

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
27 August 2009 (27.08.2009)

(10) International Publication Number
WO 2009/105592 A3

(51) International Patent Classification:
C12Q 1/68 (2006.01) C07H 21/04 (2006.01)

(21) International Application Number:
PCT/US2009/034592

(22) International Filing Date:
19 February 2009 (19.02.2009)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/029,849 19 February 2008 (19.02.2008) US

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ,

CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))
- with sequence listing part of description (Rule 5.2(a))

(88) Date of publication of the international search report:
30 December 2009

(54) Title: COMPOSITIONS AND METHODS FOR DETECTION OF PROPIONIBACTERIUM ACNES NUCLEIC ACID

(57) Abstract: Methods for amplifying and detecting Propionibacterium acnes nucleic acid by targeting specific sequences in 16S rRNA, 23S rRNA, or DNA encoding 16S rRNA or 23S rRNA are disclosed. Nucleic acid oligonucleotide sequence compositions specific for P. acnes nucleic acid sequences in 16S or 23S rRNA or DNA encoding 16S or 23S rRNA sequences are disclosed, which are useful for amplification oligonucleotides, capture probes in sample preparation, and probes for detection of P. acnes nucleic acid sequences.



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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 09/34592

A. CLASSIFICATION OF SUBJECT MATTER
 IPC(8) - C12Q 1/68; C07H 21/04 (2009.01)
 USPC - 435/6; 536/24.33; 536/24.3
 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): C12Q 1/68; C07H 21/04 (2009.01)
 USPC: 435/6; 536/24.33; 536/24.3

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)
 WEST (PGPB,USPT,EPAB,JPAB), esp@cenet, Google Scholar: propionibacterium, acnes, oligomer, promoter, 16s rRNA, Hogan, Livezey, Gen-Probe, nucleic acid detection DNA oligomer promoter
 GenCore 6.3: SEQ ID NO: 199, 16, 35

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|--|-----------------------|
| A | WO 01/81581 A2 (SKEIKY et al.) 1 November 2001 (01.11.2001), pg 2, ln 12-26; pg 42, ln 1-13; pg 48, ln 14; pg 52, ln 10-23; pg 52, ln 27; SEQ ID NO: 35. | 1, 3, 11-12, 20 |
| A | US 2006/0046265 A1 (BECKER et al.) 2 March 2006 (02.03.2006), para [0042], SEQ ID NO: 5 | 1, 3, 11-12, 20 |
| A | ROSS et al. Phenotypic and genotypic characterization of antibiotic-resistant Propionibacterium acnes isolated from acne patients attending dermatology clinics in Europe, the U.S.A., Japan and Australia. British J of Dermatology 2001, 144(2):339-346. | 1, 3, 11-12, 20 |

Further documents are listed in the continuation of Box C.

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| * 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 | "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 |
| "E" earlier application or patent but published on or after the international filing date | "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 |
| "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) | "&" document member of the same patent family |
| "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 | |

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| Date of the actual completion of the international search 27 October 2009 (27.10.2009) | Date of mailing of the international search report 06 NOV 2009 |
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| 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: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774 |
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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 09/34592

Continuation of Box (III): Lack of Unity -

Group II+: claims 6-11, 16-20, drawn to a composition comprising at least two oligomers specific for *P. acnes* 23S rRNA sequence and a method of using it for detecting *P. acnes* in a sample. Should Applicant pay additional fee, Applicant is invited to specify the oligonucleotides to be searched. The exact claims searched will depend on the specifically elected oligonucleotide(s).

The inventions listed as Groups I+ and II+ 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:

Groups I and II share the technical feature of detecting *P. acnes* in a sample by means of detecting the presence of its ribosomal RNA. However, this shared technical feature does not represent a contribution over the prior art. Specifically, an article entitled "Phenotypic and genotypic characterization of antibiotic-resistant *Propionibacterium acnes* isolated from acne patients attending dermatology clinics in Europe, the U.S.A., Japan and Australia" by ROSS, et al. (British Journal of Dermatology 2001; 144(2):339-346) discloses analysing genomic DNA of *P. acnes* by means of two separate amplification reactions: "First, a 1.4-kb section of the DNA encoding 23S rRNA (including the conserved domain V) was amplified, and secondly, a 1.5-kb section encoding the 16S rRNA was obtained. Polymerase chain reaction (PCR) conditions and primers were as described previously" (pg 341, col 2), with the purpose of elucidation of the molecular basis of *P. acnes* antibiotic resistance, conferred by mutations in genes encoding 23S and 16S rRNA. As the above method of detecting *P. acnes* in a sample by means of detecting the presence of its ribosomal RNA was known at the time of the invention, this cannot be considered a special technical feature that would otherwise unify the groups.

The special technical feature of the invention listed as Groups I+ is the specific nucleic acid sequences recited therein. As 16S rRNA nucleotide sequence, including the claimed SEQ ID NO:199, was known at the time of the invention (WO 2001/081581 A2 to SKEIKY et al., claim 1, SEQ ID NO: 35, nucleotides 2640-2141), and as no significant structural similarities can readily be ascertained among the claimed nucleic acid sequences, the inventions do not share a special technical feature. Without a shared special technical feature, the inventions lack unity with one another.

The special technical feature of the invention listed as Groups II+ is the specific nucleic acid sequences recited therein. As 23S rRNA nucleotide sequence, including the claimed SEQ ID NO:202, was known at the time of the invention (GenBak Accession Number AE017283 entitled "*Propionibacterium acnes* KPA171202, complete genome" (Jul 2004), nucleotides 108744-109293 [Retrieved from the Internet 25 Aug 2009: <<http://www.ncbi.nlm.nih.gov/nuccore/50839098>>]), and as no significant structural similarities can readily be ascertained among the claimed nucleic acid sequences, the inventions do not share a special technical feature. Without a shared special technical feature, the inventions lack unity with one another.

Groups I+ and II+ therefore lack unity under PCT Rule 13 because they do not share a same or corresponding special technical feature.

Note: Claims 2, 4, 5, 13, 14, and 15 were not searched for being drawn to sequences other than SEQ ID NOS: 16 and 35.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 09/34592

Box No. I Nucleotide and/or amino acid sequence(s) (Continuation of item 1.c of the first sheet)

1. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of a sequence listing filed or furnished:

a. (means)

on paper

in electronic form

b. (time)

in the international application as filed

together with the international application in electronic form

subsequently to this Authority for the purposes of search

2. In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

3. Additional comments:

GenCore 6.3: SEQ ID NO: 199, 16, 35

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 09/34592

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.:
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:

Group I+: claims 1-5, 11-15, 20, drawn to a composition comprising at least two oligomers specific for *P.acnes* 16S rRNA sequence and a method of using it for detecting *P.acnes* in a sample. The first invention encompasses a composition comprising oligonucleotides of SEQ ID NO:16 and SEQ ID NO:35. An additional oligonucleotide(s) or combination thereof will be searched for an additional fee. Should Applicant pay additional fee, Applicant is invited to specify the oligonucleotides to be searched. The exact claims searched will depend on the specifically elected oligonucleotide(s).

[Note: Claims 2, 4-5, 13-15 were not searched because they are drawn to sequences other than SEQ ID NOS: 16 and 35.]

--- Please see continuation on attached additional 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, 3, 11-12, 20, restricted to SEQ ID NOS: 16 and 35

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.