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[Continued on next page]

(54) Title: COMPOSITIONS FOR INHIBITION OF INSECT SENSING

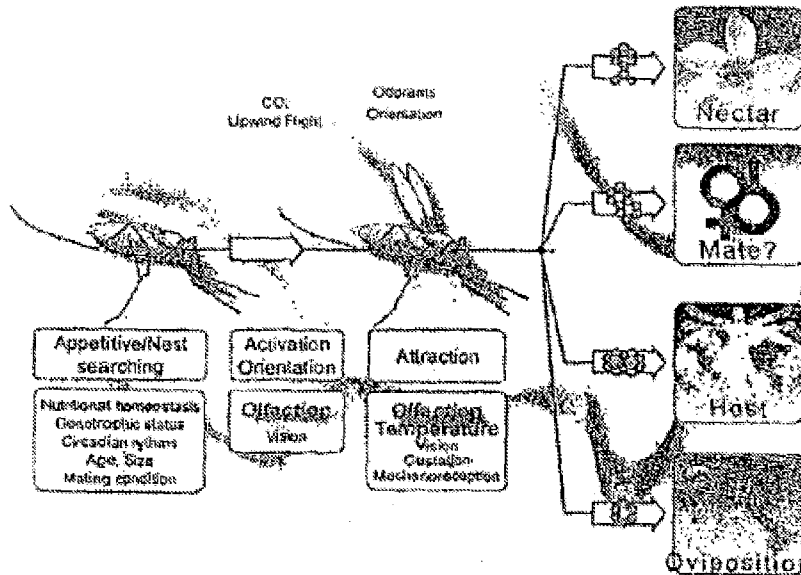


FIGURE 1

(57) Abstract: In one aspect, the invention relates to chemical modulators of insect olfactory receptors. In particular, compounds and compositions are provided that can inhibit sensory (e.g., host targeting) functions in airborne insects such as mosquitos. Method of employing such agents, and articles incorporating the same, are also provided. This abstract is intended as a scanning tool for purposes of searching in the particular art and is not intended to be limiting of the present invention.



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INTERNATIONAL SEARCH REPORT

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PCT/US2012/034847

A. CLASSIFICATION OF SUBJECT MATTER IPC(8) - A01N 43/40 (2012.01) USPC - 514/342 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) IPC(8) -A01N 37/10, 43/40, 82, 836; A61K 31/433, 4196, 4245, 4439; C07D 249/08, 12, 271/07, 285/08, 401/04, 413/04, 417/04 USPC - 514/340, 342, 363, 364, 384; 546/268.7, 269.1, 272.4; 548/129, 130, 123, 263.2, 263.6 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) PatBase, Google Patents, Google, NCBI, SureChem Open, Chemicalize.org		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X - Y	US 2010/0226949 A1 (RAY et al) 09 September 2010 (09.09.2010) entire document	1-8, 10 ----- 9, 11
Y	US 2003/0165879 A1 (WOODS et al) 04 September 2003 (04.09.2003) entire document	9
Y	US 2008/0095813 A1 (KIEC) 24 April 2008 (24.04.2008) entire document	11
A	VOSSHALL et al. A unified nomenclature system for the insect olfactory coreceptor. Chemical Senses Advanced Access. 25 March 2011. doi:10.1093/chemse/bjr022. entire document	1-12
A	US 2009/0099135 A1 (ENAN) 16 April 2009 (16.04.2009) entire document	1-12
A	BOHBOT et al. Insect repellants: modulators of mosquito odorant receptor activity. PLoS ONE 5(8):e12138. 11 August 2010. entire document	1-12
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/>		
* Special categories of cited documents:	"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 "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 "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 28 August 2012	Date of mailing of the international search report 17 SEP 2012	
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774	

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2012/034847

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

- 1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

- 2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

- 3. Claims Nos.: 50-78
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

(See Extra Sheet)

- 1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
- 2. As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
- 3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

- 4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-12

- Remark on Protest**
- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
 - The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
 - No protest accompanied the payment of additional search fees.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees need to be paid.

Group I, claims 1-12, are drawn to disrupting insect odorant sensing.

Group II, claims 13-29 and 79-116, are drawn to compositions for mediating Orco response.

Group III, claims 30-38, are drawn to an article including a compound for modulating Orco ion channels.

Group IV, claims 39-49 and 117, are drawn to chemical compound structures.

Group V, claims 118-127, are drawn to a method for preparing a compound.

The inventions listed in Groups I through V do not relate to a single general inventive concept under PCT Rule 13.1, because under PCT Rule 13.2 they lack the same or corresponding special technical features for the following reasons:

The special technical features of Group I, a method for disrupting insect odorant sensing by providing to an insect environment a compound that modulates insect Orco channels, are not present in Groups II-V; the special technical features of Group II, a method for mediating Orco response by providing a compound of the formulas shown, are not present in Groups I and III-V; the special technical features of Group III, an article including a compound that modulates insect Orco channels, are not present in Groups I, II, IV, and V; the special technical features of Group IV, compounds of the structural formulas as shown, are not present in Groups I-III and V; and the special technical features of Group V, methods for preparing a compound including reacting a R5-CO-NH-NH2 compound with a R4-N=C=S or R4-N=C=O compound, are not present in Groups I-IV.

Groups I through V share the technical features of disrupting insect odorant sensing by means of providing to an insect environment a compound that modulates insect Orco ion channels. However, these shared technical features do not represent a contribution over the prior art. Specifically, US 2009/0232918 A1 to Enan teaches compositions, methods and cell lines related to controlling insects (Abstract, compositions related to controlling insects; an embodiment of a composition comprises a plant essential oil and targets at least one receptor of insects chosen from tyramine receptor, Or83b olfactory receptor, and Or43a olfactory receptor, resulting in a change in the intracellular levels of cAMP, Ca²⁺, or both in the insects) including disrupting insect odorant sensing by means of providing to an insect environment a compound (Paras. [0011] and [0012] compositions of the present invention may be used to control insects by either treating a host directly, or treating an area in which the host will be located, for example, an indoor living space, outdoor patio or garden; see also Paras. [0095] through [0099] the following oils interact with the olfactory receptors: black seed oil (BSO), α -pinene, quinone, p-cymene, sabinene, α -thujone and d-limonene) that modulates insect Orco ion channels (Para. [0046] The insect control may be related to one or more of the receptors, comprising tyramine receptor (TyrR), Or83b Olfactory receptor (Or83b), and Or43a olfactory receptor (Or43a); Para. [0099] Certain other oils...also interact with the olfactory receptors).

Since none of the special technical features of the Group I through V inventions are found in more than one of the inventions, unity is lacking.