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BIOLOGY 343
PLANTS AND PEOPLE
JULY 31, 2010

Name _____ Student No. _____

Signature _____

Time: 2.5 hr

Instructor: Shona Ellis

Total marks: 125

This examination is composed of three parts. The recommended amount of time to spend on each part and the worth of the questions are indicated. Do Part C in an Exam Booklet.

PART A. Multiple Choice Questions (2 marks each, 10 minutes total)

Write the letter of the answer that **best** applies in the brackets.

1. The integument of the ovule becomes the: ()
 - A. endosperm.
 - B. seed.
 - C. seedcoat.
 - D. cotyledon.
 - E. fruit wall

2. Which of the following statements is **false** about indigo? ()
 - A. Indigo must be in its insoluble form when used in a dye bath.
 - B. Indigo plants make good fertilizer because they have symbiotic associations with nitrogen-fixing bacteria which helps add nitrogen to the soil.
 - C. Indigo turns blue upon oxidation.
 - D. Indigo dye coats fibres rather than binds to them chemically.
 - E. Indigo is blue

3. "Doctrine of Signatures" refers to: ()
 - A. the way a doctor signs a prescription.
 - B. the rules by which plants are named.
 - C. when a plant looks like the disease that it cures.
 - D. the Hippocratic Oath.
 - E. none of the above are true.

4. Plant products which are used to keep ice from forming in ice cream and give a smooth texture to food are often derived from: ()
- A. essential oil.
 - B. latex.
 - C. gums.
 - D. lignin.
 - E. pectin.
5. Carolus Linnaeus' most important contribution was: ()
- A. inventing the cotton gin.
 - B. the development of the binomial system of nomenclature.
 - C. the development of the theory of evolution.
 - D. rounding the Cape of Good Hope.
 - E. publishing the first book on plants.
6. Which statement is **false** about Coastal B.C.'S First Peoples' systems of food acquisition: ()
- A. Food storage was not an important technology as food was available all year round.
 - B. Burn technology resulted in higher fruit yields and young edible shoots which attracted game.
 - C. Plant cultivation was practiced to some degree.
 - D. B.C.'s first Peoples were hunter gatherers.
 - E. Fish was a very important source of protein.
7. Protoplasts are generated by: ()
- A. putting pieces of plant tissue on nutrient medium supplemented with hormones and agar.
 - B. putting pieces of plant tissue on nutrient medium supplemented with hormones.
 - C. putting callus tissue into liquid medium and placing it on a shaker.
 - D. treating plant cells with cellulases to remove the cell wall.
 - E. transforming plant cells with *Agrobacterium*.
8. In the preparation of alcohols, the following is true: ()
- A. molasses is fermented to make bourbon.
 - B. potatoes are fermented to make rye.
 - C. sugarcane is fermented to make rum.
 - D. soy is fermented to make sake.
 - E. juniper is fermented to make gin.

9. Double fertilization: ()
- A. is a feature of seed plants.
 - B. is the result of fusion between two sperm nuclei and an egg.
 - C. results in the development of nutrient tissue within some seeds.
 - D. occurs once within an ovary.
 - E. All the above are correct answers.
10. Fermentation is the process: ()
- A. by which rum is made from molasses.
 - B. of making simpler molecules from more complex ones often by the action of micro-organisms.
 - C. of separating compounds based on different boiling points.
 - D. compounds are separated based on different solubilities.
 - D. All of the above statements are true.
11. Which of these statements is true? The domestication of grains occurred in the centres of origin: ()
- A. corn from Mexico.
 - B. wheat from the Far East.
 - C. rice from the Near East.
 - D. barley from South America
 - E. all of the above are true.
12. The spice trade to the east greatly declined with the collapse of the Roman Empire which took place: ()
- A. around 476 BCE (=BC).
 - B. around 476 CE (=AD).
 - C. in the 1490's.
 - D. around the same time as Marco Polo had his adventures in China.
 - E. about the same time that the Spanish “discovered” the new World.
13. Which statement is **false** about most domesticated plants: ()
- A. They are not genetically modified.
 - B. They often have reduced defenses against pests.
 - C. They are the consequence of human selection.
 - D. They are less able to withstand disease outbreaks than their wild ancestors.
 - E. All of the above statements are true.

14. The four families which contain members which are usually considered herbs/spices are: ()
- A. Lamiaceae, Apiaceae, Brassicaceae, and Liliaceae.
 - B. Lamiaceae, Apiaceae, Brassicaceae, and Poaceae.
 - C. Lamiaceae, Apiaceae, Brassicaceae, and Curcubitaceae.
 - D. Lamiaceae, Fabaceae, Apiaceae, and Brassicaceae
 - E. Lamiaceae, Fabaceae, Apiaceae, and Solanaceae.
15. White wine is made with: ()
- A. red grapes or green grapes.
 - B. green grapes only.
 - C. red grapes only.
 - D. skins of green grapes.
 - E. grape leaves.

PART B. Short Questions (50 marks total, 40 minutes total)

Restrict your answer to the space provided.

1. Give an example of an alkaloid, derived from a plant, which has medicinal qualities. Include the common and scientific name of the plant as well as the family to which it belongs and its place of origin. What ailment is this drug used to treat? (6 marks)

2. Name two crops that originated in Central America. Give the species name, common name and the family to which it belongs. Describe the part(s) of the plant we use. (5 marks)

3. (a) What is resin? Explain why resin is not used very often in foods? (5 marks)

(b) Give two examples of uses of plant resins. (2 marks)

4. (a) Explain why you would expect to find more fibres in angiosperm wood than in conifer wood. (3 marks)

(b) Distinguish between simple and complex tissues.
(2 mark)

5. (a) Explain the process of distillation. (5 marks)

(b) Name products made from the distillation of two different plants or plant products (you must include the name of the starting material in your answer). (2 marks)

6. (a) Explain the process of yeast fermentation; include starting material and products. (4 marks)

(b) Give two examples of yeast-fermented foods/beverages consumed by people. (2 marks)

7. Explain how *Agrobacterium* is used as a vector by humans to introduce foreign DNA into plants. (7 marks)

8. Give one example of a gene that has been introduced to a crop plant and describe how it is beneficial for that particular crop. (6 marks)

PART C. (15 marks each, 15 - 20 minutes each) Answer **three** of the following. Please indicate (by number) which you have done on the front cover of booklet.

1. Give the history and use of **one** of the following psychoactive plants: marijuana, coca shrub, or peyote cactus. Include the distribution (past and present) in your discussion.
2. Discuss how people have used plants for their basic needs in the past and present. Consider **one** of the following: food, clothing, transportation, and shelter.
3. Select a food plant of your choice. Describe its biology and discuss its importance as a food plant.
4. Discuss the positive and negative impacts of ergot alkaloids on society.
5. What role did the trade in slaves between Africa and North America play in the movement of plants? Give specific examples.
6. Outline what we know about the origin, early history, and migration of one of the following: coffee, corn, sweet potato, cabbage, tomato, or rice.
7. Define biodiversity. Why is maintaining biodiversity important? How have people influenced plant biodiversity (give examples)?
8. Describe a plant species that is poisonous, yet used medicinally. Discuss its historical use and therapeutic application.
9. Read Gept's paper. Explain how genetic engineering differs from conventional crop domestication and classical plant breeding. What similarities do they share?
10. Based on Steinberg's paper explain the history of association between the Mopan Maya and the cacao tree. Discuss the benefits and negative impacts of the development of cacao as a cash crop by the Maya.
11. What are the pros and cons of switching to plant-derived biofuels to reduce our reliance on oil. Consider environmental and human impacts.
12. Define ethnobotany. Discuss **one** of the following in terms of uses by First Nations Peoples of B.C.: food plants, medicinal plants, algae, cultivated plants, conifers, plants used for making nonfood items.
13. Read Merlin, 2003. Distinguish between the terms archaeology and paleoethnobotany. Explain the role of these areas to Merlin's conclusions about the use of psychoactive plants in the Near East. Select one plant featured in Merlin's paper and explain the type of data collected and what conclusions were drawn.
14. Was the Supreme Court of Canada's decision to uphold previous rulings warranted in the Percy Schmeiser vs. Monsanto case? Explain the charges and discuss the issues for and against the decision.
15. Explain the evolution of bread wheat (assume that bread wheat is the evolutionary product of two hybridization/non-disjunction episodes producing allopolyploids).