EXERCISE 15

KINGDOM ANIMALIA

soft to the touch

PHYLUM PORIFERA

PHYLUM COLENTERATA-CNIDARIA - hard to the touch

MATERIALS: Prepared slides of Grantia
"Skeleton" of sponges for demonstration
Dissecting and light microscopes
Prepared slides of hydra
Live hydra (if available)
Demonstration specimens of various coelenterates

Sponges are simple and primitive animals which probably evolved from flagellated protozoans. Most sponges are marine; only a few live in fresh water. The radially symmetrical, nonmotile adults are attached to the bottom, but the larvae are ciliated and motile. Once the larvae settle to the bottom, they lose their motility and develop slowly into an adult sponge. Sponges are grouped according to the type of spicules (i.e., skeletal elements) they produce, i.e., chalk sponges, glass sponges, and horn sponges.

Study a prepared slide of grantia, a simple chalk sponge. Note the spicules which form the skeleton. The cells are loosely arranged so that the tissues are not distinct. Therefore, sponges exhibit a cellular-tissue level of organization, i.e., a body organization intermediate between distinct cellular and tissue levels. The pores along the body wall are sites where water enters the radial canals which in turn carry the water into the gastral cavity. The water current is maintained by the beating of the flagella of the choanocytes which line the interior of the radial canals. Water passes out of the gastral cavity via the osculum. Microscopic organisms in the water are engulfed by the choanocytes and then digested in food vacuoles. Digested nutrients diffuse to the amoebocytes which distribute nutrients to other cells as they "wander" within the body wall of the sponge. For a more detailed study of the sponge, refer to pages 161 and 162.

Observe other sponges on the demonstration table.

I. Characteristics of Phylum Porifera

A. Radial symmetry (some asymmetrical)
B. Diploblastic (body wall in two layers)
C. Reproduce asexually by budding or sexually by fertilization
D. Possess numerous pores in the body wall
E. Canals lined with collar cells (choanocytes)

II. Classification

A. Calcarea -- Leucosolenia and Grantia
B. Hexactinellida -- Venus flower basket
C. Demospongia -- Spongilla (fresh water)

III. A Representative Sponge - Leucosolenia

A. Longitudinal Section

1. Osculum -- an excurrent opening
2. Epidermis
3. Porocyte
4. Ostium
5. Amoebocyte (wandering cell)
6. Spicule (forms the skeletal system)
7. Spongocoel
8. Choanocyte (flagellated collar cells)

B. Sponge colony

C. Typical cells

1. Amebocytes
2. Epithelial cell
3. Spicule
4. Choanocyte

Looked at 3 different sponges Grantia

Basket
Both
Finger

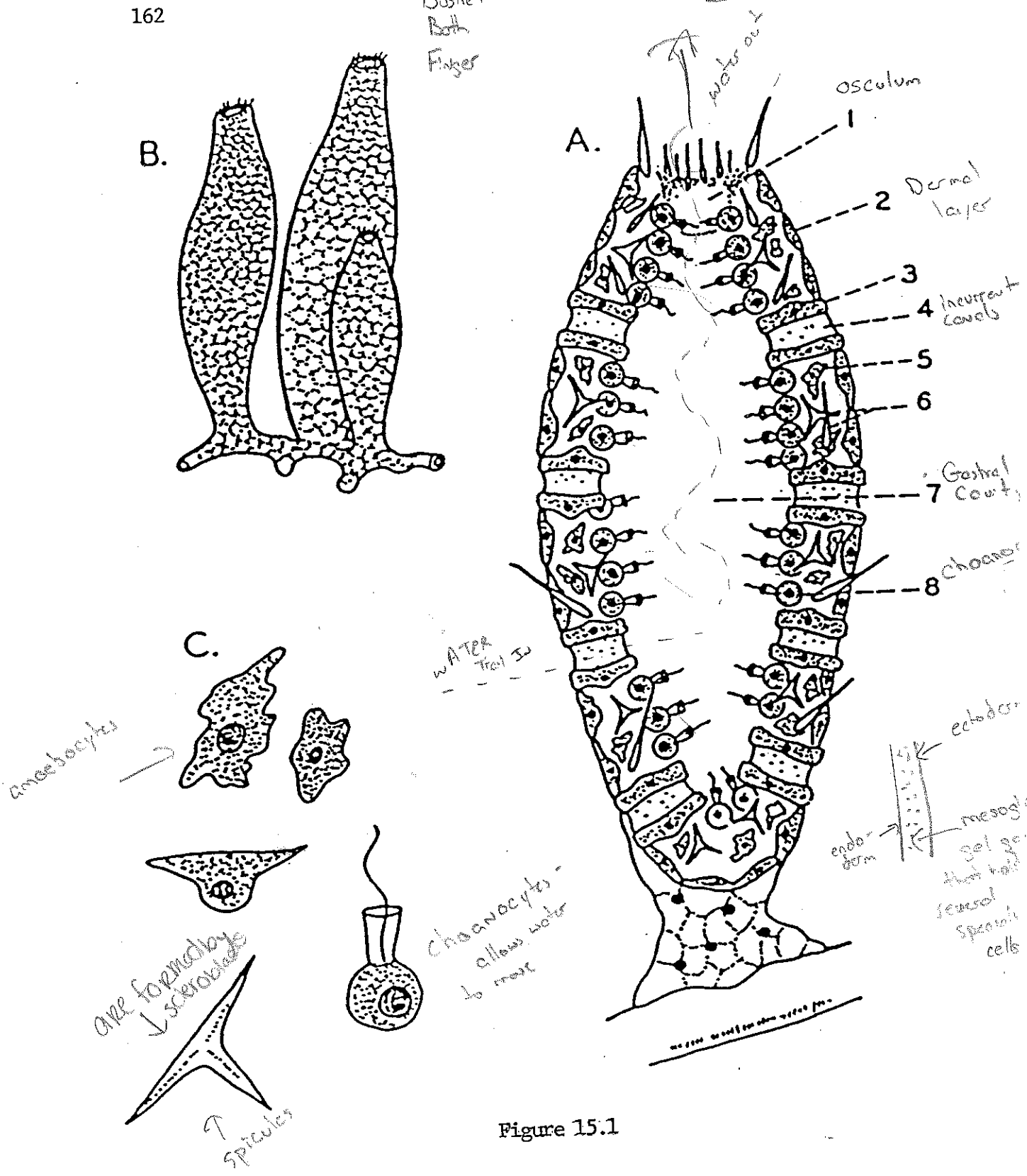


Figure 15.1

PORIFERA

Coelenterates include jellyfish, sea anemones, corals, and hydroids. Most are marine, but they occur in fresh water. The radially symmetrical adults may be either attached or motile; all larvae are ciliated and motile. Some members of this phylum exhibit an alternation of generations, i.e., an asexually reproducing generation (polyp) alternating with a sexually reproducing generation (medusa). Coelenterates exhibit a tissue level of body organization. A major characteristic is the presence of a saclike body of two cell layers which constitute two distinct tissues; an outer epidermis (ectoderm) and an inner gastrodermis (endoderm) which are separated by a noncellular material called the mesoglea. The saclike cavity within the body is called the gastrovascular cavity. A distinct characteristic of coelenterates is the presence of stinging cells which eject dart-like weapons of offense and defense. See Figure 15.2.

Using your stereo-microscope, examine one of the living Hydra, a common fresh water coelenterate, which your instructor has placed in a small dish of water. Note the tentacles surrounding the mouth and the basal disc attached to the dish.

Examine the prepared slide of Hydra, l.s. Locate the epidermis, gastrodermis, mesoglea, and gastrovascular cavity. Observe prepared slides of reproducing Hydra.

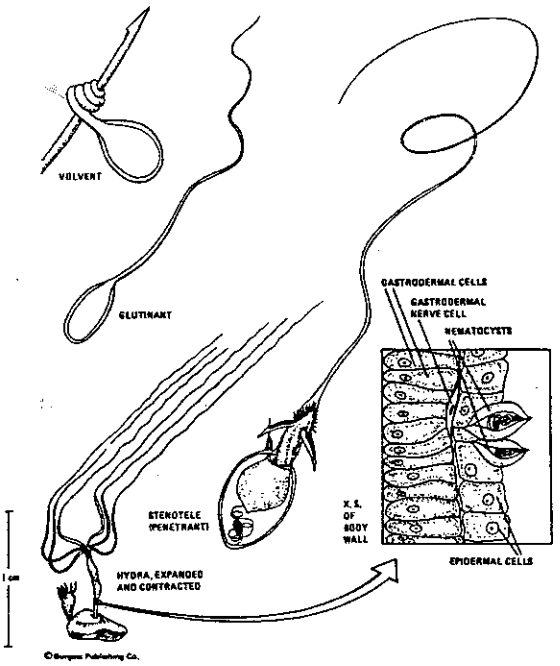


Figure 15.2

HYDRA, NEMATOCYSTS, APPEARANCE AND X.S. OF BODY WALL

Demonstration specimens of other genera of this phylum will be set up for observation. They may include sea fans, Portuguese Man of War, jellyfish, coral, and anemones. Give special attention to their taxonomic classification.

I. Characteristics of Phylum Coelenterata

- A. Radial symmetry
- B. Diploblastic
- C. Possess stinging cells called nematocysts
- D. Extracellular digestion
- E. Reproduce sexually by fertilization and asexually by budding
- F. Some species exhibit metagenesis (alternation of generations)

II. Classification

- A. Hydrozoa - Hydra, Obelia
- B. Scyphozoa - Jellyfish
- C. Anthozoa - Sea anemones and coral animals

III. A representative Coelenterate -- The Hydra

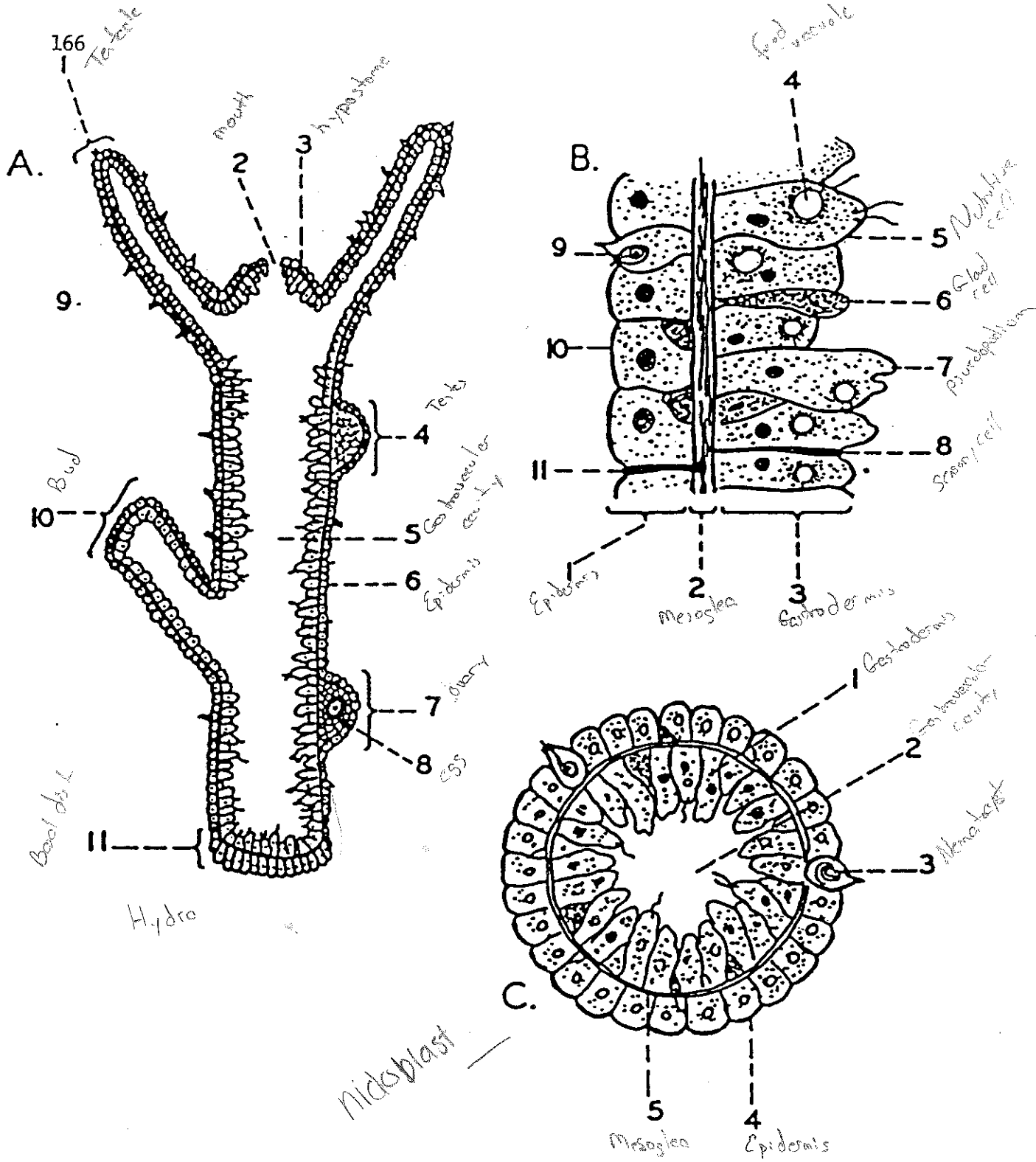
- A. Logintudinal Section
  1. Tentacle
  2. Mouth
  3. Hypostome
  4. Testis
  5. Gastrovascular cavity
  6. Epidermis
  7. Ovary
  8. Egg
  9. Nematocyst
  10. Bud
  11. Basal disk

B. Histology

1. Epidermis
2. Mesoglea
3. Gastrodermis
4. Food vacuole
5. Nutritive cell
6. Gland cell
7. Pseudopodium
8. Sensory cell

C. Cross Section

1. Gastrodermis
2. Gastrovascular cavity
3. Nematocyst
4. Epidermis
5. Mesoglea



COELENTERATA

Figure 15.3

EXERCISES

1. Trace the path of water as it passes through Grantia.
2. Name two tissue layers of coelenterates.
3. What is the function of the nematocyst in the Hydra?
4. Hydra is a diploblastic animal. What does this mean?

DRAWINGS (Use the space above)

1. Draw and label a Hydra.
2. Draw a budding Hydra in outline.

These last pages of this exercise included labeled specimens, a brief list of characteristics and classification, that should be helpful in your lecture as well as this laboratory.

If time permits, your instructor may choose to show a brief film on the Coelenterates.