



(51) International Patent Classification:

C07H 15/04 (2006.01) A61P 1/12 (2006.01)
C07H 15/18 (2006.01) A61P 31/04 (2006.01)
A61K 39/08 (2006.01) A61K 39/40 (2006.01)
C08B 37/00 (2006.01) A61K 39/44 (2006.01)
C08L 5/00 (2006.01) A61K 47/48 (2006.01)
C12P 19/04 (2006.01)

(21) International Application Number:

PCT/IB2011/003244

(22) International Filing Date:

23 December 2011 (23.12.2011)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

1022042.4 24 December 2010 (24.12.2010)
1111440.2 4 July 2011 (04.07.2011)

GB
GB

(71) Applicant (for all designated States except US): NO-VARTIS AG [CH/CH]; Lichtstrasse 35, CH-4056 Basel (CH).

(72) Inventors; and

(75) Inventors/Applicants (for US only): COSTANTINO, Paolo [IT/IT]; Novartis Vaccines, Via Fiorentina, 1, I-53100 Siena (IT). ADAMO, Roberto [IT/IT]; Novartis Vaccines, Via Fiorentina, 1, I-53100 Siena (IT). ROMANO, Maria Rosaria [IT/IT]; Novartis Vaccines, Via Fiorentina, 1, I-53100 Siena (IT). DANIEL, Elisa [IT/IT]; Novartis Vaccines, Via Fiorentina, 1, I-53100 Siena (IT). BERTI, Francesco [IT/IT]; Novartis Vaccines, Via Fiorentina, 1, I-53100 Siena (IT). CAPPELLITTI, Emilia [IT/IT]; Novartis Vaccines, Via Fiorentina, 1, I-53100 Siena (IT). LAY, Luigi [IT/IT]; Novartis Vaccines, Via Fiorentina, 1, I-53100 Siena (IT).

(74) Agents: MARSHALL, Cameron, John et al.; Carpmaels & Ransford, One Southampton Row, London WC1B 5HA (GB).

[Continued on next page]

(54) Title: COMPOUNDS

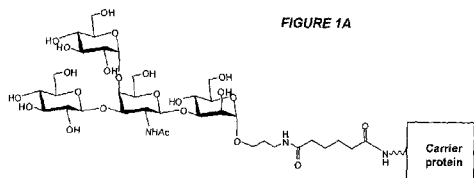
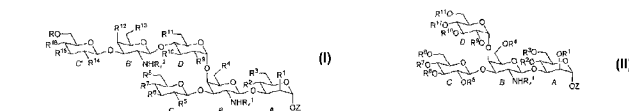


FIGURE 1A

FIGURE 1B



SDS-PAGE (gel 3-8%)
1. Marker
2. Carrier protein
3. C. Difficile Tetra-carrier protein

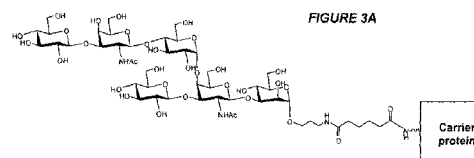


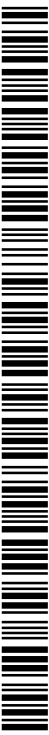
FIGURE 3A

FIGURE 3B



SDS-PAGE (gel 3-8%)
1. Marker
2. Carrier protein
3. C. Difficile Exa-carrier protein

(57) Abstract: The invention provides a synthetic C. difficile PS-II cell wall saccharide. The invention also provides a process for purifying C. difficile PS-II saccharide from C. difficile bacterial cells resulting in reduced contamination. The saccharides may be used in vaccines, particularly as conjugates with carrier proteins.



(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, CL, 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, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, 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, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ,

UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, 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, RS, SE, SI, SK, SM, 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))

(88) Date of publication of the international search report:
1 August 2013

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2011/003244

A. CLASSIFICATION OF SUBJECT MATTER					
INV.	C07H15/04	C07H15/18	A61K39/08	C08B37/00	C08L5/00
	C12P19/04	A61P1/12	A61P31/04	A61K39/40	A61K39/44
	A61K47/48				
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) A61K C08B C08L C12P C07H

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, WPI Data, BEILSTEIN Data, CHEM ABS Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2009/033268 A1 (UNIV GUELPH [CA]; MONTEIRO MARIO ARTUR [CA]; GANESHAPILLAI JEYABARATHY) 19 March 2009 (2009-03-19)	1-12, 25-28
Y	claims 9,21,26,38-41 page 4 - page 5; compounds PS-II paragraph [0019] paragraph [00108] - paragraph [0015] paragraph [00167] paragraph [00154] paragraph [00159] claim 17 ----- -/--	10

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents :

<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"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</p> <p>"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</p> <p>"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</p> <p>"&" document member of the same patent family</p>
---	---

Date of the actual completion of the international search 13 June 2013	Date of mailing of the international search report 20/06/2013
---	--

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

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2011/003244

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,P	ELISA DANIELI ET AL: "First Synthesis of C. difficile PS-II Cell Wall Polysaccharide Repeating Unit", ORGANIC LETTERS, vol. 13, no. 3, 29 December 2010 (2010-12-29), pages 378-381, XP055025457, ISSN: 1523-7060, DOI: 10.1021/ol1026188 page 379; compound 1 page 379, column 1, paragraph 2 - paragraph 3 -----	1-12
E	WO 2012/119769 A1 (MAX PLANCK GES ZUR [DE]; SEEBERGER PETER H [DE]; OBERLI MATTHIAS [US];) 13 September 2012 (2012-09-13) claims 1-24 figures 1-2 -----	1-12
X,P	MATTHIAS A. OBERLI ET AL: "A Possible Oligosaccharide-Conjugate Vaccine Candidate for Clostridium difficile Is Antigenic and Immunogenic", CHEMISTRY & BIOLOGY, vol. 18, no. 5, 26 May 2011 (2011-05-26), pages 580-588, XP055007928, ISSN: 1074-5521, DOI: 10.1016/j.chembiol.2011.03.009 page 581; compound 2 -----	1-12
Y	OLGA MARTÍNEZ-ÁVILA ET AL: "Gold Manno-Glyconanoparticles: Multivalent Systems to Block HIV-1 gp120 Binding to the Lectin DC-SIGN", CHEMISTRY - A EUROPEAN JOURNAL, vol. 15, no. 38, 28 September 2009 (2009-09-28), pages 9874-9888, XP055055959, ISSN: 0947-6539, DOI: 10.1002/chem.200900923 page 9877; compounds 18-25 -----	10
X	GANESHAPILLAI ET AL: "Clostridium difficile cell-surface polysaccharides composed of pentaglycosyl and hexaglycosyl phosphate repeating units", 12 January 2008 (2008-01-12), CARBOHYDRATE RESEARCH, PERGAMON, GB, PAGE(S) 703 - 710, XP022497595, ISSN: 0008-6215 page 704, paragraph 2.1 -----	25-28

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2011/003244

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.:

6-12, 25-28(completely); 1-5(partially)

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.:

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: 6-12(completely); 1-5(partially)

Clostridium difficile PS-II cell wall saccharide of formula I

2. claims: 13, 14(completely); 1-5(partially)

Clostridium difficile PS-II cell wall saccharide of formula II

3. claims: 15, 16(completely); 1-5(partially)

Clostridium difficile PS-II cell wall saccharide of formula III

4. claims: 17-21

An pharmaceutical composition comprising Clostridium difficile PS-II cell wall saccharide, related process and method of treatment

5. claims: 22-24

A method for making a Clostridium difficile PS-II cell wall saccharide

6. claims: 25-28

A process for purifying a Clostridium difficile PS-II cell wall saccharide

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2011/003244

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2009033268	A1	19-03-2009	
		AU 2008299536 A1	19-03-2009
		CA 2698157 A1	19-03-2009
		CN 101896197 A	24-11-2010
		EP 2195018 A1	16-06-2010
		JP 2010539256 A	16-12-2010
		NZ 583750 A	25-05-2012
		US 2010330125 A1	30-12-2010
		WO 2009033268 A1	19-03-2009

WO 2012119769	A1	13-09-2012	NONE
