

Name: _____
Student No: _____

**BIO 2135 - Animal Form and Function
Final Examination
Worth 35 % of the final grade**

April 29, 2008

- a) Place your name and student number in the space provided below. Be sure that your name, or student number, is on the top of each page.
- b) Check to be sure that you exam is complete with a total of 19 pages including this one
- c) Answer all questions in the space provided on the exam. Do not transfer answers to the back of the page.
- d) Answer the essay question at the end of the exam in the examination booklet that has been provided. Be sure that your name and student number is on the cover of the examination booklet. Double spaced please!
- e) The exam is marked out of 170 points
- f) This is not an open book exam.

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30pts Part 1. Briefly explain what each of the following biological terms means. Where possible include an example in your explanation from a group or an organism to which the term applies.

Stomochord

Placoid scale

Lateral line

Kingdom Animalia

Aortic arches

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Jugular vein

Heterocercal tail

Dual circulatory system

Tetrapoda

Endoskeleton

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40 pts Part 2: Answer each of the following multiple choice questions by placing an X in the space to the left of the correct choice. There is only one correct answer for each question and questions have either 4 or 5 answers to choose from. **Be sure your X doesn't cross over two answers – if it does the question will be scored as 0.**

2.1. Catabolism of lipids begins with the hydrolysis of

- _____ a. glycerol
- _____ b. fatty acids
- _____ c. glyceraldehydes
- _____ d. triglycerides
- _____ e. glucose phosphate

2.2 Specializations of the digestive tract of most herbivores reflect the difficulty of digesting foods rich in

- _____ a. plant protein.
- _____ b. carotene.
- _____ c. bacteria.
- _____ d. cellulose.
- _____ e. phytolipids.

2.3. Flow of water over fish gills maintains a concentration gradient (of gases) between the blood and the water over the length of the capillary bed; this is referred to as a _____ mechanism.

- _____ a. osmotic
- _____ b. passive
- _____ c. countercurrent
- _____ d. active
- _____ e. exchange

2.4. The structure responsible for color and color changes in reptile and amphibian skin are

- _____ a. mucous glands.
- _____ b. warts.
- _____ c. keratins.
- _____ d. pigment glands.
- _____ e. chromatophores.

2.5. A vertebrate class that produces amniotic eggs is

- _____ a. Myxini.
- _____ b. Cephalaspidomorpha.
- _____ c. Osteichthyes.
- _____ d. Amphibia.
- _____ e. Reptilia.

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2.6. Marine fishes excrete excess sodium and chloride mainly by means of

- _____ a. the cloaca
- _____ b. the gills
- _____ c. the metanephridium
- _____ d. the protonephridium
- _____ e. the kidneys

2.7. Which of the following is the reason that birds don't usually eat leafy vegetative materials

- _____ a. They don't like the taste
- _____ b. It's not available in all habitats
- _____ c. It's too low in calories
- _____ d. They can't chew it because they haven't any teeth

2.8. The part of the bird feather that emerges from the follicle is known as the

- _____ a. Quill
- _____ b. Vane
- _____ c. Barb
- _____ d. Barbule

2.9 Which of the following features of birds is not an adaptation for flight?

- _____ a. endothermy
- _____ b. modified hind limbs
- _____ c. high metabolic rate
- _____ d. bones with numerous air spaces
- _____ e. feathers

2.10. Which of the following statements about hair is true?

- _____ a. It is homologous to feathers
- _____ b. It is a dermal structure
- _____ c. It is found in all mammals
- _____ d. It is found in all endotherms

2.11. The number of chambers in the amphibian heart is

- _____ a. 1.
- _____ b. 2.
- _____ c. 3.
- _____ d. 4.
- _____ e. 5

2.12. Birds are capable of flight because they have

- _____ a. Wings and a lightweight skeleton
- _____ b. Highly efficient respiratory and digestive system
- _____ c. A high-pressure circulatory system and well developed nervous and sensory systems
- _____ d. All of these.

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13. To be able to breathe across their skin the skin of an amphibian is

- _____ a. Moist and covered with scales
- _____ b. Dry and highly vascularised
- _____ c. Moist and highly vascularised
- _____ d. Dry and covered in scales

2.14 Which of the following is not a mammalian characteristic?

- _____ a. heterodont dentition
- _____ b. diaphragm
- _____ c. three middle-ear ossicles
- _____ d. mucous glands in the skin
- _____ e. four chambered heart

2.15. When the oxygen supply to skeletal muscle is insufficient, muscle cells convert pyruvate to lactate, allowing _____ to continue as long as glucose is present.

- _____ a. oxidative phosphorylation
- _____ b. oxidative respiration
- _____ c. facilitated phosphorylation
- _____ d. glycolysis
- _____ e. facultative aerobiosis

2.16. The evolutionary contribution of amphibians to life on land was the development of

- _____ a. the amniotic egg and shell.
- _____ b. lungs and limbs.
- _____ c. a watertight skin.
- _____ d. a life cycle independent of a need for water to breed.
- _____ e. All of the above are amphibian "innovations."

2.17. What change(s) does an animal that moves from water to land have to accommodate?

- _____ a. change in oxygen content
- _____ b. regulation of body temperature in a more extreme environment
- _____ c. wider diversity of habitats
- _____ d. about 1000 times less buoyant density and 50 time less viscosity
- _____ e. All of the above are challenges of life out of water

2.18. The nitrogenous waste produced by amphibians that spend time on land is

- _____ a. creatine.
- _____ b. uric acid.
- _____ c. guanine.
- _____ d. ammonia.
- _____ e. urea.

2.19. The urostyle of the frog skeleton represents

- _____ a. a backward extension of the cranium.
- _____ b. several fused caudal vertebrae.
- _____ c. a relocation and fusion of the "missing" ribs.
- _____ d. a newly evolved feature of anurans.
- _____ e. an enigmatic structure of unknown origin.

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2.20. Insects, reptiles and birds produce _____ as their primary nitrogenous waste.

- a. uric acid
- b. creatine
- c. ammonia
- d. urea
- e. methylamine

2.21. The degrading processes of metabolism are called

- a. heterometabolism
- b. anabolism
- c. cannibalism
- d. catabolism
- e. embolism

2.22. Animals that can tolerate a broad range of salinities are called

- a. osmoconformers
- b. osmoregulators
- c. euryhaline
- d. stenohaline
- e. marine

2.23. Blood pressure in the capillaries forces a protein-free filtrate out of the

- a. glomerulus.
- b. proximal tubule.
- c. loop of Henle.
- d. distal tubule.
- e. renal pelvis.

2.24. Fishes regulate buoyancy by precisely regulating the volume of gas in the

- a. stomach.
- b. gills.
- c. body tissues.
- d. pyloric cecum.
- e. swim bladder.

2.25. Excretion in an acorn worm involves a series of blood sinuses called the

- a. flame bulb.
- b. nephridium.
- c. renal corpuscle.
- d. kidney.
- e. glomerulus.

2.26. Food trapped on the inner surface of the pharyngeal basket of a tunicate is passed to this structure before moving into the digestive system

- a. Urostyle
- b. Stomochord
- c. Endostyle
- d. Prosostyle

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2.27. The development of limbs probably helped the first amphibians in

- _____ a. Finding mates
- _____ b. Running on land
- _____ c. Swimming
- _____ d. Moving between bodies of water

2.28. One of the most important co-enzymes in a cell is the electron acceptor called

- _____ a. FAD-
- _____ b. ATP
- _____ c. NAD+
- _____ d. GAF-
- _____ e. ADP

2.29 Osmoregulation is a major function of kidneys and _____ in fishes.

- _____ a. skin
- _____ b. rectal glands
- _____ c. hepatic caecae
- _____ d. gills
- _____ e. fins

2.30. The mechanism whereby buoyancy is achieved in different kinds of boney fishes is

- _____ a. through the presence of a large, oily liver when a swim bladder is not present.
- _____ b. through the presence of a swim bladder that is kept filled as the fish periodically swims to the surface and gulps air.
- _____ c. through the presence of a swim bladder

2.31. Reptiles are a paraphyletic group because

- _____ a. They do not have a common ancestor.
- _____ b. They have a common ancestor.
- _____ c. They do not include all the descendents of the common ancestor.
- _____ d. They include all the descendents of the common ancestor.

2.32 Mammalian teeth specialized for catching, killing, or tearing prey are

- _____ a. incisors.
- _____ b. maxillaries.
- _____ c. canines.
- _____ d. molars.
- _____ e. premolars.

2.33. Like the Chordata, the Hemichordata possess a:

- _____ a. Buccal diverticulum.
- _____ b. Notochord.
- _____ c. Dorsal nerve cord.
- _____ e. Cranium.
- _____ f. Closed circulatory system

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2.34. Some cartilaginous and bony fishes such as the tuna, maintain water flow over the gills by holding the mouth open. This is called _____ ventilation.

- _____ a. buccal
- _____ b. pneumatic
- _____ c. costal
- _____ d. active
- _____ e. ram

2.35. Tubular nerve cord and pharyngeal gill slits are considered to be evidence of evolutionary ties between _____ and chordates.

- _____ a. echiurans
- _____ b. echinoderms
- _____ c. phoronids
- _____ d. sipunculans
- _____ e. hemichordates

2.36. The intercostal muscles are attached to

- _____ a. Femur
- _____ b. Tibia
- _____ c. Ribs
- _____ d. Appendicular skeleton
- _____ e. None of these

2.37. The three carbon glucose fragments resulting from glycolysis are called

- _____ a. glycerol
- _____ b. pyruvate
- _____ c. nicotinamide
- _____ d. triglyceride
- _____ e. phosphoglyceraldehyde

2.38. An electron stripping process called _____ oxidizes food molecules to obtain energy

- _____ a. oxidative chemiosmosis
- _____ b. cellular respiration
- _____ c. photosynthesis
- _____ d. thermogenesis
- _____ e. glycolysis

2.39. On cool mornings a bumblebee warms up its flight muscles by means of

- _____ a. basking
- _____ b. shivering
- _____ c. countercurrent exchange
- _____ d. vasodilation
- _____ e. convection

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2.40. _____ glands are functional in female mammals and are present, but nonfunctional, in males.

- _____ a. Sudoriferous
- _____ b. Apocrine
- _____ c. Sebaceous
- _____ d. Mammary
- _____ e. Eccrine

40 pts Part 3: Fill in the missing word, or provide the one word answer in the space provided at the end of the sentence. If the line is missing, add it.

3.1. The protons pumped by the electron transport system can only cross the membrane by passing through this enzyme embedded in the membrane. _____

3.2. The dorsal part of a turtle's shell is the _____ .

3.3. Myomeres are blocks of this. _____

3.4. The amnion, chorion and allantois are the _____ membranes of the amniote egg.

3.5. Most of the living animals and this vertebrate group have two openings in the skull to accommodate the jaw muscles. _____

3.6. Life's process are regulated and kept in balance, a biological process referred to as this. _____

3.7. Number of chambers in a bird's heart. _____

3.8. In a bird ingested food is stored here before it is digested. _____

3.9. Instead of the lungs expanding and contracting in birds it is these that do that. _____

3.10. Mammalian taxonomists spend a lot of time looking at mammal jaws and these when dividing the class into different taxa. _____

3.11. The number of chambers in a shark's heart. _____

3.12. The bones of birds are hollow and filled with air and referred to this type of bone. _____

3.13. The main respiratory surface in most amphibians. _____

3.14. This is the energy that you need to provide to get a reaction started. _____

3.15. The presence of fore and hind limbs identifies amphibians and all the vertebrates to follow as this group of animals. _____

3.16. These muscles help to ventilate reptile lungs. _____

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- 3.17. To warm up reptiles often bask in the sun because they are _____ and can't generate their own body heat.
- 3.18. This valve in the ventricle of an amphibian heart separates blood flow from the two parts of the circulatory system. _____
- 3.19. Animals that obtain most of their body heat from external sources rather than their own metabolism are called _____
- 3.20. These secretions of the sebaceous gland help maintain the hair of mammals. _____
- 3.21. Animals can tolerate, and function in a wide range of temperatures without experiencing problems. _____
- 3.22. Mitochondrial location of the cyclic part of respiration. _____
- 3.23. The most anterior pair of fins on the side of a shark are these fins. _____
- 3.24. Tunicates (Urochordates) trap food in mucous secreted by a groove called the _____.
- 3.25. Water moves through the gill slits into this space before leaving the lancelet (Amphioxus). _____
- 3.26. Although a shark doesn't have a large stomach they do have this special structure that slows the passage of food and increases the surface area of the gut. (2 words) _____
- 3.27. This type of mammal carries its young in a pouch. _____
- 3.28. This doesn't have the highest energy level that its triphosphate counterpart has, but cells can still use it. _____
- 3.29. The skeleton of a shark is made of this material. _____
- 3.30. These feathers insulate a bird. _____
- 3.31. The number of sets of teeth that diphyodont mammals have. _____
- 3.32. Slits in this are one of the chordate characteristics. _____
- 3.33. The formal name given to the jawless fish. _____
- 3.34. An adult tunicate (urochordate) has this type of existence. _____
- 3.35. Reptiles that lack temporal openings and arches on the skull are called _____

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3.36. If energy is absorbed in a chemical reaction this reaction is of this type. _____

3.37. Enzymes act as these, and speed up the reactions making it easier for the reaction to happen.

3.38. Another way of describing post anal segmentation. _____

3.39. The sharp edges of these mammalian teeth make them ideal for cutting and biting. _____

3.40. Like feathers, these help insulate mammals and are a diagnostic character of this vertebrate class. _____

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30 pts Part 5: Answer 6 of the following 10 questions in the space provided:

5.1 What is a hydrostatic skeleton? Use two examples to show how it is used for locomotion

5.2 What are the differences and similarities between intracellular digestion and extracellular digestion?

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5.3 Compare the circulatory system of a bony fish and a bird.

5.4 What is counter current exchange and give two biological example of how it works?

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5.5 Why is the skin of an amphibian suited for the way these animals live?

5.6 Describe how a bird ventilates its lungs

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5.7 What are the main parts of the vertebrate digestive system and what are their respective functions

5.8 Animals can regulate their body temperatures by controlling heat loss and gain. What are the different ways that they do that?

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5.9 Briefly describe what happens in the intermembrane space of mitochondria.

5.10 What is the difference between complete and incomplete metamorphosis in insects? Is there any advantage of one over the other?

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20 pts Part 7: Answer the essay question in the examination booklet that has been provided.

Please Write double spaced please, its much easier to read (Thanks)!

HINT: You may find it advantageous to organise your thoughts in point form using the first page of your examination booklet

Osmoregulation and excretion are closely related processes in animals and where an animal lives often affects how it can carry out these processes. Using an example organism from each of the three categories compare excretion and osmoregulation processes paying attention to the structures involved and the nature of the metabolic waste that is excreted.

- A) An acoelomate organism
- B) A terrestrial protostome
- C) A marine deuterostome