0-4,

wherein both the C-13 methyl and C-17 hydroxyl are (*S*)-configured.

14. A compound according to claim 1 having the formula:



wherein Z is selected from -O-, -S- and -NH-.

15. A compound of claim 14 wherein

m is 1-12;

n is 0-4;

R_1 is selected from hydrogen, -OH and halo;

R_4 is selected from hydrogen, halo and C_1-C_6 alkyl;

R_2 is selected from hydrogen and halo;

R_3 is selected from hydrogen, halo and -OH; and

Z is selected from -O- and -S-.

16. A compound according to claim 15 wherein

m is 2-8;

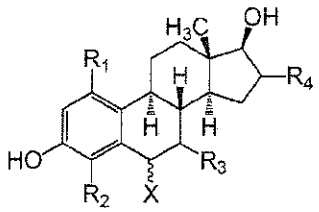
n is 0-3;

R_1-R_4 are hydrogen; and

Z is -O-,

wherein both the C-13 methyl and C-17 hydroxyl are (*S*)-configured.

17. A compound according to claim 1 having the formula:



18. A compound according to claim 17 wherein:

R_1 is selected from hydrogen, -OH and halo;

R_4 is selected from hydrogen, halo and C_1-C_6 alkyl;

R_2 is selected from hydrogen and halo;

R_3 is selected from hydrogen, halo and -OH;

X is selected from C_1-C_{12} alkyl, C_2-C_{12} alkenyl, $-(CH_2)_mCOOCH_3$, $-(CH_2)_m-O-CH_3$, $-(CH_2)_m-O-(CH_2)_nCH_3$, $(CH_2)_m-S-CH_3$, $-(CH_2)_m-S-(CH_2)_nCH_3$, $-(CH_2)_m-N-(CH_2)_nCH_3$, $-C_2-C_8$ alkenyl-O-$(CH_2)_nCH_3$, $-C_2-C_8$ alkenyl-S-$(CH_2)_nCH_3$, $-C_2-C_8$ alkenyl-N-$(CH_2)_nCH_3$, $-C_2-C_8$ alkynyl-O-$(CH_2)_nCH_3$, $-C_2-C_8$ alkynyl-S-$(CH_2)_nCH_3$, $-C_2-C_8$ alkynyl-N-$(CH_2)_nCH_3$, $-(CH_2)_m-OH$, $-(CH_2)_m-O-NH_2$, $-(CH_2)_m-S-NH_2$, $-NH(CH_2)_mCH_3$, $NH(CH_2)_mOCH_3$, $-NH(CH_2)_mCHOH-COOH$, $-(CH_2)_m(NH)CH_2OH$, $-(CH_2)_mNHCOOH$, $-(CH_2)_m N(CH_3)-SO_2-NH_3$, and $-(CH_2)_m-NH-SO_2-NH_2$;

m is an integer from 1-20; and

n is an integer from 0-8.

19. A compound of claim 18 wherein

R_1, R_2, R_3 and R_4 are hydrogen;

X is selected from C_1-C_{12} alkyl, C_2-C_{12} alkenyl, $-(CH_2)_m-O-CH_3$, $-(CH_2)_m-O-(CH_2)_nCH_3$, $(CH_2)_m-S-CH_3$, and $-(CH_2)_m-S-(CH_2)_nCH_3$;

m is an integer from 1-12; and

n is an integer from 0-4.

20. A compound according to claim 1 selected from

a) (6*S*,8*R*,9*S*,13*S*,14*S*)-3-hydroxy-6-(methoxymethyl)-13-methyl-7,8,9,11,12,13,15,16-octahydro-6*H*-cyclopenta[*a*]phenanthren-17(14*H*)-one,

b) (6*R*,8*R*,9*S*,13*S*,14*S*)-3-hydroxy-6-(methoxymethyl)-13-methyl-7,8,9,11,12,13,15,16-octahydro-6*H*-cyclopenta[*a*]phenanthren-17(14*H*)-one,

c) (6*S*,8*R*,9*S*,13*S*,14*S*)-6-(methoxymethyl)-13-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol,

d) (6*R*,8*R*,9*S*,13*S*,14*S*)-6-(methoxymethyl)-13-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol,

e) (6*S*,8*R*,9*S*,10*R*,13*S*,14*S*)-17-hydroxy-6-(methoxymethyl)-10,13-dimethyl-6,7,8,9,10,11,12,13,14,15,16,17-dodecahydro-3*H*-cyclopenta[*a*]phenanthren-3-one;

f) (6*R*,8*R*,9*S*,10*R*,13*S*,14*S*)-17-hydroxy-6-(methoxymethyl)-10,13-dimethyl-6,7,8,9,10,11,12,13,14,15,16,17-dodecahydro-3*H*-cyclopenta[*a*]phenanthren-3-one,

g) (6*S*,8*R*,9*S*,13*S*,14*S*)-6-(hydroxymethyl)-13-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol,

h) (6*R*,8*R*,9*S*,13*S*,14*S*)-6-(hydroxymethyl)-13-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol,

i) (6*R*,8*R*,9*S*,10*R*,13*S*,14*S*)-6-(methoxymethyl)-10,13-dimethylhexadecahydro-1*H*-cyclopenta[*a*]phenanthrene-3,17-diol,

j) (6*R*,8*R*,9*S*,13*S*,14*S*)-6-((aminooxy)methyl)-13-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol,

k) (6*S*,8*R*,9*S*,13*S*,14*S*)-6-((aminooxy)methyl)-13-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol,

l) (6*R*,8*R*,9*S*,13*S*,14*S*)-6-((aminooxy)methyl)-17-hydroxy-13-methyl-6,7,8,9,10,11,12,13,14,15,16,17-dodecahydro-3*H*-cyclopenta[*a*]phenanthren-3-one,

m) (6*S*,8*R*,9*S*,13*S*,14*S*)-6-((aminooxy)methyl)-17-hydroxy-13-methyl-6,7,8,9,10,11,12,13,14,15,16,17-dodecahydro-3*H*-cyclopenta[*a*]phenanthren-3-one,

n) (6*R*,8*R*,9*S*,13*S*,14*S*)-6-(((methoxymethyl)amino)methyl)-13-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol,

o) (6*S*,8*R*,9*S*,13*S*,14*S*)-6-((methoxymethyl)amino)methyl)-13-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol,

p) 1-((((6*R*,8*R*,9*S*,13*S*,14*S*)-3,17-dihydroxy-13-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthren-6-yl)methyl)amino)propan-2-one,

q) 1-(((((6*S*,8*R*,9*S*,13*S*,14*S*)-3,17-dihydroxy-13-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthren-6-yl)methyl)amino)propan-2-one,

r) (6*R*,8*R*,9*S*,13*S*,14*S*)-6-methoxy-13-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol,

s) (6*S*,8*R*,9*S*,13*S*,14*S*)-6-(2-methoxyethyl)-13-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol,

t) (6*R*,8*R*,9*S*,13*S*,14*S*)-6-(4-methoxybutyl)-13-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol,

u) (6*R*,8*R*,9*S*,13*S*,14*S*)-6-(6-methoxyhexyl)-13-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol,

v) (6*R*,8*R*,9*S*,13*S*,14*S*)-6-(6-methoxyoctyl)-13-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol;

w) (6*R*,8*R*,9*S*,13*S*,14*S*)-3-hydroxy-6-(methoxymethyl)-13-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthren-17-yl stearate,

x) (6*R*,8*R*,9*S*,10*R*,13*S*,14*S*)-6-(methoxymethyl)-10,13-dimethyl-7,8,9,10,11,12,13,14,15,16-decahydro-3*H*-cyclopenta[*a*]phenanthrene-3,17(6*H*)-dione,

y) (6*S*,8*R*,9*S*,10*R*,13*S*,14*S*)-6-(methoxymethyl)-10,13-dimethyl-7,8,9,10,11,12,13,14,15,16-decahydro-3*H*-cyclopenta[*a*]phenanthrene-3,17(6*H*)-dione,

z) (6*R*,8*R*,9*S*,10*R*,13*S*,14*S*)-6-(methoxymethyl)-10,13-dimethyl-4,5,6,7,8,9,10,11,12,13,14,15,16,17-tetradecahydro-3*H*-cyclopenta[*a*]phenanthrene-3,17-diol,

aa) (6*S*,8*R*,9*S*,10*R*,13*S*,14*S*)-6-(methoxymethyl)-10,13-dimethyl-4,5,6,7,8,9,10,11,12,13,14,15,16,17-tetradecahydro-3*H*-cyclopenta[*a*]phenanthrene-3,17-diol,

bb) (6*S*,8*R*,9*S*,13*S*,14*S*)-6-(methoxymethyl)-13-methyl-17-oxo-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthren-3-yl hydrogen sulfate,

cc) (6*R*,8*R*,9*S*,13*S*,14*S*)-6-(methoxymethyl)-13-methyl-17-oxo-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthren-3-yl hydrogen sulfate,

dd) (6*R*,8*R*,9*S*,13*S*,14*S*)-13-methyl-6-(4-propoxybutyl)-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol,

ee) (6*R*,8*R*,9*S*,13*S*,14*S*)-13-methyl-6-(5-ethoxypentyl)-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol,

ff) (6*R*,8*S*,9*S*,14*S*)-6-(methoxymethyl)-2-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol,

gg) (6*R*,8*S*,9*S*,14*S*)-6-(6-methoxyhexyl)-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol, and

hh) (6*S*,8*S*,9*S*,13*S*,14*S*)-6-(6-methoxyhexyl)-13-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol.

21. Use of a therapeutically effective amount of a compound of claim 1 in the manufacture of a medicament for inhibiting solid tumor growth in a mammalian host.

22. The use of claim 21 wherein the mammalian host is a human.

23. The use of claim 22 wherein the solid tumor growth represents a solid tumor associated with a cancer selected from the group consisting of breast, pancreatic, lung, colon, prostate, ovarian, brain, liver, spleen, kidney, lymph node, small intestine, blood cells, bone, stomach, endometrium, testiclular, ovary, central nervous system, skin, head and neck, esophagus, and bone marrow cancer.

24. Use of a compound of claim 1 in the manufacture of a medicament for reducing transcription of one or more genes that are responsible for, or whose products are essential for, chromosome replication, and wherein said medicament is to be selectively boundto an estrogen receptor.

25. The use according to claim 24 wherein the compound selectively binds to the ER-β receptor.

26. A pharmaceutical composition comprising a compound of claim 1 and a pharmaceutically-acceptable carrier.

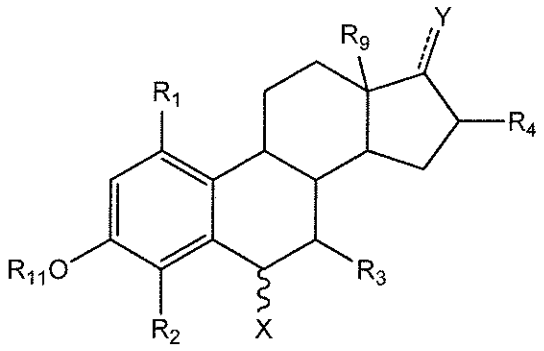
27. An *in vitro* method of reducing transcription of one or more genes that are responsible for, or whose products are essential for, chromosome replication,

comprising selectively binding a compound of claim 1 to an estrogen receptor.

28. The method according to claim 27 wherein the compound selectively binds to the ER-β receptor.

We claim:

1. A compound of formula:



wherein

R_1, R_2, R_3 and R_4 are independently selected from hydrogen, C_1-C_6 alkyl, halo, a sulfate, a glucuronide, -OH, a bulky group, aryl, cycloalkyl, heteroaryl, heterocycloalkyl, $-N(CH_2)_n$, a phosphate group, and a phosphinate group;

R_6 is selected from H, C_1-C_6 alkyl, sulfate, and glucuronide;

R_9 is selected from hydrogen, halogen or alkyl;

R_{11} is selected from H, C_1-C_6 alkyl, a sulfate, a glucoronide, $-SO_2NH_2$, and $-NH_2$;

X is selected from C_2-C_{12} alkenyl, C_2-C_{12} alkynyl, $-NH_2$, $-SO_2NH_2$, -COOH, -CN, $-CH_2CN$, -NHCN, -CHO, -COOsalt, $-OSO_2$alkyl, -SH, $-SCH_3$, $-CH[(CH_2)_nCH_3]COOCH_3$, $-(CH_2)_mCOOCH_3$, $-(CH_2)_q-O-CH_3$, $-(CH_2)_q-O-(CH_2)_nCH_3$, $(CH_2)_m-S-CH_3$, $-(CH_2)_m-S-(CH_2)_nCH_3$, $-(CH_2)_m-NH-(CH_2)_nCH_3$, $-C_2$-C_8 alkenyl-O-$(CH_2)_nCH_3$, $-C_2$-C_8 alkenyl-S-$(CH_2)_nCH_3$, $-C_2$-C_8 alkenyl-N-$(CH_2)_nCH_3$, $-C_2$-C_8 alkynyl-O-$(CH_2)_nCH_3$, $-C_2$-C_8 alkynyl-S-$(CH_2)_nCH_3$, $-C_2$-C_8 alkynyl-N-$(CH_2)_nCH_3$, $-(CH_2)_m-OH$, $-(CH_2)_m-O-NH_2$, $-(CH_2)_m-S-NH_2$, $-NH(CH_2)_mCH_3$, $-NH(CH_2)_mOCH_3$, $-NH(CH_2)_mCHOH-COOH$, $-N(CH_3)_2$, $-(CH_2)_m(NH)CH_2OH$, -NHCOOH, $-(CH_2)_mNHCOOH$, $-NO_2$, -SCN, $-SO_2$alkyl, $-B(OH)_2$, $-(CH_2)_m N(CH_3)-SO_2-NH_3$, $-(CH_2)_m-NH-SO_2-NH_2$, $-NHC(=S)CH_3$, and $-NHNH_2$;

Y is selected from hydrogen, $-OCO(R_6)$ and -OH;

m is an integer between 1-20;

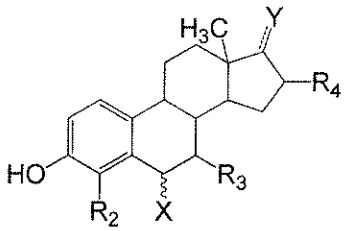
n is an integer between 0-8;

q is an integer from 2-20;and

the ~~~~ symbol represents any type of bond regardless of the stereochemistry;

and the respective enantiomers, stereochemical isomers, hydrates, solvates, tautomers and pharmaceutically acceptable salts thereof.

2. A compound according to claim 1 having the formula:



3. A compound according to claim 2 wherein

Y is -OH;

R_4 is selected from hydrogen, halo and C_1-C_6 alkyl;

R_2 is selected from hydrogen, -OH and halo;

R_3 is selected from hydrogen, halo and -OH; and

X is selected from C_2-C_{12} alkenyl, $-(CH_2)_mCOOCH_3$, $-(CH_2)_q-O-CH_3$, $-(CH_2)_q-O-(CH_2)_nCH_3$, $(CH_2)_m-S-CH_3$, $-(CH_2)_m-S-(CH_2)_nCH_3$, $-(CH_2)_m-N-(CH_2)_nCH_3$, $-C_2-C_8$ alkenyl-$O-(CH_2)_nCH_3$, $-C_2-C_8$ alkenyl-$S-(CH_2)_nCH_3$, $-C_2-C_8$ alkenyl-$N-(CH_2)_nCH_3$, $-C_2-C_8$ alkynyl-$O-(CH_2)_nCH_3$, $-C_2-C_8$ alkynyl-$S-(CH_2)_nCH_3$, $-C_2-C_8$ alkynyl-$N-(CH_2)_nCH_3$, $-(CH_2)_m-OH$, $-(CH_2)_m-O-NH_2$, $-(CH_2)_m-S-NH_2$, $-NH(CH_2)_mCH_3$, $-NH(CH_2)_mOCH_3$, $-NH(CH_2)_mCHOH-COOH$, $-(CH_2)_m(NH)CH_2OH$, $-(CH_2)_mNHCOOH$, $-(CH_2)_m N(CH_3)-SO_2-NH_3$, and $-(CH_2)_m-NH-SO_2-NH_2$.

4. A compound according to claim 3 wherein

Y is (*S*)-configured -OH;

R_4 is selected from hydrogen and alkyl;

R_2 and R_3 are hydrogen;

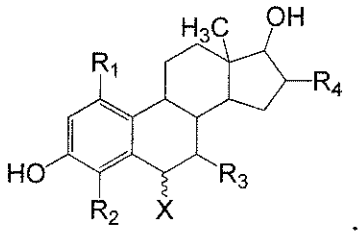
X is selected from C_2-C_{12} alkenyl, $-(CH_2)_q-O-CH_3$, $-(CH_2)_q-O-(CH_2)_nCH_3$, $(CH_2)_m-S-CH_3$, and $-(CH_2)_m-S-(CH_2)_nCH_3$;

m is an integer from 1-6;

n is an integer from 0-3; and

the C-13 methyl group is (*S*)-configured.

5. A compound according to claim 1 having the formula:



6. A compound according to claim 5 wherein:

R_1 is selected from hydrogen, -OH and halo;

R_4 is selected from hydrogen, halo or C_1-C_6 alkyl;

R_2 is selected from hydrogen and halo;

R_3 is selected from hydrogen, halo and -OH; and

X is selected from C_2-C_{12} alkenyl, $-(CH_2)_mCOOCH_3$, $-(CH_2)_q-O-CH_3$, $-(CH_2)_q-O-(CH_2)_nCH_3$, $(CH_2)_m-S-CH_3$, $-(CH_2)_m-S-(CH_2)_nCH_3$, $-(CH_2)_m-N-(CH_2)_nCH_3$, $-C_2-C_8$ alkenyl-O-$(CH_2)_nCH_3$, $-C_2-C_8$ alkenyl-S-$(CH_2)_nCH_3$, $-C_2-C_8$ alkenyl-N-$(CH_2)_nCH_3$, $-C_2-C_8$ alkynyl-O-$(CH_2)_nCH_3$, $-C_2-C_8$ alkynyl-S-$(CH_2)_nCH_3$, $-C_2-C_8$ alkynyl-N-$(CH_2)_nCH_3$, $-(CH_2)_m-OH$, $-(CH_2)_m-O-NH_2$, $-(CH_2)_m-S-NH_2$, $-NH(CH_2)_mCH_3$, $NH(CH_2)_mOCH_3$, $-NH(CH_2)_mCHOH-COOH$, $-(CH_2)_m(NH)CH_2OH$, $-(CH_2)_mNHCOOH$, $-(CH_2)_mN(CH_3)-SO_2-NH_3$, and $-(CH_2)_m-NH-SO_2-NH_2$.

7. A compound according to claim 6 wherein:

R_1 is hydrogen;

R_4 is selected from hydrogen or alkyl;

R_2 and R_3 are hydrogen;

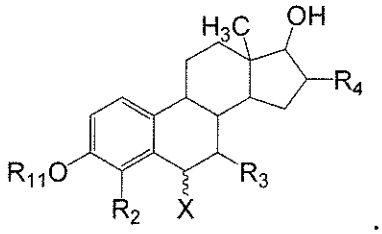
X is selected from C_2-C_{12} alkenyl, $-(CH_2)_q-O-CH_3$, $-(CH_2)_q-O-(CH_2)_nCH_3$, $(CH_2)_m-S-CH_3$, and $-(CH_2)_m-S-(CH_2)_nCH_3$;

m is an integer from 1-12; and

n is an integer from 0-4,

wherein both the C-13 methyl and C-17 hydroxyl are (*S*)-configured.

8. A compound according to claim 1 having the formula:



9. A compound according to claim 8 wherein:

R_{11} is selected from hydrogen and C_1-C_6 alkyl;

R_4 is selected from hydrogen, halo and C_1-C_6 alkyl;

R_2 is selected from hydrogen and halo;

R_3 is selected from hydrogen, halo and -OH; and

X is selected from C_2-C_{12} alkenyl, $-(CH_2)_mCOOCH_3$, $-(CH_2)_q-O-CH_3$, $-(CH_2)_q-O-(CH_2)_nCH_3$, $(CH_2)_m-S-CH_3$, $-(CH_2)_m-S-(CH_2)_nCH_3$, $-(CH_2)_m-N-(CH_2)_nCH_3$, $-C_2$-C_8 alkenyl-O-$(CH_2)_nCH_3$, $-C_2$-C_8 alkenyl-S-$(CH_2)_nCH_3$, $-C_2$-C_8 alkenyl-N-$(CH_2)_nCH_3$, $-C_2$-C_8 alkynyl-O-$(CH_2)_nCH_3$, $-C_2$-C_8 alkynyl-S-$(CH_2)_nCH_3$, $-C_2$-C_8 alkynyl-N-$CH_2)_nCH_3$, $-(CH_2)_m$-OH, $-(CH_2)_m-O-NH_2$, $-CH_2)_m-S-NH_2$, $-NH(CH_2)_mCH_3$, $-NH(CH_2)_mOCH_3$, $-NH(CH_2)_mCHOH-COOH$, $-(CH_2)_m(NH)CH_2OH$, $-(CH_2)_mNHCOOH$, $-(CH_2)_m N(CH_3)-SO_2-NH_3$, and $-(CH_2)_m-NH-SO_2-NH_2$.

10. A compound according to claim 9 wherein:

R_{11} is hydrogen;

R_4 is selected from hydrogen or alkyl;

R_2 and R_3 are hydrogen;

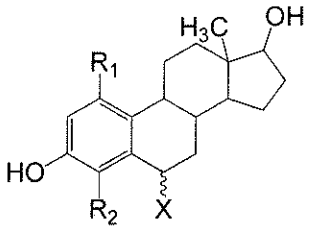
X is selected from C_2-C_{12} alkenyl, -$(CH_2)_q$-O-CH_3, -$(CH_2)_q$-O-$(CH_2)_nCH_3$, $(CH_2)_m$-S-CH_3, and -$(CH_2)_m$-S-$(CH_2)_nCH_3$;

m is an integer from 1-12; and

n is an integer from 0-4,

wherein both the C-13 methyl and C-17 hydroxyl are (*S*)-configured.

11. A compound according to claim 1 having the formula:



12. A compound according to claim 11 wherein:

R_1 is selected from hydrogen, -OH and halo;

R_2 is selected from hydrogen and halo; and

X is selected from C_2-C_{12} alkenyl, -$(CH_2)_m$$COOCH_3$, -$(CH_2)_q$-O-$CH_3$, -$(CH_2)_q$-O-$(CH_2)_nCH_3$, $(CH_2)_m$-S-CH_3, -$(CH_2)_m$-S-$(CH_2)_nCH_3$, -$(CH_2)_m$-N-$(CH_2)_nCH_3$, -C_2-C_8 alkenyl-O-$(CH_2)_nCH_3$, -C_2-C_8 alkenyl-S-$(CH_2)_nCH_3$, -C_2-C_8 alkenyl-N-$(CH_2)_nCH_3$, -C_2-C_8 alkynyl-O-$(CH_2)_nCH_3$, -C_2-C_8 alkynyl-S-$(CH_2)_nCH_3$, -C_2-C_8 alkynyl-N-$(CH_2)_nCH_3$, -$(CH_2)_m$-OH, -$(CH_2)_m$-O-NH_2, -$(CH_2)_m$-S-NH_2, -$NH(CH_2)_mCH_3$, $NH(CH_2)_mOCH_3$, -$NH(CH_2)_mCHOH$-COOH, -$(CH_2)_m(NH)CH_2OH$, -$(CH_2)_m$$NHCOOH$, -$(CH_2)_m$ $N(CH_3)$-SO_2-NH_3, and -$(CH_2)_m$-NH-SO_2-NH_2.

13. A compound of claim 12 wherein

R_1 and R_2 are hydrogen;

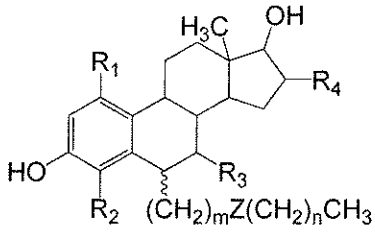
X is selected from C_2-C_{12} alkenyl, -$(CH_2)_q$-O-CH_3, -$(CH_2)_q$-O-$(CH_2)_nCH_3$, $(CH_2)_m$-S-CH_3, and -$(CH_2)_m$-S-$(CH_2)_nCH_3$;

m is an integer from 1-12; and

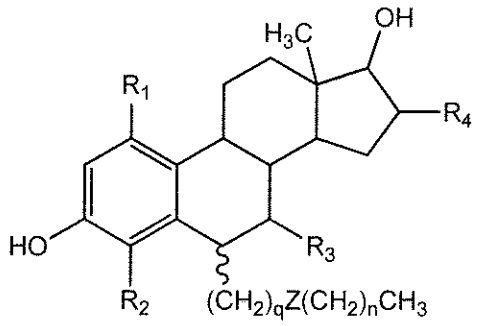
n is an integer from 0-4,

wherein both the C-13 methyl and C-17 hydroxyl are (*S*)-configured.

14. A compound according to claim 1 having the formula:



or formula



a b

wherein Z is selected from -O-, -S- and -NH-.

15. A compound of claim 14 wherein

m is 2-12;

n is 0-4;

R_1 is selected from hydrogen, -OH and halo;

R_4 is selected from hydrogen, halo and C_1-C_6 alkyl;

R_2 is selected from hydrogen and halo;

R_3 is selected from hydrogen, halo and -OH; and

Z is selected from -O- and -S- for both a and b.

16. A compound according to claim 15 wherein

m is 2-8;

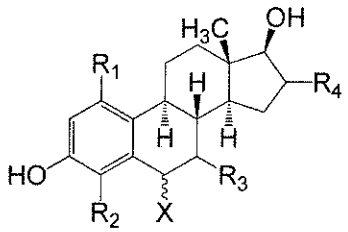
n is 0-3;

R_1-R_4 are hydrogen; and

Z is -O-,

wherein both the C-13 methyl and C-17 hydroxyl are (*S*)-configured.

17. A compound according to claim 1 having the formula:



.

18. A compound according to claim 17 wherein:

R_1 is selected from hydrogen, -OH and halo;

R_4 is selected from hydrogen, halo and C_1-C_6 alkyl

R_2 is selected from hydrogen and halo;

R_3 is selected from hydrogen, halo and -OH; and

X is selected from C_2-C_{12} alkenyl, $-(CH_2)_mCOOCH_3$, $-(CH_2)_q$-O-CH_3, $-(CH_2)_q$-O-$(CH_2)_nCH_3$, $(CH_2)_m$-S-CH_3, $-(CH_2)_m$-S-$(CH_2)_nCH_3$, $-(CH_2)_m$-N-$(CH_2)_nCH_3$, -C_2-C_8 alkenyl-O-$(CH_2)_nCH_3$, -C_2-C_8 alkenyl-S-$(CH_2)_nCH_3$, -C_2-C_8 alkenyl-N-$(CH_2)_nCH_3$, -C_2-C_8 alkynyl-O-$(CH_2)_nCH_3$, -C_2-C_8 alkynyl-S-$(CH_2)_nCH_3$, -C_2-C_8 alkynyl-N-$(CH_2)_nCH_3$, $-(CH_2)_m$-OH, $-(CH_2)_m$-O-NH_2, $-(CH_2)_m$-S-NH_2, $-NH(CH_2)_mCH_3$, $NH(CH_2)_mOCH_3$, $-NH(CH_2)_mCHOH$-COOH, $-(CH_2)_m(NH)CH_2OH$, $-(CH_2)_mNHCOOH$, $-(CH_2)_m N(CH_3)-SO_2-NH_3$, and $-(CH_2)_m$-NH-SO_2-NH_2;

19. A compound of claim 18 wherein

R_1, R_2, R_3 and R_4 are hydrogen;

X is selected from C_2-C_{12} alkenyl, $-(CH_2)_q$-O-CH_3, $-(CH_2)_q$-O-$(CH_2)_nCH_3$, $(CH_2)_m$-S-CH_3, and $-(CH_2)_m$-S-$(CH_2)_nCH_3$;

m is an integer from 1-12; and

n is an integer from 0-4.

20. A compound according to claim 1 selected from

(6*R*,8*R*,9*S*,13*S*,14*S*)-6-((aminooxy)methyl)-13-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol,

(6*S*,8*R*,9*S*,13*S*,14*S*)-6-((aminooxy)methyl)-13-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol,

(6*S*,8*R*,9*S*,13*S*,14*S*)-6-(2-methoxyethyl)-13-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol,

(6*R*,8*R*,9*S*,13*S*,14*S*)-6-(4-methoxybutyl)-13-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol,

(6*R*,8*R*,9*S*,13*S*,14*S*)-6-(6-methoxyhexyl)-13-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol,
(6*R*,8*R*,9*S*,13*S*,14*S*)-6-(6-methoxyoctyl)-13-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol;
(6*R*,8*R*,9*S*,13*S*,14*S*)-13-methyl-6-(4-propoxybutyl)-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol,
(6*R*,8*R*,9*S*,13*S*,14*S*)-13-methyl-6-(5-ethoxypentyl)-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol,
(6*R*,8*S*,9*S*,14*S*)-6-(6-methoxyhexyl)-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol, and
(6*S*,8*S*,9*S*,13*S*,14*S*)-6-(6-methoxyhexyl)-13-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol.

21. Use of a therapeutically effective amount of a compound of claim 1 in the manufacture of a medicament for inhibiting growth of cancer cells, wherein the use comprises to provide a growth of cancer cells; and to contact said cancer cells with a compound of claim 1.

22. The use of claim 21 wherein the cancer cells comprises_a solid tumor selected from the group consisting of breast, pancreatic, lung, colon, prostate, ovarian, brain, liver, spleen, kidney, lymph node, small intestine, blood cells, bone, stomach, endometrium, testiclular, ovary, central nervous system, skin, head and neck, esophagus, and bone marrow tumor.

23. The use of claim 21, wherein said compound is in a pharmaceutical suitable carrier.

24. The use of claim 22, wherein said solid tumor is selected from the group consisting of estrogen dependent and estrogen independent tumors

25. The use of claim 24, wherein said solid tumor is an estrogen independent tumor.

26. A compound selected from the group consisting of:

(6*S*,8*R*,9*S*,10*R*,13*S*,14*S*)-17-hydroxy-6-(methoxymethyl)-10,13-dimethyl-6,7,8,9,10,11,12,13,14,15,16,17-dodecahydro-3*H*-cyclopenta[*a*]phenanthren-3-one;

(6*R*,8*R*,9*S*,10*R*,13*S*,14*S*)-17-hydroxy-6-(methoxymethyl)-10,13-dimethyl-6,7,8,9,10,11,12,13,14,15,16,17-dodecahydro-3*H*-cyclopenta[*a*]phenanthren-3-one,

(6*R*,8*R*,9*S*,10*R*,13*S*,14*S*)-6-(methoxymethyl)-10,13-dimethylhexadecahydro-1*H*-cyclopenta[*a*]phenanthrene-3,17-diol

(6*S*,8*R*,9*S*,13*S*,14*S*)-6-(hydroxymethyl)-13-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol,

(6*S*,8*R*,9*S*,13*S*,14*S*)-6-((aminooxy)methyl)-13-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol,

(6*R*,8*R*,9*S*,13*S*,14*S*)-6-(((methoxymethyl)amino)methyl)-13-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol,

(6*S*,8*R*,9*S*,13*S*,14*S*)-6-(((methoxymethyl)amino)methyl)-13-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol,

1-((((6*R*,8*R*,9*S*,13*S*,14*S*)-3,17-dihydroxy-13-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthren-6-yl)methyl)amino)propan-2-one,

1-((((6*S*,8*R*,9*S*,13*S*,14*S*)-3,17-dihydroxy-13-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthren-6-yl)methyl)amino)propan-2-one,

(6*R*,8*R*,9*S*,13*S*,14*S*)-3-hydroxy-6-(methoxymethyl)-13-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthren-17-yl stearate,

(6*R*,8*R*,9*S*,10*R*,13*S*,14*S*)-6-(methoxymethyl)-10,13-dimethyl-7,8,9,10,11,12,13,14,15,16-decahydro-3*H*-cyclopenta[*a*]phenanthrene-3,17(6*H*)-dione,

(6*S*,8*R*,9*S*,10*R*,13*S*,14*S*)-6-(methoxymethyl)-10,13-dimethyl-7,8,9,10,11,12,13,14,15,16-decahydro-3*H*-cyclopenta[*a*]phenanthrene-3,17(6*H*)-dione,

(6*R*,8*R*,9*S*,10*R*,13*S*,14*S*)-6-(methoxymethyl)-10,13-dimethyl-4,5,6,7,8,9,10,11,12,13,14,15,16,17-tetradecahydro-3*H*-cyclopenta[*a*]phenanthrene-3,17-diol,

(6*S*,8*R*,9*S*,13*S*,14*S*)-6-(methoxymethyl)-13-methyl-17-oxo-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthren-3-yl hydrogen sulfate,

cc) (6*R*,8*R*,9*S*,13*S*,14*S*)-6-(methoxymethyl)-13-methyl-17-oxo-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthren-3-yl hydrogen sulfate, and

(6*R*,8*S*,9*S*,14*S*)-6-(methoxymethyl)-2-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6*H*-cyclopenta[*a*]phenanthrene-3,17-diol.