Name: _____
Student No:_____

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

April 11, 2014

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 20 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 180 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.

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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

Glomerulus

Homodont

Gizzard

Endotherm

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Sister group

Tunicin

Mutable connective tissue

Pedicellarea

Eccrine glands

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30 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 One region of the sea star stomach, the _____, receives ingested food.
_____ a. gizzard
_____ b. crop
_____ c. cardiac stomach
_____ d. pylorus
_____ e. rectal cecum

2.2 Birds are thought to have descended from the ancient reptiles known as
_____ a. pterodactyls.
_____ b. saurentians.
_____ c. pterosaurs.
_____ d. archosaurs.
_____ e. plesiodactyls.

2.3 Interpretations of the life-style of the ancient bird Archaeopteryx have been important in the development of hypotheses on the
_____ a. origin of flight.
_____ b. appropriate reptilian ancestor for birds.
_____ c. appearance of light weight bones.
_____ d. development of amniotic eggs.
_____ e. origin of endothermy.

2.4 The functional excretory units in the kidneys of fishes are
_____ a. flame bulbs.
_____ b. nephridia.
_____ c. Malpighian tubules.
_____ d. green glands.
_____ e. nephrons.

2.5 Which of the following is not a chordate character:
_____ a. Ventral nerve cord
_____ b. Presence of a notochord
_____ c. Pharyngeal gill slits
_____ d. Hollow nerve cord
_____ a. A tail.

2.6 Ilium, ischium, and pubis comprise the _____ of tetrapods.
_____ a. hind limbs
_____ b. front limbs
_____ c. neck
_____ d. pectoral girdle
_____ e. pelvic girdle

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2.7 Bird eggs are hard because they are impregnated with
_____ a. Calcium
_____ b. Silica
_____ c. Phosphate
_____ d. Iron silicate

2.8 The posterior end of an adult tunicate is in the region of the
_____ a. siphuncle.
_____ b. oral siphon.
_____ c. atrial siphon.
_____ d. siphonoglyph.
_____ e. head.

2.9 Hagfishes
_____ a. are entirely freshwater animals.
_____ b. are parasitic.
_____ c. have a complex but well-researched reproductive cycle.
_____ d. generate enormous quantities of slime if disturbed.
_____ e. All of the above are correct.

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

2.11 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.

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

2.13 In diapsids, the excretion of _____, conserves water.
_____ a. urea
_____ b. ammonia
_____ c. creatine
_____ d. creatinine
_____ e. uric acid

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2.14 Ancient members of the _____ are thought to be ancestral to all vertebrates.
_____ a. Agnatha
_____ b. Tetrapoda
_____ c. Pisces
_____ d. Gnathostomata

2.15 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.

2.16 Some sharks and some 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

2.17 Mammals have all the following types of teeth except:
_____ a. Incisors
_____ b. Molars
_____ c. Dentaries
_____ d. Canines
_____ e. Premolars

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

2.19 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

2.20 In the acornworms, the anterior region of the digestive tract, which contains the gills, is the
_____ a. pharynx.
_____ b. esophagus.
_____ c. buccal cavity.
_____ d. atrium.
_____ e. stomach.

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2.21 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

2.22 Members of the amphibian order Anura, frogs, have the vertebrae fused into a rod-like
_____ a. pygidium.
_____ b. telson.
_____ c. uropod.
_____ d. urostyle.
_____ e. anal cirrus.

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 tunic of tunicates is composed of proteins, various salts, anda. glycoprotein.
_____ b. sclerotin.
_____ c. glycogen.
_____ d. cellulose.
_____ e. chitin.

2.25 The dorsal portion of a turtle shell is called the
_____ a. carapace.
_____ b. cephalothorax.
_____ c. plastron.
_____ d. sternum.
_____ e. dorsum.

2.26 Osmoregulation is a major function of kidneys and _____ in fishes.
_____ a. skin
_____ b. rectal glands
_____ c. hepatic cecae
_____ d. gills
_____ e. fins

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

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2.28 The perforated pharynx of chordates evolved as a device for
_____ a. Support
_____ b. Respiration
_____ c. Filter-feeding
_____ d. All of the above

2.29 The first (anterior-most) vertebra of an amphibian is
_____ a. thoracic.
_____ b. cervical.
_____ c. lumbar.
_____ d. cephalic.
_____ e. caudal.

2.30 The lancelet, Amphioxus, is supported during swimming and burrowing by its:
_____ a. Vertebral column.
_____ b. Myomeres.
_____ c. Hydroskeleton.
_____ d. Notochord.
_____ e. Axostyle.

PART 3 Starts on the next page

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44 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 This stomach connects to the digestive glands found in each of a sea star's arms. _____

3.2 These expand and contract when a bird breaths (Two words). _____

3.3 These mammalian glands are used for communication; they're especially large in skunks so that you can be sure to get the message. _____

3.4 Reptiles, birds and mammals are distinguished from fishes and amphibians in that their embryos develop in this fluid filled sac. _____

3.5 Blood in this vessel moves toward the front of a lancelet. _____

3.6 The secondary acoustic pathway in amphibians detects these sound frequencies. _____

3.7 The sternum of a bird is modified and this part modification provides the attachment surface for flight muscles. _____

3.8 This artery leaving the amphibian heart carries blood to the skin and lungs. _____

3.9 To warm up reptiles often bask in the sun because they are _____ and can't generate their own body heat.

3.10 Contraction of these muscles in the collar help anchor an acorn worm in its burrow. _____

3.11 Number of paired gill arches in a bony fish. _____

3.12 Tunicates trap food in mucous secreted by a groove called the _____.

3.13 The plate-like structures on the gill of a bony fish are where the gas exchange occurs. _____

3.14 This internal organ contains nutrients stores in amphibians (Two words). _____

3.15 Echinoderms have this special type of radial symmetry. _____

3.16 These feathers insulate a bird. _____

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

3.18 This is trapped on the inner surface of the mucus net the lines the pharyngeal cavity of early chordates. _____

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

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

3.21 In echinoderms, the blastopore ultimately forms this structure. _____

3.22 Blood flows through the gill arch of a bony fish in this direction. _____

3.23 Number of chambers in an agnathan's heart. _____

3.24 This, along with the intercostal muscles, help aerate the lungs of a mammal. _____

3.25 Birds descended from the _____- hipped dinosuars.

3.26 Type of symmetry seen in the larval stage of a cephalochordate. _____

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

3.28 Cilia on this organ create the water currents that bring food into the ammocoete's mouth. _____

3.29 The small diverticula, out-pockets of the gut wall, are found only in the digestive tract of the ray-finned fishes. They are an adaptation that increases the digestive surface area. _____

3.30 Describes the structure of the chordate nerve cord. _____

3.31 When it was discovered this fish was thought to be the link between fish and the first tetrapods - it turns out it isn't. _____

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

3.33 The only environment where you'll find a hemichordate. _____

3.34 After leaving the heart of a fish, blood flows first to these structures. _____

3.35 This term describes the body shape of a fish; it's the best one for moving through a dense medium such as water. _____

3.36 The ancestral food for amphibians was this group of animals and their feeding strategy is this.

_____

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3.37 Water enters the water vascular system through openings in this structure. _____

3.38 Relative to the surrounding sea water, the water in the water vascular system is this. _____

3.39 Birds and mammals have to maintain their body temperature at a fixed point with little or no variation. _____

3.40 Although you can't compress or stretch the notochord it will do this. _____

3.41 The extra loop in the amphibian circulatory system missing in fish. _____

3.42. The opening of the stomocord is connected to this structure in the acorn worm. _____

3.43 Birds make sounds using this. _____

3.44 Evolutionarily the presence of a cartilaginous skeleton in the Chondrichthyes is this type of trait. _____

PART 4 Starts on the next page

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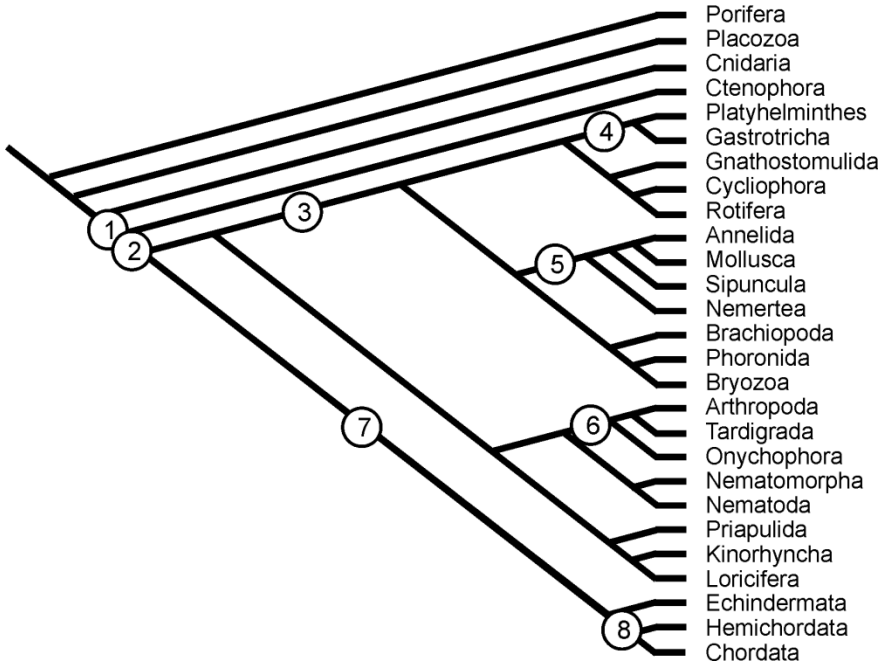
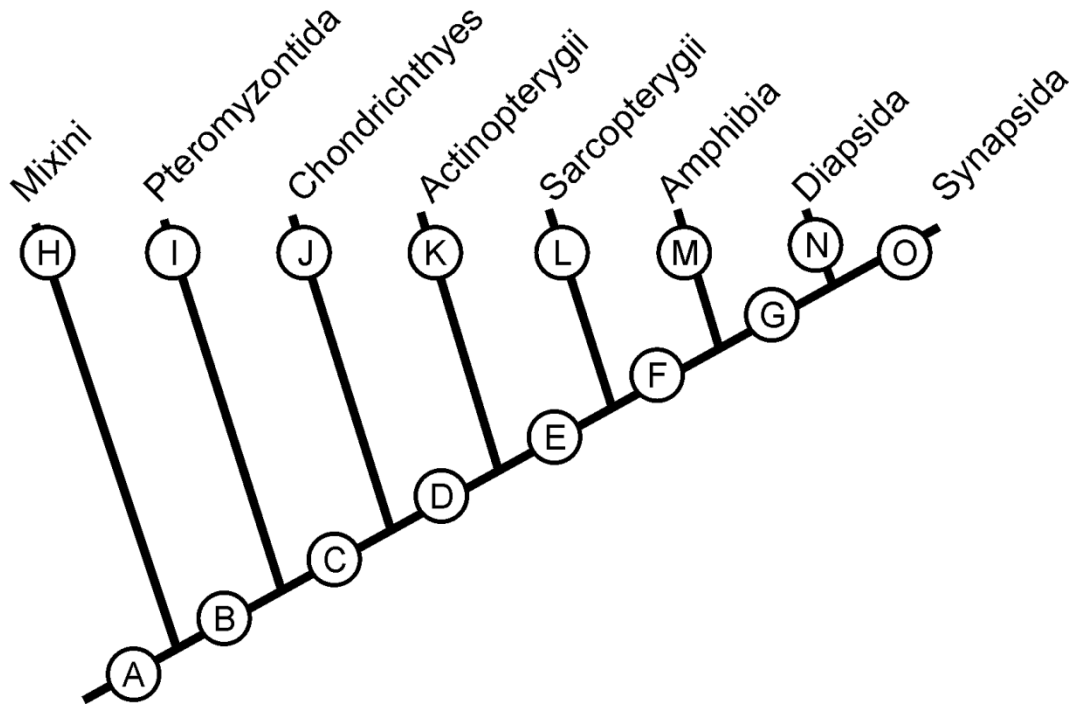
10 pts Part 4 Using the numbers shown on the cladogram describe 5 of the 8 indicated events that defined the evolution of the major animal groups. Be sure to enter the character number in the table.



Character #	Description

Name: _____
Student No:_____

10 pts Part 5 Using the letters shown on the vertebrate cladogram identify were the synapomorphies and autapomorphies in the table would be located. Be sure to enter the character letter in the table and a letter may be used more than once.



Letter		Letter	
	Paired fins		Faveolar lung
	Heterocercal tail		Swim bladder
	Horny keratinized teeth		Three pairs of barbels
	Pectoral and pelvic girdles		Costal ventilation
	Heterodont dentition		Neural crest cells

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36 pts Part 6: Answer 6 of the following 12 questions in the space provided. Each is worth 6 points. Do an extra question as a bonus and you could raise your marks by up to 6 points depending on how well you answer the extra question.

6.1Describe the ancestral Echinoderm and how it fed.

6.2 Describe how an acorn worm feeds

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6.3 What is a notochord, what group of animals has one and what does it do?

6.4 What is knotting behaviour, what group of animals do it and why is it important

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

6.6 The move on land created a problem that linked respiration and locomotion. What was the problem and how did the crocodiles resolve it?

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6.7 The feather was an important event in diapsid evolutionary history. Briefly describe the evolutionary sequence leading to the flight feather of birds.

6.8 Two different types of chordates have spiral valves. Who has them and what do they do in each?

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6.9 Why is the lung fish heart, which has only three chambers, ideally suited to its survival in and out of water?

6.10 How does a tube-foot work?

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6.11 A number of unique adaptations allowed the bony fish to be able to remain still (not always having to swim) in the aquatic environment. Describe them.

6.12 What is genome duplication, what animal group has undergone duplication and what was the advantage of doing so?

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20 pts Part 7: 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

All animals have to obtain oxygen and transport it to actively metabolizing tissues that require it. Using an example organism from each of the following four categories and compare oxygen acquisition and its transport in each of the animals you have chosen

A) A invertebrate marine deuterostome
B) A terrestrial deuterostome
C) A marine protostome
D) An terrestrial protostome