

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INTERNATIONAL FLAVORS & FRAGRANCES, INC.  
Petitioner

v.

THE UNITED STATES OF AMERICA, AS REPRESENTED BY THE  
SECRETARY OF AGRICULTURE  
Patent Owner

Patent Number: 7,579,016  
Issue Date: AUGUST 25, 2009  
Title: METHODS FOR REPELLING ARTHROPODS  
USING ISOLONGIFOLENONE ANALOGS

Case IPR2013-00124

**MOTION TO AMEND  
UNDER 37 C.F.R. § 42.121**

## I. SUMMARY OF MOTION TO AMEND

This motion to amend is submitted in compliance with 37 C.F.R. § 42.121. The Patent Owner requests that claims 1-26 be cancelled and that proposed new claims 27-44 be entered.

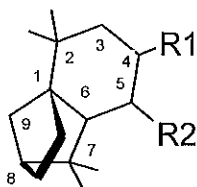
Cancelled claims 1-26 (totaling twenty-six claims) include one independent claims and twenty-five dependent claims. Proposed new claims 27-45 (totaling nineteen claims) include two independent claims and seventeen dependent claims (i.e., less than the amount of the original dependent claims). The proposed substitute claim set presents less than one new or substitute claim for each original claim, satisfying the general presumption that “only one substitute claim would be needed to replace each challenged claim.” 37 C.F.R. § 42.121(a)(3). Proposed new claim 27 corresponds to claims 1 and the first five compounds in claim 8. Proposed new claims 28-44 correspond to claims 9-26. Proposed new claim 45 corresponds to claim 1 with the limitation that the arthropods are ticks or mites.

Support for each of the proposed claims from “the original disclosure of the patent” and from the “earlier-filed disclosure for each claim for which benefit of the filing date of the earlier filed disclosure is sought” is provided below. *See* 37 C.F.R. §§42.121(b)(1)-(2).

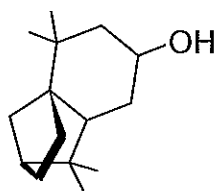
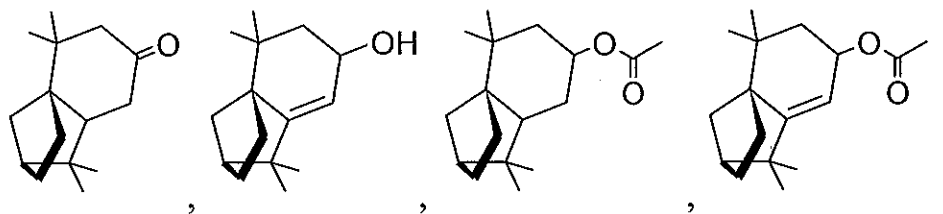
## II. CLAIM LISTING

1. 26. (Cancelled)

27. (Proposed substitute for original claim 1) A method for repelling arthropods, said method comprising treating an object or area with an arthropod repelling effective amount of at least one isolongifolenone analog and optionally a carrier or carrier material; wherein said at least one isolongifolenone analog has the following formula:

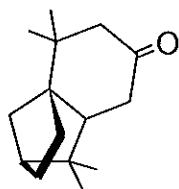


wherein R<sub>1</sub> is hydrogen, an oxygen, a C<sub>1-10</sub> alcohol, aldehyde, alkyl, ether, or esters of said alcohol with a C<sub>1-10</sub> saturated or unsaturated, straight or branched acid and R<sub>2</sub> is hydrogen, an oxygen, a C<sub>1-10</sub> alcohol, aldehyde, alkyl, ether, or esters of said alcohol with a C<sub>1-10</sub> saturated or unsaturated, straight or branched acid; optionally there is a double bond between carbons 5 and 6 and R<sub>2</sub> is hydrogen; wherein said at least one isolongifolenone analog is selected from the group consisting of

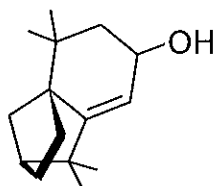


, and mixtures thereof.

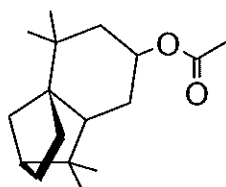
28. (Proposed new claim) The method according to claim 27, wherein said at least one isolongifolenone analog is



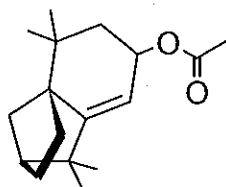
29. (Proposed new claim) The method according to claim 27, wherein said at least one isolongifolenone analog is



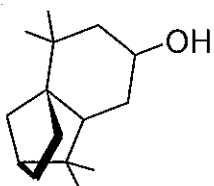
30. (Proposed new claim) The method according to claim 27, wherein said at least one isolongifolenone analog is



31. (Proposed new claim) The method according to claim 27, wherein said at least one isolongifolenone analog is



32. (Proposed new claim) The method according to claim 27, wherein said at least one isolongifolenone analog is



33. (Proposed new claim) The method according to claim 27, wherein said arthropod repelling effective amount of at least one isolongifolenone analog is about 10-about 300 nmole/cm<sup>2</sup>.

34. (Proposed new claim) The method according to claim 27, wherein said arthropod repelling effective amount of at least one isolongifolenone analog is about 10-about 200 nmole/cm<sup>2</sup>.

35. (Proposed new claim) The method according to claim 27, wherein said arthropod repelling effective amount of at least one isolongifolenone analog is about 20-about 100 nmole/cm<sup>2</sup>.

36. (Proposed new claim) The method according to claim 27, wherein said arthropod repelling effective amount of at least one isolongifolenone analog is about 20-about 80 nmole isolongifolenone/cm<sup>2</sup>.

37. (Proposed new claim) The method according to claim 27, wherein said arthropods are selected from the group consisting of *Aedes* species, *Culex* species, *Anopheles* species, *Ornithodoros* species, *Ixodes* species, *Boophilus* species, *Amblyomma* species, and mixtures thereof.

38. (Proposed new claim) The method according to claim 27, wherein said arthropods are selected from the group consisting of *Aedes aegypti*, *Anopheles stephensi*, *Ixodes scapularis*, *Amblyomma americanum*, and mixtures thereof.

39. (Proposed new claim) The method according to claim 27, wherein said arthropods are selected from the group consisting of *Aedes aegypti*, *Anopheles stephensi*, and mixtures thereof.

40. (Proposed new claim) The method according to claim 27, wherein said arthropods are selected from the group consisting of *Ixodes scapularis*, *Amblyomma americanum*, and mixtures thereof.

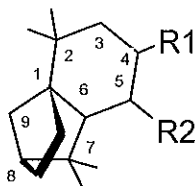
41. (Proposed new claim) The method according to claim 27, wherein said arthropods are *Aedes aegypti*.

42. (Proposed new claim) The method according to claim 27, wherein said arthropods are *Anopheles stephensi*.

43. (Proposed new claim) The method according to claim 27, wherein said arthropods are *Ixodes scapularis*.

44. (Proposed new claim) The method according to claim 27, wherein said arthropods are *Amblyomma americanum*.

45. (Proposed new claim) A method for repelling arthropods, said method comprising treating an object or area with an arthropod repelling effective amount of at least one isolongifolenone analog and optionally a carrier or carrier material; wherein said at least one isolongifolenone analog has the following formula:

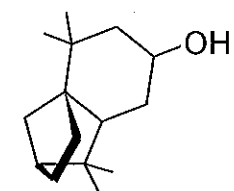
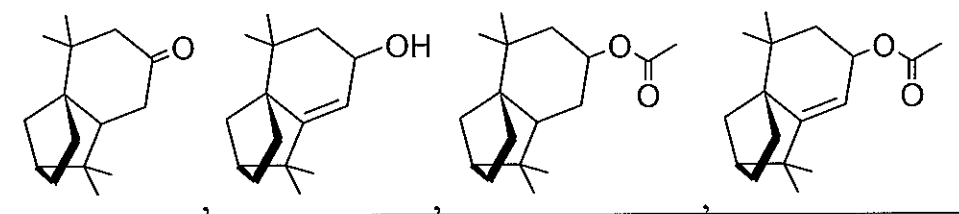


wherein R<sub>1</sub> is hydrogen, an oxygen, a C<sub>1-10</sub> alcohol, aldehyde, alkyl, ether, or esters of said alcohol with a C<sub>1-10</sub> saturated or unsaturated, straight or branched acid and R<sub>2</sub> is hydrogen, an oxygen, a C<sub>1-10</sub> alcohol, aldehyde, alkyl, ether, or esters of said alcohol with a C<sub>1-10</sub> saturated or unsaturated, straight or branched acid; optionally

there is a double bond between carbons 5 and 6 and R<sub>2</sub> is hydrogen; wherein said arthropods are ticks or mites.

## II. DISCUSSION OF PROPOSED CHANGES

Proposed substitute independent claim 27 includes all of the limitations of original independent claim 1, as well as several additional elements (underlined, below). In particular, the additional elements of proposed substitute claim 27 recite wherein said at least one isolongifolenone analog is selected from the group consisting of



, and mixtures thereof.

Likewise, each proposed new dependent claim includes one or more new limitations from the '016 patent, since they depend on claim 27.

Proposed substitute independent claim 45 includes all of the limitations of original independent claim 1, as well as several additional elements (underlined, below). In particular, the additional elements of proposed substitute claim 45 recite wherein said arthropods are ticks or mites.

### III. SUPPORT FOR CLAIMED SUBJECT MATTER

Each of the proposed claims finds support in “the original disclosure of the patent” (U.S. App. Ser. No. 12/106,505 (the ’505 application), which issued as U.S. Pat. No. 7,579,016). See 37 C.F.R. §§42.121(b)(1)-(2). Support for each of the proposed claims and/or the additional elements of the proposed claims is provided below with reference to the as-filed version of the application. The as-filed version of the ’016 application is submitted herewith as **Exhibit 1**.

Support for proposed substitute claim 27 can be found in at least ¶¶ 0071 and 0078-0083. Support for proposed substitute claims 28-44 can be found in at least ¶ 0085. Support for proposed substitute claim 41 can also be found in at least ¶ 0031. Support for proposed substitute claim 42 can also be found in at least ¶ 0052. Support for proposed substitute claims 43-44 can also be found in at least ¶ 0036. Support for proposed substitute claim 45 can be found in at least ¶¶ 0071 and 0036.

### IV. ALLOWABILITY OF PROPOSED SUBSTITUTE CLAIMS

On January 25, 2013, International Flavors & Fragrances, Inc. (“Petitioner”) filed a petition under 35 U.S.C. §§ 311-319 and 37 C.F.R. § 42.100 et. seq. requesting *inter partes* review of U.S. Patent No. 7,579,016, proposing three grounds of rejection. On June 27, 2013, the Patent Trial and Appeal Board issued a decision instituting an *inter partes* review with respect all of the grounds of rejection proposed in the Petition. The grounds of rejection for which the *inter partes* review was granted are based on one or more of the following references (referred to collectively herein as “the cited references”): WO 00/19822 (“Behan”); Grieco et al. (“Grieco”) *A Novel High-Throughput Screening System to Evaluate the Behavioral Response of Adult Mosquitoes to Chemicals*, 21 J. AM. MOSQUITO CONTROL ASS’N 404-411 (2005); Carroll et al. (“Carroll”), *Repellency of deet and SS220 applied to skin involves olfactory sensing by two species of ticks*, 19 MEDICAL AND VETERINARY ENTOMOLOGY 101-106 (2006).



Substitute independent claim 27 is patentable over the cited references, of which Behan appears to be the closest known prior art, because the cited references do not disclose or suggest that modifying the structure of isolongifolanone would lead a person of ordinary skill in the art to conclude that such modified compounds would have the same or similar properties as isolongifolanone. Indeed, a person of ordinary skill in the art would expect that minor structural changes to a known insect repellent often results in a modified compound that does not repel insects. It is noted that Behan **never** actually tested isolongifolanone as a repellent against insects.

For example, Debboun and Wagman (Debboun, M., and J. Wagman, J. Med. Entomol., 41(3): 430-434 (2004); **Exhibit 2**) tested 17 derivatives of N,N-diethyl-3-methylbenzamide (DEET) and N,N-diethylphenylacetamide (DEPA) for repellency (Abstract): "...Seven analogs were less effective than DEET and one compound, N,N-diethyl-3-hydroxybenzamide, was a poor repellent...." In addition, Teal et al. (Teal, P.E.A., et al., Can. Entomol., 116: 777-779 (1984); **Exhibit 3**) showed that (Z)-11-hexadecen-1-ol (precursor to (Z)-11-hexadecenal) is a repellent for female *Heliothis zea* whereas (Z)-11-hexadecenal attracts female *Heliothis zea* (see page 778). Hwang et al. (Hwang, Y., et al., J. Chem. Ecol., 10(1): 145-151 (1984); **Exhibit 4**) showed that even a change from *cis* to *trans* double bond affects repellency; see Table 2 where oleic acid was a repellent but elaidic acid was an attractant.

Furthermore, the Declaration by Dr. Aijun Zhang provides unpublished data showing that J4-120F (precursor to isolongifolanone J4-120H) and J4-120G (saturated form of J4-120F) did not have statistically significant repellency towards female *Aedes aegypti* and *Ix. scapularis* tick nymphs in comparison to isolongifolanone (see Figures 1, 2, and 3 in **Exhibit 5**).

Thus a person of ordinary skill in the art would expect that minor structural changes to a known insect repellent often results in a modified compound that does not repel insects.

It is well settled that dependent claims are nonobvious under Section 103 if the independent claim from which they depend is nonobvious. *In re Fine*, 5 USPQ2d

1596, 1600 (Fed. Cir. 1988).

New dependent claims 28 and 44 are dependent upon independent claim 27 which defines an unobvious method which is patentable over the prior art. Thus, the proposed new dependent claims are likewise patentable over the cited references.

Substitute independent claim 45 is patentable over the cited references, of which Behan appears to be the closest known prior art, because the cited references do not disclose or suggest that modifying the structure of isolongifolanone would lead a person of ordinary skill in the art to conclude that such modified compounds would have the same or similar properties as isolongifolanone. Indeed, a person of ordinary skill in the art would expect that minor structural changes to a known insect repellent often results in a modified compound that does not repel ticks and mites. It is noted that Behan **never** actually tested isolongifolanone as a repellent against ticks and mites, instead Behan was only concerned with insects (and even then did **not** test isolongifolanone against insects).

Ticks such as *Ixodes scapularis* and insects such as *Aedes aegypti* are both members of the Phylum Arthropoda; however, *Ixodes scapularis* ticks are members of the Class Arachnida whereas *Aedes aegypti* insects are members of the Class Insecta. There is nothing on record showing that a person of ordinary skill in the art would expect that an alleged repellent (i.e., isolongifolanone, which was **never** tested by Behan against insects or ticks) for *Aedes aegypti* insects (Class Insecta) would also serve as a repellent for *Ixodes scapularis* ticks (Class Arachnida), or *vice versa*.

For example, McMahon et al. (McMahon, C., et al., Med. And Vet. Entom., 17: 370-378 (2003); **Exhibit 6**) showed that DEET (known insect repellent, and repellent towards some ticks and mites, having a structure very different from isolongifolanone (see **Exhibit 7** from Department of Health Toxicology, Imperial College)) did not repel *Amblyomma variegatum* ticks when the ticks were exposed to their aggregation-attachment pheromone and DEET (see Table 1).

Furthermore, the Declaration by Dr. Aijun Zhang provides unpublished data

showing that J4-120F (precursor to isolongifolanone J4-120H) and J4-120G (saturated form of J4-120F) did not have statistically significant repellency towards ticks in comparison to isolongifolanone (see Figures 1, 2, and 3 in **Exhibit 5**).

Thus a person of ordinary skill in the art would expect that minor structural changes to a known insect repellent often results in a modified compound that does not repel ticks and mites.

Finally, the Board is requested to address whether the subject of burden of proof is affected by the September 24, 2013 decision of the U.S. Court of Appeals for the Federal Circuit in *Rambus, Inc. v. Teresa Stanek Rea* (Fed. Cir. 2013)(last paragraph on page 9 and paragraph bridging pages 10-11; **Exhibit 8**)

#### V. CONCLUSION

For at least the foregoing reasons, the Patent Owner respectfully requests that the Board grant this Motion to Amend.

Please charge any required fees pertaining to this Motion To Amend to the Deposit Account of the undersigned, No. 50-2134, and credit any overpayment to said Account.

Respectfully submitted,

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*Representing Patent Owner*

Date: 25 September 2013

## CERTIFICATE OF SERVICE

The undersigned hereby certifies that copies of the following documents:

1. Patent Owner Motion to Amend;
2. U.S. App. Ser. No. 12/106,505, as filed (Exhibit 1);
3. Debboun, M., and J. Wagman, J. Med. Entomol., 41(3): 430-434 (2004) (Exhibit 2);
4. Teal et al. (Teal, P.E.A., et al., Can. Entomol., 116: 777-779 (1984) (Exhibit 3)
5. Hwang, Y., et al., J. Chem. Ecol., 10(1): 145-151 (1984)(Exhibit 4);
6. Declaration Under 37 C.F.R. Section 1.132 by Dr. Aijun Zhang and the figures (Exhibit 5);
7. McMahon, C., et al., Med. And Vet. Entom., 17: 370-378 (2003) (Exhibit 6);
8. Structure of DEET from Department of Health Toxicology, Imperial College (Exhibit 7);
9. September 24, 2013 decision of the U.S. Court of Appeals for the Federal Circuit in *Rambus, Inc. v. Teresa Stanek Rea* (Fed. Cir. 2013)(Exhibit 8); and
6. Certificate of Service.

were served on September 25, 2013 via Federal Express standard overnight shipping directed to the Petitioners' attorneys of record at the following address:

**Elizabeth M. Quirk**  
**International Flavors & Fragrances, Inc.**  
521 West 57<sup>th</sup> Street  
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Respectfully submitted,

By: G. Byron Stover  
G. Byron Stover  
PTO Reg. No. 34,737  
*Representing Patent Owner*

Date: 25 September 2013