

Name: _____
Student No: _____

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

April 26, 2010

- 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 21 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 175 points
- f) This is not an open book exam.

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45pts 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.

Kingdom Animalia

Ommatidium

Glomerulus

Madreporite

Notocord

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Gill rakers

Ram ventilation

Iliac vein

Posterior vena cava

Opercular gill

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Amniota

Urostyle

Sauropsida

Heterodont

Diphyodont teeth

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35 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 The major excretory product of most mammals is

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

2.2 In sea stars, thin folds of the body wall that function in respiration are called

- _____ a. filamentous gills.
- _____ b. ctenidia.
- _____ c. Polian vesicles.
- _____ d. book gills.
- _____ e. dermal branchiae.

2.3 The adaptive radiation of early mammals was due to

- _____ a. their homeothermic advantage.
- _____ b. their metabolic efficiency that allowed lower food consumption per unit of body mass.
- _____ c. the independence of their young.
- _____ d. the extinction of many competing amniote groups at the end of the Cretaceous 65 million years ago.

2.4 Muscles called _____ are responsible for making hairs stand on end.

- _____ a. follicular erectors
- _____ b. pelage adductors
- _____ c. pelage abductors \
- _____ d. vibrissal erectors
- _____ e. arrector pili

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2.5 The original function of the water vascular system of echinoderms was probably

- _____ a. locomotion.
- _____ b. feeding.
- _____ c. excretion.
- _____ d. respiration.
- _____ e. circulation.

2.6 All chordates have

- _____ a. a single, dorsal, tubular, nerve cord.
- _____ b. a ventral heart.
- _____ c. pharyngeal slits.
- _____ d. a postanal tail at some stage.
- _____ e. All of the above are chordate features.

2.7 The endostyle of invertebrate chordates may have been the precursor to the vertebrate

- _____ a. gall bladder.
- _____ b. liver.
- _____ c. thyroid gland.
- _____ d. pancreas.
- _____ e. esophagus.

2.8 The functional excretory organs of adult reptiles, birds and mammals is called

- _____ a. protonephridia.
- _____ b. green glands.
- _____ c. metanephric kidneys.
- _____ d. Malpighian glands.
- _____ e. flame bulbs.

2.9 Bony fishes belong to the vertebrate class

- _____ a. Cephalaspidomorphi.
- _____ b. Elasmobranchi.
- _____ c. Osteichthyes.
- _____ d. Chondrichthyes.
- _____ e. Myxini.

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2.10 In the epidermis of fish skin there are sensory pits that may be used for detecting water currents; these pits comprise the

- _____ a. utriculi.
- _____ b. pneumatic pits.
- _____ c. lateral line system.
- _____ d. sacculi.
- _____ e. rete mirabile.

2.11 This sorts the food in a hemichordate acorn worm

- _____ a. Ciliary organ
- _____ b. Setal organ
- _____ c. Collar
- _____ d. Proboscis complex

2.12 The vertebral column of a bird has been modified so it is

- _____ a. much longer and more flexible.
- _____ b. springy and elastic to store energy for flight.
- _____ c. rigid with many vertebrae fused together.
- _____ d. broad to assist in aerodynamic lift.
- _____ e. no longer connected to the ribs.

2.13 Frogs inflate their lungs:

- _____ a. by swallowing air
- _____ b. contraction of a diaphragm
- _____ c. intercostal muscles attached to the ribs
- _____ d. Use a combination of A, B and C above
- _____ e. None of the above. All amphibians breath through their skin

2.14 A mammal that feeds on the flesh of another animal is called a/an

- _____ a. carnivore.
- _____ b. herbivore.
- _____ c. insectivore.
- _____ d. omnivore.
- _____ e. frogivore.

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2.15 The characteristic larvae of lampreys are called

_____ a. lancelets.

_____ b. tomaria.

_____ c. ammocoetes.

_____ d. tadpoles.

_____ e. tunicates.

2.16 Insect dominance is probably due to the evolution of

_____ a. flight.

_____ b. cephalization.

_____ c. the exoskeleton.

_____ d. metamerism.

_____ e. jointed appendages.

2.17 Chitin-lined tubules that deliver air directly to body tissues in many terrestrial arthropods are called

_____ a. lamellae.

_____ b. alveolar lungs.

_____ c. tracheae.

_____ d. book lungs.

_____ e. Malpighian tubules.

2.18 Reduction in competition between adult and larval arthropods is accomplished by

_____ a. asexual reproduction.

_____ b. regeneration.

_____ c. metamorphosis.

_____ d. ecdysis.

_____ e. parthenogenesis.

2.19 _____ are sensory structures that provide information regarding movement, vibrations of the substrate, and orientation with respect to gravity.

_____ a. Papillae

_____ b. Ommatidia

_____ c. Antennules

_____ d. Antennae

_____ e. Statocysts

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2.20 Which of the following best describes the ancestral appendages of the insect thorax

- _____ a. three pairs of legs and three pairs of wings
- _____ b. three pairs of legs and two pairs of wings
- _____ c. six legs and no wings
- _____ d. eight legs and no wings

2.21 The relationship between insects and flowers is

- _____ a. neutral, and of neither harm nor benefit.
- _____ b. a case of herbivores eating host plants.
- _____ c. co-evolution, with flowers evolving to attract insects and the insects adapting to pollinate flowers and harvest pollen and nectar.
- _____ d. Always harmful to the plants.

2.22 Toxic secretions in amphibians are frequently accompanied by

- _____ a. warning coloration.
- _____ b. warts and claws.
- _____ c. mimicry.
- _____ d. crypsis.

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

- _____ a. hirudins
- _____ b. echinoderms
- _____ c. hemichordates
- _____ d. cephalochordates

2.24 The most primitive of the early fishes were the

- _____ a. agnathans.
- _____ b. gnathostomes.
- _____ c. acanthodians.
- _____ d. lobe-finned fishes.
- _____ e. ray-finned fishes.

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2.25 A portion of the tubule system of their nephrons allows mammals to produce urine that is 2 to 22 times as concentrated as their blood. This part of the tubular system is called the

- _____ a. loop of Henle.
- _____ b. ureter.
- _____ c. urethra.
- _____ d. glomerulus.
- _____ e. Malpighian loop.

2.26 In amphibians, a _____ valve in the conus arteriosus or ventral aorta helps direct blood into pulmonary and systemic circuits.

- _____ a. bicuspid
- _____ b. tricuspid
- _____ c. mitral
- _____ d. semilunar
- _____ e. spiral

2.27 This part of the cuticle is the last layer added at the very end of the moult

- _____ a. Crosslinked exocuticle
- _____ b. Proteins of the epicuticle
- _____ c. the wax layer of the epicuticle
- _____ d. procuticle
- _____ e. endocuticle

2.28 Echinoderm radial symmetry is described as secondary because:

- _____ a. it appears only in the free-swimming larval stages
- _____ b. it is often modified into biradial or bilateral symmetry as in sea urchins and sea cucumbers
- _____ c. echinoderms do not have radially symmetric larvae
- _____ d. rather than an indefinite number of planes of symmetry there are only five.

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2.29 The ciliated groove that extends longitudinally along the midventral aspect of the pharynx in

cephalochordates is the

- _____ a. atrium.
- _____ b. midgut cecum.
- _____ c. cirrus.
- _____ d. endostyle.
- _____ e. myotome.

2.30 The names Chelicerata and Mandibulata have reference to

- _____ a. mouthparts.
- _____ b. genitalia.
- _____ c. locomotor appendages.
- _____ d. sensory appendages
- _____ e. internal anatomy

2.31 Embryologically, the echinoderm water vascular system originates as a modification of the

- _____ a. pyloric caecae.
- _____ b. dermal branchiae.
- _____ c. coelom.
- _____ d. Tiedemann bodies.
- _____ e. closed circulatory system

2.32 In many birds a diverticulum of the esophagus, the _____, can be used to store large quantities of food.

- _____ a. crop
- _____ b. pyloric cecum
- _____ c. duodenum
- _____ d. ventriculus
- _____ e. gizzard

2.33 Reproductively, all birds are

- _____ a. hermaphroditic.
- _____ b. oviparous.
- _____ c. viviparous.
- _____ d. parthenogenetic.
- _____ e. ovoviviparous.

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2.34 _____ glands are associated with hair follicles and secrete oil.

_____ a. Eccrine

_____ b. Sebaceous

_____ c. Sudoriferous

_____ d. Apocrine

_____ e. Musk

2.35 The muscular partition separating thoracic and abdominal cavities in the mammals is the

_____ a. diaphragm.

_____ b. costal partition. \

_____ c. rectus abdominus.

_____ d. visceral septum.

_____ e. interthoracic septum.

35 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 In placental mammals the embryo develop in this part of the female reproductive tract. _____

3.2 This bone, an addition to the axial skeleton of a frog, helps support and contain the internal organs. _____

3.3 To help grind up ingested food birds often swallow small stones that are used in this part of the digestive tract to break up ingested food. _____

3.4 One type of agnathan is the lamprey, the other is this. _____

3.5 The only type of fin found in a cephalochordate. _____

3.6 The Uniramia got their name from this type of arthropod appendage. _____

3.7 These feathers insulate a bird. _____

3.8 The cells that give a reptiles skin its apparent colors. _____

3.9 This membrane surrounds the embryo and all the other membranes found in a reptiles egg. _____

3.10 Although almost all insects have them now for locomotion, ancestrally they didn't. _____

3.11 The base of the feather that emerges from the follicle that forms it. _____

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- 3.12 This insect stage is found in only one of the two types of metamorphosis. _____
- 3.13 These teeth, which you would find in predatory mammals, are missing in an herbivore. _____
- 3.14 The mouthpart forms the top of the buccal cavity in an insect. _____
- 3.15 Another name for the supraesophageal ganglion of an insect. _____
- 3.16 Another term for egg-laying animals. _____
- 3.17 Position of the heart in chordates. _____
- 3.18 The number of tagma in an insect. _____
- 3.19 The sharp edges of these mammalian teeth make them ideal for cutting and biting. _____
- 3.20 The name of the body cavity that surrounds the internal organs in an echinoderm. _____
- 3.21 Without bilateral symmetry, we refer to the main surface opposite the mouth in echinoderms as this side of the animal. _____
- 3.22 Female insects store sperm from the male in this receptacle. _____
- 3.23 A bird's feather is analogous with these on mammals. _____
- 3.24 This, the larger of the two flight muscles in a bird, lowers the wing. _____
- 3.25 Nitrogenous wastes generated by a reptile embryo are stored here. _____
- 3.26 These on a sea star keep other animals settling on and attaching to its aboral surface, _____
- 3.27 In insects this is a package of sperm passed to the female. _____
- 3.28 This stomach in a sea star can be inverted to help them feed on captured prey. _____
- 3.29 The fins on the left side of the body are connected to those on the right by these. _____

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3.30 The calcareous plates that form the internal skeleton of an
echinoderm. _____

3.31 Like vertebrates, insects cover their eggs with this protective
surface. _____

3.32 Like all deuterostomes, echinoderms have this type of divided
coelom. _____

3.33 This gland produces the oils that birds use to maintain and lubricate
their feathers. _____

3.34 Another way of describing post anal segmentation. _____

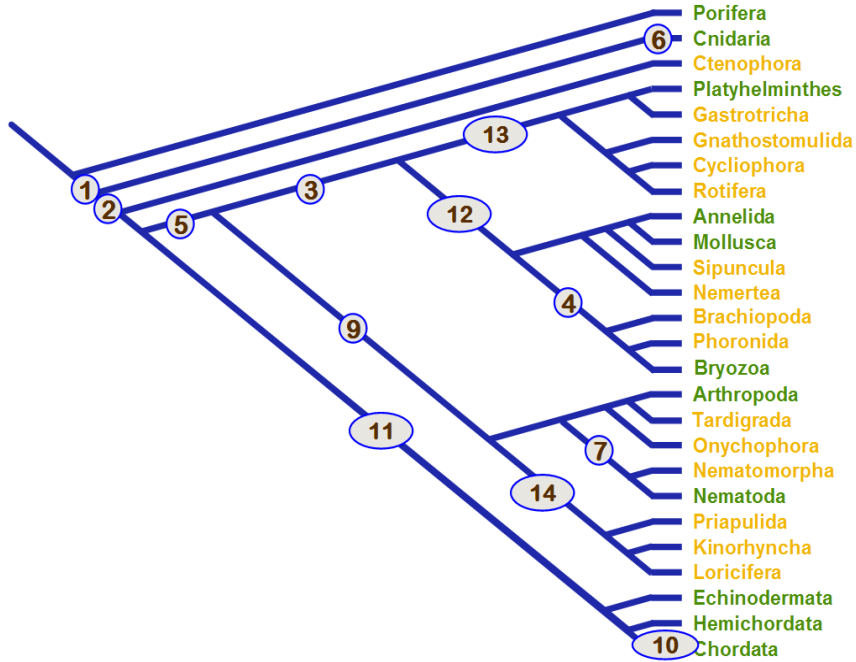
3.35 The skeleton of a shark is made of this material. _____

Question 4 starts on the next page

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10 pts Part 4 Complete the following table by placing the number on the cladogram or the information in the table.



Character #	Description
	Gap junctions between epithelial cells
2.	
3.	
	Lophophore and U shaped gut
9.	
	Blastopore becomes the mouth
10.	
	Collagenous cuticle, long but no circular muscles
11.	
6.	
12.	Lophotrochozoa: Either a lophophore or a trochophore larval stage

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

5.1 What are the functional and evolutionary differences between anapsid, diapsid and synapsid skulls?

5.2 Sea stars are often predators, what kind of prey do they feed on and how do they ingest and digest the food they capture?

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5.3 Describe how an insect filters metabolic wastes from its blood. What is the metabolic waste.

5.4 Ancestrally vertebrates had six aortic arches, this number decreases in the various classes. Briefly explain the changes that occur in cartilaginous fish, birds and mammals

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5.5 The adaptation of birds to flight involved modifications in both weight and power to fuel flight. Why were the two necessary and give one example of modifications that involve weight and another example for power.

5.5 Why are tunicates (Urochordates) so important in our understanding of the origins of the Chordata?

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5.7 What is the origin of the vertebrate nephron?

5.8 How is the frog's appendicular and axial skeleton modified for its unique form of locomotion.

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5.9 What is the importance of the hepatic and renal portal systems and just what is a portal system in animals that have both?

5.10 What is the difference between direct and indirect flight in insects, how does indirect flight work?

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20 pts Part 6: Answer the essay question in the examination booklet that has been provided.

Please Write double spaced.

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

Microphagy is feeding on very small particulate of food and is a common feeding strategy in many of the animals that we have looked at during the course. What are common problems animals encounter when the use this feeding strategy and how are they solved? Discuss this using two protostomes, one deuterostome and a parazoan in your answer.