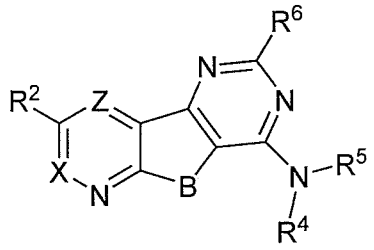
CLAIMS

What is claimed is:

1. A compound of formula (I),



(I)

or a pharmaceutically acceptable salt thereof, wherein:

B is O or S;

X is N;

Z is N or CR^3;

R^1 is selected from hydrogen, C_1-C_4-alkyl, C_1-C_4-haloalkyl, halo, and $-OR^b$;

R^2 is selected from hydrogen, C_1-C_4-alkyl, C_1-C_4-haloalkyl, C_1-C_4-hydroxyalkyl, C_1-C_4-acetoxyalkyl, halo, and $-OR^b$;

R^3 is selected from hydrogen and C_1-C_4-alkyl;

R^4 and R^5 are each independently selected from hydrogen, alkyl, alkenyl, alkynyl, aryl, heteroaryl, cycloalkyl, heteroalkyl, heterocycle, and $-(CR^cR^d)_n$-Y, each of which may be optionally substituted;

or R^4 and R^5 are taken together with the nitrogen atom to which they are attached to form an optionally substituted heterocyclic ring;

R^6 is selected from hydrogen and C_1-C_4-alkyl;

each Y is independently selected from halo, -OR, -SR, -C(O)R, -C(O)OR, -S(O)R, $-SO_2R$, $-NR_2$, $-C(O)NR_2$, -NRC(O)R, $-S(O)_2NR_2$, $-NRS(O)_2R$, aryl, heteroaryl, cycloalkyl, and heterocycle, each of which may be optionally substituted;

n is 1, 2, 3, 4, 5, 6, 7, or 8;

R^b is selected from hydrogen, C_1-C_4-alkyl, C_1-C_4-haloalkyl, aryl, heteroaryl, cycloalkyl, and heterocycle;

R^c and R^d are each independently selected from hydrogen, C_1-C_4-alkyl, C_1-C_4-haloalkyl, and halo; and

each R is independently selected from hydrogen, alkyl, aryl, arylalkyl, cycloalkyl, cycloalkylalkyl, heterocycle, heterocyclealkyl, heteroaryl, heteroarylalkyl, and heteroalkyl, each of which may be optionally substituted.

2. The compound of claim 1 or a pharmaceutically acceptable salt thereof, wherein R^2 is selected from hydrogen, C_1-C_4-alkyl, C_1-C_4-haloalkyl, halo, and -OR^b.

3. The compound of any one of claims 1-2, or a pharmaceutically acceptable salt thereof, wherein

R^2 is selected from C_1-C_4-alkyl, C_1-C_4-haloalkyl, halo, and -OR^b.

4. The compound of any one of claims 1-3, or a pharmaceutically acceptable salt thereof,wherein

R^2 is C_1-C_4 alkyl.

5. The compound of claim 4, or a pharmaceutically acceptable salt thereof,wherein

R^2 is methyl.

6. The compound of any one of claims 1-5, or a pharmaceutically acceptable salt thereof, wherein

Z is CR^3.

7. The compound of claim 6, or a pharmaceutically acceptable salt thereof, wherein

R^3 is C_1-C_4 alkyl.

8. The compound of claim 7, or a pharmaceutically acceptable salt thereof, wherein

R^3 is methyl.

9. The compound of any one of claims 1-8, or a pharmaceutically acceptable salt thereof, wherein

R^4 is hydrogen or alkyl; and

R^5 is selected from alkyl, alkenyl, alkynyl, aryl, heteroaryl, cycloalkyl, heteroalkyl, heterocycle, and $-(CR^cR^d)_n-Y$, each of which may be optionally substituted.

10. The compound of claim 9, or a pharmaceutically acceptable salt thereof, wherein

R^4 is selected from hydrogen and methyl;

R^5 is selected from C_1-C_4 alkyl, C_3-C_6 cycloalkyl, a 3- to 6-membered heterocycle having one heteroatom selected from N and O, and $-(CR^cR^d)_n-Y$;

n is 1, 2 or 3;

R^c and R^d are each hydrogen;

Y is selected from –OR, aryl, C_3-C_6 cycloalkyl, and a 5- to 6-membered heteroaryl having 1 or 2 heteroatoms independently selected from N, O and S; and

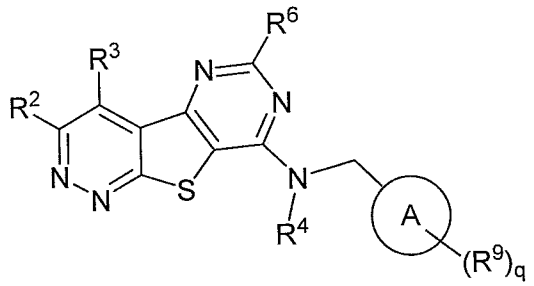
R is C_1-C_4 alkyl;

wherein each aryl, cycloalkyl, heteroaryl and heterocycle is independently unsubstituted or substituted with 1 or 2 substituents independently selected from C_1-C_4 alkyl, C_1-C_4 hydroxyalkyl, C_1-C_4 alkoxy, halo, hydroxy, aryl, C_3-C_6 cycloalkyl, a 3- to 6-membered heterocycle having one heteroatom independently selected from N and O, and a 5- to 6-membered heteroaryl having 1 or 2 heteroatoms independently selected from N, O and S.

11. The compound of any one of claims 1-10, or a pharmaceutically acceptable salt thereof, wherein

R^6 is hydrogen.

12. The compound of claim 1, wherein the compound is a compound of formula (Ii):



(Ii)

or a pharmaceutically acceptable salt thereof, wherein:

A is selected from aryl, cycloalkyl, heterocyclyl and heteroaryl;

q is 1, 2 or 3; and

each R^9 is independently selected from alkyl, halo, hydroxyalkyl, alkoxyalkyl, aminoalkyl, aryl, cycloalkyl, heteroaryl, heterocyclyl, sulfanyl, $-(CR^cR^d)_p-Y$, -OR, -SR, -C(O)R, -C(O)OR, -S(O)R, $-SO_2R$, $-NR_2$, $-C(O)NR_2$, and $-S(O)_2NR_2$, each of which may be optionally substituted.

13. The compound of claim 12, or a pharmaceutically acceptable salt thereof, wherein

A is selected from phenyl, a C_3-C_6 cycloalkyl, a 3- to 6-membered heterocycle having one or two heteroatoms independently selected from N, S and O, and a 5- to 6-membered heteroaryl having 1 or 2 heteroatoms independently selected from N, O and S.

14 The compound of any one of claims 12-13, or a pharmaceutically acceptable salt thereof, wherein

each R^9 is independently selected from C_1-C_6 alkyl, halo, C_1-C_6 hydroxyalkyl, C_1-C_6-alkoxy-C_1-C_6-alkyl, phenyl, C_3-C_6 cycloalkyl, a 3- to 6-membered heterocycle having one or two heteroatoms independently selected from N, O and S, a 5- to 6-membered heteroaryl having 1 or 2 heteroatoms independently selected from N, O and S, $-(CR^cR^d)_p-Y$, -OR, -C(O)R, $-C(O)NR_2$, and $-SO_2R$;

each Y is independently selected from C_3-C_6 cycloalkyl, a 3- to 6-membered heterocycle having one or two heteroatoms independently selected from N, O and S, and a 5- to 6-membered heteroaryl having 1 or 2 heteroatoms independently selected from N, O and S;

p is 1;

R^c and R^d are hydrogen;

each R is independently selected from hydrogen, C_1-C_6 alkyl, hydroxy, C_3-C_6 cycloalkyl, a 3- to 6-membered heterocycle having one or two heteroatoms independently selected from N, O and S, and a 5- to 6-membered heteroaryl having 1 or 2 heteroatoms independently selected from N, O and S; and

each alkyl, phenyl, cycloalkyl, heterocyclyl and heteroaryl is independently unsubstituted or substituted with 1, 2, or 3 substituents independently selected from halo, hydroxy, C_1-C_4 alkyl, C_1-C_4 haloalkyl, C_3-C_6 cycloalkyl, C_1-C_4 alkoxy and C_1-C_4 haloalkoxy.

15. The compound of any one of claims 12-14, or a pharmaceutically acceptable salt thereof, wherein

R^6 is hydrogen.

16. The compound of claim 1, selected from the group consisting of:

N,*N*,3,4-tetramethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

N-cyclohexyl-3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

3,4-dimethyl-*N*-(tetrahydro-2*H*-pyran-4-yl)pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

3,4-dimethyl-8-(piperidin-1-yl)pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

N-cyclobutyl-3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

3,4-dimethyl-8-(pyrrolidin-1-yl)pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

3,4-dimethyl-*N*-(1-(5-(trifluoromethyl)pyrimidin-2-yl)azetidin-3-yl)pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

8-(4-cyclopropylpiperazin-1-yl)-3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

8-(azetidin-1-yl)-3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

8-(3-azabicyclo[3.1.0]hexan-3-yl)-3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

1-(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)-*N*,*N*-dimethylpyrrolidin-3-amine;

N-(2-methoxyethyl)-*N*,3,4-trimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

6-(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)-2-oxa-6-azaspiro[3.3]heptane;

8-(3-(methoxymethyl)azetidin-1-yl)-3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

8-(3,3-difluoroazetidin-1-yl)-3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

3,4-dimethyl-*N*-(1-(6-(trifluoromethyl)pyridin-3-yl)azetidin-3-yl)pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

3,4-dimethyl-*N*-(1-phenylpyrrolidin-3-yl)pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

3,4-dimethyl-8-(3-(pyridin-4-yl)azetidin-1-yl)pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

N-cyclopropyl-3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

N-(2-(4-methoxyphenyl)cyclopropyl)-3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

N-(3-fluoro-4-methoxybenzyl)-3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

3,4-dimethyl-8-(3-phenylpyrrolidin-1-yl)pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

N-(4-(2-fluoropyridin-3-yl)benzyl)-3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

8-(3-(4-fluorophenoxy)azetidin-1-yl)-3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

8-(3-(2-fluorophenoxy)azetidin-1-yl)-3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

8-(3-(3-fluorophenoxy)azetidin-1-yl)-3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

3,4-dimethyl-8-(3-phenoxyazetidin-1-yl)pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

1-(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)-3-methylazetidin-3-ol;

1-(3-((3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino)azetidin-1-yl)ethan-1-one;

1-(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)azetidin-3-one;

N-[1-(5-fluoropyrimidin-2-yl)azetidin-3-yl]-3,4-dimethyl-pyrimido[4',5':4,5]furo[2,3-*c*]pyridazin-8-amine;

1-[4-[[(3,4-dimethylpyrimido[4',5':4,5]furo[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]cyclobutanol;

2-[4-[[(3,4-dimethylpyrimido[4',5':4,5]furo[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]propan-2-ol;

1-[3-[[(3,4-dimethylpyrimido[4',5':4,5]furo[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]cyclobutanol;

2-[3-[[(3,4-dimethylpyrimido[4',5':4,5]furo[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]propan-2-ol;

N-cyclopropyl-3,4-dimethyl-pyrimido[4',5':4,5]furo[2,3-*c*]pyridazin-8-amine;

N-cyclobutyl-3,4-dimethyl-pyrimido[4',5':4,5]furo[2,3-*c*]pyridazin-8-amine;

N-cyclopentyl-3,4-dimethyl-pyrimido[4',5':4,5]furo[2,3-*c*]pyridazin-8-amine;

3,4-dimethyl-*N*-(2-oxaspiro[3.3]heptan-6-yl)pyrimido[4',5':4,5]furo[2,3-*c*]pyridazin-8-amine;

N-(3,3-difluorocyclobutyl)-3,4-dimethyl-pyrimido[4',5':4,5]furo[2,3-*c*]pyridazin-8-amine;

3,4-dimethyl-8-(2-oxa-6-azaspiro[3.3]heptan-6-yl)pyrimido[4',5':4,5]furo[2,3-*c*]pyridazine;

2-[5-[[(3,4-dimethylpyrimido[4',5':4,5]furo[2,3-*c*]pyridazin-8-yl)amino]methyl]-2-pyridyl]propan-2-ol;

N-[(3-fluoro-4-methoxy-phenyl)methyl]-3,4-dimethyl-pyrimido[4',5':4,5]furo[2,3-*c*]pyridazin-8-amine;

2-[4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]propan-2-ol;

N-(2-(4-methoxyphenyl)cyclopropyl)-3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

N-(4-(2-fluoropyridin-3-yl)benzyl)-3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

1-(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)-3-methyl-azetidin-3-ol;

N-[1-(2,3-difluorophenyl)pyrrolidin-3-yl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

N-[1-(3-chloro-5-cyclopropyl-2-pyridyl)azetidin-3-yl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

N-[1-(6-cyclopropyl-2-methyl-3-pyridyl)azetidin-3-yl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

N-[1-(5-fluoropyrimidin-2-yl)azetidin-3-yl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

N-[1-(2,5-dichloro-4-pyridyl)azetidin-3-yl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

N-[1-(5-cyclopropylpyrazin-2-yl)azetidin-3-yl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

tert-butyl 3-[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]azetidine-1-carboxylate;

N-(azetidin-3-yl)-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

N-[1-(5-isopropoxypyrimidin-2-yl)azetidin-3-yl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

N-[[6-(difluoromethoxy)-3-pyridyl]methyl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

N-[[4-(cyclopropylmethoxy)-3-fluoro-phenyl]methyl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

3,4-dimethyl-*N*-[[4-(pentafluoro-l6-sulfanyl)phenyl]methyl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

3,4-dimethyl-*N*-[(4-methylsulfonylphenyl)methyl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

N-[(3,4-dimethoxyphenyl)methyl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

1-(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)azetidin-3-amine;

N-[1-(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)azetidin-3-yl]acetamide;

N-[1-(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)azetidin-3-yl]pyridine-4-carboxamide;

1-(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)-3-methyl-azetidin-3-amine;

(3R)-1-(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)pyrrolidin-3-amine;

2-[4-[1-[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]ethyl]phenyl]propan-2-ol;

1-[4-[1-[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]ethyl]phenyl]cyclobutanol;

1-[3-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]cyclobutanol;

3-cyclopropyl-1-(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)azetidin-3-ol;

1-(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)azetidine-3-carboxamide;

8-(2,6-diazaspiro[3.3]heptan-2-yl)-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

2-[5-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-2-pyridyl]propan-2-ol;

2-[4-[[(3,4-dimethylpyrimido[4,5]thieno[1,2-c]pyridazin-8-yl)amino]methyl]-3-fluoro-phenyl]propan-2-ol;

3,4-dimethyl-*N*-[[4-(morpholinomethyl)phenyl]methyl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

3,4-dimethyl-*N*-[[4-(2-pyridyl)phenyl]methyl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

3,4-dimethyl-*N*-[[4-(2-pyridyloxy)phenyl]methyl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

3,4-dimethyl-*N*-[[4-(4-methylpiperazin-1-yl)phenyl]methyl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

2-[4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-2-fluoro-phenyl]propan-2-ol;

2-[4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]-1,1,1-trifluoro-propan-2-ol;

1-[4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]cyclobutanol;

2-[4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-3-fluoro-phenyl]butan-2-ol;

2-[4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]butan-2-ol;

2-[1-[[4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]methyl]pyrrolidin-2-yl]propan-2-ol;

3,4-dimethyl-*N*-[(4-piperazin-1-ylphenyl)methyl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

N-[2-(3,4-difluorophenyl)cyclopropyl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

N-[[4-[4-(2-methoxyethyl)piperazin-1-yl]phenyl]methyl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

N-[(2,6-difluoro-4-methoxy-phenyl)methyl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

[4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]-pyrrolidin-1-yl-methanone;

[4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]-morpholino-methanone;

[4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]-(2-oxa-6-azaspiro[3.3]heptan-6-yl)methanone;

[4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]-(1-piperidyl)methanone;

3-azabicyclo[3.1.0]hexan-3-yl-[4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]methanone;

[4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]-[3-(methoxymethyl)azetidin-1-yl]methanone;

[4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]-[(3S)-3-fluoropyrrolidin-1-yl]methanone;

[4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]-[(3R)-3-fluoropyrrolidin-1-yl]methanone;

(4,4-difluoro-1-piperidyl)-[4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]methanone;

azetidin-1-yl-[4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]methanone;

N-cyclopropyl-4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-*N*-methyl-benzamide;

N-cyclopropyl-4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]benzamide;

(3,3-difluoropyrrolidin-1-yl)-[4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]methanone;

N-[(4-methoxyphenyl)methyl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

N-[(3,5-difluoro-4-methoxy-phenyl)methyl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

2-[4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)-methyl-amino]methyl]phenyl]propan-2-ol;

2-[1-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-3-bicyclo[1.1.1]pentanyl]propan-2-ol;

N-(3-fluoro-1-bicyclo[1.1.1]pentanyl)-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

methyl 1-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]bicyclo[1.1.1]pentane-3-carboxylate;

N-[1-(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)azetidin-3-yl]-3-isocyano-pyridin-2-amine;

2-[2-(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)isoindolin-5-yl]propan-2-ol;

1-cyclopropyl-1-[4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]ethanol;

3-[4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]pentan-3-ol;

4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-*N*-methyl-benzamide;

3,4-dimethyl-*N*-[[6-(trifluoromethyl)-3-pyridyl]methyl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

N-[(4,6-dimethyl-3-pyridyl)methyl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

N-[(5,6-dimethyl-3-pyridyl)methyl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-*N*-(1-methylcyclopropyl)benzamide;

N-cyclobutyl-4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]benzamide;

4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-*N*-(3-fluorocyclobutyl)benzamide;

N-(3,3-difluorocyclobutyl)-4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]benzamide;

N-cyclopentyl-4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]benzamide;

4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-*N*-(2-oxaspiro[3.3]heptan-6-yl)benzamide;

4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-*N*-isopropyl-benzamide;

(3,3-difluoroazetidin-1-yl)-[4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]methanone;

4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-*N*-[(1R)-2,2,2-trifluoro-1-methyl-ethyl]benzamide;

4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-*N*-(3-hydroxy-1,2,2-trimethyl-propyl)benzamide;

N-cyclohexyl-4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]benzamide;

N-(4,4-dimethylcyclohexyl)-4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]benzamide;

N-[1-(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)azetidin-3-yl]-2,3-difluoro-pyridin-4-amine;

N-[2-(3,5-dichloro-2-pyridyl)-2-azaspiro[3.3]heptan-6-yl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

N-[2-(3-chloro-5-fluoro-2-pyridyl)-2-azaspiro[3.3]heptan-6-yl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

N-[2-(5-chloro-3-fluoro-2-pyridyl)-2-azaspiro[3.3]heptan-6-yl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

3,4-dimethyl-*N*-[2-(5-methylpyrimidin-2-yl)-2-azaspiro[3.3]heptan-6-yl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

3,4-dimethyl-*N*-[2-[(2-methylpyrimidin-5-yl)methyl]-2-azaspiro[3.3]heptan-6-yl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

3,4-dimethyl-*N*-[2-[[2-(trifluoromethyl)pyrimidin-5-yl]methyl]-2-azaspiro[3.3]heptan-6-yl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

1-[6-[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]-2-azaspiro[3.3]heptan-2-yl]-3,3,3-trifluoro-propan-1-one;

[6-[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]-2-azaspiro[3.3]heptan-2-yl]-tetrahydropyran-4-yl-methanone;

1-[6-[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]-2-azaspiro[3.3]heptan-2-yl]hexan-1-one;

2-[1-(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)pyrrolidin-3-yl]propan-2-ol;

[6-[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]-2-azaspiro[3.3]heptan-2-yl]-[4-(trifluoromethyl)phenyl]methanone;

1-(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)-*N*-[4-(trifluoromethyl)phenyl]pyrrolidine-3-carboxamide;

1-(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)-*N*-(2-pyridyl)pyrrolidine-3-carboxamide;

2-[5-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-2-fluoro-phenyl]propan-2-ol;

N-cyclopropyl-5-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-2-fluoro-benzamide;

N-cyclobutyl-5-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-2-fluoro-benzamide;

N-cyclopentyl-5-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-2-fluoro-benzamide;

5-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-2-fluoro-*N*-isopropyl-benzamide;

5-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-2-fluoro-*N*-isobutyl-benzamide;

N-(2,2-dimethylcyclopropyl)-5-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-2-fluoro-benzamide;

5-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-2-fluoro-*N*-[(1R)-2,2,2-trifluoro-1-methyl-ethyl]benzamide;

5-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-2-fluoro-*N*-(3-fluorocyclobutyl)benzamide;

N-(3,3-difluorocyclobutyl)-5-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-2-fluoro-benzamide;

5-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-2-fluoro-*N*-(3-hydroxy-1,2,2-trimethyl-propyl)benzamide;

5-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-2-fluoro-*N*-(2-methoxyethyl)benzamide;

5-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-2-fluoro-*N*-methyl-benzamide;

2-[2-chloro-4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]propan-2-ol;

2-[3-chloro-4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]propan-2-ol;

3,4-dimethyl-*N*-[[4-(2-thienyl)phenyl]methyl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

3,4-dimethyl-*N*-[[4-(1H-pyrrol-2-yl)phenyl]methyl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

3,4-dimethyl-*N*-[[4-(1-methylpyrazol-3-yl)phenyl]methyl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

3,4-dimethyl-*N*-[[4-(2-methylpyrazol-3-yl)phenyl]methyl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

3-chloro-4-methyl-8-pyrrolidin-1-yl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

3-chloro-*N*-cyclobutyl-4-methyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

3-chloro-*N*-[[6-(difluoromethoxy)-3-pyridyl]methyl]-4-methyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

3-chloro-*N*-[(3-fluoro-4-methoxy-phenyl)methyl]-4-methyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

2-[4-[[(3-chloro-4-methyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]propan-2-ol;

3-chloro-4-methyl-*N*-[1-[5-(trifluoromethyl)pyrimidin-2-yl]azetidin-3-yl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

2-[4-[[(3-methoxy-4-methyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]propan-2-ol;

3-methoxy-4-methyl-8-pyrrolidin-1-yl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

3-methoxy-4-methyl-*N*-[1-[5-(trifluoromethyl)pyrimidin-2-yl]azetidin-3-yl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

1-[4-[[(3,4-dimethylpyrimido[4',5':4,5]furo[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]cyclobutanol;

2-[4-[[(3,4-dimethylpyrimido[4',5':4,5]furo[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]propan-2-ol;

1-[3-[[(3,4-dimethylpyrimido[4',5':4,5]furo[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]cyclobutanol;

2-[3-[[(3,4-dimethylpyrimido[4',5':4,5]furo[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]propan-2-ol;

N-cyclopropyl-3,4-dimethyl-pyrimido[4',5':4,5]furo[2,3-*c*]pyridazin-8-amine;

N-cyclobutyl-3,4-dimethyl-pyrimido[4',5':4,5]furo[2,3-*c*]pyridazin-8-amine;

N-cyclopentyl-3,4-dimethyl-pyrimido[4',5':4,5]furo[2,3-*c*]pyridazin-8-amine;

3,4-dimethyl-*N*-(2-oxaspiro[3.3]heptan-6-yl)pyrimido[4',5':4,5]furo[2,3-*c*]pyridazin-8-amine;

N-(3,3-difluorocyclobutyl)-3,4-dimethyl-pyrimido[4',5':4,5]furo[2,3-*c*]pyridazin-8-amine;

3,4-dimethyl-8-(2-oxa-6-azaspiro[3.3]heptan-6-yl)pyrimido[4',5':4,5]furo[2,3-*c*]pyridazine;

2-[5-[[(3,4-dimethylpyrimido[4',5':4,5]furo[2,3-*c*]pyridazin-8-yl)amino]methyl]-2-pyridyl]propan-2-ol;

N-[(4-methoxyphenyl)methyl]-3,4-dimethyl-pyrimido[4',5':4,5]furo[2,3-*c*]pyridazin-8-amine;

N-[(2,6-difluoro-4-methoxy-phenyl)methyl]-3,4-dimethyl-pyrimido[4',5':4,5]furo[2,3-*c*]pyridazin-8-amine;

N-[(3,5-difluoro-4-methoxy-phenyl)methyl]-3,4-dimethyl-pyrimido[4',5':4,5]furo[2,3-*c*]pyridazin-8-amine;

2-[4-[[(3,4-dimethylpyrimido[4',5':4,5]furo[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]-1,1,1-trifluoro-propan-2-ol;

N-[1-(3,4-difluorophenyl)azetidin-3-yl]-3,4-dimethyl-pyrimido[4',5':4,5]furo[2,3-*c*]pyridazin-8-amine

2-chloro-*N*-cyclopropyl-4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]benzamide;

N-[1-(3,5-dichloro-2-pyridyl)azetidin-3-yl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

N-[1-(5-chloro-3-fluoro-2-pyridyl)azetidin-3-yl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

2-chloro-*N*-cyclobutyl-4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]benzamide;

2-chloro-*N*-cyclopentyl-4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]benzamide;

2-chloro-4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-*N*-isopropyl-benzamide;

2-chloro-*N*-(2,2-dimethylcyclopropyl)-4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]benzamide;

2-chloro-4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-*N*-[(1*R*)-2,2,2-trifluoro-1-methyl-ethyl]benzamide;

2-chloro-4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-*N*-(3-fluorocyclobutyl)benzamide;

2-chloro-*N*-(3,3-difluorocyclobutyl)-4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]benzamide;

2-chloro-4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-*N*-[1-[1-(hydroxymethyl)cyclopropyl]ethyl]benzamide;

2-chloro-4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-*N*-(2-methoxyethyl)benzamide;

2-chloro-4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-*N*-methyl-benzamide;

3,4-dimethyl-*N*-[(4-thiazol-2-ylphenyl)methyl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

3,4-dimethyl-*N*-[(3-pyrimidin-2-ylphenyl)methyl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

3,4-dimethyl-*N*-[(3-pyrazol-1-ylphenyl)methyl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

8-[(3*S*)-3-[(2-chloro-4-pyridyl)oxy]pyrrolidin-1-yl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

3,4-dimethyl-8-[(3*S*)-3-[(2-methyl-4-pyridyl)oxy]pyrrolidin-1-yl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

3,4-dimethyl-8-[(3*S*)-3-[[2-(trifluoromethyl)-4-pyridyl]oxy]pyrrolidin-1-yl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

3,4-dimethyl-8-[(3*S*)-3-(3-pyridyloxy)pyrrolidin-1-yl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

5-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)(methyl)amino]methyl]-2-fluoro-*N*-methyl-benzamide;

2-[4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-2-methyl-phenyl]propan-2-ol;

2-[4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-3-methyl-phenyl]propan-2-ol;

8-[(3*R*)-3-[(2-chloro-4-pyridyl)oxy]pyrrolidin-1-yl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

3,4-dimethyl-8-[(3*R*)-3-[[2-(trifluoromethyl)-4-pyridyl]oxy]pyrrolidin-1-yl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

3,4-dimethyl-8-[(3*R*)-3-[(2-methyl-4-pyridyl)oxy]pyrrolidin-1-yl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

3-[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]-1-(4-fluorophenyl)cyclobutanol;

3,4-dimethyl-8-[(3*R*)-3-(3-pyridyloxy)pyrrolidin-1-yl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

3,4-dimethyl-*N*-[[4-(1-methylpyrrol-2-yl)phenyl]methyl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

N-[[4-(2,4-dimethylpyrazol-3-yl)phenyl]methyl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

N-[[4-(2-ethylpyrazol-3-yl)phenyl]methyl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

N-[[2-fluoro-4-(2-methylpyrazol-3-yl)phenyl]methyl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

3,4-dimethyl-*N*-[(4-pyrazol-1-ylphenyl)methyl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

8-[4-[(2-chloro-4-pyridyl)oxy]-1-piperidyl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

8-[3-[(2-chloro-4-pyridyl)oxymethyl]pyrrolidin-1-yl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

8-[3-[(2-chloro-4-pyridyl)oxymethyl]azetidin-1-yl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

8-[3-[(2-chloro-4-pyridyl)oxy]azetidin-1-yl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

3,4-dimethyl-8-(3-pyrazin-2-yloxyazetidin-1-yl)pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

8-[3-[(4,6-dimethyl-3-pyridyl)oxy]azetidin-1-yl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

1,1,1,3,3,3-hexadeuterio-2-[4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]propan-2-ol;

2-[(3*R*)-1-(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)pyrrolidin-3-yl]propan-2-ol;

2-[(3*S*)-1-(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)pyrrolidin-3-yl]propan-2-ol;

5-[1-(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)azetidin-3-yl]oxypyridine-2-carbonitrile;

3,4-dimethyl-8-[3-(3-pyridyloxy)azetidin-1-yl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

3,4-dimethyl-8-[3-(1-methylpyrazol-4-yl)oxyazetidin-1-yl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

3,4-dimethyl-8-[(3*S*,4*R*)-3-methyl-4-[(2-methyl-4-pyridyl)oxy]pyrrolidin-1-yl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

3,4-dimethyl-8-[(3*S*)-3-(2-pyridyloxy)pyrrolidin-1-yl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

3,4-dimethyl-8-[(3*S*)-3-[[5-(trifluoromethyl)-2-pyridyl]oxy]pyrrolidin-1-yl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

3,4-dimethyl-8-[(3*S*)-3-pyrazin-2-yloxypyrrolidin-1-yl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

3,4-dimethyl-8-[(3*S*)-3-[[6-(trifluoromethyl)-3-pyridyl]oxy]pyrrolidin-1-yl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

4-[(3*S*)-1-(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)pyrrolidin-3-yl]oxybenzonitrile;

3,4-dimethyl-8-[(3*S*)-3-[(6-methyl-3-pyridyl)oxy]pyrrolidin-1-yl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

3,4-dimethyl-8-[(2*R*,4*S*)-2-methyl-4-[(2-methyl-4-pyridyl)oxy]pyrrolidin-1-yl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

3,4-dimethyl-8-[3-(4-pyridyloxy)-3-(trifluoromethyl)pyrrolidin-1-yl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazine;

N-[[4-(1-methoxy-1-methyl-ethyl)phenyl]methyl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

2-[4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-3-fluoro-phenyl]-2-methyl-propan-1-ol;

2-[4-[dideuterio-[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]propan-2-ol;

3,4-dimethyl-*N*-[[4-[1-methyl-1-(trideuteriomethoxy)ethyl]phenyl]methyl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

N-[[4-(1-amino-1-methyl-ethyl)phenyl]methyl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

N-[(1,1-dimethyl-3H-isobenzofuran-5-yl)methyl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

2-[4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]propane-1,2-diol;

3,4-dimethyl-*N*-[[4-(oxetan-3-yl)phenyl]methyl]pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine;

2-[4-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]phenyl]-2-methyl-propan-1-ol;

[8-[[4-(2-hydroxypropan-2-yl)benzyl]amino]-4-methyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-3-yl]methyl acetate; and

2-[4-[[[3-(hydroxymethyl)-4-methyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl]amino]methyl]phenyl]propan-2-ol,

or a pharmaceutically acceptable salt thereof.

17. The compound of any one of claims 1-16, wherein the compound is isotopically labeled.

18. A pharmaceutical composition comprising a therapeutically effective amount of a compound of any one of claims 1-17, or a pharmaceutically acceptable salt thereof, and a pharmaceutically acceptable carrier.

19. The use of a compound according to any one of claims 1-17 in the manufacture of a medicament for treating a neurological and/or psychiatric disorder associated with muscarinic acetycholine receptor M4 dysfuntion in a mammal.

20. The use according to claim 19, for treating a disorder selected from Alzheimer's disease, schizophrenia, a sleep disorder, a pain disorder, and a cognitive disorder.

21. The use according to claim 19 for treating a disorder selected from wherein the disorder is selected from psychosis, schizophrenia, conduct disorder, disruptive behavior disorder, bipolar disorder, psychotic episodes of anxiety, anxiety associated with psychosis, psychotic mood disorders such as severe major depressive disorder; mood disorders associated with psychotic disorders, acute mania, depression associated with bipolar disorder, mood disorders associated with schizophrenia, behavioral manifestations of mental retardation, autistic disorder, movement disorders, Tourette's syndrome, akinetic-rigid syndrome, movement disorders associated with Parkinson's disease, tardive dyskinesia, drug induced and neurodegeneration based dyskinesias, attention deficit hyperactivity disorder, cognitive disorders, dementias, and memory disorders.

22. A compound according to any one of claims 1-17 for use in therapy.

23. The compound of claim 1, or a pharmaceutically acceptable salt thereof, selected from N-(3-fluoro-4-methoxybenzyl)-3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-c]pyridazin-8-amine.

24. The compound of claim 1, or a pharmaceutically acceptable salt thereof, selected from 2-[4-[[(3,4-Dimethylpyrimido[4',5':4,5]thieno[2,3-c]pyridazin-8-yl)amino]methyl]phenyl]propan-2-ol.

25. The compound of claim 1, or a pharmaceutically acceptable salt thereof, selected from *N*-[1-(5-fluoropyrimidin-2-yl)azetidin-3-yl]-3,4-dimethyl-pyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-amine.

26. The compound of claim 1, or a pharmaceutically acceptable salt thereof, selected from 2-[4-[1-[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]ethyl]phenyl]propan-2-ol.

27. The compound of claim 1, or a pharmaceutically acceptable salt thereof, selected from 2-[5-[[(3,4-dimethylpyrimido[4',5':4,5]thieno[2,3-*c*]pyridazin-8-yl)amino]methyl]-2-pyridyl]propan-2-ol.