

(19)



(11)

EP 2 519 636 B8

(12)

CORRECTED EUROPEAN PATENT SPECIFICATION

(15) Correction information:

Corrected version no 1 (W1 B1)
Corrections, see
Bibliography INID code(s) 73

(51) Int Cl.:

C12N 15/45 ^(2006.01) **A61K 39/17** ^(2006.01)

(48) Corrigendum issued on:

09.08.2017 Bulletin 2017/32

(86) International application number:

PCT/US2010/062274

(45) Date of publication and mention of the grant of the patent:

01.03.2017 Bulletin 2017/09

(87) International publication number:

WO 2011/082189 (07.07.2011 Gazette 2011/27)

(21) Application number: **10841650.4**

(22) Date of filing: **28.12.2010**

(54) PRODUCTION OF HEMAGGLUTININ-NEURAMINIDASE PROTEIN IN MICROALGAE

HERSTELLUNG EINES HÄMAGGLUTININ-NEURAMINIDASE-PROTEINS IN MIKROALGEN

PRODUCTION DE PROTÉINE HÉMAGGLUTININE-NEURAMINIDASE DANS DES MICROALGUES

(84) Designated Contracting States:

AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR

(74) Representative: **D Young & Co LLP**

120 Holborn
London EC1N 2DY (GB)

(30) Priority: **28.12.2009 US 290469 P**

(56) References cited:

EP-A1- 2 090 648 **WO-A2-02/083869**
WO-A2-2006/013572 **US-A1- 2003 166 207**
US-A1- 2006 275 904 **US-A1- 2006 286 650**
US-A1- 2007 128 222 **US-A1- 2008 022 422**

(43) Date of publication of application:

07.11.2012 Bulletin 2012/45

(73) Proprietors:

- **DSM IP Assets B.V.**
6411 TE Heerlen (NL)
- **Merial, Inc.**
Duluth, GA 30096 (US)

- **PRASAD V ET AL: "Expression of biologically active Hemagglutinin-neuraminidase protein of Peste des petits ruminants virus in transgenic pigeonpea [Cajanus cajan (L) Millsp.]", PLANT SCIENCE, ELSEVIER IRELAND LTD, IE, vol. 166, no. 1, 1 January 2004 (2004-01-01), pages 199-205, XP008161290, ISSN: 0168-9452**
- **GOMEZ E ET AL: "Expression of Hemagglutinin-Neuraminidase glycoprotein of Newcastle Disease Virus in agroinfiltrated Nicotiana benthamiana plants", JOURNAL OF BIOTECHNOLOGY, ELSEVIER SCIENCE PUBLISHERS, AMSTERDAM, NL, vol. 144, no. 4, 1 December 2009 (2009-12-01), pages 337-340, XP026778485, ISSN: 0168-1656, DOI: 10.1016/J.JBIOTEC.2009.09.015 [retrieved on 2009-09-30]**

(72) Inventors:

- **APT, Kirk E.**
Ellicott City, Maryland 21042 (US)
- **LIPPMEIER, James Casey**
Columbia, Maryland 21045 (US)
- **BAYNE, Anne-Cecile V.**
Ellicott City, Maryland 21043 (US)
- **PRITCHARD, Joyce A.**
Gainesville, Georgia 30504 (US)
- **GUO, Xuan**
Suwanee, Georgia 30024 (US)

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 2 519 636 B8

- TANABAYASHI ET AL.: "Expression of mumps virus glycoproteins in mammalian cells from cloned cDNAs: both F and HN proteins are required for cell fusion.", *VIROLOGY*, vol. 187, no. 2, April 1992 (1992-04), pages 801-804, XP0026462300,
- LEÓN ROSA ET AL: "Nuclear transformation of eukaryotic microalgae: historical overview, achievements and problems", *ADVANCES IN EXPERIMENTAL MEDICINE AND BIOLOGY*, vol. 16, 1 January 2007 (2007-01-01), pages 1-11, XP009105948, ISSN: 0065-2598, DOI: 10.1007/978-0-387-75532-8_1
- LEON-BANARES R ET AL: "Transgenic microalgae as green cell-factories", *TRENDS IN BIOTECHNOLOGY, ELSEVIER PUBLICATIONS, CAMBRIDGE, GB*, vol. 22, no. 1, 1 January 2004 (2004-01-01), pages 45-52, XP004481957, ISSN: 0167-7799, DOI: 10.1016/J.TIBTECH.2003.11.003
- ANNE-CÉCILE V. BAYNE ET AL: "Vaccination against Influenza with Recombinant Hemagglutinin Expressed by *Schizochytrium* sp. Confers Protective Immunity", *PLOS ONE*, vol. 8, no. 4, 1 January 2013 (2013-01-01) , pages e61790-e61790, XP055062273, ISSN: 1932-6203, DOI: 10.1371/journal.pone.0061790
- TANABAYASHI ET AL.: 'Expression of mumps virus glycoproteins in mammalian cells from cloned cDNAs: both F and HN proteins are required for cell fusion.' *VIROLOGY* vol. 187, no. 2, April 1992, pages 801 - 804
- SIM ET AL.: 'Expression and Characterization of Synthetic Heat-Labile Enterotoxin B Subunit and Hemagglutinin?Neuraminidase-Neutralizing Epitope Fusion Protein in *Escherichia coli* and Tobacco Chloroplasts.' *PLANT MOL BIOL REP* vol. 27, 28 May 2009, pages 388 - 399, XP008161281
- FUHRMANN ET AL.: 'Production of Antigens in *Chlamydomonas reinhardtii*: Green Microalgae as a Novel Source of Recombinant Proteins.' FROM: *METHODS IN MOLECULAR MEDICINE, VOL. 94: MOLECULAR DIAGNOSIS OF INFECTIOUS DISEASES*. vol. 94, 2004, pages 191 - 195
- SIRIPORNADULSIL ET AL.: 'CHAPTER 11: Microalgal Vaccines. from Transgenic Microalgae as Green Cell Factories.' *LANDES BIOSCIENCE AND SPRINGER SCIENCE BUSINESS MEDIA*. 2007, pages 122 - 128
- FLOSS ET AL.: 'Production of vaccines and therapeutic antibodies for veterinary applications in transgenic plants: an overview.' *TRANSGENIC RES* vol. 16, 2007, pages 315 - 332
- JOENSUU ET AL.: 'Transgenic plants for animal health: plant-made vaccine antigens for animal infectious disease control.' *PHYTOCHEM REV* vol. 7, 2008, pages 553 - 577, XP019613381
- PRASAD ET AL.: 'Expression of biologically active Hemagglutinin-neuraminidase protein of Peste des petits ruminants virus in transgenic pigeonpea [*Cajanus cajan* (L) Millsp.]' *PLANT SCIENCE*. vol. 166, 2004, pages 199 - 205, XP008161290