Name: _____
Student No:_____

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

April 27, 2015

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 18 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 145 points

f) Please be sure that your seat number is on the exam and the examination booklet

g) This is not an open book exam.

Name: _____

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Seat number: _____

Name: _____
Student No:_____

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.

Kingdom Animalia

Paraphyletic taxon

Dermal branchia

Tiedmann bodies

Neural Crest

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Ammocoete larva

Heterocercal tail

Squalene

Faveolar lung

Syrinx

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35 pts Part 2: Answer each of the following multiple choice questions by placing and 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 This process is a series of abrupt structural, physiological, and behavioral changes that transform a larva into an adult.
_____ a. regeneration
_____ b. neoteny
_____ c. metamorphosis
_____ d. parthenogeny
_____ e. paedomorphosis

2.2 In reptiles, the teeth are uniformly conical and are referred to as
_____ a. apicodont.
_____ b. heterodont.
_____ c. conodont.
_____ d. homodont.
_____ e. thecodont.

2.3 The major excretory product of most mammals is
_____ a. ammonia.
_____ b. uric acid.
_____ c. guanine.
_____ d. creatine.
_____ e. urea.

2.4 This membrane produces the shell of a reptilian egg:
_____ a. amnion
_____ b. chorion
_____ c. allantois
_____ d. placenta
_____ e. none of these

2.5 Which of the following is not one of the characteristics seen in all chordates at some time in their life history?
_____ a. tubular nerve cord
_____ b. mouth developed from blastopore
_____ c. notochord
_____ d. pharyngeal gill slits
_____ e. postanal tail

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2.6 The major osmoregulatory problems of freshwater fishes are
_____ a. water loss and salt loss.
_____ b. water gain and salt loss.
_____ c. water gain and salt gain.
_____ d. water loss and salt gain.
_____ e. nonexistent because freshwater fishes are isosmotic to their environment.

2.7 The ray finned fishes belong to the class
_____ a. Gnathostomata.
_____ b. Chondrichthyes.
_____ c. Sarcopterygii.
_____ d. Agnatha.
_____ e. Actinopterygii.

2.8 This supportive rod that extends most of the length of the body of all chordates at some time in their life history.
_____ a. spinal column
_____ b. endostyle
_____ c. hemichord
_____ d. backbone
_____ e. notochord

2.9 Reptiles of this lineage had one opening in the temporal region of the skull.
_____ a. diapsid
_____ b. synapsid
_____ c. triapsid
_____ d. amphiapsid
_____ e. anapsid

2.10 The lancelet, Amphioxus, is supported during swimming and burrowing by its:
_____ a. vertebral column.
_____ b. myomeres.
_____ c. hydroskeleton.
_____ d. notochord.
_____ e. stomochord.

2.11 This vascular network secretes gases into the swim bladder.
_____ a. rete mirabile
_____ b. glomerulus
_____ c. vascular plexus
_____ d. lamella
_____ e. pneumatic duct

2.12 In their feeding habits, most adult amphibians are
_____ a. herbivores.
_____ b. carnivores.
_____ c. sanguinivores.
_____ d. frugivores.
_____ e. scavengers.

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2.13 Tubular nerve cord and pharyngeal gill slits are considered to be evidence of evolutionary ties between _____ and chordates.
_____ a. echiurans
_____ b. echinoderms
_____ c. lophophorates
_____ d. sipunculans
_____ e. hemichordates

2.14 The major secretory and absorptive structures of the sea star digestive system are the
_____ a. cardiac stomachs.
_____ b. rectal ceca.
_____ c. Polian vesicles.
_____ d. pyloric ceca.
_____ e. pyloric stomachs.

2.15 The structure responsible for color and color changes in amphibian skin are
_____ a. mucous glands.
_____ b. warts.
_____ c. keratins.
_____ d. pigment glands.
_____ e. chromatophores.

2.16 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.

2.17 This diapsid lineage included dinosaurs and many other extinct reptiles
_____ a. archosaurs
_____ b. lepidosaurs
_____ c. ichthyosaurs
_____ d. plesiosaurs
_____ e. theriosaurs

2.18 Larval amphibians are usually _____ in their feeding habits.
_____ a. sanguinivorous
_____ b. carnivorous
_____ c. herbivorous
_____ d. omnivorous
_____ e. insectivorous

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2.19 The ventral portion of a turtle shell is the
_____ a. dorsum.
_____ b. plastron.
_____ c. sternum.
_____ d. carapace.
_____ e. scute.

2.20 The first vertebrates to produce amniotic eggs were early members of the class
_____ a. Reptilia.
_____ b. Gnathostoma.
_____ c. Amphibia.
_____ d. Mammalia.
_____ e. Agnatha.

2.21 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.

2.22 Hagfish belong to the class
_____ a. Cephalaspidomorphi.
_____ b. Dipneusti.
_____ c. Holocephali.
_____ d. Myxini.
_____ e. Elasmobranchii.

2.23 Freshwater fishes move ions across the gills into the blood from the environment by
_____ a. simple diffusion.
_____ b. osmosis.
_____ c. active transport.
_____ d. facilitated diffusion.
_____ e. pinocytosis.

2.24 The propulsive mechanism of a fish is
_____ a. its trunk and tail musculature.
_____ b. movement of water into the mouth and forced out the gills.
_____ c. movement of the pectoral fins.
_____ d. movement of the pelvic fins.

2.25 Sea stars, sea urchins, and sea cucumbers belong to the phylum
_____ a. Echinodermata.
_____ b. Pogonophora.
_____ c. Echiura.
_____ d. Tardigrada.
_____ e. Phoronida.

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2.26 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

2.27 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 In their reproductive habits, the monotremes are
_____ a. parthenogenetic.
_____ b. oviparous.
_____ c. viviparous.
_____ d. ovoviparous.
_____ e. marsupian.

2.29 Birds are
_____ a. synapsids
_____ b. diapsids
_____ c. Anapsids
_____ d. Aviapsids

2.30 The amphibian lineage leading to reptiles, birds, and mammals is called the _____ lineage.
_____ a. tetrapods
_____ b. gnathostome
_____ c. nonamniote
_____ d. amniote
_____ e. agnathan

2.31 Modem adult echinoderms have a form of symmetry known as
_____ a. asymmetry.
_____ b. pentaradial.
_____ c. triradial.
_____ d. bilateral.
_____ e. trilateral.

2.32 Embryologically, the echinoderm water vascular system originates as a modification of the
_____ a. pyloric cecae.
_____ b. dermal branchiae.
_____ c. coelom.
_____ d. Tiedemann bodies.
_____ e. closed circulatory system

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2.33 The body regions of acornworms are _____, collar, and trunk.
_____ a. porosoma
_____ b. opisthosoma
_____ c. head
_____ d. cephalothorax
_____ e. proboscis

2.34 Excretion in hemichordates may involve a series of blood sinuses called the
_____ a. flame bulb.
_____ b. nephridium.
_____ c. renal corpuscle.
_____ d. kidney.
_____ e. glomerulus.

2.35 In frogs, long hind limbs and powerful muscles form an efficient _____ system for jumping.
_____ a. lever
_____ b. undulatory
_____ c. hydrostatic
_____ d. accordion
_____ e. pulley

PART 3 Starts on the next page

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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 Number of paired gill openings in a bony fish. _____

3.2 Name for the process that creates the neurotube-notochord-mesoderm complex in chordates. _____

3.3 This stance was the ultimate solution for resolving the conflict between locomotion and respiration in the diapsids. _____

3.4 If teeth are present in a ray-finned fish they are small and have this shape. _____

3.5 Number of ovaries in a bird. _____

3.6 In brittle stars the ossicles in the arms resemble these. _____

3.7 This and the tibia form the lower bones of the tetrapod hind limb. _____

3.8 The diaphragm muscle in a crocodile moves this internal organ to increase the volume of the thoracic cavity. _____

3.9 The appearance of radial symmetry in the echinoderms is referred to as this type of evolutionary event. _____

3.10 The only vertebrate taxon that still has a notochord in the adult stage. _____

3.11 The endostyle is located on this side of the pharyngeal basket of a cephalochordate. _____

3.12 Outer covering of an adult urochordate. _____

3.13 Frogs, caecilians, and these are the only living amphibians. _____

3.14 This creates the blood filtrate found inside the glomerulus of an acorn worm (Two words) _____

3.15 A shark's scales are formed from this layer of the integument. _____

3.16 Pharyngeal gill slits are not an autapomorphy for the Chordata. They are a symplesiomorphy shared with this phylum of animals. _____

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

3.18 The type of carbohydrate polymer contained in the tunic of a urochordate.

_____

3.19 The water vascular system is also called this type of system. _____

3.20 Another name for the digestive caeca found in the arms of a sea star; it's the same as the stomach to which they are attached. _____

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3.21 This part of the swim bladder removes gas from inside it and returns it to the blood (Two words). _____

3.22 Branchial arteries are also referred to as this type of arch. _____

3.23 What we're more likely to call the vibrissae, the sensory tactile hairs in mammals. _____

3.24 The number of paired limbs that tetrapod refers to. _____

3.25 The most primitive type of quadrate shaped scale found in the early fish. _____

3.26 The arms of a sea star are connected to this part of the animal (Two words) _____

3.27 Outer cells of the amphibian epidermis have this to strengthen them, but not so much that gas exchange is inhibited. _____

3.28 A valve inside this part of the amphibian heart shunts blood from the ventricle into either the pulmonary or systemic circuit (Two words) _____

3.29 Metabolism warms the bodies of mammals and birds. This term describes that type of heat. _____

3.30 Bones in these limbs transmit vibrations to the amphibian ear. _____

3.31 Modifications of the apocrine glands to nourish the young are one of the possible origins of these glands in mammals. _____

3.32 Number of chambers in a crocodile’s heart. _____

3.33 The ancestral echinoderms tube feet were originally used for this.

3.34 Large particles that are excluded from the digestive tract accumulate in the buccal cavity of a cephalochordate. To remove them the animal engages in this behaviour. _____

3.35 Embryological precursor of the chordate nerve cord. _____

PART 4 Starts on the next page

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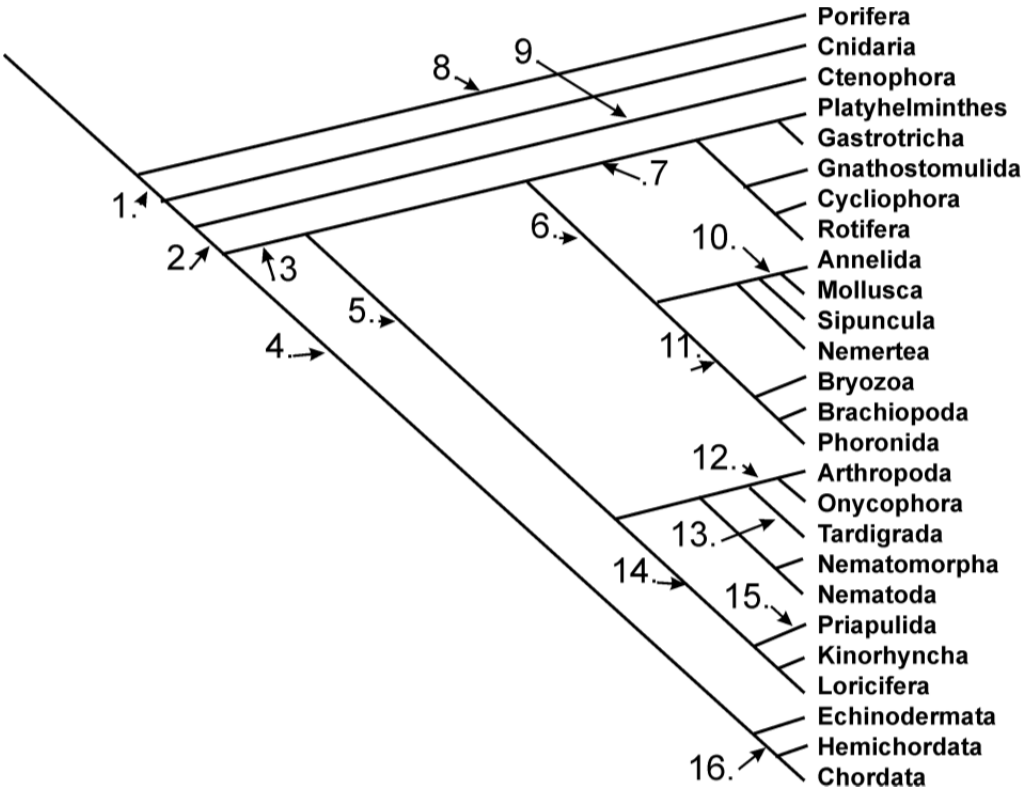
9 pts Part 4 Provide one apomorphy for 9 of the numbers shown on this cladogram. Be sure the number appears in the table.



Number	Apomorphy

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36 pts Part 5: Answer 6 of the following 10 questions in the space provided. Each is worth 6 points.

5.1 Changes in genomic content and complexity have been key events in the evolution of the Chordates. Give two examples.

5.2 What is a spiral valve, what does it do and who has one?

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5.3 Briefly describe the evolutionary origin of the nephron.

5.4 How does a starfish keep its aboral surface free of debris and other organisms.

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Student No:_____

5.5 Describe how a bird ventilates its lungs

5.6 What are the similarities and differences in the structure and function of protonephridia saccate metanephridia and metanephridia? Give an example of animals for each.

Name: _____
Student No:_____

5.7 What are the autapomorphies that define the Urochordates? Describe the biological role and function of two of them.

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

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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 a feather and how is its structure related to its importance for flight?

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20 pts Part 6: Answer the essay question in the examination booklet that has been provided. Please use both sides of the page and write double spaced, it's 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