Abstract:
The present disclosure provides methods and systems for identifying biologically active random peptides (BARPs) in plants and libraries of transformed plants, where each plant expresses a different candidate BARP.
INTERNATIONAL SEARCH REPORT

International application No. PCT/US 16/28797

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - C12N 15/09, C12N 15/10, C12N 5/10, C12Q 1/02 (2016.01)
CPC - C12N 15/102, C12N 15/1034, C12Q 1/681.1

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched CPC - C12N 15/00, C12N 15/1044
(keyword limited; terms below)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>WO 00/05406 A1 (M &amp; E BIOTECH A/S) 03 February 2000 (03.02.2000) p 2, ln 26 to p 3, ln 7; p 5, ln 4-7; p 5, ln 21-23; p 7, ln 9-24; p 7, ln 26-31; p 9, ln 24-30; p 10, ln 25-30; p 13, ln 4-25; p 25, ln 26-32; p 30, ln 21 to p 31, ln 8; p 31, ln 25-30; p 62, ln 24-30; p 68, ln 23-27; p 70, ln 21-27</td>
<td>1-4, 7, 10, 12-13, 15-17, 19-24, 29-30, 31A, 31B</td>
</tr>
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<td>Y</td>
<td>GB 2130219 A (CETUS CORP) 31 May 1984 (31.05.1984) p 1, ln 1-8; p 1, ln 21-22; p 1, ln 46-49</td>
<td>5, 25</td>
</tr>
<tr>
<td>Y</td>
<td>US 20110162109 A1 (Himanen et al.) 30 June 2011 (30.06.2011) para [00085], [00086], [00095]</td>
<td>8-9, 11, 14, 18, 27-28</td>
</tr>
</tbody>
</table>

Further documents are listed in the continuation of Box C.

* 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
G document member of the same patent family

Date of the actual completion of the international search 14 October 2016

Date of mailing of the international search report 24 OCT 2016

Name and mailing address of the ISA/US
Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450
Facsimile No. 571-273-8300

Authorized officer: Lee W. Young

Form PCT/ISA/2 10 (second sheet) (January 2015)
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).

This International Searching Authority found multiple inventions in this international application, as follows:

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.

Group 1: Claims 1-30, 31A, 31B, drawn to a method for identifying biologically active random peptides (BARPs) in plants, and to a library of transformed plants comprising BARPs.

Group 1+: Claim 32, drawn to an isolated peptide. Group 1+ will be searched upon payment of additional fees. The isolated peptide may be searched for an additional fee and election as such, for example, to the extent that peptide encompasses SEQ ID NO: 2. Additional peptides will be searched upon the payment of additional fees. Applicants must specify the claims that encompass any additionally elected peptide(s). 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. Another exemplary election would be an isolated peptide encompassing SEQ ID NO: 4.

---- please see continuation on extra 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 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.: 1-30, 31A, 31B

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.
Continuation of: Box No III Observations where unity of invention is lacking

The inventions listed as Groups I and II+ do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

Special Technical Features

Group I requires method steps for identifying biologically active random peptides in plants, and to transformed plants, not required by Group II+.

Group II+ requires an isolated peptide. The technical feature of each of the inventions listed as Group I is the specific peptide sequence recited therein. Each invention requires a peptide sequence, not required by any of the other inventions and not required by Group I.

Common Technical Features

The feature shared by Groups I and II+ is a biologically active random peptide (BARP).

However, this shared technical feature does not represent a contribution over prior art, because the shared technical feature is taught by WO 00/05406 A1 to M & E Biotech A S et al. (hereinafter 'M&E Biotech').

M&E Biotech discloses a biologically active random peptide (BARP) (p 2, in 26 to p 3, in 7 "the inventors disclose herein a method for expression of large intracellular libraries of such enzyme activity modulators in which the active site of said enzyme activity modulators have been altered by introduction of stretches of randomized amino acid sequences or by introduction of random nucleotides at specific sites in the active site. This creates libraries of putative modulators capable of modulating the activity of an array of different enzymes inside cells"; p 5, in 4-7 "a method for identifying a modulator in the form of a biologically active polypeptide fragment or ribonucleic acid fragment which is capable of detectably modulating, in vivo, a phenotypic trait in a cell"; p 10, in 25-29 "When using the term "biologically active" to designate a molecule is herein meant that the molecule in question exhibits a detectable effect on living cells, i.e. that the molecule interacts with the biology of the living cell so as to produce an effect which can be recognized as a change in the cell's phenotype").

As the technical feature was known in the art at the time of the invention, it cannot be considered a special technical feature that would otherwise unify the groups.

Groups I and II+ therefore lack unity of invention under PCT Rule 13 because they do not share a same or corresponding special technical feature.

NOTE: There are two claims numbered claim 31. For the purposes of this invitation, the first instance of claim 31 is designated as "Claim 31A" and the second instance of claim 31 is designated as "Claim 31B".