



(11) **EP 2 875 128 B8**

(12) **CORRECTED EUROPEAN PATENT SPECIFICATION**

- (15) Correction information:  
**Corrected version no 1 (W1 B1)**  
**Corrections, see**  
**Bibliography INID code(s) 73**
- (48) Corrigendum issued on:  
**24.06.2020 Bulletin 2020/26**
- (45) Date of publication and mention of the grant of the patent:  
**20.05.2020 Bulletin 2020/21**
- (21) Application number: **13740348.1**
- (22) Date of filing: **18.07.2013**
- (51) Int Cl.:  
**C12N 9/14 (2006.01) C12N 9/12 (2006.01)**
- (86) International application number:  
**PCT/GB2013/051925**
- (87) International publication number:  
**WO 2014/013260 (23.01.2014 Gazette 2014/04)**

(54) **MODIFIED HELICASES**  
MODIFIZIERTE HELIKASEN  
HÉLICASES MODIFIÉES

- (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**
- (30) Priority: **19.07.2012 US 201261673452 P**  
**08.03.2013 US 201361774862 P**
- (43) Date of publication of application:  
**27.05.2015 Bulletin 2015/22**
- (60) Divisional application:  
**20171363.3**
- (73) Proprietor: **Oxford Nanopore Technologies Limited**  
**Oxford OX4 4DQ (GB)**
- (72) Inventors:  
  - **HERON, Andrew**  
**Oxford**  
**Oxfordshire OX4 4GA (GB)**
  - **CLARKE, James**  
**Oxford**  
**Oxfordshire OX4 4GA (GB)**
- **MOYSEY, Ruth**  
**Oxford**  
**Oxfordshire OX4 4GA (GB)**
  - **WALLACE, Elizabeth Jayne**  
**Oxford**  
**Oxfordshire OX4 4GA (GB)**
  - **BRUCE, Mark**  
**Oxford**  
**Oxfordshire OX4 4GA (GB)**
  - **JAYASINGHE, Lakmal**  
**Oxford**  
**Oxfordshire OX4 4GA (GB)**
  - **CAPROTTI, Domenico**  
**Oxford**  
**Oxfordshire OX4 4GA (GB)**
  - **SOEROES, Szabolcs**  
**Oxford**  
**Oxfordshire OX4 4GA (GB)**
  - **MCNEILL, Luke**  
**Oxford**  
**Oxfordshire OX4 4GA (GB)**
  - **ALVES, David**  
**Oxford**  
**Oxfordshire OX4 4GA (GB)**
  - **BOWEN, Rebecca**  
**Oxford**  
**Oxfordshire OX4 4GA (GB)**

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 2 875 128 B8**

- MILTON, John  
Oxford  
Oxfordshire OX4 4GA (GB)
- (74) Representative: J A Kemp LLP  
14 South Square  
Gray's Inn  
London WC1R 5JJ (GB)
- (56) References cited:
- |                   |                   |
|-------------------|-------------------|
| WO-A1-2010/004265 | WO-A1-2010/086602 |
| WO-A1-2010/086603 | WO-A2-2013/057495 |
- DATABASE UniProt [Online] 30 November 2010 (2010-11-30), "RecName: Full=Putative ski2-type helicase; EC=3.6.4.-; ", XP002712958, retrieved from EBI accession no. UNIPROT:E1QUS6 Database accession no. E1QUS6
  - DATABASE UniProt [Online] 11 July 2012 (2012-07-11), "SubName: Full=DEAD/DEAH box helicase; ", XP002712959, retrieved from EBI accession no. UNIPROT:I3D0E7 Database accession no. I3D0E7
  - DATABASE UniProt [Online] 28 November 2012 (2012-11-28), "RecName: Full=Putative ski2-type helicase; EC=3.6.4.-; ", XP002712960, retrieved from EBI accession no. UNIPROT:K0IM99 Database accession no. K0IM99
  - DATABASE UniProt [Online] 23 September 2008 (2008-09-23), "SubName: Full=GI23225; ", XP002712961, retrieved from EBI accession no. UNIPROT:B4KAC8 Database accession no. B4KAC8
  - DATABASE REFSEQ [Online] NCBI; 7 June 2012 (2012-06-07), "activating signal cointegrator 1 complex subunit 3-like [Strongylocentrotus purpuratus]; ", XP002712962, Database accession no. XP\_003728286
  - DATABASE UniProt [Online] 15 May 2007 (2007-05-15), "SubName: Full=Predicted protein; ", XP002712963, retrieved from EBI accession no. UNIPROT:A4S1E1 Database accession no. A4S1E1
  - J. D. RICHARDS ET AL: "Structure of the DNA Repair Helicase Hel308 Reveals DNA Binding and Autoinhibitory Domains", JOURNAL OF BIOLOGICAL CHEMISTRY, vol. 283, no. 8, 1 February 2008 (2008-02-01), pages 5118-5126, XP55056802, ISSN: 0021-9258, DOI: 10.1074/jbc.M707548200
  - FAIRMAN-WILLIAMS M E ET AL: "SF1 and SF2 helicases: family matters", CURRENT OPINION IN STRUCTURAL BIOLOGY, ELSEVIER LTD, GB, vol. 20, no. 3, 1 June 2010 (2010-06-01), pages 313-324, XP027067341, ISSN: 0959-440X, DOI: 10.1016/J.SBI.2010.03.011 [retrieved on 2010-04-22] cited in the application
  - SCHNEIDER GRÉGORY F ET AL: "DNA sequencing with nanopores.", NATURE BIOTECHNOLOGY APR 2012, vol. 30, no. 4, April 2012 (2012-04), pages 326-328, XP002712964, ISSN: 1546-1696
  - Anonymous: "Press release: Oxford Nanopore introduces DNA 'strand sequencing' on the high-throughput GridION platform and presents MinION, a sequencer the size of a USB memory stick", , 17 February 2012 (2012-02-17), XP002712965, Retrieved from the Internet: URL:<https://www.nanoporetech.com/news/press-releases/view/39> [retrieved on 2013-09-16]
  - GREEN N S ET AL: "Quantitative evaluation of the lengths of homobifunctional protein cross-linking reagents used as molecular rulers", PROTEIN SCIENCE, CAMBRIDGE UNIVERSITY PRESS, vol. 10, no. 1, 1 January 2001 (2001-01-01), pages 1293-1304, XP002415341, ISSN: 0961-8368, DOI: 10.1110/PS.51201
  - J. A. Ali ET AL: "Kinetic Measurement of the Step Size of DNA Unwinding by Escherichia coli UvrD Helicase", Science, vol. 275, no. 5298, 17 January 1997 (1997-01-17), pages 377-380, XP55492703, US ISSN: 0036-8075, DOI: 10.1126/science.275.5298.377
  - B. Theissen ET AL: "Cooperative binding of ATP and RNA induces a closed conformation in a DEAD box RNA helicase", Proceedings of the National Academy of Sciences, vol. 105, no. 2, 15 January 2008 (2008-01-15), pages 548-553, XP055493662, US ISSN: 0027-8424, DOI: 10.1073/pnas.0705488105
  - S. ARSLAN ET AL: "Engineering of a superhelicase through conformational control", SCIENCE, vol. 348, no. 6232, 17 April 2015 (2015-04-17), pages 344-347, XP55440958, US ISSN: 0036-8075, DOI: 10.1126/science.aaa0445
  - Martin R. Singleton ET AL: "Structure and Mechanism of Helicases and Nucleic Acid Translocases", Annual Review of Biochemistry, vol. 76, no. 1, 7 June 2007 (2007-06-07), pages 23-50, XP055056968, ISSN: 0066-4154, DOI: 10.1146/annurev.biochem.76.052305.115300