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[Continued on next page]

(54) Title: TRANSGENIC BIOSENSORS

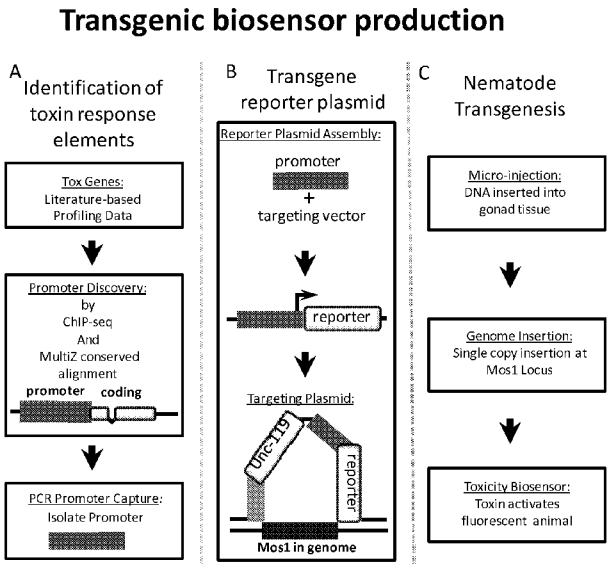

FIGURE 1

(57) Abstract: Systems and methods relate to transgenic organisms and their use as biosensors are described. In some embodiments, the systems and methods include a first population of transgenic organisms that includes a first constitutively expressed reporter gene, and a first transgene that includes a first inducible promoter from a response pathway gene, wherein the first inducible promoter is coupled to a first reporter gene. Other embodiments are described.

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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))*

(88) Date of publication of the international search report:
28 February 2013

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/038884

A. CLASSIFICATION OF SUBJECT MATTER

C12N 5/10(2006.01)i, C12N 15/11(2006.01)i, C12N 15/85(2006.01)i, C12Q 1/02(2006.01)i

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 5/10

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & Keywords: C. elegans, oxigative stress response pathway gene, hsp-16.41, fluorescent reporter

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	SHYU et al., `Visualization of protein interactions in living Caenorhabditis elegans using bimolecular fluorescence complementation analysis' Nature Protocols, Vol.3, No.4, pp.588-596 (2008) See the whole document, especially figure 2, table 1 and pp.589-590.	1-3,5-7,10-15
X	FROKJAER-JENSEN et al., 'Single-copy insertion of transgenes in Caenorhabditis elegans' Nature Genetics, Vol.40, No.11, pp.1375-1383 (November 2008)	1-3,5-7,10-14
A	See the whole document, especially the abstract and figures.	15
A	SEMPLE et al., 'Rapid selection of transgenic C. elegans using antibiotic resistance' Nature Methods, Vol.7, No.9, pp.725-727 (September 2010) See the whole document.	1-3,5-7,10-15
PX	ZEISER et al., 'MosSCI and gateway compatible plasmid toolkit for constitutive and inducible expression of transgenes in the C. elegans germline' PLoS one, Vol.6, Issue 5, e20082, pp.1-6 (26 May 2011) See the whole document, especially figure 1.	1-3,5-7,10-15

☐ 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 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	Date of mailing of the international search report
27 DECEMBER 2012 (27.12.2012)	**27 DECEMBER 2012 (27.12.2012)**
Name and mailing address of the ISA/KR Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer Kim Seung Beom Telephone No. 82-42-481-8746

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/038884

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.: 4,8-9
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:

Claim 4 is worded in reference to a "third population" of claim 2. Claims 8-9 are worded in reference to a "third population" of claim 7. However, said "third population" has not been worded in claims 2 and 7. Therefore, claims 4, 8-9 do not meet the requirement of PCT Article 6.

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 the Extra sheet.

1. ☐ As all required addtional 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 fee, this Authority did not invite payment of any additional fee.

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.:

1-15, partially, relating to a population of transgenic organisms comprising: a first transgene comprising a hsp-16.41 inducible promoter and a reporter gene; and a first constitutively expressed reporter gene.

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

Information on patent family members

International application No.

PCT/US2012/038884

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
None			

Continuation of Box No. III

- Inventions 1-335 (claims 1-15, partially) relate to a population of transgenic organisms comprising a first transgene comprising an inducible promoter for a gene selected from the 335 genes listed in claim 14 (hsp-16.41, hsp-16.2, mtl-2, ~, ZK616.8), and a first constitutively expressed reporter gene.

- Inventions 336-7040 (claim 16, partially) relate to an object comprising a promoter region for a gene selected from the 6705 genes listed in claim 16 (1341 C. elegans genes (cdr-1, gcs-1, ugt-1,~, zyg-12) and their homologous genes in Danio rerio, Drosophila melanogaster, Daphnia spp., and Xenopus laevis).

- Inventions 7041-7202 (claims 17-20, partially) relate to a transgene comprising a promoter region selected from SEQ ID NO:1-162.

Since the above mentioned inventions do not share any of the technical features identified, except that the promoters listed above are inducible promoters, a "special technical relationship" between the inventions, as defined in PCT Rule 13.2, does not exist. Accordingly, the international application does not relate to a one invention or to a single inventive concept.