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(71) Applicant: **VERDEZYNE, INC.** [US/US]; 2715 Loker Avenue West, Carlsbad, CA 92010 (US).

(72) Inventors: **BEARDSLEE, Tom**; 2715 Loker Avenue West, Carlsbad, CA 92010 (US). **HUTAGALUNG, Alex**; 2715 Loker Avenue West, Carlsbad, CA 92015 (US). **PICATAGGIO, Stephen**; 2715 Loker Avenue West, Carlsbad, CA 92010 (US).

(74) Agents: **GIRINATH, Prashant** et al.; Wilson Sonsini Goodrich & Rosati, 650 Page Mill Road, Palo Alto, CA 94304-1050 (US).

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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))*

(88) Date of publication of the international search report:
18 September 2014

(54) Title: BIOLOGICAL METHODS FOR PREPARING A FATTY DICARBOXYLIC ACID

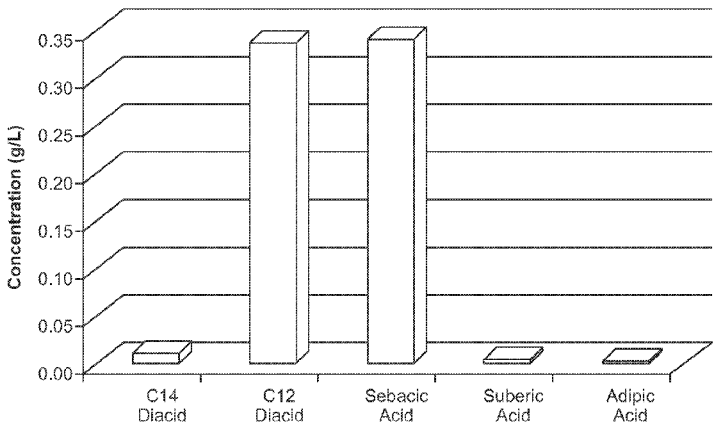

FIG. 17

(57) Abstract: The technology relates in part to biological methods for producing a fatty dicarboxylic acid and engineered microorganisms capable of such production. Provided are engineered microorganisms capable of producing fatty dicarboxylic acids and products expressed by such microorganisms. Also provided are biological methods for producing fatty dicarboxylic acids.

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
INV. C12N1/16 C12N1/28 C12P7/64
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)
C12N C12P

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, BIOSIS, Sequence Search, 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,P	WO 2013/006733 A2 (VERDEZYNE INC [US]; BEARDSLEE TOM [US]; PICATAGGIO STEPHEN [US]; HUTAG) 10 January 2013 (2013-01-10) the whole document -----	135-159
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X	GERALDINE BUTLER ET AL: "Evolution of pathogenicity and sexual reproduction in eight Candida genomes", NATURE, vol. 459, no. 7247, 4 June 2009 (2009-06-04), pages 657-662, XP055035717, ISSN: 0028-0836, DOI: 10.1038/nature08064 the whole document -----	135-159
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[X] Further documents are listed in the continuation of Box C.

[X] 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	Date of mailing of the international search report
15 April 2014	28/07/2014

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Scheffzyk, Irmgard

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Form PCT/ISA/210 (second sheet) (April 2005)

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2012/094425 A2 (VERDEZYNE INC [US]; PICATAGGIO STEPHEN [US]; BEARDSLEE TOM [US]) 12 July 2012 (2012-07-12) sequence 39	135-147, 151-159
X	P Dommes ET AL: "THE J O U R N A L OF BIOLOGICAL CHEMISTRY @-Oxidation in Candida tropicalis PARTIAL PURIFICATION AND BIOLOGICAL FUNCTION OF AN INDUCIBLE 2,4-DIENOYL COENZYME A", J. Biol. Chem. at EUROPEAN PATENT OFFICE on April, 25 September 1983 (1983-09-25), pages 10846-10852, XP055114149, Retrieved from the Internet: URL:http://www.jbc.org/content/258/18/10846.full.pdf [retrieved on 2014-04-15] the whole document	1, 160-200
A	WO 2009/037329 A2 (BASF PLANT SCIENCE GMBH [DE]; PUZIO PIOTR [BE]; THIMM OLIVER [DE]; BLA) 26 March 2009 (2009-03-26) the whole document	168,171
X	A. P. JACKSON ET AL: "Comparative genomics of the fungal pathogens Candida dubliniensis and Candida albicans", GENOME RESEARCH, vol. 19, no. 12, 10 September 2009 (2009-09-10), pages 2231-2244, XP055114161, ISSN: 1088-9051, DOI: 10.1101/gr.097501.109 the whole document	135-150
A	BEOPOULOS ATHANASIOS ET AL: "Control of lipid accumulation in the yeast Yarrowia lipolytica", APPLIED AND ENVIRONMENTAL MICROBIOLOGY, AMERICAN SOCIETY FOR MICROBIOLOGY, US, vol. 74, no. 24, 1 December 2008 (2008-12-01), pages 7779-7789, XP009112521, ISSN: 1098-5336, DOI: 10.1128/AEM.01412-08 the whole document	1, 135-202

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INTERNATIONAL SEARCH REPORT

International application No
PCT/US2013/076739

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	OKAZAKI K ET AL: "Two acyl-coenzyme A oxidases in peroxisomes of the yeast Candida tropicalis: primary structures deduced from genomic DNA sequence", PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES, NATIONAL ACADEMY OF SCIENCES, US, vol. 83, no. 5, 1 March 1986 (1986-03-01), pages 1232-1236, XP002979085, ISSN: 0027-8424, DOI: 10.1073/PNAS.83.5.1232 the whole document -----	1, 135-202

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INTERNATIONAL SEARCH REPORT

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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:

see 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 an 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, 160-202(completely); 109-159(partially)

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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1, 160-202(completely); 109-159(partially)

   A genetically modified Yarrowia lipolytica yeast comprising (i) an active,modified endogenous acyl-CoA oxisae or an active modified endogenous acyl-CoA dehydrogenase; (II) a genetic modification that alters a native enoyl CoA isomerase activity and (iii) a genetic modification that alters a native dieneoyl CoA reductase (DCR) activity, wherin the yeast is capable of producing a diacid from a feedstock comprising one or more components from a vegetable oil.

   ---

2. claims: 2-38(completely); 40-75, 109-159(partially)

   A genetically modified yeast comprising an active, modified endogenous acyl-CoA oxidase or an active modified endgenous acyl-CoA dehydrogenase, which yeast is capable of producing a diacid from a feedstock comprising one or more components from a vegetable oil.

   ---

3. claims: 39(completely); 40-75, 109-159(partially)

   A genetically modified yeast comprising (i) an active,modified endogenous acyl-CoA oxidase or an active modified endogenous acyl-CoA dehydrogenase; (ii) a genetic modification that alters an enoyl CoA isomerase activity, wherein the yeast is capable of producing a diacid from a feedstock comprising one or more compionents from a vegetable oil.

   ---

4. claims: 76-108(completely); 109-159(partially)

   A genetically modified yeast comprising a heterologous acyl-CoA oxidase or a heterologous acyl-CoA dehydrogenase, which yeast is capable of producing a diacid from a feedstock comprising one or more components from a vegetable oil.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/076739

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 and necessary to the claimed invention, the international search was carried out on the basis of:

   a. (means)

   [ ] on paper

   [X] in electronic form

   b. (time)

   [ ] in the international application as filed

   [ ] together with the international application in electronic form

   [X] subsequently to this Authority for the purpose of search

2. [X] In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto 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:

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2013/076739

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		WO 2009037329 A2	26-03-2009