

# Phylum Protozoa through Phylum Cnidaria

BI 103 Marine Biology  
Laboratory Notes 04

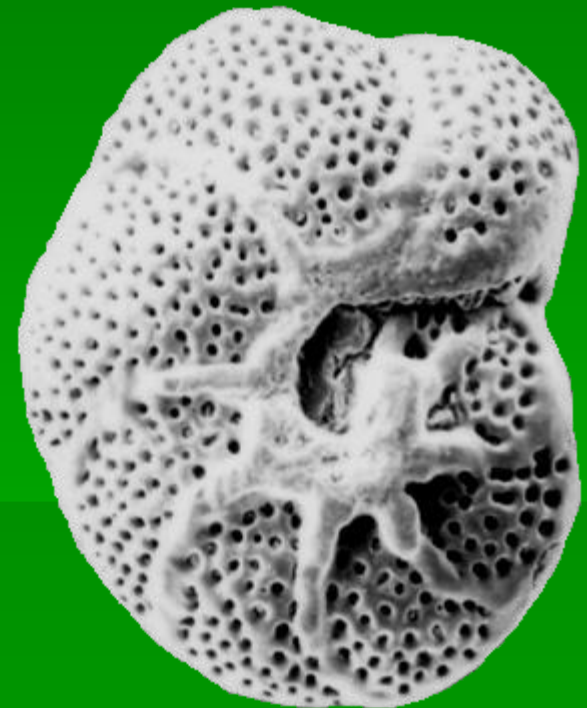
## ■ PHYLUM PROTOZOA

- proto, Greek for 'first', and zoa, Greek for 'animal'
- all are eukaryotic heterotrophs
- all are unicellular and microscopic, although some may be colonial
- some possess chloroplasts and are capable of photosynthesis
- some 50,000 species have been described

## ■ Class Foraminifera

- some 250,000 species (including fossil species) have been described, and all living species are marine
- may be planktonic or benthic
- all are amoeboid, but with a shell
  - their shells are also referred to as **tests**, because, in some forms, the protoplasm covers the exterior of the shell
  - the shells are commonly divided into chambers, which are added during growth
  - the simplest forms are open tubes or hollow spheres

- the shell may be made of calcium carbonate, organic compounds, or sand grains and other particles cemented together



- from the pores in the test, extensions of the cytoplasm called **reticulopodia**, (similar to the pseudopodia of an amoeba, although much more numerous and thinner) enable motility and feeding



- fully grown individuals range in size from about 100  $\mu\text{m}$  to almost 20 cm long
- most species are heterotrophic, feeding on foods ranging from dissolved organic molecules, bacteria, diatoms and other single celled phytoplankton, to small animals such as copepods
- some of the larger living species have a symbiotic relationship with **zooxanthellae**, which they "farm" inside their shells

- Guam species

- *Baculogypsina sphaerulata*
- a.k.a. star sand
- abundant in beach sand in Guam, and predominant on many wind-swept beaches



- *Marginopora vertebralis*
  - a.k.a. paper shells

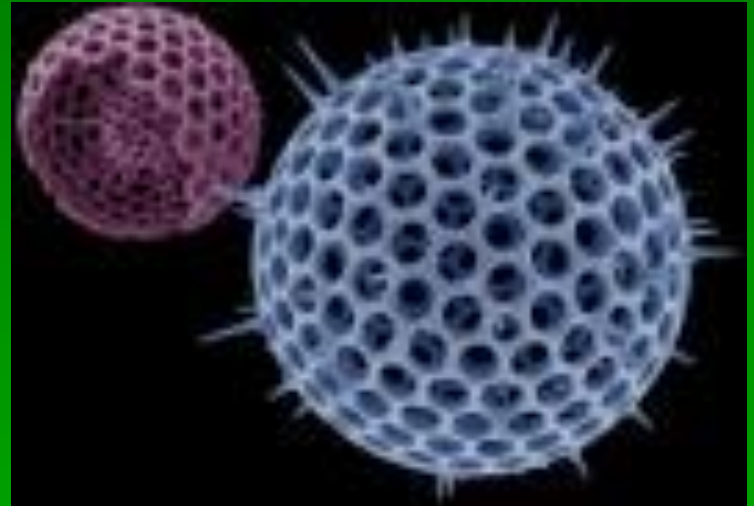


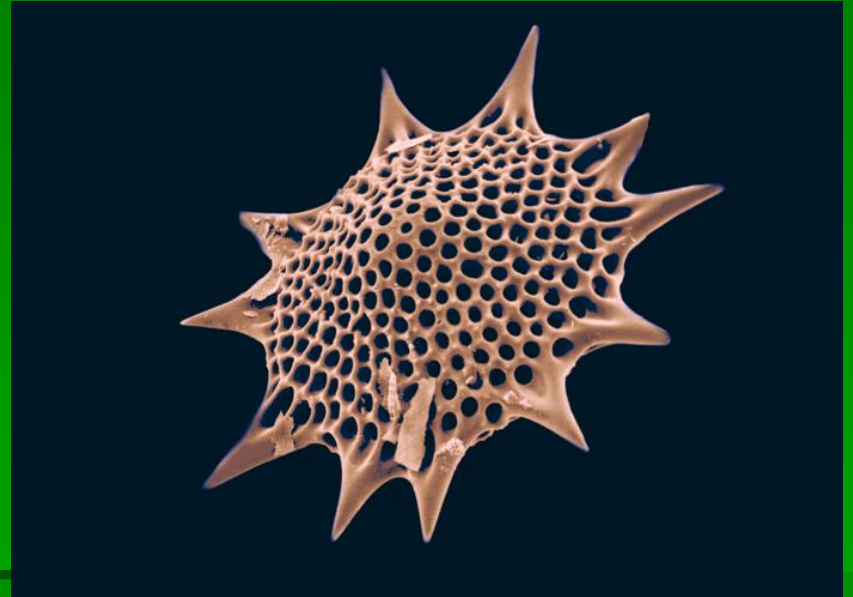
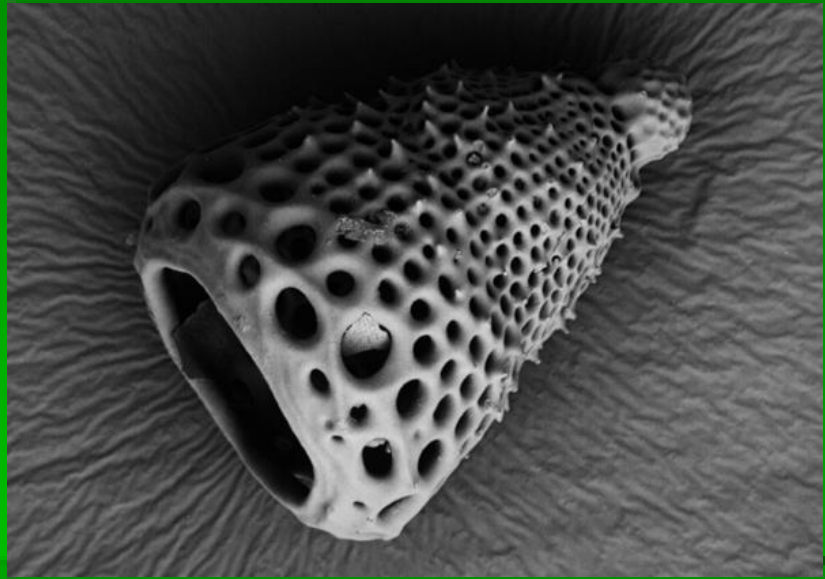


## ■ Class Radiolaria

- an ancient group, going back all the way to the early Cambrian Period 540 Mybp
- their silica skeletons are often perfect in geometric form and symmetry, making them perhaps the artistically most beautiful of all protozoans
- skeletons tend to have arm-like extensions that resemble spikes, which are used both to increase surface area for buoyancy and to capture prey

- most radiolarians are planktonic, ranging anywhere from 30  $\mu\text{m}$  to 2 mm in diameter
- can reproduce sexually or asexually
- may be filter-feeders or predators, and some may form symbiotic relationships with zooxanthellae



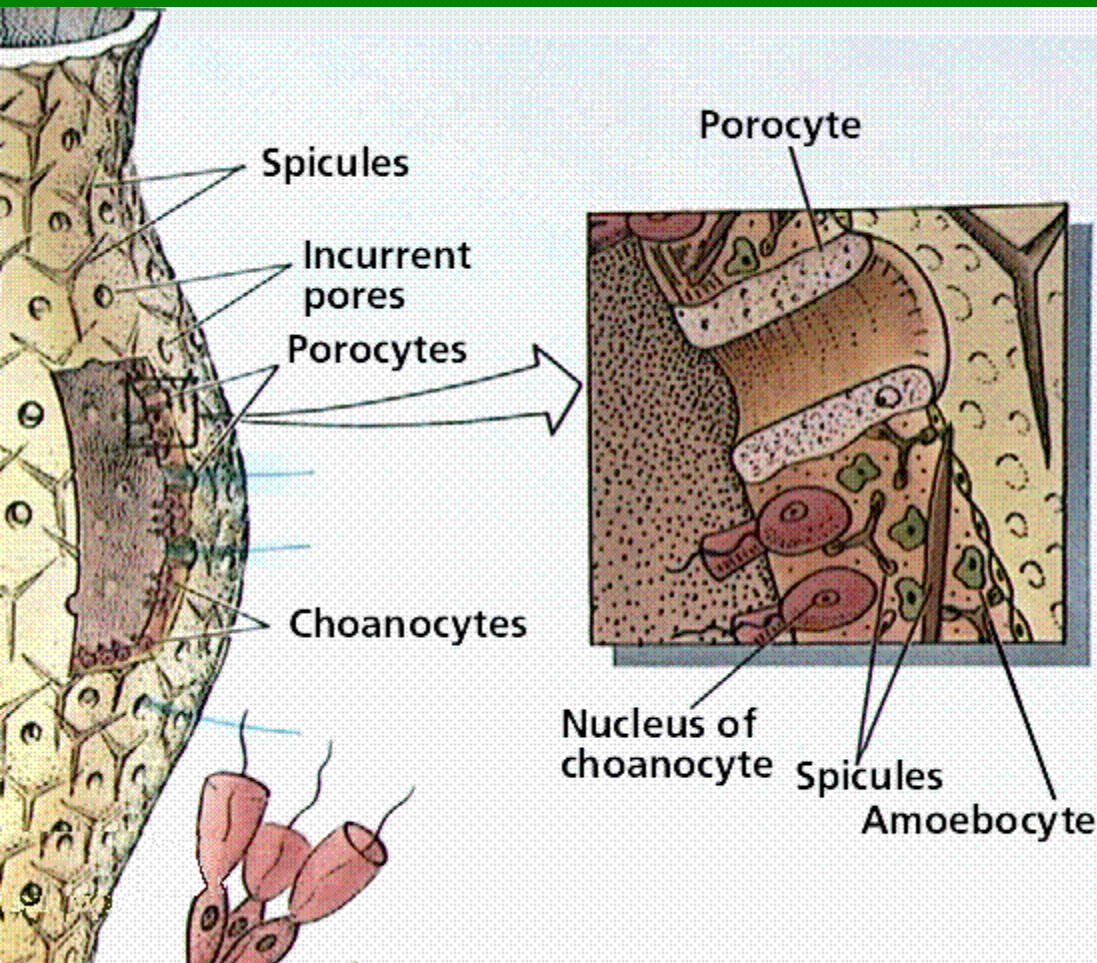


## ■ PHYLUM PORIFERA

- better known as sponges
- best described as colonial aggregations of specialized cells
  - the cells are essentially independent individuals, and do not form tissues or organs
- some 6,000 species, most of which are marine
- all are sessile
  - permanently attached to the substrate

- body is characterized by numerous tiny pores, called **ostia**
  - hence, the name Porifera, *pori*, which is Latin for 'small opening' or 'pore', and *fera*, which is Latin for 'bearer'
- Ostia are openings through which water enters the sponge for filtration of food particles

- Ostia lead into chambers lined by **choanocytes**, or collar cells
  - Each collar cell has a flagellum that creates water currents and a collar that traps food particles that are ingested by the body of the cell
- Water exiting the chambers passes into a larger internal chamber and out of the sponge through an opening called the **osculum**





- larger sponges have some skeletal support in the form of **spicules**
  - spicules are needle-like rods that may be calcareous or siliceous
- reproduction may be sexual or asexual
  - sexual reproduction is by budding
  - sexual reproduction involves the transformation of collar cells into gametes; fertilization is external



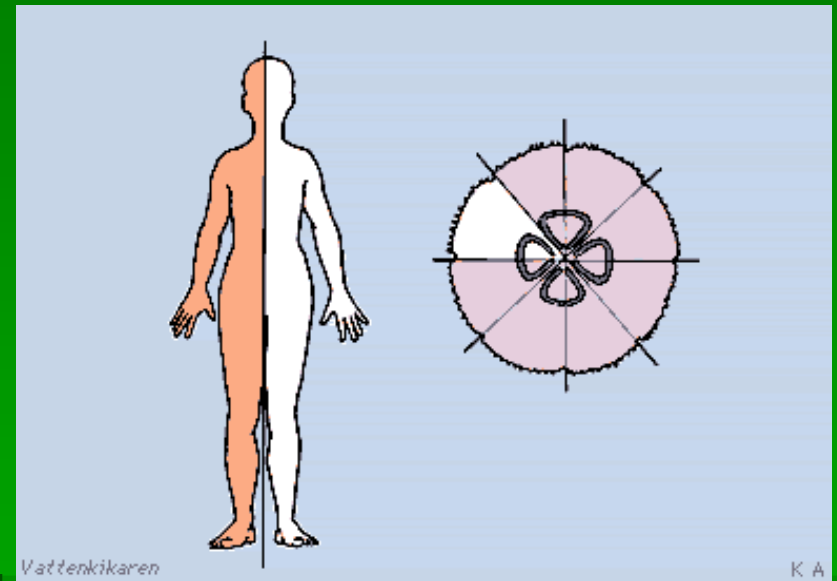
- Guam has a large number of sponges species, which have not been thoroughly studied
- *Cinachyra australiensis*
  - small, ovoid sponge on the reef flat
  - note the oscula



## ■ PHYLUM CNIDARIA

- name is derived from Greek *cnidos*, meaning 'stinging nettle'
- some 9,000 species are known, most of which are marine
- have true tissue level of development
- Digestive system is a blind sac

- display **radial symmetry**
  - Central mouth opening, surrounded by tentacles
  - Any plane through the mouth produces mirror-image halves
  - Compare to bilateral symmetry

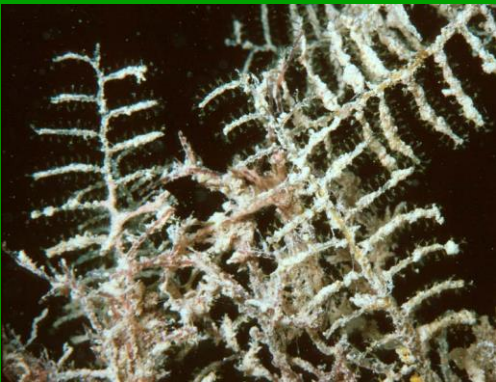


- May exist in either of two forms
  - **Polyp**
    - Anemone-like, sedentary or sessile morph
  - **Medusa**
    - Bell-like, or jellyfish-like, motile morph
- All possess **nematocysts**
  - Nematocysts are better known as stinging cells, but not all are venomous

- Types of Cnidaria

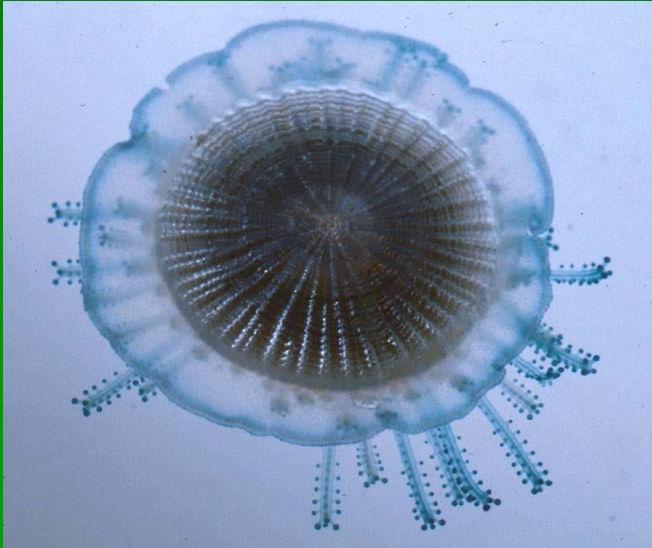
- Class Hydrozoa

- Common in lagoons and harbors in Guam
    - Complex life cycle
      - Medusae with male and female reproductive organs bud off from a mature hydroid
      - They then reproduce sexually, forming zygotes that develop into planulae, or larvae
      - These planulae settle down to form polyps, which may remain solitary or form colonies



- Class Scyphozoa
  - True jellyfishes
  - Medusa is predominant stage of life cycle







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- Class Anthozoa

- Polyp is the predominant stage of the life cycle
- Includes sea anemones, sea fans, sea whips, stony corals, and soft corals
- Stony corals are noted for forming symbiotic relationships with zooxanthellae and for building extensive coral reefs



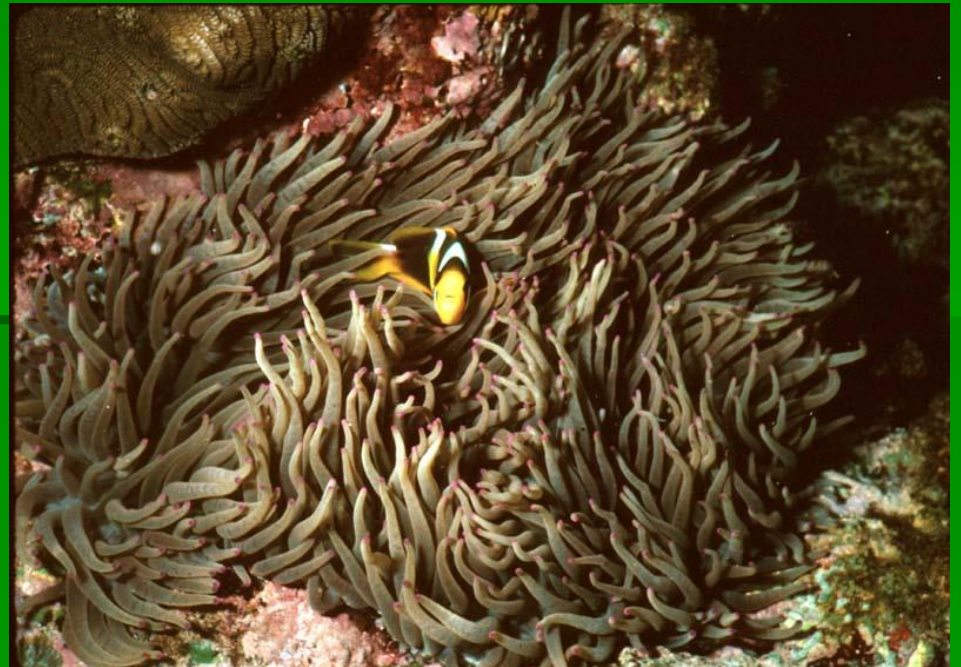
*Heliopora coerulea*



*Sinularia polydactyla*



*Aiptasia pulchella*



*Heteractis crispa*





*Acropora* species





*Goniopora* species







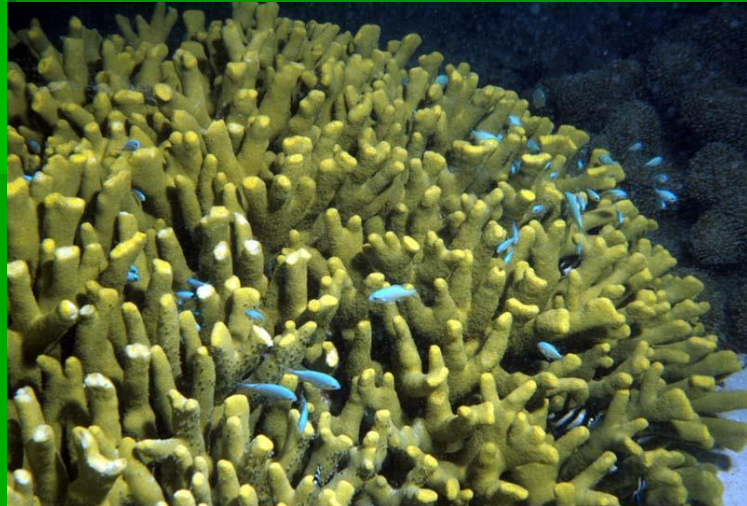
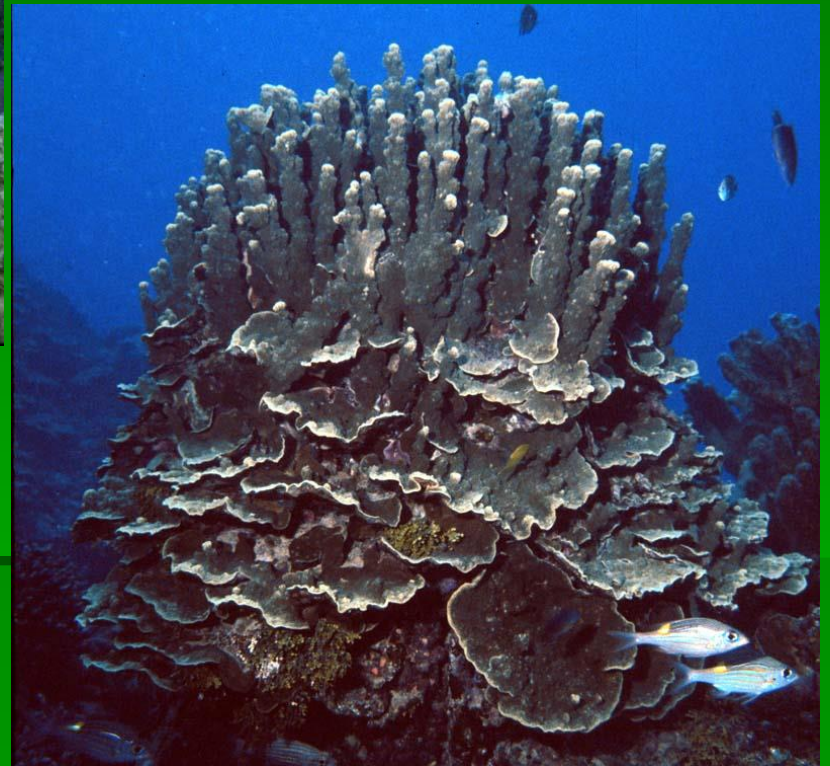
*Pocillopora* species







*Porites* species



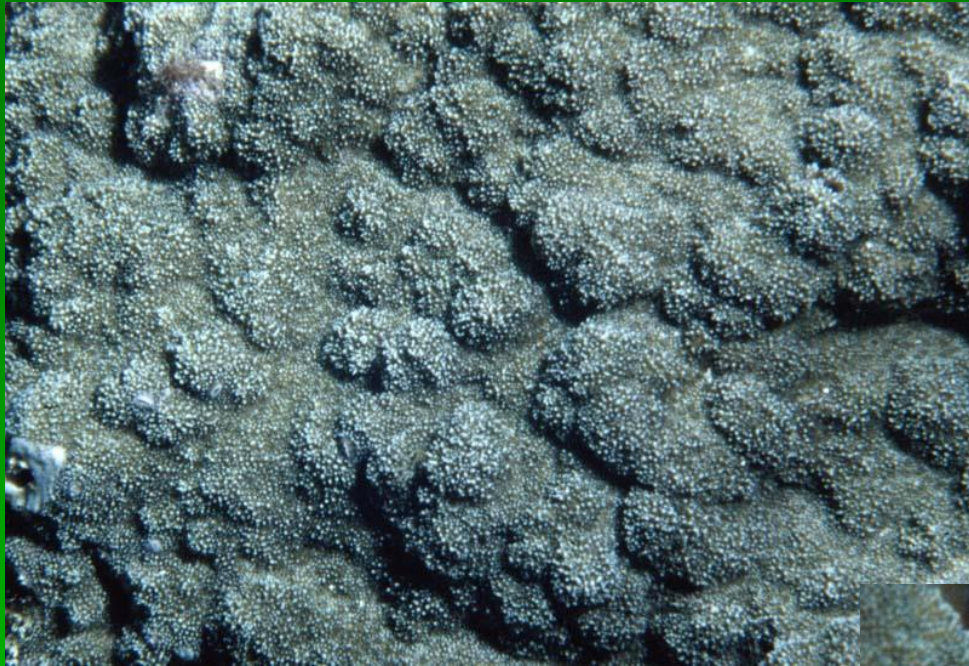




*Fungia* species







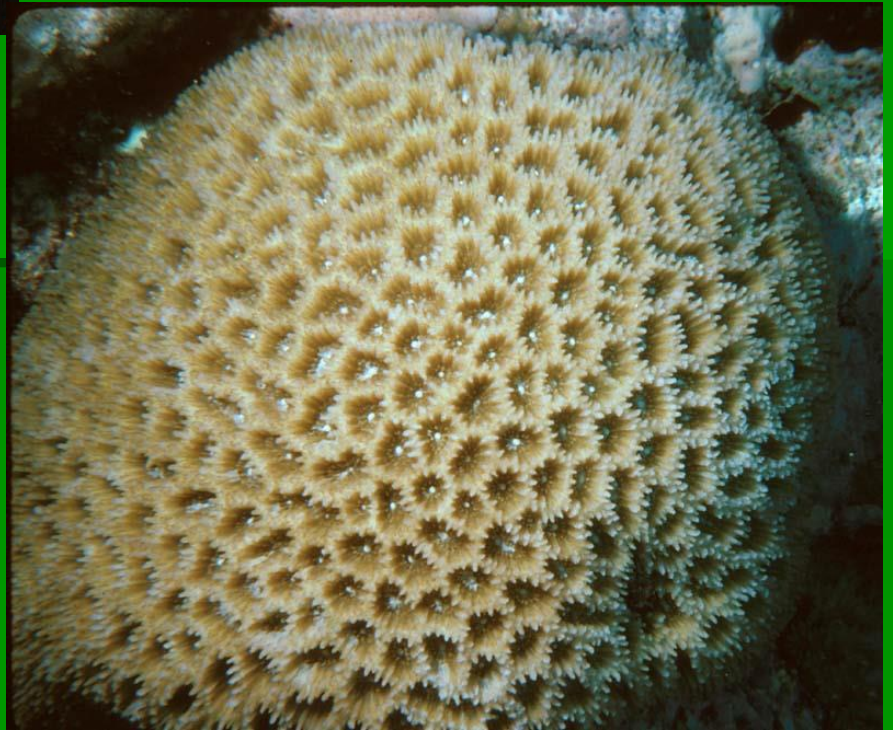
*Montipora* species







*Favia* species



*Leptoria phrygia*







*Pavona* species





*Lobophyllia* species

