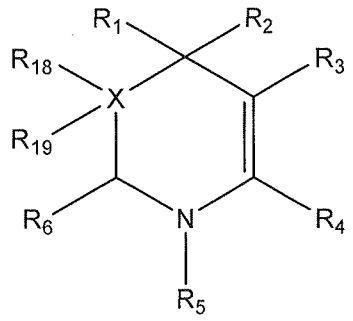
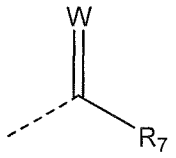


formula I

wherein, X, if present, is one or two carbon atoms forming part of the ring structure;

R_1 and R_2 are independently selected from the group consisting of C_1 to C_{10} alkyl, C_2 to C_{10} alkenyl and C_1 to C_{10} alkoxy, each of which groups may be substituted or unsubstituted;

R_3 is selected from



wherein W is oxygen and R_7 is selected from the group consisting of C_1 to C_{20} alkyl, C_2 to C_{20} alkenyl, C_2 to C_{20} alkynyl, aryl, heteroaryl, aroyl, C_2 to C_{20} alkanone, C_5 to C_7 cycloalkyl, C_4 to C_7 cycloalkanone, C_5 to C_7 cycloalkenyl, C_2 to C_{20} alkanoyl, C_2 to C_{20} alkanoyloxy, C_2 to C_{20} alkoxycarbonyl, C_2 to C_{20} carbamoyl, C_2 to C_{20} carboxyl, haloalkyl, N-alkyl, N-aryl, N-heterocyclyl, N-SO_2-R_{20} and heterocyclic all of which groups may be substituted or unsubstituted and wherein R_{20} is selected from the group consisting of C_1 to C_6 alkyl and phenyl each of which may be substituted or unsubstituted with the proviso that R_3 comprises a carbon atom directly attached to the ring structure in formula I and that carbon is double bonded to another atom;

R_4 is selected from the group consisting of hydrogen, C_1 to C_{12} alkyl, C_2 to C_{12} alkenyl, aryl, heteroaryl, C_5 to C_7 cycloalkyl, C_5 to C_7 cycloalkenyl, C_1 to C_{12} alkanoyl, C_1 to C_{12} alkanoyloxy, C_1 to C_{12} carboalkoxy and C_1 to C_{12} alkanone all of which groups may be substituted or unsubstituted;

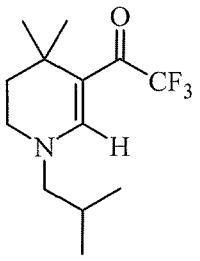
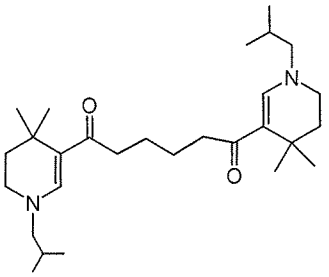
R_5 is selected from the group consisting of C_1 to C_{12} alkyl, C_2 to C_{12} alkenyl, C_2 to C_{12} alkynyl, aryl, heteroaryl, C_5 to C_9 cycloalkyl, C_5 to C_7 cycloalkenyl, C_2 to C_9 alkanoyl, C_2 to C_9 alkanoyloxy and carbamoyl all of which groups may be substituted or unsubstituted;

R_6 is selected from the group consisting of hydrogen, oxo, substituted or unsubstituted C_1 to C_6 alkyl, substituted or unsubstituted C_2 to C_6 alkenyl and substituted or unsubstituted C_2 to C_6 alkanoyl; and

R_{18} and R_{19} are independently selected from the group consisting of hydrogen, C_1 to C_6 alkyl, C_2 to C_6 alkenyl and C_1 to C_6 alkoxy, each of which groups may be substituted or unsubstituted,

with the proviso that when R_5 is alkyl or cycloalkyl and R_4 is hydrogen then R_7 is not an unsubstituted alkyl chain, an ester or an ether; and

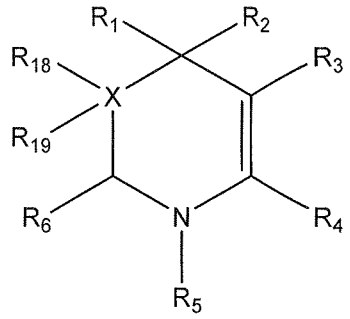
when R_5 is unsubstituted benzyl then R_7 is not hexyl; and

wherein, substituted refers to substitution with a group selected from alkyl, alkenyl, aryl, heteroaryl, heterocyclyl, alkynyl, aroyl, alkanone, cycloalkyl, cycloalkanone, cycloalkenyl, alkanoyl, alkanoyloxy, alkoxycarbonyl, carbamoyl, carboxyl, haloalkyl, N-alkyl, N-aryl and N-heterocyclyl and wherein the compound is not  or .

[0011] In one embodiment, the compound is a non-naturally occurring compound.

CLAIMS

1. A compound of formula I, or a salt thereof:

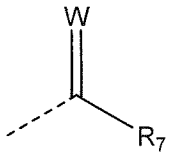


formula I

wherein, X, if present, is one or two carbon atoms forming part of the ring structure;

R_1 and R_2 are independently selected from the group consisting of C_1 to C_{10} alkyl, C_2 to C_{10} alkenyl and C_1 to C_{10} alkoxy, each of which groups may be substituted or unsubstituted;

R_3 is selected from



wherein W is oxygen and R_7 is selected from the group consisting of C_1 to C_{20} alkyl, C_2 to C_{20} alkenyl, C_2 to C_{20} alkynyl, aryl, heteroaryl, aroyl, C_2 to C_{20} alkanone, C_5 to C_7 cycloalkyl, C_4 to C_7 cycloalkanone, C_5 to C_7 cycloalkenyl, C_2 to C_{20} alkanoyl, C_2 to C_{20} alkanoyloxy, C_2 to C_{20} alkoxycarbonyl, C_2 to C_{20} carbamoyl, C_2 to C_{20} carboxyl, haloalkyl, N-alkyl, N-aryl, N-heterocyclyl, N-SO_2-R_{20} and heterocyclic all of which groups may be substituted or unsubstituted and wherein R_{20} is selected from the group

consisting of C_1 to C_6 alkyl and phenyl each of which may be substituted or unsubstituted with the proviso that R_3 comprises a carbon atom directly attached to the ring structure in formula I and that carbon is double bonded to another atom;

R_4 is selected from the group consisting of hydrogen, C_1 to C_{12} alkyl, C_2 to C_{12} alkenyl, aryl, heteroaryl, C_5 to C_7 cycloalkyl, C_5 to C_7 cycloalkenyl, C_1 to C_{12} alkanoyl, C_1 to C_{12} alkanoyloxy, C_1 to C_{12} carboalkoxy and C_1 to C_{12} alkanone all of which groups may be substituted or unsubstituted;

R_5 is selected from the group consisting of C_1 to C_{12} alkyl, C_2 to C_{12} alkenyl, C_2 to C_{12} alkynyl, aryl, heteroaryl, C_5 to C_9 cycloalkyl, C_5 to C_7 cycloalkenyl, C_2 to C_9 alkanoyl, C_2 to C_9 alkanoyloxy and carbamoyl all of which groups may be substituted or unsubstituted;

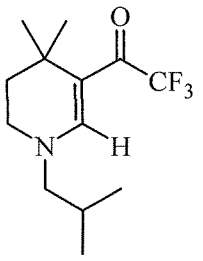
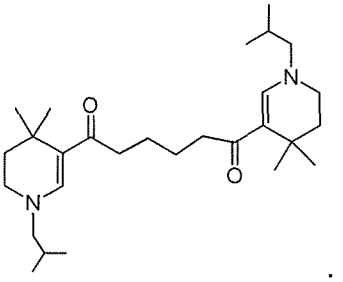
R_6 is selected from the group consisting of hydrogen, oxo, substituted or unsubstituted C_1 to C_6 alkyl, substituted or unsubstituted C_2 to C_6 alkenyl and substituted or unsubstituted C_2 to C_6 alkanoyl; and

R_{18} and R_{19} are independently selected from the group consisting of hydrogen, C_1 to C_6 alkyl, C_2 to C_6 alkenyl and C_1 to C_6 alkoxy, each of which groups may be substituted or unsubstituted,

with the proviso that when R_5 is alkyl or cycloalkyl and R_4 is hydrogen then R_7 is not an unsubstituted alkyl chain, an ester or an ether; and

when R_5 is unsubstituted benzyl then R_7 is not hexyl; and

wherein, substituted refers to substitution with a group selected from alkyl, alkenyl, aryl, heteroaryl, heterocyclyl, alkynyl, aroyl, alkanone, cycloalkyl, cycloalkanone, cycloalkenyl, alkanoyl, alkanoyloxy, alkoxycarbonyl, carbamoyl, carboxyl, haloalkyl, N-alkyl, N-aryl and N-heterocyclyl and wherein

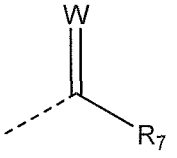
the compound is not  or .

2. The compound of claim 1 wherein the atom which is double bonded to the carbon attached directly to the ring is selected from the group consisting of a carbon atom and an oxygen atom.

3. The compound of claim 1 or claim 2 wherein X is one carbon atom;

R_1 and R_2 are independently selected from the group consisting of C_1 to C_6 alkyl, C_2 to C_6 alkenyl and C_1 to C_6 alkoxy, each of which groups may be substituted or unsubstituted;

R_3 is selected from



wherein W is oxygen and R_7 is selected from the group consisting of C_1 to C_6 alkyl, trihaloalkyl, C_2 to C_6 alkenyl, C_2 to C_6 alkynyl, aryl, aroyl, C_2 to C_{12} alkanone, C_2 to C_9 alkanoyl, C_2 to C_9 alkanoyloxy, C_2 to C_9 alkoxycarbonyl, C_2 to C_6 carboxyl, C_1 to C_6 haloalkyl, C_4 to C_7 cycloalkanone, N- C_1 to C_6 alkyl, N- C_5 to C_7 aryl, N- C_5 to C_7 heterocycly, N-SO_2-R_{20} and C_5 or C_6 heterocyclic all of which groups may be substituted or unsubstituted and wherein R_{20} is selected from the group consisting of C_1 to C_6 alkyl and phenyl each of which may be substituted or unsubstituted with the proviso that R_3 comprises a carbon atom directly attached to the ring structure in formula I and that carbon is double bonded to another atom;

R_4 is selected from the group consisting of hydrogen, C_1 to C_6 alkyl, C_2 to C_6 alkenyl, phenyl, heteroaryl, C_6 cycloalkyl, C_1 to C_{12} alkanoyl, C_1 to C_9 alkanoyloxy, C_1 to C_9 carboalkoxy and C_1 to C_6 alkanone all of which groups may be substituted or unsubstituted;

R_5 is selected from the group consisting of C_1 to C_6 alkyl, C_2 to C_6 alkenyl, phenyl, naphthyl, C_6 cycloalkyl, C_2 to C_6 alkanoyl and C_2 to C_6 alkanoyloxy all of which groups may be substituted or unsubstituted;

R_6 is selected from the group consisting of hydrogen, oxo and substituted or unsubstituted C_1 to C_6 alkyl; and

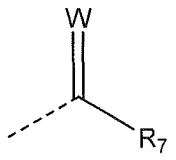
R_{18} and R_{19} are independently selected from the group consisting of hydrogen and C_1 to C_6 alkyl, each of which groups may be substituted or unsubstituted; and

substituted refers to substitution with a group selected from alkyl, alkenyl, aryl, heteroaryl, heterocyclyl, alkynyl, aroyl, alkanone, cycloalkyl, cycloalkanone, cycloalkenyl, alkanoyl, alkanoyloxy, alkoxycarbonyl, carbamoyl, carboxyl, haloalkyl, N-alkyl, N-aryl and N-heterocyclyl and wherein.

4. The compound of any one of the preceding claims wherein X is one carbon atom;

R_1 and R_2 are independently selected from C_1 to C_4 alkyl substituted or unsubstituted;

R_3 is selected from



wherein W is oxygen and R_7 is selected from the group consisting of C_1 to C_4 alkyl, trifluoro substituted C_1 to C_4 alkyl, C_2 to C_6 alkenyl, phenyl, phenylheterocyclic, alkylbenzoyl, phenyl substituted alkanone, C_2 to C_9 alkanoyloxy, C_2 to C_9 alkoxycarbonyl, C_2 to C_4 carboxyl, C_5 or C_6 heterocyclic, N- C_1 to C_6 alkyl, N- C_6 aryl, N-SO_2-R_{20}, POSS substituted alkanoyloxy and POSS substituted carboalkoxy all of which groups may be substituted or unsubstituted and wherein R_{20} is selected from the group

consisting of C_1 to C_6 alkyl and phenyl each of which may be substituted or unsubstituted with the proviso that R_3 comprises a carbon atom directly attached to the ring structure in formula I and that carbon is double bonded to another atom;

R_4 is selected from the group consisting of hydrogen, C_1 to C_6 alkyl, C_2 to C_6 alkenyl, phenyl, C_6 cycloalkyl, C_1 to C_{12} alkanoyl and C_1 to C_{12} alkanoyloxy all of which groups may be substituted or unsubstituted;

R_5 is selected from the group consisting of C_1 to C_6 alkyl, phenyl, naphtyl and C_6 cycloalkyl all of which groups may be substituted or unsubstituted;

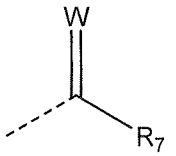
R_6 is hydrogen or oxo;

R_{18} and R_{19} are hydrogen; and

wherein substituted refers to substitution with a group selected from alkyl, alkenyl, aryl, heteroaryl, heterocyclyl, alkynyl, aroyl, alkanone, cycloalkyl, cycloalkanone, cycloalkenyl, alkanoyl, alkanoyloxy, alkoxycarbonyl, carbamoyl, carboxyl, haloalkyl, N-alkyl, N-aryl and N-heterocyclyl.

5. The compound of any one of the preceding claims wherein X is one carbon, R_1 and R_2 are methyl, ethyl or propyl;

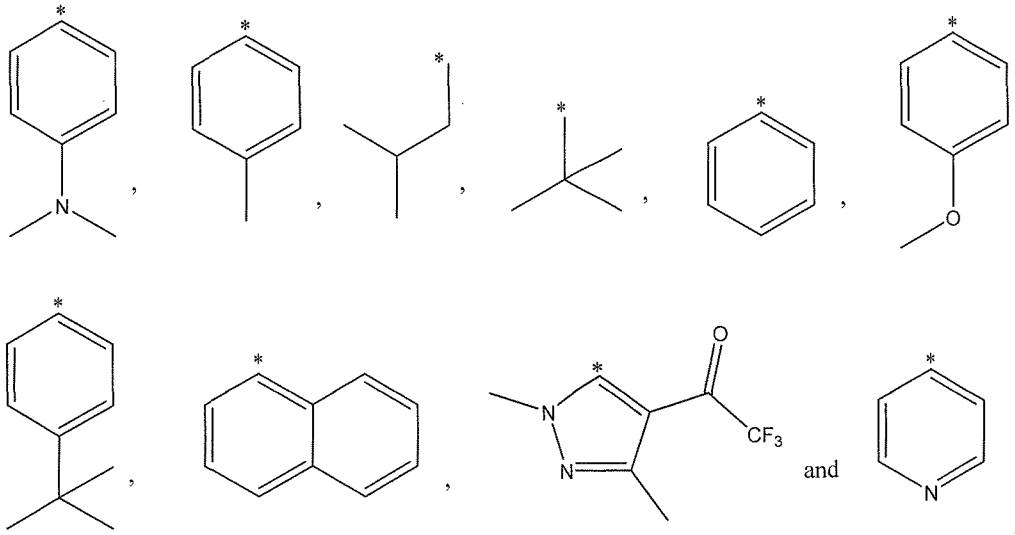
R_3 is



wherein W is oxygen and R_7 is selected from the group consisting of

ring structure in formula I and that carbon is double bonded to another atom; and

R_5 is selected from the group consisting of



7. The compound of any one of the preceding claims wherein R_5 is directly attached to the nitrogen of the ring via a tertiary carbon.

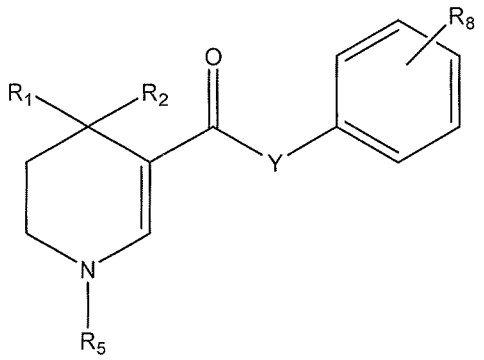
8. The compound of any one of the preceding claims wherein when R_5 is alkyl it is tert-butyl.

9. The compound of claim 1 wherein R_1 and R_2 are independently selected from the group consisting of C_1 to C_{10} alkyl, C_2 to C_{10} alkenyl and C_1 to C_{10} alkoxy, each of which groups may be substituted with a group selected from alkyl, alkenyl, heteroaryl, heterocyclyl, alkynyl, aroyl, alkanone, cycloalkyl, cycloalkanone, cycloalkenyl, alkanoyl, alkanoyloxy, alkoxycarbonyl, carbamoyl, carboxyl, haloalkyl, N-alkyl, N-aryl and N-heterocyclyl.

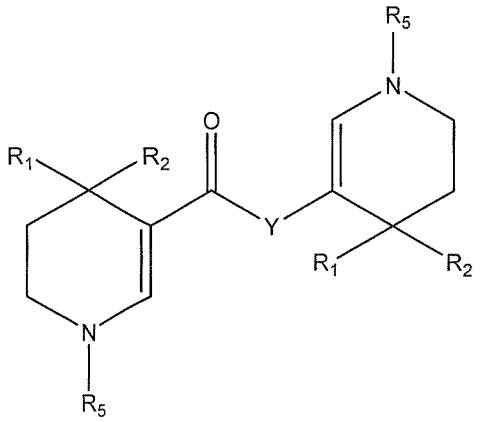
10. The compound of claim 1 wherein R_6 is selected from the group consisting of hydrogen, substituted or unsubstituted C_1 to C_6 alkyl, substituted or unsubstituted C_2 to C_6 alkenyl and substituted or unsubstituted C_2 to C_6 alkanoyl and wherein substituted refers to substitution with a group selected from alkyl, alkenyl, aryl, heteroaryl, heterocyclyl, alkynyl, aroyl, alkanone, cycloalkyl, cycloalkanone, cycloalkenyl, alkanoyl, alkanoyloxy, alkoxycarbonyl, carbamoyl, carboxyl, haloalkyl, N-alkyl, N-aryl and N-heterocyclyl.

11. The compound of claim 1 wherein X is 1 or two carbon atoms forming part of the ring structure.

12. The compound of any one of the preceding claims wherein the compound is a compound of formula IIa or IIb:



formula IIa



formula IIb

wherein R_1, R_2 and R_5 are as described in claim 1;

Y, when present, is selected from nitrogen, N-alkyl, C_6, C_7, C_8, C_9, C_{10}, C_{11} or C_{12} alkyl optionally substituted with oxo, hydroxyl, alkoxy and halo and may be oxygen linked to the ring;

R_8, when present, may be selected from the group consisting of C_1 to C_6 alkyl, substituted or unsubstituted, aryl, alkoxy, halo and amino, wherein substituted refers to substitution with a group selected from alkyl, alkenyl, aryl, heteroaryl, heterocyclyl, alkynyl, aroyl, alkanone, cycloalkyl, cycloalkanone, cycloalkenyl, alkanoyl, alkanoyloxy, alkoxycarbonyl, carbamoyl, carboxyl, haloalkyl, N-alkyl, N-aryl and N-heterocyclyl.

13. The compound of claim 12 wherein the compound is a compound of formula IIb and Y is selected from C_8, C_9, C_{10}, C_{11} or C_{12} alkyl optionally substituted with oxo, hydroxyl, alkoxy and halo.

14. The compound of claim 13 wherein Y is C_9 alkyl substituted with oxo.

15. The compound of claim 14 wherein R_5 is t-butyl.

16. The compound of any one of the preceding claims wherein the compound is selected from the group consisting of: