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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* JEAN-MARC HOUGARD and CEDRIC PENNETIER<sup>1</sup>

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Appeal 2015-002750  
Application 10/588,492  
Technology Center 1600

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Before MELANIE L. McCOLLUM, JEFFREY N. FREDMAN,  
and TIMOTHY G. MAJORS, *Administrative Patent Judges*.

MAJORS, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 involving claims to insecticide compositions that have been rejected as obvious. We have jurisdiction under 35 U.S.C. § 6(b).

We reverse.

STATEMENT OF THE CASE

Appellants’ “invention relates to a novel insecticide composition and its use, in particular for the impregnation of mosquito nets.” (Spec. 1, ll. 5–6.) According to the Specification, “a major obstacle to the use of mosquito

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<sup>1</sup> Appellants identify the Real Party in Interest as Institut de Recherche pour le Développement (IRD). (App. Br. 2.)

nets impregnated with a pyrethroid insecticide” is that mosquitos develop resistance “via mutation of the *kdr* gene.” (*Id.* at 1, ll. 27–29.) Appellants disclose “[t]he purpose of the present invention is [] to provide a novel insecticide composition not containing pyrethroid, while being at least as effective as pyrethroid insecticides.” (*Id.* at 1, ll. 32–34.)

Appellants further disclose “[t]he invention [] relates to an insecticide composition comprising a non-pyrethroid insecticide in combination with an insect repellent, characterized in that the concentration of insecticide in the insecticide composition is lower than its lethal concentration 100 (LC100) when it is used alone.” (*Id.* at 2, ll. 14–17.) According to the Specification, “the combination of the non-pyrethroid insecticide and insect repellent has synergistic effects on the mortality and the KD [“Knock-Down”] effect . . . [and] thus gives the insecticide composition of the invention characteristics similar to those of pyrethroids.” (*Id.* at 5, ll. 3–11.)

Claims 2, 5–7, 10, 12, 13, 16, 17, and 19 are on appeal. Claim 2 is illustrative:

2. A mosquito insecticide composition comprising a nonpyrethroid insecticide having acetylcholinesterase inhibitor activity, in synergistic combination with an insect repellent, wherein:

the non-pyrethroid insecticide having acetylcholinesterase inhibitor activity is a carbamate insecticide or an organophosphate insecticide,

the insect repellent is selected from the group consisting of: [] N,N-diethyl-meta-toluamide (DEET); 2-(2-hydroxyethyl)-piperidine carboxylic acid ester of 1-methyl-propyl (KBR2023); N-butyl-N-acetyl-3-ethylamine propionate (IR3535); N,N diethylphenylacetamide (DEPA); 1-(3-

cyclohexen-1-yl-carbonyl)-2-methylpiperine (AI-37220); (2-hydroxymethylcyclohexyl) acetic acid lactone; 2-ethyl-1,3-hexandiol; indalone; and methylneodecanamide (MNDA),

the composition has a concentration of the non-pyrethroid insecticide from an approximate LC20 to approximate LC40 compared to a lethal concentration 100 (LC100) when the insecticide is used alone, and

the composition has a concentration of the insect repellent that is lower than the concentration of said insect repellent procuring a protective effect when the insect repellent is used alone.

(App. Br. 27 (Claims App'x).)

Claims 2, 5–7, 10, 12, 13, 16, 17, and 19 stand rejected as unpatentable under 35 U.S.C. § 103(a) over Karl<sup>2</sup> and Skovmand.<sup>3</sup>

In response to a species election requirement, Appellants elected the species O-[2-diethylamino)-6-methyl-4pyrimidinyl] O,O-dimethyl phosphorothioate (pirimiphos-methyl) as the insecticide and N,N-diethylmeta-toluamide (DEET) as the insect repellent. (*See* 11/8/2010 Resp. to Restriction Requirement 2; *see also*, Final Act. 2.) We limit our analysis of the claims to the patentability of the elected species and do not address the patentability of the broader generic elements of the claims. *Ex parte Ohsaka*, 2 USPQ2d 1460, 1461 (BPAI 1987).

#### DISCUSSION

Appellants argue the patentability of the rejected claims as a group. We select claim 2 as representative. 37 C.F.R. § 41.37(c)(1)(iv).

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<sup>2</sup> Karl et al., US 2005/0132500 A1, published June 23, 2005 (“Karl”).

<sup>3</sup> Skovmand, WO 01/37662 A1, published May 31, 2001 (“Skovmand”).

Claim 2, in view of Appellants' species election, generally recites a composition including the insecticide pirimiphos-methyl ("PM") and the repellent DEET, where both PM and DEET are present in concentrations lower than concentrations that provide lethal (LC100)<sup>4</sup> and protective effects when either the insecticide or repellent alone is used. At the crux of this appeal is whether, as Appellants contend, the combination of PM and DEET in lower concentrations as claimed provides unexpected synergistic effects. (*See, e.g.*, App. Br. 5–6.)

The Examiner finds that Karl and Skovmand teach compositions comprising an insecticide and/or repellent for application to nettings, fabrics, and the like. (Final Act. 6.) The Examiner also finds that both Karl and Skovmand identify suitable insecticides and repellents that include Appellants' elected insecticide and repellent. (*Id.*) For example, the Examiner finds that Karl teaches

[t]he insecticide is selected from organophosphorous compounds such as pirimiphos-ethyl and piri[mi]phos-methyl (claim 4 of Karl et al., elected insecticide and limitation of instant claims . . . and the repellent is selected from compounds such as N,N-Diethyl-meta-toluamine (i.e., DEET, claim 4 of Karl [] and elected repellent and limitation of instant claims . . . .

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<sup>4</sup> The Specification defines "Lethal concentration 100 (LC100)" as "the concentration of an insecticide for which essentially 100 % of the insects in contact with this insecticide are killed." (Spec. 3, ll. 21–22.) The Specification also discloses, "the lethal concentration X (LCX) corresponds to the concentration of an insecticide for which essentially X % of the insects in contact with this insecticide are killed." (*Id.* at 3, ll. 23–25.)

(*Id.*) According to the Examiner, Karl also teaches “[t]he composition comprises from about 0.001 to 95% by weight of the insecticide and/or repellent (claim 7 of Karl [ ]).” (*Id.*) The Examiner’s findings as to Skovmand’s teachings are similar. (*Id.* at 6–7.)

The Examiner finds that neither Karl nor Skovmand expressly teach a composition with the reduced concentrations of insecticide and repellent recited in claim 2. More specifically, the Examiner finds

[t]he difference between the invention of the instant application and that of Karl [ ] and Skovmand [ ] is that Karl [ ] and Skovmand do not expressly teach that the concentration of the insecticide in the product being lower (i.e., LC20 to LC40, and LC30) than its lethal concentration 100 (LC100) from an approximate LC20 to approximate LC40 compared when it is used alone, and that the concentration of the insect repellent in the product being lower than the concentration of the insect repellent procuring a maximum repellent effect and a protective effect when it is used alone.

(*Id.* at 7.)

The Examiner concludes, however, “it would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Karl [ ] and Skovmand to arrive at products containing at least one non-pyrethroid insecticide and at least one insect repellent” in the lower concentrations claimed. (Final Act. 8.) According to the Examiner, it was “known in the art that combining insecticidal actives increases the efficacy of an insecticide such that the maximum level of insects killed for a given application rate of an insecticide is increased, or alternatively, the application rate of an insecticide giving the maximum level of insects killed can be reduced.” (*Id.*) The Examiner reasons “one would

have been motivated to make this combination in order to receive the expected benefit of having products impregnated with low doses of repellents and insecticides that will last longer due to the combination of the non-pyrethroid insecticide and repellent.” (*Id.*)

Appellants argue that Karl and Skovmand “fail[] to teach or suggest any synergistic effect of combining a non-pyrethroid insecticide and an insect repellent.” (App. Br. 6, 11.) Appellants contend Karl “is primarily focused on” a binder component that provides wash resistance (App. Br. 6–7) and, insofar as the elected insecticide and repellent are mentioned at all, they are not disclosed as part of any specific combination but among a list of “virtually all known insecticides . . . and known repellents.” (*See id.* at 8.) Appellants’ contentions about Skovmand are similar. (*See, e.g., id.* at 9–10 (Skovmand “focuses on creating a fabric in which the insecticide and/or repellent does not wash off or degrade”) and 11 (Skovmand “lists the entire gamut of known pyrethroid, carbamate, organophosphorous and sterilizing insecticides”).)

Appellants further argue “[t]he claimed combination of non-pyrethroid insecticide and insect repellent is much more effective against mosquitoes, and at lower doses, than the additive properties of either component when used alone” thus indicating “a very strong synergy that would not have been expected.” (*Id.* at 11.) In support, Appellants cite multiple published articles (*id.* at 13–14), the “prosecution record” including testing described in the Specification (*id.* at 16–19), and the declaration of Cedric Pennetier dated January 17, 2014 (Pennetier Decl.) (*id.* at 20–21). Against this evidence, the Appellants contend “the Examiner has not

provided any evidence to show that it ‘was known in the art’ . . . that combining insecticide with insect repellent, specifically the elected species of pirimiphos-methyl and DEET, would be expected to produce synergistic effect.” (*Id.* at 16; *see also* Reply Br. 3–5.)

The Examiner responds that “the compositions of the prior art are the same as Appellant’s claimed composition” and thus “all the properties associated with Appellant’s compositions would also be possessed by the compositions of the prior art.” (Ans. 6.) As to Appellants’ evidence of alleged unexpected synergism, the Examiner responds as follows:

with regards to Appellant’s argument that the prosecution record provides a significant amount of evidence to show that the combination of non-pyrethroid insecticide and insect repellent produces synergistic activity, the Examiner is not persuaded by Appellant’s argument because in pesticidal combinations, it is very common in the art to produce combinations that are synergistic and both KARL and SKOVMAND specifically disclose in their claims the combination of non-pyrethroid insecticide and insect repellent as instantly claimed.

(*Id.* at 8.)

As noted above, we limit our review to the patentability of the elected species — a composition that includes PM and DEET.

We agree with the Examiner that claim 2 would have been *prima facie* obvious over Karl and Skovmand. Contrary to Appellants’ arguments, the teachings of Karl and Skovmand are not limited to what either reference is “primarily focused on” or to the references’ preferred embodiments. *Merck & Co., Inc. v. Biocraft Labs., Inc.*, 874 F.2d 804, 807 (Fed. Cir. 1989) (“[I]n a section 103 inquiry, the fact that a specific [embodiment] is taught to be preferred is not controlling, since all disclosures of the prior art, including

unpreferred embodiments, must be considered.”) (internal quotation marks omitted). Moreover, the cited art teaches that the insecticides and/or repellents may be included in a broad range of concentrations from about 0.001 to 95% by weight. *See In re Aller*, 220 F.2d 454, 456 (CCPA 1955) (“[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.”).

But our inquiry does not end with the Examiner’s *prima facie* case because Appellants have provided evidence of secondary considerations they contend shows that claim 2 is nonobvious. With respect to that evidence, initially we observe that the testing examples cited in the Specification and Pennetier Decl. do not include a specific example combining PM and DEET — the elected combination. The Pennetier Decl. states, however, that the “[testing] results [of the additional combinations of carbamate or organophosphate insecticides with repellents] confirm that the synergistic interactions previously observed between DEET or KBR 3023 and propoxur or pyrimiphos-methyl . . . were not an isolated phenomenon.” (Pennetier Decl. 8.) With respect to the “synergistic interactions previously observed,” the declaration references a 2007 article by Pennetier (“Pennetier 2007”).<sup>5</sup> (*Id.*)

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<sup>5</sup> Pennetier et al., *Synergy between repellents and non-pyrethroid insecticides strongly extends the efficacy of treated nets against Anopheles gambiae*, 6:38 MALARIA JOURNAL 1–7 (2007). Appellants cite Pennetier 2007 in the Evidence Appendix of their Appeal Brief. (*See App. Br.* 35.)

Unlike the cited testing from the Specification or the testing specifically discussed in the Pennetier Decl., Pennetier 2007 does describe testing of a composition comprising both PM and DEET. (Pennetier 2007 Abstract.) Indeed, earlier in prosecution Appellants argued that Pennetier 2007 evidenced synergism in a composition comprising PM and DEET. (*See, e.g.*, Sept. 4, 2012 Remarks 11–12 (“evidence of the unexpected results of a composition containing the AchE inhibitor pirimiphos-methyl (PM) in combination with DEET are provided in PENNETIER et al. (Malaria Journal (2007))”).) According to Appellants, Pennetier 2007 shows “[t]he difference of efficacy between expected and observed  $LT_{95}$  and  $BIT_{95}$  of DEET/PM . . . indicates a very strong synergy.” (*Id.* at 12; *see also* Dec. 2, 2011 Remarks 12–14.)

Examiner agreed that Pennetier 2007 evidenced synergism in a PM/DEET composition. According to the Examiner, “[t]he publications presented by Applicant discloses data that demonstrates synergy produced from mixtures of one insecticide component, pirimiphos-methyl . . . in combination with [] a repellent of DEET.” (*See* Oct. 7, 2013 Office Action 11; *see also* Mar. 2, 2012 Office Action 14.) Yet the Examiner found that Appellants’ evidence remained insufficient because Appellants had not shown synergism across the “whole class of carbamate and organophosphate insecticides” and thus Appellants’ evidence was not “commensurate in scope with that of the claimed subject matter.” (Oct. 7, 2013 Office Action 11–12;

*see also* Mar. 2, 2012 Office Action 14–15.)<sup>6</sup> However, the Examiner’s position is inconsistent with the species election that remains applicable to claim 2 and which has not been withdrawn by the Examiner.

Examiner’s response now to Appellants’ evidence of alleged unexpected synergism is that Karl and Skovmand disclose combinations of insecticides and/or repellents, that “it is very common in the art to produce combinations that are synergistic,” and that “[i]t is known in the art that combining insecticidal actives increases the efficacy of an insecticide.” (Ans. 8; Final Act. 8.) In other words, the Examiner suggests that the skilled person would have expected synergism in a composition including PM and DEET as claimed. *In re Kollman*, 595 F.2d 48, 55 n.6 (CCPA 1979) (“Synergism, in and of itself, is not conclusive of unobviousness in that synergism might be expected.”).

We are not persuaded. Instead, we agree with Appellants that the Examiner has not provided sufficient factual evidence to support this position. (*See* App. Br. 15–16; Reply Br. 3–4.)

We conclude the preponderance of the evidence does not establish that claim 2 would have been obvious over Karl and Skovmand. We thus

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<sup>6</sup> The Examiner’s determination that evidence of synergism for combinations of insecticides and repellents other than PM and DEET was required likely explains why the later-submitted Pennetier Decl. did not provide new testing data for the elected combination. We note the test methodology in Pennetier 2007 differs from the test methodologies described in the Pennetier Decl. and the cited examples in the Specification. We decline, however, to revisit on appeal whether the Examiner was correct in agreeing that Pennetier 2007 evidenced synergism in a composition of PM and DEET.

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reverse the rejection of claim 2. Each of claims 5–7, 10, 12, 13, 16, 17, and 19 depend from claim 2, and thus we reverse as to those claims as well.

#### SUMMARY

We reverse the rejection of claims 2, 5–7, 10, 12, 13, 16, 17, and 19 as obvious over Karl and Skovmand.

REVERSED