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— *of inventorship (Rule 4.17(iv))*

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**(54) Title:** MODIFICATIONS OF CST-II FOR INCREASED PROTEIN EXPRESSION

(57) **Abstract:** The present invention provides modified Campylobacter sialyltransferase proteins that exhibit enhanced expression as compared to its unmodified form. Nucleic acids that encode the sialyltransferase proteins are also included, as are methods to produce and use the sialyltransferase proteins.

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INTERNATIONAL SEARCH REPORT

International application No
PCT/US 07/02878

A CLASSIFICATION OF SUBJECT MATTER
IPC(8) - C12P 21/02 (2008 04)
USPC - 435/69 1, 900/240, 900/200
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 435/69 1 900/240 900/200

Document ilion starched other than minimum documentation to the extent that such document are included in the fields searched
USPC 435/41 6 514/12 2 900/20 10 (text search)

I leutronic data base consulted during the international search (name of data base and where practicable search terms used)
Electronic Data Bases (USPT PGPB EPAB JPAB) DtalogPRO(Eng tneer tng/Lrfe Science Research) Google Scholar

Search Terms

C DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation ot document with indication where appropriate ot the relevant passages | Relevant to claim No |
|---|---|---|
| X<br>---- ---<br>Y | US 6 699 705 B2 (GILBERT et al ) 2 March 2004 (02 03 2004) especially col 3 In 55 67 col 32 In 7-9 col 33 In 47-52 col 39 In 65-67 col 40 In 1 and In 15-31 col 53 and 54 SEQ ID NO 2 Fig 4 | 1-4 9 10 12 13 15 17<br>----------<br>7 14 18 19 |
| Y | Hirel et al Extent of N terminal methionine excision from Escherichia coll proteins is governed by the side chain length of the penultimate amino acid Proc Nat Acad Sci (USA) November 1989 Vol 86 No 21 Pg 8247-8251 especially abstract and pg 8250 Table 1 | 7 |
| Y | WO 2005/051327 A2 (DEFREES et al ) 9 June 2005 (09 06 2005) especially pg 99 para [0357 -0358] | 18 19 |
| Y | New England BioLabs Datasheet pMAL Protein Fusion and Purification System 10 September 2004 (10 09 2004) Available on the internet at <URL http //web archive org/web/20040910192107/http //www neb com/nebecomm/products_ untl/productE8000 asp> | 14 |

D Further documents are listed in the continuation of Bo\ C ☐

* Special categories of cited documents
A document defining the general state of the art which is nol considered to be of particular relevance
E earlier application or patent but published on or after the international filing date
L document which may Ihrow doubis on pnont) 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 pπor to the intemauonal filing date but later than the priority date claimed

T later document published after the international filing date orpno πi\ dlattee aınndd nboll inn cionnflfliiccttt wiillhh tthee appplication bul cited Io understand the principle or theory uınddeerrllyyiinngg Ihe invention
\ document of particular relevance the claimed invention cannot be considered novel or cannot be considered to involve an tn\ent tve step when the document is taken alone
Y document of particular relevance the ςlaimed invention cannot be considered Io involve an inventive step when lhe documenl 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 famil)

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INTERNATIONAL SEARCH REPORT

International application No
PCT/US 07/02878

Box No Il Obsen ations where certain claims ѵ\ ere found unsearchable (Continuation of itcm 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) lor the following reasons

1 L J Claims Nos
because they relate to subject matter not required to be searched by this Authority, namely

2 D 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 meaningtul international search can be carried out, specilically

3 D Claims Nos
because they are dependent claims and are not dratted in accordance with the second and third sentences ol Rule 6 4(a)

Box No III Obsen abons where unity ofim ention is lacking (Continuation of item 3 of first sheet)

lhis International Searching Authority tound multiple inventions in this international application, as follows
This application contains (he fo7owinginventions 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 - X Claims 1-19 directed to a tagged sialyltransferase protein selected from the group consisting of SEQ ID Nos 4-10 a tagged sialyltransferase protein comprising motif A represented by SEQ ID NOs 11-12 and an expression vector represented by SEQ ID NO 3 wherein each group is represented by one of SEQ ID NOs 4-12 and 3 respectively

The inventions listed as Groups I - X 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

(continued in Extra Box)

1 I__I As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims

2 I__I As all searchable claims could be searched without effort justifying additional fees this Authority did not invite payment of additional fees

3 I__I As onh some ol the required additional search lees were timel) paid h\ the applicant this international search report uners onH those claims tor which tees were paid specifically claims Nos

4 ☒ No required additional search fees were timeh paid bv the applicant Consequently this international search report is restricted to the invention tirst mentioned in the claims, it is covered by claims Nos
Claims 1-19 directed to a tagged sialyltransferase protein restricted to SEQ ID No 4 (Claims 1-4 7 9 10 12-19)

Remark on Protest

I__I The additional search fees were accompanied by the applicant s protest and where applicable, the payment of a protest fee

I__I 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

I__I No protest accompanied the payment of additional search fees

continuation of Box III

The 10 groups are the 9 tagged sialyltransferase protein sequences represented by SEQ ID NOs 4-12 and the expression vector represented by the nucleic acid sequence of SEQ ID NO 3 The different sequences represented by the amino acid content of each group and the nucleic acid sequence are different structures that are not common to one another but are different because they are composed of unique amino acid and nucleic acid sequences Further, the common technical feature of the listed groups is a sialyltransferase protein However, this is not an improvement over the prior art of US 6,689,604 B1 to Gilbert, et al (10 February 2004 (10 02 2004)) that teaches a sialyltransferase polypeptide from Campylobacter vectors for expression, and its use (col 2 ln 65-col 3 ln 1, col 3 ln 16-27, col 3 ln 28-34) Therefore, the inventions listed as Groups I - X lack unity of invention under PCT Rule 13 because they do not share a same or corresponding special technical feature