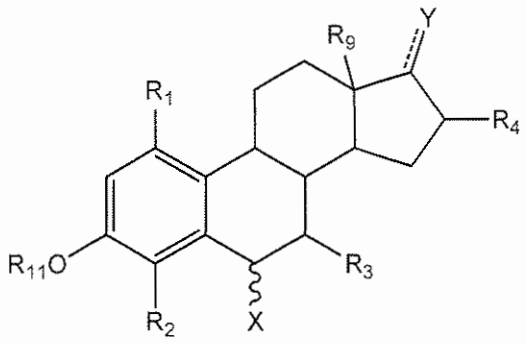
We claim:

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, and $-SO_2NH_2$, ~~and $-NH_2$~~;

X is selected from C_2-C_{12} alkenyl, C_2-C_{12} alkynyl, ~~$-NH_2$, $-SO_2NH_2$, $-COOH$, $-CN$, $-CH_2CN$, $-NHCN$, $-CHO$, $-COOsalt$, $-OSO_2alkyl$, $-SH$, $-SCH_3$, $-CH[(CH_2)_nCH_3]COOCH_3$, $-(CH_2)_mCOOCH_3$,~~ $-(CH_2)_q$-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-$(CH_2)_nCH_3$, and $-C_2$-C_8 alkynyl-N-$(CH_2)_nCH_3$, ~~$-(CH_2)_mOH$, $-(CH_2)_mO-NH_2$, $-(CH_2)_mS-NH_2$, $-NH(CH_2)_mCH_3$, $-NH(CH_2)_mOCH_3$, $-NH(CH_2)_mCHOH-COOH$, $N(CH_3)_2$, $-(CH_2)_m(NH)CH_2OH$, $-NHCOOH$, $(CH_2)_mNHCOOH$, NO_2, SCN, SO_2alkyl, $B(OH)_2$, $(CH_2)_m N(CH_3)SO_2NH_3$, $(CH_2)_m NH-SO_2-NH_2$, $NHC(=S)CH_3$, and $NHNH_2$~~;

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

m is an integer between 1-20;

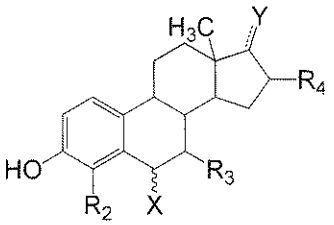
n is an integer between 0-8;

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

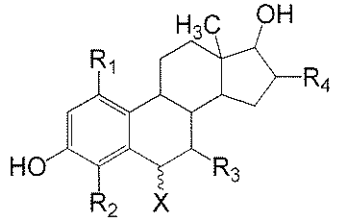
X is selected from C_2-C_{12} alkenyl, -$(CH_2)_q$-O-CH_3, -$(CH_2)_q$-O-$(CH_2)_n CH_3$, $(CH_2)_m$-S-CH_3, and -$(CH_2)_m$-S-$(CH_2)_n CH_3$;

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, -$(CH_2)_m COOCH_3$, -$(CH_2)_q$-O-CH_3, -$(CH_2)_q$-O-$(CH_2)_n CH_3$, $(CH_2)_m$-S-CH_3, -$(CH_2)_m$-S-$(CH_2)_n CH_3$, -$(CH_2)_m$-N-$(CH_2)_n CH_3$, -C_2-C_8 alkenyl-O-$(CH_2)_n CH_3$, -C_2-C_8 alkenyl-S-$(CH_2)_n CH_3$, -C_2-C_8 alkenyl-N-$(CH_2)_n CH_3$, -C_2-C_8 alkynyl-O-$(CH_2)_n CH_3$, -C_2-C_8 alkynyl-S-$(CH_2)_n CH_3$, and -C_2-C_8 alkynyl-N-$(CH_2)_n CH_3$, ~~-$(CH_2)_m$-OH, -$(CH_2)_m$-O-NH_2, -$(CH_2)_m$-S-NH_2, -NH$(CH_2)_m CH_3$, NH$(CH_2)_m OCH_3$, -NH$(CH_2)_m$CHOH-COOH, -$(CH_2)_m$(NH)CH_2OH, -$(CH_2)_m$NHCOOH, -$(CH_2)_m$N(CH_3)-SO_2-NH_2, 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;

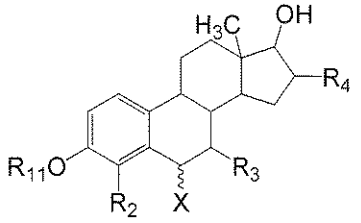
X is selected from C_2-C_{12} alkenyl, -$(CH_2)_q$-O-CH_3, -$(CH_2)_q$-O-$(CH_2)_n CH_3$, $(CH_2)_m$-S-CH_3, and -$(CH_2)_m$-S-$(CH_2)_n CH_3$;

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, -$(CH_2)_m COOCH_3$, -$(CH_2)_q$-O-CH_3, -$(CH_2)_q$-O-$(CH_2)_n CH_3$, $(CH_2)_m$-S-CH_3, -$(CH_2)_m$-S-$(CH_2)_n CH_3$, -$(CH_2)_m$-N-$(CH_2)_n CH_3$, -C_2-C_8 alkenyl-O-$(CH_2)_n CH_3$, -C_2-C_8 alkenyl-S-$(CH_2)_n CH_3$, -C_2-C_8 alkenyl-N-$(CH_2)_n CH_3$, -C_2-C_8 alkynyl-O-$(CH_2)_n CH_3$, -C_2-C_8 alkynyl-S-$(CH_2)_n CH_3$, and -C_2-C_8 alkynyl-N-$(CH_2)_n CH_3$~~, -$(CH_2)_m$OH, -$(CH_2)_m$-O-NH_2, -$CH_2)_m$-S-NH_2, -$NH(CH_2)_m CH_3$, -$NH(CH_2)_m OCH_3$, -$NH(CH_2)_m CHOH$-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~~.

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;

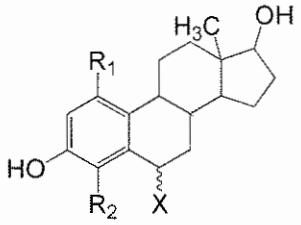
X is selected from C_2-C_{12} alkenyl, -$(CH_2)_q$-O-CH_3, -$(CH_2)_q$-O-$(CH_2)_n CH_3$, $(CH_2)_m$-S-CH_3, and -$(CH_2)_m$-S-$(CH_2)_n CH_3$;

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-$(CH_2)_n CH_3$, $(CH_2)_m$-S-CH_3, -$(CH_2)_m$-S-$(CH_2)_n CH_3$, -$(CH_2)_m$-N-$(CH_2)_n CH_3$, -C_2-C_8 alkenyl-O-$(CH_2)_n CH_3$, -C_2-C_8 alkenyl-S-$(CH_2)_n CH_3$, -C_2-C_8 alkenyl-N-$(CH_2)_n CH_3$, -C_2-C_8 alkynyl-O-$(CH_2)_n CH_3$, -C_2-C_8 alkynyl-S-$(CH_2)_n CH_3$, and -C_2-C_8 alkynyl-N-$(CH_2)_n CH_3$~~, -$(CH_2)_m$-OH, -$(CH_2)_m$-O-NH_2, -$(CH_2)_m$-S-NH_2, -$NH(CH_2)_m CH_3$, $NH(CH_2)_m OCH_3$, -$NH(CH_2)_m$-CHOH-COOH, -$(CH_2)_m(NH)CH_2OH$, -$(CH_2)_m NHCOOH$, -$(CH_2)_m N(CH_3)$-SO_2-NH_2, 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-$(CH_2)_n CH_3$, $(CH_2)_m$-S-CH_3, and -$(CH_2)_m$-S-$(CH_2)_n CH_3$;

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.

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