Student Name: _____

Student Number: _____

UNIVERSITY OF TORONTO
Faculty of Arts and Science

22 APRIL 2010 EXAMINATION

EVOLUTION & ADAPTATION
EEB214H1S

Duration - 3 hours
No Aids Allowed

9 pages total (possible 100 marks)

All Questions CAN be Answered in Essay OR Point Form

Please Use Back of Page if Necessary to Answer Questions

(7 MARKS) **1. Match the following terms (e.g., pepper moths------camoflauge):**

Bees & Ants	Mimicry
Cuckoo	Phylogenetic Tree
Whales & Penguins	Biohomogenization
Monarch Butterfly	Eusocial Species
Herbivores	Convergent Evolution
GMO(s)	Brood Parasite
Molecular Clock	Gut Symbionts

(6 MARKS) **2. Mark the following statements either TRUE or FALSE.**

_____ The Viceroy butterfly is a good example of Mullerian mimicry.

_____ Leaves have more nitrogen available to consumers than dead animal carcasses.

_____ Parasites are less common in social rather than solitary animal species.

_____ Compared to other metabolic requirements, the majority of a carnivore's energy budget is taken up by respiration.

_____ Insects represent the greatest biomass of all living organisms in the world.

_____ The intensity of sexual selection is greatest in polygamous mating systems.

(5 MARKS) **3. On the back of the notebook in which Darwin kept his thoughts on the evolution of species he jotted *"Nothing for any purpose"*. Briefly, discuss the significance of this quotation.**

(6 MARKS) **4. Briefly characterize the <u>contribution of each</u> of the following as it pertained to the development of Darwin and Wallace's theory of evolution by natural selection:**

a) Jean Lamarck:

b) Charles Lyell:

c) Gregor Mendel:

(8 MARKS) **5. Briefly explain <u>ANY TWO</u> of the following theories, providing a specific example that clearly explains each:**

a) Red Queen Hypothesis
b) Hamilton's Kin Selection Theory
c) Resource Tracking Hypothesis
d) Batesian Gradient Theory
e) Fisher's Hypothesis
f) The Handicap Principle

(4 MARKS) **6. What is meant by *BIODIVERSITY* and how has it arisen?**

(5 MARKS) **7. If natural selection favours behaviours and reproductive strategies that maximize individual reproductive success, then briefly explain under what conditions might an individual forego the opportunity to reproduce itself.**

(7 MARKS) **8. What is meant by *SEXUAL CONFLICT*? Give one specific example <u>for each sex</u> (use a different species example for each sex).**

(3 MARKS) **9. *CANNIBALISM* has evolved periodically in the animal kingdom as a successful strategy. Give one example that explains under what conditions such an adaptation would be favoured.**

(6 MARKS) **10. What is meant by *PARENTAL-OFFSPRING CONFLICT*? Explain briefly using specific examples to illustrate your points.**

(12 MARKS) **11. Compare and contrast <u>ONLY TWO</u> of the following pairs of terms, providing a specific example for each:**

a. Batesian Mimcry vs Mullerian Mimcry
b. Parasitoid vs Parasite
c. Convergent Evolution vs Competitive Release
d. Selective Breeding vs Genetic Engineering
e. Phenotype vs Genotype

(7 MARKS) 12. ***Evolution has led to many examples of two animals sharing or cooperating in attaining one or more of their life goals. Two broad categories recognized are: MUTUALISM & SOCIALITY.*** **Choose ONLY ONE of these categories, define, and using a specific example, discuss in terms of morphological, physiological, and/or behavioural adaptations that have evolved to achieve this cooperation.**

(4 MARKS) **13. Using an example, define what is meant by an *EVOLUTIONARY ARMS RACE*?**

(10 MARKS) **14.** ***Predators have evolved highly efficient adaptations to optimize their feeding success.*** **In essay or point form, explain why potential prey remain so abundant.**

(10 MARKS) **15. Answer ONLY ONE of the following questions in essay or point form:**

a) In what way have we humans become a component of (Darwin's) natural selection in the evolution of animals? Use examples where possible to explain.

OR

b) Describe the evolutionary costs and benefits for animals that feed on plants. Using examples, outline traits that herbivorous animals have evolved to overcome the obstacles.