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(54) Title: FERMENTATION PROCESSES FOR CULTIVATING STREPTOCOCCI AND PURIFICATION PROCESSES FOR
OBTAINING CPS THEREFROM

(57) Abstract: This invention is in the field of bacterial cultures, and specifically relates to the optimization of culture conditions
to improve the production of bacterial capsular polysaccharides from Streptococcus strains in fed batch culture and to novel pu-
rification methods suitable for production scale purification of bacterial capsular polysaccharides from Streptococcus strains re-
sulting in higher levels of purity than previously obtained for production scale.



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INTERNATIONAL SEARCH REPORT

International application No

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A. CLASSIFICATION OF SUBJECT MATTER

INV. C12N1/20 A61K39/04 C12P19/04

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 A61K 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 practical, search terms used)

EPO-Internal, 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 2007/052168 A (NOVARTIS VACCINES & DIAGNOSTIC [IT]; SWENNEN ERWIN [IT]) 10 May 2007 (2007-05-10) cited in the application page 3, last paragraph - page 4 page 5, paragraph 3 - page 7 pages 27-30; claims 1-16,20; figures 1-5	1-20
X	WO 2006/082527 A (CHIRON SRL [IT]; COSTANTINO PAOLO [IT]) 10 August 2006 (2006-08-10) cited in the application page 6 - page 10	43-58
A	WO 2004/033623 A (AVENTIS PASTEUR INC [US]; EGEN RICHARD C [US]; FORTIN LORI ANN [US]; S) 22 April 2004 (2004-04-22) abstract; examples 1,2	1-14
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Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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- *E* earlier document but published on or after the international filing date
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- *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.
- *G* document member of the same patent family

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	PAOLETTI L C ET AL: "Cell growth rate regulates expression of group b Streptococcus type III capsular polysaccharide" INFECTION AND IMMUNITY, AMERICAN SOCIETY FOR MICROBIOLOGY. WASHINGTON, vol. 64, no. 4, 1 January 1996 (1996-01-01), pages 1220-1226, XP002436901 ISSN: 0019-9567 -----	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2008/003729

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 allsearchable 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 reportcovers 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.:

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: 21,23-36; in part: 1-20

Method for cultivationg Streptococcus for production of capsular polysaccharides (cps) wherein said cultivating comprises a linear addition of a carbon source to a cultivating medium, and does not use an algorithm to control the cultivating by monitoring a pH of the cultivating medium. In particular, said cultivating medium is a defined medium, wherein the vitamin source consists of six or fewer vitamins, wherein two of the vitamins have to be calcium pantothenate and niacinamide.

2. claims: 22,37-42; in part: 1-20

Method for cultivationg Streptococcus for production of capsular polysaccharides (cps) wherein said cultivating comprises a linear addition of a carbon source to a cultivating medium, and does not use an algorithm to control the cultivating by monitoring a pH of the cultivating medium. In particular, said cultivating medium is a complex medium, wherein the vitamin source consists of four or fewer vitamins, wherein one of the vitamins has to be biotin

3. claims: 43-58

Method for purifying a capsular polysaccharide (cps) from Streptococcus agalactiae comprising a step of filtration using an adherent filter, and, method for production of a purified cps comprising a step of removing protein contaminants with a protein adherent filter to produce the purified cps.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2007052168 A	10-05-2007	AU 2006310176 A1 CA 2627976 A1 EP 1951886 A2 JP 2009513155 T US 2008312137 A1	10-05-2007 10-05-2007 06-08-2008 02-04-2009 18-12-2008
WO 2006082527 A	10-08-2006	AU 2006211049 A1 CA 2596653 A1 CN 101146829 A EP 1848746 A2 JP 2008528052 T	10-08-2006 10-08-2006 19-03-2008 31-10-2007 31-07-2008
WO 2004033623 A	22-04-2004	AU 2003299501 A1	04-05-2004