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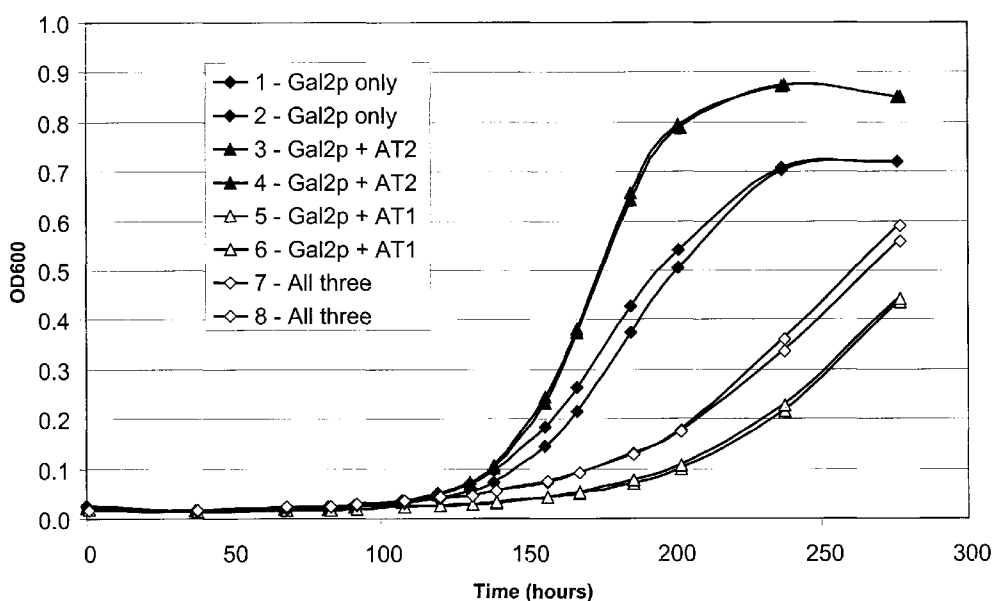
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Declaration under Rule 4.17:
— of inventorship (Rule 4.17(iv))

[Continued on next page]

(54) Title: CLONING AND CHARACTERIZATION OF L-ARABINOSE TRANSPORTERS FROM NON-CONVENTIONAL YEAST

Flask Cultures -- 0.2% Arabinose



(57) Abstract: Two genes from non-conventional yeast encode arabinose transporters. These arabinose transporters are capable of transporting arabinose across the cell membrane. These genes may be expressed heterologously in a host that is not otherwise capable of taking up significant amounts of arabinose from the environment of use. Methods are disclosed to use such genetically engineered hosts to ferment pentose such as arabinose, to produce ethanol.

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Published:

- *with international search report*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

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21 February 2008

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 07/64418

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - C12N 15/00, C12N 1/00 (2007.10)

USPC - 435/255.2, 435/255.21, 435/101

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)

USPC: 435/255.2, 435/255.21, 435/101

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

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

PubWest: PGPB,USPT,USOC,EPAB,JPAB; Google Scholar; Google Patents; text: Arabinose; L-arabinose; transporter; yeast; S. cerevisiae; A. adenivorans; K. marxianus; P. guilliermondii; expression; growth; vector; replica plating; screening; testing; fermentation; sole source; Km; Vmax; conventional; non-conventional

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ----- Y	US 2005/0142648 A1 (BOLES et al.) 30 June 2005 (30.06.2005), para [0017], [0006], [0018], [0015]	1, 2, 9 ----- 3-5, 8, 10-14
Y	SAHA et al., "Production of L-arabitol from L-arabinose by Candida entomaea and Pichia guilliermondii" Applied Microbiology and Biotechnology, April 1996, Vol 45, No 3, Pg. 299-306 (04.1996), Abstract	3-5, 11, 12
Y	US 2005/0260705 A1 (BETTER) 24 November 2005 (24.11.2005). abstract; para [0004], [0032], [0037], [0052], [0046], [0042], [0041], [0044]	8, 10-14
Y	BILLARD et al., "Glucose uptake in Kluyveromyces lactis: role of the HGT1 gene in glucose transport" J Bacteriol, October 1996, Vol 178, No 20. Pg. 5860-6. p. 5862 (10.1996), Fig. 3; pg. 5861, col 1, para 1	4, 5

Further documents are listed in the continuation of Box C.

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	"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
"E" earlier application or patent but published on or after the international filing date	"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
"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)	"&" document member of the same patent family
"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	

Date of the actual completion of the international search 16 November 2007 (16.11.2007)	Date of mailing of the international search report 11 DEC 2007
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. 571-273-3201	Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 07/64418

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:
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 1-14, drawn to isolated yeast arabinose transporter and identification of such.
This application contains claims directed to more than one species of the generic invention. These species are deemed to lack unity of invention because they are not so linked as to form a single general inventive concept under PCT Rule 13.1.
In order for more than one species to be examined, the appropriate additional examination fees must be paid. The species are as follows:

The different species related to different arabinose transporters are:

a) SEQ ID NO:2

b) SEQ ID NO:4

The species listed above do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, the species lack the same or corresponding special technical features for the following reasons:
(see continuation in extra box)

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.:

Group 1, claims 1-5 and 8-14, the first named invention is isolated yeast arabinose transporter and identification of such limited to SEQ ID NO:2.

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/US 07/64418

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

The different amino acid sequences represented by the different arabinose transporters are different structures that are not common to one another but are different because they are composed of unique amino acid sequences.
The first named invention is isolated yeast arabinose transporter and identification of such limited to SEQ ID NO:2.

Note: Claims 6 and 7 relate to SEQID NO: 4. The International Search was directed to claims 1-14, limited to SEQID NO: 2, per the lack of unity determination. Thus, as claims 6 and 7 are directed to SEQID NO: 4, they are not treated in the present search report.