

ZOOLOGY 101 SECTION 4 LECTURE NOTES

The Radiate animals: Cnidarians and Ctenophorans

I. Phylum Cnidaria (Coelenterata)

- Hydroids, sea anemones, jellyfishes, hard and soft corals

Characteristics:

1. Tissue level of organization
2. Entirely aquatic
3. Radial or biradial symmetry
4. Two basic body types: **polyps** and **medusae**
5. Exoskeleton or endoskeleton of chitin, calcium carbonate or protein possible
6. Body composed of two tissue layers with **mesoglea**
7. **Gastrovascular cavity** with only one opening
8. Special stinging cell organelles called **nematocysts**
9. Non-central nerve net
10. Muscular system of an outer layer of longitudinal fibers and an inner layer of circular fibers
11. Reproduction may be asexual, sexual or both
12. No excretory or respiratory tissues or organs
13. No coelomic, or body, cavity

** **Nematocysts**: stinging organelle contained in special cells called *cnidocytes*.

- Used to paralyze prey and for defense, secretes toxins
- Tiny capsule made of material similar to chitin
- Contains coiled tubular filament inside connected to a toxin vesicle
- Operculum: small lid covering end of capsule

- Cnidocil: ciliate like trigger mechanism for some nematocysts
- Water pressure mechanism for discharge

Four Classes of Cnidarians Recognized:

1. **Hydrozoa**: includes hydroids, fire corals, Portuguese man-o-war
2. **Scyphozoa**: the "true" jellyfishes
3. **Cubozoa**: the box jellyfishes
4. **Anthozoa**: sea anemones, stony corals and soft corals

A. Class Hydrozoa

- Solitary or colonial
- Asexual polyps and sexual medusae
- Alternation of generations
- Neither pharynx nor septa present
- Medusae (when present) with a **velum**
- Both freshwater and marine forms

Ex. Hydra

B. Class Scyphozoa

- Solitary
- Polyp stage reduced or absent
- Bell-shaped medusae lacking velum
- Gelatinous mesoglea much enlarged
- Margin of bell or umbrella typically ringed with eight notches that are provided with sensory organs (eye spots, light receptors, statocysts)
- All are marine

Ex. Aurelia

C. Class Cubozoa

D. Class Anthozoa

- Entirely polyp type, no medusae
- Solitary or colonial
- Enteron (lower gastrovascular cavity) subdivided by at least eight septa bearing nematocysts
- Pharynx present
- Nematocysts on tentacles and internal
- Gonads subdermal interiorly
- All are marine
- Divided into three subclasses:
 - **Zoantharia**: sea anemones and stony corals
 - Simple unbranched tentacles
 - Body plan multiples of 6 (hexamerous)
 - **Alcyonaria**: sea fans, pens, sea pansies (soft corals)
 - Body plan multiples of 8 (octomerous)
 - Eight tentacles, pinnate branched
 - **Ceriantipatharia**: tube anemones and black corals

II. Phylum Ctenophora

- Comb jellies and sea walnuts

Characteristics:

1. All are marine
2. Eight longitudinal rows of **comb plates**: transverse plates of long fused cilia used for locomotion
3. Radial symmetry only
4. No nematocysts!! (except one species)

5. All are free swimmers, no sessile forms
6. Contain **colloblasts**: specialized cells which secrete a sticky glue-like substance that aids in capturing prey (characteristic of phyla)