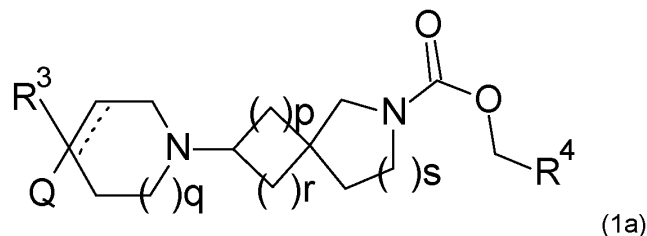


CLAIMS

1. A compound of the formula (1a):



- 5 or a salt thereof, wherein
 p is 1 or 2;
 q is 0, 1 or 2;
 r is 1 or 2;
 s is 0 or 1, where the total of r and s is 1 or 2;
 10 Q is $CR^1R^2NR^5R^6$, NR^5R^6 , OR^7 , SR^7 ;
 R^1 is selected from hydrogen or a C_{1-6} non-aromatic hydrocarbon group which is optionally substituted with one to six fluorine atoms and wherein one or two, but not all, carbon atoms of the hydrocarbon group may optionally be replaced by a heteroatom selected from O, N and S and oxidized forms thereof;
 15 R^2 is selected from hydrogen or a C_{1-6} non-aromatic hydrocarbon group which is optionally substituted with one to six fluorine atoms and wherein one or two, but not all, carbon atoms of the hydrocarbon group may optionally be replaced by a heteroatom selected from O, N and S and oxidized forms thereof;
 R^3 is selected from hydrogen; fluorine; cyano; hydroxy; amino; and a C_{1-6} non-
 20 aromatic hydrocarbon group which is optionally substituted with one to six fluorine atoms and wherein one, two or three, but not all, carbon atoms of the hydrocarbon group may optionally be replaced by a heteroatom selected from O, N and S and oxidized forms thereof;
 R^4 is a hydrogen or a C_{1-6} non-aromatic hydrocarbon group which is optionally
 25 substituted with one to six fluorine atoms and wherein one or two, but not all, carbon atoms of the hydrocarbon group may optionally be replaced by a heteroatom selected from O, N and S and oxidised forms thereof;
 R^5 is selected from hydroxy; OR^7 ; COR^7 ; $COOR^7$; CH_2COR^7 ; CH_2COOR^7 ; a
 30 C_{1-6} non-aromatic hydrocarbon group which is optionally substituted with one to six fluorine atoms and wherein one or two, but not all, carbon atoms of the hydrocarbon group may optionally be replaced by a heteroatom selected from

O, N and S and oxidized forms thereof; and a group W or CH₂W where W is an optionally substituted 5- or 6-membered ring containing 0, 1, 2 or 3

heteroatoms selected from O, N and S and oxidized forms thereof;

R⁶ is selected from hydroxy; OR⁷; COR⁷; COOR⁷; CH₂COR⁷; CH₂COOR⁷; a

5 C₁₋₆ non-aromatic hydrocarbon group which is optionally substituted with one to six fluorine atoms and wherein one or two, but not all, carbon atoms of the hydrocarbon group may optionally be replaced by a heteroatom selected from O, N and S and oxidized forms thereof; and a group W or CH₂W where W is an optionally substituted 5- or 6-membered ring containing 0, 1, 2 or 3

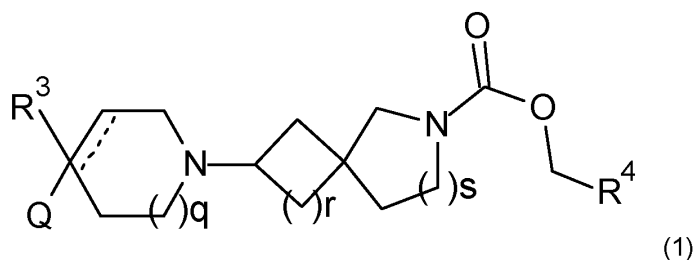
10 heteroatoms selected from O, N and S and oxidized forms thereof; and

R⁷ is selected from hydrogen a C₁₋₆ non-aromatic hydrocarbon group which is optionally substituted with one to six fluorine atoms and wherein one or two, but not all, carbon atoms of the hydrocarbon group may optionally be replaced by a heteroatom selected from O, N and S and oxidized forms thereof; and a group

15 W or CH₂W or C₁₋₄ hydrocarbon group-W where W is an optionally substituted 5- or 6-membered ring containing 0, 1, 2 or 3 heteroatoms selected from O, N and S and oxidized forms thereof;

and the dotted line indicates an optional second carbon-carbon bond, provided that when a second carbon-carbon bond is present, then R³ is absent.

20 2. A compound according to claim 1 of the formula (1):



or a salt thereof, wherein

25 q is 0, 1 or 2;

r is 1 or 2;

s is 0 or 1, where the total of r and s is 1 or 2;

Q is CR¹R²NR⁵R⁶, NR⁵R⁶, OR⁷, SR⁷;

30 R¹ is selected from hydrogen or a C₁₋₆ non-aromatic hydrocarbon group which is optionally substituted with one to six fluorine atoms and wherein one or two,

but not all, carbon atoms of the hydrocarbon group may optionally be replaced by a heteroatom selected from O, N and S and oxidized forms thereof;

R^2 is selected from hydrogen or a C_{1-6} non-aromatic hydrocarbon group which is optionally substituted with one to six fluorine atoms and wherein one or two,

5 but not all, carbon atoms of the hydrocarbon group may optionally be replaced by a heteroatom selected from O, N and S and oxidized forms thereof;

R^3 is selected from hydrogen; fluorine; cyano; hydroxy; amino; and a C_{1-6} non-aromatic hydrocarbon group which is optionally substituted with one to six

10 fluorine atoms and wherein one, two or three, but not all, carbon atoms of the hydrocarbon group may optionally be replaced by a heteroatom selected from O, N and S and oxidized forms thereof;

R^4 is a hydrogen or a C_{1-6} non-aromatic hydrocarbon group which is optionally substituted with one to six fluorine atoms and wherein one or two, but not all,

15 carbon atoms of the hydrocarbon group may optionally be replaced by a heteroatom selected from O, N and S and oxidised forms thereof;

R^5 is selected from hydroxy; OR^7 ; COR^7 ; $COOR^7$; CH_2COR^7 ; CH_2COOR^7 ; a C_{1-6} non-aromatic hydrocarbon group which is optionally substituted with one to

six fluorine atoms and wherein one or two, but not all, carbon atoms of the hydrocarbon group may optionally be replaced by a heteroatom selected from

20 O, N and S and oxidized forms thereof; and a group W or CH_2W where W is an optionally substituted 5- or 6-membered ring containing 0, 1, 2 or 3

heteroatoms selected from O, N and S and oxidized forms thereof;

R^6 is selected from hydroxy; OR^7 ; COR^7 ; $COOR^7$; CH_2COR^7 ; CH_2COOR^7 ; a

25 C_{1-6} non-aromatic hydrocarbon group which is optionally substituted with one to six fluorine atoms and wherein one or two, but not all, carbon atoms of the

hydrocarbon group may optionally be replaced by a heteroatom selected from O, N and S and oxidized forms thereof; and a group W or CH_2W where W is an

optionally substituted 5- or 6-membered ring containing 0, 1, 2 or 3

heteroatoms selected from O, N and S and oxidized forms thereof; and

30 R^7 is selected from hydrogen a C_{1-6} non-aromatic hydrocarbon group which is optionally substituted with one to six fluorine atoms and wherein one or two, but

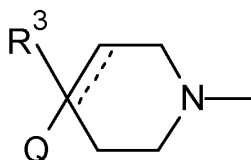
not all, carbon atoms of the hydrocarbon group may optionally be replaced by a heteroatom selected from O, N and S and oxidized forms thereof; and a group

W or CH_2W where W is an optionally substituted 5- or 6-membered ring

35 containing 0, 1, 2 or 3 heteroatoms selected from O, N and S and oxidized forms thereof;

and the dotted line indicates an optional second carbon-carbon bond, provided that when a second carbon-carbon bond is present, then R^3 is absent.

3. A compound according to claim 1 or 2 wherein Q is NR^5R^6 .
4. A compound according to claim 1 or 2 wherein Q is $CR^1R^2NR^5R^6$.
5. A compound according to any one of claims 1 to 4 wherein R^1 is selected from hydrogen, methyl or ethyl.
6. A compound according to any one of claims 1 to 5 wherein R^2 is selected from hydrogen methyl or ethyl.
7. A compound according to any one of claims 1 to 6 wherein R^5 is selected from a C_{1-4} alkyl group which is optionally substituted with one to four fluorine atoms; and a group W or CH_2W where W is an optionally substituted 5- or 6-membered aromatic ring containing 0, 1, 2 or 3 heteroatoms selected from O, N and S.
8. A compound according to claim 7 wherein R^5 is selected from methyl, ethyl, propyl, isopropyl, cyclopropyl, fluoroethyl, difluoroethyl, butyl or cyclobutyl.
9. A compound according to claim 7 wherein R^5 is a group W or CH_2W where W is an optionally substituted phenyl, pyridyl or isoxazole ring.
10. A compound according to any one of claims 1 to 9 wherein R^6 is selected from; COR^7 ; $COOR^7$; CH_2COR^7 ; CH_2COOR^7 or a C_{1-6} non-aromatic hydrocarbon group which is optionally substituted with one to six fluorine atoms and wherein one or two, but not all, carbon atoms of the hydrocarbon group may optionally be replaced by a heteroatom selected from O, N and S and oxidized forms thereof.
11. A compound according to claim 10 wherein R^6 is selected from methyl, ethyl, trifluoroethyl, hydroxyethyl or methoxyethyl.
12. A compound according claim 10 wherein R^6 is selected from; COR^7 ; $COOR^7$; CH_2COR^7 ; CH_2COOR^7 , wherein R^7 is selected from H, methyl, fluoromethyl, difluoromethyl, trifluoromethyl, ethyl, fluoroethyl, difluoroethyl or trifluoroethyl.
13. A compound according to claim 1 or 2 wherein the moiety:



is selected from groups A to KKK.

14. A compound according to any one of claims 1 to 12 wherein R^3 is present and the optional second carbon-carbon bond is absent.
15. A compound according to claim 14 wherein R^3 is selected from hydrogen; fluorine; hydroxyl, methoxy and cyano.
16. A compound according to claim 15 wherein R^3 is hydrogen.
17. A compound according to any one of claims 1 to 13 wherein R^4 is selected from hydrogen and methyl.
18. A compound according to claim 1 or 2 which is
 - 10 Ethyl 6-{4-[acetyl(cyclopropyl)amino]piperidin-1-yl}-2-azaspiro[3.3]heptane-2-carboxylate
 - Ethyl 6-{4-[acetyl(ethyl)amino]piperidin-1-yl}-2-azaspiro[3.3]heptane-2-carboxylate
 - Ethyl 2-{4-[acetyl(ethyl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
 - 15 Ethyl 2-{4-[acetyl(propan-2-yl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
 - Ethyl 2-{4-[acetyl(cyclopropyl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
 - 20 Ethyl 2-{4-[cyclopropyl(trifluoroacetyl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
 - Ethyl 2-{4-[cyclopropyl(propanoyl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
 - Ethyl 2-{4-[acetyl(cyclobutyl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
 - 25 Ethyl 2-{4-[ethyl(2,2,2-trifluoroethyl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
 - Ethyl 2-{4-[cyclopropyl(2-methoxyethyl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
 - 30 Ethyl 2-{4-[cyclopropyl(2-methoxy-2-oxoethyl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
 - Ethyl 2-{4-[cyclopropyl(1,2-oxazol-3-ylmethyl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
 - Ethyl 2-{4-[acetyl(cyclopropyl)amino]methyl}piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
 - 35

- Ethyl 2-(4-{[cyclopropyl(propanoyl)amino]methyl}piperidin-1-yl)-6-azaspiro[3.4]octane-6-carboxylate
- Ethyl 2-(4-{1-[acetyl(cyclopropyl)amino]ethyl}piperidin-1-yl)-6-azaspiro[3.4]octane-6-carboxylate
- 5 Ethyl 2-(4-{1-[cyclopropyl(propanoyl)amino]ethyl}piperidin-1-yl)-6-azaspiro[3.4]octane-6-carboxylate
- Methyl 2-(4-[acetyl(cyclobutyl)amino]piperidin-1-yl)-6-azaspiro[3.4]octane-6-carboxylate
- Ethyl 2-(4-[ethyl(formyl)amino]piperidin-1-yl)-6-azaspiro[3.4]octane-6-carboxylate
- 10 Methyl 2-(4-[acetyl(ethyl)amino]piperidin-1-yl)-6-azaspiro[3.4]octane-6-carboxylate
- Ethyl 2-(4-[acetyl(propyl)amino]piperidin-1-yl)-6-azaspiro[3.4]octane-6-carboxylate
- 15 Ethyl 2-(4-[acetyl(2-methylpropyl)amino]piperidin-1-yl)-6-azaspiro[3.4]octane-6-carboxylate
- Ethyl 2-(4-[acetyl(cyclopropylmethyl)amino]piperidin-1-yl)-6-azaspiro[3.4]octane-6-carboxylate
- Ethyl 2-(4-{acetyl[(1-methylcyclobutyl)methyl]amino}piperidin-1-yl)-6-azaspiro[3.4]octane-6-carboxylate
- 20 Ethyl 2-(4-[acetyl(1-methylcyclobutyl)amino]piperidin-1-yl)-6-azaspiro[3.4]octane-6-carboxylate
- Ethyl 2-(4-{acetyl[(3-methyloxetan-3-yl)methyl]amino}piperidin-1-yl)-6-azaspiro[3.4]octane-6-carboxylate
- 25 Ethyl 2-(4-[acetyl(2,2-difluoroethyl)amino]piperidin-1-yl)-6-azaspiro[3.4]octane-6-carboxylate
- Ethyl 2-(4-[acetyl(2,2,2-trifluoroethyl)amino]piperidin-1-yl)-6-azaspiro[3.4]octane-6-carboxylate
- Ethyl 2-(4-[acetyl(2-fluoro-2-methylpropyl)amino]piperidin-1-yl)-6-azaspiro[3.4]octane-6-carboxylate
- 30 Ethyl 2-(4-[acetyl(2,2-difluoropropyl)amino]piperidin-1-yl)-6-azaspiro[3.4]octane-6-carboxylate
- Ethyl 2-(4-[acetyl(3,3-difluorocyclobutyl)amino]piperidin-1-yl)-6-azaspiro[3.4]octane-6-carboxylate
- 35 Ethyl 2-(4-[acetyl(2-methoxy-2-methylpropyl)amino]piperidin-1-yl)-6-azaspiro[3.4]octane-6-carboxylate

- Ethyl 2-(4-{acetyl[(1-methoxycyclobutyl)methyl]amino}piperidin-1-yl)-6-azaspiro[3.4]octane-6-carboxylate
- Ethyl 2-(4-{acetyl[(1-hydroxycyclobutyl)methyl]amino}piperidin-1-yl)-6-azaspiro[3.4]octane-6-carboxylate
- 5 Ethyl 2-{4-[acetyl(methoxy)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
- Ethyl 2-{4-[acetyl(phenyl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
- Ethyl 2-{4-[acetyl(pyridin-2-yl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
- 10 Ethyl 2-{4-[acetyl(benzyl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
- Ethyl 2-{4-[acetyl(1,3-oxazol-5-ylmethyl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
- 15 Ethyl 2-{4-[acetyl(1,3-oxazol-2-ylmethyl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
- (1,1-2H₂)-Ethyl 2-{4-[acetyl(ethyl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
- Ethyl 2-{4-[ethyl(methoxycarbonyl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
- 20 Ethyl 2-{4-[(ethoxycarbonyl)(ethyl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
- Ethyl 2-{4-[(methoxycarbonyl)(propan-2-yl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
- 25 Ethyl 2-{4-[(methoxycarbonyl)(2,2,2-trifluoroethyl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
- Ethyl 2-(4-{[(2-methoxyethoxy)carbonyl](2,2,2-trifluoroethyl)amino}piperidin-1-yl)-6-azaspiro[3.4]octane-6-carboxylate
- Ethyl 2-{4-[(dimethylcarbamoyl)(ethyl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
- 30 Ethyl 2-{4-[ethyl(2-fluoroethyl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
- Ethyl 2-{4-[(2,2-difluoroethyl)(ethyl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
- 35 Ethyl 2-{4-[(methoxycarbonyl)(oxetan-3-yl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate

- Ethyl 2-{4-[cyclopropyl(2,2,2-trifluoroethyl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
- Ethyl 2-{4-[cyclopropyl(2-hydroxyethyl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
- 5 Ethyl 2-{4-[cyclobutyl(2-hydroxyethyl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
- Ethyl 2-{4-[(2-hydroxyethyl)(2,2,2-trifluoroethyl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
- Ethyl 2-{4-[(2-methoxyethyl)(2,2,2-trifluoroethyl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
- 10 Ethyl 2-{4-[ethyl(oxetan-3-yl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
- Ethyl 2-{4-[oxetan-3-yl(2,2,2-trifluoroethyl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
- 15 Ethyl 2-{4-[(2-cyanoethyl)(ethyl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
- Ethyl 2-{4-[ethyl[2-(methylsulfonyl)ethyl]amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
- Ethyl 2-{4-[ethyl(methoxy)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
- 20 Ethyl 2-{4-[(2-hydroxyethyl)(phenyl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
- Ethyl 2-{4-[benzyl(2,2,2-trifluoroethyl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
- 25 Ethyl 2-{4-[ethyl(1,3-oxazol-5-ylmethyl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
- Ethyl 2-{4-[(2-fluoroethyl)(1,3-oxazol-5-ylmethyl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
- Ethyl 2-{4-[(1,3-oxazol-5-ylmethyl)(2,2,2-trifluoroethyl)amino]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
- 30 Ethyl 2-{4-[1-[acetyl(ethyl)amino]propyl]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
- Ethyl 2-{4-[2-[acetyl(ethyl)amino]propan-2-yl]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate
- 35 Ethyl 2-{4-[1-(1H-pyrazol-1-yl)ethyl]piperidin-1-yl}-6-azaspiro[3.4]octane-6-carboxylate

Ethyl 2-[4-(1-phenylethoxy)piperidin-1-yl]-6-azaspiro[3.4]octane-6-carboxylate

Ethyl 2-[4-(benzylsulfanyl)piperidin-1-yl]-6-azaspiro[3.4]octane-6-carboxylate

Ethyl 6-[4-[acetyl(cyclopropyl)amino]piperidin-1-yl]-2-azaspiro[3.4]octane-2-carboxylate

5 Methyl 6-[4-[acetyl(ethyl)amino]piperidin-1-yl]-2-azaspiro[3.4]octane-2-carboxylate
Ethyl 6-[4-[acetyl(ethyl)amino]piperidin-1-yl]-2-azaspiro[3.4]octane-2-carboxylate

19. A compound according to any one of claims 1 to 18 for use in medicine.
20. A pharmaceutical composition comprising a compound as defined in any one of
10 claims 1 to 19 and a pharmaceutically acceptable excipient.
21. A compound according to any one of claims 1 to 18 having muscarinic M₁ receptor and/or M₄ receptor agonist activity.
22. A compound according to claims 1 to 18 for use in the treatment of a cognitive disorder or psychotic disorder or for the treatment or lessening the severity of
15 acute, chronic, neuropathic, or inflammatory pain.
23. A compound according to claims 1 to 18 that exhibits selectivity for the M₁ receptor and/or the M₁ and M₄ receptor relative to the M₂ and M₃ receptor subtypes for use in the treatment of Alzheimer's Disease, dementia with Lewy bodies and other cognitive disorder or for the treatment or lessening the
20 severity of acute, chronic, neuropathic, or inflammatory pain, or for the treatment addiction, or for the treatment of movement disorders.
24. A compound according to according to claims 1 to 18 that exhibits selectivity for the M₄ receptor receptor relative to the M₁, M₂ and M₃ receptor subtypes for use in the treatment of schizophrenia or other psychotic disorder or for the
25 treatment or lessening the severity of acute, chronic, neuropathic, or inflammatory pain, or for the treatment addiction, or for the treatment of movement disorders.