

Invertebrate Zoology  
Midterm Exam 2- Fall 2008

Read through the exam before you begin. This exam consists of four (4) parts. You must provide answers for each part. However, you are required to answer only a SUBSET of the questions in each part. If you answer more questions than indicated in the instructions provided, your answers will be graded in order, and you will be graded only on the number of questions you are required to answer. Feel free to use diagrams to augment your answers.

**Part I. Describe the function(s) performed by 8 of the following 11 structures in the taxon indicated; in each case be certain to consider all functions performed by the structure (3 points each; 24 points total)**

1. osphradium in gastropod

2. malpighian tubule in arthropod

3. ctenidium in lamellibranch

4. operculum in prosobranch

5. notopodium in *Arenicola*

6. sulfide binding protein in pogonophoran

7. clitellum in clitellate

8. aculeus in scorpion

9. maxillules in Branchiura

10. pedipalps in pseudoscorpions

11. antennal gland in crustacean

**Part II. Answer 7 of the following 9 questions using the following selection of invertebrate life-cycle stages: trochophore, zoea, nauplius, cypris, glochidia larva, megalops, epitoke, miracidium, veliger, pelagospheara larva.** Note: You may use an answer more than once (2 points each; 14 total points).

1. Identify a larval stage that possesses cilia (i.e., short undulopodia).
2. Identify a larval stage that occurs in a phylum that does NOT possess a schizocoelous coelom.
3. Identify a life-cycle stage that is edible.
4. Identify a life-cycle stage that is found in gastropods and sipunculans (among other taxa).
5. Identify a larval stage that is parasitic.
6. Identify a life-cycle stage that may be found in marine environments.
7. Identify a life-cycle stage exhibited by at least some polychaetes.
8. Identify a pelagic life-cycle stage.
9. Identify a life cycle stage that occurs after the trochophore in the life-cycles of some animals.

**Part III. (42 points; 6 points each). Answer 7 of the following 10 questions.**

1. Select a phylum of schizocoelous coelomates and provide the following information:  
Name of phylum \_\_\_\_\_

- i) Total number of species known to date. \_\_\_\_\_
- ii) Primary mode of locomotion (or one of the primary modes if several are utilized within the phylum).
- iii) Whether it includes terrestrial species or not. \_\_\_\_\_
- iv) Whether it includes species that reproduce asexually or not. \_\_\_\_\_
- v) Primary mode of respiration (or one of the primary modes if several are utilized within the phylum).
- vi) Whether it includes species that possess an enterocoelom or not. \_\_\_\_\_

2. Describe 3 different structures that have been modified to serve the respiratory needs of polychaetes. In each case identify a group of polychaetes that exhibits the modification you have described.

(i)

(ii)

(iii)

3. Describe 3 differences between protostomes and deuterostomes; be certain to indicate which condition of each of the features you describe is found in each group.

(i)

(ii)

(iii)

4. Describe the type of environment (marine, freshwater, etc.), **and** where in that environment (benthic, pelagic, etc.), in which you might expect to find a typical member of each of the following taxa:

(i) Symphyla

(ii) squid

(iii) Conchostraca

(iv) Scaphopoda

(v) Pulmonata

(vi) Polychaeta

5. (i) Compare and contrast the typical mode of feeding in gastropods versus bivalves. Be certain to indicate which taxon exhibits which feeding mode.

(ii) List, in order from external to internal, the 3 layers of a molluscan shell.

6. Identify the tagmata with which each of the following appendages/structures is associated:

(i) pereopod \_\_\_\_\_

(ii) chelicera \_\_\_\_\_

(iii) parapodium \_\_\_\_\_

(iv) prostomial cirri \_\_\_\_\_

(v) pleopod \_\_\_\_\_

(vi) pecten \_\_\_\_\_

7. Describe the concept of tagmatization; provide an example that illustrates this concept.

8. Describe 3 major differences between annelids and arthropods; be certain to indicate which condition of each feature is found in each group.

(i)

(ii)

(iii)

9. Describe locomotion in each of the following taxa; be certain to describe the structures involved in each case.

(i) squid

(ii) gastropod

(iii) leech

10. Describe how each of the following taxa goes about obtaining food.

(i) *Arenicola* (the lug worm)

(ii) the cladoceran *Daphnia*

(iii) the annelid family Pogonophoridae

**Part IV. For 10 of the following 14 questions, identify a taxon from the following list that fulfills ALL of the criteria listed.** You may use a taxon more than once (20 points; 2 points each).

Scorpiones  
Cheliceriformes  
Arachnida  
*Chaetopterus*  
Crustacea  
Bonnellidae  
Polychaeta  
Polyplacophora

Sipuncula  
Cephalopoda  
*Nereis*  
Merostomata  
Prosobranchia  
Monoplacophora  
Gastropoda  
Scaphopoda

Pycnogonida  
Pogonophora  
Pulmonata  
*Lepidonotus*  
Aranae  
Notostraca  
Chelicerata  
Clitellata

1. With a mixocoel, pedipalps and chelicera.
2. Conspicuously tagmatized, with parapodia, some of which produce a mucous bag to trap food.
3. With 6-40 pairs of ctenidia, radular teeth that may contain iron, and a mantle cavity in the form of a groove between the foot and girdle.
4. With a mixocoel, phyllopodous appendages, and mandibles.
5. Undergoes torsion, generally retains torted condition in adult, and respire using ctenidia.

6. Voracious predator that functionally moves with its posterior end first; entirely marine
7. Among two most speciose (non-hexapod) arthropod subphyla; generally with uniramous appendages; mostly terrestrial.
8. Terrestrial, with book lungs and a waist.
9. Lacks a gut, can occur in very deep water, exhibits a segmented opisthosoma.
10. With segments that are essentially homonymous, a ventral nerve cord, and setae.
11. Lives in marine burrows, possesses urns in its coelomic cavity, and 1 pair of metanephridia.
12. Among two most speciose (non-hexapod) arthropod subphyla; generally with biramous appendages, mostly aquatic.
13. With jointed appendages, abdominal book gills, and a carapace.
14. Conspicuously tagmatized, with jointed appendages and undergoes ecdysis.