**Biology 3201**

**Unit 4: Evolutionary Change: Historical Perspective**: Last Biology Sheet :)

Chapters 19-21

1. Define the terms evolution, adaptation and variation.(P. 644)
2. Use the Peppered Moth story as an example of evolution and adaptation. (644-646)
3. Explain the process of natural selection and artificial selection. (647)
4. What were the contributions of the following people?

A. Charles Lyell (655)

B. Thomas Mathus (656)

C. Alfred Wallace (650)

D. Jean Baptiste Lamarck (651)

E. Georges Cuvier (650)

1. Describe the theories put forth by Lamarck and Darwin. (651-55)
2. Why was Darwin unable to account for the mechanism of inheritance of traits in his theory? (656)
3. Draw a timeline illustrating how early life forms evolved to the organisms we currently see on earth. Include the appearance of: (660-61)

- single cells

- marine worms

- clams

- fish

- dinosaurs

- small mammals

- modern mammals (humans)

1. Discuss the relationship between the relative age of rock sediments and the relative age of fossils contained within the rock layers. (662?)
2. Compare the processes and accuracy of the methods of dating fossils. Include: (662)

A. relative dating

B. absolute dating

1. Perform calculations involving half-life (to be provided)
2. Evaluate current evidence that supports the modern theory of evolution. Include

A. fossil record (659)

B. biogeography (663)

C. comparative anatomy (homologous structures, analogous structures, and vestigial structures) (664-65)

D. comparative embryology (665)

E. heredity (666)

F. molecular biology (666)

1. How did the work of Mendel and the idea of mutations support Darwins theory? (674-75)
2. What is the modern theory of evolution and what is its importance to biological sciences? (675)
3. Define population genetics, gene pool, allele frequency.
4. State the Hardy-Weinberg law and explain its significance in terms of the development of evolutionary theories. (681-83)
5. Perform calculations involving Hardy-Weinberg equilibrium (to be provided)
6. Describe conditions that have the potential to disrupt Hardy-Weinberg equilibrium:

A. mutations (688)

B. genetic drift (bottleneck effect and founder effect) (689-91)

C. gene flow (692)

D. non-random mating (inbreeding, assortive mating) (692)

E. natural selection (stabilizing selection, directional selection, disruption selection) (693)

F. sexual selection (695)

1. Define speciation. (709)
2. Describe transformation and divergence and how these paths may lead to the formation of a new species. (708)
3. Explain the conditions under which speciation may occur. (709, 716)
4. Demonstrate how biological barriers to reproduction may contribute to speciation. Include:

A. pre-zygotic barriers (709-710)

 behavioural isolation

 habitat isolation

 temporal isolation

 mechanical isolation

 gametric isolation

B. post-zygotic barriers (710)

 hybrid inviability

 hybrid sterility

 hybrid breakdown

1. Evaluate adaptive radiation as a mechanism for speciation. (720)
2. Explain convergent and divergent evolution and justify its occurrence in certain groups of organisms (721)
3. Explain the process of coevolution (722)
4. Compare the views on gradualism and punctuated equilibrium and discuss how evidence for evolution fuels the debate between them (Gould and Elderidge). (723-725)
5. What is the evidence for the origin and development of organisms on earth according to the following theories:

A. chemical evolution (Oparin-Haldane thoery and Miller-Urey theory) (727)

B. panspermia theory (728)

C. GAIA theory (728)

D. intelligent design theory (729)

E. heterotroph hypothesis (729)

F. symbiogenesis (729)