BIO 2135 - Animal Form and Function
Midterm examination
Worth either 10% or 15% of your final grade

Friday, March 14, 2014

a) Place your name and student number in the space provided below. Be sure that your name is on the top of each page because the exam **will** be separated to facilitate marking

b) Circle the lab section for your lab. This information is used to get the exam back to you

c) Check to be sure that your exam is complete with a total of 14 pages including this one

d) Answer all questions in the space provided on the exam. Do not transfer answers to the back of the page

e) The exam is out of 90 pts.

Name:_____

Student No:_____

Circle your lab section:

Tue: A1-BSC312, A5-BSC330.

Wed: A2-BSC312, A6-BSC330

Thu: A3-BSC312, A7-BSC330

Fri: A4-BSC312, A8-BSC330

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

Deuterocerebrum

{Second part of the Tripartite/three part brain}{In arthropods}{appendage is the antennae}{Lost in the chelicerates} and three for the full points

Extracorporeal digestion

{Digestion outside of the body}{digestive enzymes released onto the food before being ingested}{example spiders, Horse shoe crab, ticks and mites don't have extracorporeal so Chelicerata isn't a good answer.}

Ommatidium

{Basic unit/repeating unit of Compound eye} {forms a mosaic/pixel like image} {light focusing – lens crystalline cone} {light sensing Retinular cells/rhabdome}

Dart sac

{In snails/gastropods – no points for saying molluscs since it is not found throught the phylum}{inserted/stabbing into the other snail/between the snails}{Increases the likely hood that sperm from the snail delivering the dart will be transferred and used to fertilize eggs}{Part of the male reproductive system}

Gnathobasic mandible

{Base of the mandible is used to grind}{Charateristic/autopomorophy} of {Crustacea; Not arthropods since the other sub-phyla don't have one'} {distal end of the articulated leg is still present} any three for the full points

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Capitulum

{Anterior/front tagama}of a {tick}{appendages include the chelicera and pedipalps}

Spermatophore

{Sperm package passed from male to female}{protects the sperm inside from drying out in insects/for squid insures transfer to female opening inside mantle without release into water}{ex: Insects, squid}

23 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

2.1 The tough, leathery polysaccharide in the arthropod procuticle is

_____ a. lipoprotein.

_____ b. calcium carbonate.

_____ c. scleroprotein.

__X__ d. chitin.

_____ e. glycogen.

2.2 The excretory organs of a crayfish are called

_____ a. flame bulbs.

__X__ b. antennal glands.

_____ c. metanephridia.

_____ d. coxal glands.

_____ e. Malpighian tubules.

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2.3 The excretory organs of insects are

_____ a. protonephridia.

_____ b. renettes.

__X__ c. Malpighian tubules.

_____ d. metanephridia.

_____ e. coxal glands.

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

_____ a. Crosslinked exocucticle

_____ b. Proteins of the epicuticle

__X__ c. the wax layer of the epicuticle

_____ d. procuticle

_____ e. endocuticle

2.5 The dorsal lobe of a parapodium is called the:

_____ a. aciculum.

_____ b. neuropodium.

__X__ c. notopodium.

_____ d. cirrus.

_____ e. ctenidium.

2.6 The names Chelicerata and Mandibulata have reference to

__X__ a. mouthparts.

_____ b. genitalia.

_____ c. locomotor appendages.

_____ d. sensory appendages

_____ e. intemal anatomy

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2.7 In the earthworm, the typhlosole

_____ a. is the organ of locomotion.

__X__ b. increases the absorptive area of the gut.

_____ c. grinds the food.

_____ d. produces secretions during mating.

_____ e. coordinates the contractions of the digestive system.

2.8 In the cuticle of terrestrial arthropods all but which of the following is true

_____ a. the chitin and protein in the exocuticle are chemically cross linked to each other

__X__ b. waxes in the procuticle waterproof the whole cuticle

_____ c. moulting starts with apolysis

_____ d. the only living layer is the epidermis

_____ e. the endocuticle is recycled and used in producing the new cuticle.

2.9 The outer most layer of a nematode body is:

_____ a. ciliated epidermis

__X__ b. a noncellular cuticle

_____ c. a cellular cuticle

_____ d. a syncytial tegument

_____ e. a nonciliated epidermis

2.10 The circulatory system of an earthworms is:

_____ a. closed with hearts pumping blood to the anterior arteries and veins returning from the posterior.

_____ b. open with blood "washing" through the coelomic cavity.

_____ c. half closed with hearts pushing blood toward the head but washing posteriorly through an open cavity.

__X__ d. closed with dorsal and ventral blood vessels joined by five paired "hearts" forcing circulation flow dorsal-ventrally.

_____ e. absent and they rely solely on diffusion to absorb gases through the epidermis.

2.11 A distinctive feature of marine polychaete worms is the lateral extensions called

__X__ a. parapodia.

_____ b. setae.

_____ c. prostomi.

_____ d. palps.

_____ e. tentacles.

2.12 Segmental arrangements of body parts in an animal is called

__X__ a. metamerism.

_____ b. triploblastism.

_____ c. tagmatization.

_____ d. serialism.

_____ e. cephalization.

2.13 Reproductive females in a social insect colony are called

_____ a. drones.

__X__ b. queens.

_____ c. workers.

_____ d. mothers.

_____ e. ovigers.

2.14 The food of a crayfish is sorted according to size by setae in the:

_____ a. gastrolith

_____ b. hepatopancreas

__X__ c. gastric mill

_____ d. cardiac stomach

_____ e. pyloric stomach

2.15 The major nitrogenous waste excreted by insects is

_____ a. urea.

_____ b. ammonia.

_____ c. urine.

__X__ d. uric acid.

_____ e. guanine.

2.16 The rasping/grinding structure occurring in the mouth of most molluscs is the

_____ a. Tongue.

_____ b. nacre.

_____ c. odontophore.

_____ d. operculum.

__X__ e. radula.

2.17 What of the following are adaptations for a predatory life that are found in squids and other related molluscs

_____ a. loss, or reduction of the shell

_____ b. change from an open to a closed circulatory system

_____ c. extra hearts to help pump blood across the gills

_____ d. loss of cilia of the surface of the ctenidia

__X__ e. all of the above.

2.18 The gastropod larval stage in which torsion occurs is called the

_____ a. dipleurula.

_____ b. pilidium.

_____ c. Muller's larva.

__X__ d. veliger.

_____ e. trochophore.

2.19 One feature that is still found in all molluscs is a:

_____ a. a calcareous external shell

_____ b. a radula

_____ c. a ciliary-mucous mode of locomotion

_____ d. at least some degree of torsion

__X__ e. a mantle

2.20 The external openings of the respiratory system of insects are

_____ a. tracheae.

_____ b. malpighii.

__X__ c. spiracles.

_____ d. nephridiopores.

_____ e. tracheoles.

2.21 The first trunk appendages of centipedes are the _____, which function as poison claws.

__X__ a. maxillipeds

_____ b. chelipeds

_____ c. pereiopods

_____ d. pleopods

_____ e. uropods

2.22 The epicuticle is:

_____ a. primarily a physical barrier for an arthropod, providing strength for the exoskeleton

_____ b. forms the bulk of the arthropod cuticle

_____ c. protects parasitic nematodes from attack by their hosts defense systems

_____ d. acts a chemical barrier in all arthropods

__X__ e. prevents water loss in terrestrial arthropods

2.23 The water movement in the body of a cephalopod (squid for example) mollusc provides:

_____ a. oxygen for respiration

_____ b. jet power for rapid locomotion

_____ c. a way to carry wastes out of the body

__X__ d. all of these

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22 pts Part 3: Complete the following sentences using the appropriate terms. Place the term in the space in the sentence or at the end of the sentence.

3.1 The legs of the crayfish are used as an example of this type of homology. **Serial**

3.2 This opening is found in the telson of a crayfish. **Anus**

3.3 One of two mouthparts in an insect that has palps. **Labium/Maxilla**

3.4 In addition to their unique book lungs, spiders also use structures similar to insects to get air to their internal tissues. **Trachea/Trachioles**

3.5 The basic sugar unit of the complex carbohydrate found in insect procuticle. **Glucosamine**

3.6 Earthworms have no gills and instead rely on gas exchange across this. **Skin/epidermis/ Body wall**

3.7 In annelids, structures made from this embryonic tissue are not metamerically arranged. **Endoderm**

3.8 A terrestrial insect may swallow this to help escape from the old cuticle. **Air**

3.9 Once the food has been sorted in a mollusc, it passes into this gland to be biochemically broken down. **Digestive**

3.10 In this type of insect flight muscle, there is one nerve impulse for each contraction of the muscle. **Synchronous**

3.11 This fluid-filled cavity forms the hydrostatic skeleton of a nematode. **Pseudocoel**

3.12 The tongue of an insect. **Hypopharynx**

3.13 The supraesophageal ganglion of a worm is also called a this. **Brain**

3.14 The anterior tagma of a chelicerate. **Prosoma**

3.15 The radula in a mollusc sits on this cartilaginous tonguelike structure. **Odonotophore**

3.16 These structures are important in both locomotion and gas exchange in marine worms. **Parapodia**

3.17 These cells in a nematode are thought to be osmoregulatory. **Renette**

3.18 The name of the openings in the crustacean hearts. **Ostia**

3.19 The most anterior appendage in a chelicerate. **Chelicera**

3.20 The number of pairs of seminal vesicles in an earthworm. **Three**

3.21 Any part of the digestive tract involved in storing food prior to digestion; it's particularly large in leeches. **Crop**

3.22 This type of flight muscle is found in dragonflies and is the primitive arrangement of muscles used for flight. **Direct**

24 pts Part 4: Answer 4 of the following 9 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 fifth question.

4.1 What is a crystalline style, who has one and what does it do?

{Molluscs/clam/snail/gastropod – not squid}{solid rod inside style sac}{spins to wind in the mucous string of food}{grinds against gastric shield}{Releases enzymes to dissolve the mucous string}{a statement that it frees up the particulate food to be available for sorting/into digestive gland} Must have first and any five of the others to a maximum of 6 points

4.2 Briefly describe the structure of the shell of a generalized mollusc and how it is formed.

{formed by secretions of the mantle}{Grows at the edges and mention something about growth rings etc} {formed from calcium salts}three layers {Outer peristracum, organic/has protein/ Chonchin – protects the other layers}{Middle prismatic}{inner nacreous/mother of pearl layer} Must have name in the{} and either the location or function to get the full point. If only names given score 1 point only and not the full three points that were possible.

4.3 Compared to how the human body functions, and that of most animals, nematodes do things differently. Give three examples

Any of these three examples must have normal animal condition and what is weird in the nematodes to get the full points

A) Sperm mobility {In animals usually flagellum}{ for movement in nematodes is amoebic}
B) Body wall {In animals two muscle layers of circular and longitudinal}{ in nematodes there are only longitudinal muscles
C) Male reproductive system {in most animals there are paired testes}{ in nematodes there is only one
D) Muscle innervation {in most animals the nerve cord extends axons to innervate the muscles of the body wall}{ in nematodes extensions of the muscle cell extend to the nerve cord}

4.4 Describe the circulatory system of a polycheate (A marine worm like *Nereis*) and the path that blood follows as it moves through the worm' body?

Main types of vessels{closed system} {longitudinal on dorsal vessel moving blood to the front to the front} {Longitudinal ventral vessel moving blood posterior to the back} if both are mentioned but no the direction award one point{lateral connect ventral to dorsal/ventro-dorsal direction of flow}, {lateral pass through the gut picking up nutrients}{lateral in association with metanephridia to remove nitrogenous wastes}, {lateral extend into the parapodia were gas exchange occurs}

NOTE: Polycheates do not have aortic arches or hearts.

4.5 Explain how the honey bee worker's mouth parts have been modified to match its role in a honey bee colony

First: {manibulating the wax to build the combs/cells of the hive}{done by mandibles}
Second: {Collecting nectar}{central tounge from modified labium}{sheath of maxilla (galea) and labial palps surround it}{sheath closes around tounge and nectar is sucked up and into the mouth}

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

2 points definition of incomplete metamorphosis [{no pupal stage, adults} {and young look the same as adults} 2 pts definition of complete [{extra pupal/resting stage, adults and young don't look the same}] 2pts. {Advantage is for complete} – {adults don't compete with young for food}{transformation to adult is quicker in complete metamorphosis compared to slow development in incomplete}{larval stage can be food acquisition and adult reproductive only}.

4.7 What is a setal sorting field? What animal has one and what does it do? (Note there are no points for saying only that it sorts!)

{Setal hairs}{part of the gastric mill} {hairs made of cuticle – must identify that these are cuticle and NOT cilia} {sort suitable food from unsuitable}{sorts to send small/nutritious goes into the digestive gland}{and large/nonnutritious what goes to the intestine} {found in large crustacean (Not crustacea because it is not found in the zooplanktonic forms) crabs, crayfish/lobster/ shrimp all are suitable examples} Any six for the full 6 points

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4.8 How does an orb spider build its web; a web like the one we saw in class?

{Uses wind for first horizontal thread} {drops from center} {adds radiating spokes} {Inside to the outside with loose scaffold} {scaffold eaten as spider returns to center} {as it goes back to the center lays down the sticky more tightly packed threads}

4.9 Describe the structure of a triradiate pharynx, in what phylum would you find it and how does it solve the problem in feeding for animals in that phylum?

{Triradiate pharynx muscles in three blocks – there may be a diagram} {formed from epitheliomuscular cells- not just muscle since this is an autoapomorphy that defines the Nematodes}{in Nematodes}{three pieces is most efficient way to open a tube}{Problem: Coelomic fluid under constant hydrostatic pressure Open mouth and pressure would squeeze food out}{Pharynx muscles for two valves}{open front/close back and fill pharynx close front, open back and empty pharynx – describe the mechanism properly}