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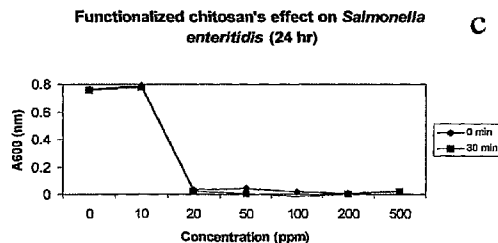
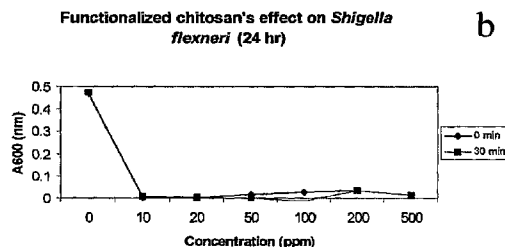
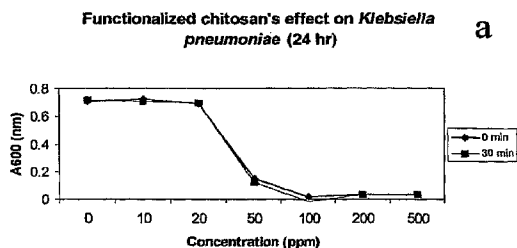
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[Continued on next page]

(54) Title: CHITOSAN-DERIVATIVE COMPOUNDS AND METHODS OF CONTROLLING MICROBIAL POPULATIONS



(57) Abstract: The present invention is directed to chitosan-derivative compounds and structures, methods of making chitosan-derivative compounds and methods for controlling, inhibiting and enhancing microbial populations in a variety of environments. The present invention is also directed to the control, inhibition and enhancement of microbial populations in animals, particularly humans. The microbial populations include bacteria, viruses and other pathogens where control of microbial populations are a necessity. The chitosan-derivative compounds of the present invention include chitosan-arginine compounds, related chitosan-L/D unnatural amino acid compounds, chitosan-acid amine compounds, chitosan-L/D natural amino acid derivative compounds, co-derivatives of the chitosan-derivative compounds, salts of the chitosan derivative compounds, and chitosan-guanidine compounds.

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RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA,
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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
C08B

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	LIU W G ET AL: "A chitosan-arginine conjugate as a novel anticoagulation biomaterial" JOURNAL OF MATERIALS SCIENCE: MATERIALS IN MEDICINE, KLUWER ACADEMIC PUBLISHERS, BO, vol. 15, no. 11, 1 November 2004 (2004-11-01), pages 1199-1203, XP019211990 ISSN: 1573-4838 cited in the application abstract ----- -/--	1-12, 20, 22-24, 81-85, 95, 96, 117-119, 133-135

 Further documents are listed in the continuation of Box C. 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 document but published on or after the international filing date

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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.

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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.
X	<p>G. CÁRDENAS, J. D. CUELLAR, K. NEIRA: "Synthesis and characterization of carboxymethyl chitosan-arg and carboxymethyl chitosan-lys derivatives" JOURNAL OF THE CHILEAN CHEMICAL SOCIETY, vol. 49, no. 3, 2004, pages 237-240, XP002445867</p> <p>abstract</p>	<p>1-13, 20, 22-24, 81-85, 91, 92, 94-96, 111-113, 117-119, 127-129, 133-135, 152-154</p>
X	<p>US 4 542 014 A (BRESAK ANN F [US] ET AL) 17 September 1985 (1985-09-17)</p> <p>claim 1; example II column 3, lines 22-54</p>	<p>1-12, 20, 22-24, 81-85, 95, 96, 117-119, 133-135</p>
X	<p>WO 2004/041118 A2 (UMD INC [US]) 21 May 2004 (2004-05-21)</p> <p>page 30, line 29</p>	<p>1-12, 20, 22-24, 81-85, 95, 96, 117-119, 133-135</p>
X	<p>JEON YOU-JIN ET AL: "Effect of antimicrobial activity by chitosan oligosaccharide N-conjugated with asparagine" JOURNAL OF MICROBIOLOGY AND BIOTECHNOLOGY, KOREAN SOCIETY FOR APPLIED MICROBIOLOGY, SEOUL, KO, vol. 11, no. 2, April 2001 (2001-04), pages 281-286, XP008081226 ISSN: 1017-7825 cited in the application abstract</p>	<p>1-4, 18, 20, 22-24, 35-37, 61, 63, 65-67, 91, 111, 127, 128, 130, 152, 153</p>
X	<p>US 2002/150585 A1 (MARCIONI DANTE J [US]) 17 October 2002 (2002-10-17)</p> <p>paragraphs [0051], [0052]; claims 16, 37 paragraphs [0043], [0101]</p> <p style="text-align: center;">-/--</p>	<p>1-4, 14, 15, 20-24, 86-88, 100-105, 120-123, 139-145</p>

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2007/002078

C(Continuation). . . DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E	WO 2007/028244 A (BUI-KHAC TRUNG [CA]; ONG NGOC LANG [CA]) 15 March 2007 (2007-03-15) claims 1,2,4,5 *Table 1 on page 30*	1-4, 16, 17, 20-24, 35-37, 59, 60, 63-67, 74-80, 89, 90, 106-110, 124-126, 146-151, 174, 175, 179, 180, 183-185, 187, 188
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X	FR 2 306 997 A (NESTLE SA [CH]) 5 November 1976 (1976-11-05) page 3, lines 32-36; example 2	1-4, 13, 18-20, 22-24, 91-94, 127-132, 152-154, 156, 157
X	US 3 879 376 A (VANLERBERGHE GUY ET AL) 22 April 1975 (1975-04-22) claim 10; table II	1-4, 13, 18-20, 22-24, 91-94, 127-132, 152-154, 156, 157
X	JP 60 233102 A (DAINICHISEIKA COLOR CHEM) 19 November 1985 (1985-11-19) abstract	1-4, 20, 22-31, 33, 34, 161, 162, 166-168

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2007/002078

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 2006/029519 A (LE GROUPE LYSAC INC [CA]; BERRADA MOHAMMED [CA]) 23 March 2006 (2006-03-23) examples 1-4	1-4, 20, 22-31, 33, 34, 161, 162, 166-168
X	US 5 637 681 A (STOCKEL RICHARD F [US]) 10 June 1997 (1997-06-10) column 3, line 1 - column 4, line 19	1-4, 20, 22-31, 33, 34, 161, 162, 166-168
A	RABEA E I ET AL: "Chitosan as antimicrobial agent: Applications and mode of action" BIOMACROMOLECULES, ACS, WASHINGTON, DC, US, vol. 4, no. 6, 3 September 2003 (2003-09-03), pages 1457-1465, XP002339032 ISSN: 1525-7797 abstract	1-195
A	ZHANG Y ET AL: "Synthesis and antimicrobial activity of polymeric guanidine and biguanidine salts" POLYMER, ELSEVIER SCIENCE PUBLISHERS B.V, GB, vol. 40, no. 22, October 1999 (1999-10), pages 6189-6198, XP004172488 ISSN: 0032-3861 abstract	1-4, 20-37, 55, 63-80, 161-171, 174, 175, 183-185, 187-195

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2007/002078

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.:

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: 1-4 (part), 5-12, 20-24 (part), 35-37 (part), 38-54, 63-67 (part), 74-80 (part), 81-85, 95-99, 117-119, 133-138, 155, 172, 173, 174 (part), 175 (part), 176, 183-185 (part), 187 (part), 188 (part)

Chitosan-arginine compounds (A) for controlling microbial populations, their co-derivatives, salts thereof, process of manufacture thereof and method for controlling microbial activity in an individual comprising administering said compounds

2. claims: 1-4 (part), 14, 15, 20-24 (part), 35-37 (part), 57, 58, 63-67 (part), 74-80 (part), 86-88, 100-105, 120-123, 139-145, 174 (part), 175 (part), 177, 178, 183-185 (part), 187 (part), 188 (part)

Related chitosan-L/D unnatural amino acid compounds (B) for controlling microbial populations, their co-derivatives, salts thereof, process of manufacture thereof and method for controlling microbial activity in an individual comprising administering said compounds

3. claims: 1-4 (part), 16, 17, 20-24 (part), 35-37 (part), 59, 60, 63-67 (part), 74-80 (part), 89, 90, 106-110, 124-126, 146-151, 174 (part), 175 (part), 179, 180, 183-185 (part), 187 (part), 188 (part)

Chitosan-acid amine compounds (C) for controlling microbial populations, their co-derivatives, salts thereof, process of manufacture thereof and method for controlling microbial activity in an individual comprising administering said compounds

4. claims: 1-4 (part), 13, 18, 19, 20-24 (part), 35-37 (part), 56, 61, 62, 63-67 (part), 74-80 (part), 91-94, 111-116, 127-132, 152-154, 156-160, 174 (part), 175 (part), 181, 182, 183-185 (part), 186, 187 (part), 188 (part)

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Chitosan-L/D natural amino acid compounds (D) for controlling microbial populations; their co-derivatives, salts thereof, process of manufacture thereof and method for controlling microbial activity in an individual comprising administering said compounds

5. claims: 1-4(part), 20-24 (part), 25-34, 35-37 (part), 55, 63-67 (part), 68-73, 74-80 (part), 161-171, 174 (part), 175 (part), 183-185 (part), 187 (part), 188 (part), 189-195

Chitosan-guanidine compounds (G) for controlling microbial populations, their co-derivatives, salts thereof, process of manufacture thereof and method for controlling microbial activity in an individual comprising administering said compounds

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2007/002078

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