Chapter 6
Porifera
Unicellular Protists
choanoflagellates-colonial organization

Theories of Unicellular Origin of Metazoans
1) 1874-Haeckel first proposed metazoans arose from a colonial flagellated form & cells gradually became specialized
2) as cells in a colony became more specialized, the colony became dependent on them
3) colonial ancestral form was at first radially symmetrical, & reminiscent of a blastula stage of development
4) this hypothetical ancestor was called a blastea
5) another hypothetical ancestral forms similar to a gastrula may have existed, & refer to them as gastraea
6) Bilateral symmetry evolved when the planula larvae adapted to crawling on the floor

7) Molecular Evidence
   a) small subunit rRNA & biochemical pathways support the colonial flagellate hypothesis
   b) metazoans appear to be monophyletic & arising from choanoflagellates

Monophyletic group contains the most recent common ancestor of all members of the group & all of its descendants
Phylum: Porifera: “pore-bearing”; their sac-like bodies are perforated by many pores.

5000 species
mostly marine: found in all seas and at all depths; they vary greatly in size
few brackish
some 150 live in fresh water

General Features
1) some sponges appear radially symmetrical, but many are irregular
2) some stand erect, some branched, & some encrusting
3) embryos free-swimming, adult sponges always attached
4) sessile: efficient aquatic filter
5) flagellated “collar cells”, or choanocytes, move water (with food) through pores
6) brightly colored → pigments in their dermal cells
7) growth patterns often depend on characteristics of the environment
8) many other animals live as commensals or parasites in or on sponges
9) sponges also grow on a variety of other living organisms
10) few animals prey on sponges
11) sponges may have elaborate skeletal structure & often have anoxious odor

12) skeletal structure of a sponge can be fibrous and/or rigid
   a. rigid skeleton: calcareous or siliceous spicules
   b. fibrous portion → collagen fibrils in intercellular matrix
   c. one form of collagen, spong in, comes in several types
   d. composition along with their shape of spicules → basis of sponge classification
Class
   Calcarea  small calcareous sponges
         spicules
          composed of CaCO$_3$
          monaxons or 3 or 4 rays

   Hexactinellida  glass sponges
         spicules
          composed of silica
          6 rayed

   Demospongiae
         95% of living sponges
         spicules
          composed of silica
          not 6 rayed
          bound together by spongin or may be absent
Three Body Forms

Sycon

Radial canal lined with choanocytes
Dermal ostium
Incipient canals lined with pinacocytes
Prosopytes
Mesohyl
Spongocoel
Apopyle
Gemmule: reproductive packet filled with archaeocytes
A. Developing demosponge

B. Ovum → 16-cell stage → Blastula → Inversion → Amphiblastula → Gastrula → Mature ecyonid sponge

class: Calcarea

Leucosolenia

Euplectella
class: Hexatinellida
class: Demospongiae

Poterion
class: Demospongiae

Callyspongia
class: Demospongiae

Class: Calcarea
Class: Demospongiae

Marine Demospongiae on Caribbean coral reefs