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Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

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))
- with sequence listing part of description (Rule 5.2(a))

(88) Date of publication of the international search report:

30 May 2024 (30.05.2024)

(54) Title: GENOTYPING AND SEQUENCING ASSAYS FOR PRRSV

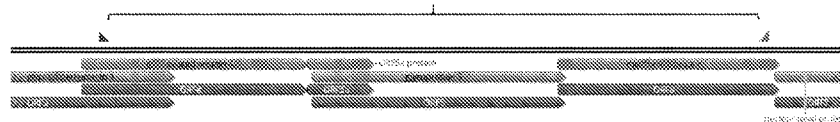


FIGURE 1

(57) Abstract: The present disclosure provides in vitro assays for genotyping a porcine reproductive and respiratory syndrome virus (PRRSV). Methods and kits for the in vitro assays are also provided.



WO 2024/077281 A3

**INTERNATIONAL SEARCH REPORT**

International application No.

PCT/US23/76300

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC - INV. C12Q 1/02; C12Q 1/60; C12Q 1/68; G01N 33/50 (2023.01)

ADD.

CPC - INV. G01N 33/569; C12Q 1/02; C12Q 1/6806; C12Q 1/6869

ADD. C12Q 2531/113; C12Q 2600/16; G01N 2333/08

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)

See Search History document

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

See Search History document

Electronic database consulted during the international search (name of database and, where practicable, search terms used)

See Search History document

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	TIAN. "Rapid visual detection of porcine reproductive and respiratory syndrome virus via recombinase polymerase amplification combined with a lateral flow dipstick" pages 493-499. Archives of Virology. Vol. 167, No. 2. 07 January 2022; abstract; pg. 494, column 2, paragraph 3; DOI: 10.1007/s00705-021-05349-8	1-40
A	US 2016/0317642 A1 (BOEHRINGER INGELHEIM VETMEDICA GMBH) 03 November 2016; claim [1]	1-40
A	US 2022/0241393 A1 (ELANCO US INC.) 04 August 2022; claim [1]	1-40
A	US 2019/0352709 A1 (OXFORD NANOPORE TECHNOLOGIES LIMITED) 21 November 2019; paragraph [0481]	19-27
A	US 2014/0271698 A1 (JORDAN DIANNA M. MURPHY) 18 September 2014; claim [1]	19-27

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

"D" document cited by the applicant in the international application

"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

12 March 2024 (12.03.2024)

Date of mailing of the international search report

**APR 12 2024**

Name and mailing address of the ISA/

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P.O. Box 1450, Alexandria, Virginia 22313-1450

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# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US23/76300

**Box No. I Nucleotide and/or amino acid sequence(s) (Continuation of item 1.c of the first sheet)**

1. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of a sequence listing:
  - a.  forming part of the international application as filed.
  - b.  furnished subsequent to the international filing date for the purposes of international search (Rule 13ter.1(a)),  
 accompanied by a statement to the effect that the sequence listing does not go beyond the disclosure in the international application as filed.
2.  With regard to any nucleotide and/or amino acid sequence disclosed in the international application, this report has been established to the extent that a meaningful search could be carried out without a WIPO Standard ST.26 compliant sequence listing.
3. Additional comments:

**INTERNATIONAL SEARCH REPORT**

International application No.

PCT/US23/76300

**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:  
-\*\*\*-Please See Supplemental Page-\*\*\*-

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 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.:  
Groups I+, claims 1-40, SEQ ID NO: 1 (forward primer), SEQ ID NO: 2 (reverse primer).

**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.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US23/76300

\*\*\*-Continued From Box No. III: Observations where unity of invention is lacking-\*\*\*

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Groups I+, claims 1-40, SEQ ID NO: 1 (forward primer), SEQ ID NO: 2 (reverse primer), are directed to in vitro assays for genotyping a porcine reproductive and respiratory syndrome virus, methods of use thereof, and kits comprising primers for use in said assays.

The assays, methods, and kits of Claims 1-11, 12-13 (each in-part), 14-27, 28-29 (each in-part), 30-38, 39 (in-part) and 40 are believed to encompass the first named invention of Groups I+ and are the claims that will be searched to the extent that they comprise a forward primer encompassing SEQ ID NO: 1 (first exemplary forward primer) and SEQ ID NO: 2 (first exemplary reverse primer). This first named invention of Group I+ has been selected to encompass the first species of each of the genera found in claims 1 and 12 based on the guidance set forth in section 10.54 of the PCT International Search and Preliminary Examination Guidelines. Note that SEQ ID NOs: 3 and 4 each comprise SEQ ID NOs: 1 and 2, respectively.

Applicant is invited to elect additional forward and reverse primer sequences, with specified SEQ ID NO: for each, or with specified substitution(s) at specified site(s) of a SEQ ID NO:, such that the sequence of each elected species is fully specified (i.e. no optional or variable residues or substituents), and where available as an option within at least one searchable claim, to be searched. Additional sequence(s) will be searched upon the payment of additional fees. Applicants must specify the searchable claims that encompass any additionally elected sequence(s). Applicants must further indicate, if applicable, the claims which encompass the first named invention, if different than what was indicated above for this group. Failure to clearly identify how any paid additional invention fees are to be applied to the "+" group(s) will result in only the first claimed invention to be searched/examined. An exemplary election would be SEQ ID NO: 5 (forward primer), SEQ ID NO: 6 (reverse primer).

No technical features are shared between the nucleotide sequences of Groups I+ and, accordingly, these groups lack unity a priori.