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- (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, BN, 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, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, 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, 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, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, 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, KM, 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))
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- (88) **Date of publication of the international search report:**  
3 September 2015



WO 2015/088937 A3

(54) **Title:** AXMI477, AXMI482, AXMI486 AND AXMI525 TOXIN GENES FROM BACILLUS THURINGIENSIS AND METHODS FOR THEIR USE

(57) **Abstract:** Compositions and methods for conferring pesticidal activity to bacteria, plants, plant cells, tissues and seeds are provided. Compositions comprising a coding sequence for a Bacillus thuringiensis toxin polypeptide are provided. The coding sequences can be used in DNA constructs or expression cassettes for transformation and expression in plants and bacteria. Compositions also comprise transformed bacteria, plants, plant cells, tissues, and seeds. In particular, isolated toxin nucleic acid molecules are provided. Additionally, amino acid sequences corresponding to the polynucleotides are encompassed, and antibodies specifically binding to those amino acid sequences. In particular, the present invention provides for isolated nucleic acid molecules comprising nucleotide sequences encoding the amino acid sequence shown in SEQ ID NO:5-26, or the nucleotide sequence set forth in SEQ ID NO: 1-4, as well as variants and fragments thereof.

INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2014/068989

A. CLASSIFICATION OF SUBJECT MATTER  
INV. C12N15/82 C07K14/325  
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 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, Sequence Search, EMBASE, MEDLINE, 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	DATABASE Geneseq [Online] 7 November 2013 (2013-11-07), "B. thuringiensis B-SC5 PIP protein, SEQ 504.", XP002738878, retrieved from EBI accession no. GSP:BAT11744 Database accession no. BAT11744 the whole document	1-24
X	-& WO 2013/134734 A2 (VESTARON CORP [US]) 12 September 2013 (2013-09-12) pages 3, 4, 9, 93-95, 100, 133, 134; Seq. ID Nos 503 and 504 ----- -/--	1-24

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 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  23 April 2015	Date of mailing of the international search report  22/07/2015
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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  Kurz, Birgit
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## INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2014/068989

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DATABASE Geneseq [Online]  25 August 2005 (2005-08-25), "Bacillus thuringiensis Cry9 protein, cry9ba1, SEQ ID NO: 21.", XP002738879, retrieved from EBI accession no. GSP:AEA81464 Database accession no. AEA81464 the whole document	1-24
X	-& US 2005/138685 A1 (FLANNAGAN RONALD D [US] ET AL) 23 June 2005 (2005-06-23) pages 1-3, 8, 9, 11; Examples 1, 2 and 4; Figure 1; Seq. ID No. 21	1-24
X	WO 2011/014749 A1 (ATHENIX CORP [US]; SAMPSON KIMBERLY S [US]; TOMSO DANIEL JOHN [US]; GU) 3 February 2011 (2011-02-03) abstract; claims 1-31; pages 2-8, 15, 16, 27, 29 and 30; Examples 3-5, 8, 9; Table 2	1-24
X	US 2006/156432 A1 (ARNAUT GRETA [BE] ET AL) 13 July 2006 (2006-07-13) Claims 1-21; paragraphs 14, 16, 20, 40-42, 50, 52, 58-61, 105; Example 8	1-24
X	US 5 380 831 A (ADANG MICHAEL J [US] ET AL) 10 January 1995 (1995-01-10) cited in the application Columns 1-4; Examples 1, 4 and 5; claims 1-12	1-24
A	W. YE ET AL: "Mining New Crystal Protein Genes from Bacillus thuringiensis on the Basis of Mixed Plasmid-Enriched Genome Sequencing and a Computational Pipeline", APPLIED AND ENVIRONMENTAL MICROBIOLOGY, vol. 78, no. 14, 15 July 2012 (2012-07-15) , pages 4795-4801, XP055173468, ISSN: 0099-2240, DOI: 10.1128/AEM.00340-12 abstract; pages 4795 and 4796; Figures 1 and 2	1-24
A	SARVJEET KAUR: "Molecular approaches for identification and construction of novel insecticidal genes for crop protection", WORLD JOURNAL OF MICROBIOLOGY AND BIOTECHNOLOGY, KLUWER ACADEMIC PUBLISHERS, DO, vol. 22, no. 3, 1 March 2006 (2006-03-01), pages 233-253, XP019271780, ISSN: 1573-0972 abstract; pages 233-235, 237, 239; Figure 1	1-24

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2014/068989

## 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.:

see extra sheet(s)

### 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: 1-24(partially)

Seq. ID No. 1 encoding Seq. ID No. 5, fragments and/or truncated proteins derived therefrom having Seq. ID Nos 6-10. Vectors, host cells plants and seeds comprising the sequences and encoded proteins, compositions and methods of use.

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2. claims: 1-24(partially)

Seq. ID No. 2 encoding Seq. ID No. 11, fragments and/or truncated proteins derived therefrom having Seq. ID Nos 12-14. Vectors, host cells plants and seeds comprising the sequences and encoded proteins, compositions and methods of use.

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3. claims: 1-24(partially)

Seq. ID No. 3 encoding Seq. ID No. 15, fragments and/or truncated proteins derived therefrom having Seq. ID Nos 16-19. Vectors, host cells plants and seeds comprising the sequences and encoded proteins, compositions and methods of use.

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4. claims: 1-24(partially)

Seq. ID No. 4 encoding Seq. ID No. 20, fragments and/or truncated proteins derived therefrom having Seq. ID Nos 21-26. Vectors, host cells plants and seeds comprising the sequences and encoded proteins, compositions and methods of use.

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## INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2014/068989

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