



- (51) **International Patent Classification:**
C12N 5/10 (2006.01) *C12N 15/86* (2006.01)
C12N 15/33 (2006.01)
- (21) **International Application Number:**
PCT/US2012/040932
- (22) **International Filing Date:**
5 June 2012 (05.06.2012)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
61/493,918 6 June 2011 (06.06.2011) US
- (71) **Applicant (for all designated States except US):** **BLUE-BIRD BIO, INC.** [US/US]; 840 Memorial Drive, Cambridge, Massachusetts 02139 (US).
- (72) **Inventor; and**
- (75) **Inventor/Applicant (for US only):** **KUTNER, Robert H.** [US/US]; 15 North Beacon Street #915, Allston, Massachusetts 02134 (US).
- (74) **Agents:** **MCDONALD, Michael J.** et al.; Cooley LLP, 777 - 6th Street, NW, Suite 1100, Washington, District of Columbia 20001 (US).
- (81) **Designated States (unless otherwise indicated, for every kind of national protection available):** AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR,

KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

- (84) **Designated States (unless otherwise indicated, for every kind of regional protection available):** ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

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))*
- *with sequence listing part of description (Rule 5.2(a))*

- (88) **Date of publication of the international search report:**
25 April 2013



(54) **Title:** IMPROVED GENESWITCH SYSTEMS

(57) **Abstract:** The present invention provides improved molecular switch gene expression systems and improved retroviral packaging cells and viral particle production. In various embodiments, the present invention also provides retroviral vectors that have increased control over gene expression. Further, the present invention provides vector systems that are useful in methods of gene therapy.

A. CLASSIFICATION OF SUBJECT MATTER*C12N 5/10(2006.01)i, C12N 15/33(2006.01)i, C12N 15/86(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; C12N; C12N 15/64; C12P 19/34; C12N 15/867; C12N 15/86; C12N 9/22

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: mammalian packaging cell, lentiviral vector.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2005-026316 A2 (BIOPTION AB) 24 March 2005 See abstract; claims 1, 2, 14, 30, and 56.	1-7, 29-34, 40-46, 54
A	US 2010-221789 A1 (BROWN, DAVID et al.) 2 September 2010 See abstract; claim 1.	1-7, 29-34, 40-46, 54
A	US 2008-241929 A1 (NALDINI, LUIGI et al.) 2 October 2008 See abstract; claims 1, 9, and 18.	1-7, 29-34, 40-46, 54
A	WO 2005-014836 A2 (CAMBRIDGE UNIVERSITY TECHNICAL SERVICES LIMITED et al.) 17 February 2005 See abstract; claims 1, 15 and 20.	1-7, 29-34, 40-46, 54
A	SURYANARAYANA, V. V. S. et al., 'Non-segmented negative sense RNA viruses as vectors for vaccine development', Current Science, 10 February 2010, Vol.98, No.3, pp.379-391, ISSN 0011-3891. See abstract; p.386, right column, paragraph 2.	1-7, 29-34, 40-46, 54

 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

25 FEBRUARY 2013 (25.02.2013)

Date of mailing of the international search report

26 FEBRUARY 2013 (26.02.2013)

Name and mailing address of the ISA/KR



Facsimile No. 82-42-472-7140

Authorized officer

HEO, Joo Hyung

Telephone No. 82-42-481-8150



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/040932

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2005-026316 A2	24.03.2005	WO 2005-026316 A3	26.05.2005
US 2010-221789 A1	02.09.2010	AU 2003-212886 A1 EP 1572902 A2 EP 1572902 A3 EP 1572902 A4 US 2003-0166282 A1 WO 03-064621 A2	02.09.2003 14.09.2005 12.10.2005 11.04.2007 04.09.2003 07.08.2003
US 2008-241929 A1	02.10.2008	AT 368122 T AT 528406 T AU 4489700 A AU 778698 B2 CA 2370103 A1 CA 2370103 C DE 60035676 D1 DE 60035676 T2 EP 1171624 A1 EP 1171624 A4 EP 1171624 B1 EP 1849873 A1 EP 1849873 B1 IL 146144 D0 JP 2003-508017 A US 7250299 B1 WO 00-66759 A1	15.08.2007 15.10.2011 17.11.2000 16.12.2004 09.11.2000 02.08.2011 06.09.2007 30.04.2008 16.01.2002 26.06.2002 25.07.2007 31.10.2007 12.10.2011 25.07.2002 04.03.2003 31.07.2007 09.11.2000
WO 2005-014836 A2	17.02.2005	DE 602004013165 D1 DE 602004013165 T2 EP 1660665 A2 EP 1660665 B1 ES 2305840 T3 GB 0318704 D0 US 2007-0184025 A1 US 8298826 B2 WO 2005-014836 A3	29.05.2008 30.04.2009 31.05.2006 16.04.2008 01.11.2008 10.09.2003 09.08.2007 30.10.2012 02.06.2005