

**EEB 4275 (Invertebrate Zoology)
Fall, 2010
Study Guide 2**

For each phylum, in addition to the information listed below, you should know the common name, habitat (e.g. freelifving/parasitic; marine, terrestrial, freshwater), and position within the general scheme of “invertebrate” organization with respect to the major subgroupings of “invertebrates” i.e. acoelomate vs. blastocoelomate vs. eucoelomate; bilateria vs. radiata; protostome vs. deuterostome; level of organization: cell, tissue, organ system etc.; you should have some idea of the total diversity of each phylum. You should also be able to describe how each phylum generally handles locomotion, respiration, circulation, excretion, food acquisition, digestion, reproduction, osmoregulation, development, defense, and sensory perception. In addition, you should know the distinguishing characteristics, and diversity of the major Classes and Subclasses (if covered) of each phylum and the life-cycle stages, if any, present in each.

Eucoelomates: 2 main types (i.e., protostomes and deuterostomes) and 5 ways they differ (e.g. spiral vs. radial cleavage, etc); be able to diagram the embryonic formation of a schizocoelom and an enterocoelom, in each case illustrating the position of the three embryonic germ layers.

Mollusca- distinguishing characteristics of phylum and its 7 classes and approximate diversity; candidate synapomorphies of the phylum and their issues; know the layers of the shell/mantle and their composition and functions; basic circulation and the relationship between the vessels, haemocoel and gills; understand which cavities represent true eucoelom; embryonic origin of the haemocoel; structure and function of a metanephridium; morphology and components of the digestive system (including odontophore structure and its distribution among the 7 classes); respiration and basic ctenidial structure, osphradium and its function; nervous system- nerve cords, paired ganglia and the portions of the body they each enervate; molluscan life-cycle stages (trochophore, veliger, etc.) and their presence among mollusc classes; Cl. Aplacophora- characteristics; Cl. Polyplacophora- characteristics (which structures are repeated?); Cl. Monoplacophora- distinguishing features (which structures are repeated?); Cl. Scaphopoda- general features; Cl. Bivalvia- general characteristics, body plan compared to the basic molluscan body plan; water movement, food acquisition; gill structure in Anomalodesmata, Protobranchia, and Lamellibranchia, Cl. Gastropoda- stages in torsion (ventral flexure, contraction, etc.); know how the contorted body plan compares to that of the basic un-torted molluscan body plan (i.e. morphological consequences of torsion); 3 gastropod subclasses and their distinguishing characteristics (i.e. Prosobranchia, Opisthobranchia, Pulmonata); configuration of respiratory organs in gastropod subclasses; types of feeding in the gastropods. Cl. Cephalopoda- general characteristics, body plan compared to the basic molluscan body plan; functional vs. anatomical orientation of cephalopod body; general characteristics (circulation, respiration, prey capture, etc.) of 2 extant cephalopod subclasses (i.e., Nautiloidea and Coleoidea), shell in each, buoyancy compensation and/or movement in each.

Annelida- body cavity and its functions (site for accumulation of waste, hydrostatic skeleton, etc.); distinguish between a true segment and a proglottid; what is metamerism and how does it compare with strobilization in the tapeworms? Three main body regions of annelids (prostomium, etc.). Describe serial homology, tagmatization (be able to provide an example in annelids, e.g. *Chaetopterus*). What is homonomy? Heteronomy? Provide an example of each. Distinguishing characteristics of phylum; musculature; nervous system; excretion (metanephridia and segments they drain); reproduction; circulation; digestion/feeding; diversity; Class Polychaeta- general characteristics; diversity; parapodial structure in *Nereis* (notopodium vs neuropodium structure and function, etc.); feeding modes- explain an example of each mode (i.e., filter feeding, selective deposit feeding etc.); respiration- various modifications of the body surface, parapodia and other structures for respiration; examples of each; circulatory system; excretion; development; reproduction- what is epitoky? Two types of epitoky (direct transformation, asexual production). Distinguish features of errant vs. sedentary polychaetes; Family Pogonophoridae- distinguishing characteristics; general morphology; diversity; 4 major body regions; symbiotic relationship with bacteria and source of carbon for life; mechanism preventing sulfide poisoning; problems with determining embryonic origin of body cavity. Clitellata- general characteristics; Subclass Oligochaeta- respiration, reproduction, distinguish between copulation and fertilization, parapodia? Setae? Subclass Hirudinoidea- general characteristics, parapodia? Setae? general life style. Are these subclasses monophyletic?

Echiura- distinguishing characteristics; general characteristics; evidence of segmentation? diversity; life cycle and sex determination in bonellids

Sipuncula- distinguishing characteristics; general characteristics; evidence of segmentation? Urns and their function; diversity

Arthropoda- distinguishing characteristics; features shared with other panarthropoda (i.e., tardigrades, onychophorans); 5 subphyla and their diversity, (extant vs. extinct) and general membership; monophyly of subphyla; segment formation; tagmata; articulated exoskeleton and its features, ecdysis, etc.; morphology (articles/podites) of typical biramous arthropod appendage (jointed, etc.); distinguish a uniramous from a biramous appendage; provide an

example of a group with each; details of the following arthropod systems in particular: musculature; body cavity (mixocoel- what is it?); circulatory system; respiration (compare respiratory structures of terrestrial vs. aquatic arthropods); excretion/osmoregulation (nephridia and malpighian tubules); digestive system; nervous system; reproduction. Comparison to annelids: skeleton, muscles, tagmatization, appendages, etc.; **Trilobitomorpha**: general features, distinguishing features, appendage form; **Crustacea**- general features, distinguishing features; major body divisions; compare typical biramous phyllopodium and its parts to basic arthropod appendage; understand concept of serial homology and be able to illustrate it in arthropods; distinguish homonomy from heteronomy; development (nauplius larva etc.); major subgroupings (classes Branchiopoda, Maxillopoda, Malacostraca) of crustaceans and their distinguishing characteristics; orders, and/or suborders as appropriate. **Myriapoda**- general features, distinguishing characteristics; classes and their characteristics. **Cheliceriformes**- general features, distinguishing characteristics; major subgroupings (classes, subclasses and orders), their distinguishing features and diversity.

Tardigrada- distinguishing characteristics, habitat, diversity, and the unusual aspects of their biology (anabiosis, cryptobiosis and the factors that induce these stages).

Onychophora- distinguishing characteristics, habitat, diversity, and unusual aspects of their biology.

Panarthropoda- distinguishing characteristics (features of cuticle, mixocoel, ecdysis, etc.); 3 phyla included and the hypothesis of their relationships to one another; features supporting this hypothesis.

protostome	arthrobranch	schizocoely
neuropodium	cephalic lobe	trunk
ecdysis	forepart	nephrostome
biramous	spinerette	pedipalp
cephalothorax	ctenidium	clitellum
enterocoely	operculum	nephridiopore
segment	tagmatization	metamerism
article	exhalent siphon	dextral shell
cephalization	inhalent siphon	schizocoel
chelate	torsion	epipodite
notopodium	pleiopod	homonomous
pereopod	metanephridium	tagmata
enterocoel	maxillipeds	glochidia larva
antenna	antennule	coxa
mandible	uniramous	mixocoel
triploblastic	cephalized	siphuncle
pectine	exopodite	pleopod
cuttlebone	eucoelom	gastric shield
trophosome	chitin	detorsion
hemocoel	crystalline style	naupliar eye
planospiral shell	bipectinate ctenidium	unipectinate ctenidium
prostomium	nauplius	trochophore
veliger	open circulatory system	endopodite
typhlosole	foot	prismatic layer
periostracum	nacreous layer	chelicera
uropod	cyclomorhosis	gnathopod
seta(e)	blastocoel	osphradium
aciculum	serial homology	cuttlebone
radula	odontophore	ink sac
anabiosis	peristomium	mantle cavity
mantle	maxillules	maxilla
teloblastic growth	pygidium	buccal mass
heteronomous	copulation	epitoke
chromatophore	fertilization	byssal threads
spermatophore	malpighian tubule	chiliped
blastula	diplosegment	gastrula
errant	parapodium	umbo
sedintary	tun	beak
visceral mass	opisthosoma	hypostome
telson	sinistral shell	pneumostome
prosoma	urns	spiracle
cephalon	archenteron	pedicel

