

EEB 4275 (Invertebrate Zoology)
Fall, 2012
Preliminary Study Guide Exam 1 (Sept 21)

What is an “invertebrate”? Do the “invertebrates” constitute a monophyletic group?

Differences between a prokaryote and a eukaryote; 2 eukaryotic Kingdoms considered as invertebrates (i.e., Protista and Animalia) and their basic features, monophyletic or not, approx. number of phyla, etc. Five levels of organization/complexity exhibited by invertebrates and exemplar phyla; do these levels represent monophyletic sets of taxa? 3 basic categories of aquatic habitats (littoral zone, etc.) and their subcategories (supralittoral, etc.).

NOTE: For each “invertebrate” phylum, IN ADDITION TO THE INFO OUTLINED BELOW, you should know the common name, distinguishing characteristics (synapomorphies if they exist), approximate range in size, position within the general scheme of “invertebrate” organization with respect to the major subgroupings of invertebrates i.e. body cavity configuration (acoelomate vs. blastocoelomate vs. eucoelomate), bilateria vs. radiata, protostome vs. deuterostome; level of organization: cell, tissue, organ/organ system etc., general habitat (e.g. freeliving/parasitic; marine, etc.), solitary/colonial, etc. You should have some idea of diversity in each phylum, class, subclass, etc (if covered). You should know how each phylum generally handles locomotion, feeding (food acquisition, digestion, etc.), respiration, circulation, excretion, reproduction, development, sensory perception, and defense. Larval type (if any) of each.

PROTISTS: What are the “Protists”? What are their distinguishing features? Do they represent a monophyletic assemblage of taxa? Distinction between saprobic, holozoic, and mixotrophic organisms.

"Amoebozoans"- distinguishing feature(s); lobopodia vs. filopodia

Lobosea- distinguishing characteristics; naked versus testate taxa; example genera.

"Rhizaria"- distinguishing feature(s); 2 phyla.

Foraminifera- distinguishing characteristics. potential synapomorphy (reticulopodia)? What are reticulopodia? How are they associated with the test? What is the test? Huge volume, relationship to the pyramids, etc.

Radiolaria- distinguishing feature(s); potential synapomorphy (axopods)? 2 major Classes and their distinguishing characteristics. What are axopods? How are they associated with the test? What is the test?

Whip-like structures: distinction between flagellum vs. undulopodium vs. cilium; cross section through axoneme and basal body (kinetosome) of undulopodium.

"Alveolates"

Ciliophora- distinguishing characteristics; nuclei (dikaryotic) and potential synapomorphy; elements of a kinetid; what is infraciliature? What is a cytostome? Variations in body form of ciliates illustrated using example genera; sessile vs. errant taxa; fission vs. conjugation and syngamy; what are trichocysts?

"Excavata"- distinguishing feature(s)

Parabasalida- distinguishing characteristics; potential synapomorphy? What is a hypermastigote? Where would you expect to find one? Do they possess infraciliature?

Choanoflagellata- habitats and distinguishing characteristics; collar and its function; potential close relatives.

ANIMALIA (=Metazoans): General features (e.g., possession of collagen, develop from embryos, etc.), potential synapomorphies. Are the metazoans monophyletic? Major subdivisions (parazoans, radiatans, bilaterians) and their distinguishing features; level of complexity/organization of phyla covered to date.

Porifera- distinguishing characteristics; potential synapomorphy? Cell totipotency and aggregation properties; cell layers (pinacoderm, etc.) and their cell types (amoebocytes, archaeocytes, collenocytes, choanocytes, pinacocytes, etc.); functions of each cell type and their positions in the body wall. Sponge body types (asconoid, syconoid, leuconoid) and their implications for sponge body size, water flow through each sponge body type; be able to illustrate a labeled example of each; parts of the body (osculum etc.); asexual reproduction- gemmules; sexual reproduction, parenchymula and amphiblastula larvae; 3 classes of sponges and their distinguishing characteristics, body type, spicule types, etc. What are the Symplasma? Distinguishing feature/s? Why have some considered this group to represent a separate phylum? Phylogenetic implications of the Homoscleromorpha.

Cnidaria- distinguishing characteristics; synapomorphy; tissue level of organization; extracellular digestions; 2 tissue layers and their embryonic germ layer origins; mesoglea vs. mesenchyme- embryonic layer of origin; cell types and their locations and functions in each tissue layer; 2 basic body forms (polyp vs. medusa) and how emphasized in different classes; 2 types of polymorphism (simultaneous vs. sequential) and an example of each; 4 classes and their distinguishing

characteristics; location of cnidocytes, life styles, etc.; gastrozooid vs gonozooid; life cycle of *Obelia*; colonial components of *Physalia*; life cycle of *Aurelia*; what is a rhopalium? Concept of a stomodeum; 2 subclasses of Anthozoans and their basic features.

Ctenophora- basic characteristics; synapomorphies, orientation relative to cnidarian medusae and other features useful for separating the 2 phyla (e.g. larval stage, ctenes, colloblasts, etc.); number of tissue layers; kleptocnidae; colloblasts; comb plates; cydippid larva.

Body form generalizations: Distinguish diploblasty from triploblasty; know examples of phyla exhibiting each configuration; types of symmetry (spherical, radial, biradial, bilateral, asymmetrical), know and be able to recognize examples of each; planes of sectioning (frontal, cross, sagittal, longitudinal, etc.); formal distinction between a colony and a constituent individual; understand basic development of an embryo from zygote through gastrula in diploblastic and triploblastic organisms-including the arrangement of the ectoderm, endoderm, and mesoderm (if relevant) and various body cavities in each; tissue types produced by (i.e., fates of 3 embryonic germ layers). be able to illustrate the different configurations of the body cavity (acoelomate, blastocoelomate, eucoelomate)

Understand acoelomate condition; be able to draw frontal section through acoelomate gastrula and cross section through acoelomate adult; 5 phyla currently considered to be at least functionally “acoelomate”; do they collectively comprise a monophyletic group? Distinction between true acoelomate vs. functionally acoelomate condition.

Platyhelminthes- distinguishing characteristics; basic organ systems; central nervous system and cephalization (what is it?), musculature; structure and function of a protonephridium; difference in structure of the epidermis of “turbellarians” and the tegument (=neodermis) of neodermatans; characteristics of the “turbellarians”; are they monophyletic?; 3 classes and 2 subclasses of subphylum Neodermata and the basic and distinguishing features of each, host associations; larval types in each (e.g., Mueller's larva, sporocyst, redia, cercaria, oncomiracidium, hexacanth).

Nemertea- distinguishing characteristics; locomotion, understand details of the proboscis and rhynchocoel; circulatory system and its elements; complete digestive system; asexual reproduction, sexual reproduction (dioecy, etc.); pilidium larva in some. Why considered eucoelomates by some?

Gastrotricha- distinguishing characteristics; reproduction (including parthenogenesis- what is it?), monoecious; direct development, locomotion (ventral cilia and adhesive tubes, etc.); complete digestive system.

Gnathostomulida- distinguishing characteristics, pharyngeal jaw apparatus; monoecious; direct development, locomotion (ventral cilia); complete gut.

Micrognathozoa- most recently recognized phylum (2000!); locomotion; do they possess a complete gut?

Understand blastocoelomate condition; be able to draw frontal section through blastocoelomate gastrula and cross section through blastocoelomate adult; 9 phyla currently considered to exhibit this body cavity type; do they collectively comprise a monophyletic group?

Nematoda- distinguishing characteristics; potential synapomorphy? Musculature and its arrangement especially in cross section, parts of a muscle cell; diversity of habitats; 2 classes and their distinguishing features; basic structure of reproductive system; typical life-cycle; configuration of excretory system; outer body layers and their functions.

Nematomorpha- distinguishing characteristics; features that distinguish them from nematodes; general host associations and habitats occupied (larvae vs. adults); generalized life cycle; sexual dimorphism.

Rotifera- distinguishing characteristics; body parts (e.g. corona and its trochal discs and cingulum; mastax and its trophi, etc.); configuration of outer body layers; diversity of feeding modes and associated modifications of feeding structures; 2 Classes and their general types features; how monogonontans and digonantans differ wrt reproduction and life-cycles; role of mictic versus amictic eggs.

Acanthocephala- distinguishing characteristics; parts of the body; sister taxon? Syndermata (i.e. Rotifera + Acanthocephala)- features uniting and distinguishing these phyla; host associations.

Entoprocta- distinguishing characteristics; general morphology (colonial, sessile, with tentacles, etc.); tentacles and their functions; basic orientation of body; larval stages; configuration of gut (position of anus).

Priapula- habitat; body regions; larval stage; specialized excretory structures; configuration of outer body layers.

Kinorhyncha- distinguishing characteristics (zonites, scalids, etc); body regions; juvenile; habitat.

Loricifera- distinguishing characteristics; larval stage, etc; habitat; body regions.

Cycliophora- distinguishing characteristics; only known habitat; complexity of life cycle; postulated affinities; year of description of phylum.

Terms for which you should be prepared to provide a definition and an example:

Parazoa	polyp	Eubacteria
Protista	medusa	Archaea
undulopodium	amphiblastula larva	eukaryote
radiatan	planula larva	test
bilaterian	gonozooid	protonephridium
flame cell	gasterozooid	nephridiopore
monoecious	nematocyst	blastopore
acoelomate	cnidocyte	blastocoel
blastocoelomate	parenchyma	blastomere
eucoelomate	epidermis	gastrula
redia	gastrodermis	archenteron
eulittoral	mesoglea	syncytium
flagellum	gastrovascular cavity	cercaria
blastocoelomate	gorgonin	kinetosome
foraminiferan	scyphistoma	prokaryote
Animalia	strobila	transverse fission
pinacoderm	ephyra	epithelio-muscular cell
lobopodium	velum	nutritive-muscular cell
filopodium	cydippid larva	hexacanth
reticulopodium	ectoderm	sporocyst
axopodium	endoderm	hexacanth
rhopalium	mesoderm	cercaria
triploblastic	mesenchyme	benthic
diploblastic	blastocoel	pelagic
cytostome	oncomiracidium	interstitial
macronucleus	Metazoa	meiofauna
micronucleus	rhynchocoel	epifauna
mitic female	scalid	infauna
amictic female	Mueller's larva	plankton
infraciliature	neodermis	nekton
alveolus	pilidium larva	supralittoral
trichocyst	parthenogenesis	sublittoral
pinacocyte	gemmae	dactylozooid
choanocyte	dioecious	atrium
porocyte	mastax	pilidium larva
amoebocyte	lemnisci	cnida
archeocytes	spongocoel	gastrulation
collenocytes	stylet	hypodermis
sclerocytes	scolex	cuticle
spongin	trophi	proglottid
mesohyle	oncomiracidium	parenchymula larva
osculum	haptor	
spicule	cercomer	
megasclere	trochus	
microsclere	corona	
asconoid	lorica	
syconoid	cingulum	
leuconoid	parthenogenesis	