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(54) Title: COMPOSITIONS OF AMINOACYL-tRNA SYNTHETASE AND USES THEREOF

(57) Abstract: Compositions and methods of producing components of protein biosynthetic machinery that include orthogonal tRNA's, orthogonal aminoacyl-tRNA synthetases, and orthogonal pairs of tRNA's/synthetases are provided. Methods for identifying these orthogonal pairs are also provided along with methods of producing proteins using these orthogonal pairs.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US05/43603

A. CLASSIFICATION OF SUBJECT MATTER
 IPC: C12N 9/22(2006.01);C12P 21/02(2006.01)

USPC: 435/199,252.3,193,320.1;536/23.2
 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)
 U.S. : 435/199,252.3,193,320.1;536/23.2

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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,927,042 B2 (SCULTZ et al) 09 August 2005 (09.08.2005). Entire document.	1-3, 7, 9, 10, 12-19, 26-28, 30, 36-40, 42 and 45
X	WO/2002/086075 A2 (SCHULTZ et al) 31 October 2002 (31.10.2002). Entire document.	1-3, 7, 9, 10, 12-19, 26-28, 30, 36-40, 42 and 45
X	US 2003/0108885 A1 (SCHULTZ et al) 12 June 2003 (12.06.2003). Entire document.	1-4, 7, 9-19, 26-28, 30, 36-40, 42 and 45
X	US 2003/0082575 A1 (SCHULTZ et al) 1 May 2003 (01.05.2003). Entire document.	1-4, 7, 9-19, 26-28, 30, 36-40, 42 and 45
X	WANG, L., et al., Addition of the keto functional group to the genetic code of Escherichia coli, Proc. Natl. Acad. Sci. U.S.A., 7 January 2003, Vol. 100, No. 1, pages 56-61.	4, 11 and 43

Further documents are listed in the continuation of Box C. See patent family annex.

* 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 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	

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US05/43603

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 Continuation 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 any 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.:
- 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/US05/43603

BOX 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.

Group I. Claims 1-4, 7, 9-19, 26-30, 36-45 are drawn to a composition, a translation system or a cell comprising an amino acyl tRNA synthetase (RS) having the nucleic acid sequence of SEQ ID NO: 4, a polynucleotide sequence of encoding the amino acid sequence of SEQ ID NO: 5, a polynucleotide sequence encoding the amino acid sequence of SEQ ID NO: 17, and a complementary sequence and conservative variation, vectors where the RS preferentially aminoacylates a tRNA,

Group II. Claim 5 is drawn to a composition, a translation system or a cell comprising an amino acyl tRNA synthetase (RS) having the nucleic acid sequence of SEQ ID NO: 4, a polynucleotide sequence of encoding the amino acid sequence of SEQ ID NO: 5, a polynucleotide sequence encoding the amino acid sequence of SEQ ID NO: 17, a complementary sequence thereof and a conservative variation thereof and a tRNA wherein said tRNA is chemically aminoacylated.

Group III. Claims 6 and 8 are drawn to composition, a translation system or a cell comprising an amino acyl tRNA synthetase (RS) having the nucleic acid sequence of SEQ ID NO: 4, a polynucleotide sequence of encoding the amino acid sequence of SEQ ID NO: 5, a polynucleotide sequence encoding the amino acid sequence of SEQ ID NO: 17, a complementary sequence thereof and a conservative variation thereof and a tRNA wherein said tRNA is enzymatically aminoacylated by a molecule such as a ribosyme.

The inventions listed as Groups I-III 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: The invention in group I utilize a tRNA synthetase to aminoacylate a cognate tRNA while the invention of Group II utilizes a chemical method to aminoacylate a corresponding tRNA and the invention in group III utilize a ribozyme to aminoacylate the tRNA therefore Group I-III are patentably distinct thus are not so linked as to form a single general inventive concept under PCT Rule 13.1.