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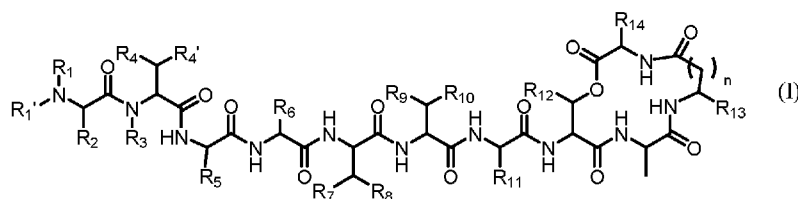
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MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,  
OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA,  
SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN,  
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MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,

(54) Title: ANTIMICROBIAL PEPTIDES



(57) Abstract: This disclosure relates to compounds of formula (I) or a pharmaceutically acceptable salt thereof: Formula (I), in which n, R<sub>1</sub>, R<sub>1</sub>', R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, R<sub>4</sub>', and R<sub>5</sub>-R<sub>14</sub> are defined in the specification. The compounds of formula (I) can be used to treat bacterial infection.



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# INTERNATIONAL SEARCH REPORT

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<b>A. CLASSIFICATION OF SUBJECT MATTER</b> INV. A61K38/12      C07K5/12      C07K7/54      C07K7/56 ADD.				
According to International Patent Classification (IPC) or to both national classification and IPC				
<b>B. FIELDS SEARCHED</b>				
Minimum documentation searched (classification system followed by classification symbols) A61K C07K				
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, CHEM ABS Data, EMBASE, WPI Data				
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>				
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
X	HYUNJUN YANG ET AL: "Elucidation of the Teixobactin Pharmacophore", ACS CHEMICAL BIOLOGY, vol. 11, no. 7, 3 June 2016 (2016-06-03), pages 1823-1826, XP055459656, US ISSN: 1554-8929, DOI: 10.1021/acscchembio.6b00295 figures 1,2; table 1 <div style="text-align: center; margin-top: 10px;">----- -/--</div>	1-52		
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.				
* Special categories of cited documents : <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;">                     "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                 </td> <td style="width: 50%; border: none; vertical-align: top;">                     "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                      "&amp;" document member of the same patent family                 </td> </tr> </table>			"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
"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			
28 May 2018	08/06/2018			
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  Härtinger, Stefan			

## INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2017/082697

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DARCY J ATKINSON ET AL: "Enduracididine, a rare amino acid component of peptide antibiotics: Natural products and synthesis", BEILSTEIN JOURNAL OF ORGANIC CHEMISTRY, vol. 12, 7 November 2016 (2016-11-07), pages 2325-2342, XP055459646, DOI: 10.3762/bjoc.12.226 page 2329, left-hand column; figure 7 -----	1-52
X	WO 99/67286 A2 (UNIV ROCKEFELLER [US]; UNIV NEW YORK [US]; MUIR TOM W [US]; MAYVILLE P) 29 December 1999 (1999-12-29) claims 1,9,10,17; example 3 -----	1-52
X	WO 2014/089053 A1 (NOVOBIOTIC PHARMACEUTICALS LLC [US]) 12 June 2014 (2014-06-12) claims -----	1-52
X	WO 99/26968 A1 (UNIV NOTTINGHAM [GB]; BYCROFT BARRIE WALSHAM [GB]; WILLIAMS PAUL [GB];) 3 June 1999 (1999-06-03) claims 1,11 -----	1-52
X	WO 2010/080819 A1 (C3 JIAN INC [US]; ECKERT RANDAL H [US]; KAPLAN CHRIS [US]; HE JIAN [US]) 15 July 2010 (2010-07-15) page 62; claims 1,30; compound 313 -----	1-52
X	JP S50 160492 A (ISHIHARA MINING AND CHEMICAL CO., LTD., JAPAN) 25 December 1975 (1975-12-25)	1
A	*Registry Number 55599-68-3*; example 1; tables	2-52
X	& DATABASE CA [Online] CHEMICAL ABSTRACTS SERVICE, COLUMBUS, OHIO, US; 25 December 1975 (1975-12-25), ICHIHASHI, MASAYUKI ET AL: "Antibiotic A-3302-A and -B", retrieved from STN Database accession no. 1976:403872	1
A	abstract -----	2-52
X,P	SHIMAA A.H. ABDEL MONAIM ET AL: "Teixobactin as a scaffold for unlimited new antimicrobial peptides: SAR study", BIOORGANIC & MEDICINAL CHEMISTRY, 1 September 2017 (2017-09-01), XP055459632, GB ISSN: 0968-0896, DOI: 10.1016/j.bmc.2017.09.040 page 5; table 1 -----	1
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## INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2017/082697

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	CHRISTIAN E. SCHUMACHER ET AL: "Synthesis and biological evaluation of novel teixobactin analogues", ORGANIC & BIOMOLECULAR CHEMISTRY, vol. 15, no. 41, 1 January 2017 (2017-01-01), pages 8755-8760, XP055459636, ISSN: 1477-0520, DOI: 10.1039/C7OB02169K figure 1; compounds 1-9 -----	1
X,P	WO 2017/181179 A1 (UNIV CALIFORNIA [US]) 19 October 2017 (2017-10-19) claim 1; figures; tables 1-3 -----	1
X,P	CN 106 632 604 A (SHENZHEN INST OF ADV TECH CAS) 10 May 2017 (2017-05-10) paragraph [0117]; compounds 1a-1i -----	1
X,P	CN 107 266 531 A (UNIV PEKING SHENZHEN GRADUATE SCHOOL; SHENZHEN QIANYAN DRUG R & D TECH) 20 October 2017 (2017-10-20) compounds XXX, I -----	1
X,P	CHUCHU GUO ET AL: "Chemistry and Biology of Teixobactin", CHEMISTRY - A EUROPEAN JOURNAL, 12 December 2017 (2017-12-12), pages 1-18, XP055459629, DE ISSN: 0947-6539, DOI: 10.1002/chem.201704167 table 1; compounds TX1-TX111 -----	1
A	US 2014/205681 A1 (ARORA PARAMJIT S [US] ET AL) 24 July 2014 (2014-07-24)  paragraph [0185]; claims 1,9,40 -----	1,2, 4-13, 15-23, 25, 27-35, 42-52

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/EP2017/082697

## 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: 3, 14, 24, 26, 36-41(completely); 1, 2, 4-13, 15-23, 25, 27-35, 42-52(partially)

Teixobactin analogues (n = 0)

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2. claims: 1, 2, 4-13, 15-23, 25, 27-35, 42-52(all partially)

Ring-expanded Teixobactin analogues (n = 1)

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/EP2017/082697
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
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