Animal survey

- Note - very easy questions to ask: what phylum, class, etc. does animal x belong to (or vice versa!).

Phylum Porifera - sponges

Are sessile (don’t move); until 1766 they were thought to be plants, then it was discovered that they generate a current in the water.

Wide range of sizes (1 cm to 2 m).

Major characteristics:

- no tissues - cells are not arranged in functional or specialized groups known as tissues.

- all are aquatic, most marine.

- asymmetrical or radial symmetry [OVERHEAD, fig. 18.5A p. 370]

Go through [OVERHEAD, fig. 18.5B p. 370]:

- Sponges filter water for food

- Water is moved in through small pores in the “wall” (=epidermis (not a tissue!)) of the sponge, filtered, and moved into a central cavity (=spongocoel) and then out through the “osculum”, which is usually a larger opening.

- current is set up by choanocytes (=collar cells) located on the inside of the spongocoel, which have a flagellum which they use to set up the current.

- Choanocytes will also trap food particles on their “collar”.

- Amoebocytes take food particles and distribute them throughout the sponge.

Some comments:

- some sponges can literally be forced through a sieve, after which they will re-assemble themselves.

- some uses for sponges are:

  - bath sponges

  - an anticancer drug from a Caribbean sponge blocks DNA synthesis in tumors.
Phylum Cnidaria - Jellyfish (about 9,000 species)

- all aquatic, and mostly marine.

- radial symmetry

- basically consist of a sac, which forms a gastrovascular cavity (gut) which is surrounded by tentacles at the opening to the outside.

  - there is only one opening, which is both the mouth and anus. Prey is caught with the tentacles, moved into the gut, digested, and then the remains are expelled.

- two main forms [OVERHEAD, not in book]

  polyps - animal is usually anchored in one place, and the opening is on the opposite side of the anchor (i.e., it usually points up).

  medusa - animal floats (can move actively), opening usually points down (sort of like a bell).

  most species go through both forms during their life cycle, but one form usually predominates.

Cnidocytes (Cnidoblasts) [OVERHEAD fig. 18.6C, p. 371]:

All Cnidarians are carnivorous (though some corals live together with algae, and thus can photosynthesize for part of their energy).

Tentacles are covered with cnidocytes.

  - consist of coiled thread, which is either sticky, venomous, barbed, or some combination of these.

  - when a prey animal comes in contact with a tentacle, the cnidocytes are fired. This usually paralyzes and captures the prey.

  - can also be used defensively.

Also have primitive muscles & nerves, as well as cells specialized for digestion.

Divided into four classes, which include such animals as jellyfish, box jellies, corals, and sea anemones [OVERHEAD, fig. 18.6A,B, p. 371].

Some comments:

  Some can be extremely dangerous (deadly). [OVERHEAD, not in book] (Sherlock Holmes story “The Lion's mane” was based on a box jellyfish).
Coral reefs (e.g., Great barrier reef, Red Sea, Caribbean) are one of the most productive habitats on earth, and like rain forests are being destroyed at incredible rates (often due to the build up of hotels and stuff catering to divers!).

**Phylum Platyhelminthes - Flat worms (12,000 species)**

- Bilateral symmetry.
  - this is often a result of moving in one direction, thus having a “head” end.
- flattened front to back
- gut (if present) only has a single opening.
- have distinct organs and organ systems (e.g., digestive, nervous, reproductive, etc. [but NO circulatory system!])
- Three (sometimes four) classes, which includes free living and parasitic animals like Planaria (free living), Liver flukes, Shistosomiasis, Tape worms, etc.
  - Example: schistosomiasis (or sometimes, billharzia) **[OVERHEAD, not in book]**
    - passes from one person to another via a snail (essentially eggs are deposited in water, hatch, invade snail, multiply then infect people who are wading in the water).
    - Schistosomiasis is very debilitating [body pains, dysentery, anemia, lack of energy], and is a major medical problem in many parts of Africa and South America [Don’t go swimming or wading in stagnant fresh water!!].
    - An example: Aswan dam - disease incidence jumped from 5% to 75%. This is progress??
    - Can be cured, though as usual, cure is easier to get in wealthy countries.

**Comments:**

Parasites are not unusual. Even humans have numerous parasites.

Some time ago a company sold diet pills consisting of tape worm eggs. It really worked!! (though the company was soon out of business).
Phylum Nematoda - round worms (90,000 described species, though probably many more exist)

[OVERHEAD, fig. 18.8A, p. 373]
- round, mostly circular in cross section
- have a thick cuticle.
- have a complete digestive tract - mouth -> anus.
- only have longitudinal muscles. Therefore move by “thrashing” or “whipping” around.
- no circulatory system.
- probably the most numerous group of animals in terms of numbers of individuals (e.g. 90,000+ found in one rotten apple).
- many important pests and parasites in this group. Some examples:
  - Filarial worms - one species can clog lymphatic vessels, “elephantiasis”. Now fortunately becoming less common [incredibly disgusting pictures available].
  - Ascaris, hookworm, Trichinella (causes trichonosis).
  - Pinworm - affects 60% of kids in the United States! Fortunately not a serious parasite.
- But most species are free living (e.g., vinegar eels, often used in lab)

Phylum Annelida - segmented worms (about 12,000 species)
- earthworms and leeches probably best known examples.

Major characteristics [OVERHEAD, fig. 18.10A, p. 376]
- segmented.
- digestive tract, blood vessels, nerve cords run the length of the animal
- “heart” and blood vessels present (respire through skin) - closed system.
- metanephridia (a primitive kidney), brainlike ganglia, many types of muscles.
- hermaphroditic, but cross fertilize.

Three major classes include such animals as earthworms, blood worms, and leeches. [OVERHEADS, not in book]
Comments:

Darwin was a worm expert, and calculated that 1 acre contained approximately 50,000 worms, a figure we still sometimes use today.

Some leeches are again being used in medicine to help alleviate tissue swelling (anti-coagulants), particularly in finger or limb attachment surgeries.

**Phylum Molluska** (about 100,000 species)

All have a similar arrangement of body parts [OVERHEAD, fig. 18.9A, p. 374]:
1) ventrally, a muscular foot  
2) a dorsal covering, the mantle  
3) in between -> visceral mass, which contains internal organs

Most have a shell (derived from the mantle):

- usually external, but sometimes internal (squid).
- some have lost their shell (octopus)

Some other features:

- many have a radula (scraping tongue)
- recognizable internal organs

Very diverse & successful group [OVERHEADS, not in book, but see figures 18.9C-E, pp. 374-375] - 8 classes, which include animals like: tusk shells, chitons, snails, slugs, bivalves (clams, oysters, etc.), squid & octopus.

Some comments:

- Squid & Octopus are the most advanced group. They're also the most intelligent invertebrates out there.

- Squid can range up to 17m (a giant squid was found washed ashore in New Zealand in the late 1800’s), though it is suspected that even larger squid are out there.

- Octopus have a beak which they use to inject venom into prey. The Blue ringed octopus (Australia) is tiny but deadly to humans.
Phylum Arthropoda (900,000 species known, but maybe up to several million in existence)

[OVERHEAD, not in book]

- the most successful group of animals out there.
- major characteristics:
  - exoskeleton - made up of chitin. Sometimes called a cuticle.
  - jointed appendages. Arthro-pod (explain derivation)
    - occur in pairs which can be modified for feeding, movement, gills, sensory, etc.
- other characteristics:
  - open circulatory system (only a few big vessels).
- Four major subphyla (yes, this time we'll go through them!):
  - Trilobites [OVERHEAD, not in book]
    - extinct/compound eyes/three longitudinal body parts.
    - incredibly common during Cambrian to the end of Paleozoic - we have many, many, fossils.
  - Chelicerates [OVERHEAD, not in book]
    - includes spiders, scorpions & relatives (incl. horseshoe crabs)
  - Crustaceans
    - most are aquatic, and include animals like shrimp, krill, lobster, crabs, barnacles, isopods (pill bugs) etc.
  - Uniramians (millipedes, centipedes, insects!!) [OVERHEAD, not in book]
    - mostly terrestrial.
    - see your text for a run down of just a few of the insect groups.

Comments [OVERHEAD, not in book]:

Insects (Class Insecta) are the most successful group of animals. Period.
- humans and insects:
- beneficial - pollinators, decomposers, etc.

- harmful - destroy crops, disease vectors, etc., and are fighting back to our pesticides by becoming resistant!

**Phylum Echinodermata** - 6,000 species [OVERHEAD, not in book]

- Starfish, sea urchins, sea cucumbers, etc.

- all marine

- Endoskeleton (internal skeleton) composed of bony plates, or “dermal ossicles”.

- water-vascular system - network of hydraulic canals that help these organisms move (tube feet) [OVERHEAD, fig.18.13A, p. 382]

- thought to be closest living phylum to ours.

Six classes, which include animals like starfish, sea urchins, sea cucumbers, and sea lilies (which are one of the most abundant fossil animals we have).