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(71) Applicant: BAYER AKTIENGESELLSCHAFT

[DE/DE]; Kaiser-Wilhelm-Allee 1, 51373 Leverkusen (DE).

(72) Inventors: HOFFMEISTER, Laura; Urdenbacher

Allee19, 40593 Düsseldorf (DE). FISCHER, Rüdiger; Zu den Fußfällen 23, 50259 Pulheim (DE). WILLOT, Matthieu; Jahnstraße 15, 40215 Düsseldorf (DE). HAGER, Dominik; Lottenstraße 10, 40789 Monheim (DE). ILG, Kerstin; Neusser Wall 32, 50670 Köln (DE). LINKA, Marc; Merkurstraße 52, 40223 Düsseldorf (DE). GÖRGENS, Ulrich; Fester Str.37, 40882 Ratingen (DE). LÖSEL, Peter; Am Schokker 5, 51371 Leverkusen (DE). XIANG, Jing; /o Pharmaron Beijing Co. Ltd., Building 17 No. 6 TaiHe Road BDA, Beijing, 100176 (CN). ZHU, Yongkuan; c/o Pharmaron Beijing Co. Ltd., Building 17 No. 6 TaiHe Road BDA, Beijing, 100176 (CN). TURBERG, Andreas; Sinterstr.86, 42781 Haan (DE).

(74) Agent: BIP PATENTS; Alfred-Nobel-Str. 10, NRW,

40789 Monheim am Rhein (DE).

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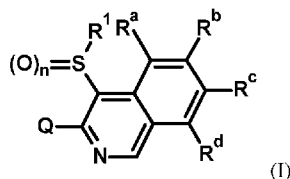
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(54) Title: FUSED BICYCLIC HETEROCYCLE DERIVATIVES AS PESTICIDES



(I)

(57) Abstract: The invention relates to novel compounds of the formula (I) in which the Q, R¹, R^a, R^b, R^c, R^d and n have the meanings given above, to their use as acaricides and/or insecticides for controlling animal pests and to processes and intermediates for their preparation.



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Fused bicyclic heterocycle derivatives as pesticides

The present invention relates to novel fused bicyclic heterocycle derivatives of the formula (I), to their use as acaricides and/or insecticides for controlling animal pests, particularly arthropods and especially insects and arachnids, and to processes and intermediates for their preparation.

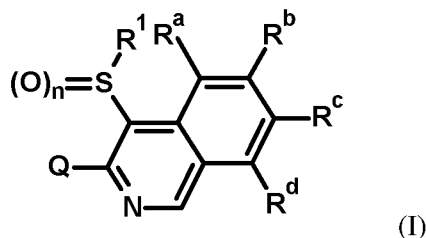
5 Fused bicyclic heterocycle derivatives with insecticidal properties are already described in the literature, e.g. in WO 2010/125985, WO 2012/074135, WO 2012/086848, WO 2013/018928, WO 2013/191113, WO 2014/142292, WO 2014/148451, WO 2015/000715, WO 2015/121136, WO 2015/198859, WO 2015/133603, WO 2015/198859, WO 2015/002211, WO 2015/071180, WO 2015/091945, WO 2016/005263, WO 2015/198817, WO 2016/124563, WO 2016/124557, WO 2016/091731, WO 10 2016/039444, WO 2016/041819, WO 2016/039441, WO 2016/026848, WO 2016/023954, WO 2016/020286, WO 2016/046071, WO 2017/072039.

Modern crop protection compositions have to meet many demands, for example in relation to extent, persistence and spectrum of their action and possible use. Questions of toxicity, sparing of beneficial species and pollinators, environmental properties, application rates, combinability with other active 15 compounds or formulation auxiliaries play a role, as does the question of the complexity involved in the synthesis of an active compound, and resistances can also occur, to mention just a few parameters. For all these reasons alone, the search for novel crop protection compositions cannot be considered complete, and there is a constant need for novel compounds having improved properties compared to the known compounds, at least in relation to individual aspects.

20 It was an object of the present invention to provide compounds which broaden the spectrum of the pesticides in various aspects and/or improve their activity.

Novel fused bicyclic heterocycle derivatives have now been found, these having advantages over the compounds already known, examples of which include better biological or environmental properties, a wider range of application methods, better insecticidal or acaricidal action, and good compatibility with 25 useful plants. The fused bicyclic heterocycle derivatives can be used in combination with further agents for improving efficacy, especially against insects that are difficult to control.

The subject matter of the present invention is therefore novel compounds of the formula (I)



in which (configuration 1-1)

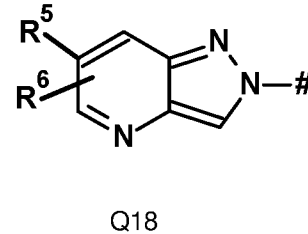
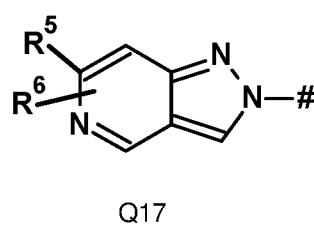
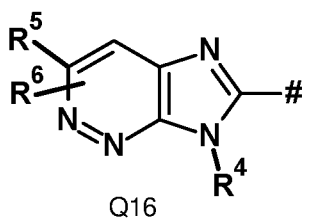
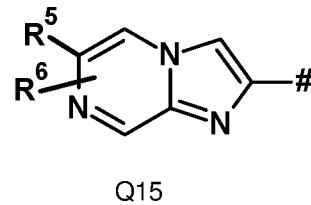
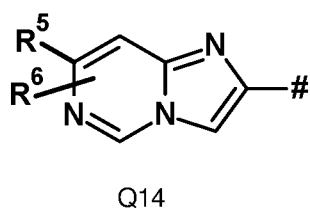
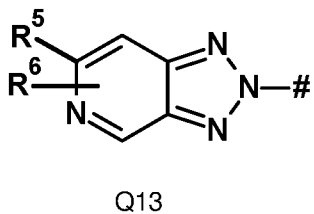
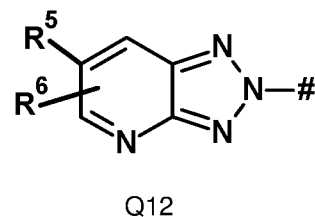
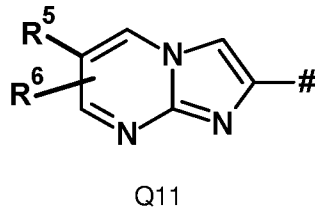
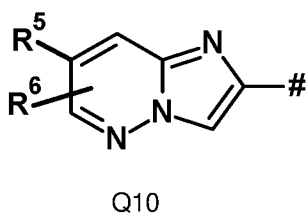
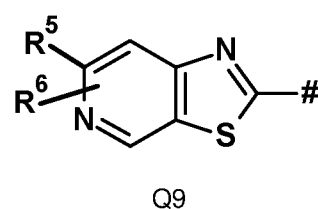
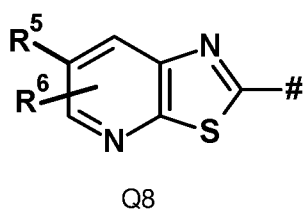
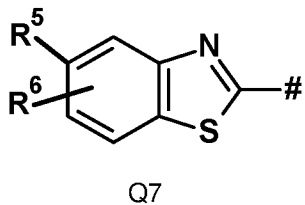
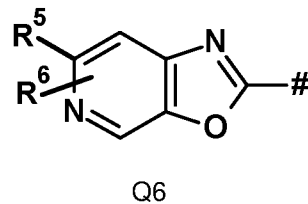
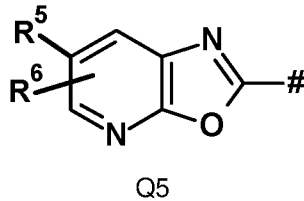
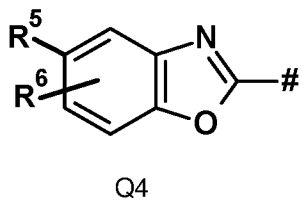
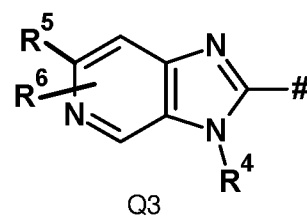
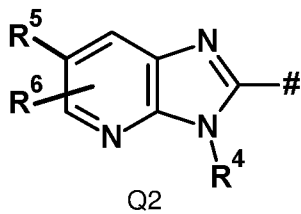
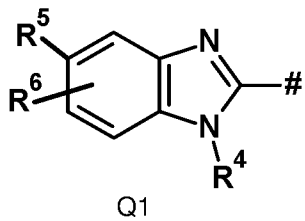
5 R¹ represents (C₁-C₆)-alkyl, (C₁-C₆)-haloalkyl, (C₁-C₆)-cyanoalkyl, (C₁-C₆)-hydroxyalkyl, (C₁-C₆)-alkoxy-(C₁-C₆)-alkyl, (C₁-C₆)-haloalkoxy-(C₁-C₆)-alkyl, (C₂-C₆)-alkenyl, (C₂-C₆)-alkenyloxy-(C₁-C₆)-alkyl, (C₂-C₆)-haloalkenyloxy-(C₁-C₆)-alkyl, (C₂-C₆)-haloalkenyl, (C₂-C₆)-cyanoalkenyl,
 10 (C₂-C₆)-alkynyl, (C₂-C₆)-alkynyloxy-(C₁-C₆)-alkyl, (C₂-C₆)-haloalkynyloxy-(C₁-C₆)-alkyl, (C₂-C₆)-haloalkynyl, (C₂-C₆)-cyanoalkynyl, (C₃-C₈)-cycloalkyl, (C₃-C₈)-cycloalkyl-(C₃-C₈)-cycloalkyl, (C₁-C₆)-alkyl-(C₃-C₈)-cycloalkyl, halo-(C₃-C₈)-cycloalkyl, amino, (C₁-C₆)-alkylamino, di-(C₁-C₆)-alkyl-amino, (C₃-C₈)-cycloalkylamino, (C₁-C₆)-alkylcarbonylamino, (C₁-C₆)-alkylthio-(C₁-C₆)-alkyl, (C₁-C₆)-haloalkylthio-(C₁-C₆)-alkyl, (C₁-C₆)-alkylsulfinyl-(C₁-C₆)-alkyl, (C₁-C₆)-haloalkylsulfinyl-(C₁-C₆)-alkyl, (C₁-C₆)-alkylsulfonyl-(C₁-C₆)-alkyl, (C₁-C₆)-haloalkylsulfonyl-(C₁-C₆)-alkyl, (C₁-C₆)-alkoxy-(C₁-C₆)-alkylthio-(C₁-C₆)-alkyl, (C₁-C₆)-alkoxy-(C₁-C₆)-alkylsulfinyl-(C₁-C₆)-alkyl, (C₁-C₆)-alkoxy-(C₁-C₆)-alkylsulfonyl-(C₁-C₆)-alkyl, (C₁-C₆)-alkylcarbonyl-(C₁-C₆)-alkyl, (C₁-C₆)-haloalkylcarbonyl-(C₁-C₆)-alkyl, (C₁-C₆)-alkoxycarbonyl-(C₁-C₆)-alkyl, (C₁-C₆)-haloalkoxycarbonyl-(C₁-C₆)-alkyl, (C₁-C₆)-alkylsulfonylamino, aminosulfonyl-(C₁-C₆)-alkyl, (C₁-C₆)-alkylaminosulfonyl-(C₁-C₆)-alkyl or di-(C₁-C₆)-alkylaminosulfonyl-(C₁-C₆)-alkyl,

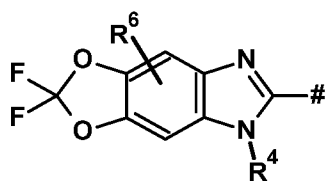
15 R^a, R^b, R^c, R^d independently of one another represent hydrogen, cyano, halogen, nitro, acetyl, hydroxy, amino, SCN, tri-(C₁-C₆)-alkylsilyl, (C₃-C₈)-cycloalkyl, (C₃-C₈)-cycloalkyl-(C₃-C₈)-cycloalkyl, (C₁-C₆)-alkyl-(C₃-C₈)-cycloalkyl, halo-(C₃-C₈)-cycloalkyl, (C₁-C₆)-alkyl, (C₁-C₆)-haloalkyl, (C₁-C₆)-cyanoalkyl, (C₁-C₆)-hydroxyalkyl, hydroxycarbonyl-(C₁-C₆)-alkoxy, (C₁-C₆)-alkoxycarbonyl-(C₁-C₆)-alkyl, (C₁-C₆)-alkoxy-(C₁-C₆)-alkyl, (C₂-C₆)-alkenyl, (C₂-C₆)-haloalkenyl, (C₂-C₆)-cyanoalkenyl, (C₂-C₆)-alkynyl, (C₂-C₆)-haloalkynyl, (C₂-C₆)-cyanoalkynyl, (C₁-C₆)-alkoxy, (C₁-C₆)-haloalkoxy, (C₁-C₆)-cyanoalkoxy, (C₁-C₆)-alkoxycarbonyl-(C₁-C₆)-alkoxy, (C₁-C₆)-alkoxy-(C₁-C₆)-alkoxy, (C₁-C₆)-alkylhydroxyimino, (C₁-C₆)-alkoxyimino, (C₁-C₆)-alkyl-(C₁-C₆)-alkoxyimino, (C₁-C₆)-haloalkyl-(C₁-C₆)-alkoxyimino, (C₁-C₆)-alkylthio, (C₁-C₆)-haloalkylthio, (C₁-C₆)-alkoxy-(C₁-C₆)-alkylthio, (C₁-C₆)-alkylthio-(C₁-C₆)-alkyl, (C₁-C₆)-alkylsulfinyl, (C₁-C₆)-haloalkylsulfinyl, (C₁-C₆)-alkoxy-(C₁-C₆)-alkylsulfinyl, (C₁-C₆)-alkylsulfinyl-(C₁-C₆)-alkyl, (C₁-C₆)-alkylsulfonyl, (C₁-C₆)-haloalkylsulfonyl, (C₁-C₆)-alkoxy-(C₁-C₆)-alkylsulfonyl, (C₁-C₆)-alkylsulfonyl-(C₁-C₆)-alkyl, (C₁-C₆)-alkylsulfonyloxy, (C₁-C₆)-alkylcarbonyl, (C₁-C₆)-alkylthiocarbonyl, (C₁-C₆)-haloalkylcarbonyl, (C₁-C₆)-alkylcarbonyloxy, (C₁-C₆)-alkoxycarbonyl, (C₁-C₆)-haloalkoxycarbonyl, aminocarbonyl, (C₁-C₆)-alkylaminocarbonyl, (C₁-C₆)-alkylaminothiocarbonyl, di-(C₁-C₆)-alkylaminocarbonyl, di-(C₁-C₆)-alkylaminothiocarbonyl, (C₂-C₆)-alkenylaminocarbonyl, di-(C₂-C₆)-alkenylaminocarbonyl, (C₃-C₈)-cycloalkylaminocarbonyl, (C₁-C₆)-alkylsulfonylamino, (C₁-C₆)-alkylamino, di-(C₁-C₆)-alkylamino, aminosulfonyl, (C₁-C₆)-alkylaminosulfonyl, di-(C₁-C₆)-alkylaminosulfonyl, (C₁-C₆)-alkylsulfoximino, aminothiocarbonyl, (C₁-C₆)-alkylaminothiocarbonyl, di-(C₁-C₆)-alkyl-

aminothiocarbonyl, (C₃-C₈)-cycloalkylamino, NHCO-(C₁-C₆)-alkyl ((C₁-C₆)-alkylcarbonylamino), NHCO-O(C₁-C₆)-alkyl ((C₁-C₆)-alkoxycarbonylamino) or NHCO-(C₃-C₈)-cycloalkyl ((C₃-C₈)-cycloalkylcarbonylamino),

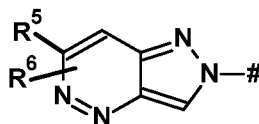
where at least one of the radicals R^a, R^b, R^c or R^d represents a substituent other than hydrogen,

- 5 Q represents a heteroaromatic 9-membered or 12-membered fused bicyclic or tricyclic ring system from the group consisting of Q1 to Q20,





Q19



Q20

R^4 represents (C₁-C₆)-alkyl, (C₁-C₆)-haloalkyl, (C₁-C₆)-cyanoalkyl, (C₁-C₆)-hydroxyalkyl, (C₁-C₆)-alkoxy-(C₁-C₆)-alkyl, (C₁-C₆)-haloalkoxy-(C₁-C₆)-alkyl, (C₂-C₆)-alkenyl, (C₂-C₆)-alkenyloxy-(C₁-C₆)-alkyl, (C₂-C₆)-haloalkenyloxy-(C₁-C₆)-alkyl, (C₂-C₆)-haloalkenyl, (C₂-C₆)-cyanoalkenyl, (C₂-C₆)-alkynyl, (C₂-C₆)-alkynyloxy-(C₁-C₆)-alkyl, (C₂-C₆)-haloalkynyl, (C₃-C₆)-cycloalkyl, (C₃-C₆)-cycloalkyl-(C₃-C₆)-cycloalkyl, (C₁-C₆)-alkyl-(C₃-C₆)-cycloalkyl, halo-(C₃-C₆)-cycloalkyl, (C₁-C₆)-alkylthio-(C₁-C₆)-alkyl, (C₁-C₆)-alkylsulfinyl-(C₁-C₆)-alkyl, (C₁-C₆)-alkylsulfonyl-(C₁-C₆)-alkyl or (C₁-C₆)-alkylcarbonyl-(C₁-C₆)-alkyl,

R^5, R^6 independently of one another represent hydrogen, cyano, halogen, (C₁-C₆)-alkyl, (C₁-C₆)-haloalkyl, (C₂-C₆)-alkenyl, (C₂-C₆)-haloalkenyl, (C₂-C₆)-alkynyl, (C₂-C₆)-haloalkynyl, (C₃-C₆)-cycloalkyl, (C₃-C₆)-cycloalkyl-(C₃-C₆)-cycloalkyl, (C₁-C₆)-alkyl-(C₃-C₆)-cycloalkyl, (C₁-C₆)-alkoxy, (C₁-C₆)-haloalkoxy, (C₁-C₆)-alkoxyimino, (C₁-C₆)-alkylthio, (C₁-C₆)-haloalkylthio, (C₁-C₆)-alkylsulfinyl, (C₁-C₆)-haloalkylsulfinyl, (C₁-C₆)-alkylsulfonyl, (C₁-C₆)-haloalkylsulfonyl, (C₁-C₆)-alkylsulfonyloxy, (C₁-C₆)-alkylcarbonyl, (C₁-C₆)-haloalkylcarbonyl, aminocarbonyl, (C₁-C₆)-alkylaminocarbonyl, di-(C₁-C₆)-alkylaminocarbonyl, (C₁-C₆)-alkylsulfonylamino, (C₁-C₆)-alkylamino, di-(C₁-C₆)-alkylamino, aminosulfonyl, (C₁-C₆)-alkylaminosulfonyl or di-(C₁-C₆)-alkylaminosulfonyl,

n represents 0, 1 or 2,

where, if Q represents Q2, R^c does not represent (C₁-C₆)-haloalkyl.

It has additionally been found that the compounds of the formula (I) have very good efficacy as pesticides, preferably as insecticides and/or acaricides, and additionally generally have very good plant compatibility, in particular with respect to crop plants.

The compounds according to the invention are defined in general terms by the formula (I). Preferred substituents or ranges of the radicals given in the formulae mentioned above and below are illustrated hereinafter:

Configuration 2-1

R^1 preferably represents (C₁-C₄)-alkyl, (C₁-C₄)-hydroxyalkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-cyanoalkyl, (C₁-C₄)-alkoxy-(C₁-C₄)-alkyl, (C₁-C₄)-haloalkoxy-(C₁-C₄)-alkyl, (C₂-C₄)-alkenyl, (C₂-C₄)-alkenyloxy-(C₁-C₄)-alkyl, (C₂-C₄)-haloalkenyloxy-(C₁-C₄)-alkyl, (C₂-C₄)-haloalkenyl, (C₂-C₄)-

5 cyanoalkenyl, (C₂-C₄)-alkynyl, (C₂-C₄)-alkynyloxy-(C₁-C₄)-alkyl, (C₂-C₄)-haloalkynyloxy-(C₁-C₄)-alkyl, (C₂-C₄)-haloalkynyl, (C₂-C₄)-cyanoalkynyl, (C₃-C₆)-cycloalkyl, (C₃-C₆)-cycloalkyl-(C₃-C₆)-cycloalkyl, (C₁-C₄)-alkyl-(C₃-C₆)-cycloalkyl, halo-(C₃-C₆)-cycloalkyl, (C₁-C₄)-alkylamino, di-(C₁-C₄)-alkylamino, (C₃-C₆)-cycloalkylamino, (C₁-C₄)-alkylcarbonylamino, (C₁-C₄)-alkylthio-(C₁-C₄)-alkyl, (C₁-C₄)-haloalkylthio-(C₁-C₄)-alkyl, (C₁-C₄)-alkylsulfinyl-(C₁-C₄)-alkyl, (C₁-C₄)-haloalkylsulfinyl-(C₁-C₄)-alkyl, (C₁-C₄)-alkylsulfonyl-(C₁-C₄)-alkyl, (C₁-C₄)-alkylcarbonyl-(C₁-C₄)-alkyl, (C₁-C₄)-haloalkylcarbonyl-(C₁-C₄)-alkyl or (C₁-C₄)-alkylsulfonylamino,

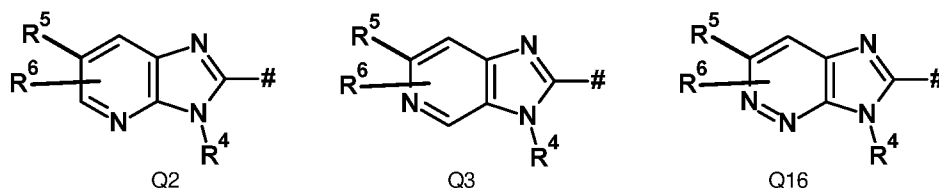
10 R^a, R^b, R^c, R^d independently of one another preferably represent hydrogen, cyano, halogen, nitro, acetyl, hydroxy, amino, SCN, tri-(C₁-C₄)-alkylsilyl, (C₃-C₆)-cycloalkyl, (C₃-C₆)-cycloalkyl-(C₃-C₆)-cycloalkyl, (C₁-C₄)-alkyl-(C₃-C₆)-cycloalkyl, halo-(C₃-C₆)-cycloalkyl, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-cyanoalkyl, (C₁-C₄)-hydroxyalkyl, (C₁-C₄)-alkoxy-(C₁-C₄)-alkyl, (C₂-C₄)-alkenyl, (C₂-C₄)-haloalkenyl, (C₂-C₄)-cyanoalkenyl, (C₂-C₄)-alkynyl, (C₂-C₄)-haloalkynyl, (C₂-C₄)-cyanoalkynyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-cyanoalkoxy, (C₁-C₄)-alkoxy-

15 (C₁-C₄)-alkoxy, (C₁-C₄)-alkylhydroxyimino, (C₁-C₄)-alkoxyimino, (C₁-C₄)-alkyl-(C₁-C₄)-alkoxyimino, (C₁-C₄)-haloalkyl-(C₁-C₄)-alkoxyimino, (C₁-C₄)-alkylthio, (C₁-C₄)-haloalkylthio, (C₁-C₄)-alkylthio-(C₁-C₄)-alkyl, (C₁-C₄)-alkylsulfinyl, (C₁-C₄)-haloalkylsulfinyl, (C₁-C₄)-alkylsulfinyl-(C₁-C₄)-alkyl, (C₁-C₄)-alkylsulfonyl, (C₁-C₄)-haloalkylsulfonyl, (C₁-C₄)-alkylsulfonyl-(C₁-C₄)-alkyl, (C₁-C₄)-alkylsulfonyloxy, (C₁-C₄)-alkylcarbonyl, (C₁-C₄)-

20 haloalkylcarbonyl, aminocarbonyl, aminothiocarbonyl, (C₁-C₄)-alkylaminocarbonyl, di-(C₁-C₄)-alkyl-aminocarbonyl, (C₁-C₄)-alkylsulfonylamino, (C₁-C₄)-alkylamino, di-(C₁-C₄)-alkylamino, aminosulfonyl, (C₁-C₄)-alkylaminosulfonyl, di-(C₁-C₄)-alkylaminosulfonyl, aminothiocarbonyl, NHCO-(C₁-C₄)-alkyl ((C₁-C₄)-alkylcarbonylamino), NHCO-O(C₁-C₄)-alkyl ((C₁-C₄)-alkoxycarbonylamino) or NHCO-(C₃-C₆)-cycloalkyl ((C₃-C₆)-cycloalkylcarbonylamino),

25 where at least one of the radicals R^a, R^b, R^c or R^d represents a substituent other than hydrogen,

Q preferably represents a heteroaromatic 9-membered fused bicyclic ring system from the group consisting of Q2, Q3, Q16,



30 R⁴ preferably represents (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-cyanoalkyl, (C₁-C₄)-hydroxyalkyl, (C₁-C₄)-alkoxy-(C₁-C₄)-alkyl, (C₁-C₄)-haloalkoxy-(C₁-C₄)-alkyl, (C₂-C₄)-alkenyl, (C₂-C₄)-alkenyloxy-(C₁-C₄)-alkyl, (C₂-C₄)-haloalkenyloxy-(C₁-C₄)-alkyl, (C₂-C₄)-haloalkenyl, (C₂-C₄)-cyanoalkenyl, (C₂-C₄)-alkynyl, (C₂-C₄)-alkynyloxy-(C₁-C₄)-alkyl, (C₂-C₄)-haloalkynyl,

(C₃-C₆)-cycloalkyl, (C₃-C₆)-cycloalkyl-(C₃-C₆)-cycloalkyl, (C₁-C₄)-alkyl-(C₃-C₆)-cycloalkyl, halo-(C₃-C₆)-cycloalkyl, (C₁-C₄)-alkylthio-(C₁-C₄)-alkyl, (C₁-C₄)-alkylsulfinyl-(C₁-C₄)-alkyl, (C₁-C₄)-alkylsulfonyl-(C₁-C₄)-alkyl or (C₁-C₄)-alkylcarbonyl-(C₁-C₄)-alkyl,

5 R⁵, R⁶ independently of one another preferably represent hydrogen, cyano, halogen, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₂-C₄)-alkenyl, (C₂-C₄)-haloalkenyl, (C₂-C₄)-alkynyl, (C₂-C₄)-haloalkynyl, (C₃-C₆)-cycloalkyl, (C₃-C₆)-cycloalkyl-(C₃-C₆)-cycloalkyl, (C₁-C₄)-alkyl-(C₃-C₆)-cycloalkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-alkoxyimino, (C₁-C₄)-alkylthio, (C₁-C₄)-haloalkylthio, (C₁-C₄)-alkylsulfinyl, (C₁-C₄)-haloalkylsulfinyl, (C₁-C₄)-alkylsulfonyl, (C₁-C₄)-haloalkylsulfonyl, (C₁-C₄)-alkylsulfonyloxy, (C₁-C₄)-alkylcarbonyl, (C₁-C₄)-haloalkylcarbonyl, aminocarbonyl, (C₁-C₄)-alkylaminocarbonyl, di-(C₁-C₄)-alkylaminocarbonyl, (C₁-C₄)-alkylsulfonylamino, (C₁-C₄)-alkylamino, di-(C₁-C₄)-alkylamino, aminosulfonyl, (C₁-C₄)-alkylaminosulfonyl or di-(C₁-C₄)-alkylaminosulfonyl,

10 n preferably represents 0, 1 or 2,

where, if Q represents Q₂, R^c does not represent (C₁-C₄)-haloalkyl.

15 Configuration 3-1

R¹ particularly preferably represents (C₁-C₄)-alkyl, (C₁-C₄)-hydroxyalkyl, (C₁-C₄)-haloalkyl, (C₂-C₄)-alkenyl, (C₂-C₄)-haloalkenyl, (C₂-C₄)-alkynyl, (C₂-C₄)-haloalkynyl, (C₃-C₆)-cycloalkyl, (C₁-C₄)-alkylthio-(C₁-C₄)-alkyl, (C₁-C₄)-alkylsulfinyl-(C₁-C₄)-alkyl or (C₁-C₄)-alkylsulfonyl-(C₁-C₄)-alkyl,

20 R^a, R^b, R^c, R^d independently of one another particularly preferably represent hydrogen, cyano, halogen, nitro, hydroxy, amino, SCN, tri-(C₁-C₄)-alkylsilyl, (C₃-C₆)-cycloalkyl, (C₃-C₆)-cycloalkyl-(C₃-C₆)-cycloalkyl, (C₁-C₄)-alkyl-(C₃-C₆)-cycloalkyl, halo-(C₃-C₆)-cycloalkyl, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-cyanoalkyl, (C₁-C₄)-alkoxy-(C₁-C₄)-alkyl, (C₂-C₄)-alkenyl, (C₂-C₄)-haloalkenyl, (C₂-C₄)-cyanoalkenyl, (C₂-C₄)-alkynyl, (C₂-C₄)-haloalkynyl, (C₂-C₄)-cyanoalkynyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-cyanoalkoxy, (C₁-C₄)-alkylhydroxyimino, (C₁-C₄)-alkoxyimino, (C₁-C₄)-alkyl-(C₁-C₄)-alkoxyimino, (C₁-C₄)-alkylthio, (C₁-C₄)-haloalkylthio, (C₁-C₄)-alkylsulfinyl, (C₁-C₄)-haloalkylsulfinyl, (C₁-C₄)-alkylsulfonyl, (C₁-C₄)-haloalkylsulfonyl, (C₁-C₄)-alkylsulfonyloxy, (C₁-C₄)-alkylcarbonyl, (C₁-C₄)-haloalkylcarbonyl, aminocarbonyl, (C₁-C₄)-alkylaminocarbonyl, di-(C₁-C₄)-alkylaminocarbonyl, (C₁-C₄)-alkylsulfonylamino, (C₁-C₄)-alkylamino, di-(C₁-C₄)-alkylamino, aminosulfonyl, (C₁-C₄)-alkylaminosulfonyl, di-(C₁-C₄)-alkylaminosulfonyl, NHCO-(C₁-C₄)-alkyl ((C₁-C₄)-alkylcarbonylamino), NHCO-O-(C₁-C₄)-alkyl ((C₁-C₄)-alkoxycarbonylamino) or NHCO-(C₃-C₆)-cycloalkyl ((C₃-C₆)-cycloalkylcarbonylamino),

where at least one of the radicals R^a, R^b, R^c or R^d represents a substituent other than hydrogen,

Q particularly preferably represents a heteroaromatic 9-membered or 12-membered fused bicyclic or tricyclic ring system from the group consisting of Q2, Q3 and Q16,

5 R⁴ particularly preferably represents (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-cyanoalkyl, (C₁-C₄)-hydroxyalkyl, (C₁-C₄)-alkoxy-(C₁-C₄)-alkyl, (C₁-C₄)-haloalkoxy-(C₁-C₄)-alkyl, (C₂-C₄)-alkenyl, (C₂-C₄)-alkenyloxy-(C₁-C₄)-alkyl, (C₂-C₄)-haloalkenyloxy-(C₁-C₄)-alkyl, (C₂-C₄)-haloalkenyl, (C₂-C₄)-cyanoalkenyl, (C₂-C₄)-alkynyl, (C₂-C₄)-alkynyloxy-(C₁-C₄)-alkyl, (C₂-C₄)-haloalkynyl, (C₃-C₆)-cycloalkyl, (C₃-C₆)-cycloalkyl-(C₃-C₆)-cycloalkyl, (C₁-C₄)-alkyl-(C₃-C₆)-cycloalkyl, halo-(C₃-C₆)-cycloalkyl, (C₁-C₄)-alkylthio-(C₁-C₄)-alkyl, (C₁-C₄)-alkylsulfinyl-(C₁-C₄)-alkyl, 10 (C₁-C₄)-alkylsulfonyl-(C₁-C₄)-alkyl or (C₁-C₄)-alkylcarbonyl-(C₁-C₄)-alkyl,

R⁵, R⁶ are independently more preferably hydrogen, cyano, halogen, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₂-C₄)-alkenyl, (C₂-C₄)-haloalkenyl, (C₂-C₄)-alkynyl, (C₂-C₄)-haloalkynyl, (C₃-C₆)-cycloalkyl, (C₃-C₆)-cycloalkyl-(C₃-C₆)-cycloalkyl, (C₁-C₄)-alkyl-(C₃-C₆)-cycloalkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-alkoxyimino, (C₁-C₄)-alkylthio, (C₁-C₄)-haloalkylthio, (C₁-C₄)-alkylsulfinyl, (C₁-C₄)-haloalkylsulfinyl, (C₁-C₄)-alkylsulfonyl, (C₁-C₄)-haloalkylsulfonyl, (C₁-C₄)-alkylsulfonyloxy, (C₁-C₄)-alkylcarbonyl, (C₁-C₄)-haloalkylcarbonyl, aminocarbonyl, (C₁-C₄)-alkylaminocarbonyl, di-(C₁-C₄)-alkylaminocarbonyl, (C₁-C₄)-alkylsulfonylamino, (C₁-C₄)-alkylamino, di-(C₁-C₄)-alkylamino, aminosulfonyl, (C₁-C₄)-alkylaminosulfonyl or di-(C₁-C₄)-alkylaminosulfonyl, 15

20 n particularly preferably represents 0, 1 or 2,

where, if Q represents Q2, R^c does not represent (C₁-C₄)-haloalkyl.

Configuration 4-1

R¹ very particularly preferably represents (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl or (C₃-C₆)-cycloalkyl,

25 R^a, R^b, R^c, R^d independently of one another very particularly preferably represent hydrogen, cyano, halogen, (C₁-C₄)-alkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkyl, (C₁-C₄)-haloalkoxy, (C₃-C₆)-cycloalkyl, (C₁-C₄)-alkylthio, (C₁-C₄)-alkylsulfinyl, (C₁-C₄)-alkylsulfonyl, (C₁-C₄)-haloalkylthio, (C₁-C₄)-haloalkylsulfinyl, (C₁-C₄)-haloalkylsulfonyl, NHCO-(C₁-C₄)-alkyl ((C₁-C₄)-alkylcarbonylamino), NHCO-O(C₁-C₄)-alkyl ((C₁-C₄)-alkoxy-carbonylamino) or NHCO-(C₃-C₆)-cycloalkyl ((C₃-C₆)-cycloalkylcarbonylamino),

30 where at least one of the radicals R^a, R^b, R^c or R^d represents a substituent other than hydrogen,

Q very particularly preferably represents a heteroaromatic 9-membered or 12-membered fused

bicyclic or tricyclic ring system from the group consisting of Q2, Q3 and Q16,

R⁴ very particularly preferably represents (C₁-C₄)-alkyl or (C₁-C₄)-alkoxy-(C₁-C₄)-alkyl,

R⁵ very particularly preferably represents hydrogen, cyano, halogen, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₃-C₆)-cycloalkyl, (C₃-C₆)-cycloalkyl-(C₃-C₆)-cycloalkyl, (C₁-C₄)-alkyl-(C₃-C₆)-cycloalkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-alkoxyimino, (C₁-C₄)-alkylthio, (C₁-C₄)-haloalkylthio, (C₁-C₄)-alkylsulfinyl, (C₁-C₄)-haloalkylsulfinyl, (C₁-C₄)-alkylsulfonyl, (C₁-C₄)-haloalkylsulfonyl, (C₁-C₄)-alkylcarbonyl, (C₁-C₄)-haloalkylcarbonyl, (C₁-C₄)-alkylaminocarbonyl, di-(C₁-C₄)-alkylaminocarbonyl, (C₁-C₄)-alkylsulfonylamino, (C₁-C₄)-alkylaminosulfonyl or di-(C₁-C₄)-alkylaminosulfonyl,

10 R⁶ very particularly preferably represents hydrogen,

n very particularly preferably represents 0, 1 or 2,

where, if Q represents Q2, R^c does not represent (C₁-C₆)-haloalkyl.

Configuration 5-1

R¹ specifically represents methyl, ethyl, n-propyl, isopropyl, cyclopropyl, n-butyl, isobutyl, tert-butyl, cyclobutyl, fluoromethyl, difluoromethyl, trifluoromethyl, fluoroethyl, difluoroethyl, trifluoroethyl, tetrafluoroethyl or pentafluoroethyl,

R^a, R^b, R^c, R^d independently of one another specifically represent hydrogen, fluorine, chlorine, bromine, iodine, cyano, methyl, ethyl, cyclopropyl, cyclobutyl, methoxy, ethylsulfonyl, difluoromethyl, trifluoromethyl, trifluoromethoxy, trifluoromethylthio, trifluoroethylthio, trifluoroethylsulfinyl, trifluoroethylsulfonyl, difluoroethoxy, trifluoroethoxy, methyl(carbonyl)amino, ethyl(carbonyl)amino, cyclopropyl(carbonyl)amino or methoxy(carbonyl)amino,

where one of the radicals R^a, R^b, R^c or R^d represents a substituent other than hydrogen,

Q specifically represents a heteroaromatic 9-membered or 12-membered fused bicyclic ring system from the group consisting of Q2, Q3 and Q16,

25 R⁴ specifically represents methyl, ethyl, isopropyl, methoxymethyl or methoxyethyl,

R⁵ specifically represents fluorine, chlorine, bromine, fluoromethyl, difluoromethyl, trifluoromethyl, fluoroethyl (CH₂CFH₂, CHFCH₃), difluoroethyl (CF₂CH₃, CH₂CHF₂, CHFCHF₂), trifluoroethyl, (CH₂CF₃, CHFCHF₂, CF₂CFH₂), tetrafluoroethyl (CHFCHF₃, CF₂CHF₂), pentafluoroethyl, trifluoromethoxy, difluorochloromethoxy, dichlorofluoromethoxy, trifluoromethylthio, trifluoromethylsulfinyl or trifluoromethylsulfonyl,

30

R⁶ specifically represents hydrogen,

n specifically represents 0, 1 or 2,

where, if Q represents Q2, R^c does not represent difluoromethyl or trifluoromethyl.

Configuration 5-2

5 R¹ specifically represents methyl, ethyl, n-propyl, isopropyl, cyclopropyl, n-butyl, isobutyl, tert-butyl, cyclobutyl, fluoromethyl, difluoromethyl, trifluoromethyl, fluoroethyl, difluoroethyl, trifluoroethyl, tetrafluoroethyl or pentafluoroethyl,

10 R^a, R^b, R^c, R^d independently of one another specifically represent hydrogen, fluorine, chlorine, bromine, iodine, cyano, methyl, ethyl, cyclopropyl, cyclobutyl, methoxy, ethylsulfonyl, difluoromethyl, trifluoromethyl, trifluoromethoxy, trifluoromethylthio, trifluoroethylthio, trifluoroethylsulfinyl, trifluoroethylsulfonyl, difluoroethoxy, trifluoroethoxy, difluoropropoxy, methyl(carbonyl)amino, ethyl(carbonyl)amino, cyclopropyl(carbonyl)amino or methoxy(carbonyl)amino,

where one of the radicals R^a, R^b, R^c or R^d represents a substituent other than hydrogen,

15 Q specifically represents a heteroaromatic 9-membered or 12-membered fused bicyclic ring system from the group consisting of Q2, Q3 and Q16,

R⁴ specifically represents methyl, ethyl, isopropyl, methoxymethyl or methoxyethyl,

20 R⁵ specifically represents fluorine, chlorine, bromine, fluoromethyl, difluoromethyl, trifluoromethyl, fluoroethyl (CH₂CFH₂, CHFCH₃), difluoroethyl (CF₂CH₃, CH₂CHF₂, CHFCHF₂), trifluoroethyl, (CH₂CF₃, CHFCHF₂, CF₂CFH₂), tetrafluoroethyl (CHFCH₂F, CF₂CHF₂), pentafluoroethyl, trifluoromethoxy, difluoroethylmethoxy, dichlorofluoromethoxy, trifluoromethylthio, trifluoromethylsulfinyl or trifluoromethylsulfonyl,

R⁶ specifically represents hydrogen,

n specifically represents 0, 1 or 2,

where, if Q represents Q2, R^c does not represent difluoromethyl or trifluoromethyl.

25 Configuration 6-1

R¹ especially represents ethyl,

R^a especially represents hydrogen,

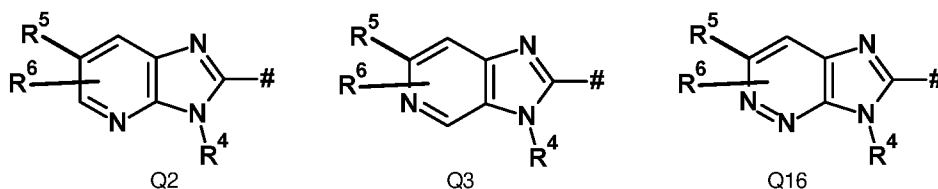
R^b especially represents hydrogen, methyl, difluoromethyl, trifluoromethyl or chlorine,

R^c especially represents hydrogen, chlorine, bromine, cyano, methyl, cyclopropyl, difluoromethyl, trifluoromethyl, methoxy, methyl(carbonyl)amino (-NH-CO-Me), cyclopropyl(carbonyl)amino (-NH-CO-cyclopropyl), methoxy(carbonyl)amino (-NH-CO-OMe), ethylsulfonyl, 2,2-difluoroethoxy, 2,2,2-trifluoroethoxy or 2,2,2-trifluoroethylthio (2,2,2-trifluoroethylsulfanyl: -SCH₂CF₃),

R^d especially represents hydrogen, bromine, chlorine, cyano or trifluoromethyl,

where one of the radicals R^b, R^c or R^d represents a substituent other than hydrogen,

Q especially represents a heteroaromatic 9-membered fused bicyclic ring system from the group consisting of Q2, Q3 and Q16,



R⁴ especially represents methyl,

R⁵ especially represents trifluoromethyl, pentafluoroethyl, trifluoromethoxy or trifluoromethylsulfonyl,

R⁶ especially represents hydrogen,

n especially represents 2,

where, if Q represents Q2, R^c does not represent difluoromethyl or trifluoromethyl.

Configuration 6-1a

R¹ especially represents ethyl,

R^a especially represents hydrogen,

R^b especially represents hydrogen or trifluoromethyl,

R^c especially represents hydrogen, chlorine, bromine, cyano, methyl, cyclopropyl, methoxy, methyl(carbonyl)amino (-NH-CO-Me), cyclopropyl(carbonyl)amino (-NH-CO-cyclopropyl), methoxy(carbonyl)amino (-NH-CO-OMe), ethylsulfonyl, 2,2-difluoroethoxy, 2,2,2-trifluoroethoxy or 2,2,2-trifluoroethylthio,

R^d especially represents hydrogen, bromine, chlorine, cyano or trifluoromethyl,

where one of the radicals R^b, R^c or R^d represents a substituent other than hydrogen,

Q is especially a heteroaromatic 9-membered fused bicyclic ring system from the group of Q2,

R⁴ especially represents methyl,

5 R⁵ especially represents trifluoromethyl, pentafluoroethyl, trifluoromethoxy or trifluoromethylsulfonyl,

R⁶ especially represents hydrogen,

n especially represents 2.

Configuration 6-1b

R¹ especially represents ethyl,

10 R^a especially represents hydrogen,

R^b especially represents hydrogen,

R^c especially represents hydrogen,

R^d especially represents bromine, cyano or trifluoromethyl,

Q is especially a heteroaromatic 9-membered fused bicyclic ring system from the group of Q3,

15 R⁴ especially represents methyl,

R⁵ is especially trifluoromethyl or pentafluoroethyl,

R⁶ especially represents hydrogen,

n especially represents 2.

Configuration 6-1c

20 R¹ especially represents ethyl,

R^a especially represents hydrogen,

R^b especially represents hydrogen, methyl, difluoromethyl, trifluoromethyl or chlorine,

R^c especially represents hydrogen, chlorine, bromine, cyano, methyl, difluoromethyl or trifluoromethyl,

R^d especially represents hydrogen, bromine or chlorine,

where one of the radicals R^b, R^c or R^d represents a substituent other than hydrogen,

Q especially represents a heteroaromatic 9-membered fused bicyclic ring system from the group consisting of Q16,

5 R⁴ especially represents methyl,

R⁵ especially represents trifluoromethyl or pentafluoroethyl,

R⁶ especially represents hydrogen,

n especially represents 2.

Configuration 6-2

10 R¹ especially represents ethyl,

R^a especially represents hydrogen,

R^b especially represents hydrogen, methyl, difluoromethyl, trifluoromethyl or chlorine,

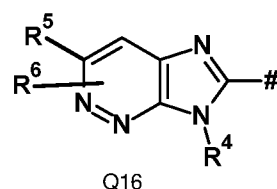
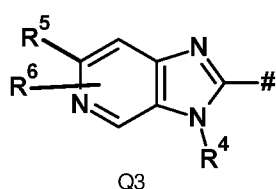
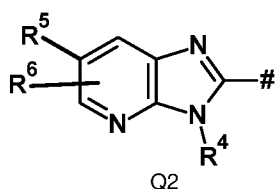
R^c especially represents hydrogen, chlorine, bromine, cyano, methyl, cyclopropyl, difluoromethyl, trifluoromethyl, methoxy, methyl(carbonyl)amino (-NH-CO-Me), cyclopropyl(carbonyl)amino (-NH-CO-cyclopropyl), methoxy(carbonyl)amino (-NH-CO-OMe), ethylsulfonyl, 2,2-difluoroethoxy, 2,2,2-trifluoroethoxy, 2,2-difluoropropoxy (-OCH₂CF₂CH₃) or 2,2,2-trifluoroethylthio (2,2,2-trifluoroethylsulfanyl: -SCH₂CF₃),

15

R^d especially represents hydrogen, bromine, chlorine, cyano or trifluoromethyl,

where one of the radicals R^b, R^c or R^d represents a substituent other than hydrogen,

20 Q especially represents a heteroaromatic 9-membered fused bicyclic ring system from the group consisting of Q2, Q3 and Q16,



R⁴ especially represents methyl,

R⁵ especially represents trifluoromethyl, pentafluoroethyl, trifluoromethoxy or trifluoromethylsulfonyl,

R⁶ especially represents hydrogen,

n especially represents 2,

5 where, if Q represents Q2, R^c does not represent difluoromethyl or trifluoromethyl.

Configuration 6-2a

R¹ especially represents ethyl,

R^a especially represents hydrogen,

R^b especially represents hydrogen or trifluoromethyl,

10 R^c especially represents hydrogen, chlorine, bromine, cyano, methyl, cyclopropyl, methoxy, methyl(carbonyl)amino (-NH-CO-Me), cyclopropyl(carbonyl)amino (-NH-CO-cyclopropyl), methoxy(carbonyl)amino (-NH-CO-OMe), ethylsulfonyl, 2,2-difluoroethoxy, 2,2,2-trifluoroethoxy, 2,2-difluoropropoxy (-OCH₂CF₂CH₃) or 2,2,2-trifluoroethylthio,

R^d especially represents hydrogen, bromine, chlorine, cyano or trifluoromethyl,

15 where one of the radicals R^b, R^c or R^d represents a substituent other than hydrogen,

Q especially represents a heteroaromatic 9-membered fused bicyclic ring system from the group of Q2,

R⁴ especially represents methyl,

20 R⁵ especially represents trifluoromethyl, pentafluoroethyl, trifluoromethoxy or trifluoromethylsulfonyl,

R⁶ especially represents hydrogen,

n especially represents 2.

Configuration 6-2b

R¹ especially represents ethyl,

25 R^a especially represents hydrogen,

R^b especially represents hydrogen,

R^c especially represents hydrogen,

R^d especially represents bromine, cyano or trifluoromethyl,

Q especially represents a heteroaromatic 9-membered fused bicyclic ring system from the group of Q3,

5 R⁴ especially represents methyl,

R⁵ is especially trifluoromethyl or pentafluoroethyl,

R⁶ especially represents hydrogen,

n especially represents 2.

Configuration 6-2c

10 R¹ especially represents ethyl,

R^a especially represents hydrogen,

R^b especially represents hydrogen, methyl, difluoromethyl, trifluoromethyl or chlorine,

R^c especially represents hydrogen, chlorine, bromine, cyano, methyl, difluoromethyl or trifluoromethyl,

15 R^d especially represents hydrogen, bromine or chlorine,

where one of the radicals R^b, R^c or R^d represents a substituent other than hydrogen,

Q especially represents a heteroaromatic 9-membered fused bicyclic ring system from the group consisting of Q16,

R⁴ especially represents methyl,

20 R⁵ especially represents trifluoromethyl or pentafluoroethyl,

R⁶ especially represents hydrogen,

n especially represents 2.

In a preferred embodiment, the invention relates to compounds of the formula (I) where Q represents Q2 and R¹, R⁴, R⁵, R⁶, R^a, R^b, R^c, R^d and n have the definitions given in configuration (1-1) or configuration 25 (2-1) or configuration (3-1) or configuration (4-1) or configuration (5-1) or configuration (5-2) or configuration (6-1) or configuration (6-2).

In a preferred embodiment, the invention relates to compounds of the formula (I) where Q represents Q3 and R¹, R⁴, R⁵, R⁶, R^a, R^b, R^c, R^d and n have the definitions given in configuration (1-1) or configuration (2-1) or configuration (3-1) or configuration (4-1) or configuration (5-1) or configuration (5-2) or configuration (6-1) or configuration (6-2).

- 5 In a preferred embodiment, the invention relates to compounds of the formula (I) where Q represents Q16 and R¹, R⁴, R⁵, R⁶, R^a, R^b, R^c, R^d and n have the definitions given in configuration (1-1) or configuration (2-1) or configuration (3-1) or configuration (4-1) or configuration (5-1) or configuration (5-2) or configuration (6-1) or configuration (6-2).

- 10 In a preferred embodiment, the invention relates to compounds of the formula (I) where Q represents Q3 or Q16 and R¹, R⁴, R⁵, R⁶, R^a, R^b, R^c, R^d and n have the definitions given in configuration (1-1) or configuration (2-1) or configuration (3-1) or configuration (4-1) or configuration (5-1) or configuration (5-2) or configuration (6-1) or configuration (6-2).

- 15 In a preferred embodiment, the invention relates to compounds of the formula (I) where n represents 2 and Q, R¹, R⁴, R⁵, R⁶, R^a, R^b, R^c and R^d have the definitions given in configuration (1-1) or configuration (2-1) or configuration (3-1) or configuration (4-1) or configuration (5-1) or configuration (5-2) or configuration (6-1) or configuration (6-2).

In the general or preferred definitions, unless stated otherwise, halogen is selected from the group consisting of fluorine, chlorine, bromine and iodine, preferably in turn from the group consisting of fluorine, chlorine and bromine.

- 20 Aryl (including as part of a larger unit, for example arylalkyl), unless defined differently elsewhere, is selected from the series phenyl, naphthyl, anthryl, phenanthrenyl, and is preferably in turn phenyl.

- 25 In the context of the present invention, unless defined differently elsewhere, the term "alkyl", either on its own or else in combination with further terms, for example haloalkyl, is understood to mean a radical of a saturated, aliphatic hydrocarbon group which has 1 to 12 carbon atoms and may be branched or unbranched. Examples of C₁-C₁₂-alkyl radicals are methyl, ethyl, n-propyl, isopropyl, n-butyl, isobutyl, sec-butyl, tert-butyl, n-pentyl, isopentyl, neopentyl, tert-pentyl, 1-methylbutyl, 2-methylbutyl, 1-ethylpropyl, 1,2-dimethylpropyl, hexyl, n-heptyl, n-octyl, n-nonyl, n-decyl, n-undecyl and n-dodecyl. Among these alkyl radicals, particular preference is given to C₁-C₆-alkyl radicals. Particular preference is given to C₁-C₄-alkyl radicals.

- 30 According to the invention, unless defined differently elsewhere, the term "alkenyl", either on its own or else in combination with further terms, is understood to mean a straight-chain or branched C₂-C₁₂-alkenyl radical which has at least one double bond, for example vinyl, allyl, 1-propenyl, isopropenyl, 1-butenyl, 2-butenyl, 3-butenyl, 1,3-butadienyl, 1-pentenyl, 2-pentenyl, 3-pentenyl, 4-pentenyl, 1,3-pentadienyl, 1-hexenyl, 2-hexenyl, 3-hexenyl, 4-hexenyl, 5-hexenyl and 1,4-hexadienyl. Among these, preference is given to C₂-C₆-alkenyl radicals and particular preference to C₂-C₄-alkenyl radicals.
- 35

According to the invention, unless defined differently elsewhere, the term "alkynyl", either on its own or else in combination with further terms, is understood to mean a straight-chain or branched C₂-C₁₂-alkynyl radical which has at least one triple bond, for example ethynyl, 1-propynyl and propargyl. Among these, preference is given to C₃-C₆-alkynyl radicals and particular preference to C₃-C₄-alkynyl radicals. The
5 alkynyl radical may also contain at least one double bond.

According to the invention, unless defined differently elsewhere, the term "cycloalkyl", either on its own or else in combination with further terms, is understood to mean a C₃-C₈-cycloalkyl radical, for example cyclopropyl, cyclobutyl, cyclopentyl, cyclohexyl, cycloheptyl and cyclooctyl. Among these, preference is given to C₃-C₆-cycloalkyl radicals.

10 The term "alkoxy", either on its own or else in combination with further terms, for example haloalkoxy, is understood in the present case to mean an O-alkyl radical, where the term "alkyl" is as defined above.

Halogen-substituted radicals, for example haloalkyl, are mono- or polyhalogenated, up to the maximum number of possible substituents. In the case of polyhalogenation, the halogen atoms may be identical or different. In this case, halogen represents fluorine, chlorine, bromine or iodine, in particular fluorine,
15 chlorine or bromine.

Unless stated otherwise, optionally substituted radicals may be mono- or polysubstituted, where the substituents in the case of polysubstitutions may be the same or different.

The radical definitions or illustrations given in general terms or listed within ranges of preference apply correspondingly to end products and to starting materials and intermediates. These radical definitions can
20 be combined with one another as desired, i.e. including combinations between the respective ranges of preference.

Preference according to the invention is given to using compounds of the formula (I) which contain a combination of the meanings listed above as being preferred.

Particular preference according to the invention is given to using compounds of the formula (I) which
25 contain a combination of the meanings listed above as being particularly preferred.

Very particular preference according to the invention is given to using compounds of the formula (I) which contain a combination of the definitions listed above as being very particularly preferred.

Most preference according to the invention is given to using compounds of the formula (I) which contain a combination of the meanings listed above as being most preferable.

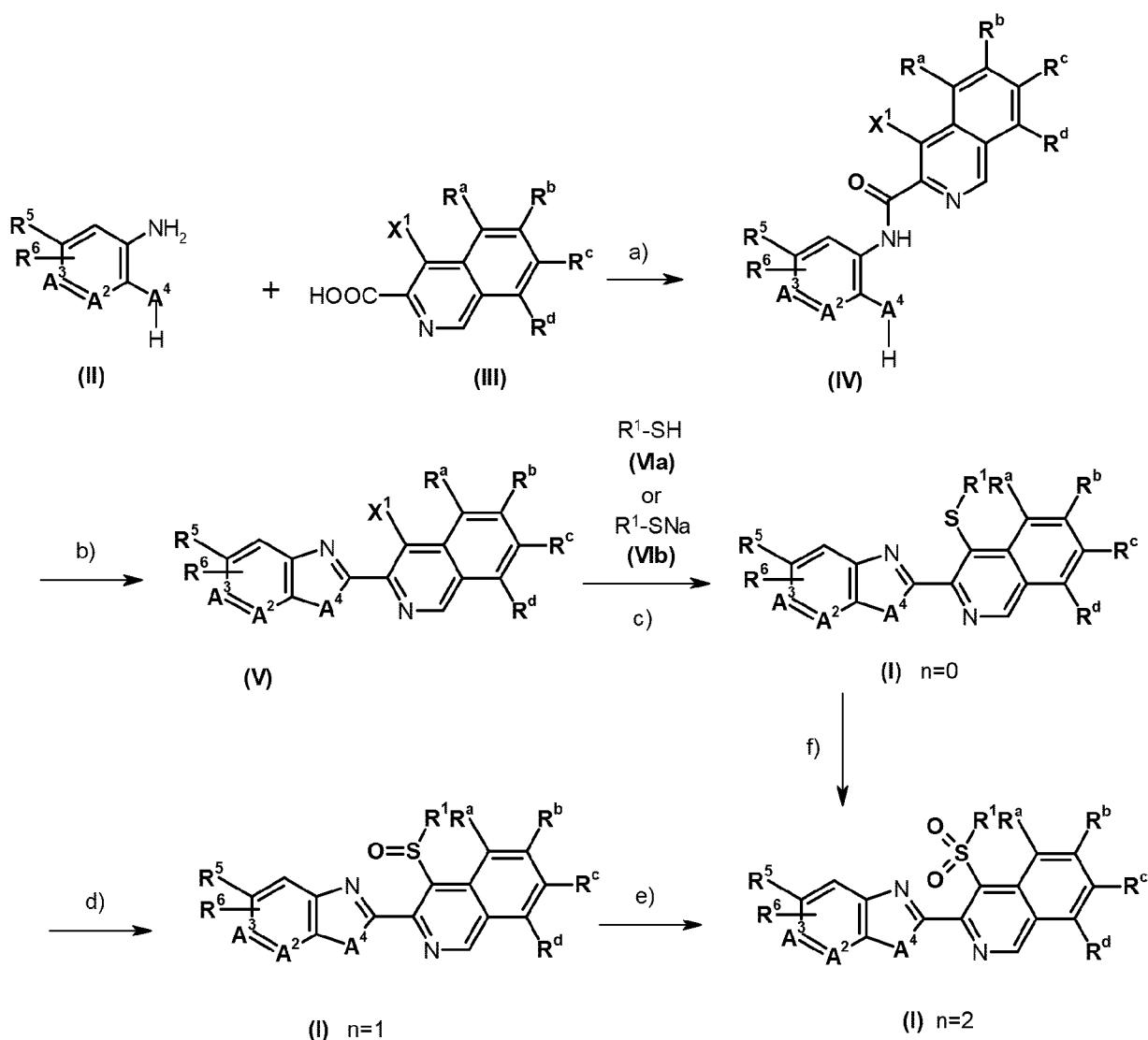
30 Especially used according to the invention are compounds of the formula (I) which contain a combination of the meanings listed above as being specifically emphasized.

Depending on the nature of the substituents, the compounds of the formula (I) may be in the form of geometric and/or optically active isomers or corresponding isomer mixtures in different compositions. These stereoisomers are, for example, enantiomers, diastereomers, atropisomers or geometric isomers. The invention therefore encompasses both pure stereoisomers and any desired mixtures of these isomers.

- 5 The compounds of the formula (I) according to the invention can be obtained by the processes shown in the schemes below:

Process A

- The compounds of the formula (I) in which Q represents Q1 to Q9, Q16 or Q19 can be prepared by known methods, for example analogously to the processes described in WO2009/131237, WO2010/125985, 10 WO2011/043404, WO2011/040629, WO2012/086848, WO2013/018928, WO2015/000715, WO2015/198859, WO2016/039444, WO2016/039441, WO2016/116338 and WO2015/121136.



The radicals R^1 , R^4 , R^5 , R^6 , R^a , R^b , R^c , R^d and n have the meanings described above, A^2 and A^3 represent

CH or N, A⁴ represents O, S or -NR⁴ and X¹ represents halogen.

Step a)

The compounds of the formula (IV) can be prepared in analogy to the process described in US5576335 by the reaction of compounds of the formula (II) with carboxylic acids of the formula (III) in the presence
5 of a condensing agent or a base.

Compounds of the formula (II) are either commercially available or can be prepared by known methods, for example analogously to the processes described in US2003/69257, WO2006/65703, WO2009/131237, WO2010/125985, WO2011/043404, WO2011/040629, WO2012/086848, WO2013/018928 or WO2015/000715.

10 Carboxylic acids of the formula (III) are either commercially available or can be prepared by known methods. Possible preparation routes are described in processes H and I.

The reaction of the compounds of the formula (II) with carboxylic acids of the formula (III) can be carried out neat or in a solvent, preference being given to conducting the reaction in a solvent selected from customary solvents that are inert under the prevailing reaction conditions. Preference is given to ethers,
15 for example diisopropyl ether, dioxane, tetrahydrofuran, 1,2-dimethoxyethane; halogenated hydrocarbons, for example dichloromethane, chloroform, carbon tetrachloride, 1,2-dichloroethane or chlorobenzene; nitriles, for example acetonitrile or propionitrile; aromatic hydrocarbons, for example toluene or xylene; aprotic polar solvents, for example N,N-dimethylformamide or N-methylpyrrolidone, or nitrogen compounds, for example pyridine.

20 Suitable condensing agents are, for example, carbodiimides such as 1-(3-dimethylaminopropyl)-3-ethylcarbodiimide hydrochloride (EDCI) or 1,3-dicyclohexylcarbodiimide.

Suitable bases are inorganic bases which are typically used in such reactions. Preference is given to using bases selected by way of example from the group consisting of acetates, phosphates, carbonates and bicarbonates of alkali metals or alkaline earth metals. Particular preference is given here to sodium acetate,
25 sodium phosphate, potassium phosphate, caesium carbonate, sodium carbonate, potassium carbonate, sodium bicarbonate, potassium bicarbonate.

The reaction can be carried out under reduced pressure, at standard pressure or under elevated pressure and at temperatures of 0°C to 180°C; with preference, the reaction is carried out at atmospheric pressure and temperatures of 20 to 140°C.

30 **Step b)**

The compounds of the formula (V) can be prepared by condensing the compounds of the formula (IV),

for example analogously to the processes described in WO2009/131237, WO2010/125985, WO2011/043404, WO2011/040629, WO2012/086848, WO2013/018928, WO2015/000715 and WO2015/121136.

5 The conversion to compounds of the formula (V) can be carried out neat or in a solvent, preference being given to conducting the reaction in a solvent selected from customary solvents that are inert under the prevailing reaction conditions. Preference is given to ethers, for example diisopropyl ether, dioxane, tetrahydrofuran, 1,2-dimethoxyethane, tert-butyl methyl ether; halogenated hydrocarbons, for example dichloromethane, chloroform, carbon tetrachloride, 1,2-dichloroethane or chlorobenzene; nitriles, for example acetonitrile or propionitrile; aromatic hydrocarbons, for example toluene or xylene; aprotic polar
10 solvents, for example N,N-dimethylformamide or N-methylpyrrolidone, or nitrogenous compounds, for example pyridine.

The reaction can be carried out in the presence of a condensing agent, an acid, a base or a chlorinating agent.

15 Examples of suitable condensing agents are carbodiimides such as 1-(3-dimethylaminopropyl)-3-ethylcarbodiimide hydrochloride (EDCI) or 1,3-dicyclohexylcarbodiimide; anhydrides such as acetic anhydride, trifluoroacetic anhydride; a mixture of triphenylphosphine, a base and carbon tetrachloride, or a mixture of triphenylphosphine and an azo diester, for example diethylazodicarboxylic acid.

Examples of suitable acids which can be used in the reaction described are sulfonic acids such as paratoluenesulfonic acid; carboxylic acids such as acetic acid, or polyphosphoric acids.

20 Examples of suitable bases are nitrogenous heterocycles such as pyridine, picoline, 2,6-lutidine, 1,8-diazabicyclo[5.4.0]-7-undecene (DBU); tertiary amines such as triethylamine and N,N-diisopropylethylamine; inorganic bases such as potassium phosphate, potassium carbonate and sodium hydride.

An example of a suitable chlorinating agent is phosphorus oxychloride.

25 The reaction can be carried out under reduced pressure, at atmospheric pressure or under elevated pressure, and at temperatures of 0°C to 200°C.

Step c)

The compounds of the formula (I) where n represents 0 can be prepared by reacting the compounds of the formula (V) with the compounds of the formula (VIa) in the presence of a base or by reaction with
30 compounds of the formula (VIb).

Mercaptan derivatives of the formula (VIa), for example methyl mercaptan, ethyl mercaptan or isopropyl

mercaptan, are either commercially available or can be prepared by known methods, for example analogously to the processes described in US2006/25633, US2006/111591, US2820062, Chemical Communications, **13** (2000), 1163-1164 or Journal of the American Chemical Society, **44** (1922), p. 1329.

5 The conversion to compounds of the formula (I) where n represents 0 can be carried out neat or in a solvent, preference being given to conducting the reaction in a solvent selected from customary solvents that are inert under the prevailing reaction conditions. Preference is given to ethers, for example diisopropyl ether, dioxane, tetrahydrofuran, 1,2-dimethoxyethane, tert-butyl methyl ether; nitriles, for example acetonitrile or propionitrile; aromatic hydrocarbons, for example toluene or xylene; aprotic polar solvents, for example N,N-dimethylformamide, N-methylpyrrolidone or dimethyl sulfoxide.

10 Examples of suitable bases are inorganic bases from the group consisting of acetates, phosphates and carbonates of alkali metals or alkaline earth metals. Preference is given here to caesium carbonate, sodium carbonate and potassium carbonate. Further suitable bases are alkali metal hydrides, for example sodium hydride.

15 Alternatively, it is possible to directly use the salts of the mercaptan derivatives (compounds of the formula (VIb)), for example sodium ethanethiolate, sodium methanethiolate or sodium isopropanethiolate, without addition of further base. The reaction can be carried out under reduced pressure, at atmospheric pressure or under elevated pressure, and at temperatures of 0°C to 200°C.

In the reaction described, X¹ preferably represents a fluorine or chlorine atom.

20 If R^a, R^b, R^c or R^d likewise represents halogen (for example chlorine or fluorine), for example with use of methyl mercaptan, ethyl mercaptan or isopropyl mercaptan, it is also possible for multiple exchange with the alkyl mercaptan to take place as well as the single substitution of X¹.

Step d)

25 The compounds of the formula (I) where n represents 1 can be prepared by oxidizing the compounds of the formula (I) where n represents 0. The oxidation is generally carried out in a solvent selected from customary solvents which are inert under the prevailing reaction conditions. Preference is given to halogenated hydrocarbons, for example dichloromethane, chloroform, carbon tetrachloride, 1,2-dichloroethane or chlorobenzene; alcohols such as methanol or ethanol; formic acid, acetic acid, propionic acid or water.

30 Examples of suitable oxidizing agents are hydrogen peroxide, meta-chloroperbenzoic acid or sodium periodate.

The reaction can be conducted under reduced pressure, at standard pressure or under elevated pressure, and at temperatures of -20°C to 120°C.

Step e)

The compounds of the formula (I) where n is 2 can be prepared by oxidizing the compounds of the formula (I) where n is 1. The oxidation is generally carried out in a solvent. Preference is given to halogenated hydrocarbons, for example dichloromethane, chloroform, carbon tetrachloride, 1,2-dichloroethane or chlorobenzene; alcohols such as methanol or ethanol; formic acid, acetic acid, propionic acid or water.

Examples of suitable oxidizing agents are hydrogen peroxide and meta-chloroperbenzoic acid.

The reaction can be conducted under reduced pressure, at standard pressure or under elevated pressure, and at temperatures of -20°C to 120°C.

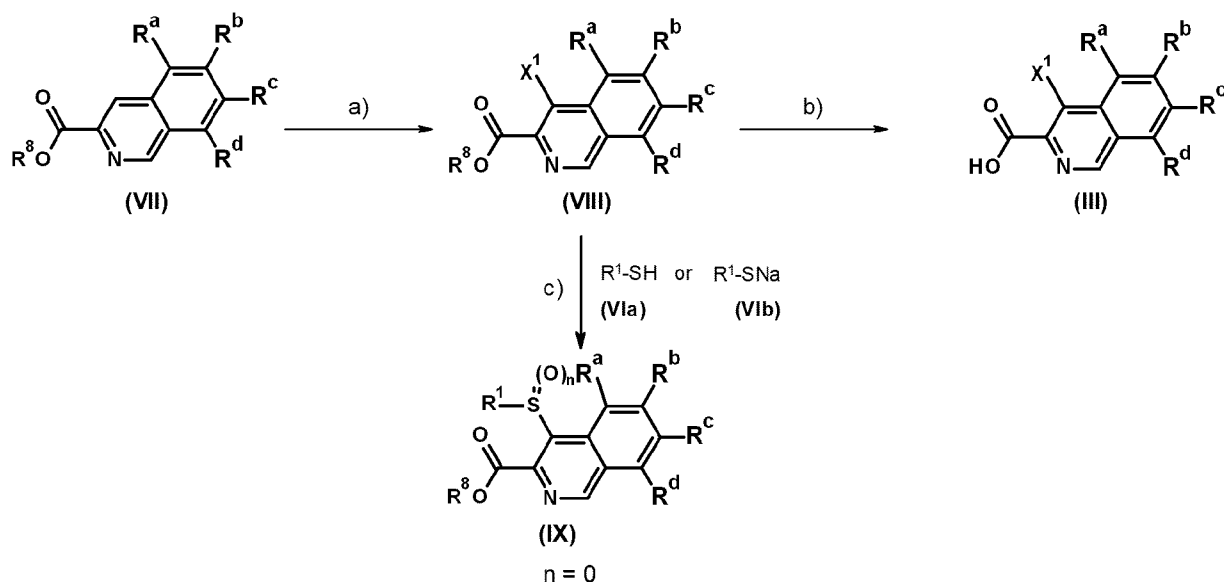
Step f)

10 The compounds of the formula (I) where n is 2 can also be prepared in a one-step process by oxidizing the compounds of the formula (I) where n is 0. The oxidation is generally carried out in a solvent. Preference is given to halogenated hydrocarbons, for example dichloromethane, chloroform, carbon tetrachloride, 1,2-dichloroethane or chlorobenzene; alcohols such as methanol or ethanol; formic acid, acetic acid, propionic acid or water.

15 Examples of suitable oxidizing agents are hydrogen peroxide and meta-chloroperbenzoic acid.

The reaction can be conducted under reduced pressure, at standard pressure or under elevated pressure, and at temperatures of -20°C to 120°C.

If R^a, R^b, R^c or R^d likewise represents alkylsulfanyl(=alkylthio), it is possible with use of a suitable oxidizing agent, for example hydrogen peroxide and meta-chloroperbenzoic acid, as well as the oxidation of the sulfur atom alongside R¹ to the sulfone, for oxidation of the alkylsulfanyl substituent to alkylsulfonyl to take place in addition.

Process B

The radicals R^1 , R^a , R^b , R^c , R^d and n have the meanings described above, X^1 represents halogen and R^8 represents C_1 - C_4 -alkyl.

5 Step a)

Compounds of the formula (VIII) can be prepared by known methods from compounds of the formula (VII) via a halogenation. This can be effected, for example, via a directed ortho-lithiation, followed by capture of the carbanion with a suitable electrophilic halogenating agent or alternatively via an electrophilic aromatic halogenation analogously to the processes described in Bioorganic & Medicinal
 10 Chemistry Letters, 24 (2014), 4236-4238; Tetrahedron, 58 (2002), 6723-6728 and WO2003/010146. Compounds of the formula (VII) are commercially available or can be synthesized via an esterification from compounds of the formula (XXV).

Step b)

The compounds of the formula (III) can be synthesized in analogy to the processes described in Synthesis
 15 1987, 6, 586-587, Tetrahedron Letters 2006, 47, 565-567 or ChemMedChem 2010, 5, 65-78 via a hydrolysis from the compounds of the formula (VIII).

Examples of suitable bases are, for example, lithium hydroxide or sodium hydroxide. Solvents used may be polar aprotic and protic solvents and mixtures of these, for example ethanol, tetrahydrofuran or water.

The reaction can be conducted under reduced pressure, at standard pressure or under elevated pressure,
 20 and at temperatures of -20°C to 120°C .

Step c)

The compounds of the formula (IX) where n represents 0 can be prepared by reacting the compounds of the formula (VIII) with the compounds of the formula (VIa) in the presence of a base or by reaction with compounds of the formula (VIb).

- 5 Mercaptan derivatives of the formula (VIa), for example methyl mercaptan, ethyl mercaptan or isopropyl mercaptan, are either commercially available or can be prepared by known methods, for example analogously to the processes described in US2006/25633, US2006/111591, US2820062, Chemical Communications, **13** (2000), 1163-1164 or Journal of the American Chemical Society, **44** (1922), p. 1329.

10 The conversion to the compound of the formula (IX) where n represents 0 can be carried out neat or in a solvent, preference being given to conducting the reaction in a solvent selected from customary solvents that are inert under the prevailing reaction conditions. Preference is given to ethers, for example diisopropyl ether, dioxane, tetrahydrofuran, 1,2-dimethoxyethane, tert-butyl methyl ether; nitriles, for example acetonitrile or propionitrile; aromatic hydrocarbons, for example toluene or xylene; aprotic polar solvents, for example N,N-dimethylformamide, N-methylpyrrolidone or dimethyl sulfoxide.

- 15 Examples of suitable bases are inorganic bases from the group consisting of acetates, phosphates and carbonates of alkali metals or alkaline earth metals. Preference is given here to caesium carbonate, sodium carbonate and potassium carbonate. Further suitable bases are alkali metal hydrides, for example sodium hydride.

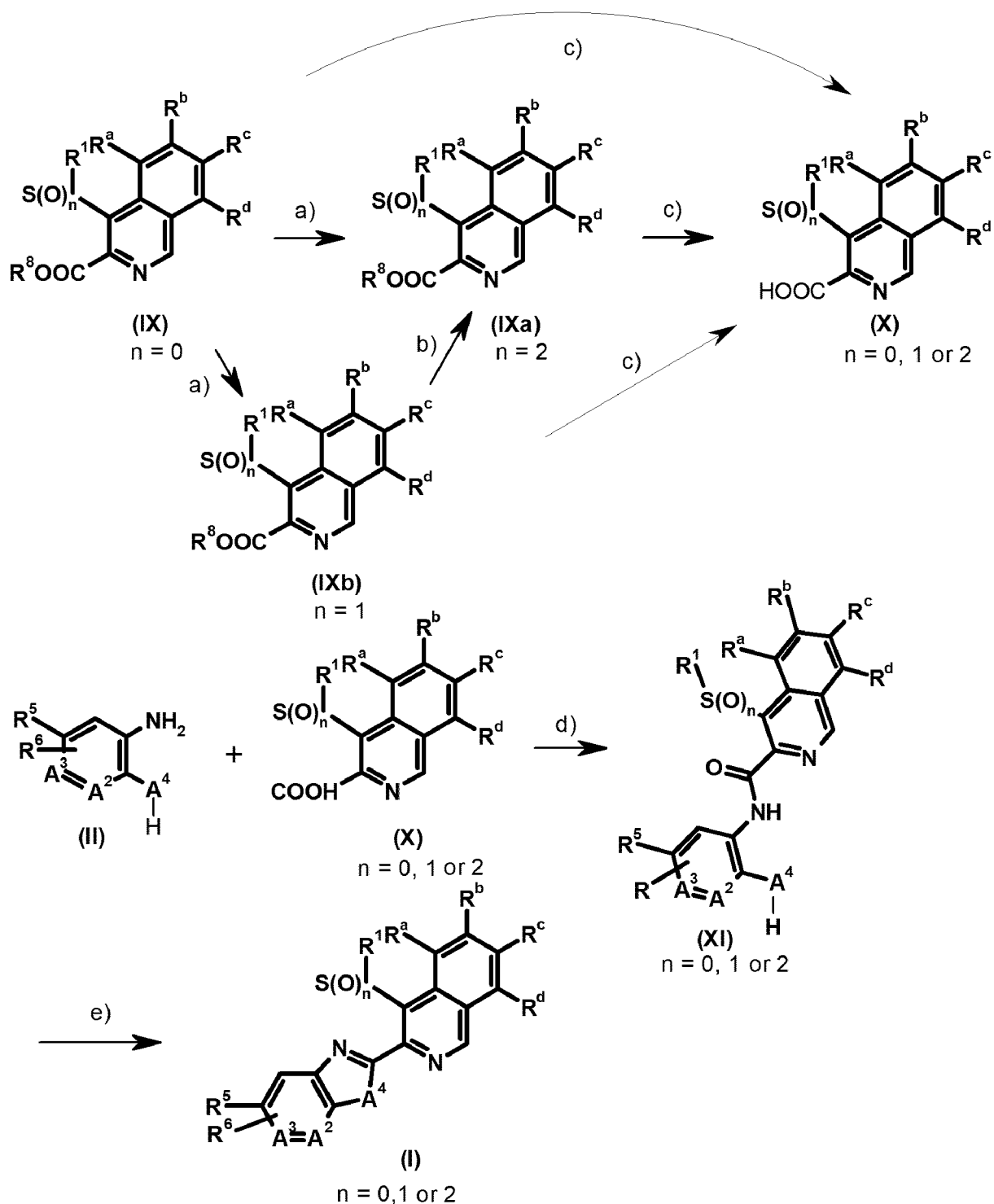
20 Alternatively, it is possible to directly use the salts of the mercaptan derivatives (compounds of the formula (VIb)), for example sodium ethanethiolate, sodium methanethiolate or sodium isopropanethiolate, without addition of further base. The reaction can be carried out under reduced pressure, at atmospheric pressure or under elevated pressure, and at temperatures of 0°C to 200°C.

In the reaction described, X¹ preferably represents a fluorine or chlorine atom.

25 If R^a, R^b, R^c or R^d likewise represents halogen (for example chlorine or fluorine), for example with use of methyl mercaptan, ethyl mercaptan or isopropyl mercaptan, it is also possible for multiple exchange with the alkyl mercaptan to take place as well as the single substitution of X¹.

Process C

30 The compounds of the formula (I) in which Q represents Q1 to Q9, Q16 or Q19 can be prepared by known methods, for example analogously to the processes described in WO2009/131237, WO2010/125985, WO2011/043404, WO2011/040629, WO2012/086848, WO2013/018928, WO2015/000715, WO2015/198859, WO2016/039444, WO2016/039441, WO2016/116338 and WO2015/121136.



The radicals R^1 , R^4 , R^5 , R^6 , R^a , R^b , R^c , R^d and n have the meanings described above, A^2 and A^3 represent CH or N, X^1 represents halogen, A^4 represents O, S or $-NR^4$ and R^8 represents (C_1-C_4) -alkyl.

Steps a), b)

- The compounds of the formula (IXa) where n represents 2 can be prepared by oxidizing the compounds of the formula (IX) where n represents 0. The oxidation is generally carried out in a solvent. Preference is given to halogenated hydrocarbons, for example dichloromethane, chloroform, carbon tetrachloride, 1,2-

dichloroethane or chlorobenzene; alcohols such as methanol or ethanol; formic acid, acetic acid, propionic acid or water.

Examples of suitable oxidizing agents are hydrogen peroxide and meta-chloroperbenzoic acid.

5 The reaction can be conducted under reduced pressure, at standard pressure or under elevated pressure, and at temperatures of -20°C to 120°C.

The compounds of the formula (IXb) where n represents 1 can be prepared analogously by oxidizing the compounds of the formula (IX) where n represents 0.

The compounds of the formula (IXa) where n represents 2 can be prepared analogously by oxidizing the compounds of the formula (IXb) where n represents 1.

10 **Step c)**

The compounds of the formula (X) where n represents 0, 1 or 2 can be prepared by hydrolysis of the compounds of the formulae (IX, n=0) (IXa, n=2) or (IXb, n=1) in the presence of a base. The hydrolysis is generally conducted in a solvent. Preference is given to alcohols such as methanol or ethanol; water; ethers, for example diisopropyl ether, dioxane, tetrahydrofuran, 1,2-dimethoxyethane, tert-butyl methyl ether; nitriles, for example acetonitrile or propionitrile; aromatic hydrocarbons, for example toluene or xylene; aprotic polar solvents, for example N,N-dimethylformamide, N-methylpyrrolidone or dimethyl sulfoxide; or mixtures of the solvents mentioned.

20 Examples of suitable bases are inorganic bases from the group consisting of acetates, phosphates and carbonates of alkali metals or alkaline earth metals. Preference is given here to caesium carbonate, sodium carbonate and potassium carbonate.

The reaction can be conducted under reduced pressure, at standard pressure or under elevated pressure, and at temperatures of -20°C to 200°C.

The further conversion of compounds of the formula (X) to compounds of the formula (I) is carried out analogously to process A.

25 **Step d)**

The compounds of the formula (XI) can be prepared by the reaction of compounds of the formula (II) with carboxylic acids of the formula (X) in the presence of a condensing agent or a base.

30 The compounds of the formula (II) are either commercially available or can be prepared by known methods, for example analogously to the processes described in US2003/069257, US2012/0319050, WO2011/107998 or WO2010/91310.

The reaction of the compounds of the formula (II) with carboxylic acids of the formula (X) where n represents 0, 1 or 2 can be effected neat or in a solvent, preference being given to conducting the reaction in a solvent selected from customary solvents that are inert under the prevailing reaction conditions. Preference is given to ethers, for example diisopropyl ether, dioxane, tetrahydrofuran, 1,2-
5 dimethoxyethane; halogenated hydrocarbons, for example dichloromethane, chloroform, carbon tetrachloride, 1,2-dichloroethane or chlorobenzene; nitriles, for example acetonitrile or propionitrile; aromatic hydrocarbons, for example toluene or xylene; aprotic polar solvents, for example N,N-dimethylformamide or N-methylpyrrolidone, or nitrogen compounds, for example pyridine.

Suitable condensing agents are, for example, carbodiimides such as 1-(3-dimethylaminopropyl)-3-
10 ethylcarbodiimide hydrochloride (EDCI), 1,3-dicyclohexylcarbodiimide, thionyl chloride or oxalyl chloride.

Suitable bases are inorganic bases which are typically used in such reactions. Preference is given to using bases selected by way of example from the group consisting of acetates, phosphates, carbonates and bicarbonates of alkali metals or alkaline earth metals. Particular preference is given here to sodium acetate,
15 sodium phosphate, potassium phosphate, caesium carbonate, sodium carbonate, potassium carbonate, sodium bicarbonate, potassium bicarbonate. Further suitable bases are alkali metal hydrides, for example sodium hydride.

The reaction can be carried out under reduced pressure, at standard pressure or under elevated pressure and at temperatures of 0°C to 180°C; with preference, the reaction is carried out at atmospheric pressure
20 and temperatures of 20 to 140°C.

Step e)

The compounds of the formula (I) where n represents 0, 1 or 2 can be prepared by condensing the compounds of the formula (XI) in the presence of a base.

The conversion to compounds of the formula (I) where n is 0, 1 or 2 can be effected neat or in a solvent,
25 preference being given to conducting the reaction in a solvent selected from customary solvents that are inert under the prevailing reaction conditions. Preference is given to ethers, for example diisopropyl ether, dioxane, tetrahydrofuran, 1,2-dimethoxyethane, tert-butyl methyl ether; halogenated hydrocarbons, for example dichloromethane, chloroform, carbon tetrachloride, 1,2-dichloroethane or chlorobenzene; nitriles, for example acetonitrile or propionitrile; aromatic hydrocarbons, for example toluene or xylene;
30 aprotic polar solvents, for example N,N-dimethylformamide or N-methylpyrrolidone, or nitrogenous compounds, for example pyridine.

Suitable bases are inorganic bases which are typically used in such reactions. Preference is given to using bases selected by way of example from the group consisting of acetates, phosphates, carbonates and

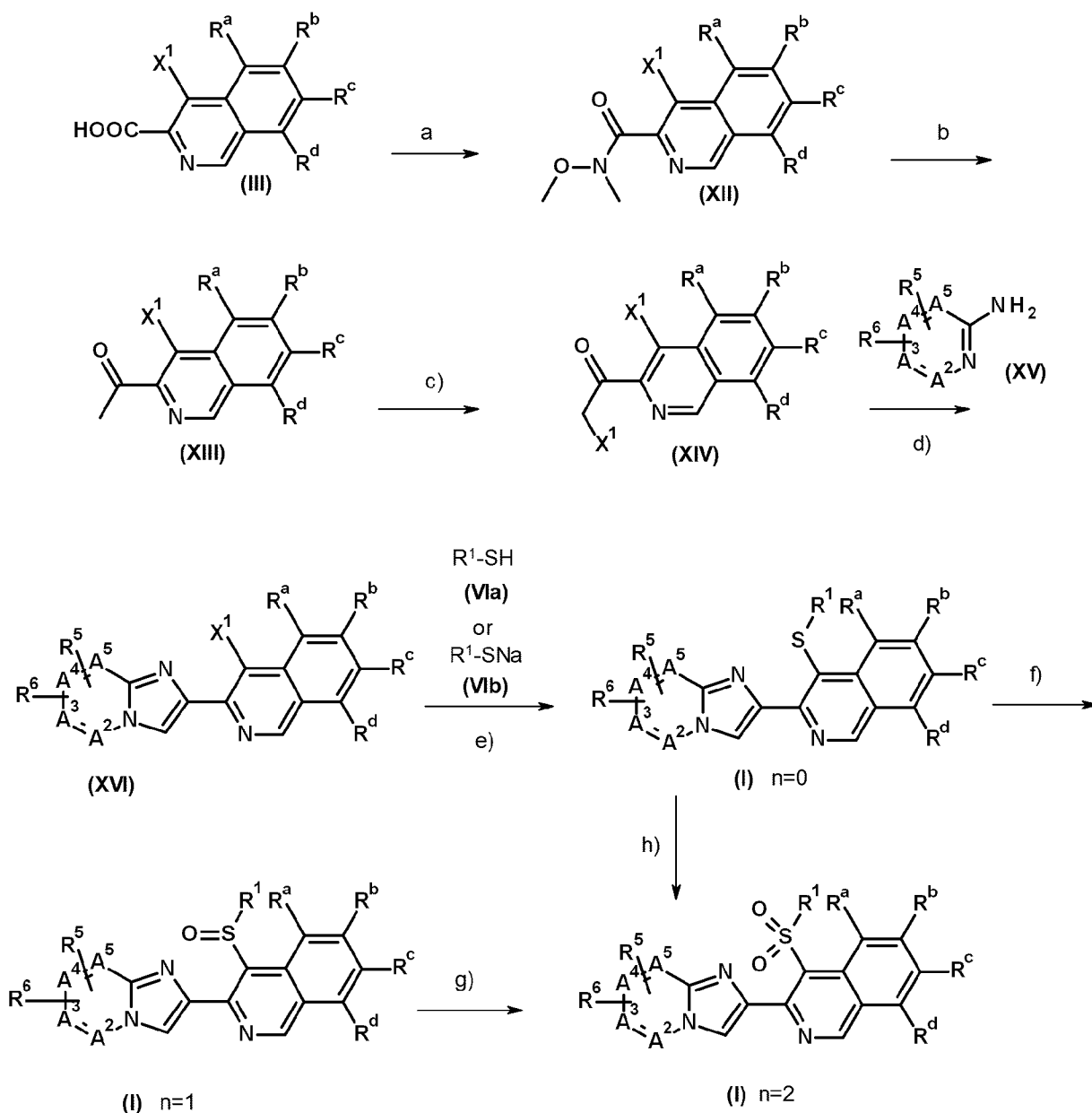
bicarbonates of alkali metals or alkaline earth metals. Particular preference is given here to sodium acetate, sodium phosphate, potassium phosphate, caesium carbonate, sodium carbonate, potassium carbonate, sodium bicarbonate, potassium bicarbonate.

The reaction can be carried out under reduced pressure, at atmospheric pressure or under elevated pressure, and at temperatures of 0°C to 200°C.

Process D

The compounds of the formula (I) in which Q represents Q10, Q11, Q14 or Q15 can be prepared by known methods, for example analogously to the processes described in US2009/203705, US2012/258951, WO2013/3298, WO2016/071214 or J. Med. Chem. **31**, (1988) 1590-1595.

10



The radicals R¹, R⁵, R⁶, R^a, R^b, R^c, R^d and n have the meanings described above. A², A³ and A⁵ represent CH or N, A⁴ represents CR⁵ or N (where A², A³, A⁴ and A⁵ do not both represent N) and X¹ represents halogen.

Step a)

- 5 Carboxylic acids of the formula (III) are converted analogously to the process described in WO2011/75643 or EP2671582 in the presence of O,N-dimethylhydroxylamine hydrochloride to Weinreb amides of the formula (XII).

Carboxylic acids of the formula (III) are either commercially available or can be prepared by known methods. Possible preparation routes are described in processes H and I.

10 **Steps b, c)**

Compounds of the formula (XII) can then be converted by known methods, for example in analogy to the process described in WO2011/75643, with a Grignard reagent, for example methylmagnesium bromide, to ketones of the formula (XIII). Compounds of the formula (XIV) are obtainable by subsequent halogenation analogously to the known method described, for example, in US2012/302573.

15 **Step d)**

- The compounds of the formula (XVI) can be prepared by cyclizing the compounds of the formula (XIV) with amines of the formula (XV). The cyclization is effected, for example, in ethanol, acetonitrile or N,N-dimethylformamide by known methods in analogy to the processes described, for example, in WO2005/66177, WO2012/88411, WO2013/3298, US2009/203705, US2012/258951, WO2012/168733,
20 WO2014/187762 or J. Med. Chem. **31** (1988) 1590-1595.

The compounds of the formula (XV) are commercially available.

Step e)

- The compounds of the formula (I) where n represents 0 can be prepared by reacting the compounds of the formula (XVI) with the compounds of the formula (VIa) in the presence of a base. Mercaptan derivatives
25 of the formula (VIa), for example methyl mercaptan, ethyl mercaptan or isopropyl mercaptan, are either commercially available or can be prepared by known methods, for example analogously to the processes described in US2006/25633, US2006/111591, US2820062, Chemical Communications, **13** (2000), 1163-1164 or Journal of the American Chemical Society, **44** (1922), p. 1329.

- Alternatively, it is possible to directly use the salts of the mercaptan derivatives (VIb), for example sodium
30 ethanethiolate, sodium methanethiolate or sodium isopropanethiolate, without addition of further base.

Steps f, g)

The compounds of the formula (I) where n represents 1 can be prepared by oxidizing the compounds of the formula (I) where n represents 0. The oxidation is carried out by known methods using a suitable oxidizing agent, for example hydrogen peroxide, meta-chloroperbenzoic acid or sodium periodate.

- 5 The compounds of the formula (I) where n represents 2 can be prepared by oxidizing the compounds of the formula (I) where n represents 1.

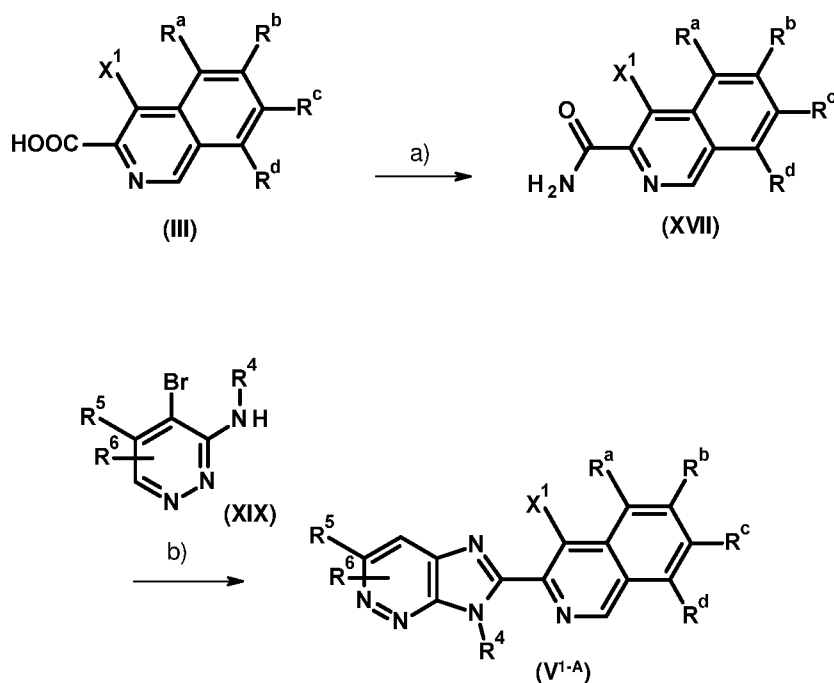
The oxidation is generally carried out in a solvent. Preference is given to halogenated hydrocarbons, for example dichloromethane, chloroform, carbon tetrachloride, 1,2-dichloroethane or chlorobenzene; alcohols such as methanol or ethanol; formic acid, acetic acid, propionic acid or water. Examples of
10 suitable oxidizing agents are hydrogen peroxide and meta-chloroperbenzoic acid.

Step h)

The compounds of the formula (I) where n represents 2 can also be prepared in a one-step process by oxidizing the compounds of the formula (I) where n represents 0. The oxidation is generally carried out in a solvent. Preference is given to halogenated hydrocarbons, for example dichloromethane, chloroform,
15 carbon tetrachloride, 1,2-dichloroethane or chlorobenzene; alcohols such as methanol or ethanol; formic acid, acetic acid, propionic acid or water. Examples of suitable oxidizing agents are hydrogen peroxide and meta-chloroperbenzoic acid.

Process E

The compounds of the formula (I) in which Q represents Q16 can be prepared by known methods, for
20 example analogously to the processes described in WO2014/142292.



The radicals R^a, R^b, R^c, R^d, R⁴, R⁵ and R⁶ have the meanings described above. X¹ represents halogen.

Step a)

The compounds of the formula (XVII) can be prepared in analogy to the process described in US5374646 or Bioorganic and Medicinal Chemistry Letters 2003, 13, 1093 - 1096 by reacting compounds of the formula (III) with an ammonia source in the presence of a condensing agent.

Carboxylic acids of the formula (III) are either commercially available or can be prepared by known methods. Possible preparation routes are described in processes H and I.

The reaction of the compounds of the formula (III) with the ammonia source is preferably carried out in a solvent selected from customary solvents which are inert under the prevailing reaction conditions. Preference is given to ethers, for example dioxane or tetrahydrofuran.

A suitable condensing agent is, for example, carbonyldiimidazole.

The reaction can be carried out under reduced pressure, at atmospheric pressure or under elevated pressure. Preferably, the reaction is carried out at atmospheric pressure and temperatures from 20 to 70°C.

Step b)

The compounds of the formula (V^{1-A}) can be prepared in analogy to the process described in WO2014/142292 by reacting compounds of the formula (XVII) with compounds of the formula (XIX) in the presence of a palladium catalyst in basic media.

Compounds of the formula (XIX) can be prepared, for example, analogously to the processes described in WO2014/142292. A palladium catalyst used may, for example, be [1,1'-bis-(diphenylphosphino)ferrocene]dichloropalladium(II). Frequently, the bases used are inorganic bases such as potassium tert-butoxide.

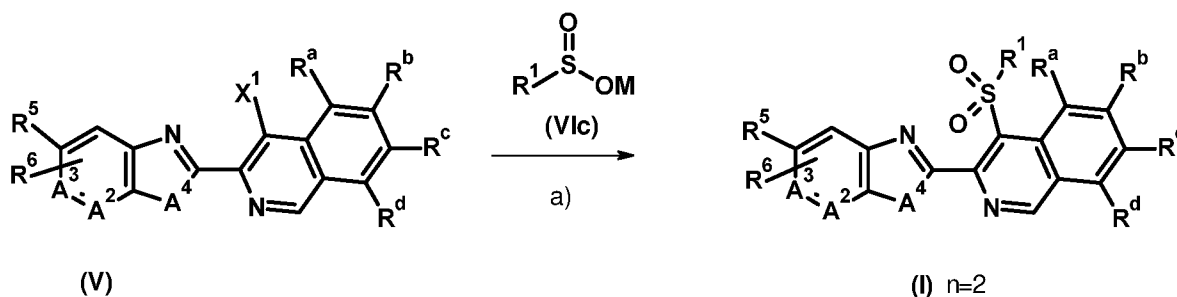
5 The reaction is carried out in a solvent. Frequently, toluene is used.

The reaction can be carried out under reduced pressure, at atmospheric pressure or under elevated pressure. Preferably, the reaction is carried out at atmospheric pressure and temperatures from 20 to 110°C.

The further conversion of compounds of the formula (V^{1-A}) to compounds of the formula (I) is carried out analogously to process A.

10 Process F

The compounds of the formula (I) in which n represents 2 and Q represents Q1 to Q9, Q16 and Q19 can be prepared by known methods, for example analogously to the processes described in WO2009/131237, WO2010/125985, WO2011/043404, WO2011/040629, WO2012/086848, WO2013/018928, WO2015/000715 and WO2015/121136.



15

The radicals R¹, R^a, R^b, R^c, R^d, R⁴, R⁵, R⁶, A² and A³ have the meanings described above, A⁴ represents O, S or N-R⁴ and X¹ represents halogen, preferably bromine or iodine.

Step a)

20 Alternatively, compounds of the formula (I) where n represents 2 can also be prepared in a one-step procedure, for example in analogy to the process described in Journal of Organic Chemistry 2005, 70, 2696-2700 by a halogen-sulfone exchange with a compound of the formula (VIc) proceeding from compounds of the formula (V). The exchange is generally carried out in a solvent. Preference is given to using polar aprotic solvents, for example dimethyl sulfoxide and N,N-dimethylformamide.

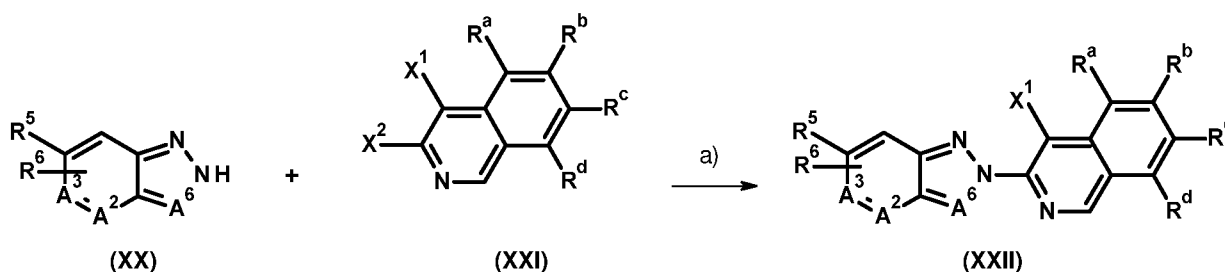
25 Compounds of the formula (VIc) are either commercially available or can be prepared by known methods, for example analogously to the processes described in Organic Synthesis 1977, 57, 88-92; Tetrahedron Letters 1979, 9, 821-824 and Bulletin de la Société Chimique de France 1958, 4, 447-450.

Examples of suitable sulfur reagents are the lithium, sodium or potassium salts of sulfinic acid.

The reaction can be conducted under reduced pressure, at standard pressure or under elevated pressure, and at temperatures of -20°C to 120°C.

Process G

- 5 The compounds of the formula (I) in which Q represents Q12, Q13, Q17, Q18 or Q20 can be prepared by known methods, for example analogously to the processes described in WO2010/091310, WO 2012/66061 or WO2013/099041.



- The radicals R^a, R^b, R^c, R^d, R⁵ and R⁶ have the meanings described above. A², A³ and A⁶ represent CH or
 10 N. X¹ and X² represent halogen.

Step a)

- The compounds of the formula (XXII) can be prepared by reacting compounds of the formula (XX) with
 compounds of the formula (XXI) under basic conditions, for example analogously to the processes
 described in WO2010/091310, WO 2012/66061, WO2013/099041 or Tetrahedron 1993, 49, 10997-
 15 11008.

Compounds of the formula (XX) are either commercially available or can be prepared by known methods,
 for example analogously to the processes described in WO2005/100353, WO 2012/66061 or in European
 Journal of Medicinal Chemistry 2010, 45, 2214 - 2222.

- Compounds of the formula (XXI) are either commercially available or can be prepared by known methods,
 20 for example analogously to the processes described in WO2013/43518, EP2168965 or in Journal of
 Medicinal Chemistry 2003, 46, 1449 – 1455.

The bases used are usually inorganic bases such as sodium hydride, potassium carbonate or caesium
 carbonate.

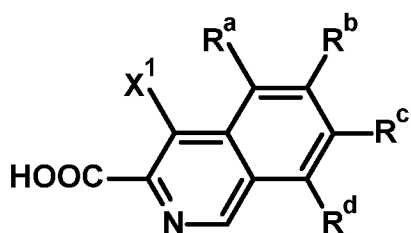
- The conversion to compounds of the formula (XXII) is usually carried out in a solvent, preferably in a
 25 nitrile, for example acetonitrile or propionitrile, or in an aprotic polar solvent, for example N,N-
 dimethylformamide or N-methylpyrrolidone.

The reaction can be carried out under reduced pressure, at atmospheric pressure or under elevated pressure, and at temperatures of 0°C to 200°C.

Alternatively, the reaction of compounds of the formula (XX) with compounds of the formula (XXI) to give compounds of the formula (XXII) can also be carried out by palladium-catalysed *N*-arylation, e.g. analogously to the processes described in *Angewandte Chemie Int. Ed.* 2011, 50, 8944-8947.

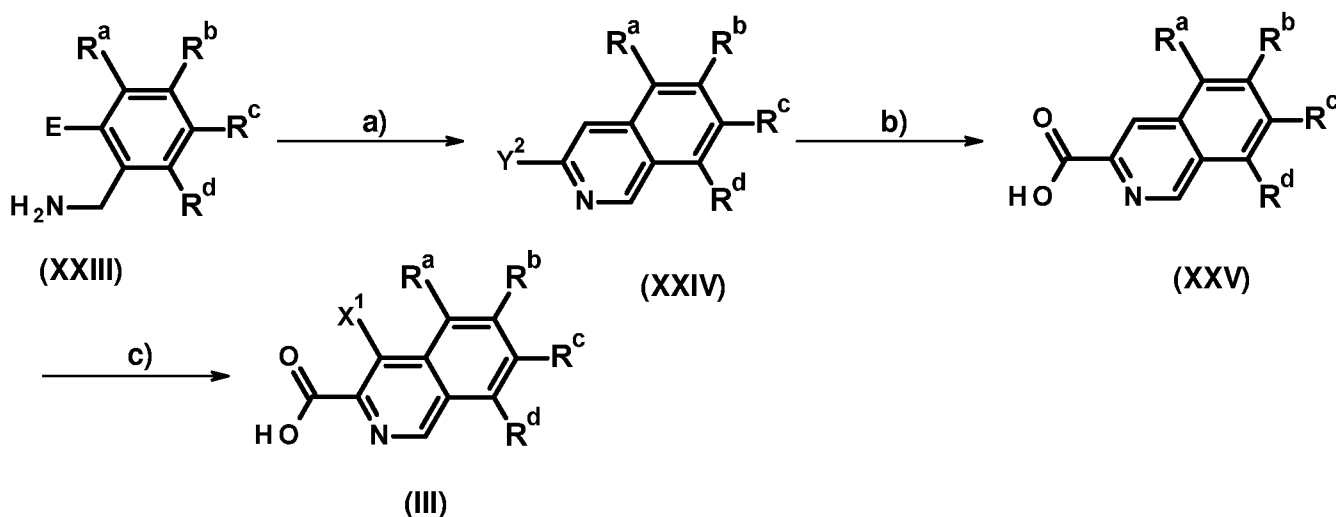
The further conversion of compounds of the formula (XXII) to compounds of the formula (I) is carried out analogously to process A.

Process H



(III)

- 10 Carboxylic acids of the formula (III) are either commercially available or can be prepared by known methods, for example from benzylamines or hetarylmethanamines analogously to the processes described in *Tetrahedron*, **40** (1984), 311-314, *Monatshefte für Chemie*, **139** (2008), 673-684, *Synlett*, **3** (2006), 379-382; *Indian Journal of Chemistry, Section B: Organic Chemistry Including Medicinal Chemistry*, **22B** (1983), 178-179; *Journal of Organic Chemistry*, **55** (1990), 2838-2842; *Heterocycles*, **60** (2003), 953-957;
- 15 *Chemical Communications*, **2** (2002), 180-181, WO2015/071178, *Bioorganic & Medicinal Chemistry Letters*, **24** (2014), 4236-4238; *Tetrahedron*, **58** (2002), 6723-6728 and WO2003/010146.



The radicals R^a, R^b, R^c and R^d have the meanings described above. E represents hydrogen or halogen and X¹ represents halogen. Y² represents methyl, C(O)OR⁸ or cyano. R⁸ represents hydrogen or C₁-C₆-alkyl.

Step a)

The compounds of the formula (XXIV) can be synthesized in analogy to the processes described in Tetrahedron, **40** (1984), 311-314 or Monatshefte für Chemie, **139** (2008), 673-684 via a condensation of benzylamines or hetarylmethanamines of the formula (XXIII) with the corresponding carbonyl compounds under acidic or basic conditions.

The compounds of the formula (XXIII) are either commercially available or can be prepared by known methods, for example in analogy to the methods described in WO1997/41846; US2011/0105753; Journal of Medicinal Chemistry, **46** (2003), 461-473; WO2010/024430; WO2005/111003; Journal of Heterocyclic Chemistry, **23** (1986), 989-990.

Step b)

Compounds of the formula (XXV) can be prepared by known methods, for example via a hydrolysis of compounds of the formula (XXIV) (if Y² = C(O)OR⁸ or cyano) under acidic, basic or thermal conditions.

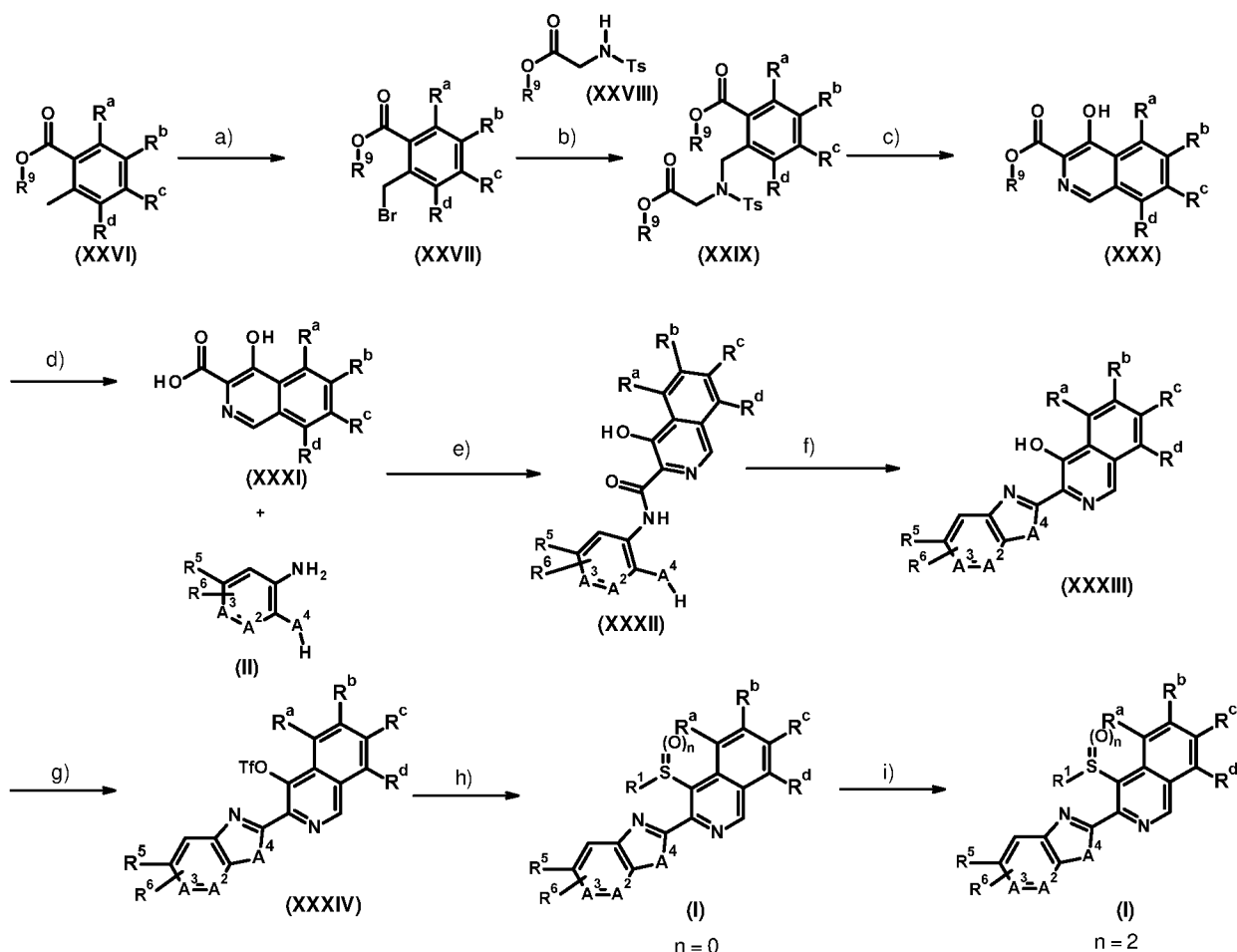
Compounds of the formula (XXV) can be prepared in analogy to the processes described in Synlett, **3** (2006), 379-382; Indian Journal of Chemistry, Section B: Organic Chemistry Including Medicinal Chemistry, **22B** (1983), 178-179; Journal of Organic Chemistry, **55** (1990), 2838-2842; Heterocycles, **60** (2003), 953-957; Chemical Communications, **2** (2002), 180-181 and WO2015/071178, via a benzylic oxidation from compounds of the formula (XXIV) (if Y² = methyl).

Step c)

Compounds of the formula (III) can be prepared by known methods from compounds of the formula (XXV) via a halogenation. This can be effected, for example, via a directed ortho-lithiation, followed by capture of the carbanion with a suitable electrophilic halogenating reagent or alternatively via a carboxylic acid derivative-directed halogenation in analogy to the processes described in Bioorganic & Medicinal Chemistry Letters, **24** (2014), 4236-4238; Tetrahedron, **58** (2002), 6723-6728 and WO2003/010146.

Process I

Compounds of the formula (I) where R¹, R^a, R^b, R^c, R^d, R⁵, R⁶, A², A³ and A⁴ have the meaning described above and R⁹ represents (C₁-C₄)-alkyl, Tf represents triflate (CF₃SO₂-) and Ts represents tosylate (CH₃C₆H₄SO₂-) can be prepared by known methods, for example by the process described below.

**Step a)**

Compounds of the formula (XXVII) are either commercially available or can be prepared analogously to the processes described in Bioorganic & Medicinal Chemistry Letters 2016, 26, 2526-2530 or Tetrahedron Letters 2012, 53, 3654-3657 from compounds of the formula (XXVI) via free-radical bromination.

The bromination agent used can, for example, be N-bromosuccinimide. Azo compounds such as azoisobutyronitrile (AIBN) or peroxides such as, for example, dibenzoyl peroxide can be used as radical initiators.

The solvent used is preferably an aprotic solvent such as, for example carbon tetrachloride.

10 The reaction can be conducted under reduced pressure, at standard pressure or under elevated pressure, and at temperatures of -20°C to 120°C .

The compounds of the formula (XXVI) are commercially available.

Step b)

Compounds of the formula (XXIX) can be prepared analogously to the process described in

WO2007/090068 via amination using a compound of the formula (XXVIII) in the presence of a base.

Suitable bases are, for example, inorganic bases such as carbonate bases. The solvent used can be a polar aprotic solvent such as, for example, *N,N*-dimethylformamide or tetrahydrofuran.

5 The reaction can be conducted under reduced pressure, at standard pressure or under elevated pressure, and at temperatures of -20°C to 120°C.

The compounds of the formula (XXVIII) are commercially available.

Step c)

10 Compounds of the formula (XXX) can be prepared analogously to the process described in WO2007/090068 via cyclization of compounds of the formula (XXIX). The reaction can take place in the presence of a base; it is possible to employ, for example, alkoxide bases such as sodium methoxide or potassium methoxide or sodium ethoxide or potassium ethoxide.

Suitable solvents are protic solvents such as, for example, short-chain alcohols such as methanol or ethanol.

15 The reaction can be conducted under reduced pressure, at standard pressure or under elevated pressure, and at temperatures of -20°C to 120°C.

Step d)

The compounds of the formula (XXXI) can be synthesized in analogy to the processes described in Synthesis 1987, 6, 586-587, Tetrahedron Letters 2006, 47, 565-567 or ChemMedChem 2010, 5, 65-78 via a hydrolysis from the compounds of the formula (XXX).

20 Examples of suitable bases are, for example, lithium hydroxide or sodium hydroxide. Solvents used may be polar aprotic and protic solvents and mixtures of these, for example ethanol, tetrahydrofuran or water.

The reaction can be conducted under reduced pressure, at standard pressure or under elevated pressure, and at temperatures of -20°C to 120°C.

Step e)

25 The compounds of the formula (XXXII) can be prepared by the reaction of compounds of the formula (II) with carboxylic acids of the formula (XXXI) in the presence of a condensing agent or a base.

The compounds of the formula (II) are either commercially available or can be prepared by known methods, for example analogously to the processes described in US2003/069257, US2012/0319050, WO2011/107998 or WO2010/91310.

The reaction of the compounds of the formula (II) with carboxylic acids of the formula (XXXI) can be effected neat or in a solvent, preference being given to conducting the reaction in a solvent selected from customary solvents that are inert under the prevailing reaction conditions. Preference is given to ethers, for example diisopropyl ether, dioxane, tetrahydrofuran, 1,2-dimethoxyethane; halogenated hydrocarbons, for example dichloromethane, chloroform, carbon tetrachloride, 1,2-dichloroethane or chlorobenzene; nitriles, for example acetonitrile or propionitrile; aromatic hydrocarbons, for example toluene or xylene; aprotic polar solvents, for example N,N-dimethylformamide or N-methylpyrrolidone, or nitrogen compounds, for example pyridine.

Suitable condensing agents are, for example, carbodiimides such as 1-(3-dimethylaminopropyl)-3-ethylcarbodiimide hydrochloride (EDCI), 1,3-dicyclohexylcarbodiimide, thionyl chloride or oxalyl chloride.

Suitable bases are inorganic bases which are typically used in such reactions. Preference is given to using bases selected by way of example from the group consisting of acetates, phosphates, carbonates and bicarbonates of alkali metals or alkaline earth metals. Particular preference is given here to sodium acetate, sodium phosphate, potassium phosphate, caesium carbonate, sodium carbonate, potassium carbonate, sodium bicarbonate, potassium bicarbonate. Further suitable bases are alkali metal hydrides, for example sodium hydride.

The reaction can be carried out under reduced pressure, at standard pressure or under elevated pressure and at temperatures of 0°C to 180°C; with preference, the reaction is carried out at atmospheric pressure and temperatures of 20 to 140°C.

Step f)

The compounds of the formula (XXXIII) can be prepared by condensing the compounds of the formula (XXXII) in the presence of a base.

The conversion to compounds of the formula (XXXIII) can be effected neat or in a solvent, preference being given to conducting the reaction in a solvent selected from customary solvents that are inert under the prevailing reaction conditions. Preference is given to ethers, for example diisopropyl ether, dioxane, tetrahydrofuran, 1,2-dimethoxyethane, tert-butyl methyl ether; halogenated hydrocarbons, for example dichloromethane, chloroform, carbon tetrachloride, 1,2-dichloroethane or chlorobenzene; nitriles, for example acetonitrile or propionitrile; aromatic hydrocarbons, for example toluene or xylene; aprotic polar solvents, for example N,N-dimethylformamide or N-methylpyrrolidone, or nitrogenous compounds, for example pyridine.

Suitable bases are inorganic bases which are typically used in such reactions. Preference is given to using bases selected by way of example from the group consisting of acetates, phosphates, carbonates and

bicarbonates of alkali metals or alkaline earth metals. Particular preference is given here to sodium acetate, sodium phosphate, potassium phosphate, caesium carbonate, sodium carbonate, potassium carbonate, sodium bicarbonate, potassium bicarbonate.

5 The reaction can be carried out under reduced pressure, at atmospheric pressure or under elevated pressure, and at temperatures of 0°C to 200°C.

Step g)

10 Compounds of the formula (XXXIV) can be prepared analogously to the processes described in WO2011/075630 from compounds of the formula (XXXIII) via triflation of the hydroxy group in the presence of an auxiliary base. The triflation agent used can, for example, be trifluoromethanesulfonic anhydride.

Suitable auxiliary bases are amine bases such as, for example, triethylamine or Hünig base or else pyridine.

The reaction can be carried out in the presence of a polar aprotic solvent such as, for example, pyridine, dichloromethane or tetrahydrofuran.

15 The reaction can be carried out under reduced pressure, at atmospheric pressure or under elevated pressure, and at temperatures of 0°C to 200°C.

Step h)

Compounds of the formula (I) where n represents 0 can be prepared analogously to the processes described in WO2013/161853 via transition metal-catalysed C-S coupling from compounds of the formula (XXXIV).

20 Suitable for use as catalyst are, for example, palladium complexes such as Pd₂(dba)₃•CHCl₃. Suitable for use as auxiliary base are, for example, amine bases such as trialkylamines, or inorganic bases such as, for example carbonate bases. Suitable solvents are polar aprotic solvents such as, for example, ethers, tetrahydrofuran or 1,4-dioxane.

25 The reaction can be carried out under reduced pressure, at atmospheric pressure or under elevated pressure, and at temperatures of 0°C to 200°C.

Step i)

30 The compounds of the formula (I) where n is 2 can be prepared by oxidizing the compounds of the formula (I) where n is 0. The oxidation is generally carried out in a solvent. Preference is given to halogenated hydrocarbons, for example dichloromethane, chloroform, carbon tetrachloride, 1,2-dichloroethane or chlorobenzene; alcohols such as methanol or ethanol; formic acid, acetic acid, propionic acid or water.

Examples of suitable oxidizing agents are hydrogen peroxide and meta-chloroperbenzoic acid.

The reaction can be conducted under reduced pressure, at standard pressure or under elevated pressure, and at temperatures of -20°C to 120°C.

Methods and uses

- 5 The invention also relates to methods for controlling animal pests, in which compounds of the formula (I) are allowed to act on animal pests and/or their habitat. The control of the animal pests is preferably conducted in agriculture and forestry, and in material protection. This preferably excludes methods for surgical or therapeutic treatment of the human or animal body and diagnostic methods carried out on the human or animal body.
- 10 The invention further relates to the use of the compounds of the formula (I) as pesticides, especially crop protection compositions.

In the context of the present application, the term "pesticide" in each case also always encompasses the term "crop protection composition".

- 15 The compounds of the formula (I), given good plant tolerance, favourable endotherm toxicity and good environmental compatibility, are suitable for protecting plants and plant organs against biotic and abiotic stress factors, for increasing harvest yields, for improving the quality of the harvested material and for controlling animal pests, especially insects, arachnids, helminths, especially nematodes and molluscs, which are encountered in agriculture, in horticulture, in animal husbandry, in aquatic cultures, in forests, in gardens and leisure facilities, in the protection of stored products and of materials, and in the hygiene
- 20 sector.

- In the context of the present patent application, the term "hygiene" should be understood to mean any and all measures, provisions and procedures which have the aim of preventing diseases, especially infection diseases, and which serve to protect the health of humans and animals and/or protect the environment and/or maintain cleanliness. According to the invention, this especially includes measures for cleaning,
- 25 disinfection and sterilization, for example of textiles or hard surfaces, especially surfaces made of glass, wood, cement, porcelain, ceramic, plastic or else metal(s), in order to ensure that these are free of hygiene pests and/or their secretions. The scope of protection of the invention in this regard preferably excludes surgical or therapeutic treatment procedures to be applied to the human body or the bodies of animals, and diagnostic procedures which are conducted on the human body or the bodies of animals.

- 30 The term "hygiene sector" covers all areas, technical fields and industrial applications in which these hygiene measures, provisions and procedures are important, for example with regard to hygiene in

kitchens, bakeries, airports, bathrooms, swimming pools, department stores, hotels, hospitals, stables, animal keeping, etc.

The term "hygiene pest" should therefore be understood to mean one or more animal pests whose presence in the hygiene sector is problematic, especially for reasons of health. A main aim is therefore that of avoiding, or limiting to a minimum degree, the presence of hygiene pests and/or the exposure to these in the hygiene sector. This can especially be achieved through the use of a pesticide which can be used both for prevention of infestation and for prevention of an existing infestation. It is also possible to use formulations which prevent or reduce exposure to pests. Hygiene pests include, for example, the organisms mentioned below.

The term "hygiene protection" thus covers all acts by which these hygiene measures, provisions and procedures are maintained and/or improved.

The compounds of the formula (I) can preferably be used as pesticides. They are active against normally sensitive and resistant species and also against all or specific stages of development. The abovementioned pests include:

Pests from the phylum of the Arthropoda, in particular from the class of the Arachnida, for example *Acarus* spp., e.g. *Acarus siro*, *Aceria kuko*, *Aceria sheldoni*, *Aculops* spp., *Aculus* spp., e.g. *Aculus fockeui*, *Aculus schlehtendali*, *Amblyomma* spp., *Amphitetranychus viennensis*, *Argas* spp., *Boophilus* spp., *Brevipalpus* spp., e.g. *Brevipalpus phoenicis*, *Bryobia graminum*, *Bryobia praetiosa*, *Centruroides* spp., *Chorioptes* spp., *Dermanyssus gallinae*, *Dermatophagoides pteronyssinus*, *Dermatophagoides farinae*, *Dermacentor* spp., *Eotetranychus* spp., e.g. *Eotetranychus hicoriae*, *Epitrimerus pyri*, *Eutetranychus* spp., e.g. *Eutetranychus banksi*, *Eriophyes* spp., e.g. *Eriophyes pyri*, *Glycyphagus domesticus*, *Halotydeus destructor*, *Hemitarsonemus* spp., e.g. *Hemitarsonemus latus* (=Polyphagotarsonemus latus), *Hyalomma* spp., *Ixodes* spp., *Latrodectus* spp., *Loxosceles* spp., *Neutrombicula autumnalis*, *Nuphersa* spp., *Oligonychus* spp., e.g. *Oligonychus coffeae*, *Oligonychus coniferarum*, *Oligonychus ilicis*, *Oligonychus indicus*, *Oligonychus mangiferus*, *Oligonychus pratensis*, *Oligonychus punicae*, *Oligonychus yothersi*, *Ornithodoros* spp., *Ornithonyssus* spp., *Panonychus* spp., e.g. *Panonychus citri* (=Metatetranychus citri), *Panonychus ulmi* (=Metatetranychus ulmi), *Phyllocoptruta oleivora*, *Platytetranychus multidigituli*, *Polyphagotarsonemus latus*, *Psoroptes* spp., *Rhipicephalus* spp., *Rhizoglyphus* spp., *Sarcoptes* spp., *Scorpio maurus*, *Steneotarsonemus* spp., *Steneotarsonemus spinki*, *Tarsonemus* spp., e.g. *Tarsonemus confusus*, *Tarsonemus pallidus*, *Tetranychus* spp., e.g. *Tetranychus canadensis*, *Tetranychus cinnabarinus*, *Tetranychus turkestani*, *Tetranychus urticae*, *Trombicula alfreddugesi*, *Vaejovis* spp., *Vasates lycopersici*;

from the class of the Chilopoda, for example *Geophilus* spp., *Scutigera* spp.;

from the order or the class of the Collembola, for example *Onychiurus armatus*; *Sminthurus viridis*;

from the class of the Diplopoda, for example *Blaniulus guttulatus*;

from the class of the Insecta, for example from the order of the Blattodea e.g. *Blatta orientalis*, *Blattella asahinai*, *Blattella germanica*, *Leucophaea maderae*, *Loboptera decipiens*, *Neostylopyga rhombifolia*, *Panchlora* spp., *Parcoblatta* spp., *Periplaneta* spp., e.g. *Periplaneta americana*, *Periplaneta australasiae*,
5 *Pycnoscelus surinamensis*, *Supella longipalpa*;

from the order of the Coleoptera, for example *Acalymma vittatum*, *Acanthoscelides obtectus*, *Adoretus* spp., *Aethina tumida*, *Agelastica alni*, *Agrilus* spp., e.g. *Agrilus planipennis*, *Agrilus coxalis*, *Agrilus bilineatus*, *Agrilus anxius*, *Agriotes* spp., e.g. *Agriotes linneatus*, *Agriotes mancus*, *Alphitobius diaperinus*, *Amphimallon solstitialis*, *Anobium punctatum*, *Anoplophora* spp., e.g. *Anoplophora glabripennis*, *Anthonomus* spp., e.g. *Anthonomus grandis*, *Anthrenus* spp., *Apion* spp., *Apogonia* spp., *Atomaria* spp., e.g. *Atomaria linearis*, *Attagenus* spp., *Baris caerulescens*, *Bruchidius obtectus*, *Bruchus* spp., e.g. *Bruchus pisorum*, *Bruchus rufimanus*, *Cassida* spp., *Cerotoma trifurcata*, *Ceutorrhynchus* spp., e.g. *Ceutorrhynchus assimilis*, *Ceutorrhynchus quadridens*, *Ceutorrhynchus rapae*, *Chaetocnema* spp., e.g. *Chaetocnema confinis*, *Chaetocnema denticulata*, *Chaetocnema ectypa*, *Cleonus mendicus*, *Conoderus* spp., *Cosmopolites* spp., e.g. *Cosmopolites sordidus*, *Costelytra zealandica*, *Ctenicera* spp., *Curculio* spp., e.g. *Curculio caryae*, *Curculio caryatrypes*, *Curculio obtusus*, *Curculio sayi*, *Cryptolestes ferrugineus*, *Cryptolestes pusillus*, *Cryptorhynchus lapathi*, *Cryptorhynchus mangiferae*, *Cylindrocopturus* spp., *Cylindrocopturus adpersus*, *Cylindrocopturus furnissi*, *Dendroctonus* spp., e.g. *Dendroctonus ponderosae*, *Dermestes* spp., *Diabrotica* spp., e.g. *Diabrotica balteata*, *Diabrotica barberi*, *Diabrotica undecimpunctata howardi*, *Diabrotica undecimpunctata undecimpunctata*, *Diabrotica virgifera virgifera*, *Diabrotica virgifera zea*, *Dichocrocis* spp., *Di cladispa armigera*, *Diloboderus* spp., *Epicaerus* spp., *Epilachna* spp., e.g. *Epilachna borealis*, *Epilachna varivestis*, *Epitrix* spp., e.g. *Epitrix cucumeris*, *Epitrix fuscula*, *Epitrix hirtipennis*, *Epitrix subcrinita*, *Epitrix tuberis*, *Faustinus* spp., *Gibbium psylloides*, *Gnathocerus cornutus*, *Hellula undalis*, *Heteronyx arator*, *Heteronyx* spp., *Hylamorpha elegans*,
25 *Hylotrupes bajulus*, *Hypera postica*, *Hypomeces squamosus*, *Hypothenemus* spp., e.g. *Hypothenemus hampei*, *Hypothenemus obscurus*, *Hypothenemus pubescens*, *Lachnosterna consanguinea*, *Lasioderma serricorne*, *Latheticus oryzae*, *Lathridius* spp., *Lema* spp., *Leptinotarsa decemlineata*, *Leucoptera* spp., e.g. *Leucoptera coffeella*, *Limonium ectypus*, *Lissorhoptrus oryzophilus*, *Listronotus (=Hyperodes)* spp., *Lixus* spp., *Luperodes* spp., *Luperomorpha xanthodera*, *Lyctus* spp., *Megacyllene* spp., e.g. *Megacyllene robiniae*, *Megascelis* spp., *Melanotus* spp., e.g. *Melanotus longulus oregonensis*, *Meligethes aeneus*, *Melolontha* spp., e.g. *Melolontha melolontha*, *Migdolus* spp., *Monochamus* spp., *Naupactus xanthographus*, *Necrobia* spp., *Neogalerucella* spp., *Niptus hololeucus*, *Oryctes rhinoceros*, *Oryzaephilus surinamensis*, *Oryzaphagus oryzae*, *Otiorhynchus* spp., e.g. *Otiorhynchus cribricollis*, *Otiorhynchus ligustici*, *Otiorhynchus ovatus*, *Otiorhynchus rugosostriatus*, *Otiorhynchus sulcatus*, *Oulema* spp., e.g.
30 *Oulema melanopus*, *Oulema oryzae*, *Oxycetonia jucunda*, *Phaedon cochleariae*, *Phyllophaga* spp., *Phyllophaga helleri*, *Phyllotreta* spp., e.g. *Phyllotreta armoraciae*, *Phyllotreta pusilla*, *Phyllotreta ramosa*,

Phyllotreta striolata, Popillia japonica, Premnotypes spp., Prostephanus truncatus, Psylliodes spp., e.g. Psylliodes affinis, Psylliodes chrysocephala, Psylliodes punctulata, Ptinus spp., Rhizobius ventralis, Rhizopertha dominica, Rhynchophorus spp., Rhynchophorus ferrugineus, Rhynchophorus palmarum, Scolytus spp., e.g. Scolytus multistriatus, Sinoxylon perforans, Sitophilus spp., e.g. Sitophilus granarius, 5 Sitophilus linearis, Sitophilus oryzae, Sitophilus zeamais, Sphenophorus spp., Stegobium paniceum, Sternechus spp., e.g. Sternechus paludatus, Symphyletes spp., Tanymecus spp., e.g. Tanymecus dilaticollis, Tanymecus indicus, Tanymecus palliatus, Tenebrio molitor, Tenebrioides mauretanicus, Tribolium spp., e.g. Tribolium audax, Tribolium castaneum, Tribolium confusum, Trogoderma spp., Tychius spp., Xylotrechus spp., Zabrus spp., e.g. Zabrus tenebrioides;

10 from the order of the Dermaptera, for example Anisolabis maritime, Forficula auricularia, Labidura riparia;

from the order of the Diptera, for example Aedes spp., e.g. Aedes aegypti, Aedes albopictus, Aedes sticticus, Aedes vexans, Agromyza spp., e.g. Agromyza frontella, Agromyza parvicornis, Anastrepha spp., Anopheles spp., e.g. Anopheles quadrimaculatus, Anopheles gambiae, Asphondylia spp., Bactrocera spp., 15 e.g. Bactrocera cucurbitae, Bactrocera dorsalis, Bactrocera oleae, Bibio hortulanus, Calliphora erythrocephala, Calliphora vicina, Ceratitis capitata, Chironomus spp., Chrysomya spp., Chrysops spp., Chrysozona pluvialis, Cochliomya spp., Contarinia spp., e.g. Contarinia johnsoni, Contarinia nasturtii, Contarinia pyrivora, Contarinia schulzi, Contarinia sorghicola, Contarinia tritici, Cordylobia anthropophaga, Cricotopus sylvestris, Culex spp., e.g. Culex pipiens, Culex quinquefasciatus, Culicoides 20 spp., Culiseta spp., Cuterebra spp., Dacus oleae, Dasineura spp., e.g. Dasineura brassicae, Delia spp., e.g. Delia antiqua, Delia coarctata, Delia florilega, Delia platura, Delia radicum, Dermatobia hominis, Drosophila spp., e.g. Drosophila melanogaster, Drosophila suzukii, Echinocnemus spp., Euleia heraclei, Fannia spp., Gasterophilus spp., Glossina spp., Haematopota spp., Hydrellia spp., Hydrellia griseola, Hylemya spp., Hippobosca spp., Hypoderma spp., Liriomyza spp., e.g. Liriomyza brassicae, Liriomyza 25 huidobrensis, Liriomyza sativae, Lucilia spp., e.g. Lucilia cuprina, Lutzomyia spp., Mansonia spp., Musca spp., e.g. Musca domestica, Musca domestica vicina, Oestrus spp., Oscinella frit, Paratanytarsus spp., Paralauterborniella subcineta, Pegomya oder Pegomyia spp., e.g. Pegomya betae, Pegomya hyoscyami, Pegomya rubivora, Phlebotomus spp., Phorbia spp., Phormia spp., Piophilina casei, Platyparea poeciloptera, Prodiplosis spp., Psila rosae, Rhagoletis spp., e.g. Rhagoletis cingulata, Rhagoletis completa, Rhagoletis 30 fausta, Rhagoletis indifferens, Rhagoletis mendax, Rhagoletis pomonella, Sarcophaga spp., Simulium spp., e.g. Simulium meridionale, Stomoxys spp., Tabanus spp., Tetanops spp., Tipula spp., e.g. Tipula paludosa, Tipula simplex, Toxotrypana curvicauda;

from the order of the Hemiptera, for example Acizzia acaciaebaileyanae, Acizzia dodonaeae, Acizzia uncatoides, Acrida turrata, Acyrthosiphon spp., e.g. Acyrthosiphon pisum, Acrogonia spp., Aeneolamia 35 spp., Agonosцена spp., Aleurocanthus spp., Aleyrodes proletella, Aleurolobus barodensis, Aleurothrixus floccosus, Allocaridara malayensis, Amrasca spp., e.g. Amrasca bigutulla, Amrasca devastans, Anuraphis

cardui, Aonidiella spp., e.g. Aonidiella aurantii, Aonidiella citrina, Aonidiella inornata, Aphanostigma piri, Aphis spp., e.g. Aphis citricola, Aphis craccivora, Aphis fabae, Aphis forbesi, Aphis glycines, Aphis gossypii, Aphis hederiae, Aphis illinoisensis, Aphis middletoni, Aphis nasturtii, Aphis nerii, Aphis pomi, Aphis spiraeicola, Aphis viburniphila, Arboridia apicalis, Arytainilla spp., Aspidiella spp., Aspidiotus spp.,
5 e.g. Aspidiotus nerii, Atanus spp., Aulacorthum solani, Bemisia tabaci, Blastopsylla occidentalis, Boreioglycaspis melaleucae, Brachycaudus helichrysi, Brachycolus spp., Brevicoryne brassicae, Cacopsylla spp., e.g. Cacopsylla pyricola, Calligypona marginata, Capulinia spp., Carnecephala fulgida, Ceratovacuna lanigera, Cercopidae, Ceroplastes spp., Chaetosiphon fragaefolii, Chionaspis tegalensis, Chlorita onukii, Chondracris rosea, Chromaphis juglandicola, Chrysomphalus aonidum, Chrysomphalus
10 ficus, Cicadulina mbila, Coccoxymylus halli, Coccus spp., e.g. Coccus hesperidum, Coccus longulus, Coccus pseudomagnoliarum, Coccus viridis, Cryptomyzus ribis, Cryptoneossa spp., Ctenarytaina spp., Dalbulus spp., Dialeurodes chittendeni, Dialeurodes citri, Diaphorina citri, Diaspis spp., Diuraphis spp., Doralis spp., Drosicha spp., Dysaphis spp., e.g. Dysaphis apiifolia, Dysaphis plantaginea, Dysaphis tulipae, Dysmicoccus spp., Empoasca spp., e.g. Empoasca abrupta, Empoasca fabae, Empoasca maligna,
15 Empoasca solana, Empoasca stevensi, Eriosoma spp., e.g. Eriosoma americanum, Eriosoma lanigerum, Eriosoma pyricola, Erythroneura spp., Eucalyptolyma spp., Euphyllura spp., Euscelis bilobatus, Ferrisia spp., Fiorinia spp., Furcaspis oceanica, Geococcus coffeae, Glycaspis spp., Heteropsylla cubana, Heteropsylla spinulosa, Homalodisca coagulata, Hyalopterus arundinis, Hyalopterus pruni, Icerya spp., e.g. Icerya purchasi, Idiocerus spp., Idioscopus spp., Laodelphax striatellus, Lecanium spp., e.g. Lecanium
20 corni (=Parthenolecanium corni), Lepidosaphes spp., e.g. Lepidosaphes ulmi, Lipaphis erysimi, Lopholeucaspis japonica, Lycorma delicatula, Macrosiphum spp., e.g. Macrosiphum euphorbiae, Macrosiphum lillii, Macrosiphum rosae, Macrosteles facifrons, Mahanarva spp., Melanaphis sacchari, Metcalfiella spp., Metcalfa pruinosa, Metopolophium dirhodum, Monellia costalis, Monelliopsis pecanis, Myzus spp., e.g. Myzus ascalonicus, Myzus cerasi, Myzus ligustri, Myzus ornatus, Myzus persicae,
25 Myzus nicotianae, Nasonovia ribisnigri, Neomaskellia spp., Nephrotettix spp., e.g. Nephrotettix cincticeps, Nephrotettix nigropictus, Nettigoniclla spectra, Nilaparvata lugens, Oncometopia spp., Orthezia praelonga, Oxya chinensis, Pachyopsylla spp., Parabemisia myricae, Paratrioza spp., e.g. Paratrioza cockerelli, Parlatoria spp., Pemphigus spp., e.g. Pemphigus bursarius, Pemphigus populivenae, Peregrinus maidis, Perkinsiella spp., Phenacoccus spp., e.g. Phenacoccus madeirensis, Phloeomyzus passerinii, Phorodon
30 humuli, Phylloxera spp., e.g. Phylloxera devastatrix, Phylloxera notabilis, Pinnaspis aspidistrae, Planococcus spp., e.g. Planococcus citri, Prosopidopsylla flava, Protopulvinaria pyriformis, Pseudaulacaspis pentagona, Pseudococcus spp., e.g. Pseudococcus calceolariae, Pseudococcus comstocki, Pseudococcus longispinus, Pseudococcus maritimus, Pseudococcus viburni, Psyllopsis spp., Psylla spp., e.g. Psylla buxi, Psylla mali, Psylla pyri, Pteromalus spp., Pulvinaria spp., Pyrilla spp., Quadraspidiotus
35 spp., e.g. Quadraspidiotus juglansregiae, Quadraspidiotus ostreaeformis, Quadraspidiotus perniciosus, Quesada gigas, Rastrococcus spp., Rhopalosiphum spp., e.g. Rhopalosiphum maidis, Rhopalosiphum oxyacanthae, Rhopalosiphum padi, Rhopalosiphum rufiabdominale, Saissetia spp., e.g. Saissetia coffeae, Saissetia miranda, Saissetia neglecta, Saissetia oleae, Scaphoideus titanus, Schizaphis graminum,

Selenaspidus articulatus, Siphia flava, Sitobion avenae, Sogata spp., Sogatella furcifera, Sogatodes spp., Stictocephala festina, Siphoninus phillyreae, Tenalaphara malayensis, Tetragnonocephala spp., Tinocallis caryaefoliae, Tomaspis spp., Toxoptera spp., e.g. Toxoptera aurantii, Toxoptera citricidus, Trialeurodes vaporariorum, Trioza spp., e.g. Trioza diospyri, Typhlocyba spp., Unaspis spp., Viteus vitifolii, Zygina spp.;

from the suborder of the Heteroptera, for example Aelia spp., Anasa tristis, Antestiopsis spp., Boisea spp., Blissus spp., Calocoris spp., Campylomma livida, Cavelerius spp., Cimex spp., e.g. Cimex adjunctus, Cimex hemipterus, Cimex lectularius, Cimex pilosellus, Collaria spp., Creontiades dilutus, Dasyneus piperis, Dichelops furcatus, Diconocoris hewetti, Dysdercus spp., Euschistus spp., e.g. Euschistus heros, Euschistus servus, Euschistus tristigma, Euschistus variolarius, Eurydema spp., Eurygaster spp., Halyomorpha halys, Heliopeltis spp., Horcias nobilellus, Leptocoris spp., Leptocoris varicornis, Leptoglossus occidentalis, Leptoglossus phyllopus, Lygocoris spp., e.g. Lygocoris pabulinus, Lygus spp., e.g. Lygus elisus, Lygus hesperus, Lygus lineolaris, Macropes excavatus, Megacopta cribraria, Miridae, Monalonion atratum, Nezara spp., e.g. Nezara viridula, Nysius spp., Oebalus spp., Pentomidae, Piesma quadrata, Piezodorus spp., e.g. Piezodorus guildinii, Psallus spp., Pseudacysta perseae, Rhodnius spp., Sahlbergella singularis, Scaptocoris castanea, Scotinophora spp., Stephanitis nashi, Tibraca spp., Triatoma spp.;

from the order of the Hymenoptera, for example Acromyrmex spp., Athalia spp., e.g. Athalia rosae, Atta spp., Camponotus spp., Dolichovespula spp., Diprion spp., e.g. Diprion similis, Hoplocampa spp., e.g. Hoplocampa cookei, Hoplocampa testudinea, Lasius spp., Linepithema (Iridomyrmex) humile, Monomorium pharaonis, Paratrechina spp., Paravespula spp., Plagiolepis spp., Sirex spp., e.g. Sirex noctilio, Solenopsis invicta, Tapinoma spp., Technomyrmex albipes, Urocerus spp., Vespa spp., e.g. Vespa crabro, Wasmannia auropunctata, Xeris spp.;

from the order of the Isopoda, for example Armadillidium vulgare, Oniscus asellus, Porcellio scaber;

from the order of the Isoptera, for example Coptotermes spp., e.g. Coptotermes formosanus, Cornitermes cumulans, Cryptotermes spp., Incisitermes spp., Kalotermites spp., Microtermes obesi, Nasutitermes spp., Odontotermes spp., Porotermes spp., Reticulitermes spp., e.g. Reticulitermes flavipes, Reticulitermes hesperus;

from the order of the Lepidoptera, for example Achroia grisella, Acronicta major, Adoxophyes spp., e.g. Adoxophyes orana, Aedia leucomelas, Agrotis spp., e.g. Agrotis segetum, Agrotis ipsilon, Alabama spp., e.g. Alabama argillacea, Amyelois transitella, Anarsia spp., Anticarsia spp., e.g. Anticarsia gemmatilis, Argyroploce spp., Autographa spp., Barathra brassicae, Blastodacna atra, Borbo cinnara, Bucculatrix thurberiella, Bupalus piniarius, Busseola spp., Cacoecia spp., Caloptilia theivora, Capua reticulana, Carpocapsa pomonella, Carposina niponensis, Cheimantobia brumata, Chilo spp., e.g. Chilo plejadellus,

Chilo suppressalis, Choreutis pariana, Choristoneura spp., Chrysodeixis chalcites, Clysia ambiguella, Cnaphalocerus spp., Cnaphalocrocis medinalis, Cnephasia spp., Conopomorpha spp., Conotrachelus spp., Copitarsia spp., Cydia spp., e.g. Cydia nigricana, Cydia pomonella, Dalaca noctuides, Diaphania spp., Diparopsis spp., Diatraea saccharalis, Dioryctria spp., e.g. Dioryctria zimmermani, Earias spp.,
 5 Ecdytolopha aurantium, Elasmopalpus lignosellus, Eldana saccharina, Ephestia spp., e.g. Ephestia elutella, Ephestia kuehniella, Epinotia spp., Epiphyas postvittana, Erannis spp., Erschoviella musculana, Etiella spp., Eudocima spp., Eulia spp., Eupoecilia ambiguella, Euproctis spp., e.g. Euproctis chrysoorrhoea, Euxoa spp., Feltia spp., Galleria mellonella, Gracillaria spp., Grapholitha spp., e.g. Grapholita molesta, Grapholita prunivora, Hedylepta spp., Helicoverpa spp., e.g. Helicoverpa armigera,
 10 Helicoverpa zea, Heliothis spp., e.g. Heliothis virescens, Hofmannophila pseudospretella, Homoeosoma spp., Homona spp., Hyponomeuta padella, Kakivoria flavofasciata, Lampides spp., Laphygma spp., Laspeyresia molesta, Leucinodes orbonalis, Leucoptera spp., e.g. Leucoptera coffeella, Lithocolletis spp., e.g. Lithocolletis blancardella, Lithophane antennata, Lobesia spp., e.g. Lobesia botrana, Loxagrotis albicosta, Lymantria spp., e.g. Lymantria dispar, Lyonetia spp., e.g. Lyonetia clerkella, Malacosoma neustria, Maruca testulalis, Mamestra brassicae, Melanitis leda, Mocis spp., Monopis obviella, Mythimna separata, Nemapogon cloacellus, Nymphula spp., Oiketicus spp., Omphisa spp., Operophtera spp., Oria spp., Orthaga spp., Ostrinia spp., e.g. Ostrinia nubilalis, Panolis flammea, Parnara spp., Pectinophora spp., e.g. Pectinophora gossypiella, Perileucoptera spp., Phthorimaea spp., e.g. Phthorimaea operculella, Phyllocnistis citrella, Phyllonorycter spp., e.g. Phyllonorycter blancardella, Phyllonorycter crataegella,
 20 Pieris spp., e.g. Pieris rapae, Platynota stultana, Plodia interpunctella, Plusia spp., Plutella xylostella (=Plutella maculipennis), Podesia spp., e.g. Podesia syringae, Prays spp., Prodenia spp., Protoparce spp., Pseudaletia spp., e.g. Pseudaletia unipuncta, Pseudoplusia includens, Pyrausta nubilalis, Rachiplusia nu, Schoenobius spp., e.g. Schoenobius bipunctifer, Scirpophaga spp., e.g. Scirpophaga innotata, Scotia segetum, Sesamia spp., e.g. Sesamia inferens, Sparganothis spp., Spodoptera spp., e.g. Spodoptera eradiana, Spodoptera exigua, Spodoptera frugiperda, Spodoptera praefica, Stathmopoda spp., Stenoma spp., Stomopteryx subsecivella, Synanthedon spp., Tecia solanivora, Thaumetopoea spp., Thermesia gemmatalis, Tinea cloacella, Tinea pellionella, Tineola bisselliella, Tortrix spp., Trichophaga tapetzella, Trichoplusia spp., e.g. Trichoplusia ni, Tryporyza incertulas, Tuta absoluta, Virachola spp.;

from the order of the Orthoptera or Saltatoria, for example Acheta domesticus, Dichroplus spp.,
 30 Gryllotalpa spp., e.g. Gryllotalpa gryllotalpa, Hieroglyphus spp., Locusta spp., e.g. Locusta migratoria, Melanoplus spp., e.g. Melanoplus devastator, Paratlanticus ussuriensis, Schistocerca gregaria;

from the order of the Phthiraptera, for example Damalinia spp., Haematopinus spp., Linognathus spp., Pediculus spp., Phylloxera vastatrix, Phthirus pubis, Trichodectes spp.;

from the order of the Psocoptera, for example Lepinotus spp., Liposcelis spp.;

from the order of the Siphonaptera, for example *Ceratophyllus* spp., *Ctenocephalides* spp., e.g. *Ctenocephalides canis*, *Ctenocephalides felis*, *Pulex irritans*, *Tunga penetrans*, *Xenopsylla cheopis*;

from the order of the Thysanoptera, for example *Anaphothrips obscurus*, *Baliothrips biformis*, *Chaetanaphothrips leeuweni*, *Drepanothrips reuteri*, *Enneothrips flavens*, *Frankliniella* spp., e.g. 5 *Frankliniella fusca*, *Frankliniella occidentalis*, *Frankliniella schultzei*, *Frankliniella tritici*, *Frankliniella vaccinii*, *Frankliniella williamsi*, *Haplothrips* spp., *Heliethrips* spp., *Hercinothrips femoralis*, *Kakothrips* spp., *Rhipiphorotherips cruentatus*, *Scirtothrips* spp., *Taeniothrips cardamomi*, *Thrips* spp., e.g. *Thrips palmi*, *Thrips tabaci*;

from the order of the Zygentoma (= Thysanura), for example *Ctenolepisma* spp., *Lepisma saccharina*, 10 *Lepismodes inquilinus*, *Thermobia domestica*;

from the class of the Symphyla, for example *Scutigerebella* spp., e.g. *Scutigerebella immaculata*;

pests from the phylum of the Mollusca, for example from the class of the Bivalvia, e.g. *Dreissena* spp.;

and from the class of the Gastropoda, for example *Arion* spp., e.g. *Arion ater rufus*, *Biomphalaria* spp., *Bulinus* spp., *Deroceras* spp., e.g. *Deroceras laeve*, *Galba* spp., *Lymnaea* spp., *Oncomelania* spp., *Pomacea* 15 spp., *Succinea* spp.;

plant pests from the phylum of the Nematoda, i.e. plant-parasitic nematodes, in particular *Aglenchus* spp., e.g. *Aglenchus agricola*, *Anguina* spp., e.g. *Anguina tritici*, *Aphelenchoides* spp., e.g. *Aphelenchoides* *arachidis*, *Aphelenchoides fragariae*, *Belonolaimus* spp., e.g. *Belonolaimus gracilis*, *Belonolaimus longicaudatus*, *Belonolaimus nortoni*, *Bursaphelenchus* spp., e.g. *Bursaphelenchus cocophilus*, 20 *Bursaphelenchus eremus*, *Bursaphelenchus xylophilus*, *Cacopaurus* spp., e.g. *Cacopaurus pestis*, *Criconemella* spp., e.g. *Criconemella curvata*, *Criconemella onoensis*, *Criconemella ornata*, *Criconemella rusium*, *Criconemella xenoplax* (= *Mesocriconema xenoplax*), *Criconemoides* spp., e.g. *Criconemoides ferniae*, *Criconemoides onoense*, *Criconemoides ornatum*, *Ditylenchus* spp., e.g. *Ditylenchus dipsaci*, *Dolichodorus* spp., *Globodera* spp., e.g. *Globodera pallida*, *Globodera rostochiensis*, *Helicotylenchus* 25 spp., e.g. *Helicotylenchus dihystra*, *Hemicriconemoides* spp., *Hemicycliophora* spp., *Heterodera* spp., e.g. *Heterodera avenae*, *Heterodera glycines*, *Heterodera schachtii*, *Hirschmaniella* spp., *Hoplolaimus* spp., *Longidorus* spp., e.g. *Longidorus africanus*, *Meloidogyne* spp., e.g. *Meloidogyne chitwoodi*, *Meloidogyne fallax*, *Meloidogyne hapla*, *Meloidogyne incognita*, *Meloinema* spp., *Nacobbus* spp., *Neotylenchus* spp., *Paralongidorus* spp., *Paraphelenchus* spp., *Paratrichodorus* spp., e.g. *Paratrichodorus* 30 *minor*, *Pratylenchus* spp., *Pratylenchus* spp., e.g. *Pratylenchus penetrans*, *Pseudohalenchus* spp., *Psilenchus* spp., *Punctodera* spp., *Quinisulcius* spp., *Radopholus* spp., e.g. *Radopholus citrophilus*, *Radopholus similis*, *Rotylenchulus* spp., *Rotylenchus* spp., *Scutellonema* spp., *Subanguina* spp., *Trichodorus* spp., e.g. *Trichodorus obtusus*, *Trichodorus primitivus*, *Tylenchorhynchus* spp., e.g.

Tylenchorhynchus annulatus, Tylenchulus spp., e.g. Tylenchulus semipenetrans, Xiphinema spp., e.g. Xiphinema index.

The compounds of the formula (I) can, as the case may be, at certain concentrations or application rates, also be used as herbicides, safeners, growth regulators or agents to improve plant properties, as
5 microbicides or gametocides, for example as fungicides, antimycotics, bactericides, virucides (including agents against viroids) or as agents against MLO (mycoplasma-like organisms) and RLO (rickettsia-like organisms). They can, as the case may be, also be used as intermediates or precursors for the synthesis of other active compounds.

Formulations

10 The present invention further relates to formulations and use forms prepared therefrom as pesticides, for example drench, drip and spray liquors, comprising at least one compound of the formula (I). Optionally, the use forms comprise further pesticides and/or adjuvants which improve action, such as penetrants, e.g. vegetable oils, for example rapeseed oil, sunflower oil, mineral oils, for example paraffin oils, alkyl esters of vegetable fatty acids, for example rapeseed oil methyl ester or soya oil methyl ester, or alkanol
15 alkoxyates and/or spreaders, for example alkylsiloxanes and/or salts, for example organic or inorganic ammonium or phosphonium salts, for example ammonium sulfate or diammonium hydrogenphosphate and/or retention promoters, for example dioctyl sulfosuccinate or hydroxypropylguar polymers and/or humectants, for example glycerol and/or fertilizers, for example ammonium-, potassium- or phosphorus-containing fertilizers.

20 Customary formulations are, for example, water-soluble liquids (SL), emulsion concentrates (EC), emulsions in water (EW), suspension concentrates (SC, SE, FS, OD), water-dispersible granules (WG), granules (GR) and capsule concentrates (CS); these and further possible formulation types are described, for example, by Crop Life International and in Pesticide Specifications, Manual on development and use of
25 FAO and WHO specifications for pesticides, FAO Plant Production and Protection Papers – 173, prepared by the FAO/WHO Joint Meeting on Pesticide Specifications, 2004, ISBN: 9251048576. The formulations, in addition to one or more compounds of the formula (I), optionally comprise further active agrochemical ingredients.

Preference is given to formulations or use forms comprising auxiliaries, for example extenders, solvents, spontaneity promoters, carriers, emulsifiers, dispersants, frost protection agents, biocides, thickeners
30 and/or further auxiliaries, for example adjuvants. An adjuvant in this context is a component which enhances the biological effect of the formulation, without the component itself having any biological effect. Examples of adjuvants are agents which promote retention, spreading, attachment to the leaf surface or penetration.

These formulations are produced in a known manner, for example by mixing the compounds of the formula (I) with auxiliaries, for example extenders, solvents and/or solid carriers and/or other auxiliaries, for example surfactants. The formulations are produced either in suitable facilities or else before or during application.

- 5 The auxiliaries used may be substances suitable for imparting special properties, such as certain physical, technical and/or biological properties, to the formulation of the compounds of the formula (I), or to the use forms prepared from these formulations (for example ready-to-use pesticides such as spray liquors or seed-dressing products).

10 Suitable extenders are, for example, water, polar and nonpolar organic chemical liquids, for example from the classes of the aromatic and non-aromatic hydrocarbons (such as paraffins, alkylbenzenes, alkylnaphthalenes, chlorobenzenes), the alcohols and polyols (which, if appropriate, may also be substituted, etherified and/or esterified), the ketones (such as acetone, cyclohexanone), the esters (including fats and oils) and (poly)ethers, the simple and substituted amines, amides, lactams (such as N-alkylpyrrolidones) and lactones, the sulfones and sulfoxides (such as dimethyl sulfoxide), the carbonates
15 and the nitriles.

If the extender utilized is water, it is also possible to use, for example, organic solvents as auxiliary solvents. Useful liquid solvents are essentially: aromatics such as xylene, toluene or alkylnaphthalenes, chlorinated aromatics or chlorinated aliphatic hydrocarbons such as chlorobenzenes, chloroethylenes or methylene chloride, aliphatic hydrocarbons such as cyclohexane or paraffins, for example petroleum
20 fractions, mineral and vegetable oils, alcohols such as butanol or glycol and their ethers and esters, ketones such as acetone, methyl ethyl ketone, methyl isobutyl ketone or cyclohexanone, strongly polar solvents such as dimethylformamide or dimethyl sulfoxide, carbonates such as propylene carbonate, butylene carbonate, diethyl carbonate or dibutyl carbonate, or nitriles such as acetonitrile or propanenitrile.

In principle, it is possible to use all suitable solvents. Examples of suitable solvents are aromatic
25 hydrocarbons, for example xylene, toluene or alkylnaphthalenes, chlorinated aromatic or chlorinated aliphatic hydrocarbons, for example chlorobenzene, chloroethylene or methylene chloride, aliphatic hydrocarbons, for example cyclohexane, paraffins, petroleum fractions, mineral and vegetable oils, alcohols, for example methanol, ethanol, isopropanol, butanol or glycol and their ethers and esters, ketones, for example acetone, methyl ethyl ketone, methyl isobutyl ketone or cyclohexanone, strongly
30 polar solvents such as dimethyl sulfoxide, carbonates such as propylene carbonate, butylene carbonate, diethyl carbonate or dibutyl carbonate, nitriles such as acetonitrile or propanenitrile, and also water.

In principle, it is possible to use all suitable carriers. Useful carriers especially include, for example, ammonium salts and natural, finely ground rocks, such as kaolins, aluminas, talc, chalk, quartz, attapulgite, montmorillonite or diatomaceous earth, and synthetic, finely ground rocks, such as highly disperse silica,

aluminium oxide and natural or synthetic silicates, resins, waxes and/or solid fertilizers. It is likewise possible to use mixtures of such carriers. Useful carriers for granules include: for example crushed and fractionated natural rocks such as calcite, marble, pumice, sepiolite, dolomite, and synthetic granules of inorganic and organic flours, and also granules of organic material such as sawdust, paper, coconut shells, maize cobs and tobacco stalks.

It is also possible to use liquefied gaseous extenders or solvents. Especially suitable extenders or carriers are those which are gaseous at standard temperature and under atmospheric pressure, for example aerosol propellants such as halogenated hydrocarbons, and also butane, propane, nitrogen and carbon dioxide.

Examples of emulsifiers and/or foam formers, dispersants or wetting agents having ionic or nonionic properties or mixtures of these surface-active substances are salts of polyacrylic acid, salts of lignosulfonic acid, salts of phenolsulfonic acid or naphthalenesulfonic acid, polycondensates of ethylene oxide with fatty alcohols or with fatty acids or with fatty amines, with substituted phenols (preferably alkylphenols or arylphenols), salts of sulfosuccinic esters, taurine derivatives (preferably alkyl taurates), isethionate derivatives, phosphoric esters of polyethoxylated alcohols or phenols, fatty acid esters of polyols, and derivatives of the compounds containing sulfates, sulfonates and phosphates, for example alkylaryl polyglycol ethers, alkylsulfonates, alkyl sulfates, arylsulfonates, protein hydrolysates, lignosulfite waste liquors and methylcellulose. The presence of a surfactant is advantageous if one of the compounds of the formula (I) and/or one of the inert carriers is insoluble in water and if the application takes place in water.

Further auxiliaries which may be present in the formulations and the use forms derived therefrom include dyes such as inorganic pigments, for example iron oxide, titanium oxide and Prussian Blue, and organic dyes such as alizarin dyes, azo dyes and metal phthalocyanine dyes, and nutrients and trace nutrients such as salts of iron, manganese, boron, copper, cobalt, molybdenum and zinc.

Additional components which may be present are stabilizers, such as cold stabilizers, preservatives, antioxidants, light stabilizers, or other agents which improve chemical and/or physical stability. Foam generators or antifoams may also be present.

In addition, the formulations and use forms derived therefrom may also comprise, as additional auxiliaries, stickers such as carboxymethylcellulose and natural and synthetic polymers in the form of powders, granules or latices, such as gum arabic, polyvinyl alcohol and polyvinyl acetate, or else natural phospholipids such as cephalins and lecithins and synthetic phospholipids. Further auxiliaries may be mineral and vegetable oils.

It is possible if appropriate for still further auxiliaries to be present in the formulations and the use forms derived therefrom. Examples of such additives are fragrances, protective colloids, binders, adhesives, thickeners, thixotropic agents, penetrants, retention promoters, stabilizers, sequestrants, complexing

agents, humectants, spreaders. In general, the compounds of the formula (I) can be combined with any solid or liquid additive commonly used for formulation purposes.

Useful retention promoters include all those substances which reduce dynamic surface tension, for example dioctyl sulfosuccinate, or increase viscoelasticity, for example hydroxypropylguar polymers.

5 Useful penetrants in the present context are all those substances which are typically used to improve the penetration of agrochemically active compounds into plants. Penetrants are defined in this context by their ability to penetrate from the (generally aqueous) application liquor and/or from the spray coating into the cuticle of the plant and hence to increase the mobility of the active compounds in the cuticle. The method described in the literature (Baur et al., 1997, Pesticide Science 51, 131-152) can be used for determining
10 this property. Examples include alcohol alkoxyates such as coconut fatty ethoxylate (10) or isotridecyl ethoxylate (12), fatty acid esters, for example rapeseed oil methyl ester or soya oil methyl ester, fatty amine alkoxyates, for example tallowamine ethoxylate (15), or ammonium and/or phosphonium salts, for example ammonium sulfate or diammonium hydrogenphosphate.

The formulations preferably comprise between 0.00000001% and 98% by weight of the compound of the formula (I), more preferably between 0.01% and 95% by weight of the compound of the formula (I), most preferably between 0.5% and 90% by weight of the compound of the formula (I), based on the weight of the formulation.
15

The content of the compound of the formula (I) in the use forms prepared from the formulations (in particular pesticides) may vary within wide ranges. The concentration of the compound of the formula (I) in the use forms may typically be between 0.00000001% and 95% by weight of the compound of the formula (I), preferably between 0.00001% and 1% by weight, based on the weight of the use form. The compounds are employed in a customary manner appropriate for the use forms.
20

Mixtures

The compounds of the formula (I) can also be used in a mixture with one or more suitable fungicides, bactericides, acaricides, molluscicides, nematocides, insecticides, microbiological agents, beneficial organisms, herbicides, fertilizers, bird repellents, phytotonics, sterilants, safeners, semiochemicals and/or plant growth regulators, in order thus, for example, to broaden the spectrum of action, prolong the period of action, enhance the rate of action, prevent repellency or prevent evolution of resistance. In addition, active compound combinations of this kind can improve plant growth and/or tolerance to abiotic factors, for example high or low temperatures, to drought or to elevated water content or soil salinity. It is also possible to improve flowering and fruiting performance, optimize germination capacity and root development, facilitate harvesting and improve yields, influence maturation, improve the quality and/or the nutritional value of the harvested products, prolong storage life and/or improve the processability of the harvested products.
30

In addition, the compounds of the formula (I) may be present in a mixture with other active compounds or semiochemicals such as attractants and/or bird repellents and/or plant activators and/or growth regulators and/or fertilizers. Likewise, the compounds of the formula (I) can be used to improve plant properties, for example growth, yield and quality of the harvested material.

- 5 In a particular embodiment according to the invention, the compounds of the formula (I) are present in formulations or in the use forms prepared from these formulations in a mixture with further compounds, preferably those as described below.

If one of the compounds mentioned below can occur in different tautomeric forms, these forms are also included even if not explicitly mentioned in each case. All the mixing components mentioned, as the case
10 may be, may also form salts with suitable bases or acids if they are capable of doing so on the basis of their functional groups.

Insecticides/acaricides/nematicides

The active compounds specified here with their common names are known and are described for example in "The Pesticide Manual", 16th ed., British Crop Protection Council 2012, or can be searched for on the
15 Internet (e.g. <http://www.alanwood.net/pesticides>). The classification is based on the IRAC Mode of Action Classification Scheme applicable at the time of filing of this patent application.

(1) Acetylcholinesterase (AChE) inhibitors, preferably carbamates selected from alanycarb, aldicarb, bendiocarb, benfuracarb, butocarboxim, butoxycarboxim, carbaryl, carbofuran, carbosulfan, ethiofencarb, fenobucarb, formetanate, furathiocarb, isoprocarb, methiocarb, methomyl, metolcarb, oxamyl, pirimicarb,
20 propoxur, thiodicarb, thiofanox, triazamate, trimethacarb, XMC and xylycarb; or organophosphates selected from acephate, azamethiphos, azinphos-ethyl, azinphos-methyl, cadusafos, chlorethoxyfos, chlorfenvinphos, chlormephos, chlorpyrifos-methyl, coumaphos, cyanophos, demeton-S-methyl, diazinon, dichlorvos/DDVP, dicrotophos, dimethoate, dimethylvinphos, disulfoton, EPN, ethion, ethoprophos, famphur, fenamiphos, fenitrothion, fenthion, fosthiazate, heptenophos, imicyafos,
25 isofenphos, isopropyl O-(methoxyaminothiophosphoryl) salicylate, isoxathion, malathion, mecarbam, methamidophos, methidathion, mevinphos, monocrotophos, naled, omethoate, oxydemeton-methyl, parathion-methyl, phenthoate, phorate, phosalone, phosmet, phosphamidon, phoxim, pirimiphos-methyl, profenofos, propetamphos, prothiofos, pyraclofos, pyridaphenthion, quinalphos, sulfotep, tebupirimfos, temephos, terbufos, tetrachlorvinphos, thiometon, triazophos, triclofon and vamidothion.

30 (2) GABA-gated chloride channel blockers, preferably cyclo-diene-organochlorines selected from chlordane and endosulfan or phenylpyrazoles (fiproles) selected from ethiprole and fipronil.

(3) Sodium channel modulators, preferably pyrethroids selected from acrinathrin, allethrin, d-cis-trans allethrin, d-trans allethrin, bifenthrin, bioallethrin, bioallethrin S-cyclopentenyl isomer, bioresmethrin,

cycloprothrin, cyfluthrin, beta-cyfluthrin, cyhalothrin, lambda-cyhalothrin, gamma-cyhalothrin, cypermethrin, alpha-cypermethrin, beta-cypermethrin, theta-cypermethrin, zeta-cypermethrin, cyphenothrin [(1R)-trans isomer], deltamethrin, empenthrin [(EZ)-(1R) isomer], esfenvalerate, etofenprox, fenpropathrin, fenvalerate, flucythrinate, flumethrin, tau-fluvalinate, halfenprox, imiprothrin, 5 kadethrin, momfluorothrin, permethrin, phenothrin [(1R)-trans isomer], prallethrin, pyrethrins (pyrethrum), resmethrin, silafluofen, tefluthrin, tetramethrin, tetramethrin [(1R) isomer], tralomethrin and transfluthrin or DDT or methoxychlor.

(4) Competitive modulators of the nicotinic acetylcholine receptor (nAChR), preferably neonicotinoids selected from acetamiprid, clothianidin, dinotefuran, imidacloprid, nitenpyram, thiacloprid and 10 thiamethoxam, or nicotine, or sulfoximines selected from sulfoxaflor, or butenolides selected from flupyradifurone, or mesoionics selected from triflumezopyrim.

(5) Nicotinic acetylcholine receptor (nAChR) allosteric modulators, preferably spinosyns selected from spinetoram and spinosad.

(6) Glutamate-gated chloride channel (GluCl) allosteric modulators, preferably avermectins/milbemycins 15 selected from abamectin, emamectin benzoate, lepimectin and milbemectin.

(7) Juvenile hormone mimetics, preferably juvenile hormone analogues selected from hydroprene, kinoprene and methoprene or fenoxycarb or pyriproxyfen.

(8) Miscellaneous non-specific (multisite) inhibitors, preferably alkyl halides selected from methyl bromide and other alkyl halides; or chloropicrin or sulfuryl fluoride or borax or tartar emetic or methyl 20 isocyanate generators selected from diazomet and metam.

(9) TRPV channel modulators of chordotonal organs selected from pymetrozine and pyrifluquinazon.

(10) Mite growth inhibitors selected from clofentezine, hexythiazox, diflovidazin and etoxazole.

(11) Microbial disruptors of the insect gut membrane selected from *Bacillus thuringiensis* subspecies *israelensis*, *Bacillus sphaericus*, *Bacillus thuringiensis* subspecies *aizawai*, *Bacillus thuringiensis* 25 subspecies *kurstaki*, *Bacillus thuringiensis* subspecies *tenebrionis*, and *B.t.* plant proteins selected from Cry1Ab, Cry1Ac, Cry1Fa, Cry1A.105, Cry2Ab, VIP3A, mCry3A, Cry3Ab, Cry3Bb and Cry34Ab1/35Ab1.

(12) Inhibitors of mitochondrial ATP synthase, preferably ATP disruptors selected from diafenthiuron or organotin compounds selected from azocyclotin, cyhexatin and fenbutatin oxide, or propargite or 30 tetradifon.

- (13) Uncouplers of oxidative phosphorylation via disruption of the proton gradient selected from chlorfenapyr, DNOC and sulfluramid.
- (14) Nicotinic acetylcholine receptor channel blockers selected from bensultap, cartap hydrochloride, thiocyclam, and thiosultap-sodium.
- 5 (15) Inhibitors of chitin biosynthesis, type 0, selected from bistrifluron, chlorfluazuron, diflubenzuron, flucycloxuron, flufenoxuron, hexaflumuron, lufenuron, novaluron, noviflumuron, teflubenzuron and triflumuron.
- (16) Inhibitors of chitin biosynthesis, type 1, selected from buprofezin.
- (17) Moulting disruptors (especially in the case of Diptera) selected from cyromazine.
- 10 (18) Ecdysone receptor agonists selected from chromafenozide, halofenozide, methoxyfenozide and tebufenozide.
- (19) Octopamine receptor agonists selected from amitraz.
- (20) Mitochondrial complex III electron transport inhibitors selected from hydramethylnon, acequinocyl and fluacrypyrim.
- 15 (21) Mitochondrial complex I electron transport inhibitors, preferably METI acaricides selected from fenazaquin, fenpyroximate, pyrimidifen, pyridaben, tebufenpyrad and tolfenpyrad, or rotenone (Derris).
- (22) Voltage-dependent sodium channel blockers selected from indoxacarb and metaflumizone.
- (23) Inhibitors of acetyl-CoA carboxylase, preferably tetronic and tetramic acid derivatives selected from spirobudiclofen, spirodiclofen, spiromesifen and spirotetramat.
- 20 (24) Mitochondrial complex IV electron transport inhibitors, preferably phosphines selected from aluminium phosphide, calcium phosphide, phosphine and zinc phosphide, or cyanides selected from calcium cyanide, potassium cyanide and sodium cyanide.
- (25) Mitochondrial complex II electron transport inhibitors, preferably beta-keto nitrile derivatives selected from cyenopyrafen and cyflumetofen, or carboxanilides selected from pyflubumide.
- 25 (28) Ryanodine receptor modulators, preferably diamides selected from chlorantraniliprole, cyantraniliprole and flubendiamide,
- (29) Modulators of chordotonal organs (with undefined target structure) selected from flonicamid.

(30) Further active compounds selected from acynonapyr, afidopyropen, afoxolaner, azadirachtin, benclotiaz, benzoximate, benzpyrimoxan, bifenazate, broflanilide, bromopropylate, chinomethionat, chloroprallethrin, cryolite, cyclanilprole, cycloxaprid, cyhalodiamide, dicloromezotiaz, dicofol, dimpropyridaz, epsilon metofluthrin, epsilon momfluthrin, flometoquin, fluazaindolizine, fluensulfone, 5 flufenerim, flufenoxystrobin, flufiprole, fluhexafon, fluopyram, flupyrimin, fluralaner, fluxametamide, fufenozide, guadipyr, heptafluthrin, imidaclotiz, iprodione, kappa bifenthrin, isocycloseram, kappa tefluthrin, lotilaner, meperfluthrin, oxazosulfyl, paichongding, pyridalyl, pyrifluquinazon, pyriminostrobin, spirobudiclofen, spiropidion, tetramethylfluthrin, tetraniliprole, tetrachlorantraniliprole, tigolaner, tioxazafen, thiofluoximate and iodomethane; additionally preparations based on *Bacillus firmus* 10 (I-1582, BioNeem, Votivo), and the following compounds: 1-{2-fluoro-4-methyl-5-[(2,2,2-trifluoroethyl)sulfinyl]phenyl}-3-(trifluoromethyl)-1H-1,2,4-triazole-5-amine (known from WO2006/043635) (CAS 885026-50-6), {1'-[(2E)-3-(4-chlorophenyl)prop-2-en-1-yl]-5-fluorospiro[indole-3,4'-piperidine]-1(2H)-yl}(2-chloropyridin-4-yl)methanone (known from WO2003/106457) (CAS 637360-23-7), 2-chloro-N-[2-{1-[(2E)-3-(4-chlorophenyl)prop-2-en-1-yl]piperidin-4-yl}-4-(trifluoromethyl)phenyl]isonicotinamide (known from WO2006/003494) (CAS 872999-66-1), 3-(4-chloro-2,6-dimethylphenyl)-4-hydroxy-8-methoxy-1,8-diazaspiro[4.5]dec-3-en-2-one (known from WO 2010052161) (CAS 1225292-17-0), 3-(4-chloro-2,6-dimethylphenyl)-8-methoxy-2-oxo-1,8-diazaspiro[4.5]dec-3-en-4-yl ethylcarbonate (known from EP 2647626) (CAS-1440516-42-6), 4-(but-2-yn-1-yloxy)-6-(3,5-dimethylpiperidin-1-yl)-5-fluoropyrimidine (known from WO2004/099160) 20 (CAS 792914-58-0), PF1364 (known from JP2010/018586) (CAS Reg.No. 1204776-60-2), (3E)-3-[1-[(6-chloro-3-pyridyl)methyl]-2-pyridylidene]-1,1,1-trifluoropropan-2-one (known from WO2013/144213) (CAS 1461743-15-6), N-[3-(benzylcarbamoyl)-4-chlorophenyl]-1-methyl-3-(pentafluoroethyl)-4-(trifluoromethyl)-1H-pyrazole-5-carboxamide (known from WO2010/051926) (CAS 1226889-14-0), 5-bromo-4-chloro-N-[4-chloro-2-methyl-6-(methylcarbamoyl)phenyl]-2-(3-chloro-2-pyridyl)pyrazole-3-carboxamide (known from CN103232431) (CAS 1449220-44-3), 4-[5-(3,5-dichlorophenyl)-4,5-dihydro-5-(trifluoromethyl)-3-isoxazolyl]-2-methyl-N-(cis-1-oxido-3-thietanyl)benzamide, 4-[5-(3,5-dichlorophenyl)-4,5-dihydro-5-(trifluoromethyl)-3-isoxazolyl]-2-methyl-N-(trans-1-oxido-3-thietanyl)benzamide and 4-[(5S)-5-(3,5-dichlorophenyl)-4,5-dihydro-5-(trifluoromethyl)-3-isoxazolyl]-2-methyl-N-(cis-1-oxido-3-thietanyl)benzamide (known from WO 2013/050317 A1) (CAS 1332628-83-7), 30 N-[3-chloro-1-(3-pyridinyl)-1H-pyrazol-4-yl]-N-ethyl-3-[(3,3,3-trifluoropropyl)sulfinyl]propanamide, (+)-N-[3-chloro-1-(3-pyridinyl)-1H-pyrazol-4-yl]-N-ethyl-3-[(3,3,3-trifluoropropyl)sulfinyl]propanamide and (-)-N-[3-chloro-1-(3-pyridinyl)-1H-pyrazol-4-yl]-N-ethyl-3-[(3,3,3-trifluoropropyl)sulfinyl]propanamide (known from WO 2013/162715 A2, WO 2013/162716 A2, US 2014/0213448 A1) (CAS 1477923-37-7), 5-[[[(2E)-3-chloro-2-propen-1-yl]amino]-1-[2,6-dichloro-4-(trifluoromethyl)phenyl]-4-[(trifluoromethyl)sulfinyl]-1H-pyrazole-3-carbonitrile 35 (known from CN 101337937 A) (CAS 1105672-77-2), 3-bromo-N-[4-chloro-2-methyl-6-[(methylamino)thioxomethyl]phenyl]-1-(3-chloro-2-pyridinyl)-1H-pyrazole-5-carboxamide (Liudaibenjiaxuanan, known from CN 103109816 A) (CAS 1232543-85-9); N-[4-chloro-2-[(1,1-

dimethylethylamino]carbonyl]-6-methylphenyl]-1-(3-chloro-2-pyridinyl)-3-(fluoromethoxy)-1H-pyrazole-5-carboxamide (known from WO 2012/034403 A1) (CAS 1268277-22-0), N-[2-(5-amino-1,3,4-thiadiazol-2-yl)-4-chloro-6-methylphenyl]-3-bromo-1-(3-chloro-2-pyridinyl)-1H-pyrazole-5-carboxamide (known from WO 2011/085575 A1) (CAS 1233882-22-8), 4-[3-[2,6-dichloro-4-[(3,3-dichloro-2-propen-1-yl)oxy]phenoxy]propoxy]-2-methoxy-6-(trifluoromethyl)pyrimidine (known from CN 101337940 A) (CAS 1108184-52-6); (2E)- and 2(Z)-2-[2-(4-cyanophenyl)-1-[3-(trifluoromethyl)phenyl]ethylidene]-N-[4-(difluoromethoxy)phenyl]hydrazinecarboxamide (known from CN 101715774 A) (CAS 1232543-85-9); cyclopropanecarboxylic acid 3-(2,2-dichloroethenyl)-2,2-dimethyl-4-(1H-benzimidazol-2-yl)phenyl ester (known from CN 103524422 A) (CAS 1542271-46-4); (4aS)-7-chloro-2,5-dihydro-2-[[methoxycarbonyl]4-[[trifluoromethylthio]phenyl]amino]carbonyl]indeno[1,2-e][1,3,4]oxadiazine-4a(3H)-carboxylic acid methyl ester (known from CN 102391261 A) (CAS 1370358-69-2); 6-deoxy-3-O-ethyl-2,4-di-O-methyl-1-[N-[4-[1-[4-(1,1,2,2,2-pentafluoroethoxy)phenyl]-1H-1,2,4-triazol-3-yl]phenyl]carbamate]- α -L-mannopyranose (known from US 2014/0275503 A1) (CAS 1181213-14-8); 8-(2-cyclopropylmethoxy-4-trifluoromethylphenoxy)-3-(6-trifluoromethylpyridazin-3-yl)-3-azabicyclo[3.2.1]octane (CAS 1253850-56-4), (8-anti)-8-(2-cyclopropylmethoxy-4-trifluoromethylphenoxy)-3-(6-trifluoromethylpyridazin-3-yl)-3-azabicyclo[3.2.1]octane (CAS 933798-27-7), (8-syn)-8-(2-cyclopropylmethoxy-4-trifluoromethylphenoxy)-3-(6-trifluoromethylpyridazin-3-yl)-3-azabicyclo[3.2.1]octane (known from WO 2007040280 A1, WO 2007040282 A1) (CAS 934001-66-8), N-[3-chloro-3-(3-pyridinyl)-1H-pyrazol-4-yl]-N-ethyl-3-[(3,3,3-trifluoropropyl)thio]propanamide (known from WO 2015/058021 A1, WO 2015/058028 A1) (CAS 1477919-27-9) and N-[4-(aminothioxomethyl)-2-methyl-6-[(methylamino)carbonyl]phenyl]-3-bromo-1-(3-chloro-2-pyridinyl)-1H-pyrazole-5-carboxamide (known from CN 103265527 A) (CAS 1452877-50-7), 5-(1,3-dioxan-2-yl)-4-[[4-(trifluoromethyl)phenyl]methoxy]pyrimidine (known from WO 2013/115391 A1) (CAS 1449021-97-9), 3-(4-chloro-2,6-dimethylphenyl)-8-methoxy-1-methyl-1,8-diazaspiro[4.5]decane-2,4-dione (known from WO 2014/187846 A1) (CAS 1638765-58-8), ethyl 3-(4-chloro-2,6-dimethylphenyl)-8-methoxy-1-methyl-2-oxo-1,8-diazaspiro[4.5]dec-3-en-4-yl-carboxylate (known from WO 2010/066780 A1, WO 2011151146 A1) (CAS 1229023-00-0), 4-[(5S)-5-(3,5-dichloro-4-fluorophenyl)-4,5-dihydro-5-(trifluoromethyl)-3-isoxazolyl]-N-[(4R)-2-ethyl-3-oxo-4-isoxazolidinyl]-2-methylbenzamide (known from WO 2011/067272, WO2013/050302) (CAS 1309959-62-3).

Fungicides

The active compounds specified herein by their common name are known and described, for example, in "Pesticide Manual" (16th Ed. British Crop Protection Council) or searchable on the internet (for example: <http://www.alanwood.net/pesticides>).

All the mixing components mentioned in classes (1) to (15), as the case may be, may form salts with suitable bases or acids if they are capable of doing so on the basis of their functional groups. All the

fungicidal mixing components mentioned in classes (1) to (15), as the case may be, may include tautomeric forms.

- 1) Inhibitors of ergosterol biosynthesis, for example (1.001) cyproconazole, (1.002) difenoconazole, (1.003) epoxiconazole, (1.004) fenhexamid, (1.005) fenpropidin, (1.006) fenpropimorph, (1.007) fenpyrazamine, (1.008) fluquinconazole, (1.009) flutriafol, (1.010) imazalil, (1.011) imazalil sulfate, (1.012) ipconazole, (1.013) metconazole, (1.014) myclobutanil, (1.015) paclobutrazol, (1.016) prochloraz, (1.017) propiconazole, (1.018) prothioconazole, (1.019) pyrisoxazole, (1.020) spiroxamine, (1.021) tebuconazole, (1.022) tetraconazole, (1.023) triadimenol, (1.024) tridemorph, (1.025) triticonazole, (1.026) (1R,2S,5S)-5-(4-chlorobenzyl)-2-(chloromethyl)-2-methyl-1-(1H-1,2,4-triazol-1-ylmethyl)cyclopentanol, (1.027) (1S,2R,5R)-5-(4-chlorobenzyl)-2-(chloromethyl)-2-methyl-1-(1H-1,2,4-triazol-1-ylmethyl)cyclopentanol, (1.028) (2R)-2-(1-chlorocyclopropyl)-4-[(1R)-2,2-dichlorocyclopropyl]-1-(1H-1,2,4-triazol-1-yl)butan-2-ol, (1.029) (2R)-2-(1-chlorocyclopropyl)-4-[(1S)-2,2-dichlorocyclopropyl]-1-(1H-1,2,4-triazol-1-yl)butan-2-ol, (1.030) (2R)-2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-1-(1H-1,2,4-triazol-1-yl)propan-2-ol, (1.031) (2S)-2-(1-chlorocyclopropyl)-4-[(1R)-2,2-dichlorocyclopropyl]-1-(1H-1,2,4-triazol-1-yl)butan-2-ol, (1.032) (2S)-2-(1-chlorocyclopropyl)-4-[(1S)-2,2-dichlorocyclopropyl]-1-(1H-1,2,4-triazol-1-yl)butan-2-ol, (1.033) (2S)-2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-1-(1H-1,2,4-triazol-1-yl)propan-2-ol, (1.034) (R)-[3-(4-chloro-2-fluorophenyl)-5-(2,4-difluorophenyl)-1,2-oxazol-4-yl](pyridin-3-yl)methanol, (1.035) (S)-[3-(4-chloro-2-fluorophenyl)-5-(2,4-difluorophenyl)-1,2-oxazol-4-yl](pyridin-3-yl)methanol, (1.036) [3-(4-chloro-2-fluorophenyl)-5-(2,4-difluorophenyl)-1,2-oxazol-4-yl](pyridin-3-yl)methanol, (1.037) 1-({(2R,4S)-2-[2-chloro-4-(4-chlorophenoxy)phenyl]-4-methyl-1,3-dioxolan-2-yl}methyl)-1H-1,2,4-triazole, (1.038) 1-({(2S,4S)-2-[2-chloro-4-(4-chlorophenoxy)phenyl]-4-methyl-1,3-dioxolan-2-yl}methyl)-1H-1,2,4-triazole, (1.039) 1-[[3-(2-chlorophenyl)-2-(2,4-difluorophenyl)oxiran-2-yl]methyl]-1H-1,2,4-triazol-5-yl thiocyanate, (1.040) 1-[[rel(2R,3R)-3-(2-chlorophenyl)-2-(2,4-difluorophenyl)oxiran-2-yl]methyl]-1H-1,2,4-triazol-5-ylthiocyanate, (1.041) 1-[[rel(2R,3S)-3-(2-chlorophenyl)-2-(2,4-difluorophenyl)oxiran-2-yl]methyl]-1H-1,2,4-triazol-5-yl thiocyanate, (1.042) 2-[(2R,4R,5R)-1-(2,4-dichlorophenyl)-5-hydroxy-2,6,6-trimethylheptan-4-yl]-2,4-dihydro-3H-1,2,4-triazole-3-thione, (1.043) 2-[(2R,4R,5S)-1-(2,4-dichlorophenyl)-5-hydroxy-2,6,6-trimethylheptan-4-yl]-2,4-dihydro-3H-1,2,4-triazole-3-thione, (1.044) 2-[(2R,4S,5R)-1-(2,4-dichlorophenyl)-5-hydroxy-2,6,6-trimethylheptan-4-yl]-2,4-dihydro-3H-1,2,4-triazole-3-thione, (1.045) 2-[(2R,4S,5S)-1-(2,4-dichlorophenyl)-5-hydroxy-2,6,6-trimethylheptan-4-yl]-2,4-dihydro-3H-1,2,4-triazole-3-thione, (1.046) 2-[(2S,4R,5R)-1-(2,4-dichlorophenyl)-5-hydroxy-2,6,6-trimethylheptan-4-yl]-2,4-dihydro-3H-1,2,4-triazole-3-thione, (1.047) 2-[(2S,4R,5S)-1-(2,4-dichlorophenyl)-5-hydroxy-2,6,6-trimethylheptan-4-yl]-2,4-dihydro-3H-1,2,4-triazole-3-thione, (1.048) 2-[(2S,4S,5R)-1-(2,4-dichlorophenyl)-5-hydroxy-2,6,6-trimethylheptan-4-yl]-2,4-dihydro-3H-1,2,4-triazole-3-thione, (1.049) 2-[(2S,4S,5S)-1-(2,4-dichlorophenyl)-5-hydroxy-2,6,6-trimethylheptan-4-yl]-2,4-dihydro-3H-1,2,4-triazole-3-

thione, (1.051) 2-[2-chloro-4-(2,4-dichlorophenoxy)phenyl]-1-(1H-1,2,4-triazol-1-yl)propan-2-ol, (1.052) 2-[2-chloro-4-(4-chlorophenoxy)phenyl]-1-(1H-1,2,4-triazol-1-yl)butan-2-ol, (1.053) 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-1-(1H-1,2,4-triazol-1-yl)butan-2-ol, (1.054) 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-1-(1H-1,2,4-triazol-1-yl)pentan-2-ol, (1.055) 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-1-(1H-1,2,4-triazol-1-yl)propan-2-ol, (1.056) 2-{{[3-(2-chlorophenyl)-2-(2,4-difluorophenyl)oxiran-2-yl]methyl}-2,4-dihydro-3H-1,2,4-triazole-3-thione, (1.057) 2-{{[rel(2R,3R)-3-(2-chlorophenyl)-2-(2,4-difluorophenyl)oxiran-2-yl]methyl}-2,4-dihydro-3H-1,2,4-triazole-3-thione, (1.058) 2-{{[rel(2R,3S)-3-(2-chlorophenyl)-2-(2,4-difluorophenyl)oxiran-2-yl]methyl}-2,4-dihydro-3H-1,2,4-triazole-3-thione, (1.059) 5-(4-chlorobenzyl)-2-(chloromethyl)-2-methyl-1-(1H-1,2,4-triazol-1-yl)methyl)cyclopentanol, (1.060) 5-(allylsulfanyl)-1-{{[3-(2-chlorophenyl)-2-(2,4-difluorophenyl)oxiran-2-yl]methyl}-1H-1,2,4-triazole, (1.061) 5-(allylsulfanyl)-1-{{[rel(2R,3R)-3-(2-chlorophenyl)-2-(2,4-difluorophenyl)oxiran-2-yl]methyl}-1H-1,2,4-triazole, (1.062) 5-(allylsulfanyl)-1-{{[rel(2R,3S)-3-(2-chlorophenyl)-2-(2,4-difluorophenyl)oxiran-2-yl]methyl}-1H-1,2,4-triazole, (1.063) N'-(2,5-dimethyl-4-{{[3-(1,1,2,2-tetrafluoroethoxy)phenyl]sulfanyl}phenyl)-N-ethyl-N-methylimidoforamide, (1.064) N'-(2,5-dimethyl-4-{{[3-(2,2,2-trifluoroethoxy)phenyl]sulfanyl}phenyl)-N-ethyl-N-methylimidoforamide, (1.065) N'-(2,5-dimethyl-4-{{[3-(2,2,3,3-tetrafluoropropoxy)phenyl]sulfanyl}phenyl)-N-ethyl-N-methylimidoforamide, (1.066) N'-(2,5-dimethyl-4-{{[3-(pentafluoroethoxy)phenyl]sulfanyl}phenyl)-N-ethyl-N-methylimidoforamide, (1.067) N'-(2,5-dimethyl-4-{{3-[(1,1,2,2-tetrafluoroethyl)sulfanyl]phenoxy}phenyl)-N-ethyl-N-methylimidoforamide, (1.068) N'-(2,5-dimethyl-4-{{3-[(2,2,2-trifluoroethyl)sulfanyl]phenoxy}phenyl)-N-ethyl-N-methylimidoforamide, (1.069) N'-(2,5-dimethyl-4-{{3-[(2,2,3,3-tetrafluoropropyl)sulfanyl]phenoxy}phenyl)-N-ethyl-N-methylimidoforamide, (1.070) N'-(2,5-dimethyl-4-{{3-[(pentafluoroethyl)sulfanyl]phenoxy}phenyl)-N-ethyl-N-methylimidoforamide, (1.071) N'-(2,5-dimethyl-4-phenoxyphenyl)-N-ethyl-N-methylimidoforamide, (1.072) N'-(4-{{[3-(difluoromethoxy)phenyl]sulfanyl}-2,5-dimethylphenyl)-N-ethyl-N-methylimidoforamide, (1.073) N'-(4-{{3-[(difluoromethyl)sulfanyl]phenoxy}-2,5-dimethylphenyl)-N-ethyl-N-methylimidoforamide, (1.074) N'-[5-bromo-6-(2,3-dihydro-1H-inden-2-yloxy)-2-methylpyridin-3-yl]-N-ethyl-N-methylimidoforamide, (1.075) N'-[4-[(4,5-dichloro-1,3-thiazol-2-yl)oxy]-2,5-dimethylphenyl]-N-ethyl-N-methylimidoforamide, (1.076) N'-[5-bromo-6-[(1R)-1-(3,5-difluorophenyl)ethoxy]-2-methylpyridin-3-yl]-N-ethyl-N-methylimidoforamide, (1.077) N'-[5-bromo-6-[(1S)-1-(3,5-difluorophenyl)ethoxy]-2-methylpyridin-3-yl]-N-ethyl-N-methylimidoforamide, (1.078) N'-[5-bromo-6-[(cis-4-isopropylcyclohexyl)oxy]-2-methylpyridin-3-yl]-N-ethyl-N-methylimidoforamide, (1.079) N'-[5-bromo-6-[(trans-4-isopropylcyclohexyl)oxy]-2-methylpyridin-3-yl]-N-ethyl-N-methylimidoforamide, (1.080) N'-[5-bromo-6-[1-(3,5-difluorophenyl)ethoxy]-2-methylpyridin-3-yl]-N-ethyl-N-methylimidoforamide, (1.081) ipfentrifluconazole.

2) Inhibitors of the respiratory chain at complex I or II, for example (2.001) benzovindiflupyr, (2.002) bixafen, (2.003) boscalid, (2.004) carboxin, (2.005) fluopyram, (2.006) flutolanil, (2.007) fluxapyroxad,

(2.008) furametpyr, (2.009) isofetamid, (2.010) isopyrazam (anti-epimeric enantiomer 1R,4S,9S), (2.011) isopyrazam (anti-epimeric enantiomer 1S,4R,9R), (2.012) isopyrazam (anti-epimeric racemate 1RS,4SR,9SR), (2.013) isopyrazam (mixture of syn-epimeric racemate 1RS,4SR,9RS and anti-epimeric racemate 1RS,4SR,9SR), (2.014) isopyrazam (syn-epimeric enantiomer 1R,4S,9R), (2.015) isopyrazam (syn-epimeric enantiomer 1S,4R,9S), (2.016) isopyrazam (syn-epimeric racemate 1RS,4SR,9RS), (2.017) penflufen, (2.018) penthiopyrad, (2.019) pydiflumetofen, (2.020) Pyraziflumid, (2.021) sedaxane, (2.022) 1,3-dimethyl-N-(1,1,3-trimethyl-2,3-dihydro-1H-inden-4-yl)-1H-pyrazole-4-carboxamide, (2.023) 1,3-dimethyl-N-[(3R)-1,1,3-trimethyl-2,3-dihydro-1H-inden-4-yl]-1H-pyrazole-4-carboxamide, (2.024) 1,3-dimethyl-N-[(3S)-1,1,3-trimethyl-2,3-dihydro-1H-inden-4-yl]-1H-pyrazole-4-carboxamide, (2.025) 1-methyl-3-(trifluoromethyl)-N-[2'-(trifluoromethyl)biphenyl-2-yl]-1H-pyrazole-4-carboxamide, (2.026) 2-fluoro-6-(trifluoromethyl)-N-(1,1,3-trimethyl-2,3-dihydro-1H-inden-4-yl)benzamide, (2.027) 3-(difluoromethyl)-1-methyl-N-(1,1,3-trimethyl-2,3-dihydro-1H-inden-4-yl)-1H-pyrazole-4-carboxamide, (2.028) 3-(difluoromethyl)-1-methyl-N-[(3R)-1,1,3-trimethyl-2,3-dihydro-1H-inden-4-yl]-1H-pyrazole-4-carboxamide, (2.029) 3-(difluoromethyl)-1-methyl-N-[(3S)-1,1,3-trimethyl-2,3-dihydro-1H-inden-4-yl]-1H-pyrazole-4-carboxamide, (2.030) 3-(difluoromethyl)-N-(7-fluoro-1,1,3-trimethyl-2,3-dihydro-1H-inden-4-yl)-1-methyl-1H-pyrazole-4-carboxamide, (2.031) 3-(difluoromethyl)-N-[(3R)-7-fluoro-1,1,3-trimethyl-2,3-dihydro-1H-inden-4-yl]-1-methyl-1H-pyrazole-4-carboxamide, (2.032) 3-(difluoromethyl)-N-[(3S)-7-fluoro-1,1,3-trimethyl-2,3-dihydro-1H-inden-4-yl]-1-methyl-1H-pyrazole-4-carboxamide, (2.033) 5,8-difluoro-N-[2-(2-fluoro-4-{4-(trifluoromethyl)pyridin-2-yl]oxy}phenyl)ethyl]quinazolin-4-amine, (2.034) N-(2-cyclopentyl-5-fluorobenzyl)-N-cyclopropyl-3-(difluoromethyl)-5-fluoro-1-methyl-1H-pyrazole-4-carboxamide, (2.035) N-(2-tert-butyl-5-methylbenzyl)-N-cyclopropyl-3-(difluoromethyl)-5-fluoro-1-methyl-1H-pyrazole-4-carboxamide, (2.036) N-(2-tert-butylbenzyl)-N-cyclopropyl-3-(difluoromethyl)-5-fluoro-1-methyl-1H-pyrazole-4-carboxamide, (2.037) N-(5-chloro-2-ethylbenzyl)-N-cyclopropyl-3-(difluoromethyl)-5-fluoro-1-methyl-1H-pyrazole-4-carboxamide, (2.038) N-(5-chloro-2-isopropylbenzyl)-N-cyclopropyl-3-(difluoromethyl)-5-fluoro-1-methyl-1H-pyrazole-4-carboxamide, (2.039) N-[(1R,4S)-9-(dichloromethylene)-1,2,3,4-tetrahydro-1,4-methanonaphthalen-5-yl]-3-(difluoromethyl)-1-methyl-1H-pyrazole-4-carboxamide, (2.040) N-[(1S,4R)-9-(dichloromethylene)-1,2,3,4-tetrahydro-1,4-methanonaphthalen-5-yl]-3-(difluoromethyl)-1-methyl-1H-pyrazole-4-carboxamide, (2.041) N-[1-(2,4-dichlorophenyl)-1-methoxypropan-2-yl]-3-(difluoromethyl)-1-methyl-1H-pyrazole-4-carboxamide, (2.042) N-[2-chloro-6-(trifluoromethyl)benzyl]-N-cyclopropyl-3-(difluoromethyl)-5-fluoro-1-methyl-1H-pyrazole-4-carboxamide, (2.043) N-[3-chloro-2-fluoro-6-(trifluoromethyl)benzyl]-N-cyclopropyl-3-(difluoromethyl)-5-fluoro-1-methyl-1H-pyrazole-4-carboxamide, (2.044) N-[5-chloro-2-(trifluoromethyl)benzyl]-N-cyclopropyl-3-(difluoromethyl)-5-fluoro-1-methyl-1H-pyrazole-4-carboxamide, (2.045) N-cyclopropyl-3-(difluoromethyl)-5-fluoro-1-methyl-N-[5-methyl-2-(trifluoromethyl)benzyl]-1H-pyrazole-4-carboxamide, (2.046) N-cyclopropyl-3-(difluoromethyl)-5-fluoro-N-(2-fluoro-6-isopropylbenzyl)-1-methyl-1H-pyrazole-4-carboxamide, (2.047) N-cyclopropyl-3-(difluoromethyl)-5-fluoro-N-(2-isopropyl-5-methylbenzyl)-1-methyl-1H-pyrazole-4-carboxamide,

(2.048) N-cyclopropyl-3-(difluoromethyl)-5-fluoro-N-(2-isopropylbenzyl)-1-methyl-1H-pyrazole-4-carbothioamide, (2.049) N-cyclopropyl-3-(difluoromethyl)-5-fluoro-N-(2-isopropylbenzyl)-1-methyl-1H-pyrazole-4-carboxamide, (2.050) N-cyclopropyl-3-(difluoromethyl)-5-fluoro-N-(5-fluoro-2-isopropylbenzyl)-1-methyl-1H-pyrazole-4-carboxamide, (2.051) N-cyclopropyl-3-(difluoromethyl)-N-(2-ethyl-4,5-dimethylbenzyl)-5-fluoro-1-methyl-1H-pyrazole-4-carboxamide, (2.052) N-cyclopropyl-3-(difluoromethyl)-N-(2-ethyl-5-fluorobenzyl)-5-fluoro-1-methyl-1H-pyrazole-4-carboxamide, (2.053) N-cyclopropyl-3-(difluoromethyl)-N-(2-ethyl-5-methylbenzyl)-5-fluoro-1-methyl-1H-pyrazole-4-carboxamide, (2.054) N-cyclopropyl-N-(2-cyclopropyl-5-fluorobenzyl)-3-(difluoromethyl)-5-fluoro-1-methyl-1H-pyrazole-4-carboxamide, (2.055) N-cyclopropyl-N-(2-cyclopropyl-5-methylbenzyl)-3-(difluoromethyl)-5-fluoro-1-methyl-1H-pyrazole-4-carboxamide, (2.056) N-cyclopropyl-N-(2-cyclopropylbenzyl)-3-(difluoromethyl)-5-fluoro-1-methyl-1H-pyrazole-4-carboxamide, (2.057) pyrapropoyne.

3) Inhibitors of the respiratory chain at complex III, for example (3.001) ametocradin, (3.002) amisulbrom, (3.003) azoxystrobin, (3.004) coumethoxystrobin, (3.005) coumoxystrobin, (3.006) cyazofamid, (3.007) dimoxystrobin, (3.008) enoxastrobin, (3.009) famoxadon, (3.010) fenamidon, (3.011) flufenoxystrobin, (3.012) fluoxastrobin, (3.013) kresoxim-methyl, (3.014) metominostrobin, (3.015) orysastrobin, (3.016) picoxystrobin, (3.017) pyraclostrobin, (3.018) pyrametostrobin, (3.019) pyraoxystrobin, (3.020) trifloxystrobin, (3.021) (2E)-2-{2-[[[(1E)-1-(3-[(E)-1-fluoro-2-phenylvinyl]oxy)phenyl]ethylidene]amino]oxy)methyl]phenyl}-2-(methoxyimino)-N-methylacetamide, (3.022) (2E,3Z)-5-[[1-(4-chlorophenyl)-1H-pyrazol-3-yl]oxy]-2-(methoxyimino)-N,3-dimethylpent-3-enamide, (3.023) (2R)-2-{2-[(2,5-dimethylphenoxy)methyl]phenyl}-2-methoxy-N-methylacetamide, (3.024) (2S)-2-{2-[(2,5-dimethylphenoxy)methyl]phenyl}-2-methoxy-N-methylacetamide, (3.025) (3S,6S,7R,8R)-8-benzyl-3-[[3-[(isobutyryloxy)methoxy]-4-methoxypyridin-2-yl]carbonyl]amino]-6-methyl-4,9-dioxo-1,5-dioxonan-7-yl 2-methylpropanoate, (3.026) 2-{2-[(2,5-dimethylphenoxy)methyl]phenyl}-2-methoxy-N-methylacetamide, (3.027) N-(3-ethyl-3,5,5-trimethylcyclohexyl)-3-formamido-2-hydroxybenzamide, (3.028) (2E,3Z)-5-[[1-(4-chloro-2-fluorophenyl)-1H-pyrazol-3-yl]oxy]-2-(methoxyimino)-N,3-dimethylpent-3-enamide, (3.029) methyl {5-[3-(2,4-dimethylphenyl)-1H-pyrazol-1-yl]-2-methylbenzyl} carbamate, (3.030) metyltetraprole, (3.031) florylpicoxamid.

4) Mitosis and cell division inhibitors, for example (4.001) carbendazim, (4.002) diethofencarb, (4.003) ethaboxam, (4.004) fluopicolid, (4.005) pencycuron, (4.006) thiabendazole, (4.007) thiophanate-methyl, (4.008) zoxamide, (4.009) 3-chloro-4-(2,6-difluorophenyl)-6-methyl-5-phenylpyridazine, (4.010) 3-chloro-5-(4-chlorophenyl)-4-(2,6-difluorophenyl)-6-methylpyridazine, (4.011) 3-chloro-5-(6-chloropyridin-3-yl)-6-methyl-4-(2,4,6-trifluorophenyl)pyridazine, (4.012) 4-(2-bromo-4-fluorophenyl)-N-(2,6-difluorophenyl)-1,3-dimethyl-1H-pyrazol-5-amine, (4.013) 4-(2-bromo-4-fluorophenyl)-N-(2-bromo-6-fluorophenyl)-1,3-dimethyl-1H-pyrazol-5-amine, (4.014) 4-(2-bromo-4-fluorophenyl)-N-(2-

bromophenyl)-1,3-dimethyl-1H-pyrazol-5-amine, (4.015) 4-(2-bromo-4-fluorophenyl)-N-(2-chloro-6-fluorophenyl)-1,3-dimethyl-1H-pyrazol-5-amine, (4.016) 4-(2-bromo-4-fluorophenyl)-N-(2-chlorophenyl)-1,3-dimethyl-1H-pyrazol-5-amine, (4.017) 4-(2-bromo-4-fluorophenyl)-N-(2-fluorophenyl)-1,3-dimethyl-1H-pyrazol-5-amine, (4.018) 4-(2-chloro-4-fluorophenyl)-N-(2,6-difluorophenyl)-1,3-dimethyl-1H-pyrazol-5-amine, (4.019) 4-(2-chloro-4-fluorophenyl)-N-(2-chloro-6-fluorophenyl)-1,3-dimethyl-1H-pyrazol-5-amine, (4.020) 4-(2-chloro-4-fluorophenyl)-N-(2-chlorophenyl)-1,3-dimethyl-1H-pyrazol-5-amine, (4.021) 4-(2-chloro-4-fluorophenyl)-N-(2-fluorophenyl)-1,3-dimethyl-1H-pyrazol-5-amine, (4.022) 4-(4-chlorophenyl)-5-(2,6-difluorophenyl)-3,6-dimethylpyridazine, (4.023) N-(2-bromo-6-fluorophenyl)-4-(2-chloro-4-fluorophenyl)-1,3-dimethyl-1H-pyrazol-5-amine, (4.024) N-(2-bromophenyl)-4-(2-chloro-4-fluorophenyl)-1,3-dimethyl-1H-pyrazol-5-amine, (4.025) N-(4-chloro-2,6-difluorophenyl)-4-(2-chloro-4-fluorophenyl)-1,3-dimethyl-1H-pyrazol-5-amine.

5) Compounds capable of having multisite action, for example (5.01) Bordeaux mixture, (5.02) captafol, (5.03) captan, (5.04) chlorothalonil, (5.05) copper hydroxide, (5.06) copper naphthenate, (5.07) copper oxide, (5.08) copper oxychloride, (5.09) copper(2+) sulfate, (5.10) Dithianon, (5.011) Dodine, (5.012) Folpet, (5.013) Mancozeb, (5.014) Maneb, (5.015) Metiram, (5.016) Metiram-zinc, (5.017) Oxine-copper, (5.018) Propineb, (5.019) sulfur and sulfur preparations including Calcium polysulfide, (5.020) Thiram, (5.021) Zineb, (5.022) Ziram, (5.023) 6-ethyl-5,7-dioxo-6,7-dihydro-5H-pyrrolo[3',4':5,6][1,4]dithiino[2,3-c][1,2]thiazole-3-carbonitrile.

6) Compounds capable of inducing host defence, for example (6.001) acibenzolar-S-methyl, (6.002) isotianil, (6.003) probenazole, (6.004) tiadinil.

7) Amino acid and/or protein biosynthesis inhibitors, for example (7.001) cyprodinil, (7.002) kasugamycin, (7.003) kasugamycin hydrochloride hydrate, (7.004) oxytetracycline, (7.005) pyrimethanil, (7.006) 3-(5-fluoro-3,3,4,4-tetramethyl-3,4-dihydroisoquinolin-1-yl)quinoline.

8) ATP production inhibitors, for example (8.001) silthiofam.

9) Cell wall synthesis inhibitors, for example (9.001) bentiavalicarb, (9.002) Bentiavalicarb-isopropyl, (9.003) dimethomorph, (9.004) flumorph, (9.005) iprovalicarb, (9.006) mandipropamid, (9.007) pyrimorph, (9.008) valifenalate, (9.009) (2E)-3-(4-tert-butylphenyl)-3-(2-chloropyridin-4-yl)-1-(morpholin-4-yl)prop-2-en-1-one, (9.010) (2Z)-3-(4-tert-butylphenyl)-3-(2-chloropyridin-4-yl)-1-(morpholin-4-yl)prop-2-en-1-one.

10) Lipid and membrane synthesis inhibitors, for example (10.001) propamocarb, (10.002) propamocarb-hydrochloride, (10.003) tolclofos-methyl.

- 11) Melanin biosynthesis inhibitors, for example (11.001) tricyclazole, (11.002) 2,2,2-trifluoroethyl {3-methyl-1-[(4-methylbenzoyl)amino]butan-2-yl} carbamate.
- 12) Nucleic acid synthesis inhibitors, for example (12.001) benalaxyl, (12.002) benalaxyl-M (kiralaxyl), (12.003) metalaxyl, (12.004) metalaxyl-M (mefenoxam).
- 5 13) Signal transduction inhibitors, for example (13.001) fludioxonil, (13.002) iprodione, (13.003) procymidone, (13.004) proquinazid, (13.005) quinoxifen, (13.006) vinclozolin.
- 14) Compounds that can act as uncouplers, for example (14.001) fluazinam, (14.002) meptyldinocap.
- 15) Further compounds, for example (15.001) abscisic acid, (15.002) benthiazole, (15.003) bethoxazine, (15.004) capsimycin, (15.005) carvone, (15.006) chinomethionat, (15.007) cufraneb, (15.008) cyflufenamid, (15.009) cymoxanil, (15.010) cyprosulfamide, (15.011) flutianil, (15.012) fosetyl-aluminium, (15.013) fosetyl-calcium, (15.014) fosetyl-sodium, (15.015) methyl isothiocyanate, (15.016) metrafenone, (15.017) mildiomyacin, (15.018) natamycin, (15.019) nickel dimethyldithiocarbamate, (15.020) nitrothal-isopropyl, (15.021) oxamocarb, (15.022) oxathiapiproline, (15.023) oxyfenthione, (15.024) pentachlorophenol and salts, (15.025) phosphonic acid and its salts, (15.026) propamocarb-
15 fosetylate, (15.027) pyriofenone (chlazafenone), (15.028) tebufloquin, (15.029) tecloftalam, (15.030) tolnifanide, (15.031) 1-(4-{4-[(5R)-5-(2,6-difluorophenyl)-4,5-dihydro-1,2-oxazol-3-yl]-1,3-thiazol-2-yl}piperidin-1-yl)-2-[5-methyl-3-(trifluoromethyl)-1H-pyrazol-1-yl]ethanone, (15.032) 1-(4-{4-[(5S)-5-(2,6-difluorophenyl)-4,5-dihydro-1,2-oxazol-3-yl]-1,3-thiazol-2-yl}piperidin-1-yl)-2-[5-methyl-3-(trifluoromethyl)-1H-pyrazol-1-yl]ethanone, (15.033) 2-(6-benzylpyridin-2-yl)quinazoline, (15.034) 2,6-
20 dimethyl-1H,5H-[1,4]dithiino[2,3-c:5,6-c']dipyrrole-1,3,5,7(2H,6H)-tetrone, (15.035) 2-[3,5-bis(difluoromethyl)-1H-pyrazol-1-yl]-1-[4-(4-{5-[2-(prop-2-yn-1-yloxy)phenyl]-4,5-dihydro-1,2-oxazol-3-yl]-1,3-thiazol-2-yl}piperidin-1-yl)ethanone, (15.036) 2-[3,5-bis(difluoromethyl)-1H-pyrazol-1-yl]-1-[4-(4-{5-[2-chloro-6-(prop-2-yn-1-yloxy)phenyl]-4,5-dihydro-1,2-oxazol-3-yl]-1,3-thiazol-2-yl}piperidin-1-yl)ethanone, (15.037) 2-[3,5-bis(difluoromethyl)-1H-pyrazol-1-yl]-1-[4-(4-{5-[2-fluoro-6-(prop-2-yn-1-yloxy)phenyl]-4,5-dihydro-1,2-oxazol-3-yl]-1,3-thiazol-2-yl}piperidin-1-yl)ethanone, (15.038) 2-[6-(3-fluoro-4-methoxyphenyl)-5-methylpyridin-2-yl]quinazoline, (15.039) 2-[(5R)-3-[2-(1-{[3,5-bis(difluoromethyl)-1H-pyrazol-1-yl]acetyl}piperidin-4-yl)-1,3-thiazol-4-yl]-4,5-dihydro-1,2-oxazol-5-yl]-3-chlorophenyl methanesulfonate, (15.040) 2-[(5S)-3-[2-(1-{[3,5-bis(difluoromethyl)-1H-pyrazol-1-yl]acetyl}piperidin-4-yl)-1,3-thiazol-4-yl]-4,5-dihydro-1,2-oxazol-5-yl]-3-chlorophenyl methanesulfonate, (15.041) 2-{2-[(7,8-difluoro-2-methylquinolin-3-yl)oxy]-6-fluorophenyl}propan-2-ol, (15.042) 2-{2-fluoro-6-[(8-fluoro-2-methylquinolin-3-yl)oxy]phenyl}propan-2-ol, (15.043) 2-{3-[2-(1-{[3,5-bis(difluoromethyl)-1H-pyrazol-1-yl]acetyl}piperidin-4-yl)-1,3-thiazol-4-yl]-4,5-dihydro-1,2-oxazol-5-yl]-3-chlorophenyl methanesulfonate, (15.044) 2-{3-[2-(1-{[3,5-bis(difluoromethyl)-1H-pyrazol-1-yl]acetyl}piperidin-4-yl)-1,3-thiazol-4-yl]-4,5-dihydro-1,2-oxazol-5-yl}phenyl
35 methanesulfonate, (15.045) 2-phenylphenol and its salts, (15.046) 3-(4,4,5-trifluoro-3,3-dimethyl-3,4-

dihydroisoquinolin-1-yl)quinoline, (15.047) 3-(4,4-difluoro-3,3-dimethyl-3,4-dihydroisoquinolin-1-yl)quinoline, (15.048) 4-amino-5-fluoropyrimidin-2-ol (tautomeric form: 4-amino-5-fluoropyrimidin-2(1H)-one), (15.049) 4-oxo-4-[(2-phenylethyl)amino]butanoic acid, (15.050) 5-amino-1,3,4-thiadiazole-2-thiol, (15.051) 5-chloro-N'-phenyl-N'-(prop-2-yn-1-yl)thiophene 2-sulfonohydrazide, (15.052) 5-fluoro-2-[(4-fluorobenzyl)oxy]pyrimidin-4-amine, (15.053) 5-fluoro-2-[(4-methylbenzyl)oxy]pyrimidin-4-amine, (15.054) 9-fluoro-2,2-dimethyl-5-(quinolin-3-yl)-2,3-dihydro-1,4-benzoxazepine, (15.055) but-3-yn-1-yl {6-[[{(Z)-(1-methyl-1H-tetrazol-5-yl)(phenyl)methylene]amino}oxy)methyl]pyridin-2-yl} carbamate, (15.056) ethyl (2Z)-3-amino-2-cyano-3-phenylacrylate, (15.057) phenazine-1-carboxylic acid, (15.058) propyl 3,4,5-trihydroxybenzoate, (15.059) quinolin-8-ol, (15.060) quinolin-8-ol sulfate (2:1), (15.061) tert-butyl {6-[[{(1-methyl-1H-tetrazol-5-yl)(phenyl)methylene]amino}oxy)methyl]pyridin-2-yl} carbamate, (15.062) 5-fluoro-4-imino-3-methyl-1-[(4-methylphenyl)sulfonyl]-3,4-dihydropyrimidin-2(1H)-one, (15.063) aminopyrifen.

Biological pesticides as mixing components

The compounds of the formula (I) can be combined with biological pesticides.

15 Biological pesticides especially include bacteria, fungi, yeasts, plant extracts and products formed by microorganisms, including proteins and secondary metabolites.

Biological pesticides include bacteria such as spore-forming bacteria, root-colonizing bacteria and bacteria which act as biological insecticides, fungicides or nematicides.

Examples of such bacteria which are used or can be used as biological pesticides are:

20 *Bacillus amyloliquefaciens*, strain FZB42 (DSM 231179), or *Bacillus cereus*, especially *B. cereus* strain CNCM I-1562 or *Bacillus firmus*, strain I-1582 (Accession number CNCM I-1582) or *Bacillus pumilus*, especially strain GB34 (Accession No. ATCC 700814) and strain QST2808 (Accession No. NRRL B-30087), or *Bacillus subtilis*, especially strain GB03 (Accession No. ATCC SD-1397), or *Bacillus subtilis* strain QST713 (Accession No. NRRL B-21661) or *Bacillus subtilis* strain OST 30002 (Accession No. NRRL B-50421) *Bacillus thuringiensis*, especially *B. thuringiensis* subspecies *israelensis* (serotype H-14), strain AM65-52 (Accession No. ATCC 1276), or *B. thuringiensis subsp. aizawai*, especially strain ABTS-1857 (SD-1372), or *B. thuringiensis subsp. kurstaki* strain HD-1, or *B. thuringiensis subsp. tenebrionis* strain NB 176 (SD-5428), *Pasteuria penetrans*, *Pasteuria spp.* (Rotylenchulus reniformis nematode)-PR3 (Accession Number ATCC SD-5834), *Streptomyces microflavus* strain AQ6121 (= QRD 30 31.013, NRRL B-50550), *Streptomyces galbus* strain AQ 6047 (Accession Number NRRL 30232).

Examples of fungi and yeasts which are used or can be used as biological pesticides are:

Beauveria bassiana, in particular strain ATCC 74040, *Coniothyrium minitans*, in particular strain CON/M/91-8 (Accession No. DSM-9660), *Lecanicillium spp.*, in particular strain HRO LEC 12,

Lecanicillium lecanii (formerly known as *Verticillium lecanii*), in particular strain KV01, *Metarhizium anisopliae*, in particular strain F52 (DSM3884/ ATCC 90448), *Metschnikowia fructicola*, in particular strain NRRL Y-30752, *Paecilomyces fumosoroseus* (new: *Isaria fumosorosea*), in particular strain IFPC 200613, or strain Apopka 97 (Accession No. ATCC 20874), *Paecilomyces lilacinus*, in particular *P. lilacinus* strain 251 (AGAL 89/030550), *Talaromyces flavus*, in particular strain V117b, *Trichoderma atroviride*, in particular strain SC1 (Accession Number CBS 122089), *Trichoderma harzianum*, in particular *T. harzianum rifai* T39 (Accession Number CNCM I-952).

Examples of viruses which are used or can be used as biological pesticides are:

Adoxophyes orana (summer fruit tortrix) granulosis virus (GV), *Cydia pomonella* (codling moth) granulosis virus (GV), *Helicoverpa armigera* (cotton bollworm) nuclear polyhedrosis virus (NPV), *Spodoptera exigua* (beet armyworm) mNPV, *Spodoptera frugiperda* (fall armyworm) mNPV, *Spodoptera littoralis* (African cotton leafworm) NPV.

Also included are bacteria and fungi which are added as 'inoculant' to plants or plant parts or plant organs and which, by virtue of their particular properties, promote plant growth and plant health. Examples include:

Agrobacterium spp., *Azorhizobium caulinodans*, *Azospirillum spp.*, *Azotobacter spp.*, *Bradyrhizobium spp.*, *Burkholderia spp.*, in particular *Burkholderia cepacia* (formerly known as *Pseudomonas cepacia*), *Gigaspora spp.*, or *Gigaspora monosporum*, *Glomus spp.*, *Laccaria spp.*, *Lactobacillus buchneri*, *Paraglomus spp.*, *Pisolithus tinctorius*, *Pseudomonas spp.*, *Rhizobium spp.*, in particular *Rhizobium trifolii*, *Rhizopogon spp.*, *Scleroderma spp.*, *Suillus spp.*, *Streptomyces spp.*.

Examples of plant extracts and products formed by microorganisms, including proteins and secondary metabolites, which are used or can be used as biological pesticides are:

Allium sativum, *Artemisia absinthium*, azadirachtin, Biokeeper WP, *Cassia nigricans*, *Celastrus angulatus*, *Chenopodium anthelminticum*, chitin, Armour-Zen, *Dryopteris filix-mas*, *Equisetum arvense*, Fortune Aza, Fungastop, Heads Up (*Chenopodium quinoa* saponin extract), pyrethrum/pyrethrins, Quassia amara, *Quercus*, Quillaja, Regalia, "Requiem™ Insecticide", rotenone, ryania/ryanodine, *Symphytum officinale*, *Tanacetum vulgare*, thymol, Triact 70, TriCon, *Tropaeolum majus*, *Urtica dioica*, Veratrin, *Viscum album*, Brassicaceae extract, especially oilseed rape powder or mustard powder.

Safeners as mixing components

The compounds of the formula (I) can be combined with safeners, for example benoxacor, cloquintocet (-mexyl), cyometrinil, cyprosulfamide, dichlormid, fenchlorazole (-ethyl), fencloirim, flurazole, fluxofenim, furilazole, isoxadifen (-ethyl), mefenpyr (-diethyl), naphthalic anhydride, oxabetrinil, 2-methoxy-N-({4-[(methylcarbamoyl)amino]phenyl}sulfonyl)benzamide (CAS 129531-12-0), 4-(dichloroacetyl)-1-oxa-4-

azaspiro[4.5]decane (CAS 71526-07-3), 2,2,5-trimethyl-3-(dichloroacetyl)-1,3-oxazolidine (CAS 52836-31-4).

Plants and plant parts

All plants and plant parts can be treated in accordance with the invention. Plants are understood here to mean all plants and populations of plants, such as desirable and undesirable wild plants or crop plants (including naturally occurring crop plants), for example cereals (wheat, rice, triticale, barley, rye, oats), maize, soya beans, potatoes, sugar beet, sugar cane, tomatoes, bell peppers, cucumbers, melons, carrots, water melons, onions, lettuce, spinach, leeks, beans, *Brassica oleracea* (e.g. cabbage) and other vegetable species, cotton, tobacco, oilseed rape, and also fruit plants (the fruits being apples, pears, citrus fruits and grapes). Crop plants may be plants which can be obtained by conventional breeding and optimization methods or by biotechnological and genetic engineering methods or combinations of these methods, including the transgenic plants and including the plant cultivars which are protectable or non-protectable by plant breeders' rights. Plants shall be understood to mean all development stages such as seed, seedlings, young (immature) plants, up to and including mature plants. Plant parts shall be understood to mean all parts and organs of the plants above and below ground, such as shoot, leaf, flower and root, examples given being leaves, needles, stalks, stems, flowers, fruit bodies, fruits and seeds, and also roots, tubers and rhizomes. Plant parts also include harvested plants or harvested plant parts and vegetative and generative propagation material, for example cuttings, tubers, rhizomes, slips and seeds.

The treatment according to the invention of the plants and parts of plants with the compounds of the formula (I) is effected directly or by allowing the compounds to act on the surroundings, the habitat or the storage space thereof by the customary treatment methods, for example by dipping, spraying, evaporating, fogging, scattering, painting on, injecting, and, in the case of propagation material, especially in the case of seeds, also by applying one or more coats.

As already mentioned above, it is possible to treat all plants and their parts in accordance with the invention. In a preferred embodiment, wild plant species and plant cultivars, or those obtained by conventional biological breeding methods, such as crossing or protoplast fusion, and parts thereof, are treated. In a further preferred embodiment, transgenic plants and plant cultivars obtained by genetic engineering methods, if appropriate in combination with conventional methods (genetically modified organisms), and parts thereof are treated. The term "parts" or "parts of plants" or "plant parts" has been explained above. Particular preference is given in accordance with the invention to treating plants of the respective commercially customary plant cultivars or those that are in use. Plant cultivars are understood to mean plants having new properties ("traits") and which have been obtained by conventional breeding, by mutagenesis or by recombinant DNA techniques. They may be cultivars, varieties, biotypes or genotypes.

Transgenic plants, seed treatment and integration events

The preferred transgenic plants or plant cultivars (those obtained by genetic engineering) which are to be treated in accordance with the invention include all plants which, through the genetic modification, received genetic material which imparts particular advantageous useful properties ("traits") to these plants.

- 5 Examples of such properties are better plant growth, increased tolerance to high or low temperatures, increased tolerance to drought or to levels of water or soil salinity, enhanced flowering performance, easier harvesting, accelerated ripening, higher harvest yields, higher quality and/or higher nutritional value of the harvested products, better capability for storage and/or processability of the harvested products. Further and particularly emphasized examples of such properties are increased resistance of the plants to
- 10 animal and microbial pests, such as insects, arachnids, nematodes, mites, slugs and snails, owing, for example, to toxins formed in the plants, in particular those formed in the plants by the genetic material from *Bacillus thuringiensis* (for example by the genes CryIA(a), CryIA(b), CryIA(c), CryIIA, CryIIIA, CryIIIB2, Cry9c, Cry2Ab, Cry3Bb and CryIF and also combinations thereof), and also increased resistance of the plants to phytopathogenic fungi, bacteria and/or viruses caused, for example, by systemic
- 15 acquired resistance (SAR), systemin, phytoalexins, elicitors and resistance genes and correspondingly expressed proteins and toxins, and also increased tolerance of the plants to certain active herbicidal compounds, for example imidazolinones, sulfonylureas, glyphosate or phosphinothricin (for example the "PAT" gene). The genes which impart the desired properties ("traits") in question may also be present in combinations with one another in the transgenic plants. Examples of transgenic plants mentioned include
- 20 the important crop plants, such as cereals (wheat, rice, triticale, barley, rye, oats), maize, soya beans, potatoes, sugar beet, sugar cane, tomatoes, peas and other vegetable species, cotton, tobacco, oilseed rape, and also fruit plants (the fruits being apples, pears, citrus fruits and grapes), particular emphasis being given to maize, soya beans, wheat, rice, potatoes, cotton, sugar cane, tobacco and oilseed rape. Properties ("traits") which are particularly emphasized are the increased resistance of the plants to insects, arachnids,
- 25 nematodes and slugs and snails.

Crop protection – types of treatment

- The plants and plant parts are treated with the compounds of the formula (I) directly or by action on their surroundings, habitat or storage space using customary treatment methods, for example by dipping, spraying, atomizing, irrigating, evaporating, dusting, fogging, broadcasting, foaming, painting, spreading-
- 30 on, injecting, watering (drenching), drip irrigating and, in the case of propagation material, in particular in the case of seed, additionally by dry seed treatment, liquid seed treatment, slurry treatment, by incrusting, by coating with one or more coats, etc. It is furthermore possible to apply the compounds of the formula (I) by the ultra-low volume method or to inject the application form or the compound of the formula (I) itself into the soil.

A preferred direct treatment of the plants is foliar application, meaning that the compounds of the formula (I) are applied to the foliage, in which case the treatment frequency and the application rate should be adjusted according to the level of infestation with the pest in question.

5 In the case of systemically active compounds, the compounds of the formula (I) also access the plants via the root system. The plants are then treated by the action of the compounds of the formula (I) on the habitat of the plant. This can be accomplished, for example, by drenching, or by mixing into the soil or the nutrient solution, meaning that the locus of the plant (e.g. soil or hydroponic systems) is impregnated with a liquid form of the compounds of the formula (I), or by soil application, meaning that the compounds of the formula (I) according to the invention are introduced in solid form (e.g. in the form of granules) into the
10 locus of the plants, or by drip application (frequently also referred to as "chemigation"), meaning that the compounds of the formula (I) are introduced via surface or underground drip lines over certain periods of time together with varying amounts of water at defined locations in the vicinity of the plants. In the case of paddy rice crops, this can also be accomplished by metering the compound of the formula (I) in a solid application form (for example as granules) into a flooded paddy field.

15 **Seed treatment**

The control of animal pests by the treatment of the seed of plants has long been known and is the subject of constant improvements. Nevertheless, the treatment of seed entails a series of problems which cannot always be solved in a satisfactory manner. Thus, it is desirable to develop methods for protecting the seed and the germinating plant which dispense with, or at least reduce considerably, the additional application
20 of pesticides during storage, after sowing or after emergence of the plants. It is additionally desirable to optimize the amount of active compound used so as to provide optimum protection for the seed and the germinating plant from attack by animal pests, but without damage to the plant itself by the active compound used. In particular, methods for the treatment of seed should also take account of the intrinsic insecticidal or nematocidal properties of pest-resistant or -tolerant transgenic plants in order to achieve
25 optimal protection of the seed and also the germinating plant with a minimum expenditure on pesticides.

The present invention therefore in particular also relates to a method for the protection of seed and germinating plants from attack by pests, by treating the seed with one of the compounds of the formula (I). The method according to the invention for protecting seed and germinating plants against attack by pests further comprises a method in which the seed is treated simultaneously in one operation or
30 sequentially with a compound of the formula (I) and a mixing component. It further also comprises a method where the seed is treated at different times with a compound of the formula (I) and a mixing component.

The invention likewise relates to the use of the compounds of the formula (I) for the treatment of seed for protecting the seed and the resulting plant from animal pests.

The invention further relates to seed which has been treated with a compound of the formula (I) according to the invention for protection from animal pests. The invention also relates to seed which has been treated simultaneously with a compound of the formula (I) and a mixing component. The invention further relates to seed which has been treated at different times with a compound of the formula (I) and a mixing component. In the case of seed which has been treated at different times with a compound of the formula (I) and a mixing component, the individual substances may be present on the seed in different layers. In this case, the layers comprising a compound of the formula (I) and mixing components may optionally be separated by an intermediate layer. The invention also relates to seed in which a compound of the formula (I) and a mixing component have been applied as part of a coating or as a further layer or further layers in addition to a coating.

The invention further relates to seed which, after the treatment with a compound of the formula (I), is subjected to a film-coating process to prevent dust abrasion on the seed.

One of the advantages that occur when a compound of the formula (I) acts systemically is that the treatment of the seed protects not only the seed itself but also the plants resulting therefrom, after emergence, from animal pests. In this way, the immediate treatment of the crop at the time of sowing or shortly thereafter can be dispensed with.

A further advantage is that the treatment of the seed with a compound of the formula (I) can enhance germination and emergence of the treated seed.

It is likewise considered to be advantageous that compounds of the formula (I) can especially also be used for transgenic seed.

Furthermore, compounds of the formula (I) can be employed in combination with compositions of signalling technology, leading to better colonization by symbionts such as, for example, rhizobia, mycorrhizae and/or endophytic bacteria or fungi, and/or to optimized nitrogen fixation.

The compounds of the formula (I) are suitable for the protection of seed of any plant variety which is used in agriculture, in greenhouses, in forests or in horticulture. More particularly, this is the seed of cereals (for example wheat, barley, rye, millet and oats), maize, cotton, soya beans, rice, potatoes, sunflowers, coffee, tobacco, canola, oilseed rape, beets (for example sugar beets and fodder beets), peanuts, vegetables (for example tomatoes, cucumbers, beans, cruciferous vegetables, onions and lettuce), fruit plants, lawns and ornamental plants. Of particular significance is the treatment of the seed of cereals (such as wheat, barley, rye and oats), maize, soya beans, cotton, canola, oilseed rape, vegetables and rice.

As already mentioned above, the treatment of transgenic seed with a compound of the formula (I) is also of particular importance. This involves the seed of plants which generally contain at least one heterologous gene which controls the expression of a polypeptide having insecticidal and/or nematicidal properties in

particular. The heterologous genes in transgenic seed may originate from microorganisms such as Bacillus, Rhizobium, Pseudomonas, Serratia, Trichoderma, Clavibacter, Glomus or Gliocladium. The present invention is particularly suitable for treatment of transgenic seed which comprises at least one heterologous gene originating from Bacillus sp. The heterologous gene is more preferably derived from
5 Bacillus thuringiensis.

In the context of the present invention, the compound of the formula (I) is applied to the seed. The seed is preferably treated in a state in which it is sufficiently stable for no damage to occur in the course of treatment. In general, the seed can be treated at any time between harvest and sowing. It is customary to use seed which has been separated from the plant and freed from cobs, shells, stalks, coats, hairs or the
10 flesh of the fruits. For example, it is possible to use seed which has been harvested, cleaned and dried down to a moisture content which allows storage. Alternatively, it is also possible to use seed which, after drying, has been treated with, for example, water and then dried again, for example priming. In the case of rice seed, it is also possible to use seed which has been soaked, for example in water, until it reaches a certain stage of the rice embryo ("pigeon breast stage") which results in stimulation of germination and
15 more uniform emergence.

When treating the seed, care must generally be taken that the amount of the compound of the formula (I) applied to the seed and/or the amount of further additives is chosen in such a way that the germination of the seed is not adversely affected, or that the resulting plant is not damaged. This has to be ensured particularly in the case of active compounds which can exhibit phytotoxic effects at certain application
20 rates.

In general, the compounds of the formula (I) are applied to the seed in the form of a suitable formulation. Suitable formulations and processes for seed treatment are known to the person skilled in the art.

The compounds of the formula (I) can be converted to the customary seed-dressing formulations, such as solutions, emulsions, suspensions, powders, foams, slurries or other coating compositions for seed, and
25 also ULV formulations.

These formulations are prepared in a known manner, by mixing the compounds of the formula (I) with customary additives, for example customary extenders and solvents or diluents, dyes, wetting agents, dispersants, emulsifiers, antifoams, preservatives, secondary thickeners, adhesives, gibberellins, and also water.

30 Dyes which may be present in the seed-dressing formulations usable in accordance with the invention are all dyes which are customary for such purposes. It is possible to use either pigments, which are sparingly soluble in water, or dyes, which are soluble in water. Examples include the dyes known by the names Rhodamine B, C.I. Pigment Red 112 and C.I. Solvent Red 1.

Useful wetting agents which may be present in the seed-dressing formulations usable in accordance with the invention are all substances which promote wetting and which are customary for the formulation of active agrochemical ingredients. Usable with preference are alkyl naphthalenesulfonates, such as diisopropyl or diisobutyl naphthalenesulfonates.

- 5 Suitable dispersants and/or emulsifiers which may be present in the seed-dressing formulations usable in accordance with the invention are all nonionic, anionic and cationic dispersants customary for the formulation of active agrochemical ingredients. Nonionic or anionic dispersants or mixtures of nonionic or anionic dispersants can be used with preference. Suitable nonionic dispersants especially include ethylene oxide/propylene oxide block polymers, alkylphenol polyglycol ethers and tristyrylphenol polyglycol ethers, and the phosphated or sulfated derivatives thereof. Suitable anionic dispersants are especially lignosulfonates, polyacrylic acid salts and arylsulfonate-formaldehyde condensates.
- 10

Antifoams which may be present in the seed-dressing formulations usable in accordance with the invention are all foam-inhibiting substances customary for the formulation of active agrochemical ingredients. Silicone antifoams and magnesium stearate can be used with preference.

- 15 Preservatives which may be present in the seed-dressing formulations usable in accordance with the invention are all substances usable for such purposes in agrochemical compositions. Examples include dichlorophene and benzyl alcohol hemiformal.

Secondary thickeners which may be present in the seed-dressing formulations usable in accordance with the invention are all substances which can be used for such purposes in agrochemical compositions.

- 20 Preferred examples include cellulose derivatives, acrylic acid derivatives, xanthan, modified clays and finely divided silica.

Useful stickers which may be present in the seed-dressing formulations usable in accordance with the invention are all customary binders usable in seed-dressing products. Preferred examples include polyvinylpyrrolidone, polyvinyl acetate, polyvinyl alcohol and tylose.

- 25 Gibberellins which may be present in the seed-dressing formulations usable in accordance with the invention are preferably the gibberellins A1, A3 (= gibberellic acid), A4 and A7; particular preference is given to using gibberellic acid. The gibberellins are known (cf. R. Wegler "Chemie der Pflanzenschutz- und Schädlingsbekämpfungsmittel", vol. 2, Springer Verlag, 1970, pp. 401-412).

- 30 The seed-dressing formulations usable in accordance with the invention can be used to treat a wide variety of different kinds of seed, either directly or after prior dilution with water. For instance, the concentrates or the preparations obtainable therefrom by dilution with water can be used to dress the seed of cereals, such as wheat, barley, rye, oats and triticale, and also the seed of maize, rice, oilseed rape, peas, beans, cotton, sunflowers, soya beans and beets, or else a wide variety of different vegetable seed. The seed-

dressing formulations usable in accordance with the invention, or the dilute use forms thereof, can also be used to dress seed of transgenic plants.

For the treatment of seed with the seed-dressing formulations usable in accordance with the invention, or the use forms prepared therefrom through the addition of water, all mixing units usable customarily for the seed dressing are useful. Specifically, the procedure in seed dressing is to place the seed into a mixer in batchwise or continuous operation, to add the particular desired amount of seed-dressing formulations, either as such or after prior dilution with water, and to mix until the formulation is distributed homogeneously on the seed. If appropriate, this is followed by a drying operation.

The application rate of the seed-dressing formulations usable in accordance with the invention can be varied within a relatively wide range. It is guided by the particular content of the compounds of the formula (I) in the formulations and by the seed. The application rates of the compound of the formula (I) are generally between 0.001 and 50 g per kilogram of seed, preferably between 0.01 and 15 g per kilogram of seed.

Animal health

In the animal health field, i.e. the field of veterinary medicine, the compounds of the formula (I) are active against animal parasites, in particular ectoparasites or endoparasites. The term "endoparasite" includes especially helminths and protozoa, such as coccidia. Ectoparasites are typically and preferably arthropods, especially insects or acarids.

In the field of veterinary medicine, the compounds of the formula (I) having favourable endotherm toxicity are suitable for controlling parasites which occur in animal breeding and animal husbandry in livestock, breeding animals, zoo animals, laboratory animals, experimental animals and domestic animals. They are active against all or specific stages of development of the parasites.

Agricultural livestock include, for example, mammals, such as sheep, goats, horses, donkeys, camels, buffalo, rabbits, reindeer, fallow deer and especially cattle and pigs; or poultry such as turkeys, ducks, geese and especially chickens; or fish or crustaceans, for example in aquaculture; or, as the case may be, insects such as bees.

Domestic animals include, for example, mammals, such as hamsters, guinea pigs, rats, mice, chinchillas, ferrets, and particularly dogs, cats, caged birds; reptiles, amphibians or aquarium fish.

In a specific embodiment, the compounds of the formula (I) are administered to mammals.

In another specific embodiment, the compounds of the formula (I) are administered to birds, namely caged birds or particularly poultry.

Use of the compounds of the formula (I) for the control of animal parasites is intended to reduce or prevent illness, cases of death and reductions in performance (in the case of meat, milk, wool, hides, eggs, honey and the like), such that more economical and simpler animal husbandry is enabled and better animal well-being is achievable.

- 5 In relation to the field of animal health, the term "control" or "controlling" in the present context means that the compounds of the formula (I) are effective in reducing the incidence of the particular parasite in an animal infected with such parasites to an innocuous degree. More specifically, "controlling" in the present context means that the compounds of the formula (I) kill the respective parasite, inhibit its growth, or inhibit its proliferation.
- 10 The arthropods include, for example, but are not limited to,
- from the order of Anoplurida, for example *Haematopinus* spp., *Linognathus* spp., *Pediculus* spp., *Phthirus* spp., *Solenopotes* spp.;
- from the order of Mallophagida and the suborders Amblycerina and Ischnocerina, for example *Bovicola* spp., *Damalina* spp., *Felicola* spp.; *Lepikentron* spp., *Menopon* spp., *Trichodectes* spp., *Trimenopon* spp.,
- 15 *Trinoton* spp., *Werneckiella* spp.;
- from the order of Diptera and the suborders Nematocerina and Brachycerina, for example *Aedes* spp., *Anopheles* spp., *Atylotus* spp., *Braula* spp., *Calliphora* spp., *Chrysomyia* spp., *Chrysops* spp., *Culex* spp., *Culicoides* spp., *Eusimulium* spp., *Fannia* spp., *Gasterophilus* spp., *Glossina* spp., *Haematobia* spp., *Haematopota* spp., *Hippobosca* spp., *Hybomitra* spp., *Hydrotaea* spp., *Hypoderma* spp., *Lipoptena* spp.,
- 20 *Lucilia* spp., *Lutzomyia* spp., *Melophagus* spp., *Morellia* spp., *Musca* spp., *Odagmia* spp., *Oestrus* spp., *Philipomyia* spp., *Phlebotomus* spp., *Rhinoestrus* spp., *Sarcophaga* spp., *Simulium* spp., *Stomoxys* spp., *Tabanus* spp., *Tipula* spp., *Wilhelmia* spp., *Wohlfahrtia* spp.;
- from the order of Siphonaptera, for example *Ceratophyllus* spp., *Ctenocephalides* spp., *Pulex* spp., *Tunga* spp., *Xenopsylla* spp.;
- 25 from the order of Heteroptera, for example *Cimex* spp., *Panstrongylus* spp., *Rhodnius* spp., *Triatoma* spp.; and also pests and hygiene pests from the order of Blattellidae.

In addition, in the case of the arthropods, mention should be made by way of example, without limitation, of the following Acari:

- 30 From the subclass of Acari (Acarina) and the order of Metastigmata, for example from the family of Argasidae, such as *Argas* spp., *Ornithodoros* spp., *Otobius* spp., from the family of Ixodidae, such as *Amblyomma* spp., *Dermacentor* spp., *Haemaphysalis* spp., *Hyalomma* spp., *Ixodes* spp., *Rhipicephalus*

(*Boophilus*) spp., *Rhipicephalus* spp. (the original genus of multi-host ticks); from the order of Mesostigmata, such as *Dermanyssus* spp., *Ornithonyssus* spp., *Pneumonyssus* spp., *Raillietia* spp., *Sternostoma* spp., *Tropilaelaps* spp., *Varroa* spp.; from the order of Actinedida (Prostigmata), for example *Acarapis* spp., *Cheyletiella* spp., *Demodex* spp., *Listrophorus* spp., *Myobia* spp., *Neotrombicula* spp.,
 5 *Ornithocheyletia* spp., *Psorergates* spp., *Trombicula* spp.; and from the order of Acaridida (Astigmata), for example *Acarus* spp., *Caloglyphus* spp., *Chorioptes* spp., *Cytodites* spp., *Hypodectes* spp., *Knemidocoptes* spp., *Laminosioptes* spp., *Notoedres* spp., *Otodectes* spp., *Psoroptes* spp., *Pterolichus* spp., *Sarcoptes* spp., *Trixacarus* spp., *Tyrophagus* spp.

Examples of parasitic protozoa include, but are not limited to:

10 *Mastigophora* (Flagellata), such as:

Metamonada: from the order of Diplomonadida, for example, *Giardia* spp., *Spironucleus* spp.

Parabasala: from the order of Trichomonadida, for example, *Histomonas* spp., *Pentatrichomonas* spp., *Tetratrichomonas* spp., *Trichomonas* spp., *Tritrichomonas* spp.

Euglenozoa: from the order of Trypanosomatida, for example, *Leishmania* spp., *Trypanosoma* spp.

15 *Sarcomastigophora* (Rhizopoda) such as Entamoebidae, for example *Entamoeba* spp., Centramoebidae, for example *Acanthamoeba* sp., Euamoebidae, e.g. *Hartmanella* sp.

Alveolata such as Apicomplexa (Sporozoa): e.g. *Cryptosporidium* spp.; from the order of Eimeriida, for example, *Besnoitia* spp., *Cystoisospora* spp., *Eimeria* spp., *Hammondia* spp., *Isospora* spp., *Neospora* spp., *Sarcocystis* spp., *Toxoplasma* spp.; from the order of Adeleida, for example, *Hepatozoon* spp., *Klossiella* spp.;
 20 from the order of Haemosporida, for example, *Leucocytozoon* spp., *Plasmodium* spp.; from the order of Piroplasmida, for example, *Babesia* spp., *Ciliophora* spp., *Echinozoon* spp., *Theileria* spp.; from the order of Vesibuliferida, for example, *Balantidium* spp., *Buxtonella* spp.

Microspora such as *Encephalitozoon* spp., *Enterocytozoon* spp., *Globidium* spp., *Nosema* spp., and also, for example, *Myxozoa* spp.

25 The helminths that are pathogenic to humans or animals include, for example, *Acanthocephala*, nematodes, *Pentastoma* and *Platyhelminthes* (e.g. *Monogenea*, cestodes and trematodes).

Exemplary helminths include, but are not limited to:

Monogenea: e.g. *Dactylogyrus* spp., *Gyrodactylus* spp., *Microbothrium* spp., *Polystoma* spp., *Troglocephalus* spp.;

Cestodes: from the order of Pseudophyllidea, for example: *Bothridium* spp., *Diphyllobothrium* spp., *Diplogonoporus* spp., *Ichthyobothrium* spp., *Ligula* spp., *Schistocephalus* spp., *Spirometra* spp.

From the order of Cyclophyllida, for example: *Andrya* spp., *Anoplocephala* spp., *Avitellina* spp., *Bertiella* spp., *Cittotaenia* spp., *Davainea* spp., *Diorchis* spp., *Diplopylidium* spp., *Dipylidium* spp., *Echinococcus* spp., *Echinocotyle* spp., *Echinolepis* spp., *Hydatigera* spp., *Hymenolepis* spp., *Joyeuxiella* spp.,
5 *Mesocestoides* spp., *Moniezia* spp., *Paranoplocephala* spp., *Raillietina* spp., *Stilesia* spp., *Taenia* spp., *Thysaniezia* spp., *Thysanosoma* spp.

Trematodes: from the class of Digenea, for example: *Austrobilharzia* spp., *Brachylaima* spp., *Calicophoron* spp., *Catatropis* spp., *Clonorchis* spp., *Collyriclum* spp., *Cotylophoron* spp., *Cyclocoelum* spp., *Dicrocoelium* spp., *Diplostomum* spp., *Echinochasmus* spp., *Echinoparyphium* spp., *Echinostoma* spp.,
10 *Eurytrema* spp., *Fasciola* spp., *Fasciolides* spp., *Fasciolopsis* spp., *Fischoederius* spp., *Gastrothylacus* spp., *Gigantobilharzia* spp., *Gigantocotyle* spp., *Heterophyes* spp., *Hypoderaeum* spp., *Leucochloridium* spp., *Metagonimus* spp., *Metorchis* spp., *Nanophyetus* spp., *Notocotylus* spp., *Opisthorchis* spp., *Ornithobilharzia* spp., *Paragonimus* spp., *Paramphistomum* spp., *Plagiorchis* spp., *Posthodiplostomum* spp.,
15 *Prosthogonimus* spp., *Schistosoma* spp., *Trichobilharzia* spp., *Troglostrongylus* spp., *Typhlocoelum* spp.

Nematodes: from the order of Trichinellida, for example: *Capillaria* spp., *Trichinella* spp., *Trichomosoides* spp., *Trichuris* spp.

From the order of Tylenchida, for example: *Micronema* spp., *Parastrongyloides* spp., *Strongyloides* spp.

From the order of Rhabditina, for example: *Aelurostrongylus* spp., *Amidostomum* spp., *Ancylostoma* spp.,
20 *Angiostrongylus* spp., *Bronchonema* spp., *Bunostomum* spp., *Chabertia* spp., *Cooperia* spp., *Cooperioides* spp., *Crenosoma* spp., *Cyathostomum* spp., *Cyclococercus* spp., *Cyclodontostomum* spp., *Cylicocycclus* spp., *Cylicostephanus* spp., *Cylindropharynx* spp., *Cystocaulus* spp., *Dictyocaulus* spp., *Elaphostrongylus* spp., *Filaroides* spp., *Globocephalus* spp., *Graphidium* spp., *Gyalocephalus* spp., *Haemonchus* spp., *Heligmosomoides* spp., *Hyostrongylus* spp., *Marshallagia* spp., *Metastrongylus* spp., *Muellerius* spp.,
25 *Necator* spp., *Nematodirus* spp., *Neostrongylus* spp., *Nippostrongylus* spp., *Obeliscoides* spp., *Oesophagodontus* spp., *Oesophagostomum* spp., *Ollulanus* spp.; *Ornithostrongylus* spp., *Oslerus* spp., *Ostertagia* spp., *Paracooperia* spp., *Paracrenosoma* spp., *Parafilaroides* spp., *Parelaphostrongylus* spp., *Pneumocaulus* spp., *Pneumostrongylus* spp., *Poteriostomum* spp., *Protostrongylus* spp., *Spicocaulus* spp., *Stephanurus* spp., *Strongylus* spp., *Syngamus* spp., *Teladorsagia* spp., *Trichonema* spp., *Trichostrongylus* spp.,
30 *Triodontophorus* spp., *Troglostrongylus* spp., *Uncinaria* spp.

From the order of Spirurida, for example: *Acanthocheilonema* spp., *Anisakis* spp., *Ascaridia* spp.; *Ascaris* spp., *Ascarops* spp., *Aspiculuris* spp., *Baylisascaris* spp., *Brugia* spp., *Cercopithifilaria* spp., *Crassicauda* spp., *Dipetalonema* spp., *Dirofilaria* spp., *Dracunculus* spp.; *Draschia* spp., *Enterobius* spp., *Filaria* spp.,

Gnathostoma spp., Gongylonema spp., Habronema spp., Heterakis spp.; Litomosoides spp., Loa spp., Onchocerca spp., Oxyuris spp., Parabronema spp., Parafilaria spp., Parascaris spp., Passalurus spp., Physaloptera spp., Probstmayria spp., Pseudofilaria spp., Setaria spp., Skjrabinema spp., Spirocerca spp., Stephanofilaria spp., Strongyluris spp., Syphacia spp., Thelazia spp., Toxascaris spp., Toxocara spp.,
5 Wuchereria spp.

Acanthocephala: from the order of Oligacanthorhynchida, for example: Macracanthorhynchus spp., Prosthenorchis spp.; from the order of Moniliformida, for example: Moniliformis spp.

From the order of Polymorphida, for example: Filicollis spp.; from the order of Echinorhynchida, for example Acanthocephalus spp., Echinorhynchus spp., Leptorhynchoides spp.

10 Pentastoma: from the order of Porocephalida, for example, Linguatula spp.

In the veterinary field and in animal husbandry, the compounds of the formula (I) are administered by methods generally known in the art, such as via the enteral, parenteral, dermal or nasal route in the form of suitable preparations. Administration may be prophylactic, metaphylactic or therapeutic.

Thus, one embodiment of the present invention refers to the compounds of the formula (I) for use as a
15 medicament.

A further aspect relates to the compounds of the formula (I) for use as an antiendoparasitic agent.

A further specific aspect of the invention relates to the compounds of the formula (I) for use as an antihelminthic agent, especially for use as a nematicide, plathyhelminthicide, acanthocephalicide or pentastomicide.

20 A further specific aspect of the invention relates to the compounds of the formula (I) for use as an antiprotozoic agent.

A further aspect relates to the compounds of the formula (I) for use as an antiectoparasitic agent, especially an arthropodicide, very particularly an insecticide or an acaricide.

Further aspects of the invention are veterinary medicine formulations comprising an effective amount of
25 at least one compound of the formula (I) and at least one of the following: a pharmaceutically acceptable excipient (e.g. solid or liquid diluents), a pharmaceutically acceptable auxiliary (e.g. surfactants), especially a pharmaceutically acceptable excipient used conventionally in veterinary medicine formulations and/or a pharmaceutically acceptable auxiliary conventionally used in veterinary medicine formulations.

A related aspect of the invention is a method for production of a veterinary medicine formulation as described here, which comprises the step of mixing at least one compound of the formula (I) with pharmaceutically acceptable excipients and/or auxiliaries, especially with pharmaceutically acceptable excipients used conventionally in veterinary medicine formulations and/or auxiliaries used conventionally in veterinary medicine formulations.

Another specific aspect of the invention is veterinary medicine formulations selected from the group of ectoparasitocidal and endoparasitocidal formulations, especially selected from the group of anthelmintic, antiprotozoic and arthropodocidal formulations, very particularly selected from the group of nematocidal, platyhelminthicidal, acanthocephalicidal, pentastomicidal, insecticidal and acaricidal formulations, according to the aspects mentioned, and methods for production thereof.

Another aspect relates to a method for treatment of a parasitic infection, especially an infection caused by a parasite selected from the group of the ectoparasites and endoparasites mentioned here, by use of an effective amount of a compound of the formula (I) in an animal, especially a nonhuman animal, having a need therefor.

Another aspect relates to a method for treatment of a parasitic infection, especially an infection caused by a parasite selected from the group of the ectoparasites and endoparasites mentioned here, by use of a veterinary medicine formulation as defined here in an animal, especially a nonhuman animal, having a need therefor.

Another aspect relates to the use of the compounds of the formula (I) in the treatment of a parasite infection, especially an infection caused by a parasite selected from the group of the ectoparasites and endoparasites mentioned here, in an animal, especially a nonhuman animal.

In the present context of animal health or veterinary medicine, the term "treatment" includes prophylactic, metaphylactic and therapeutic treatment.

In a particular embodiment, in this way, mixtures of at least one compound of the formula (I) with other active compounds, especially with endo- and ectoparasiticides, are provided for the field of veterinary medicine.

In the field of animal health, "mixture" means not just that two (or more) different active compounds are formulated in a common formulation and are correspondingly employed together, but also relates to products comprising formulations separated for each active compound. Accordingly, when more than two active compounds are to be employed, all active compounds can be formulated in a common formulation or all active compounds can be formulated in separate formulations; likewise conceivable are mixed forms in which some of the active compounds are formulated together and some of the active compounds are formulated separately. Separate formulations allow the separate or successive application of the active compounds in question.

The active compounds specified here by their "common names" are known and are described, for example, in the "Pesticide Manual" (see above) or can be searched for on the Internet (e.g.: <http://www.alanwood.net/pesticides>).

- 5 Illustrative active compounds from the group of the ectoparasiticides as mixing components, without any intention that this should constitute a restriction, include the insecticides and acaricides listed in detail above. Further usable active compounds are listed below in accordance with the abovementioned classification based on the current IRAC Mode of Action Classification Scheme: (1) acetylcholinesterase (AChE) inhibitors; (2) GABA-gated chloride channel blockers; (3) sodium channel modulators; (4) nicotinic acetylcholine receptor (nAChR) competitive modulators; (5) nicotinic acetylcholine receptor (nAChR) allosteric modulators; (6) glutamate-gated chloride channel (GluCl) allosteric modulators; (7) 10 juvenile hormone mimetics; (8) miscellaneous non-specific (multi-site) inhibitors; (9) chordotonal organ modulators; (10) mite growth inhibitors; (12) inhibitors of mitochondrial ATP synthase, such as ATP disruptors; (13) uncouplers of oxidative phosphorylation via disruption of the proton gradient; (14) nicotinic acetylcholine receptor channel blockers; (15) inhibitors of chitin biosynthesis, type 0; (16) 15 inhibitors of chitin biosynthesis, type 1; (17) moulting disruptors (especially in Diptera); (18) ecdysone receptor agonists; (19) octopamine receptor agonists; (21) mitochondrial complex I electron transport inhibitors; (25) mitochondrial complex II electron transport inhibitors; (20) mitochondrial complex III electron transport inhibitors; (22) voltage-dependent sodium channel blockers; (23) inhibitors of acetyl CoA carboxylase; (28) ryanodine receptor modulators;
- 20 active compounds having unknown or non-specific mechanisms of action, e.g. fentrifanil, fenoxacrim, cycloprene, chlorobenzilate, chlordimeform, flubenzimin, dicyclanil, amidoflumet, quinomethionat, triarathene, clothiazoben, tetrasul, potassium oleate, petroleum, metoxadiazone, gossyplur, flutenzine, brompropylate, cryolite;
- 25 compounds from other classes, for example butacarb, dimetilan, cloethocarb, phosphocarb, pirimiphos(-ethyl), parathion(-ethyl), methacrifos, isopropyl o-salicylate, trichlorfon, tigolaner, sulprofos, propaphos, sebufos, pyridathion, prothoate, dichlofenthion, demeton-S-methyl sulfone, isazofos, cyanofenphos, dialifos, carbophenothion, autathiofos, aromfenvinfos(-methyl), azinphos(-ethyl), chlorpyrifos(-ethyl), fosmethilan, iodofenphos, dioxabenzofos, formothion, fonofos, flupyrazofos, fensulfothion, etrimfos;
- 30 organochlorine compounds, for example camphechlor, lindane, heptachlor; or phenylpyrazoles, e.g. acetoprole, pyrafluprole, pyriprole, vaniliprole, sisapronil; or isoxazolines, e.g. sarolaner, afoxolaner, lotilaner, fluralaner;
- pyrethroids, e.g. (cis-, trans-)metofluthrin, profluthrin, flufenprox, flubrocycythrinate, fubfenprox, fenfluthrin, protrifenbut, pyresmethrin, RU15525, tallethrin, cis-resmethrin, heptafluthrin,

bioethanomethrin, biopermethrin, fenpyrithrin, cis-cypermethrin, cis-permethrin, clopythrin, cyhalothrin (lambda-), chlovaporthrin, or halogenated hydrocarbon compounds (HCHs),

neonicotinoids, e.g. nithiazine

dicloromezotiaz, triflumezopyrim

- 5 macrocyclic lactones, e.g. nemadectin, ivermectin, latidectin, moxidectin, selamectin, eprinomectin, doramectin, emamectin benzoate; milbemycin oxime

triprene, epofenonane, diofenolan;

biologicals, hormones or pheromones, for example natural products, e.g. thuringiensin, codlemone or neem components

- 10 dinitrophenols, e.g. dinocap, dinobuton, binapacryl;

benzoylureas, e.g. fluazuron, penfluron,

amidine derivatives, e.g. chlormebuform, cymiazole, demiditraz

beehive varroa acaricides, for example organic acids, e.g. formic acid, oxalic acid.

- 15 Illustrative active compounds from the group of the endoparasiticides, as mixing components, include, but are not limited to, active anthelmintic ingredients and active antiprotozoic ingredients.

The anthelmintic active compounds include but are not limited to the following nematocidally, trematocidally and/or cestocidally active compounds:

- 20 from the class of the macrocyclic lactones, for example: eprinomectin, abamectin, nemadectin, moxidectin, doramectin, selamectin, lepimectin, latidectin, milbemectin, ivermectin, emamectin, milbemycin;

from the class of the benzimidazoles and probenzimidazoles, for example: oxibendazole, mebendazole, triclabendazole, thiophanate, parabendazole, oxfendazole, netobimin, fenbendazole, febantel, thiabendazole, cyclobendazole, cambendazole, albendazole sulfoxide, albendazole, flubendazole;

- 25 from the class of the depsipeptides, preferably cyclic depsipeptides, especially 24-membered cyclic depsipeptides, for example: emodepside, PF1022A;

from the class of the tetrahydropyrimidines, for example: morantel, pyrantel, oxantel;

from the class of the imidazothiazoles, for example: butamisole, levamisole, tetramisole;

from the class of the aminophenylamidines, for example: amidantel, deacylated amidantel (dAMD), tribendimidine;

from the class of the aminoacetonitriles, for example: monepantel;

5 from the class of the paraherquamides, for example: paraherquamide, derquantel;

from the class of the salicylanilides, for example: tribromsalan, bromoxanide, brotiane, clioxanide, closantel, niclosamide, oxyclozanide, rafoxanide;

from the class of the substituted phenols, for example: nitroxylin, bithionol, disophenol, hexachlorophen, niclofolan, meniclopholan;

10 from the class of the organophosphates, for example: trichlorfon, naphthalofos, dichlorvos/DDVP, crufomate, coumaphos, haloxon;

from the class of the piperazinones/quinolines, for example: praziquantel, epsiprantel;

from the class of the piperazines, for example: piperazine, hydroxyzine;

15 from the class of the tetracyclines, for example: tetracycline, chlorotetracycline, doxycycline, oxytetracycline, rolitetracycline;

from various other classes, for example: bunamidine, niridazole, resorantel, omphalotin, oltipraz, nitroscanate, nitroxylin, oxamniquin, mirasan, miracil, lucanthon, hycanthon, hetolin, emetin, diethylcarbamazine, dichlorophen, diamfenetide, clonazepam, bphenium, amoscanate, clorsulon.

Active antiprotozoic ingredients include, but are not limited to, the following active compounds:

20 from the class of the triazines, for example: diclazuril, ponazuril, letrazuril, toltrazuril;

from the class of polyether ionophores, for example: monensin, salinomycin, maduramicin, narasin;

from the class of the macrocyclic lactones, for example: milbemycin, erythromycin;

from the class of the quinolones, for example: enrofloxacin, pradofloxacin;

from the class of the quinines, for example: chloroquin;

25 from the class of the pyrimidines, for example: pyrimethamine;

from the class of the sulfonamides, for example: sulfaquinoxaline, trimethoprim, sulfaclozin;

from the class of the thiamines, for example: amprolium;

from the class of the lincosamides, for example: clindamycin;

from the class of the carbanilides, for example: imidocarb;

5 from the class of the nitrofurans, for example: nifurtimox;

from the class of the quinazolinone alkaloids, for example: halofuginone;

from various other classes, for example: oxamniquin, paromomycin;

from the class of the vaccines or antigens from microorganisms, for example: *Babesia canis rossi*, *Eimeria tenella*, *Eimeria praecox*, *Eimeria necatrix*, *Eimeria mitis*, *Eimeria maxima*, *Eimeria brunetti*, *Eimeria*
10 *acervulina*, *Babesia canis vogeli*, *Leishmania infantum*, *Babesia canis canis*, *Dictyocaulus viviparus*.

All the mixing components mentioned, as the case may be, may also form salts with suitable bases or acids if they are capable of doing so on the basis of their functional groups.

Vector control

The compounds of the formula (I) can also be used in vector control. In the context of the present
15 invention, a vector is an arthropod, especially an insect or arachnid, capable of transmitting pathogens, for example viruses, worms, single-cell organisms and bacteria, from a reservoir (plant, animal, human, etc.) to a host. The pathogens can be transmitted either mechanically (for example trachoma by non-stinging flies) onto a host or after injection into a host (for example malaria parasites by mosquitoes).

Examples of vectors and the diseases or pathogens they transmit are:

20 1) Mosquitoes

- Anopheles: malaria, filariasis;

- Culex: Japanese encephalitis, filariasis, other viral diseases, transmission of other worms;

- Aedes: yellow fever, dengue fever, further viral disorders, filariasis;

- Simuliidae: transmission of worms, especially *Onchocerca volvulus*;

25 - Psychodidae: transmission of leishmaniasis

2) Lice: skin infections, epidemic typhus;

3) Fleas: plague, endemic typhus, tapeworms;

4) Flies: sleeping sickness (trypanosomiasis); cholera, other bacterial diseases;

5) Mites: acariosis, epidemic typhus, rickettsialpox, tularaemia, Saint Louis encephalitis, tick-borne encephalitis (TBE), Crimean-Congo haemorrhagic fever, borreliosis;

6) Ticks: borellioses such as *Borrelia burgdorferi sensu lato.*, *Borrelia duttoni*, tick-borne encephalitis, Q fever (*Coxiella burnetii*), babesioses (*Babesia canis canis*), ehrlichiosis.

10 Examples of vectors in the context of the present invention are insects, for example aphids, flies, leafhoppers or thrips, which can transmit plant viruses to plants. Other vectors capable of transmitting plant viruses are spider mites, lice, beetles and nematodes.

Further examples of vectors in the context of the present invention are insects and arachnids such as mosquitoes, especially of the genera *Aedes*, *Anopheles*, for example *A. gambiae*, *A. arabiensis*, *A. funestus*, *A. dirus* (malaria) and *Culex*, Psychodidae such as *Phlebotomus*, *Lutzomyia*, lice, fleas, flies, mites and ticks, which can transmit pathogens to animals and/or humans.

15 Vector control is also possible if the compounds of the formula (I) are resistance-breaking.

Compounds of the formula (I) are suitable for use in the prevention of diseases and/or pathogens transmitted by vectors. Thus, a further aspect of the present invention is the use of compounds of the formula (I) for vector control, for example in agriculture, in horticulture, in forests, in gardens and in leisure facilities, and also in the protection of materials and stored products.

20 **Protection of industrial materials**

The compounds of the formula (I) are suitable for protecting industrial materials against attack or destruction by insects, for example from the orders of Coleoptera, Hymenoptera, Isoptera, Lepidoptera, Psocoptera and Zygentoma.

25 Industrial materials in the present context are understood to mean inanimate materials, such as preferably plastics, adhesives, sizes, papers and cards, leather, wood, processed wood products and coating compositions. The use of the invention for protection of wood is particularly preferred.

In a further embodiment, the compounds of the formula (I) are used together with at least one further insecticide and/or at least one fungicide.

In a further embodiment, the compounds of the formula (I) take the form of a ready-to-use pesticide, meaning that they can be applied to the material in question without further modifications. Useful further insecticides or fungicides especially include those mentioned above.

Surprisingly, it has also been found that the compounds of the formula (I) can be employed for protecting objects which come into contact with saltwater or brackish water, in particular hulls, screens, nets, buildings, moorings and signalling systems, against fouling. It is equally possible to use the compounds of the formula (I), alone or in combinations with other active compounds, as antifouling agents.

Control of animal pests in the hygiene sector

The compounds of the formula (I) are suitable for controlling animal pests in the hygiene sector. More particularly, the invention can be used in the domestic protection sector, in the hygiene protection sector and in the protection of stored products, particularly for control of insects, arachnids, ticks and mites encountered in enclosed spaces, for example dwellings, factory halls, offices, vehicle cabins, animal breeding facilities. For controlling animal pests, the compounds of the formula (I) are used alone or in combination with other active compounds and/or auxiliaries. They are preferably used in domestic insecticide products. The compounds of the formula (I) are effective against sensitive and resistant species, and against all developmental stages.

These pests include, for example, pests from the class Arachnida, from the orders Scorpiones, Araneae and Opiliones, from the classes Chilopoda and Diplopoda, from the class Insecta the order Blattodea, from the orders Coleoptera, Dermaptera, Diptera, Heteroptera, Hymenoptera, Isoptera, Lepidoptera, Phthiraptera, Psocoptera, Saltatoria or Orthoptera, Siphonaptera and Zygentoma and from the class Malacostraca the order Isopoda.

Application is effected, for example, in aerosols, unpressurized spray products, for example pump and atomizer sprays, automatic fogging systems, foggers, foams, gels, evaporator products with evaporator tablets made of cellulose or plastic, liquid evaporators, gel and membrane evaporators, propeller-driven evaporators, energy-free, or passive, evaporation systems, moth papers, moth bags and moth gels, as granules or dusts, in baits for spreading or bait stations.

Analytical determinations

The analytical determination methods described below apply to all statements in the entire document unless the respective analytical determination method is specially described in the relevant text passage.

30 Mass spectrometry

The determination of $[M+H]^+$ or M^- by LC-MS under acidic chromatographic conditions was carried out using 1 ml of formic acid per litre of acetonitrile and 0.9 ml of formic acid per litre of Millipore water as mobile phases. The Zorbax Eclipse Plus C18 50 mm * 2.1 mm, 1.8 μ m column was used at a column oven temperature of 55°C.

5 Instruments:

LC-MS3: Waters UPLC with SQD2 mass spectrometer and SampleManager sample changer. Linear gradient from 0.0 to 1.70 minutes from 10% acetonitrile to 95% acetonitrile, from 1.70 to 2.40 minutes constant 95% acetonitrile, flow rate 0.85 ml/min.

LC-MS6 and LC-MS7: Agilent 1290 LC, Agilent MSD mass spectrometer, HTS PAL sample
10 changer. Linear gradient from 0.0 to 1.80 minutes from 10% acetonitrile to 95% acetonitrile, from 1.80 to 2.50 minutes constant 95% acetonitrile, flow rate 1.0 ml/min.

The determination of $[M+H]^+$ by LC-MS under neutral chromatographic conditions was carried out using acetonitrile and Millipore water with 79 mg/l ammonium carbonate as mobile phases.

Instruments:

15 **LC-MS4:** Waters IClass Acquity with QDA mass spectrometer and FTN sample changer (column Waters Acquity 1.7 μ m 50 mm * 2.1 mm, column oven temperature 45°C). Linear gradient from 0.0 to 2.10 minutes from 10% acetonitrile to 95% acetonitrile, from 2.10 to 3.00 minutes constant 95% acetonitrile, flow rate 0.7 ml/min.

LC-MS5: Agilent 1100 LC system with MSD mass spectrometer and HTS PAL sample changer
20 (column: Zorbax XDB C18 1.8 μ m 50 mm * 4.6 mm, column oven temperature 55°C). Linear gradient from 0.0 to 4.25 minutes from 10% acetonitrile to 95% acetonitrile, from 4.25 to 5.80 minutes constant 95% acetonitrile, flow rate 2.0 ml/min.

In all cases, the retention time indices were determined from a calibration measurement of a homologous series of straight-chain alkan-2-ones having 3 to 16 carbons, where the index of the
25 first alkanone was set to 300, the index of the last alkanone was set to 1600 and linear interpolation was carried out between the values of successive alkanones.

The ^1H NMR spectra were measured with a Bruker **Avance III 400 MHz** spectrometer fitted with a 1.7 mm TCI sample head using tetramethylsilane as standard (0.00 ppm), of solutions in the solvents CD_3CN , CDCl_3 or $d_6\text{-DMSO}$. Alternatively, a **Bruker Avance III 600 MHz** spectrometer
30 fitted with a 5 mm CPNMP sample head or a Bruker **Avance NEO 600 MHz** spectrometer fitted with a 5 mm TCI sample head was employed for the measurements. In general, the measurements

were carried out at a sample head temperature of 298 K. If other measurement temperatures were used, this is specifically mentioned.

NMR peak list method

The ^1H NMR data of selected examples are stated in the form of ^1H NMR peak lists. For each signal peak, first the δ value in ppm and then the signal intensity in round brackets are listed. The δ value – signal intensity number pairs for different signal peaks are listed with separation from one another by semicolons.

The peak list for one example therefore has the form:

δ_1 (intensity₁); δ_2 (intensity₂);.....; δ_i (intensity_i);.....; δ_n (intensity_n)

The intensity of sharp signals correlates with the height of the signals in a printed representation of a ^1H NMR spectrum in cm and shows the true ratios of the signal intensities. In the case of broad signals, several peaks or the middle of the signal and the relative intensity thereof may be shown in comparison to the most intense signal in the spectrum.

Calibration of the chemical shift of ^1H NMR spectra is accomplished using tetramethylsilane or the chemical shift of the solvent if the sample does not contain any tetramethylsilane. Accordingly, in certain cases the ^1H NMR peak lists may comprise the tetramethylsilane peak.

The ^1H NMR peaks lists are equivalent to conventional ^1H NMR representations and thus usually contain all peaks listed in a conventional ^1H NMR interpretation.

In addition, like conventional ^1H NMR representations, they may show solvent signals, signals of stereoisomers of the compounds according to the invention which are optionally provided by the invention, and/or peaks of impurities.

NMR solvent signals, the tetramethylsilane peak and the water signal in the solvent in question are excluded from the calibration of the relative intensity since their stated intensity values can be very high.

The peaks of (stereo)isomers of the compounds of the invention and/or peaks of impurities usually have a lower intensity on average than the peaks of the compounds of the invention (for example at a purity of > 90%).

Such stereoisomers and/or impurities may be typical of the particular preparation process. Their peaks can thus help in this case to identify reproduction of a preparation process with reference to "by-product fingerprints".

An expert calculating the peaks of the compounds according to the invention by known methods (MestreC, ACD simulation, but also with empirically evaluated expected values) can, if required, identify the peaks

of the compounds of the invention, optionally using additional intensity filters. This identification is equivalent to the relevant peak listing in conventional ^1H NMR interpretation.

In the JCAMP database, the solvent employed, the measuring frequency of the spectrometer and the spectrometer model can be found using the parameter “solvent”, “observe frequency” and
5 “spectrometer/data system”, respectively.

^{13}C NMR data are stated analogously to the ^1H NMR data as peak lists using broadband-decoupled ^{13}C NMR spectra. Here, too, NMR solvent signals and tetramethylsilane are excluded from the calibration of the relative intensity since these signals may have relatively high intensity values.

Further details on ^1H NMR peak lists can be found in: "Citation of NMR Peaklist Data within Patent
10 Applications" in Research Disclosure Database Number 564025.

logP values

The logP values were determined according to EEC Directive 79/831 Annex V.A8 by HPLC (high-performance liquid chromatography) on a reversed-phase column (C18) using the following methods:

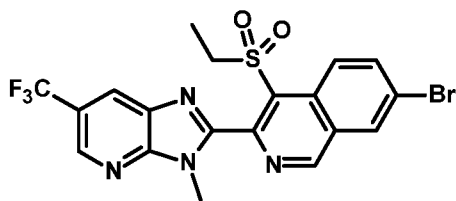
^[a] The logP value is determined by LC-UV measurement in the acidic range using 0.9 ml/l formic acid in
15 water and 1.0 ml/l formic acid in acetonitrile as mobile phases (linear gradient from 10% acetonitrile to 95% acetonitrile).

^[b] The logP value is determined by LC-UV measurement in the neutral range using 79 mg/l ammonium carbonate in water and acetonitrile as mobile phases (linear gradient from 10% acetonitrile to 95% acetonitrile).

20 Calibration was carried out using a homologous series of straight-chain alkan-2-ones (having 3 to 16 carbon atoms) with known logP values. The values between successive alkanones are determined by linear regression.

Preparation examples:

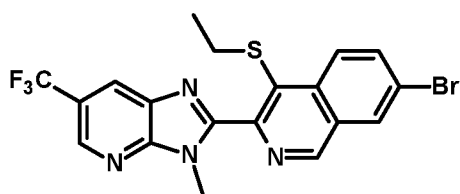
25 **7-Bromo-4-ethylsulfonyl-3-[3-methyl-6-(trifluoromethyl)imidazo[4,5-b]pyridin-2-yl]isoquinoline**
(I-37)



0.10 g (2.14 mmol) of formic acid and 0.34 g (3.00 mmol, 30% strength) of hydrogen peroxide were added to a solution of 0.20 g (0.43 mmol) of 7-bromo-4-ethylsulfanyl-3-[3-methyl-6-(trifluoroethyl)imidazo[4,5-b]pyridin-2-yl]isoquinoline in 10 ml of dichloromethane. The resulting mixture was stirred at room temperature for 6 h and then diluted with aqueous Na₂S₂O₃ solution and extracted with 30 ml of dichloromethane. The organic phase was dried over sodium sulfate, filtered and concentrated on a rotary evaporator. The residue was purified by preparative HPLC (mobile phase: MeCN/H₂O).

Analytical data: See peak list

7-Bromo-4-ethylsulfanyl-3-[3-methyl-6-(trifluoroethyl)imidazo[4,5-b]pyridin-2-yl]isoquinoline



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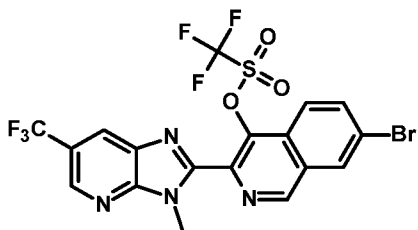
10.0 g (162 mmol) of EtSH, 2.50 g (2.40 mmol) of Pd₂(dba)₃•CHCl₃, 2.80 g (4.90 mmol) of xantphos and 6.30 g (48 mmol) of Hünig base were added to a solution of 9.00 g (16.2 mmol) of [7-bromo-3-[3-methyl-6-(trifluoromethyl)imidazo[4,5-b]pyridin-2-yl]-4-isoquinolyl] trifluoromethanesulfonate in 50 ml of 1,4-dioxane. The reaction mixture was stirred at 80°C for 16 h. The mixture was then quenched by addition of 100 ml of water and extracted with ethyl acetate (2 x 150 ml). The organic phases were washed with saturated aqueous NaCl solution, dried over sodium sulfate, filtered and concentrated under reduced pressure. The crude product obtained was purified by column chromatography on silica gel (pentane/ethyl acetate = 8:1).

15

¹H-NMR(400 Mhz, D₆-DMSO) δ ppm: 9.51 (s, 1H), 8.87 (s, 1H), 8.70 (s, 1H), 8.69 (s, 1H), 8.56 (d, 1H), 8.19 (d, 1H), 3.77 (s, 3H), 2.84 (q, 2H), 0.98 (t, 3H).

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[7-Bromo-3-[3-methyl-6-(trifluoromethyl)imidazo[4,5-b]pyridin-2-yl]-4-isoquinolyl] trifluoromethanesulfonate



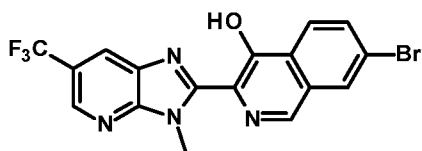
6.70 g (23.6 mmol) of trifluoromethanesulfonic anhydride were added to a solution of 1.00 g (2.40 mmol) of 7-bromo-3-[3-methyl-6-(trifluoromethyl)imidazo[4,5-b]pyridin-2-yl]isoquinolin-4-ol in 15 ml of

25

pyridine. The reaction mixture obtained was stirred at room temperature for 16 h and then diluted with aqueous NaHCO₃ solution. The mixture was extracted with 30 ml of ethyl acetate and the organic phases were dried over sodium sulfate, filtered and concentrated. The crude product obtained was purified by column chromatography on silica gel (petroleum ether/ethyl acetate = 8:1).

- 5 ¹H-NMR(400 Mhz, D₆-DMSO) δ ppm: 9.67 (s, 1H), 8.93 (s, 1H), 8.85 (s, 1H), 8.72 (s, 1H), 8.36 (d, 1H), 8.14 (d, 1H), 4.08 (s, 3H).

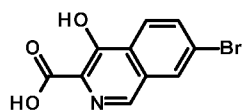
7-Bromo-3-[3-methyl-6-(trifluoromethyl)imidazo[4,5-b]pyridin-2-yl]isoquinolin-4-ol



- 17.2 g (89.7 mmol) of EDCI and 2.00 g (14.8 mmol) of HOBt were added to a mixture of 15.7 g (82.2 mmol) of N²-methyl-5-(trifluoromethyl)pyridine-2,3-diamine, 15.7 g (74.9 mmol) of 7-bromo-4-hydroxyisoquinoline-3-carboxylic acid and 20 ml of pyridine in 40 ml of CH₃CN. The resulting reaction mixture was stirred at room temperature for 16 h and then quenched with 100 ml of water and extracted with ethyl acetate (2 x 400 ml). The organic phases were dried over sodium sulfate, filtered and concentrated. The residue obtained was dissolved in 40 ml of HOAc and then stirred at 80°C for 16 h. The mixture was quenched by addition of 100 ml of water and extracted with ethyl acetate (2 x 400 ml). The organic phases were washed with saturated aqueous NaCl solution, dried over sodium sulfate, filtered and concentrated under reduced pressure. The crude product obtained was purified by column chromatography on silica gel (petroleum ether/ethyl acetate = 5:1).

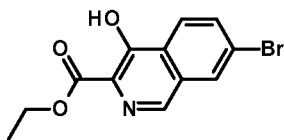
- 15 ¹H-NMR(400 Mhz, D₆-DMSO) δ ppm: 9.03 (s, 1H), 8.88 (s, 1H), 8.71 (s, 1H), 8.53 (s, 1H), 8.32 (d, 1H), 8.10 (br, 1H), 8.03 (d, 1H), 4.48 (s, 3H).

7-Bromo-4-hydroxyisoquinoline-3-carboxylic acid



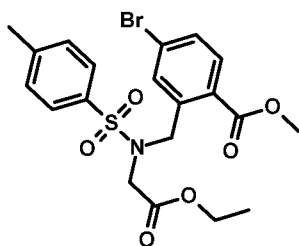
- A mixture of 12.0 g (40.7 mmol) of ethyl 7-bromo-4-hydroxyisoquinoline-3-carboxylate and 3.30 g (81.4 mmol) of NaOH in 30 ml of methanol / H₂O (7:1) was stirred at 50°C for 2 h. The reaction mixture was then adjusted to pH 3 by addition of concentrated hydrochloric acid. The solids that precipitated out were filtered off and dried.

25 ¹H-NMR(300 Mhz, D₆-DMSO) δ ppm: 8.57 (s, 1H), 8.54 (s, 1H), 8.28 (d, 1H), 8.02 (d, 1H). The -COOH proton is not visible in the spectrum measured.

Ethyl 7-bromo-4-hydroxyisoquinoline-3-carboxylate

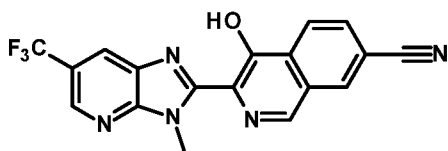
22.0 g (45.5 mmol) of methyl 4-bromo-2-[(2-ethoxy-2-oxoethyl)-(p-tolylsulfonyl)amino]methyl]benzoate and 9.80 g (182.2 mmol) of NaOEt were dissolved in 50 ml of ethanol and stirred at room temperature for 16 h. The reaction mixture was subsequently adjusted to pH 7 by addition of conc. hydrochloric acid and the resulting precipitated solid was separated off by filtration. The crude product was converted further without further purification.

¹H-NMR(300 Mhz, D₆-DMSO) δ ppm: 11.72 (br, 1H), 8.86 (s, 1H), 8.49 (d, 1H), 8.23 (d, 1H), 8.03 – 8.00 (m, 1H), 4.46 (q, 2H), 1.39 (t, 3H).

10 **Methyl 4-bromo-2-[(2-ethoxy-2-oxoethyl)-(p-tolylsulfonyl)amino]methyl]benzoate**

A mixture of 17.0 g (55.6 mmol) of methyl 4-bromo-2-(bromomethyl)benzoate and 11.5 g (83.3 mmol) of potassium carbonate was suspended in 50 ml of DMF and stirred at room temperature for 20 min. 15.7 g (61.1 mmol) of ethyl 2-(p-tolylsulfonylamino)acetate were then added and the reaction mixture obtained was stirred at room temperature for 16 h. The reaction was quenched by addition of 100 ml of water and the mixture was then extracted 2x with 150 ml of ethyl acetate. The combined organic phases were washed with 100 ml of saturated sodium chloride solution, dried over sodium sulfate, filtered and concentrated. The residue was purified by column chromatography on silica gel (mobile phase: pentane/ethyl acetate = 8/1).

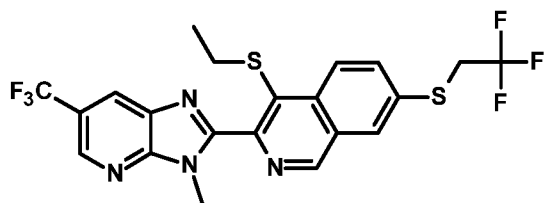
¹H-NMR(300 Mhz, D₆-DMSO) δ ppm: 7.77 – 7.60 (m, 5), 7.43 (d, 2H), 4.74 (s, 2H), 4.06 (s, 2H), 3.98 (q, 2H), 3.80 (s, 3H), 2.41 (s, 3H), 1.10 (t, 3H).

4-Hydroxy-3-[3-methyl-6-(trifluoromethyl)imidazo[4,5-b]pyridin-2-yl]isoquinoline-7-carbonitrile

1.60 g (0.789 mmol, 10% strength) *t*-Bu₃-P and 59 mg (0.26 mmol) of Pd(OAc)₂ were added to a solution of 500 mg (1.32 mmol) of 7-chloro-3-[3-methyl-6-(trifluoromethyl)imidazo[4,5-*b*]pyridin-2-yl]isoquinolin-4-ol and 279 mg (0.66 mmol) of K₄[Fe(CN)₆]•3H₂O in 10 ml of *N*-methyl-2-pyrrolidone. The mixture was stirred under a nitrogen atmosphere at 140°C for 16 h. The reaction was then quenched by addition of 100 ml of water and the mixture was extracted 2x with 150 ml of ethyl acetate. The combined organic phases were washed with saturated sodium chloride solution, dried over sodium sulfate, filtered and concentrated. The crude product was purified by preparative HPLC (MeCN/H₂O).

¹H-NMR(300 Mhz, D₆-DMSO) δ ppm: 14.58 (br, 1H), 9.09 (s, 1H), 8.86 – 8.83 (m, 2H), 8.70 (s, 1H), 8.48 (d, 1H), 8.13 (d, 1H), 4.46 (s, 3H).

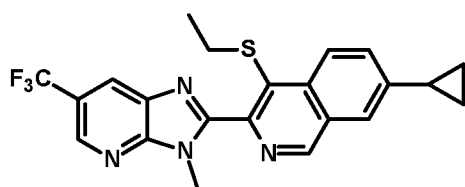
10 **4-Ethylsulfanyl-3-[3-methyl-6-(trifluoromethyl)imidazo[4,5-*b*]pyridin-2-yl]-7-(2,2,2-trifluoroethylsulfanyl)isoquinoline**



With stirring, 149 mg (1.28 mmol) of 2,2,2-trifluoromethane-1-thiol, 144 mg (1.28 mmol) of *t*-BuOK, 122 mg (0.64 mmol) of CuI and 182 mg (1.28 mmol) of N1,N2-dimethylcyclohexane-1,2-diamine were added to a solution of 300 mg (0.64 mmol) of 7-bromo-4-ethylsulfanyl-3-[3-methyl-6-(trifluoroethyl)imidazo[4,5-*b*]pyridin-2-yl]isoquinoline in 10 ml of DMF. The reaction mixture was heated in the microwave at 140°C for 2 h and then quenched by addition of 100 ml of water. The mixture was extracted 2x with 150 ml of ethyl acetate, and the organic phases were washed with saturated aqueous sodium chloride solution, dried over sodium sulfate, filtered and concentrated. The residue was purified by column chromatography on silica gel (pentane/ethyl acetate = 8/1).

¹H-NMR(300 Mhz, D₆-DMSO) δ ppm: 9.44 (s, 1H), 8.87 (d, 1H), 8.65 (d, 1H), 8.57 (d, 1H), 8.49 (d, 1H), 8.13 (dd, 1H), 4.35 (q, 2H), 3.77 (s, 3H), 2.84 (q, 2H), 0.98 (t, 3H).

15 **7-Cyclopropyl-4-ethylsulfanyl-3-[3-methyl-6-(trifluoromethyl)imidazo[4,5-*b*]pyridin-2-yl]isoquinoline**



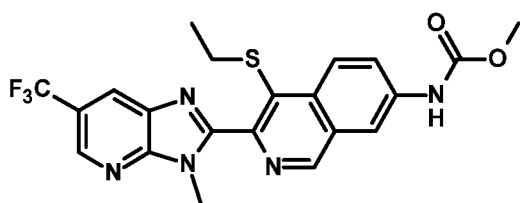
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With stirring, 276 mg (3.21 mmol) of cyclopropylboronic acid, 74 mg (0.06 mmol) of Pd(PPh₃)₄ and 314

mg (0.96 mmol) of Cs_2CO_3 were added to a solution of 300 mg (0.64 mmol) of 7-bromo-4-ethylsulfanyl-3-[3-methyl-6-(trifluoroethyl)imidazo[4,5-b]pyridin-2-yl]isoquinoline in 10 ml of THF. The reaction mixture was stirred at 85°C for 16 h and then quenched by addition of 100 ml of water. The mixture was extracted 2x with 150 ml of ethyl acetate, and the organic phases were washed with saturated aqueous sodium chloride solution, dried over sodium sulfate, filtered and concentrated. The residue was purified by preparative thin-layer chromatography on silica gel (pentane/ethyl acetate = 8/1).

LC-MS: R_t (min): 1.37; MS: ($M+H^+$): 429.

Methyl N-[4-ethylsulfanyl-3-[3-methyl-6-(trifluoromethyl)imidazo[4,5-b]pyridin-2-yl]-7-isoquinolyl]carbamate



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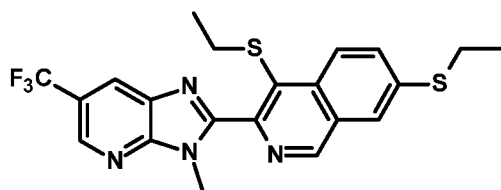
With stirring, 96 mg (1.28 mmol) of methyl carbamate, 67 mg (0.06 mmol) of $\text{Pd}_2(\text{dba})_3 \cdot \text{CHCl}_3$, 74 mg (0.13 mmol) of xantphos and 419 mg (1.28 mmol) of Cs_2CO_3 were added to a solution of 200 mg (0.43 mmol) of 7-bromo-4-ethylsulfanyl-3-[3-methyl-6-(trifluoroethyl)imidazo[4,5-b]pyridin-2-yl]isoquinoline in 10 ml of 1,4-dioxane. The reaction mixture was stirred at 110°C for 16 h and then quenched by addition of 100 ml of water. The mixture was extracted 2x with 150 ml of ethyl acetate, and the organic phases were washed with saturated aqueous sodium chloride solution, dried over sodium sulfate, filtered and concentrated. The residue was purified by column chromatography on silica gel (mobile phase: pentane/ethyl acetate = 8/1).

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$^1\text{H-NMR}$ (400 Mhz, $\text{D}_6\text{-DMSO}$) δ ppm: 10.36 (br, 1H), 9.40 (s, 1H), 8.86 (d, 1H), 8.64 (d, 1H), 8.55 (d, 1H), 8.48 (d, 1H), 8.02 (dd, 1H), 3.77 (s, 3H), 3.76 (s, 3H), 2.81 (q, 2H), 0.97 (t, 3H).

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4,7-Bis(ethylsulfanyl)-3-[3-methyl-6-(trifluoromethyl)imidazo[4,5-b]pyridin-2-yl]isoquinoline



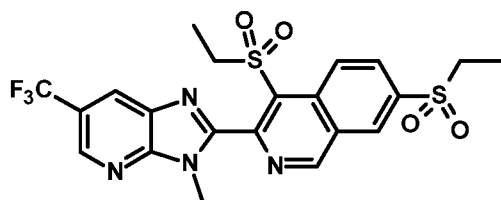
670 mg (10.8 mmol) of EtSH, 170 mg (0.16 mmol) of $\text{Pd}_2(\text{dba})_3 \cdot \text{CHCl}_3$, 190 mg (0.32 mmol) of xantphos and 420 mg (3.25 mmol) of Hünig base were added to a solution of 600 mg (1.10 mmol) of [7-bromo-3-[3-methyl-6-(trifluoromethyl)imidazo[4,5-b]pyridin-2-yl]-4-isoquinolyl] trifluoromethanesulfonate in 15 ml of 1,4-dioxane. The reaction mixture was stirred at 80°C for 16 h. The mixture was then quenched by

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addition of 100 ml of water and extracted with ethyl acetate (2 x 150 ml). The organic phases were washed with saturated aqueous NaCl solution, dried over sodium sulfate, filtered and concentrated under reduced pressure. The crude product obtained was purified by column chromatography on silica gel (pentane/ethyl acetate = 8:1).

- 5 ¹H-NMR(400 Mhz, D₆-DMSO) δ ppm: 9.43 (s, 1H), 8.87 (d, 1H), 8.66 (d, 1H), 8.51 (d, 1H), 8.21 (d, 1H), 7.94 (dd, 1H), 3.77 (s, 3H), 3.24 (q, 2H), 2.83 (q, 2H), 1.38 (t, 3H), 0.98 (t, 3H).

4,7-Bis(ethylsulfonyl)-3-[3-methyl-6-(trifluoromethyl)imidazo[4,5-b]pyridin-2-yl]isoquinoline (I-34)



- 10 0.10 g (2.23 mmol) of formic acid and 0.35 g (3.11 mmol, 30% strength) of hydrogen peroxide were added to a solution of 0.20 g (0.44 mmol) of 4,7-bis(ethylsulfonyl)-3-[3-methyl-6-(trifluoromethyl)imidazo[4,5-b]pyridin-2-yl]isoquinoline in 10 ml of dichloromethane. The resulting mixture was stirred at room temperature for 6 h and then diluted with aqueous Na₂S₂O₃ solution and extracted with 30 ml of dichloromethane. The organic phase was dried over sodium sulfate, filtered and concentrated on a rotary
15 evaporator. The residue was purified by preparative HPLC (mobile phase: MeCN / H₂O).

Analytical data: See peak list

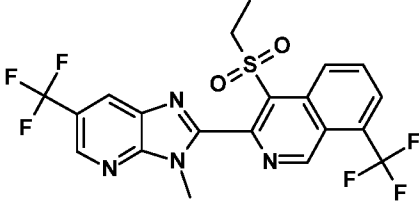
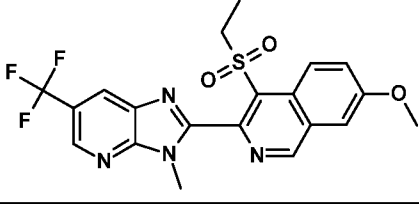
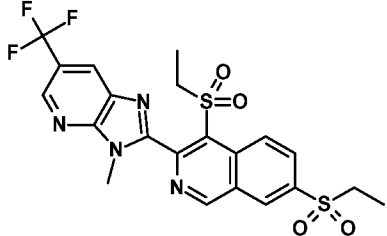
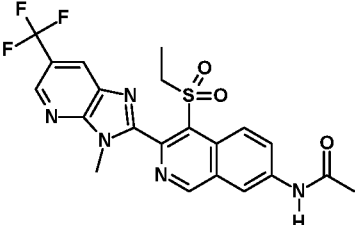
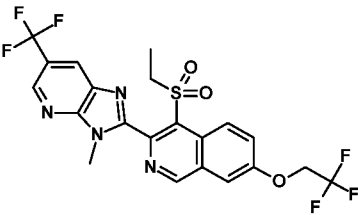
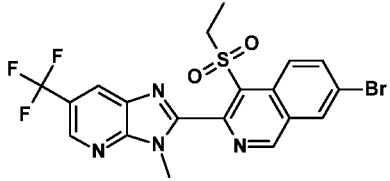
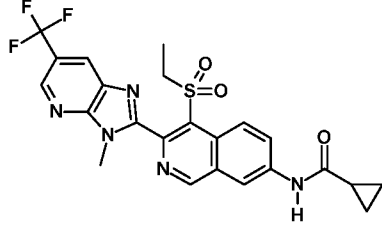
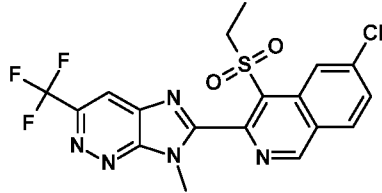
In analogy to the examples and according to the above-described preparation processes, the following compounds of the formula (I) can be obtained:

Example No.	Molecular structure
I-001	

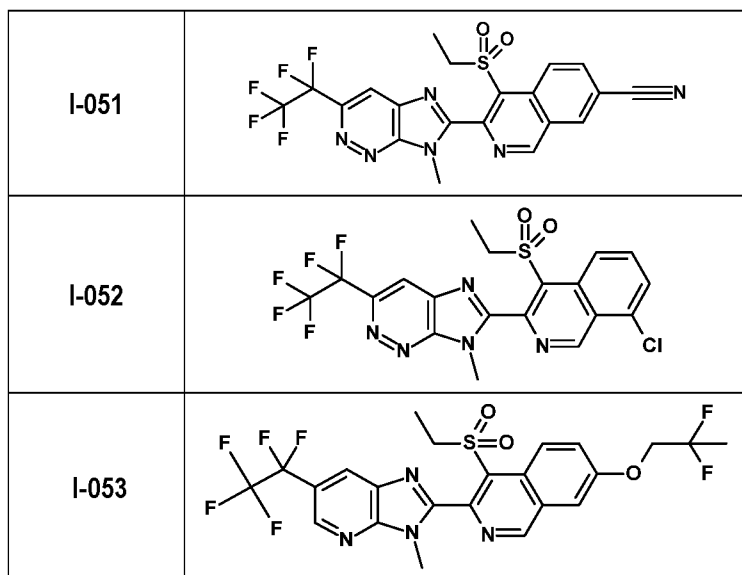
<p>I-002</p>	
<p>I-003</p>	
<p>I-004</p>	
<p>I-005</p>	
<p>I-006</p>	
<p>I-007</p>	
<p>I-008</p>	
<p>I-010</p>	

I-012	
I-013	
I-014	
I-015	
I-016	
I-018	
I-019	
I-020	
I-021	

<p>I-022</p>	
<p>I-024</p>	
<p>I-025</p>	
<p>I-026</p>	
<p>I-027</p>	
<p>I-028</p>	
<p>I-029</p>	
<p>I-030</p>	
<p>I-031</p>	

I-032	
I-033	
I-034	
I-035	
I-036	
I-037	
I-038	
I-039	

I-041	
I-042	
I-043	
I-044	
I-045	
I-046	
I-048	
I-049	
I-050	



5

Further details of ¹H NMR peak lists can be found in the Research Disclosure Database Number 564025.

NMR data of the exemplary compounds
<p>Example I-001: ¹H-NMR(300.1 Mhz, d₆-DMSO): δ= 9.8846 (5.2); 9.1571 (4.8); 9.0899 (2.7); 9.0597 (2.8); 8.8944 (4.4); 8.6420 (4.5); 8.4626 (2.6); 8.4339 (2.3); 7.8737 (0.4); 3.8722 (4.3); 3.8479 (4.7); 3.8070 (16.0); 3.3248 (6.6); 2.5046 (21.7); 1.3141 (5.0); 1.2899 (8.9); 1.2659 (4.7); 0.0002 (5.0); -0.0325 (0.3)</p>
<p>Example I-002: ¹H-NMR(400.2 Mhz, d₆-DMSO): δ= 13.5911 (1.0); 13.4609 (0.9); 13.2905 (1.0); 12.4422 (1.0); 12.0071 (1.0); 10.6649 (0.9); 9.6916 (9.8); 8.8855 (9.3); 8.8650 (5.3); 8.6510 (1.0); 8.6271 (7.9); 8.6147 (7.7); 8.5602 (1.0); 8.2386 (4.0); 8.2115 (3.7); 6.1154 (1.1); 5.3165 (1.0); 5.0188 (1.0); 4.9069 (0.9); 4.8574 (0.9); 4.7135 (1.0); 4.6924 (1.1); 4.6428 (1.1); 4.5154 (1.1); 4.4914 (0.9); 4.4694 (1.0); 4.4139 (2.9); 4.3916 (6.6); 4.3710 (8.4); 4.3428 (2.8); 4.2927 (1.2); 4.2783 (1.2); 4.2667 (1.2); 4.2613 (1.1); 4.2225 (1.2); 4.2149 (1.1); 4.2018 (1.2); 4.1791 (1.1); 4.1551 (1.0); 4.1384 (1.2); 4.1094 (1.3); 4.0980 (1.2); 4.0777 (1.0); 4.0632 (1.0); 4.0435 (1.2); 4.0013 (1.2); 3.9760 (1.5); 3.9635 (1.5); 3.9558 (1.5); 3.9014 (1.6); 3.8232 (6.2); 3.8055 (7.0); 3.7827 (31.8); 3.7310 (2.0); 3.7151 (2.2); 3.6952 (2.0); 3.6803 (2.2); 3.6545 (2.4); 3.6299 (2.4); 3.5877 (2.9); 3.5619 (3.1); 3.5394 (3.5); 3.5205 (4.4); 3.5080 (4.9); 3.4556 (12.9); 3.4394 (16.9); 3.3469 (6593.6); 3.1720 (2.7); 3.1177 (1.8); 3.1094 (1.4); 3.0696 (1.6); 3.0486 (1.2); 3.0358 (1.4); 3.0243 (1.4); 3.0133 (1.2); 2.9900 (1.3); 2.9677 (0.9); 2.9568 (1.0); 2.9152 (1.0); 2.8983 (1.0); 2.8467 (1.0); 2.7963 (1.3); 2.7745 (1.4); 2.7571 (1.5); 2.6754 (13.0); 2.5059 (1958.8); 2.3319 (12.7); 2.2262 (1.0); 2.2160 (1.0); 2.1607 (1.0); 2.0902 (1.1); 2.0633 (0.9); 1.7061 (0.9); 1.3489 (1.0); 1.2902 (8.3); 1.2713 (16.0); 1.2528 (8.6); 1.0748 (6.7); 1.0574 (12.3); 1.0396 (6.2); 0.1491 (2.3); 0.0959 (0.9); 0.0029 (456.2); -0.0762 (1.4); -0.1463 (3.1); -2.9354 (1.0); -3.0078 (1.0); -3.1700 (0.9); -3.3703 (1.0); -3.5239 (1.0); -3.5828 (1.0)</p>
<p>Example I-003: ¹H-NMR(300.1 Mhz, d₆-DMSO): δ= 9.7353 (4.6); 8.8417 (2.0); 8.8121 (2.2); 8.7133 (6.2); 8.3006 (2.7); 8.0680 (1.5); 8.0629 (1.5); 8.0382 (1.4); 8.0331 (1.4); 3.9394 (16.0); 3.7696 (0.8); 3.7451 (2.3); 3.7205 (2.4); 3.6967 (0.8); 3.3250 (4.9); 2.6484 (10.5); 2.5076 (17.0); 2.5020 (21.9); 2.4967 (15.9); 1.2682 (3.9); 1.2435 (8.3); 1.2188 (3.7); -0.0007 (12.4)</p>
<p>Example I-004: ¹H-NMR(400.2 Mhz, CDCl₃):</p>

<p>δ= 9.9674 (4.2); 9.1339 (2.0); 9.1120 (2.1); 8.7648 (2.8); 8.2878 (2.8); 8.2858 (2.8); 8.1351 (2.1); 8.1162 (2.4); 7.8612 (1.5); 7.8414 (2.0); 7.8397 (2.0); 7.8204 (1.3); 7.2622 (13.0); 3.9194 (16.0); 3.8495 (1.0); 3.8308 (3.2); 3.8121 (3.2); 3.7933 (1.1); 1.5658 (15.8); 1.4786 (3.9); 1.4600 (8.0); 1.4413 (3.8); 0.0003 (12.7)</p>
<p>Example I-005: ¹H-NMR(400.2 Mhz, CDCl₃): δ= 9.4401 (2.9); 9.4389 (3.0); 9.0387 (1.5); 9.0153 (1.6); 8.7069 (1.6); 8.7024 (1.6); 8.3710 (2.0); 8.3658 (2.1); 8.2569 (1.6); 8.2522 (1.7); 8.0945 (1.5); 8.0893 (1.5); 8.0713 (1.4); 8.0660 (1.4); 7.2612 (34.5); 5.3008 (1.1); 3.9460 (0.4); 3.9033 (16.0); 3.8347 (0.6); 3.8160 (1.8); 3.7973 (1.8); 3.7786 (0.6); 1.5520 (22.1); 1.4683 (3.4); 1.4496 (7.3); 1.4309 (3.2); 1.2543 (0.9); 0.0080 (1.1); -0.0002 (35.8); -0.0085 (1.1)</p>
<p>Example I-006: ¹H-NMR(400.2 Mhz, CDCl₃): δ= 9.9661 (3.4); 9.9643 (3.4); 9.1372 (1.6); 9.1151 (1.7); 8.7102 (1.9); 8.7060 (1.9); 8.2632 (2.0); 8.2588 (2.0); 8.1373 (1.7); 8.1356 (1.7); 8.1184 (2.0); 8.1167 (1.9); 7.8637 (1.6); 7.8447 (1.6); 7.8417 (1.7); 7.8227 (1.4); 7.2626 (11.4); 5.3005 (1.1); 4.0447 (0.5); 3.9215 (16.0); 3.8530 (0.8); 3.8343 (2.4); 3.8156 (2.5); 3.7970 (0.8); 2.9857 (0.5); 1.5922 (5.0); 1.4812 (3.7); 1.4625 (7.7); 1.4438 (3.5); 0.0080 (0.4); -0.0002 (11.0); -0.0085 (0.4)</p>
<p>Example I-007: ¹H-NMR(400.2 Mhz, d₆-DMSO): δ= 9.6618 (3.8); 8.8738 (2.1); 8.8706 (2.1); 8.8322 (1.7); 8.8096 (2.0); 8.6165 (2.2); 8.6127 (2.2); 8.1871 (2.2); 8.1831 (2.1); 7.9119 (1.4); 7.9071 (1.4); 7.8892 (1.3); 7.8845 (1.2); 7.6487 (0.4); 7.6250 (0.6); 7.6190 (0.4); 7.6152 (0.5); 7.5984 (0.6); 7.5773 (0.5); 7.5688 (0.5); 7.5509 (0.4); 4.3533 (1.0); 3.7811 (1.3); 3.7633 (16.0); 3.3440 (234.9); 2.6777 (0.6); 2.6726 (0.7); 2.5126 (48.3); 2.5082 (101.8); 2.5037 (138.3); 2.4992 (98.9); 2.4949 (45.4); 2.3306 (0.8); 2.2978 (0.5); 2.2894 (0.6); 2.2773 (1.0); 2.2664 (0.6); 2.2576 (0.5); 1.2713 (3.4); 1.2528 (7.6); 1.2342 (3.5); 1.2147 (0.6); 1.2032 (1.7); 1.1977 (1.8); 1.1823 (1.7); 1.1768 (1.8); 1.1670 (0.7); 0.9825 (0.8); 0.9720 (2.0); 0.9669 (1.9); 0.9597 (1.8); 0.9543 (2.2); 0.9429 (0.6); 0.1471 (0.4); 0.0089 (3.5); 0.0007 (104.3); -0.0076 (3.5); -0.1483 (0.4)</p>
<p>Example I-008: ¹H-NMR(300.1 Mhz, d₆-DMSO): δ= 9.8116 (5.2); 8.9631 (2.5); 8.9319 (2.7); 8.7322 (6.0); 8.7034 (3.5); 8.6972 (3.5); 8.2466 (1.9); 8.2399 (1.9); 8.2156 (1.8); 8.2088 (1.7); 4.0407 (0.5); 4.0172 (0.6); 3.9927 (0.4); 3.9523 (16.0); 3.8071 (1.0); 3.7831 (2.8); 3.7582 (2.9); 3.7346 (1.1); 3.3315 (5.9); 2.5034 (17.0); 1.9900 (2.0); 1.2831 (4.2); 1.2586 (8.6); 1.2339 (4.5); 1.1984 (0.7); 1.1747 (1.1); 1.1509 (0.6); 1.1424 (0.5); -0.0009 (6.7)</p>
<p>Example I-010: ¹H-NMR(400.2 Mhz, d₆-DMSO): δ= 9.7735 (4.6); 8.9777 (2.2); 8.9544 (2.4); 8.8829 (2.6); 8.8800 (2.5); 8.6671 (2.8); 8.6616 (2.8); 8.6256 (2.7); 8.6219 (2.6); 8.2127 (1.7); 8.2070 (1.6); 8.1894 (1.6); 8.1836 (1.5); 3.8497 (0.6); 3.8317 (1.9); 3.8131 (2.0); 3.7834 (16.0); 3.3218 (18.5); 2.5062 (25.4); 2.5019 (32.8); 2.4977 (23.5); 2.0754 (0.5); 1.2914 (3.8); 1.2729 (8.1); 1.2544 (3.6); -0.0003 (14.9); -0.0084 (0.6)</p>
<p>Example I-012: ¹H-NMR(400.2 Mhz, d₆-DMSO): δ= 9.8591 (1.9); 9.3155 (4.0); 9.3015 (1.6); 9.2793 (1.7); 9.1728 (0.5); 8.5022 (1.6); 8.4840 (1.9); 8.3241 (1.1); 8.3159 (0.3); 8.3024 (1.5); 8.2948 (4.4); 8.2837 (1.0); 5.7563 (3.4); 4.5100 (0.4); 3.9214 (16.0); 3.8731 (0.5); 3.8548 (1.4); 3.8366 (1.4); 3.8181 (0.5); 3.5798 (0.4); 3.5614 (0.3); 3.3229 (59.4); 2.6758 (0.6); 2.6714 (0.8); 2.6669 (0.6); 2.5249 (2.5); 2.5200 (3.8); 2.5113 (50.0); 2.5070 (101.5); 2.5025 (133.2); 2.4980 (95.7); 2.4935 (46.4); 2.3338 (0.6); 2.3294 (0.8); 2.3247 (0.6); 2.0865 (1.3); 1.3975 (0.4); 1.3070 (4.0); 1.2885 (8.7); 1.2700 (3.9); 1.2347 (0.6); 1.1918 (0.4); 1.1734 (0.8); 1.1551 (0.4); 0.0079 (0.9); -0.0001 (27.0); -0.0084 (0.9)</p>
<p>Example I-013: ¹H-NMR(400.2 Mhz, d₆-DMSO): δ= 9.8570 (2.0); 9.3025 (1.7); 9.2926 (4.0); 9.2804 (1.8); 8.4998 (1.6); 8.4812 (1.9); 8.3218 (1.1); 8.3152 (0.4); 8.3009 (1.4); 8.2812 (0.9); 8.2691 (4.1); 5.7550 (2.0); 3.9225 (16.0); 3.8753 (0.5); 3.8568 (1.4); 3.8384 (1.4); 3.8204 (0.6); 3.3254 (74.9); 2.6763 (0.4); 2.6719 (0.6); 2.6674 (0.4);</p>

2.5251 (1.5); 2.5202 (2.4); 2.5117 (32.5); 2.5073 (66.3); 2.5028 (87.4); 2.4983 (63.7); 2.4939 (31.5); 2.3342 (0.4); 2.3296 (0.6); 2.3254 (0.4); 1.3079 (4.0); 1.2894 (8.7); 1.2708 (3.9); 0.0078 (2.0); -0.0002 (61.1); -0.0083 (2.4)
Example I-014: ¹ H-NMR(600.4 Mhz, CDCl ₃): δ = 9.8837 (1.5); 9.4070 (1.3); 9.3922 (1.3); 8.7197 (1.8); 8.7166 (1.8); 8.2663 (1.9); 8.2632 (1.9); 8.2356 (1.2); 8.2235 (1.4); 8.0815 (0.8); 8.0675 (1.0); 8.0545 (0.7); 7.2604 (11.5); 5.2980 (1.6); 3.9462 (16.0); 3.8876 (0.8); 3.8752 (2.4); 3.8627 (2.4); 3.8503 (0.8); 3.1177 (0.4); 1.5748 (3.0); 1.4952 (3.5); 1.4828 (7.5); 1.4703 (3.5); 1.2557 (0.4); -0.0001 (8.9)
Example I-015: ¹ H-NMR(400.2 Mhz, d ₆ -DMSO): δ = 9.6955 (4.1); 9.0689 (0.4); 8.8678 (2.5); 8.8580 (2.0); 8.8357 (1.9); 8.6413 (0.3); 8.6090 (2.5); 8.4548 (0.4); 8.2674 (2.4); 8.2335 (0.5); 8.1569 (0.3); 8.0326 (1.5); 8.0109 (1.4); 7.9474 (0.4); 6.5358 (1.2); 4.3727 (1.3); 3.7867 (1.9); 3.7701 (16.0); 3.4874 (0.4); 3.4692 (0.5); 3.3212 (158.2); 3.2013 (0.7); 3.0786 (0.3); 3.0193 (0.3); 2.6937 (1.3); 2.6699 (4.7); 2.6656 (3.7); 2.6364 (10.0); 2.5053 (535.8); 2.5009 (723.2); 2.4966 (543.7); 2.3321 (7.2); 2.3278 (8.2); 1.2758 (3.5); 1.2574 (7.6); 1.2387 (4.2); 1.1858 (0.4); 1.1668 (0.7); 1.1486 (0.6); 0.1458 (1.7); 0.0077 (16.7); -0.0003 (375.2); -0.0083 (22.4); -0.1012 (1.5); -0.1498 (2.4)
Example I-016: ¹ H-NMR(600.1 Mhz, d ₆ -DMSO): δ = 3.8272 (0.6); 3.3173 (16.0); 2.5075 (4.7); 2.5045 (10.4); 2.5014 (14.6); 2.4984 (10.4); 2.4953 (4.7); 1.3982 (0.5); 0.0053 (0.4); -0.0001 (13.0); -0.0057 (0.4)
Example I-018: ¹ H-NMR(400.2 Mhz, CDCl ₃): δ = 9.9674 (3.7); 9.1297 (1.8); 9.1076 (1.9); 8.9995 (3.3); 8.1473 (1.9); 8.1285 (2.1); 8.0946 (3.5); 7.8734 (1.5); 7.8543 (1.5); 7.8516 (1.7); 7.8324 (1.3); 7.2625 (16.1); 5.3009 (1.4); 3.9344 (16.0); 3.8145 (0.8); 3.7958 (2.3); 3.7772 (2.3); 3.7585 (0.8); 1.5849 (7.4); 1.4686 (3.7); 1.4500 (7.8); 1.4312 (3.6); 1.2548 (0.3); 0.0073 (0.8); -0.0002 (19.8); -0.0084 (0.8)
Example I-019: ¹ H-NMR(400.2 Mhz, CDCl ₃): δ = 9.9672 (3.2); 9.9651 (3.4); 9.1334 (1.6); 9.1134 (1.0); 9.1114 (1.7); 9.1095 (1.1); 9.0212 (2.9); 8.1494 (1.6); 8.1475 (1.7); 8.1305 (1.9); 8.1286 (1.9); 8.1186 (3.1); 8.1163 (3.2); 7.8747 (1.6); 7.8558 (1.5); 7.8527 (1.7); 7.8338 (1.4); 7.2616 (20.1); 5.3006 (12.6); 3.9339 (16.0); 3.8211 (0.6); 3.8024 (1.7); 3.7838 (1.8); 3.7651 (0.6); 1.5624 (20.1); 1.4726 (3.6); 1.4539 (7.8); 1.4352 (3.5); 0.0080 (0.6); -0.0002 (19.8); -0.0084 (0.6)
Example I-020: ¹ H-NMR(400.2 Mhz, d ₆ -DMSO): δ = 9.8948 (4.0); 9.8928 (4.3); 9.3156 (3.8); 9.2772 (1.8); 9.2548 (2.0); 8.6671 (2.0); 8.6489 (2.2); 8.3220 (1.7); 8.3160 (0.3); 8.3037 (1.8); 8.2990 (5.1); 8.2814 (1.6); 3.9033 (16.0); 3.8724 (0.5); 3.8539 (1.2); 3.8357 (1.2); 3.8172 (0.5); 3.3225 (39.3); 2.6756 (0.6); 2.6710 (0.8); 2.6664 (0.6); 2.5245 (2.5); 2.5198 (3.8); 2.5110 (47.9); 2.5066 (99.5); 2.5020 (132.1); 2.4975 (94.6); 2.4929 (45.2); 2.3335 (0.6); 2.3288 (0.8); 2.3243 (0.6); 2.0747 (4.3); 1.2969 (3.9); 1.2784 (8.6); 1.2598 (3.8); -0.0002 (2.3)
Example I-021: ¹ H-NMR(400.1 Mhz, d ₆ -DMSO): δ = 9.9888 (4.6); 9.3370 (2.8); 8.8960 (2.7); 8.8928 (2.7); 8.7750 (1.8); 8.7536 (1.9); 8.6456 (2.8); 8.6421 (2.7); 8.3497 (1.7); 8.3282 (1.5); 8.3255 (1.5); 3.9439 (0.8); 3.9254 (2.3); 3.9069 (2.3); 3.8884 (0.8); 3.7988 (16.0); 3.3148 (16.4); 2.5075 (10.6); 2.5032 (13.8); 2.4988 (10.1); 1.3076 (3.8); 1.2891 (8.1); 1.2706 (3.7); -0.0002 (7.8)
Example I-022: ¹ H-NMR(400.2 Mhz, d ₆ -DMSO): δ = 10.4806 (2.5); 9.6903 (3.7); 9.5278 (0.4); 8.8783 (2.2); 8.8665 (2.4); 8.8630 (2.4); 8.8550 (2.1); 8.6373 (0.3); 8.6038 (4.2); 8.0888 (1.3); 8.0831 (1.2); 8.0652 (1.2); 8.0595 (1.2); 3.8016 (0.8); 3.7807 (14.8); 3.7670 (16.0); 3.7468 (2.1); 3.5078 (0.8); 3.3280 (22.0); 2.5066 (40.1); 2.5022 (54.0); 2.4978 (39.8); 2.3288 (0.4); 2.0762 (1.5); 1.2774 (3.6); 1.2588 (7.8); 1.2400 (5.4); 1.2345 (4.0); 1.1856 (0.3); 0.8533 (0.6); 0.8366 (0.4); 0.0078 (1.0); -0.0002 (22.7); -0.0083 (1.0)

<p>Example I-024: ¹H-NMR(400.2 Mhz, d₆-DMSO): δ= 9.8524 (1.6); 9.3012 (1.4); 9.2787 (1.4); 8.6170 (1.8); 8.6124 (1.8); 8.6110 (1.7); 8.4929 (1.3); 8.4743 (1.6); 8.3711 (1.7); 8.3677 (1.6); 8.3652 (1.4); 8.3148 (0.9); 8.2934 (1.1); 8.2744 (0.8); 5.7577 (2.4); 3.9012 (0.6); 3.8829 (1.8); 3.8643 (1.8); 3.8461 (0.6); 3.7883 (16.0); 3.3242 (215.3); 2.6799 (0.6); 2.6752 (1.3); 2.6706 (1.8); 2.6662 (1.2); 2.6617 (0.6); 2.5242 (5.0); 2.5195 (7.2); 2.5108 (102.8); 2.5063 (213.9); 2.5017 (282.2); 2.4971 (197.1); 2.4926 (91.4); 2.3377 (0.6); 2.3331 (1.2); 2.3285 (1.7); 2.3240 (1.2); 2.3194 (0.6); 1.3185 (3.6); 1.3000 (8.2); 1.2815 (3.5); -0.0002 (2.6)</p>
<p>Example I-025: ¹H-NMR(300.1 Mhz, d₆-DMSO): δ= 10.0264 (4.4); 9.1539 (1.6); 9.1233 (1.8); 9.0825 (2.4); 8.7428 (7.0); 8.4810 (1.4); 8.4748 (1.4); 8.4504 (1.3); 8.4440 (1.3); 3.9687 (16.0); 3.8376 (0.8); 3.8127 (2.3); 3.7878 (2.4); 3.7632 (0.8); 3.3213 (14.8); 3.2974 (0.4); 2.5084 (14.2); 2.5026 (18.9); 2.4970 (13.6); 1.3005 (3.8); 1.2758 (8.3); 1.2511 (3.7); -0.0005 (7.1)</p>
<p>Example I-026: ¹H-NMR(400.2 Mhz, CDCl₃): δ= 9.9676 (2.9); 9.9654 (3.0); 9.4478 (0.9); 9.4454 (1.6); 9.4432 (0.9); 9.4254 (0.9); 9.4230 (1.6); 9.4208 (0.9); 8.7857 (1.6); 8.7824 (1.6); 8.2993 (1.6); 8.2956 (1.7); 8.2858 (1.3); 8.2836 (1.4); 8.2677 (1.6); 8.2654 (1.6); 8.1098 (1.5); 8.0916 (1.3); 8.0874 (1.5); 8.0693 (1.2); 7.2612 (30.0); 3.9388 (16.0); 3.9169 (0.8); 3.8982 (2.6); 3.8795 (2.6); 3.8609 (0.8); 1.5514 (16.2); 1.4983 (3.3); 1.4796 (7.2); 1.4609 (3.2); 0.0694 (1.0); 0.0080 (1.0); -0.0002 (31.0); -0.0085 (0.9)</p>
<p>Example I-027: ¹H-NMR(400.2 Mhz, d₆-DMSO): δ= 9.9665 (3.8); 9.9646 (4.0); 8.9890 (1.8); 8.9670 (1.9); 8.7325 (5.7); 8.4124 (2.0); 8.3935 (2.2); 8.1060 (1.6); 8.0868 (1.7); 8.0842 (1.8); 8.0650 (1.5); 3.9617 (16.0); 3.8019 (0.6); 3.7833 (1.7); 3.7647 (1.6); 3.7467 (0.6); 3.3333 (35.2); 2.6802 (0.4); 2.6758 (0.8); 2.6712 (1.0); 2.6667 (0.8); 2.6621 (0.4); 2.5246 (3.2); 2.5199 (4.9); 2.5112 (61.0); 2.5068 (125.1); 2.5022 (165.0); 2.4977 (118.1); 2.4932 (56.8); 2.3381 (0.3); 2.3336 (0.7); 2.3290 (1.0); 2.3244 (0.7); 2.0746 (0.5); 1.2799 (3.8); 1.2614 (8.6); 1.2429 (3.8); -0.0002 (3.0)</p>
<p>Example I-028: ¹H-NMR(400.2 Mhz, d₆-DMSO): δ= 9.8021 (4.3); 8.8743 (2.0); 8.8526 (3.8); 8.8493 (4.4); 8.7232 (6.1); 8.3451 (1.7); 8.3395 (1.5); 8.3221 (1.4); 8.3164 (1.8); 5.7558 (1.4); 3.9495 (16.0); 3.7899 (0.6); 3.7720 (1.7); 3.7538 (1.7); 3.7353 (0.6); 3.5857 (0.4); 3.5799 (0.6); 3.3233 (91.2); 2.6757 (0.7); 2.6712 (0.9); 2.6667 (0.7); 2.6620 (0.4); 2.5246 (2.7); 2.5111 (53.5); 2.5067 (108.3); 2.5022 (142.3); 2.4977 (102.8); 2.4933 (50.2); 2.3335 (0.6); 2.3291 (0.9); 2.3244 (0.7); 1.2743 (3.8); 1.2558 (8.5); 1.2373 (4.0); 0.1459 (0.7); 0.0080 (5.7); -0.0001 (158.7); -0.0084 (6.4); -0.1496 (0.7)</p>
<p>Example I-029: ¹H-NMR(400.2 Mhz, CDCl₃): δ= 9.9786 (3.1); 9.9765 (3.2); 9.1290 (1.6); 9.1270 (1.0); 9.1090 (1.0); 9.1070 (1.6); 9.1050 (1.0); 9.0764 (2.1); 9.0713 (2.1); 8.6550 (1.9); 8.6500 (1.9); 8.1628 (1.5); 8.1609 (1.6); 8.1439 (1.8); 8.1420 (1.7); 7.8878 (1.5); 7.8688 (1.4); 7.8658 (1.6); 7.8468 (1.3); 7.2620 (20.1); 5.3010 (1.3); 3.9494 (16.0); 3.8167 (0.7); 3.7981 (2.1); 3.7794 (2.2); 3.7608 (0.7); 1.5652 (16.4); 1.4882 (3.4); 1.4695 (7.4); 1.4508 (3.3); 0.0079 (0.6); -0.0002 (20.9); -0.0085 (0.6)</p>
<p>Example I-030: ¹H-NMR(400.2 Mhz, CDCl₃): δ= 9.9670 (3.1); 9.9648 (3.1); 9.4520 (0.9); 9.4498 (1.6); 9.4475 (0.9); 9.4297 (1.0); 9.4274 (1.7); 9.4251 (0.9); 8.7292 (1.6); 8.7246 (1.6); 8.2876 (1.4); 8.2853 (1.4); 8.2736 (1.9); 8.2694 (3.4); 8.1126 (1.5); 8.0945 (1.3); 8.0902 (1.5); 8.0721 (1.3); 7.2615 (17.0); 5.3008 (11.9); 3.9419 (16.0); 3.9222 (0.8); 3.9034 (2.4); 3.8847 (2.5); 3.8661 (0.8); 2.0089 (0.8); 1.5582 (7.8); 1.5012 (3.4); 1.4825 (7.3); 1.4638 (3.2); 0.0698 (1.0); 0.0079 (0.7); -0.0002 (18.1); -0.0086 (0.5)</p>
<p>Example I-031: ¹H-NMR(400.2 Mhz, CDCl₃): δ= 10.0075 (3.3); 10.0054 (3.2); 9.0904 (0.8); 9.0882 (0.8); 9.0782 (1.3); 9.0761 (1.1); 9.0660 (0.9); 9.0638 (0.8); 8.7101 (1.7); 8.7056 (1.7); 8.2621 (1.8); 8.2575 (1.8); 7.9303 (3.1); 7.9277</p>

(2.9); 7.9177 (3.3); 7.9159 (3.0); 7.2610 (34.5); 5.3007 (1.8); 3.9205 (16.0); 3.8524 (0.7); 3.8337 (2.2); 3.8150 (2.2); 3.7963 (0.7); 1.5485 (16.7); 1.4820 (3.5); 1.4633 (7.5); 1.4446 (3.4); 1.2552 (0.3); 0.0080 (1.0); -0.0002 (36.2); -0.0084 (1.1)
Example I-032: ¹ H-NMR(400.1 Mhz, d ₆ -DMSO): δ = 9.8633 (2.2); 9.3049 (1.7); 9.2827 (1.8); 8.8956 (2.5); 8.8923 (2.6); 8.6468 (2.6); 8.6429 (2.6); 8.4989 (1.7); 8.4805 (2.0); 8.3215 (1.1); 8.3006 (1.5); 8.2809 (0.9); 3.9033 (0.8); 3.8849 (2.2); 3.8664 (2.2); 3.8480 (0.9); 3.8216 (16.0); 3.3357 (9.6); 2.5085 (12.7); 2.5041 (17.3); 2.4998 (12.9); 1.3225 (3.9); 1.3040 (8.2); 1.2854 (3.7); 0.0079 (0.4); 0.0000 (7.9); -0.0080 (0.3)
Example I-033: ¹ H-NMR(400.1 Mhz, d ₆ -DMSO): δ = 9.6674 (4.0); 8.8843 (1.9); 8.8660 (2.4); 8.8612 (3.9); 8.6007 (2.3); 8.5969 (2.2); 7.9224 (2.1); 7.9156 (2.4); 7.8169 (1.6); 7.8100 (1.4); 7.7931 (1.5); 7.7862 (1.4); 4.0272 (14.3); 3.8067 (0.6); 3.7884 (1.5); 3.7658 (16.0); 3.3189 (368.8); 3.2954 (3.8); 2.6746 (0.9); 2.6702 (1.2); 2.6656 (0.9); 2.6610 (0.4); 2.5100 (73.5); 2.5056 (148.6); 2.5011 (198.1); 2.4967 (140.8); 2.4924 (66.5); 2.3325 (0.9); 2.3279 (1.2); 2.3234 (0.9); 1.2739 (3.5); 1.2554 (7.7); 1.2368 (3.5); 0.0080 (1.2); -0.0001 (30.9); -0.0084 (1.2)
Example I-034: ¹ H-NMR(400.1 Mhz, d ₆ -DMSO): δ = 10.0649 (4.4); 9.1697 (2.1); 9.1468 (2.4); 9.1358 (2.8); 9.1313 (2.7); 8.8957 (2.3); 8.8922 (2.4); 8.6438 (2.5); 8.6400 (2.4); 8.5321 (1.8); 8.5271 (1.6); 8.5092 (1.7); 8.5041 (1.6); 6.5184 (0.6); 3.8945 (0.8); 3.8768 (2.1); 3.8585 (2.1); 3.8395 (0.8); 3.8078 (16.0); 3.5501 (1.1); 3.5315 (3.5); 3.5132 (3.6); 3.4949 (1.1); 3.3120 (69.8); 3.2882 (0.8); 2.6741 (1.3); 2.6697 (1.7); 2.6650 (1.2); 2.5095 (98.6); 2.5051 (197.3); 2.5006 (262.9); 2.4961 (188.4); 2.4917 (86.5); 2.3320 (1.2); 2.3276 (1.6); 2.3229 (1.2); 2.0733 (1.3); 1.3198 (3.9); 1.3012 (8.4); 1.2827 (3.7); 1.2071 (3.8); 1.1888 (8.5); 1.1704 (3.6); 0.1460 (0.6); 0.0079 (6.4); -0.0001 (141.3); -0.0084 (4.6); -0.1494 (0.6)
Example I-035: ¹ H-NMR(400.2 Mhz, d ₆ -DMSO): δ = 10.6975 (2.4); 9.7086 (4.0); 9.5474 (0.4); 8.8950 (1.9); 8.8699 (5.5); 8.6344 (0.3); 8.6057 (2.3); 8.6021 (2.2); 8.0868 (1.3); 8.0810 (1.3); 8.0633 (1.2); 8.0578 (1.3); 3.8067 (0.7); 3.7884 (1.8); 3.7695 (16.0); 3.7485 (2.2); 3.3276 (21.3); 2.6706 (1.0); 2.5103 (58.2); 2.5061 (120.0); 2.5017 (162.4); 2.4972 (118.4); 2.4930 (56.9); 2.3332 (0.8); 2.3287 (1.0); 2.3241 (0.7); 2.1891 (12.6); 2.1725 (1.7); 1.2815 (3.5); 1.2631 (7.8); 1.2443 (4.0); 1.2246 (0.5); 0.1460 (0.4); 0.0078 (4.0); -0.0003 (99.9); -0.0084 (4.1); -0.1496 (0.5)
Example I-036: ¹ H-NMR(400.2 Mhz, d ₆ -DMSO): δ = 9.6509 (4.5); 8.9438 (2.1); 8.9199 (2.3); 8.8741 (2.5); 8.8708 (2.5); 8.6133 (2.6); 8.6094 (2.6); 8.0980 (2.3); 8.0912 (2.5); 7.9467 (1.6); 7.9398 (1.4); 7.9229 (1.5); 7.9160 (1.4); 5.1267 (0.9); 5.1049 (2.8); 5.0831 (2.9); 5.0611 (1.0); 3.8293 (0.6); 3.8112 (1.7); 3.7925 (1.9); 3.7764 (16.0); 3.3251 (26.1); 2.5062 (26.6); 2.5019 (35.5); 2.4976 (26.1); 2.0754 (0.6); 1.2811 (3.7); 1.2626 (8.0); 1.2441 (3.6); 0.0073 (1.0); -0.0003 (20.8); -0.0084 (0.8)
Example I-037: ¹ H-NMR(400.2 Mhz, d ₆ -DMSO): δ = 9.7668 (4.3); 8.8939 (2.1); 8.8817 (2.4); 8.8781 (2.5); 8.8707 (2.4); 8.8192 (2.8); 8.8139 (2.8); 8.6229 (2.4); 8.6188 (2.4); 8.3169 (1.9); 8.3115 (1.6); 8.2937 (1.6); 8.2883 (1.6); 3.8456 (0.6); 3.8273 (1.7); 3.8089 (1.7); 3.7826 (16.0); 3.3267 (59.1); 2.6762 (0.5); 2.6718 (0.6); 2.6672 (0.5); 2.5250 (2.9); 2.5116 (40.5); 2.5073 (77.5); 2.5028 (99.5); 2.4983 (72.9); 2.4940 (36.0); 2.3340 (0.4); 2.3297 (0.6); 2.3251 (0.4); 1.2897 (3.7); 1.2712 (8.1); 1.2527 (3.6); 0.0078 (2.9); -0.0002 (70.8); -0.0084 (2.9)
Example I-038: ¹ H-NMR(400.2 Mhz, d ₆ -DMSO): δ = 10.9573 (2.7); 9.6777 (4.2); 8.9000 (1.8); 8.8761 (2.1); 8.8684 (4.3); 8.8635 (5.0); 8.6010 (2.5); 8.1237 (1.4); 8.1180 (1.4); 8.1002 (1.4); 8.0947 (1.5); 6.5510 (0.6); 3.8098 (0.6); 3.7911 (1.6); 3.7687 (16.0); 3.3258 (97.0); 3.3019 (0.8); 2.6747 (1.2); 2.6704 (1.6); 2.6658 (1.3); 2.5102 (98.7); 2.5059 (201.3); 2.5014 (270.0); 2.4970 (192.7); 2.4928 (89.5); 2.3329 (1.2); 2.3284 (1.5);

2.3241 (1.2); 2.0754 (1.0); 1.9325 (0.7); 1.9171 (1.0); 1.9007 (0.8); 1.2836 (3.6); 1.2651 (7.7); 1.2466 (3.5); 0.9228 (6.7); 0.9087 (3.8); 0.1460 (0.8); 0.0617 (0.4); 0.0079 (7.4); -0.0002 (149.5); -0.0085 (3.8); -0.1493 (0.6)
Example I-039: ¹ H-NMR(300.1 Mhz, d ₆ -DMSO): δ = 9.8713 (4.4); 8.9241 (2.8); 8.7317 (6.9); 8.6063 (2.4); 8.5771 (2.7); 8.1540 (1.9); 8.1477 (2.0); 8.1248 (1.7); 8.1185 (1.7); 3.9482 (16.0); 3.8436 (0.8); 3.8187 (2.2); 3.7939 (2.3); 3.7694 (0.8); 3.3189 (131.6); 2.7267 (0.5); 2.7212 (0.4); 2.5124 (30.8); 2.5068 (60.4); 2.5010 (80.0); 2.4953 (56.9); 2.2709 (0.5); 2.2645 (0.4); 2.0744 (0.4); 1.2894 (3.8); 1.2648 (8.3); 1.2401 (3.8); 0.0105 (1.4); -0.0004 (31.1); -0.0114 (1.1)
Example I-041: ¹ H-NMR(300.1 Mhz, d ₆ -DMSO): δ = 9.9704 (5.0); 9.0807 (2.0); 9.0505 (2.1); 8.7883 (2.8); 8.7337 (6.4); 8.3417 (1.7); 8.3071 (1.6); 7.6107 (1.0); 7.4261 (2.6); 7.2423 (1.3); 4.1955 (0.8); 3.9911 (0.4); 3.9621 (16.0); 3.8182 (0.9); 3.7934 (2.7); 3.7689 (2.8); 3.7463 (1.0); 3.7237 (0.3); 3.3204 (58.1); 3.2971 (1.5); 2.7289 (0.5); 2.5018 (61.7); 2.2704 (0.4); 1.4777 (0.4); 1.4536 (0.5); 1.2922 (4.0); 1.2676 (8.7); 1.2430 (4.4); 0.8584 (0.5); -0.0002 (16.9); -0.0652 (0.7)
Example I-042: ¹ H-NMR(300.1 Mhz, d ₆ -DMSO): δ = 9.9489 (4.0); 9.1291 (2.1); 8.7348 (7.1); 8.7081 (1.6); 8.6799 (1.8); 8.2286 (1.4); 8.2004 (1.3); 7.6419 (1.0); 7.4584 (2.2); 7.2752 (1.0); 4.0411 (0.5); 4.0174 (0.5); 3.9597 (16.0); 3.8374 (0.7); 3.8127 (2.3); 3.7880 (2.3); 3.7634 (0.8); 3.3178 (39.8); 3.2943 (0.4); 2.5135 (12.0); 2.5076 (23.5); 2.5016 (31.1); 2.4956 (21.2); 2.4898 (9.6); 1.9888 (2.1); 1.2988 (3.8); 1.2741 (8.4); 1.2494 (4.0); 1.2344 (1.6); 1.1984 (0.7); 1.1747 (1.2); 1.1510 (0.6); 0.8599 (0.4); 0.0106 (1.0); -0.0003 (23.8); -0.0114 (0.8)
Example I-043: ¹ H-NMR(400.2 Mhz, CDCl ₃): δ = 9.4720 (3.2); 9.0229 (1.6); 8.9997 (1.8); 8.4069 (2.2); 8.4017 (2.2); 8.1789 (5.3); 8.1307 (1.6); 8.1254 (1.5); 8.1075 (1.5); 8.1022 (1.4); 7.2618 (17.6); 5.3010 (0.9); 4.0692 (16.0); 3.7645 (0.6); 3.7458 (1.9); 3.7272 (2.0); 3.7085 (0.6); 1.5597 (8.4); 1.4681 (3.6); 1.4494 (7.7); 1.4307 (3.5); 1.2547 (0.6); 0.0079 (0.5); -0.0002 (18.5); -0.0086 (0.5)
Example I-044: ¹ H-NMR(300.1 Mhz, d ₆ -DMSO): δ = 9.7533 (4.1); 9.6049 (0.3); 8.7487 (0.5); 8.7092 (7.1); 8.6694 (2.4); 8.4435 (2.0); 8.4155 (2.3); 7.9316 (1.5); 7.9276 (1.5); 7.9035 (1.3); 7.8996 (1.4); 4.1333 (1.0); 3.9515 (0.6); 3.9363 (16.0); 3.7824 (0.7); 3.7576 (2.1); 3.7329 (2.2); 3.7084 (0.8); 3.3239 (29.5); 2.6913 (9.7); 2.6365 (0.8); 2.5145 (13.8); 2.5086 (27.0); 2.5026 (35.8); 2.4967 (24.6); 2.4910 (11.2); 1.9895 (0.5); 1.4080 (0.6); 1.2746 (3.9); 1.2499 (9.2); 1.2341 (1.6); 1.2253 (3.9); 0.8815 (0.4); 0.8704 (0.5); 0.8596 (1.4); 0.8360 (0.5); -0.0005 (5.4)
Example I-045: ¹ H-NMR(300.1 Mhz, d ₆ -DMSO): δ = 10.0279 (5.0); 9.3059 (3.4); 8.8110 (2.0); 8.7825 (2.3); 8.7466 (6.3); 8.3878 (2.1); 8.3593 (1.8); 4.2371 (0.5); 3.9657 (16.0); 3.8923 (1.1); 3.8681 (3.0); 3.8435 (3.0); 3.8190 (1.1); 3.3203 (25.8); 2.5034 (18.1); 1.9896 (0.9); 1.3009 (4.1); 1.2764 (8.4); 1.2517 (4.1); 1.1756 (0.5); -0.0008 (4.1)
Example I-046: ¹ H-NMR(400.2 Mhz, CDCl ₃): δ = 9.9980 (3.2); 9.9959 (3.2); 9.1242 (1.6); 9.1222 (1.0); 9.1042 (1.0); 9.1022 (1.7); 9.1002 (1.0); 8.1837 (5.1); 8.1787 (1.6); 8.1768 (1.7); 8.1598 (1.8); 8.1579 (1.7); 7.9011 (1.5); 7.8821 (1.4); 7.8791 (1.6); 7.8601 (1.3); 7.2617 (21.2); 4.0855 (16.0); 3.7785 (0.7); 3.7598 (2.2); 3.7411 (2.2); 3.7225 (0.7); 1.5610 (4.0); 1.4792 (3.5); 1.4605 (7.6); 1.4418 (3.4); 1.2543 (0.7); 0.0080 (0.7); -0.0002 (23.8); -0.0085 (0.8)
Example I-048: ¹ H-NMR(400.2 Mhz, CDCl ₃): δ = 9.4231 (3.8); 9.1422 (1.8); 9.1185 (1.9); 8.6991 (1.9); 8.6948 (2.0); 8.2512 (2.1); 8.2466 (2.1); 7.7385 (1.4); 7.7316 (1.5); 7.7146 (1.4); 7.7077 (1.5); 7.4702 (2.2); 7.4634 (2.1); 7.2617 (33.3);

5.3006 (1.4); 4.6381 (1.1); 4.6185 (3.4); 4.5990 (3.5); 4.5793 (1.2); 3.9036 (0.6); 3.8955 (16.0); 3.8138 (0.7); 3.7952 (2.0); 3.7765 (2.0); 3.7579 (0.7); 1.5666 (7.8); 1.4601 (3.6); 1.4509 (0.4); 1.4414 (7.6); 1.4227 (3.5); 1.2543 (0.4); 0.0078 (1.0); -0.0002 (30.5); -0.0084 (1.0)
Example I-049: ¹ H-NMR(600.1 Mhz, CDCl ₃): δ = 9.4141 (0.6); 8.6958 (0.3); 8.6928 (0.3); 8.2481 (0.3); 8.2451 (0.3); 7.4466 (0.4); 7.4420 (0.4); 7.2606 (13.6); 4.4366 (0.3); 4.4299 (0.3); 3.8924 (2.8); 1.5473 (16.0); 1.4500 (0.6); 1.4376 (1.3); 1.4251 (0.6); 0.0053 (0.3); -0.0001 (11.0); -0.0056 (0.3)
Example I-050: ¹ H-NMR(400.2 Mhz, CDCl ₃): δ = 9.4403 (3.0); 9.4390 (3.0); 9.4051 (2.8); 9.0384 (1.5); 9.0151 (1.6); 8.9991 (1.3); 8.9764 (1.4); 8.7068 (1.6); 8.7024 (1.7); 8.6886 (1.5); 8.6840 (1.5); 8.3711 (2.0); 8.3659 (2.1); 8.2571 (1.7); 8.2522 (1.8); 8.2458 (1.6); 8.2413 (1.6); 8.0944 (1.5); 8.0892 (1.4); 8.0712 (1.4); 8.0659 (1.4); 7.8421 (1.6); 7.8379 (1.7); 7.7104 (1.1); 7.7056 (1.0); 7.6877 (1.1); 7.6828 (1.0); 7.2617 (50.2); 7.2547 (0.4); 5.3007 (13.0); 3.9032 (16.0); 3.8840 (14.5); 3.8348 (0.6); 3.8159 (1.8); 3.7973 (1.9); 3.7784 (1.0); 3.7590 (1.3); 3.7404 (1.4); 3.7218 (0.5); 2.2154 (0.4); 2.2071 (0.4); 2.1945 (0.8); 2.1823 (0.4); 2.1736 (0.4); 1.5656 (22.2); 1.4682 (3.4); 1.4497 (9.9); 1.4313 (9.4); 1.4128 (3.0); 1.2484 (0.6); 1.2360 (1.3); 1.2316 (1.5); 1.2197 (0.8); 1.2150 (1.4); 1.2107 (1.3); 1.1988 (0.6); 0.9640 (0.6); 0.9518 (1.9); 0.9479 (1.5); 0.9395 (1.4); 0.9353 (1.9); 0.9227 (0.5); 0.0079 (1.4); 0.0054 (0.8); -0.0002 (54.1); -0.0086 (1.8)
Example I-051: ¹ H-NMR(600.1 Mhz, CDCl ₃): δ = 9.6302 (3.0); 9.2859 (1.6); 9.2708 (1.7); 8.6243 (1.9); 8.6220 (1.8); 8.1931 (4.9); 8.1822 (1.4); 8.1793 (1.4); 8.1672 (1.4); 8.1643 (1.3); 7.4328 (0.4); 7.2611 (62.0); 7.0843 (0.3); 4.0972 (14.7); 3.8086 (0.6); 3.7961 (1.6); 3.7837 (1.6); 3.7712 (0.6); 1.6064 (0.4); 1.5998 (0.5); 1.5953 (0.6); 1.5907 (0.7); 1.5580 (16.0); 1.4877 (3.3); 1.4826 (0.5); 1.4753 (7.0); 1.4628 (3.3); 1.4236 (0.4); 1.4113 (0.7); 1.4045 (0.6); 1.3997 (0.3); 1.3931 (0.5); 1.2884 (0.3); 1.2724 (0.6); 1.2553 (1.8); 1.2400 (0.5); 1.2327 (0.4); 1.2276 (0.7); 1.2204 (0.4); 1.2153 (0.4); 0.8804 (0.3); 0.0053 (2.0); -0.0001 (47.0); -0.0057 (0.9)
Example I-052: ¹ H-NMR(600.1 Mhz, CDCl ₃): δ = 10.0378 (3.4); 10.0364 (3.3); 9.0710 (0.9); 9.0697 (0.9); 9.0641 (0.9); 9.0622 (1.4); 9.0549 (1.0); 9.0535 (0.9); 8.1834 (5.3); 8.0146 (0.4); 7.9722 (0.4); 7.9664 (4.8); 7.9595 (3.0); 7.9569 (2.8); 7.2625 (8.0); 5.3001 (0.6); 4.1985 (1.2); 4.0839 (16.0); 3.7674 (0.7); 3.7549 (1.9); 3.7425 (1.9); 3.7300 (0.7); 1.5803 (5.2); 1.4727 (3.7); 1.4602 (7.7); 1.4478 (3.6); 1.4050 (0.5); 1.3377 (0.5); 1.3061 (0.4); 1.2554 (0.8); 0.0710 (0.5); -0.0001 (5.9)
Example I-053: ¹ H-NMR(400.2 MHz, d ₆ -DMSO): δ = 9.6479 (4.2); 8.9210 (2.0); 8.8971 (2.1); 8.8058 (2.3); 8.8012 (2.5); 8.5703 (2.5); 8.5657 (2.4); 8.0391 (2.1); 8.0322 (2.3); 7.9134 (1.6); 7.9065 (1.4); 7.8896 (1.5); 7.8827 (1.4); 5.7626 (0.8); 4.6360 (1.4); 4.6046 (3.0); 4.5730 (1.5); 3.8204 (0.5); 3.8018 (1.4); 3.7784 (16.0); 3.3380 (24.2); 2.5119 (6.7); 2.5076 (13.8); 2.5032 (18.6); 2.4987 (13.5); 2.4944 (6.4); 1.8855 (2.4); 1.8373 (5.3); 1.7890 (2.6); 1.2761 (3.5); 1.2576 (7.8); 1.2390 (3.6); -0.0011 (4.8)

Use examples

Ctenocephalides felis - in vitro contact tests with adult cat fleas

For the coating of the test tubes, 9 mg of active compound are first dissolved in 1 ml of acetone p.a. and then diluted to the desired concentration with acetone p.a. 250 μ l of the solution are distributed homogeneously on the inner walls and the base of a 25 ml glass tube by turning and rocking on an orbital

shaker (rocking rotation at 30 rpm for 2 h). With 900 ppm of active compound solution and internal surface area 44.7 cm², given homogeneous distribution, an area-based dose of 5 µg/cm² is achieved.

After the solvent has evaporated off, the tubes are populated with 5-10 adult cat fleas (*Ctenocephalides felis*), sealed with a perforated plastic lid and incubated in a horizontal position at room temperature and ambient humidity. After 48 h, efficacy is determined. To this end, the tubes are stood upright and the fleas are knocked to the base of the tube. Fleas which remain motionless at the base or move in an uncoordinated manner are considered to be dead or moribund.

A substance shows good efficacy against *Ctenocephalides felis* if at least 80% efficacy was achieved in this test at an application rate of 5 µg/cm². 100% efficacy means that all the fleas were dead or moribund. 0% efficacy means that no fleas were harmed.

In this test, for example, the following compounds from the preparation examples show an efficacy of 100% at an application rate of 5 µg/cm² (= 500 g/ha): I-005, I-025, I-032, I-034, I-037.

In this test, for example, the following compounds from the preparation examples show an efficacy of 90% at an application rate of 5 µg/cm² (= 500 g/ha): I-012.

15 **Rhipicephalus sanguineus - in vitro contact tests with adult brown dog ticks**

For the coating of the test tubes, 9 mg of active compound are first dissolved in 1 ml of acetone p.a. and then diluted to the desired concentration with acetone p.a. 250 µl of the solution are distributed homogeneously on the inner walls and the base of a 25 ml glass tube by turning and rocking on an orbital shaker (rocking rotation at 30 rpm for 2 h). With 900 ppm of active compound solution and internal surface area 44.7 cm², given homogeneous distribution, an area-based dose of 5 µg/cm² is achieved.

After the solvent has evaporated off, the tubes are populated with 5-10 adult dog ticks (*Rhipicephalus sanguineus*), sealed with a perforated plastic lid and incubated in a horizontal position in the dark at room temperature and ambient humidity. After 48 h, efficacy is determined. To this end, the ticks are knocked to the base of the tube and incubated on a hotplate at 45-50°C for not more than 5 min. Ticks which remain motionless on the base or move in such an uncoordinated manner that they are unable to deliberately avoid the heat by climbing upwards are considered to be dead or moribund.

A substance shows good activity against *Rhipicephalus sanguineus* if, in this test, an efficacy of at least 80% was achieved at an application rate of 5 µg/cm². An efficacy of 100% means that all the ticks were dead or moribund. 0% efficacy means that none of the ticks were harmed.

In this test, for example, the following compounds of the Preparation Examples show an efficacy of 100% at an application rate of 5 µg/cm²: I-032, I-037.

Boophilus microplus – injection test

Solvent: Dimethyl sulfoxide

To produce a suitable active compound formulation, 10 mg of active compound are mixed with 0.5 ml of solvent and the concentrate is diluted to the desired concentration with solvent.

- 5 1 µl of the active compound solution is injected into the abdomen of 5 engorged adult female cattle ticks (*Boophilus microplus*). The animals are transferred into dishes and kept in a climate-controlled room.

Efficacy is assessed after 7 days by laying of fertile eggs. Eggs which are not visibly fertile are stored in a climate-controlled cabinet until the larvae hatch after about 42 days. An efficacy of 100% means that none of the ticks has laid any fertile eggs; 0% means that all the eggs are fertile.

- 10 In this test, for example, the following compounds from the preparation examples show an efficacy of 80% at an application rate of 20 µg/animal: I-010.

Ctenocephalides felis - oral test

Solvent: Dimethyl sulfoxide

- 15 To produce a suitable active compound formulation, 10 mg of active compound are mixed with 0.5 ml of dimethyl sulfoxide. Dilution with citrated cattle blood gives the desired concentration.

About 20 unfed adult cat fleas (*Ctenocephalides felis*) are placed into a chamber which is closed at the top and bottom with gauze. A metal cylinder whose bottom end is closed with parafilm is placed onto the chamber. The cylinder contains the blood/active compound formulation, which can be imbibed by the fleas through the parafilm membrane.

- 20 After 2 days, the kill in % is determined. 100% means that all of the fleas have been killed; 0% means that none of the fleas have been killed.

In this test, for example, the following compounds from the preparation examples show an efficacy of 100% at an application rate of 100 ppm: I-005, I-008, I-010, I-012, I-013, I-025, I-034, I-037.

- 25 In this test, for example, the following compounds from the preparation examples show an efficacy of 80% at an application rate of 100 ppm: I-003, I-024.

Lucilia cuprina test

Solvent: Dimethyl sulfoxide

To produce a suitable active compound formulation, 10 mg of active compound are mixed with 0.5 ml of dimethyl sulfoxide, and the concentrate is diluted with water to the desired concentration.

About 20 L1 larvae of the Australian sheep blowfly (*Lucilia cuprina*) are transferred into a test vessel containing minced horsemeat and the active compound formulation of the desired concentration.

- 5 After 2 days, the kill in % is determined. 100% means that all the larvae have been killed; 0% means that no larvae have been killed.

In this test, for example, the following compounds from the preparation examples show an efficacy of 100% at an application rate of 100 ppm: I-010, I-034.

Diabrotica balteata – spray test

- 10 Solvent: 78 parts by weight of acetone
1.5 parts by weight of dimethylformamide
Emulsifier: alkylaryl polyglycol ether

- To produce a suitable active compound preparation, 1 part by weight of active compound is dissolved using the stated parts by weight of solvent and made up with water containing an emulsifier concentration
15 of 1000 ppm until the desired concentration is attained. To produce further test concentrations, the formulation is diluted with emulsifier-containing water.

- Pre-swollen wheat grains (*Triticum aestivum*) are incubated in a multiwell plate filled with agar and a little water for one day (5 seed grains per well). The germinated wheat grains are sprayed with an active compound preparation of the desired concentration. Subsequently, each cavity is infected with 10-20
20 beetle larvae of *Diabrotica balteata*.

After 7 days, the efficacy in % is determined. 100% means that all wheat plants have grown as in the untreated, uninfected control; 0% means that no wheat plant has grown.

- In this test, for example, the following compounds from the preparation examples show an efficacy of 100% at an application rate of 160 µg/cavity: I-004, I-006, I-016, I-018, I-019, I-020, I-025, I-027, I-029,
25 I-030, I-031, I-039, I-041, I-042, I-043, I-044, I-045, I-046, I-048, I-050, I-051, I-052, I-053.

In this test, for example, the following compounds from the preparation examples show an efficacy of 80% at an application rate of 160 µg/well: I-005, I-028, I-049.

Meloidogyne incognita test

- Solvent: 125.0 parts by weight of acetone

To produce a suitable active compound formulation, 1 part by weight of active compound is mixed with the stated amount of solvent and the concentrate is diluted to the desired concentration with water.

Vessels are filled with sand, active compound solution, an egg/larvae suspension of the southern root-knot nematode (*Meloidogyne incognita*) and lettuce seeds. The lettuce seeds germinate and the plants develop.

5 The galls develop on the roots.

After 14 days, the nematicidal efficacy in % is determined by the formation of galls. 100% means that no galls were found; 0% means that the number of galls on the treated plants corresponds to the untreated control.

10 In this test, for example, the following compound from the preparation examples shows an efficacy of 100% at an application rate of 20 ppm: I-008, I-027, I-041.

In this test, for example, the following compound from the preparation examples shows an efficacy of 90% at an application rate of 20 ppm: I-004, I-005, I-006, I-020, I-026, I-042.

Myzus persicae – oral test

Solvent: 100 parts by weight of acetone

15 To produce a suitable preparation of active compound, 1 part by weight of active compound is dissolved using the specified parts by weight of solvent and made up with water until the desired concentration is attained.

20 50 µl of the active compound preparation are transferred into microtitre plates and made up to a final volume of 200 µl with 150 µl of IPL41 insect medium (33% + 15% sugar). Subsequently, the plates are sealed with parafilm, which a mixed population of green peach aphids (*Myzus persicae*) within a second microtitre plate is able to puncture and imbibe the solution through it.

After 5 days, the efficacy in % is determined. 100% means that all the aphids have been killed; 0% means that no aphids have been killed.

25 In this test, for example, the following compounds from the preparation examples shows an efficacy of 100% at an application rate of 4 ppm: I-001, I-002, I-003, I-004, I-005, I-007, I-008, I-010, I-012, I-013, I-015, I-016, I-018, I-019, I-020, I-021, I-022, I-024, I-025, I-027, I-028, I-029, I-030, I-031, I-032, I-033, I-034, I-035, I-036, I-037, I-038, I-039, I-041, I-042, I-043, I-044, I-045, I-046, I-051, I-052.

In this test, for example, the following compounds from the preparation examples show an efficacy of 90% at an application rate of 4 ppm: I-006, I-014, I-026, I-050.

Myzus persicae – spray test

Solvent: 78 parts by weight of acetone
1.5 parts by weight of dimethylformamide

Emulsifier: alkylaryl polyglycol ether

- 5 To produce a suitable active compound preparation, 1 part by weight of active compound is dissolved using the stated parts by weight of solvent and made up with water containing an emulsifier concentration of 1000 ppm until the desired concentration is attained. To produce further test concentrations, the formulation is diluted with emulsifier-containing water.

10 Discs of Chinese cabbage leaves (*Brassica pekinensis*) infested by all stages of the green peach aphid (*Myzus persicae*) are sprayed with an active compound formulation of the desired concentration.

After 5 days, the efficacy in % is determined. 100% means that all the aphids have been killed; 0% means that no aphids have been killed.

15 In this test, for example, the following compounds from the preparation examples show an efficacy of 100% at an application rate of 100 g/ha: I-006, I-010, I-013, I-014, I-018, I-026, I-032, I-037, I-042, I-045.

In this test, for example, the following compounds from the preparation examples show an efficacy of 90% at an application rate of 100 g/ha: I-001, I-002, I-003, I-012, I-020, I-024, I-025, I-028, I-029, I-034, I-035, I-041, I-043, I-044.

20 In this test, for example, the following compounds from the preparation examples show an efficacy of 70% at an application rate of 100 g/ha: I-027.

Phaedon cochleariae - spray test

Solvent: 78.0 parts by weight of acetone
1.5 parts by weight of dimethylformamide

Emulsifier: alkylaryl polyglycol ether

25

To produce a suitable active compound preparation, 1 part by weight of active compound is dissolved using the stated parts by weight of solvent and made up with water containing an emulsifier concentration of 1000 ppm until the desired concentration is attained. To produce further test concentrations, the formulation is diluted with emulsifier-containing water.

Discs of Chinese cabbage leaves (*Brassica pekinensis*) are sprayed with an active compound formulation of the desired concentration and, after drying, populated with larvae of the mustard beetle (*Phaedon cochleariae*).

5 After 7 days, the efficacy in % is determined. 100% means that all the beetle larvae have been killed; 0% means that no beetle larvae have been killed.

In this test, for example, the following compounds from the preparation examples show an efficacy of 100% at an application rate of 100 g/ha: I-001, I-002, I-007, I-008, I-010, I-012, I-013, I-014, I-021, I-022, I-024, I-026, I-032, I-035, I-037, I-038.

Spodoptera frugiperda - spray test

10 Solvent: 78.0 parts by weight of acetone
1.5 parts by weight of dimethylformamide
Emulsifier: alkylaryl polyglycol ether

To produce a suitable active compound preparation, 1 part by weight of active compound is dissolved using the stated parts by weight of solvent and made up with water containing an emulsifier concentration
15 of 1000 ppm until the desired concentration is attained. To produce further test concentrations, the formulation is diluted with emulsifier-containing water.

Leaf discs of maize (*Zea mays*) are sprayed with an active compound formulation of the desired concentration and, after drying, populated with caterpillars of the fall armyworm (*Spodoptera frugiperda*).

20 After 7 days, the efficacy in % is determined. 100% means that all the caterpillars have been killed; 0% means that no caterpillar has been killed.

In this test, for example, the following compounds from the preparation examples show an efficacy of 100% at an application rate of 100 g/ha: I-001, I-004, I-005, I-006, I-008, I-010, I-012, I-013, I-014, I-016, I-019, I-020, I-021, I-022, I-024, I-025, I-026, I-027, I-028, I-029, I-030, I-031, I-032, I-033, I-036, I-037, I-038, I-039, I-041, I-043, I-045, I-046, I-048, I-049, I-050, I-051, I-052, I-053.

25 In this test, for example, the following compounds from the preparation examples show an efficacy of 83% at an application rate of 100 g/ha: I-015, I-034, I-042.

In this test, for example, the following compounds from the preparation examples show an efficacy of 67% at an application rate of 100 g/ha: I-007.

Comparative Examples

Myzus persicae - spray test (MYZUPE)

- Solvent: 78.0 parts by weight of acetone
1.5 parts by weight of dimethylformamide
- 5 Emulsifier: alkylaryl polyglycol ether

To produce a suitable active compound preparation, 1 part by weight of active compound is dissolved using the stated parts by weight of solvent and made up with water containing an emulsifier concentration of 1000 ppm until the desired concentration is attained. To produce further test concentrations, the
10 formulation is diluted with emulsifier-containing water.

Discs of Chinese cabbage leaves (*Brassica pekinensis*) infested by all stages of the green peach aphid (*Myzus persicae*) are sprayed with an active compound preparation of the desired concentration.

After the desired period of time, the efficacy in % is determined. 100% means that all the aphids have been killed; 0% means that no aphids have been killed.

- 15 In this test, for example, the following compounds from the preparation examples show superior efficacy to the prior art: see Table 1.

Spodoptera frugiperda - spray test (SPODFR)

- Solvent: 78.0 parts by weight of acetone
1.5 parts by weight of dimethylformamide
- 20 Emulsifier: alkylaryl polyglycol ether

To produce a suitable active compound preparation, 1 part by weight of active compound is dissolved using the stated parts by weight of solvent and made up with water containing an emulsifier concentration of 1000 ppm until the desired concentration is attained. To produce further test concentrations, the
formulation is diluted with emulsifier-containing water.

- 25 Leaf discs of maize (*Zea mays*) are sprayed with an active compound formulation of the desired concentration and, after drying, populated with caterpillars of the armyworm (*Spodoptera frugiperda*).

After the desired period of time, the efficacy in % is determined. 100% means that all the caterpillars have been killed; 0% means that no caterpillar has been killed.

- 30 In this test, for example, the following compounds from the preparation examples show superior efficacy to the prior art: see Table 1.

Myzus persicae - spray test (MYZUPE S)

Solvent: 14 parts by weight of dimethylformamide
Emulsifier: alkylaryl polyglycol ether

5 To produce a suitable active compound preparation, 1 part by weight of active compound is dissolved using the stated parts by weight of solvent and made up with water containing an emulsifier concentration of 1000 ppm until the desired concentration is attained. To produce further test concentrations, the formulation is diluted with emulsifier-containing water. If the addition of ammonium salts or/and penetrants is required, these are each added in a concentration of 1000 ppm to the formulation solution.

10 Bell pepper plants (*Capsicum annuum*) severely infested with the green peach aphid (*Myzus persicae*) are treated by spraying with the active compound formulation in the desired concentration.

After the desired time, the kill in % is determined. 100% means that all the animals have been killed; 0% means that no animals have been killed.

In this test, for example, the following compounds from the preparation examples show superior efficacy to the prior art: see Table 1.

15 Myzus persicae - drench test (MYZUPE D)

Solvent: 7 parts by weight of dimethylformamide
Emulsifier: 2 part by weight of alkylaryl polyglycol ether

20 To produce a suitable active compound preparation, 1 part by weight of active compound is mixed with the specified amounts of solvent and emulsifier, and the concentrate is diluted with water to the desired concentration, it being necessary to include the volume of soil which is drenched in the calculation. It should be ensured that a concentration of 40 ppm of emulsifier in the soil is not exceeded. To produce further test concentrations, water is used for dilution.

Savoy cabbage (*Brassica oleracea*) in pots with soil and infested by all stages of the green peach aphid (*Myzus persicae*) is watered with an active compound preparation of the desired concentration.

25 After the desired period of time, the efficacy in % is determined. 100% means that all the aphids have been killed; 0% means that no aphids have been killed.

In this test, for example, the following compounds from the preparation examples show superior efficacy to the prior art: see Table 1.

Aphis gossypii – spray test (APHIGO S)

30 Solvent: 14 parts by weight of dimethylformamide
Emulsifier: alkylaryl polyglycol ether

To produce a suitable active compound preparation, 1 part by weight of active compound is dissolved using the stated parts by weight of solvent and made up with water containing an emulsifier concentration of 1000 ppm until the desired concentration is attained. To produce further test concentrations, the formulation is diluted with emulsifier-containing water. If the addition of ammonium salts or/and penetrants is required, these are each added in a concentration of 1000 ppm to the formulation solution.

Cotton plants (*Gossypium hirsutum*) heavily infested by the cotton aphid (*Aphis gossypii*) are sprayed with an active compound formulation of the desired concentration.

After the desired time, the kill in % is determined. 100% means that all the aphids have been killed; 0% means that no aphids have been killed.

10 In this test, for example, the following compounds from the preparation examples show superior efficacy to the prior art: see Table 1.

Spodoptera frugiperda test (SPODFR S)

Solvent: 14 parts by weight of dimethylformamide

Emulsifier: 2 parts by weight of alkylaryl polyglycol ether

15 To produce a suitable active compound formulation, 1 part by weight of active compound is dissolved with the stated parts by weight of solvent and emulsifier and made up to the desired concentration with water. To produce further test concentrations, water is used for dilution. In the event that addition of ammonium salts or/and penetrants (rapeseed oil methyl ester) is required, these are each pipetted in at a concentration of 1000 ppm after the finished formulation solution has been diluted.

20 Maize plants (*Zea mays*) are sprayed with an active compound formulation of the desired concentration and, in each case after 5, 12 and 19 days, populated with 5 caterpillars (L2) of the fall armyworm (*Spodoptera frugiperda*).

The kill is determined 6 days after the infection. 100% means that all the caterpillars have been killed and 0% means that none of the caterpillars have been killed.

25 In this test, for example, the following compounds of the Preparation Examples show good activity: see Table 2.

Heliothis armigera test (HELIAR S)

Solvent: 14 parts by weight of dimethylformamide

Emulsifier: 2 parts by weight of alkylaryl polyglycol ether

30 To produce a suitable active compound formulation, 1 part by weight of active compound is dissolved with the stated parts by weight of solvent and emulsifier and made up to the desired concentration with

water. To produce further test concentrations, water is used for dilution. In the event that addition of ammonium salts or/and penetrants (rapeseed oil methyl ester) is required, these are each pipetted in at a concentration of 1000 ppm after the finished formulation solution has been diluted.

5 Cotton plants (*Gossypium hirsutum*) are sprayed with an active compound formulation of the desired concentration and, in each case after 12 and 19 days, populated with 5 caterpillars (L2) of the cotton bollworm (*Heliothis armigera*).

The kill is determined 6 days after the infection. 100% means that all the caterpillars have been killed and 0% means that none of the caterpillars have been killed.

10 In this test, for example, the following compounds of the Preparation Examples show good activity: see Table 2.

Plutella xylostella test (PLUTMA S)

Solvent: 14 parts by weight of dimethylformamide

Emulsifier: 2 parts by weight of alkylaryl polyglycol ether

15 To produce a suitable active compound formulation, 1 part by weight of active compound is dissolved with the stated parts by weight of solvent and emulsifier and made up to the desired concentration with water. To produce further test concentrations, water is used for dilution. In the event that addition of ammonium salts or/and penetrants (rapeseed oil methyl ester) is required, these are each pipetted in at a concentration of 1000 ppm after the finished formulation solution has been diluted.

20 Cabbage plants (*Brassica oleracea var. sabauda*) are sprayed with an active compound formulation of the desired concentration and, after 19 days, populated with 10 caterpillars (L2 larvae) of the diamond back moth (*Plutella xylostella*).

The kill is determined 6 days after the infection. 100% means that all the caterpillars have been killed and 0% means that none of the caterpillars have been killed.

25 In this test, for example, the following compounds of the Preparation Examples show good activity: see Table 2.

Phaedon cochleariae test (PHAECO S)

Solvent: 14 parts by weight of dimethylformamide

Emulsifier: 2 parts by weight of alkylaryl polyglycol ether

30 To produce a suitable active compound formulation, 1 part by weight of active compound is dissolved with the stated parts by weight of solvent and emulsifier and made up to the desired concentration with water. To produce further test concentrations, water is used for dilution. In the event that addition of

ammonium salts or/and penetrants (rapeseed oil methyl ester) is required, these are each pipetted in at a concentration of 1000 ppm after the finished formulation solution has been diluted.

Cabbage plants (*Brassica oleracea var. sabauda*) are sprayed with an active compound formulation of the desired concentration and populated with 10 L2 larvae of the mustard beetle (*Phaedon cochleariae*).

- 5 After the desired time, the kill in % is determined. 100% means that all the larvae have been killed and 0% means that none of the larvae have been killed.

In this test, for example, the following compounds of the Preparation Examples show good activity: see Table 2.

Table 1:

Substance	Structure	Object	Concentration	% Efficacy	
I-51 known from WO 2017/072039		SPODFR	0.8 g of ai/ha	67	7 dat
		MYZUPE	20 g of ai/ha	0	5 dat
			4 g of ai/ha	0	5 dat
		MYZUPE S	4 ppm	70	6 dat
			0.8 ppm	0	6 dat
		MYZUPE D	4 ppm	0	10 dat
	APHIGO S	4 ppm	20	6 dat	
I-037 according to the invention		SPODFR	0.8 g of ai/ha	100	7 dat
		MYZUPE	20 g of ai/ha	90	5 dat
			4 g of ai/ha	70	5 dat
		MYZUPE S	4 ppm	100	6 dat
			0.8 ppm	100	6 dat
		MYZUPE D	4 ppm	90	10 dat
	APHIGO S	4 ppm	65	6 dat	

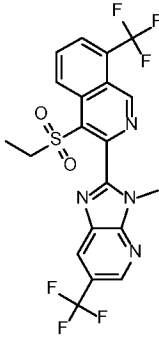
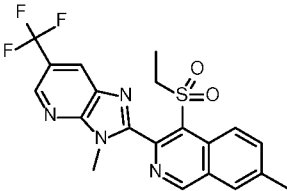
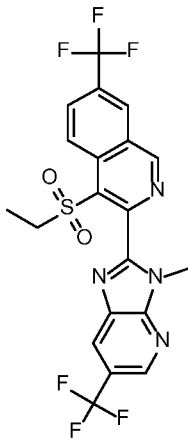
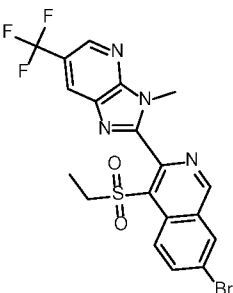
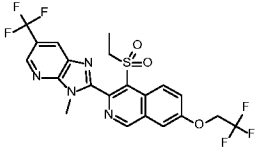
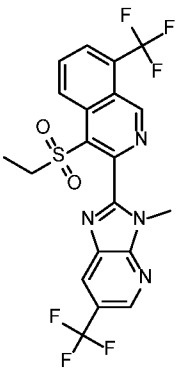
I-032 according to the invention		SPODFR	0.8 g of ai/ha	100	7 dat
		MYZUPE	20 g of ai/ha	100	5 dat
			4 g of ai/ha	90	5 dat
		APHIGO S	4 ppm	90	6 dat
I-015 according to the invention		MYZUPE S	4 ppm	100	6 dat
			0.8 ppm	25	6 dat
		APHIGO S	4 ppm	100	6 dat

Table 2:

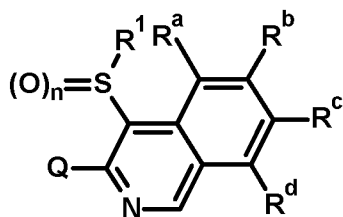
Substance	Structure	Object	Concentration	Infection	% Efficacy	
I-51 known from WO 2017/072039		PHAECO S	0.16 ppm	5 dat	10	6 dai
			0.8 ppm	12 dat	40	6 dai
			0.16 ppm	12 dat	0	6 dai
		PLUTMA S	0.16 ppm	19 dat	50	6 dai
		SPODFR S	0.16 ppm	5 dat	20	6 dai
			0.8 ppm	12 dat	80	6 dai
			0.16 ppm	12 dat	10	6 dai
			0.8 ppm	19 dat	60	6 dai
			0.16 ppm	19 dat	30	6 dai
		HELIAR S	0.16 ppm	12 dat	40	6 dai
	0.16 ppm	19 dat	20	6 dai		
I-037 according to the invention		PHAECO S	0.16 ppm	5 dat	80	6 dai
			0.8 ppm	12 dat	100	6 dai
			0.16 ppm	12 dat	60	6 dai
		SPODFR S	0.16 ppm	5 dat	70	6 dai
			0.8 ppm	12 dat	100	6 dai
			0.16 ppm	12 dat	50	6 dai
			0.8 ppm	19 dat	100	6 dai
HELIAR S	0.16 ppm	12 dat	80	6 dai		

			0.16 ppm	19 dat	70	6 dai
I-036 according to the invention		PLUTMA S SPODFR S	0.16 ppm	19 dat	80	6 dai
			0.16 ppm	5 dat	90	6 dai
			0.8 ppm	19 dat	100	6 dai
			0.16 ppm	19 dat	70	6 dai
I-032 according to the invention		SPODFR S	0.16 ppm	5 dat	100	6 dai
			0.8 ppm	12 dat	100	6 dai
			0.16 ppm	12 dat	70	6 dai

dat = days after treatment; dai = days after infestation

Claims

1. Compounds of the formula (I)



(I)

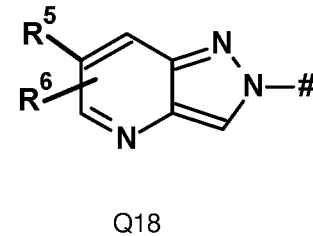
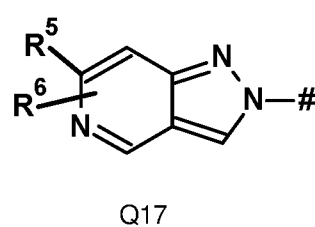
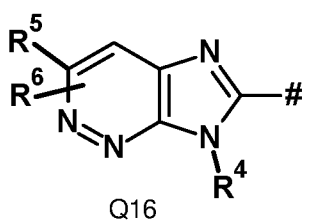
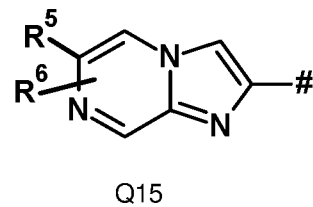
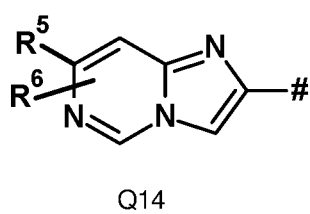
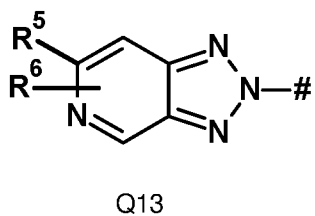
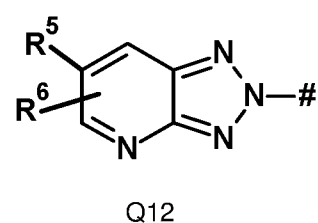
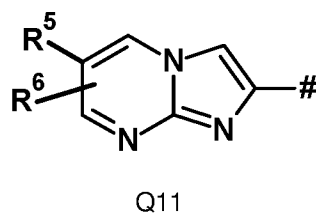
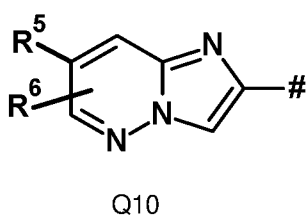
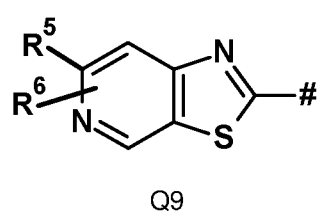
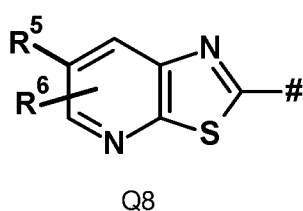
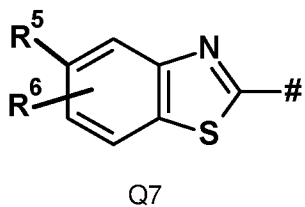
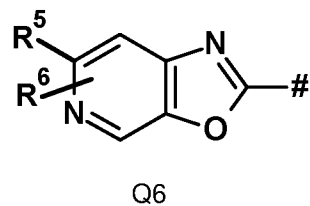
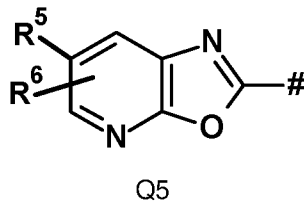
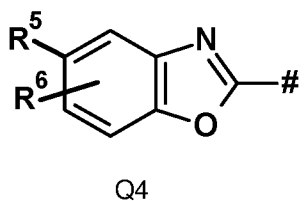
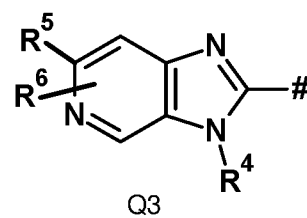
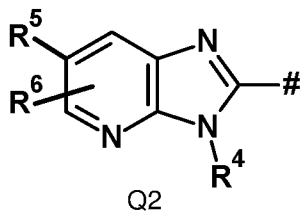
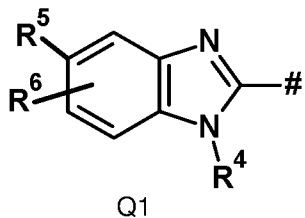
in which

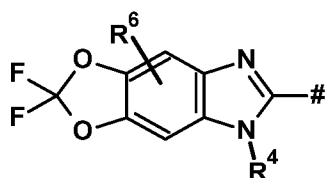
- 5 R^1 represents (C₁-C₆)-alkyl, (C₁-C₆)-haloalkyl, (C₁-C₆)-cyanoalkyl, (C₁-C₆)-hydroxyalkyl, (C₁-C₆)-alkoxy-(C₁-C₆)-alkyl, (C₁-C₆)-haloalkoxy-(C₁-C₆)-alkyl, (C₂-C₆)-alkenyl, (C₂-C₆)-alkenyloxy-(C₁-C₆)-alkyl, (C₂-C₆)-haloalkenyloxy-(C₁-C₆)-alkyl, (C₂-C₆)-haloalkenyl, (C₂-C₆)-cyanoalkenyl, (C₂-C₆)-alkynyl, (C₂-C₆)-alkynyloxy-(C₁-C₆)-alkyl, (C₂-C₆)-haloalkynyloxy-(C₁-C₆)-alkyl, (C₂-C₆)-haloalkynyl, (C₂-C₆)-cyanoalkynyl, (C₃-C₈)-cycloalkyl, (C₃-C₈)-cycloalkyl-
- 10 (C₃-C₈)-cycloalkyl, (C₁-C₆)-alkyl-(C₃-C₈)-cycloalkyl, halo-(C₃-C₈)-cycloalkyl, amino, (C₁-C₆)-alkylamino, di-(C₁-C₆)-alkyl-amino, (C₃-C₈)-cycloalkylamino, (C₁-C₆)-alkylcarbonylamino, (C₁-C₆)-alkylthio-(C₁-C₆)-alkyl, (C₁-C₆)-haloalkylthio-(C₁-C₆)-alkyl, (C₁-C₆)-alkylsulfinyl-(C₁-C₆)-alkyl, (C₁-C₆)-haloalkylsulfinyl-(C₁-C₆)-alkyl, (C₁-C₆)-alkylsulfonyl-(C₁-C₆)-alkyl, (C₁-C₆)-haloalkylsulfonyl-(C₁-C₆)-alkyl, (C₁-C₆)-alkoxy-(C₁-C₆)-alkylthio-(C₁-C₆)-alkyl, (C₁-C₆)-alkoxy-
- 15 (C₁-C₆)-alkylsulfinyl-(C₁-C₆)-alkyl, (C₁-C₆)-alkoxy-(C₁-C₆)-alkylsulfonyl-(C₁-C₆)-alkyl, (C₁-C₆)-alkylcarbonyl-(C₁-C₆)-alkyl, (C₁-C₆)-haloalkylcarbonyl-(C₁-C₆)-alkyl, (C₁-C₆)-alkoxycarbonyl-(C₁-C₆)-alkyl, (C₁-C₆)-haloalkoxycarbonyl-(C₁-C₆)-alkyl, (C₁-C₆)-alkylsulfonylamino, aminosulfonyl-(C₁-C₆)-alkyl, (C₁-C₆)-alkylaminosulfonyl-(C₁-C₆)-alkyl or di-(C₁-C₆)-alkylaminosulfonyl-(C₁-C₆)-alkyl,
- 20 R^a , R^b , R^c , R^d independently of one another represent hydrogen, cyano, halogen, nitro, acetyl, hydroxy, amino, SCN, tri-(C₁-C₆)-alkylsilyl, (C₃-C₈)-cycloalkyl, (C₃-C₈)-cycloalkyl-(C₃-C₈)-cycloalkyl, (C₁-C₆)-alkyl-(C₃-C₈)-cycloalkyl, halo-(C₃-C₈)-cycloalkyl, (C₁-C₆)-alkyl, (C₁-C₆)-haloalkyl, (C₁-C₆)-cyanoalkyl, (C₁-C₆)-hydroxyalkyl, hydroxycarbonyl-(C₁-C₆)-alkoxy, (C₁-C₆)-alkoxycarbonyl-(C₁-C₆)-alkyl, (C₁-C₆)-alkoxy-(C₁-C₆)-alkyl, (C₂-C₆)-alkenyl, (C₂-C₆)-haloalkenyl, (C₂-C₆)-cyanoalkenyl, (C₂-C₆)-alkynyl, (C₂-C₆)-haloalkynyl, (C₂-C₆)-cyanoalkynyl, (C₁-C₆)-alkoxy, (C₁-C₆)-haloalkoxy, (C₁-C₆)-cyanoalkoxy, (C₁-C₆)-alkoxycarbonyl-(C₁-C₆)-alkoxy, (C₁-C₆)-alkoxy-(C₁-C₆)-alkoxy, (C₁-C₆)-alkylhydroxyimino, (C₁-C₆)-alkoxyimino, (C₁-C₆)-alkyl-(C₁-C₆)-alkoxyimino, (C₁-C₆)-haloalkyl-(C₁-C₆)-alkoxyimino, (C₁-C₆)-alkylthio, (C₁-C₆)-haloalkylthio, (C₁-C₆)-alkoxy-(C₁-C₆)-alkylthio, (C₁-C₆)-alkylthio-(C₁-C₆)-alkyl, (C₁-C₆)-alkylsulfinyl, (C₁-C₆)-haloalkylsulfinyl, (C₁-C₆)-alkoxy-(C₁-C₆)-alkylsulfinyl, (C₁-C₆)-
- 25
- 30

alkylsulfinyl-(C₁-C₆)-alkyl, (C₁-C₆)-alkylsulfonyl, (C₁-C₆)-haloalkylsulfonyl, (C₁-C₆)-alkoxy-(C₁-C₆)-alkylsulfonyl, (C₁-C₆)-alkylsulfonyl-(C₁-C₆)-alkyl, (C₁-C₆)-alkylsulfonyloxy, (C₁-C₆)-alkylcarbonyl, (C₁-C₆)-alkylthiocarbonyl, (C₁-C₆)-haloalkylcarbonyl, (C₁-C₆)-alkylcarbonyloxy, (C₁-C₆)-alkoxycarbonyl, (C₁-C₆)-haloalkoxycarbonyl, aminocarbonyl, (C₁-C₆)-alkylaminocarbonyl, (C₁-C₆)-alkylaminothiocarbonyl, di-(C₁-C₆)-alkylaminocarbonyl, di-(C₁-C₆)-alkylaminothiocarbonyl, (C₂-C₆)-alkenylaminocarbonyl, di-(C₂-C₆)-alkenylaminocarbonyl, (C₃-C₈)-cycloalkylaminocarbonyl, (C₁-C₆)-alkylsulfonylamino, (C₁-C₆)-alkylamino, di-(C₁-C₆)-alkylamino, aminosulfonyl, (C₁-C₆)-alkylaminosulfonyl, di-(C₁-C₆)-alkylaminosulfonyl, (C₁-C₆)-alkylsulfoximino, aminothiocarbonyl, (C₁-C₆)-alkylaminothiocarbonyl, di-(C₁-C₆)-alkylaminothiocarbonyl, (C₃-C₈)-cycloalkylamino, NHCO-(C₁-C₆)-alkyl ((C₁-C₆)-alkylcarbonylamino), NHCO-O(C₁-C₆)-alkyl ((C₁-C₆)-alkoxycarbonylamino) or NHCO-(C₃-C₈)-cycloalkyl ((C₃-C₈)-cycloalkylcarbonylamino),

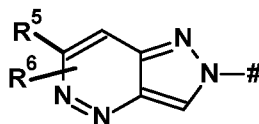
where at least one of the radicals R^a, R^b, R^c or R^d represents a substituent other than hydrogen,

Q represents a heteroaromatic 9-membered or 12-membered fused bicyclic or tricyclic ring system from the group consisting of Q1 to Q20,





Q19



Q20

5 R^4 represents (C₁-C₆)-alkyl, (C₁-C₆)-haloalkyl, (C₁-C₆)-cyanoalkyl, (C₁-C₆)-hydroxyalkyl, (C₁-C₆)-alkoxy-(C₁-C₆)-alkyl, (C₁-C₆)-haloalkoxy-(C₁-C₆)-alkyl, (C₂-C₆)-alkenyl, (C₂-C₆)-alkenyloxy-(C₁-C₆)-alkyl, (C₂-C₆)-haloalkenyloxy-(C₁-C₆)-alkyl, (C₂-C₆)-haloalkenyl, (C₂-C₆)-cyanoalkenyl, (C₂-C₆)-alkynyl, (C₂-C₆)-alkynyloxy-(C₁-C₆)-alkyl, (C₂-C₆)-haloalkynyl, (C₃-C₆)-cycloalkyl, (C₃-C₆)-cycloalkyl-(C₃-C₆)-cycloalkyl, (C₁-C₆)-alkyl-(C₃-C₆)-cycloalkyl, halo-(C₃-C₆)-cycloalkyl, (C₁-C₆)-alkylthio-(C₁-C₆)-alkyl, (C₁-C₆)-alkylsulfinyl-(C₁-C₆)-alkyl, (C₁-C₆)-alkylsulfonyl-(C₁-C₆)-alkyl or (C₁-C₆)-alkylcarbonyl-(C₁-C₆)-alkyl,

10 R^5 , R^6 independently of one another represent hydrogen, cyano, halogen, (C₁-C₆)-alkyl, (C₁-C₆)-haloalkyl, (C₂-C₆)-alkenyl, (C₂-C₆)-haloalkenyl, (C₂-C₆)-alkynyl, (C₂-C₆)-haloalkynyl, (C₃-C₆)-cycloalkyl, (C₃-C₆)-cycloalkyl-(C₃-C₆)-cycloalkyl, (C₁-C₆)-alkyl-(C₃-C₆)-cycloalkyl, (C₁-C₆)-alkoxy, (C₁-C₆)-haloalkoxy, (C₁-C₆)-alkoxyimino, (C₁-C₆)-alkylthio, (C₁-C₆)-haloalkylthio, (C₁-C₆)-alkylsulfinyl, (C₁-C₆)-haloalkylsulfinyl, (C₁-C₆)-alkylsulfonyl, (C₁-C₆)-haloalkylsulfonyl, (C₁-C₆)-alkylsulfonyloxy, (C₁-C₆)-alkylcarbonyl, (C₁-C₆)-haloalkylcarbonyl, aminocarbonyl, 15 (C₁-C₆)-alkylaminocarbonyl, di-(C₁-C₆)-alkylaminocarbonyl, (C₁-C₆)-alkylsulfonylamino, (C₁-C₆)-alkylamino, di-(C₁-C₆)-alkylamino, aminosulfonyl, (C₁-C₆)-alkylaminosulfonyl or di-(C₁-C₆)-alkylaminosulfonyl,

n represents 0, 1 or 2,

where, if Q represents Q2, R^c does not represent (C₁-C₆)-haloalkyl.

20 2. Compounds of the formula (I) according to Claim 1, in which

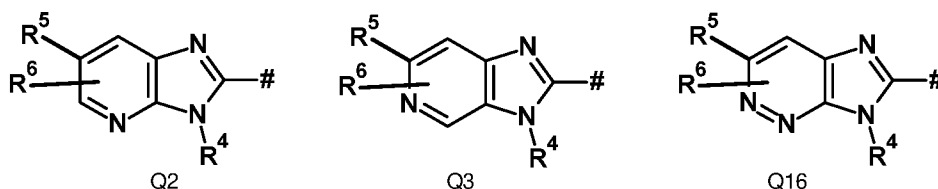
R^1 represents (C₁-C₄)-alkyl, (C₁-C₄)-hydroxyalkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-cyanoalkyl, (C₁-C₄)-alkoxy-(C₁-C₄)-alkyl, (C₁-C₄)-haloalkoxy-(C₁-C₄)-alkyl, (C₂-C₄)-alkenyl, (C₂-C₄)-alkenyloxy-(C₁-C₄)-alkyl, (C₂-C₄)-haloalkenyloxy-(C₁-C₄)-alkyl, (C₂-C₄)-haloalkenyl, (C₂-C₄)-cyanoalkenyl, (C₂-C₄)-alkynyl, (C₂-C₄)-alkynyloxy-(C₁-C₄)-alkyl, (C₂-C₄)-haloalkynyloxy-(C₁-C₄)-alkyl, (C₂-C₄)-haloalkynyl, (C₂-C₄)-cyanoalkynyl, (C₃-C₆)-cycloalkyl, (C₃-C₆)-cycloalkyl-(C₃-C₆)-cycloalkyl, (C₁-C₄)-alkyl-(C₃-C₆)-cycloalkyl, halo-(C₃-C₆)-cycloalkyl, (C₁-C₄)-alkylamino, di-(C₁-C₄)-alkylamino, (C₃-C₆)-cycloalkylamino, (C₁-C₄)-alkylcarbonylamino, (C₁-C₄)-alkylthio-(C₁-C₄)-alkyl, (C₁-C₄)-haloalkylthio-(C₁-C₄)-alkyl, (C₁-C₄)-alkylsulfinyl-(C₁-C₄)-alkyl, (C₁-C₄)-haloalkylsulfinyl-(C₁-C₄)-alkyl, (C₁-C₄)-alkylsulfonyl-(C₁-C₄)-alkyl, (C₁-C₄)-alkylsulfonyloxy-(C₁-C₄)-alkyl, (C₁-C₄)-alkylcarbonyl-(C₁-C₄)-alkyl, (C₁-C₄)-haloalkylcarbonyl-(C₁-C₄)-alkyl or (C₁-C₄)-

alkylsulfonylamino,

5 R^a, R^b, R^c, R^d independently of one another represent hydrogen, cyano, halogen, nitro, acetyl, hydroxy, amino, SCN, tri-(C₁-C₄)-alkylsilyl, (C₃-C₆)-cycloalkyl, (C₃-C₆)-cycloalkyl-(C₃-C₆)-cycloalkyl, (C₁-C₄)-alkyl-(C₃-C₆)-cycloalkyl, halo-(C₃-C₆)-cycloalkyl, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-cyanoalkyl, (C₁-C₄)-hydroxyalkyl, (C₁-C₄)-alkoxy-(C₁-C₄)-alkyl, (C₂-C₄)-alkenyl, (C₂-C₄)-haloalkenyl, (C₂-C₄)-cyanoalkenyl, (C₂-C₄)-alkynyl, (C₂-C₄)-haloalkynyl, (C₂-C₄)-cyanoalkynyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-cyanoalkoxy, (C₁-C₄)-alkoxy-(C₁-C₄)-alkoxy, (C₁-C₄)-alkylhydroxyimino, (C₁-C₄)-alkoxyimino, (C₁-C₄)-alkyl-(C₁-C₄)-alkoxyimino, (C₁-C₄)-haloalkyl-(C₁-C₄)-alkoxyimino, (C₁-C₄)-alkylthio, (C₁-C₄)-haloalkylthio, 10 (C₁-C₄)-alkylthio-(C₁-C₄)-alkyl, (C₁-C₄)-alkylsulfinyl, (C₁-C₄)-haloalkylsulfinyl, (C₁-C₄)-alkylsulfinyl-(C₁-C₄)-alkyl, (C₁-C₄)-alkylsulfonyl, (C₁-C₄)-haloalkylsulfonyl, (C₁-C₄)-alkylsulfonyl-(C₁-C₄)-alkyl, (C₁-C₄)-alkylsulfonyloxy, (C₁-C₄)-alkylcarbonyl, (C₁-C₄)-haloalkylcarbonyl, aminocarbonyl, aminothiocarbonyl, (C₁-C₄)-alkylaminocarbonyl, di-(C₁-C₄)-alkyl-aminocarbonyl, (C₁-C₄)-alkylsulfonylamino, (C₁-C₄)-alkylamino, di-(C₁-C₄)-alkylamino, 15 aminosulfonyl, (C₁-C₄)-alkylaminosulfonyl, di-(C₁-C₄)-alkylaminosulfonyl, aminothiocarbonyl, NHCO-(C₁-C₄)-alkyl ((C₁-C₄)-alkylcarbonylamino), NHCO-O(C₁-C₄)-alkyl ((C₁-C₄)-alkoxycarbonylamino) or NHCO-(C₃-C₆)-cycloalkyl ((C₃-C₆)-cycloalkylcarbonylamino),

where at least one of the radicals R^a, R^b, R^c or R^d represents a substituent other than hydrogen,

20 Q represents a heteroaromatic 9-membered fused bicyclic ring system from the group consisting of Q2, Q3, Q16,



25 R^4 represents (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-cyanoalkyl, (C₁-C₄)-hydroxyalkyl, (C₁-C₄)-alkoxy-(C₁-C₄)-alkyl, (C₁-C₄)-haloalkoxy-(C₁-C₄)-alkyl, (C₂-C₄)-alkenyl, (C₂-C₄)-alkenyloxy-(C₁-C₄)-alkyl, (C₂-C₄)-haloalkenyloxy-(C₁-C₄)-alkyl, (C₂-C₄)-haloalkenyl, (C₂-C₄)-cyanoalkenyl, (C₂-C₄)-alkynyl, (C₂-C₄)-alkynyloxy-(C₁-C₄)-alkyl, (C₂-C₄)-haloalkynyl, (C₃-C₆)-cycloalkyl, (C₃-C₆)-cycloalkyl-(C₃-C₆)-cycloalkyl, (C₁-C₄)-alkyl-(C₃-C₆)-cycloalkyl, halo-(C₃-C₆)-cycloalkyl, (C₁-C₄)-alkylthio-(C₁-C₄)-alkyl, (C₁-C₄)-alkylsulfinyl-(C₁-C₄)-alkyl, (C₁-C₄)-alkylsulfonyl-(C₁-C₄)-alkyl or (C₁-C₄)-alkylcarbonyl-(C₁-C₄)-alkyl,

30 R^5, R^6 independently of one another represent hydrogen, cyano, halogen, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₂-C₄)-alkenyl, (C₂-C₄)-haloalkenyl, (C₂-C₄)-alkynyl, (C₂-C₄)-haloalkynyl, (C₃-C₆)-cycloalkyl, (C₃-C₆)-cycloalkyl-(C₃-C₆)-cycloalkyl, (C₁-C₄)-alkyl-(C₃-C₆)-cycloalkyl, (C₁-C₄)-

alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-alkoxyimino, (C₁-C₄)-alkylthio, (C₁-C₄)-haloalkylthio, (C₁-C₄)-alkylsulfinyl, (C₁-C₄)-haloalkylsulfinyl, (C₁-C₄)-alkylsulfonyl, (C₁-C₄)-haloalkylsulfonyl, (C₁-C₄)-alkylsulfonyloxy, (C₁-C₄)-alkylcarbonyl, (C₁-C₄)-haloalkylcarbonyl, aminocarbonyl, (C₁-C₄)-alkylaminocarbonyl, di-(C₁-C₄)-alkylaminocarbonyl, (C₁-C₄)-alkylsulfonylamino, (C₁-C₄)-alkylamino, di-(C₁-C₄)-alkylamino, aminosulfonyl, (C₁-C₄)-alkylaminosulfonyl or di-(C₁-C₄)-alkylaminosulfonyl,

n represents 0, 1 or 2,

where, if Q represents Q2, R^c does not represent (C₁-C₄)-haloalkyl.

3. Compounds of the formula (I) according to Claim 1, in which

10 R¹ represents (C₁-C₄)-alkyl, (C₁-C₄)-hydroxyalkyl, (C₁-C₄)-haloalkyl, (C₂-C₄)-alkenyl, (C₂-C₄)-haloalkenyl, (C₂-C₄)-alkynyl, (C₂-C₄)-haloalkynyl, (C₃-C₆)-cycloalkyl, (C₁-C₄)-alkylthio-(C₁-C₄)-alkyl, (C₁-C₄)-alkylsulfinyl-(C₁-C₄)-alkyl or (C₁-C₄)-alkylsulfonyl-(C₁-C₄)-alkyl,

15 R^a, R^b, R^c, R^d independently of one another represent hydrogen, cyano, halogen, nitro, hydroxy, amino, SCN, tri-(C₁-C₄)-alkylsilyl, (C₃-C₆)-cycloalkyl, (C₃-C₆)-cycloalkyl-(C₃-C₆)-cycloalkyl, (C₁-C₄)-alkyl-(C₃-C₆)-cycloalkyl, halo-(C₃-C₆)-cycloalkyl, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-cyanoalkyl, (C₁-C₄)-alkoxy-(C₁-C₄)-alkyl, (C₂-C₄)-alkenyl, (C₂-C₄)-haloalkenyl, (C₂-C₄)-cyanoalkenyl, (C₂-C₄)-alkynyl, (C₂-C₄)-haloalkynyl, (C₂-C₄)-cyanoalkynyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-cyanoalkoxy, (C₁-C₄)-alkylhydroxyimino, (C₁-C₄)-alkoxyimino, (C₁-C₄)-alkyl-(C₁-C₄)-alkoxyimino, (C₁-C₄)-alkylthio, (C₁-C₄)-haloalkylthio, (C₁-C₄)-alkylsulfinyl, (C₁-C₄)-haloalkylsulfinyl, (C₁-C₄)-alkylsulfonyl, (C₁-C₄)-haloalkylsulfonyl, (C₁-C₄)-alkylsulfonyloxy, (C₁-C₄)-alkylcarbonyl, (C₁-C₄)-haloalkylcarbonyl, aminocarbonyl, (C₁-C₄)-alkylaminocarbonyl, di-(C₁-C₄)-alkylaminocarbonyl, (C₁-C₄)-alkylsulfonylamino, (C₁-C₄)-alkylamino, di-(C₁-C₄)-alkylamino, aminosulfonyl, (C₁-C₄)-alkylaminosulfonyl, di-(C₁-C₄)-alkylaminosulfonyl, NHCO-(C₁-C₄)-alkyl ((C₁-C₄)-alkylcarbonylamino), NHCO-O-(C₁-C₄)-alkyl ((C₁-C₄)-alkoxy-carbonylamino) or NHCO-(C₃-C₆)-cycloalkyl ((C₃-C₆)-cycloalkylcarbonylamino),

where at least one of the radicals R^a, R^b, R^c or R^d represents a substituent other than hydrogen,

Q represents a heteroaromatic 9-membered or 12-membered fused bicyclic or tricyclic ring system from the group consisting of Q2, Q3 and Q16,

30 R⁴ represents (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-cyanoalkyl, (C₁-C₄)-hydroxyalkyl, (C₁-C₄)-alkoxy-(C₁-C₄)-alkyl, (C₁-C₄)-haloalkoxy-(C₁-C₄)-alkyl, (C₂-C₄)-alkenyl, (C₂-C₄)-alkenyloxy-(C₁-C₄)-alkyl, (C₂-C₄)-haloalkenyloxy-(C₁-C₄)-alkyl, (C₂-C₄)-haloalkenyl, (C₂-C₄)-cyanoalkenyl, (C₂-C₄)-alkynyl, (C₂-C₄)-alkynyloxy-(C₁-C₄)-alkyl, (C₂-C₄)-haloalkynyl, (C₃-C₆)-

cycloalkyl, (C₃-C₆)-cycloalkyl-(C₃-C₆)-cycloalkyl, (C₁-C₄)-alkyl-(C₃-C₆)-cycloalkyl, halo-(C₃-C₆)-cycloalkyl, (C₁-C₄)-alkylthio-(C₁-C₄)-alkyl, (C₁-C₄)-alkylsulfinyl-(C₁-C₄)-alkyl, (C₁-C₄)-alkylsulfonyl-(C₁-C₄)-alkyl or (C₁-C₄)-alkylcarbonyl-(C₁-C₄)-alkyl,

5 R⁵, R⁶ are independently hydrogen, cyano, halogen, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₂-C₄)-alkenyl, (C₂-C₄)-haloalkenyl, (C₂-C₄)-alkynyl, (C₂-C₄)-haloalkynyl, (C₃-C₆)-cycloalkyl, (C₃-C₆)-cycloalkyl-(C₃-C₆)-cycloalkyl, (C₁-C₄)-alkyl-(C₃-C₆)-cycloalkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-alkoxyimino, (C₁-C₄)-alkylthio, (C₁-C₄)-haloalkylthio, (C₁-C₄)-alkylsulfinyl, (C₁-C₄)-haloalkylsulfinyl, (C₁-C₄)-alkylsulfonyl, (C₁-C₄)-haloalkylsulfonyl, (C₁-C₄)-alkylsulfonyloxy, (C₁-C₄)-alkylcarbonyl, (C₁-C₄)-haloalkylcarbonyl, aminocarbonyl, (C₁-C₄)-alkylaminocarbonyl, di-(C₁-C₄)-alkylaminocarbonyl, (C₁-C₄)-alkylsulfonylamino, (C₁-C₄)-alkylamino, di-(C₁-C₄)-alkylamino, aminosulfonyl, (C₁-C₄)-alkylaminosulfonyl or di-(C₁-C₄)-alkylaminosulfonyl,

n represents 0, 1 or 2,

where, if Q represents Q2, R^c does not represent (C₁-C₄)-haloalkyl.

15 4. Compounds of the formula (I) according to Claim 1, in which

R¹ represents (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl or (C₃-C₆)-cycloalkyl,

20 R^a, R^b, R^c, R^d independently of one another represent hydrogen, cyano, halogen, (C₁-C₄)-alkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkyl, (C₁-C₄)-haloalkoxy, (C₃-C₆)-cycloalkyl, (C₁-C₄)-alkylthio, (C₁-C₄)-alkylsulfinyl, (C₁-C₄)-alkylsulfonyl, (C₁-C₄)-haloalkylthio, (C₁-C₄)-haloalkylsulfinyl, (C₁-C₄)-haloalkylsulfonyl, NHCO-(C₁-C₄)-alkyl ((C₁-C₄)-alkylcarbonylamino), NHCO-O(C₁-C₄)-alkyl ((C₁-C₄)-alkoxycarbonylamino) or NHCO-(C₃-C₆)-cycloalkyl ((C₃-C₆)-cycloalkylcarbonylamino),

where at least one of the radicals R^a, R^b, R^c or R^d represents a substituent other than hydrogen,

25 Q represents a heteroaromatic 9-membered or 12-membered fused bicyclic or tricyclic ring system from the group consisting of Q2, Q3 and Q16,

R⁴ represents (C₁-C₄)-alkyl or (C₁-C₄)-alkoxy-(C₁-C₄)-alkyl,

30 R⁵ represents hydrogen, cyano, halogen, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₃-C₆)-cycloalkyl, (C₃-C₆)-cycloalkyl-(C₃-C₆)-cycloalkyl, (C₁-C₄)-alkyl-(C₃-C₆)-cycloalkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-alkoxyimino, (C₁-C₄)-alkylthio, (C₁-C₄)-haloalkylthio, (C₁-C₄)-alkylsulfinyl, (C₁-C₄)-haloalkylsulfinyl, (C₁-C₄)-alkylsulfonyl, (C₁-C₄)-haloalkylsulfonyl, (C₁-C₄)-alkylcarbonyl, (C₁-C₄)-haloalkylcarbonyl, (C₁-C₄)-alkylaminocarbonyl, di-(C₁-C₄)-

alkylaminocarbonyl, (C₁-C₄)-alkylsulfonylamino, (C₁-C₄)-alkylaminosulfonyl or di-(C₁-C₄)-alkylaminosulfonyl,

R⁶ represents hydrogen,

n represents 0, 1 or 2,

5 where, if Q represents Q2, R^c does not represent (C₁-C₆)-haloalkyl.

5. Compounds of the formula (I) according to Claim 1, in which

R¹ represents methyl, ethyl, n-propyl, isopropyl, cyclopropyl, n-butyl, isobutyl, tert-butyl, cyclobutyl, fluoromethyl, difluoromethyl, trifluoromethyl, fluoroethyl, difluoroethyl, trifluoroethyl, tetrafluoroethyl or pentafluoroethyl,

10 R^a, R^b, R^c, R^d independently of one another represent hydrogen, fluorine, chlorine, bromine, iodine, cyano, methyl, ethyl, cyclopropyl, cyclobutyl, methoxy, ethylsulfonyl, difluoromethyl, trifluoromethyl, trifluoromethoxy, trifluoromethylthio, trifluoroethylthio, trifluoroethylsulfinyl, trifluoroethylsulfonyl, difluoroethoxy, trifluoroethoxy, 2,2-difluoropropoxy, methyl(carbonyl)amino, ethyl(carbonyl)amino, cyclopropyl(carbonyl)amino or
15 methoxy(carbonyl)amino,

where one of the radicals R^a, R^b, R^c or R^d represents a substituent other than hydrogen,

Q represents a heteroaromatic 9-membered or 12-membered fused bicyclic ring system from the group consisting of Q2, Q3 and Q16,

R⁴ represents methyl, ethyl, isopropyl, methoxymethyl or methoxyethyl,

20 R⁵ represents fluorine, chlorine, bromine, fluoromethyl, difluoromethyl, trifluoromethyl, fluoroethyl (CH₂CFH₂, CHFCH₃), difluoroethyl (CF₂CH₃, CH₂CHF₂, CHFCHF₂), trifluoroethyl, (CH₂CF₃, CHFCHF₂, CF₂CFH₂), tetrafluoroethyl (CHFCHF₃, CF₂CHF₂), pentafluoroethyl, trifluoromethoxy, difluorochloromethoxy, dichlorofluoromethoxy, trifluoromethylthio, trifluoromethylsulfinyl or trifluoromethylsulfonyl,

25 R⁶ represents hydrogen,

n represents 0, 1 or 2,

where, if Q represents Q2, R^c does not represent difluoromethyl or trifluoromethyl.

6. Compounds of the formula (I) according to Claim 1, in which

R¹ represents ethyl,

R^a represents hydrogen,

R^b represents hydrogen, methyl, difluoromethyl, trifluoromethyl or chlorine,

5 R^c represents hydrogen, chlorine, bromine, cyano, methyl, cyclopropyl, difluoromethyl, trifluoromethyl, methoxy, methyl(carbonyl)amino (-NH-CO-Me), cyclopropyl(carbonyl)amino (-NH-CO-cyclopropyl), methoxy(carbonyl)amino (-NH-CO-OMe), ethylsulfonyl, 2,2-difluoroethoxy, 2,2,2-trifluoroethoxy, 2,2-difluoropropoxy (-OCH₂CF₂CH₃) or 2,2,2-trifluoroethylthio (2,2,2-trifluoroethylsulfanyl: -SCH₂CF₃),

R^d represents hydrogen, bromine, chlorine, cyano or trifluoromethyl,

10 where one of the radicals R^b, R^c or R^d represents a substituent other than hydrogen,

Q represents a heteroaromatic 9-membered fused bicyclic ring system from the group consisting of Q2, Q3 and Q16,

R⁴ represents methyl,

R⁵ represents trifluoromethyl, pentafluoroethyl, trifluoromethoxy or trifluoromethylsulfonyl,

15 R⁶ represents hydrogen,

n represents 2,

where, if Q represents Q2, R^c does not represent difluoromethyl or trifluoromethyl.

7. Compounds of the formula (I) according to Claim 1, in which

R¹ represents ethyl,

20 R^a represents hydrogen,

R^b represents hydrogen or trifluoromethyl,

R^c represents hydrogen, chlorine, bromine, cyano, methyl, cyclopropyl, methoxy, methyl(carbonyl)amino (-NH-CO-Me), cyclopropyl(carbonyl)amino (-NH-CO-cyclopropyl), methoxy(carbonyl)amino (-NH-CO-OMe), ethylsulfonyl, 2,2-difluoroethoxy, 2,2,2-trifluoroethoxy, 2,2-difluoropropoxy (-OCH₂CF₂CH₃) or 2,2,2-trifluoroethylthio,

25

R^d represents hydrogen, bromine, chlorine, cyano or trifluoromethyl,

where one of the radicals R^b , R^c or R^d represents a substituent other than hydrogen,

Q represents a heteroaromatic 9-membered fused bicyclic ring system from the group consisting of Q2,

R^4 represents methyl,

5 R^5 represents trifluoromethyl, pentafluoroethyl, trifluoromethoxy or trifluoromethylsulfonyl,

R^6 represents hydrogen,

n represents 2.

8. Compounds of the formula (I) according to Claim 1, in which

R^1 represents ethyl,

10 R^a represents hydrogen,

R^b represents hydrogen,

R^c represents hydrogen,

R^d represents bromine, cyano or trifluoromethyl,

15 Q represents a heteroaromatic 9-membered fused bicyclic ring system from the group consisting of Q3,

R^4 represents methyl,

R^5 represents trifluoromethyl or pentafluoroethyl,

R^6 represents hydrogen,

n represents 2.

20 9. Compounds of the formula (I) according to Claim 1, in which

R^1 represents ethyl,

R^a represents hydrogen,

R^b represents hydrogen, methyl, difluoromethyl, trifluoromethyl or chlorine,

R^c represents hydrogen, chlorine, bromine, cyano, methyl, difluoromethyl or trifluoromethyl,

R^d represents hydrogen, bromine or chlorine,

where one of the radicals R^b, R^c or R^d represents a substituent other than hydrogen,

Q represents a heteroaromatic 9-membered fused bicyclic ring system from the group consisting of Q16,

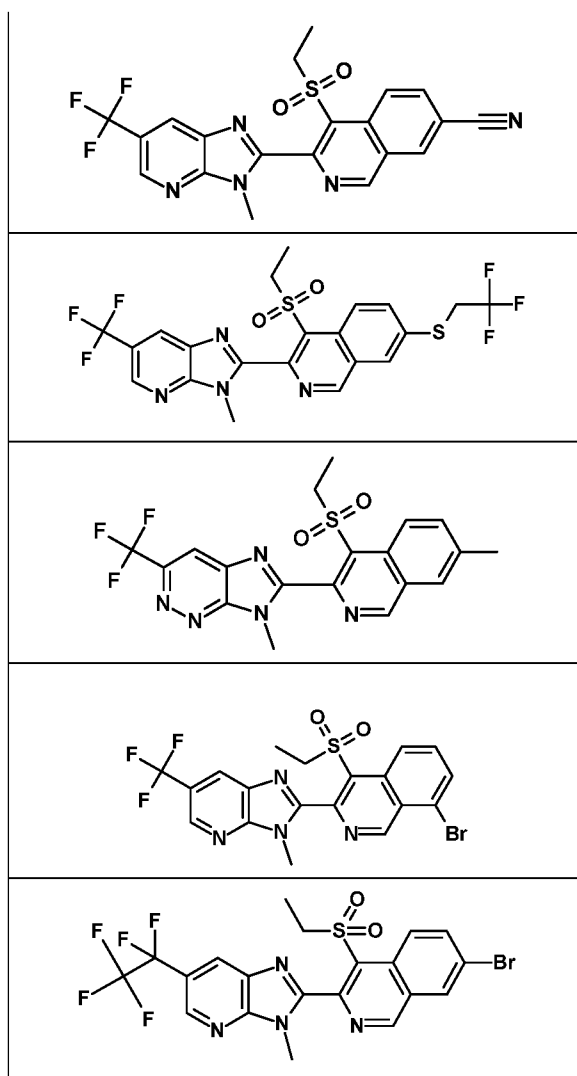
5 R⁴ represents methyl,

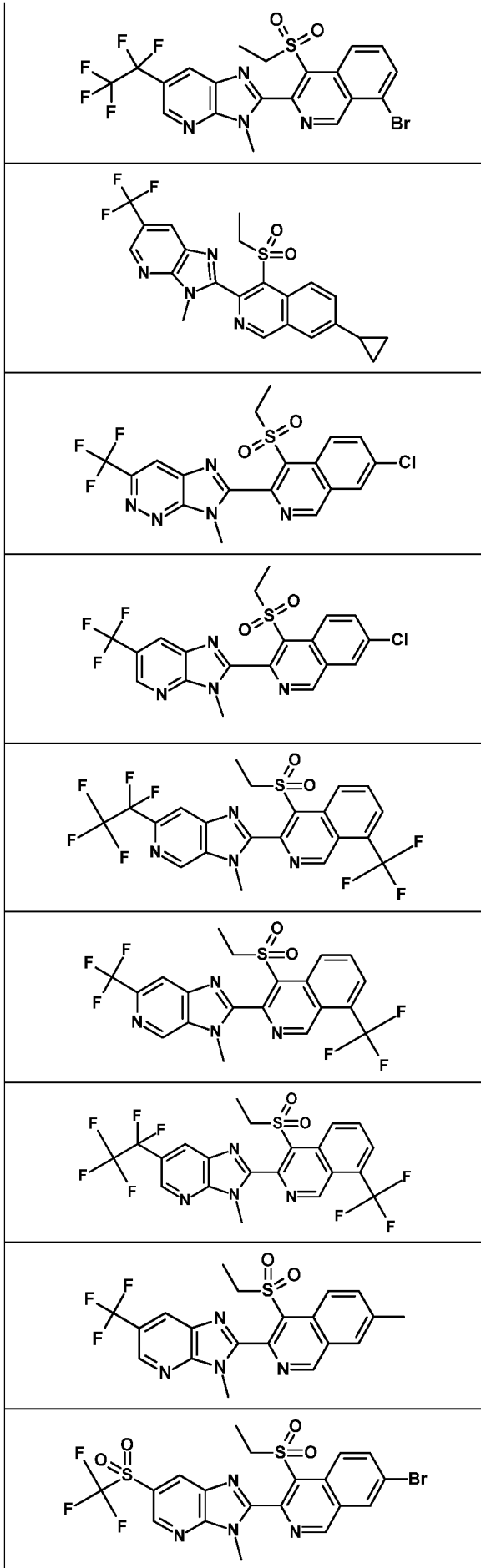
R⁵ represents trifluoromethyl or pentafluoroethyl,

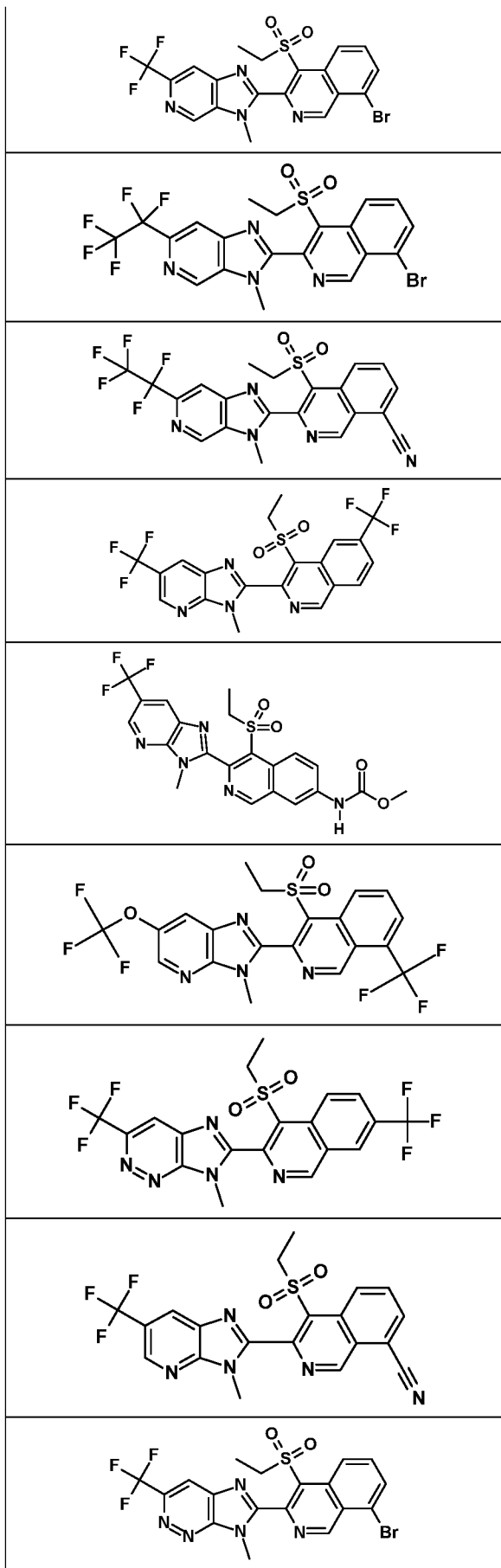
R⁶ represents hydrogen,

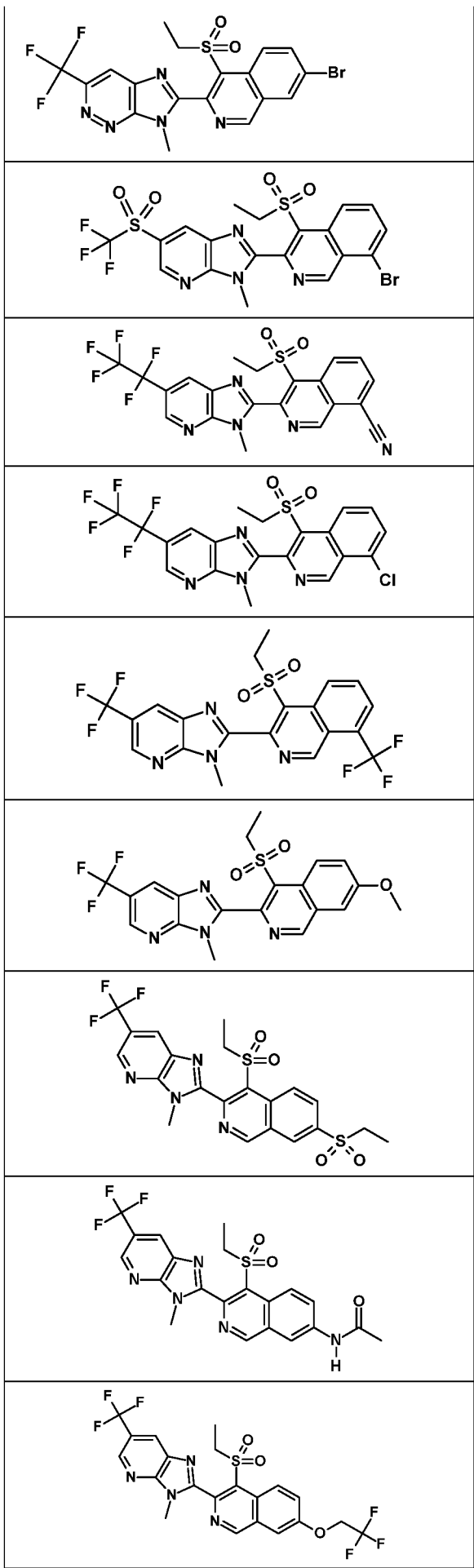
n represents 2.

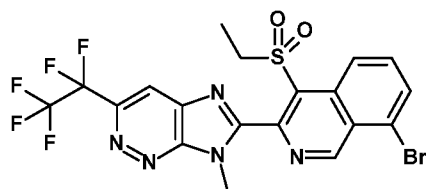
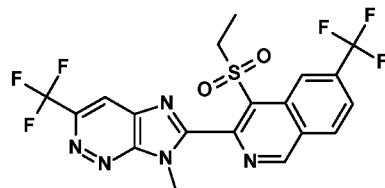
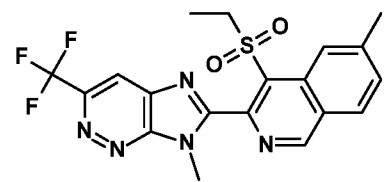
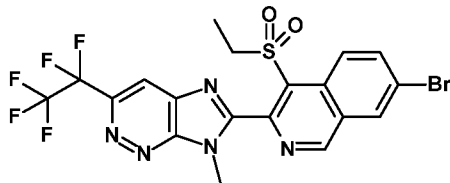
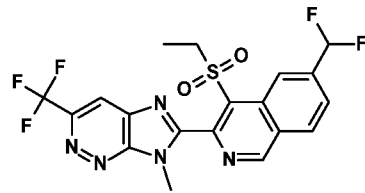
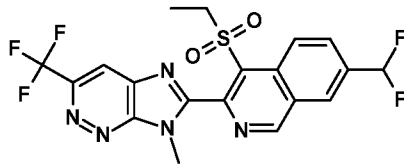
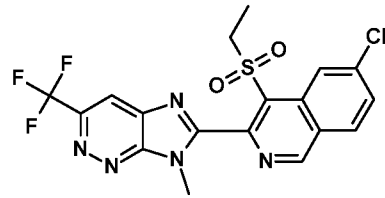
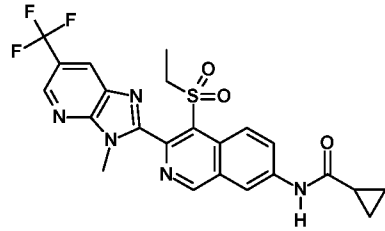
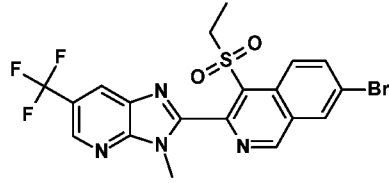
10. Compounds of the formula (I) according to Claim 1, in which the compounds have the structures below:

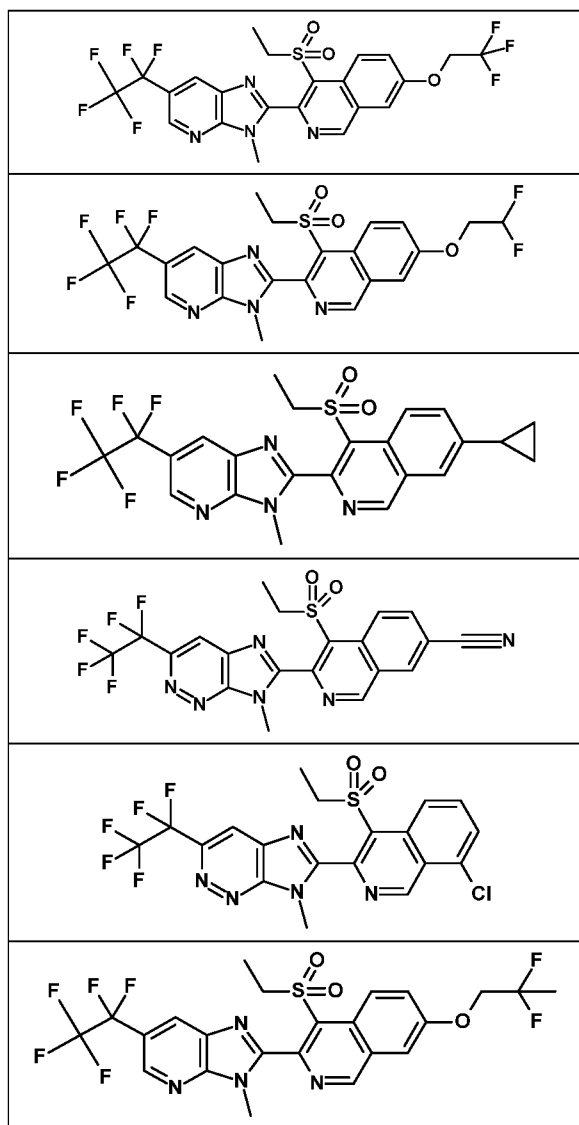












11. Agrochemical formulation comprising compounds of the formula (I) according to Claim 1 and also extenders and/or surfactants.
- 5 12. Agrochemical formulation according to Claim 11, additionally comprising a further agrochemical active compound.
13. Method for controlling animal pests, characterized in that a compound of the formula (I) according to Claim 1 or an agrochemical formulation according to Claim 11 or 12 is allowed to act on the animal pests and/or their habitat.
- 10 14. Use of compounds of the formula (I) according to Claim 1 or of agrochemical formulations according to Claim 11 or 12 for controlling animal pests.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2020/054746

A. CLASSIFICATION OF SUBJECT MATTER
INV. C07D471/04 A01N43/90 C07D487/04
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
C07D A01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, CHEM ABS Data, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2017/072039 A1 (BAYER CROPSCIENCE AG [DE]) 4 May 2017 (2017-05-04) cited in the application claims 1-12; compounds I'-43, I'-44, I'-49, I'-51, I'-54 -----	1-14

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search 1 April 2020	Date of mailing of the international search report 14/04/2020
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Johnson, Claire

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2020/054746

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2017072039	A1	04-05-2017	AR 106473 A1 17-01-2018
			AU 2016347345 A1 10-05-2018
			BR 112018008440 A2 06-11-2018
			CA 3002888 A1 04-05-2017
			CL 2018001077 A1 14-12-2018
			CN 108430986 A 21-08-2018
			CO 2018004344 A2 19-07-2018
			EP 3368521 A1 05-09-2018
			JP 2018536639 A 13-12-2018
			KR 20180069005 A 22-06-2018
			PE 20181198 A1 23-07-2018
			PH 12018500877 A1 29-10-2018
			RU 2018119344 A 28-11-2019
			TW 201726621 A 01-08-2017
			US 2018305353 A1 25-10-2018
			UY 36966 A 31-05-2017
			WO 2017072039 A1 04-05-2017
