US009510571B2

(12) **United States Patent**
Kyogoku et al.

(10) **Patent No.: US 9,510,571 B2**
(45) **Date of Patent: Dec. 6, 2016**

(54) **TRANSGENIC BIRD EXPRESSING FOREIGN GENE USING ENDOPLASMIC RETICULUM CHAPERONE PROMOTER**

(75) Inventors: **Kenji Kyogoku**, Takasago (JP); **Hiroyuki Watanabe**, Takasago (JP)

(73) Assignee: **KANEKA CORPORATION**, Osaka (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **14/342,208**

(22) PCT Filed: **Aug. 27, 2012**

(86) PCT No.: **PCT/JP2012/071609**

§ 371 (c)(1),
(2), (4) Date: **Apr. 22, 2014**

(87) PCT Pub. No.: **WO2013/031734**

PCT Pub. Date: **Mar. 7, 2013**

(65) **Prior Publication Data**

US 2014/0245465 A1 Aug. 28, 2014

(30) **Foreign Application Priority Data**

Sep. 2, 2011 (JP) 2011-191926

(51) **Int. Cl.**
A01K 67/027 (2006.01)
C07K 14/505 (2006.01)

(52) **U.S. Cl.**
CPC ***A01K 67/0275*** (2013.01); ***C07K 14/505*** (2013.01); *A01K 2217/052* (2013.01); *A01K 2227/30* (2013.01); *A01K 2267/01* (2013.01); *C12N 2740/13043* (2013.01); *C12N 2830/00* (2013.01); *C12N 2830/90* (2013.01)

(58) **Field of Classification Search**
USPC 800/19, 21, 4, 5
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2009/0148471 A1* 6/2009 Wu A61K 39/0011 424/192.1
2015/0191713 A1* 7/2015 Ciplys C12P 21/02 435/69.8

FOREIGN PATENT DOCUMENTS

JP 11-243959 9/1999
JP 2001-054391 2/2001
JP 2004-236626 8/2004
JP 2005-536984 12/2005
JP 2007-089578 4/2007
WO WO 00/29429 5/2000

OTHER PUBLICATIONS

Table of Bird Classification Families of the Eastern US Birds, 2009.*
Lillico (PNAS, 2007, 104 (5) p. 1771-1776).*
Description of GRP-78, 2015.*
JP2004-236626 translation, 2004.*
"Molecular chaperones of the endoplasmic reticulum," Handbook of Molecular Chaperones (2010), Durante, P. ed., Nova Sci. Publishers, Hauppauge, NY, p. 1-77.*
Byun et al., "Oviduct-Specific Enhanced Green Fluorescent Protein Expression in Transgenic Chickens", Biosci. Biotechnol. Biochem., vol. 75, No. 4 (2011) pp. 646-649.
International Preliminary Report on Patentability issued in International Application No. PCT/JP2012/071609 on Mar. 4, 2014.
Kaleri et al., "Oviduct-specific expression of tissue plasminogen activator in laying hens", Genetics and Molecular Biology, vol. 34, No. 2 (2011) pp. 231-236.
Lillico et al., "Oviduct-specific expression of two therapeutic proteins in transgenic hens", PNAS. vol. 104, No. 6 (2007) pp. 1771-1776.
Wang et al., "Recombinant Avian Adeno-Associated Virus-Mediated Oviduct-Specific Expression of Recombinant Human Tissue Kallikrein", Poultry Science, vol. 87 (2008) pp. 777-782.

* cited by examiner

Primary Examiner — Michael Wilson
(74) *Attorney, Agent, or Firm* — Birch, Stewart, Kolasch & Birch, LLP

(57) **ABSTRACT**

An aim is to produce a suitable foreign protein in egg white in transgenic birds at levels equivalent to or higher than the expression levels achieved using an ovalbumin promoter or an actin promoter, and to reduce the great burden on birds by reducing the expression at sites other than the oviduct while achieving expression sufficient to predict the expression levels before the birds reach sexual maturity. Provided is a transgenic bird containing a nucleic acid base sequence in chromosome in a cell that forms the oviduct, the sequence containing: (a) an avian endoplasmic reticulum chaperone promoter; and (b) a nucleic acid base sequence encoding a suitable foreign protein, functionally linked to the promoter. Also provided is a method for producing a suitable foreign protein, including recovering the suitable foreign protein from the transgenic bird. Further provided is a method for producing a transgenic bird, including introducing a nucleic acid base sequence into a chromosome in a cell that forms the oviduct, the sequence containing: (a) an avian endoplasmic reticulum chaperone promoter; and (b) a nucleic acid base sequence encoding a suitable foreign protein, functionally linked to the promoter.

9 Claims, No Drawings