

國立新竹教育大學 100 學年度碩、博士班招生考試試題

所別：應用科學系碩士班(生命科學組)

科目：生物專業英文(本科總分：100 分)

※ 請橫書作答

I. Please translate following Biology glossaries (直接翻譯，中文作答，20 points).

1. reactive oxygen species
2. pleiotropic
3. bioremediation
4. real time PCR
5. cDNA library
6. cluster of differentiation
7. somatic cell nuclear transfer
8. transposon
9. synchronic
10. taxonomy

II. Here is an abstract published on Feb. 18, 2011 in the journal *Science* by UC Davis plant scientists and their international collaborators. Accordingly, plants have for the first time been cloned as seeds, which is a milestone towards making hybrid crop plants that can retain favorable traits from generation to generation and also allow the farmer to reuse the hybrid seed. Please translate the following abstract (翻譯本文摘要，中文作答，15 points) and give a proper title for this paper (給適當文章標題，英文作答，5 points).

Abstract

Cloning through seeds has potential revolutionary applications in agriculture, because it would allow vigorous hybrids to be propagated indefinitely. However, asexual seed formation or apomixis, avoiding meiosis and fertilization, is not found in the major food crops. To develop de novo synthesis of apomixis, we crossed *Arabidopsis* MiMe and dyad mutants that produce diploid clonal gametes to a strain whose chromosomes are engineered to be eliminated after fertilization. Up to 34% of

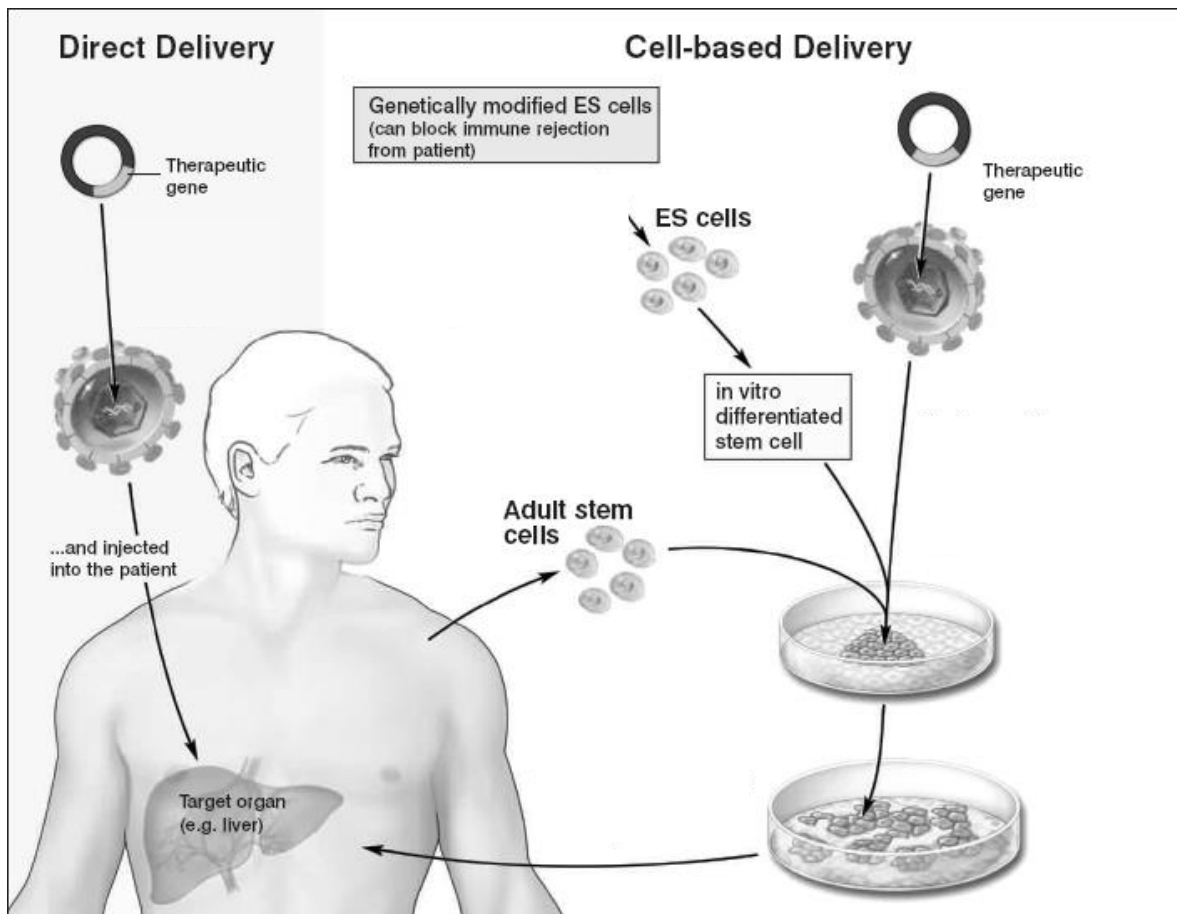
the progeny were clones of their parent, demonstrating the conversion of clonal female or male gametes into seeds. We also show that first-generation cloned plants can be cloned again. Clonal reproduction through seeds can therefore be achieved in a sexual plant by manipulating two to four conserved genes.

III. This is a report regarding to the amyloid cascade hypothesis of Alzheimer's disease (AD) posits that the generation of β -amyloid ($A\beta$) triggers Tau neurofibrillary pathology. Please draw a flowchart to describe the authors' experimental design (畫流程圖並以英文說明，15 points).

Amyloid- β oligomers may cause cognitive deficits in Alzheimer's disease by impairing neuronal NMDA-type glutamate receptors, whose function is regulated by the receptor tyrosine kinase EphB2. Here we show that amyloid- β oligomers bind to the fibronectin repeats domain of EphB2 and trigger EphB2 degradation in the proteasome. To determine the pathogenic importance of EphB2 depletions in Alzheimer's disease and related models, we used lentiviral constructs to reduce or increase neuronal expression of EphB2 in memory centres of the mouse brain. In nontransgenic mice, knockdown of EphB2 mediated by short hairpin RNA reduced NMDA receptor currents and impaired long-term potentiation in the dentate gyrus, which are important for memory formation. Increasing EphB2 expression in the dentate gyrus of human amyloid precursor protein transgenic mice reversed deficits in NMDA receptor-dependent long-term potentiation and memory impairments. Thus, depletion of EphB2 is critical in amyloid- β -induced neuronal dysfunction. Increasing EphB2 levels or function could be beneficial in Alzheimer's disease.

Adapted from Nature. 2011 Jan 6;469 (7328):47-52.

IV. This is a schematic representation of stem cell therapy. Please try your best to write down a suitable legend for this figure (以英文說明該圖例內容，15 points).



Adapted from Cell Biology Wiki-2010 Lecture 22.

V. Marine pollution is a serious problem in today's global politics as it is directly harmful to the marine life and indirectly influences human health and the Earth's valuable resources. The following content is a US patent cover page intending to remove toxic substances from ocean wastes. Please try to clarify 7 claims generated from this patent as possible as you can (中文作答美國專利 US 6251258 B1 可能產生的主張，15 points).

題目 V 的專利首頁：



US006251258B1

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

(10) **Patent No.:** US 6,251,258 B1
(45) **Date of Patent:** Jun. 26, 2001

(54) **METHOD AND APPARATUS FOR
REMOVING TOXIC SUBSTANCES FROM
WASTE MARINE PRODUCTS**

5,043,050 * 8/1991 Herbst 204/272

FOREIGN PATENT DOCUMENTS

(75) Inventors: **Masayuki Kojima; Toshiyuki
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Chiyoda-ku; **Hiroshi Asakura;**
Masataka Kasai, both of Toshima-ku,
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0921731 8/1997 (EP) .
387 483 2/1933 (GB) .
8-99001 * 4/1996 (JP) .
9-47257 * 2/1997 (JP) .
2135986 2/1998 (JP) .

(73) Assignee: **Hitachi Plant Engineering &
Construction Co., Ltd.**, Tokyo (JP)

* cited by examiner

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

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(57) **ABSTRACT**

(21) Appl. No.: **09/412,650**

(22) Filed: **Oct. 5, 1999**

(30) **Foreign Application Priority Data**

Dec. 11, 1998 (JP) 10-353136

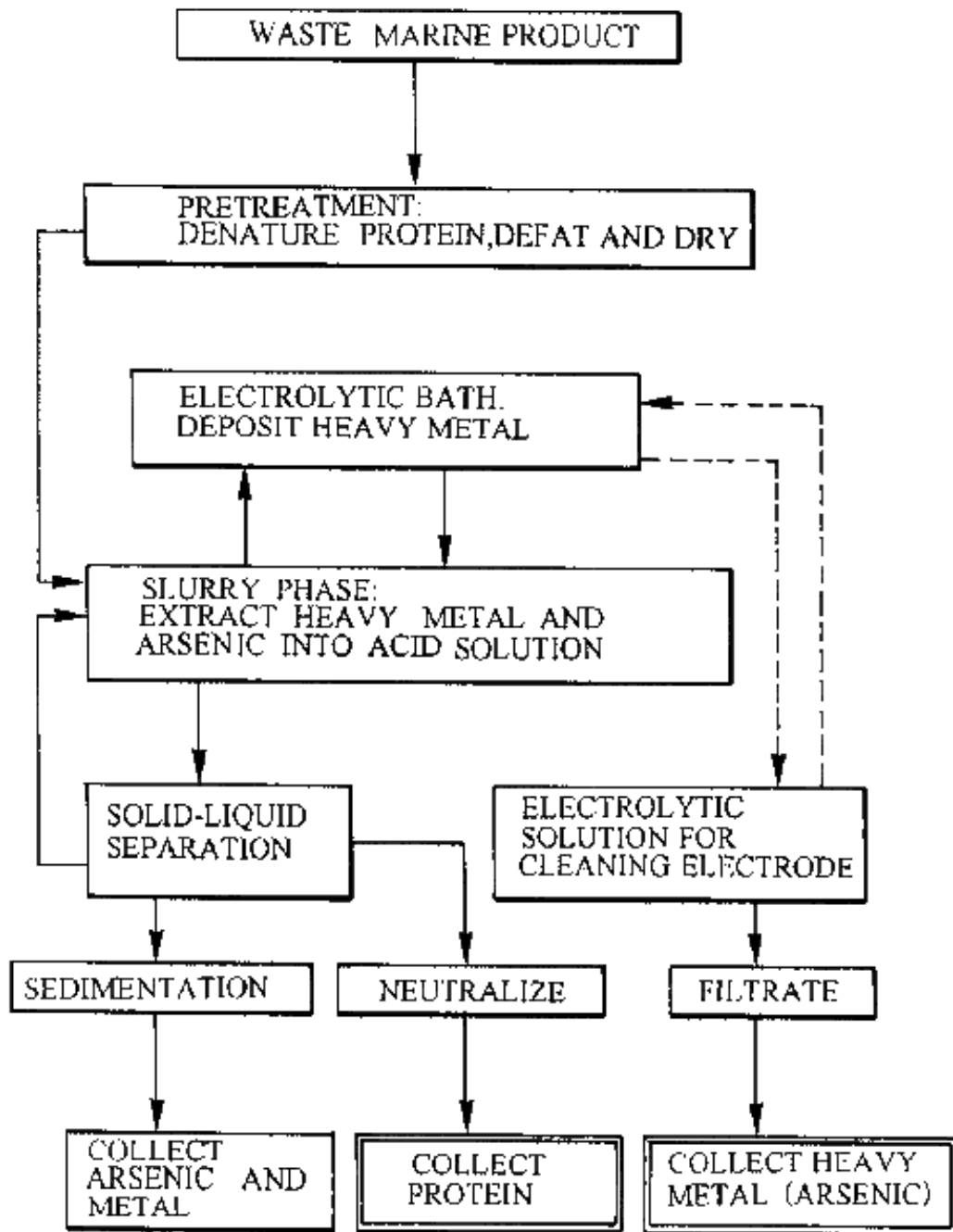
(51) **Int. Cl.⁷** **C02F 1/461**

(52) **U.S. Cl.** **205/702; 205/771; 205/772;**
588/204

(58) **Field of Search** 205/702, 771,
205/772; 588/204

In an electrolytic bath, an extraction part extracts heavy metal in the internal organs of scallops into an acid solution. A direct current voltage is applied between electrodes, which are provided in the acid solution, to deposit the heavy metal in the acid solution on the electrodes. If the deposit efficiency deteriorates, the polarity applied between the electrodes is reversed from the polarity in the deposition of the heavy metal in a neutral or alkali electrolytic solution. Consequently, the heavy metal is removed from the electrodes. Since arsenic is dissolved in the acid solution, an alkali liquid and a flocculant are added to the acid solution to sediment arsenic.

題目 V 的補充資料：



VI. Please describe your own biological background at university in English. You

can explain what you have learned from your compulsory courses, optional courses and/or the dissertation you have carried out (說明你個人的生物相關背景，英文作答，15 points).