

Invertebrate Zoology  
Midterm Exam 2- Fall 2010

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. Dennis was at the seashore this past weekend and, as usual, he collected a number of interesting bits and pieces of invertebrates. (as you know, Dennis is really good at collecting very small things!) For 4 of the following 7 "specimens":**

- (i) Identify a phylum of invertebrate in which it is found (be certain to identify a phylum and not a subgroup of a phylum)**
- (ii) Describe the function or functions potentially performed by the structure indicated.**  
**(16 points; 4 points each)**

1. spermatophore

(i) Phylum:

(ii) Function(s):

2. crystalline style

(i) Phylum:

(ii) Function(s):

3. beak

(i) Phylum:

(ii) Function(s):

4. typhlosole

(i) Phylum:

(ii) Function(s):

## 5. pereiopod

(i) Phylum:

(ii) Function(s):

## 6. aciculum

(i) Phylum:

(ii) Function(s):

## 7. operculum

(i) Phylum:

(ii) Function(s):

**Part II. Answer 8 of the following 13 questions. (48 points; 6 points each)**

1. Select a class of arthropods and for that class provide the following information. Be sure to name the class.

Name of class: \_\_\_\_\_

(i) Total number of species: \_\_\_\_\_

(ii) Whether MAJORITY of species are terrestrial or aquatic: \_\_\_\_\_

(iii) Whether class includes members that are filter feeders: \_\_\_\_\_

2. Select a class of arthropods and for that class provide the following information. Be sure to name the class.

Name of class: \_\_\_\_\_

(i) Mode(s) of excretion: \_\_\_\_\_

(ii) Name of one of its included subclasses: \_\_\_\_\_

(iii) Name of a larval stage possessed by one or more members of the class (write N/A if class includes no larval stages, i.e. undergoes direct development) : \_\_\_\_\_

3. Select a class of molluscs and for that class provide the following information. Be sure to name the class.

Name of class: \_\_\_\_\_

(i) Total number of species: \_\_\_\_\_

(ii) Whether MAJORITY of species are terrestrial or aquatic: \_\_\_\_\_

(iii) Whether class includes members that are filter feeders: \_\_\_\_\_

4. Select a class of molluscs and for that class provide the following information. Be sure to name the class.

Name of class: \_\_\_\_\_

(i) Mode(s) of excretion: \_\_\_\_\_

(ii) Name of one of its included subclasses: \_\_\_\_\_

(iii) Name of a larval stage possessed by one or more members of the class (write N/A if class includes no larval stages, i.e. undergoes direct development) : \_\_\_\_\_

5. Describe the type of environment (marine, freshwater, etc.) and habitat in that environment in which you would expect to find a typical member of each of the following taxa; if applicable be certain to indicate if they are benthic or pelagic.

(i) an anostracan

(ii) a nautiloid

(iii) a monoplacophoran

6. Describe feeding (i.e., food acquisition rather than digestion) in the following 3 taxa:

(i) Lamellibranchia

(ii) Echiura

(iii) Coleoidea

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

(i)

(ii)

(iii)

8. Using a completely labeled diagram describe the relationship between the circulatory, excretory and respiratory systems in a typical mollusc.

9. Describe the diversity of respiratory modifications found among annelids.

10. Answer each of the following:

(i) What is homonomy?

(ii) What is heteronomy?

(iii) How do the concepts of homonomy and heteronomy relate to the concept of serial homology?

11. Rank the following 6 taxa in order from 1 through 6 based on the number of species they are currently thought to include. (Use 1 for the MOST diverse taxon and 6 for the LEAST diverse).

| Taxon       | Diversity Rank |
|-------------|----------------|
| Chilopoda   | _____          |
| Gastropoda  | _____          |
| Sipuncula   | _____          |
| Maxillopoda | _____          |
| Nautiloidea | _____          |
| Polychaeta  | _____          |

12. Describe 3 differences between a metanephridium and a malpighian tubule. Be certain to indicate which structure has which of the conditions listed.

(i)

(ii)

(iii)

13. Describe 3 differences between schizocoelous and enterocoelous eucoelomates

(i)

(ii)

(iii)

**Part III. For 13 of the following 18 questions, identify a taxon from the list below that fulfills ALL of the criteria listed. You may NOT use a taxon more than once. Feel free to justify your answer if you believe there is any ambiguity (26 points; 2 points each)**

|                 |                |                 |
|-----------------|----------------|-----------------|
| Sipuncula       | Epitokes       | Thecostraca     |
| Polychaeta      | Symphyla       | Gastropoda      |
| Bivalvia        | Prosobranchia  | Trilobitomorpha |
| Ostracoda       | Monoplacophora | Anomalodesmata  |
| Acari           | Stomatopoda    | Opiliones       |
| Notostraca      | Protobranchia  | Aranae          |
| Clitellata      | Xiphosura      | Pycnogonida     |
| Cheliceriformes | Myriapoda      | Arthropoda      |
| Copepoda        | Eurypterida    | Opisthobranchia |
| Coleoidea       | Pauropoda      | Annelida        |
| Aplacophora     | Crustacea      | Diplostraca     |

1. Mollusc class with fewer than 100 species; occurs in deep marine waters:
2. With parapodia; includes errant and sedentary taxa:
3. Arthropods with bivalved carapace; essentially lacking a head and abdominal appendages:
4. Tasty Pacific morsels:
5. Tiny, fungus-sucking myriapods with eyes:
6. Unusual among arthropods in its possession of pleopodal gills:
7. Includes largest species of Maxillopoda:
8. Most speciose of Mollusc classes:
9. Extinct subphylum of arthropods:
10. Bivalve subclass entirely lacking ctenidia:
11. Only arachnids that consume solid prey:
12. Includes taxa that produce a venom of some type:
13. Marine taxon of extant (i.e., living) Cheliceriformes:
14. Entirely terrestrial taxon:
15. Rivals Crustacea for most speciose of arthropod subphyla:
16. Now considered to include pogonophorans:
17. Includes some buoyant molluscs:
18. Monophyletic phylum:

**Part IV. Answer 5 of the following 7 questions using the following selection of invertebrate life-cycle stages: acanthella, nauplius, trochophore, zoea, cypris, glochidia larva, megalops, sporocyst, epitoke, miracidium, veliger.** You may use a larval stage more than once. (2 points each; 10 total points).

1. Identify a motile larval stage of a segmented eucoelomate:
  
2. Identify a parasitic larval stage:
  
3. Identify a larval stage that undergoes torsion:
  
4. The pentastomes are considered to possess a terrestrial version of this life cycle stage:
  
5. Identify a larval stage that characterizes the Crustacea:
  
6. Identify a larval stage found in at least some annelids, sipunculans, and echiurans:
  
7. Identify a larval stage that typifies the Decapoda:

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**BONUS POINT:** Dennis was poking around and he came across the following invertebrates. He would like to know class to which each belongs.