



香港資優教育學苑

The Hong Kong Academy for Gifted Education

香港特別行政區政府教育局資助

Subvented by the Education Bureau, the Government of the HKSAR

[**Gifted Programme**]

E3BTE002C

(Token- required)

Biotechnology Course (Level III): Trends in Modern Biotechnology II

Dr CHAN Kwok Keung

Biology teacher, SKH Bishop Baker Secondary School



Application Deadline
20 May 2024 12:00 noon

Result Release
31 May 2024

Intended Learning Outcomes

Upon completion of the gifted programme, gifted students should be able to:

1. describe the basic knowledge of modern biotechnology and its trends nowadays, e.g. genetic engineering;
2. recognize the latest techniques in modern biotechnology;
3. explain the concepts of practical experiments of molecular biology and recombinant DNA technology;
4. perform experiments of genetic engineering, e.g. DNA microarray, Blue-White screening of recombinant plasmid DNA, genetically modified organisms detection by PCR;
5. discuss the ethical and moral issues of stem cell therapy.

If student members withdraw from the programme after the Application Deadline, the token will be deducted.

◆ Gifted Programme Introduction

In this course, we will have an in-depth study on the latest trends in modern biotechnology – from the fundamental knowledge of molecular biology to recombinant DNA technology and genetic engineering. Furthermore, some new techniques in modern biotechnology (e.g. polymerase chain reactions (PCR), DNA microarray, animal cloning and stem cell therapy) will also be discussed. Besides, hands-on experiments are designed to demonstrate the latest techniques in genetic engineering (e.g. DNA microarray, genetically modified organisms detection by PCR). Finally, topics such as ethical issues of modern biotechnology applications, pros and cons of stem cell therapy, etc. will be explored and discussed.

This course is under the collaboration of HKAGE and SKH Bishop Baker Secondary School.

◆ Schedule

| Session | Date | Time | Venue * |
|---------|--------|------------------------|--------------------|
| 1 | 19 Jul | 9:00 a.m. – 12:00 noon | Classroom 406 |
| 2 | 20 Jul | | Classroom 406 |
| 3 | 24 Jul | | Biology Laboratory |
| 4 | 25 Jul | | Biology Laboratory |
| 5 | 26 Jul | | Biology Laboratory |
| 6 | 27 Jul | | Biology Laboratory |

*Address: SKH Bishop Baker Secondary School, 10 Fung Yau Street South, Yuen Long, N.T. ([MAP](#))

◆ Suitable for

- S3 to S6 HKAGE student members in 2023/24 school year
- Class size: 30

Priority will be given to students who have completed “Biotechnology Course (Level III): Trends in Modern Biotechnology I (E3BTE001C)”.

◆ Pre-requisite

- Students with primary interest on biology, chemistry and biotechnology;
- Biology and chemistry knowledge of S3 or above level is preferred.

◆ Medium of Instruction

English with English Handouts

◆ Screening

Please answer the screening questions in the online application form.

*The screening questions are designed to help the applicant understand the course level and the course content. The questions must be answered by the student applicant and it can only be attempted once. The answers cannot be changed once the application is submitted. Selection is based on students' performance in answering the questions. Only students who can demonstrate motivation and knowledge of biotechnology in the screening questions can be enrolled in the programme.

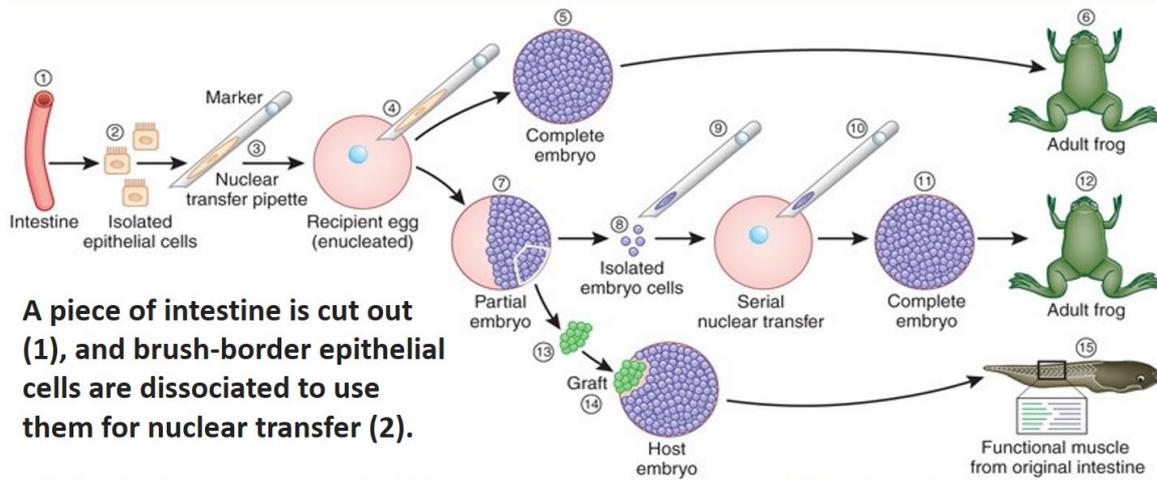
◆ Certificate

E-Certificate will be awarded to gifted students who have:

- attended at least 5 sessions; and
- completed all the assignments with satisfactory performance.

◆ Sample Notes

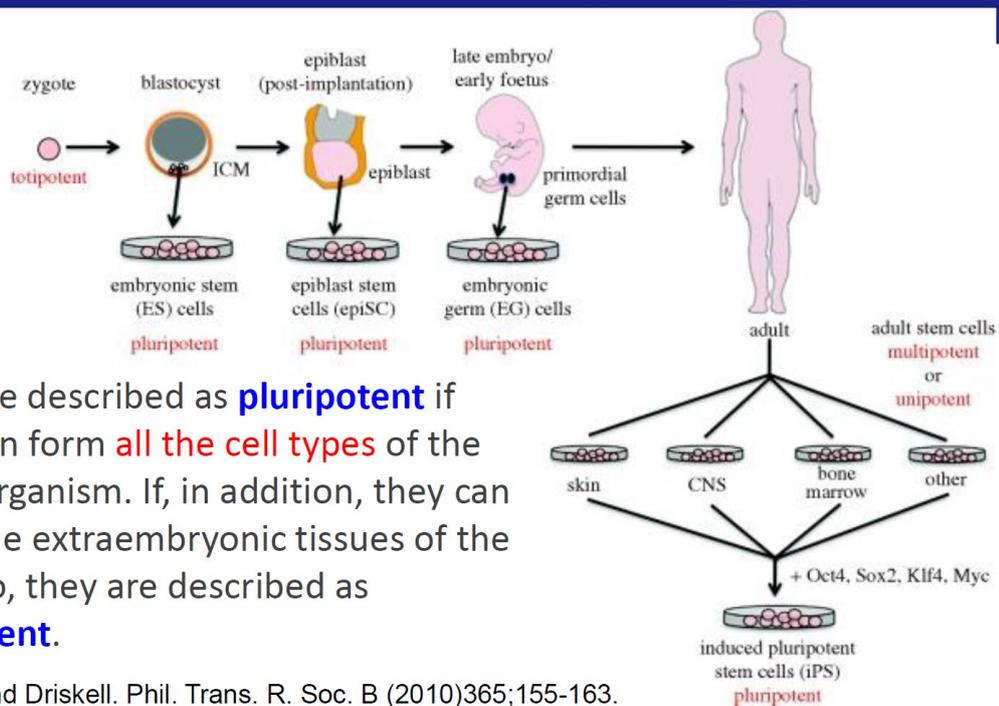
Nuclear reprogramming – somatic cell nuclear transfer (SCNT)



A piece of intestine is cut out (1), and brush-border epithelial cells are dissociated to use them for nuclear transfer (2).

A single donor cell is sucked into a narrow micropipette (3) to break the plasma membrane, but not the nucleus. The recipient egg is enucleated by ultraviolet irradiation, the micropipette is injected into the egg and the donor nucleus is ejected from the micropipette (4).

Origin of Stem Cells



Cells are described as **pluripotent** if they can form **all the cell types** of the adult organism. If, in addition, they can form the extraembryonic tissues of the embryo, they are described as **totipotent**.

Watt and Driskell. Phil. Trans. R. Soc. B (2010)365;155-163.