

# Aquaculture Immersion Excursion 2009 Teacher Workshop



## Overview of Marine & Freshwater Plants M. Dennis Hanisak

**HARBOR BRANCH**

FLORIDA ATLANTIC UNIVERSITY

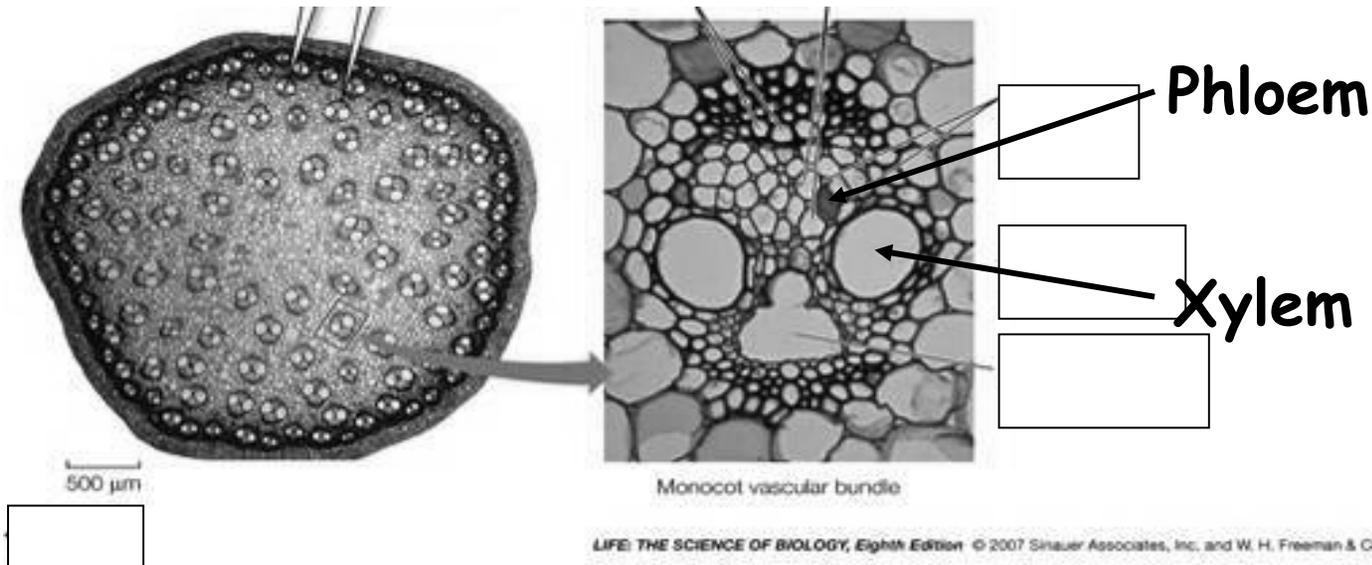
*Ocean Science for a Better World™*

# Outline

1. **What Are Vascular Plants?**
2. **What Are Algae?**
3. **Ecological Importance of Freshwater & Marine Marine Plants**
4. **Economic Importance of Freshwater & Marine Plants**
5. **Overview of Florida's Freshwater Plants**
6. **Overview of Florida's Seaweeds**

# Vascular Plants

- High degree of organization (organs)
  - Leaf, stem, root
- Vascular tissues
  - Xylem - conducts water & dissolved minerals
  - Phloem - conducts food (typically sugars)



# Flowering Plants

Kingdom Plantae

Phylum Angiospermatophyta

- A vascular plant with reproductive tissue surrounded by sterile tissue
- Reproduction is by flowers and seeds

# Ecological Importance of Freshwater & Marine Plants

- Primary producers
- Food
- Detritus food web
- Habitat
- Nutrient cycles
- Sediment production
- Sediment stability
- Reef formation and maintenance

# Economic Importance of Freshwater & Marine Plants

- Food
- Fodder
- Medicinal
- Fertilizer
- Chemicals (potash, soda, iodine)
- Phycocolloids (agar, carrageenan, alginate)
- Fuel
- Fisheries
- Recreation

# Algae

Algae are:

- Photosynthetic
- Non-vascular plants
- Contain chlorophyll *a*
- Have simple reproductive structures (=no sterile protective cells around the zygote)
- Little tissue differentiation (=no organs).

alga, algae (not **ALGAES!!**)

# Other Terms

- **Microalgae**
- **Macroalgae**
- **Seaweeds**
- **Macrophytes**

# Overview of Florida's Freshwater Plants

- **Submersed Plants** - grow entirely or almost entirely underwater
- **Emergent Plants** - grow out of the water
- **Floating and floating-leaved plants**
  - have leaves that float on the water's surface
  - either rooted to the bottom or free-floating
- **Marsh Plants** - Aquatic grasses, sedges, and rushes

# Native Submersed Freshwater Plants



Tape grass  
*Vallisneria americana*  
Photo by Vic Ramey  
Copyright 2001 Univ. Florida

***Vallisneria americana***  
**(Tape grass)**



Coontail  
*Ceratophyllum demersum*  
Photo by V. Ramey  
Copyright 2002 Univ. Florida

***Ceratophyllum demersum***  
**(Coontail)**



*Utricularia* spp.  
1996 Alison Fox

***Utricularia* spp. (Bladderwort)<sup>10</sup>**

# Native Emerged Freshwater Plants

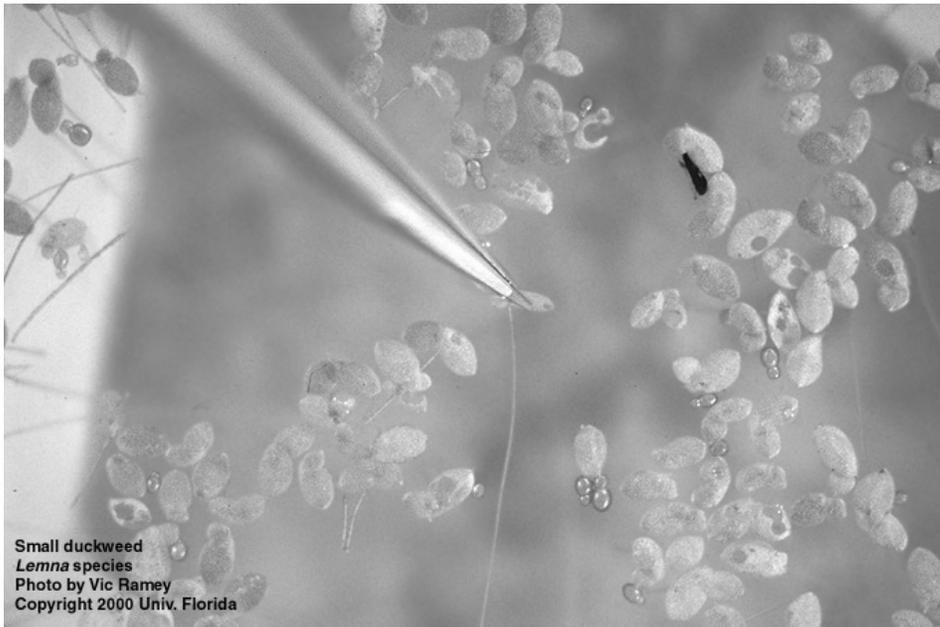


***Typha* spp.  
(Cat Tail)**



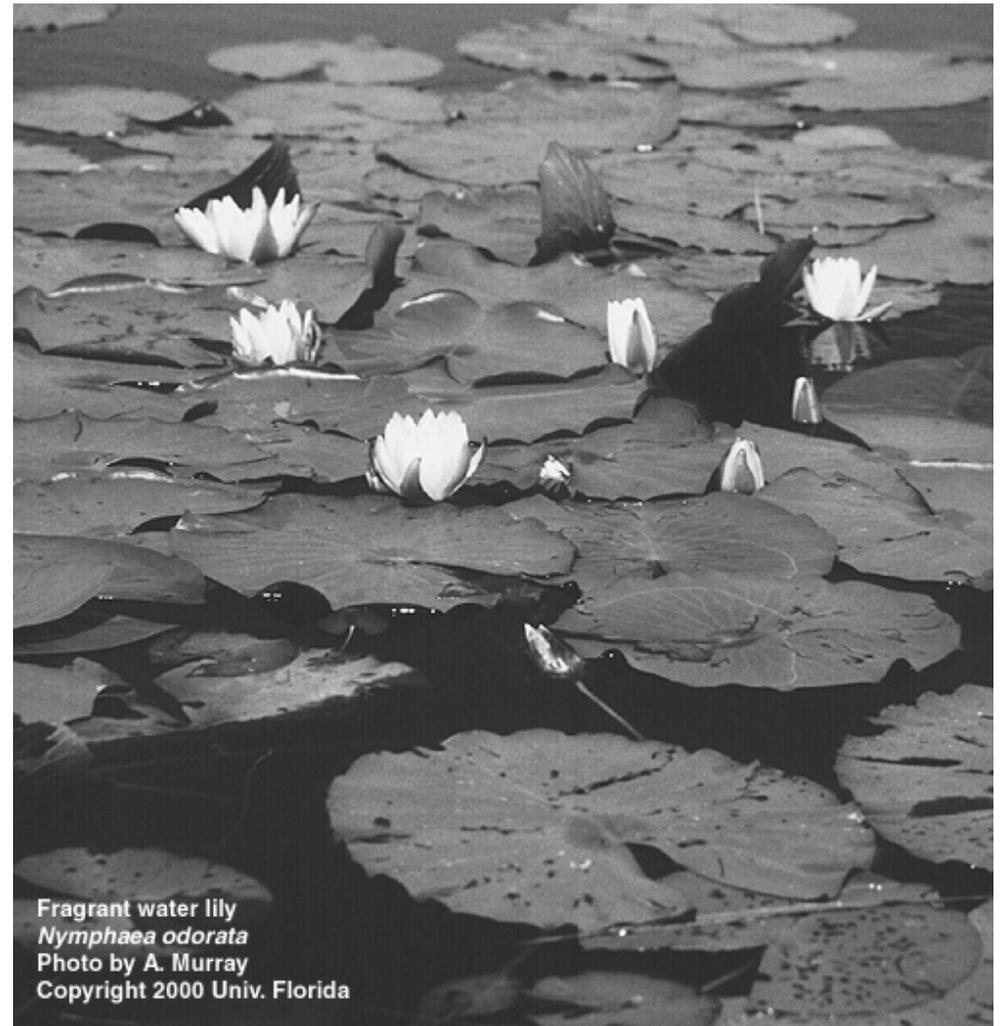
***Sagittaria* spp. (Arrowheads)**

# Native Floating and Floating-leaved Plants



Small duckweed  
*Lemna* species  
Photo by Vic Ramey  
Copyright 2000 Univ. Florida

***Lemna valdiviana***  
**(Small Duckweed)**



Fragrant water lily  
*Nymphaea odorata*  
Photo by A. Murray  
Copyright 2000 Univ. Florida

***Nymphaea odorata***  
**(Fragrant Water Lilly)**

# Native Grasses, Sedges, and Rushes



Saw-grass  
*Cladium jamaicense*  
Photo by A. Murray  
Copyright 2001 Univ. Florida

***Cladium jamaicense***  
**(Saw-Grass)\***

**\*Saw-Grass is a Sedge!**



Maidencane  
*Panicum hemitomon*  
Photo by A. Murray  
Copyright 2001 Univ. Florida

***Panicum hemitomon***  
**(Maiden Cane)**



*Juncus effusus*  
Soft rush  
Photo by Ann Murray  
Copyright 1999 University of Florida

***Juncus effusus*** (Soft Rush)

# Angiosperms in Florida's Marine Environment

- Tidal Marsh Plants
- Mangroves
- Seagrasses



*Spartina alterniflora* (smooth cord grass)



*Rhizophora mangle*  
(red mangrove)



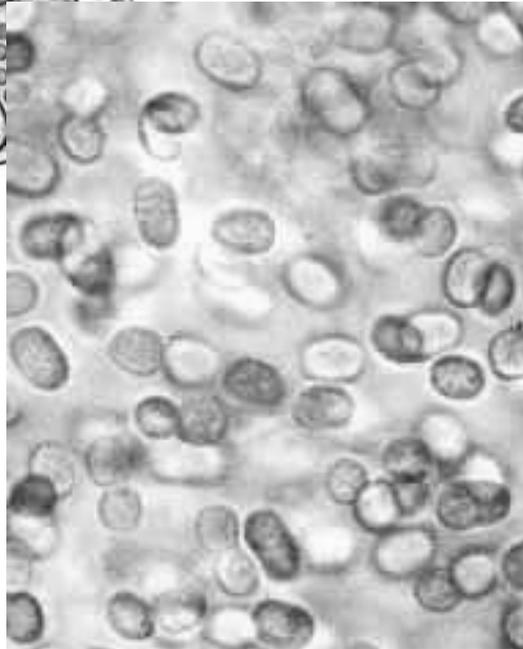
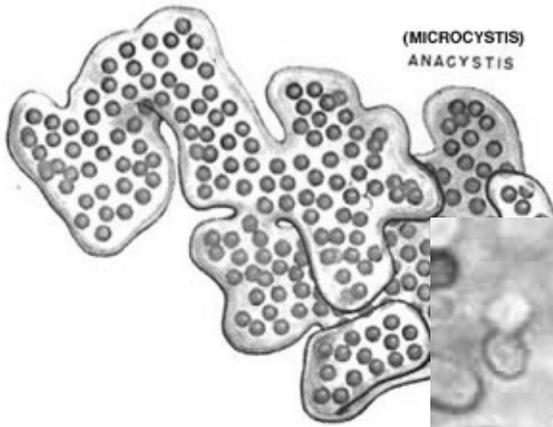
*Halodule wrightii* (shoal grass)

# Some Major Marine Algal Groups

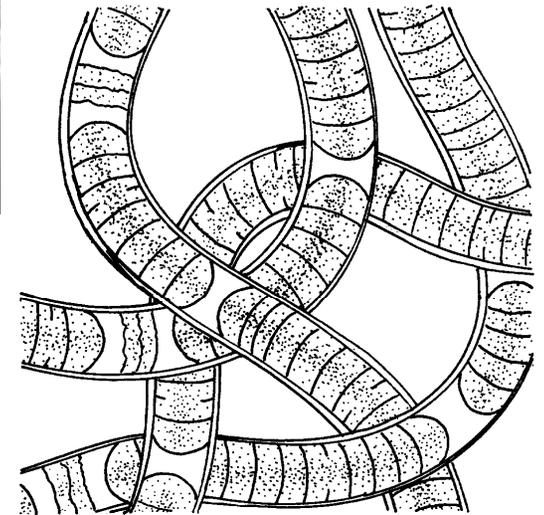
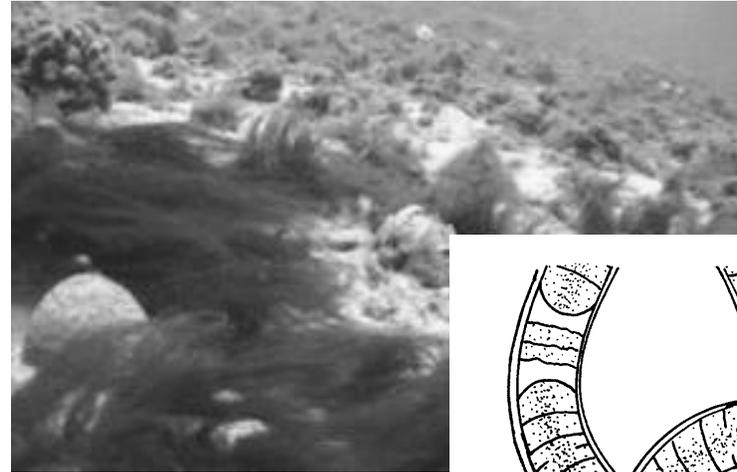
- **Microalgae**
  - **Cyanobacteria/Blue-Green Algae**
  - **Diatoms**
  - **Dinoflagellates**
  
- **Macroalgae/Seaweeds**
  - **Green Algae**
  - **Brown Algae**
  - **Red Algae**

# Cyanobacteria/Blue-Green Algae

Kingdom Monera (Prokaryota), Phylum Cyanophyta



*Anacystis*



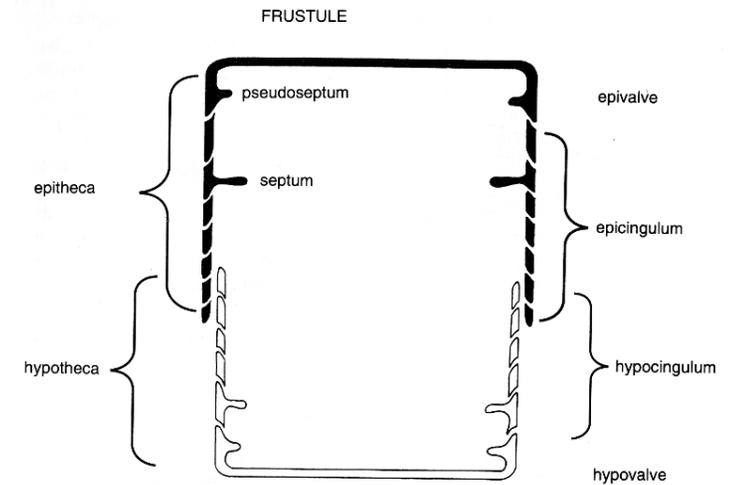
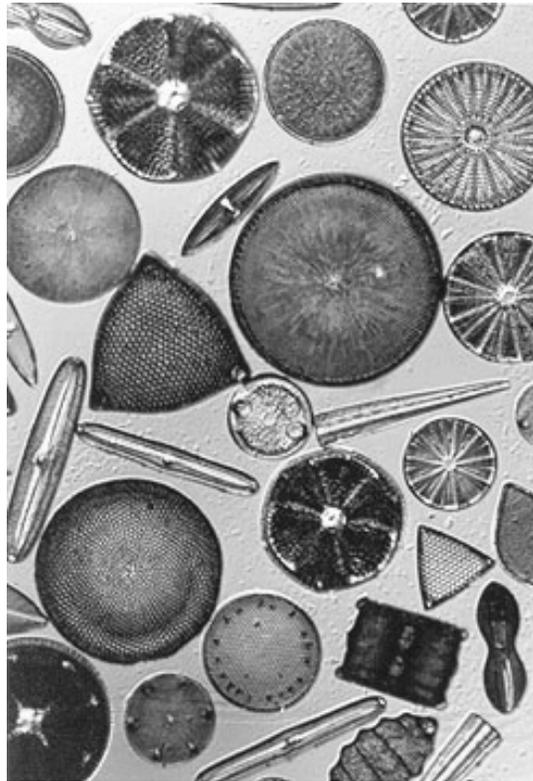
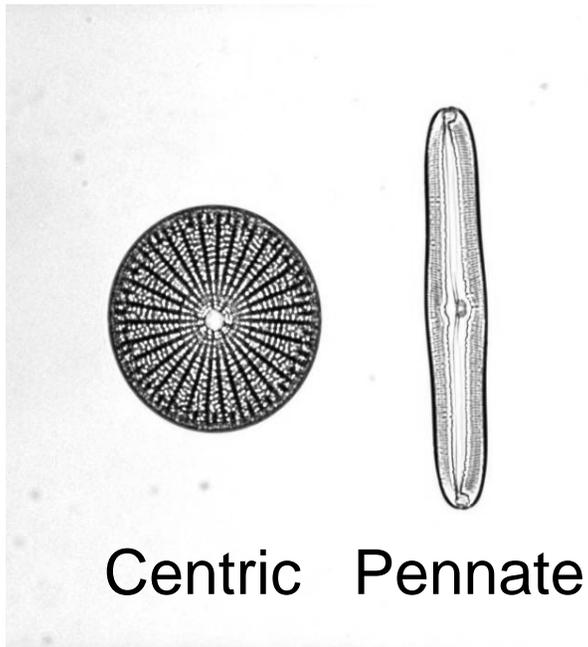
I. Livingstone © BIODIDAC

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*Lyngbya*  
16

# Diatoms

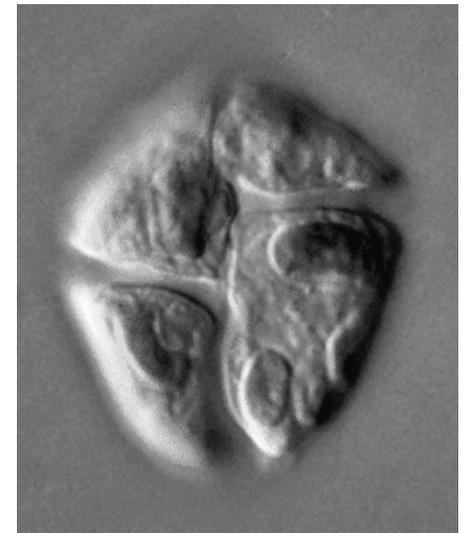
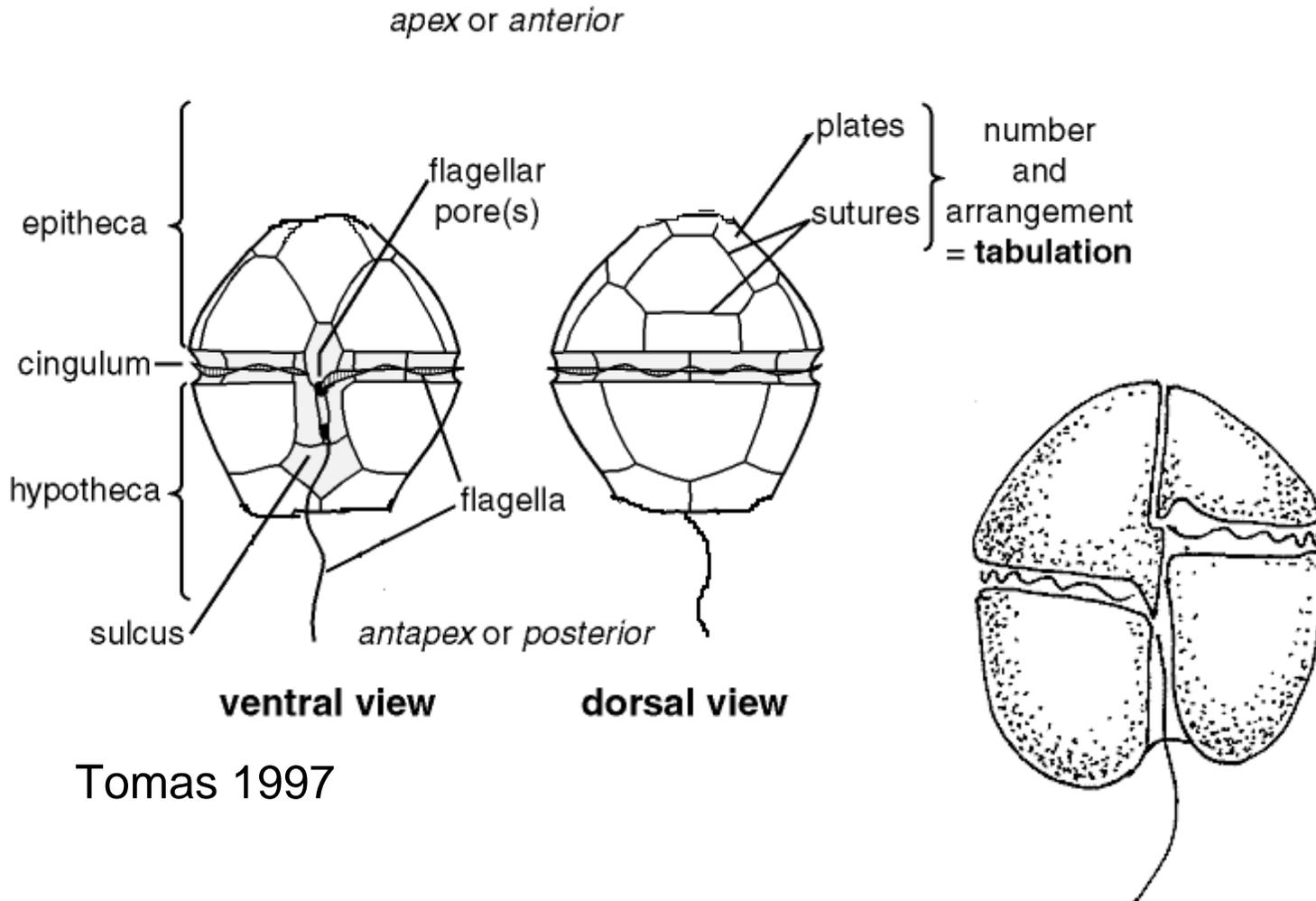
Kingdom Protista, Phylum Bacillariophyta



Tomas 1997

# Dinoflagellates

Kingdom Protista, Phylum Pyrrhophyta



*Karenia brevis*

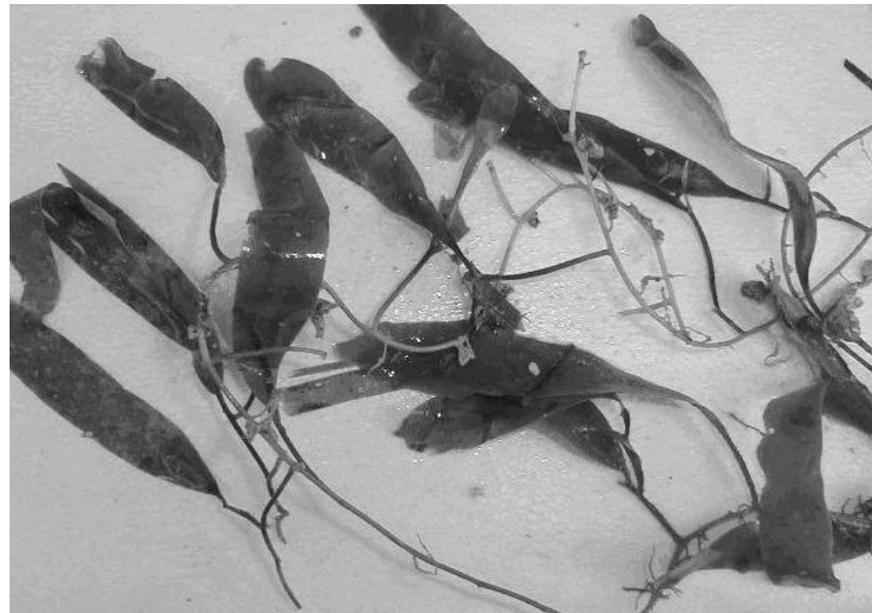
Tomas 1997

# Green Algae

Kingdom Protista, Phylum Chlorophyta



*Ulva lactuca*



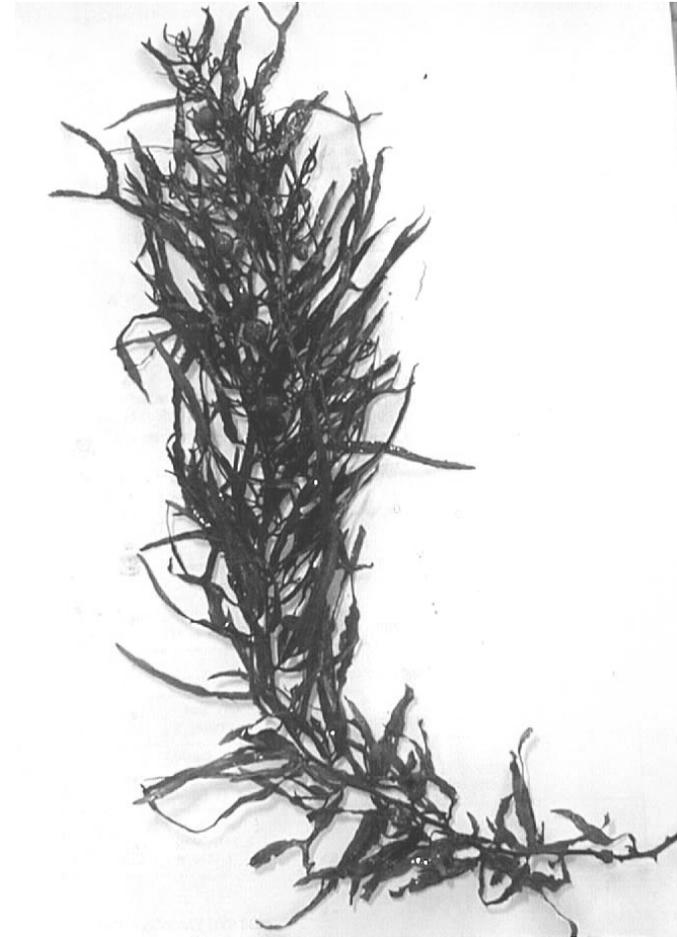
*Caulerpa prolifera*

# Brown Algae

Kingdom Protista, Phylum Phaeophyta



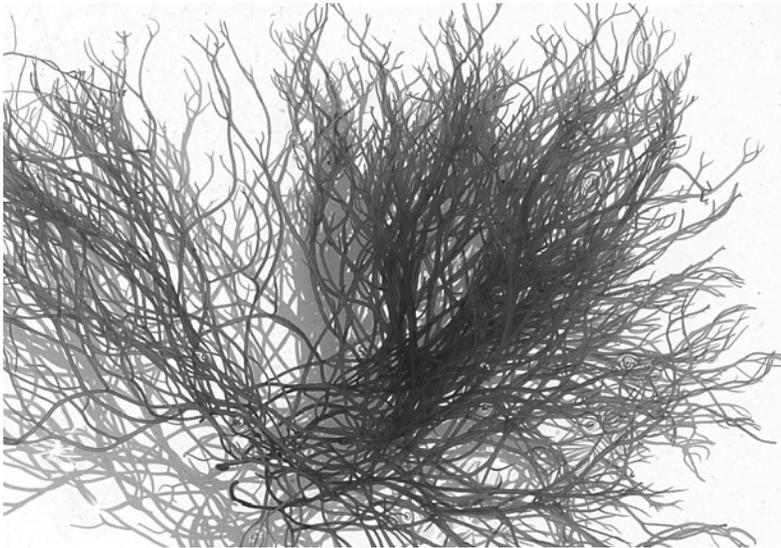
*Dictyota dichotoma*



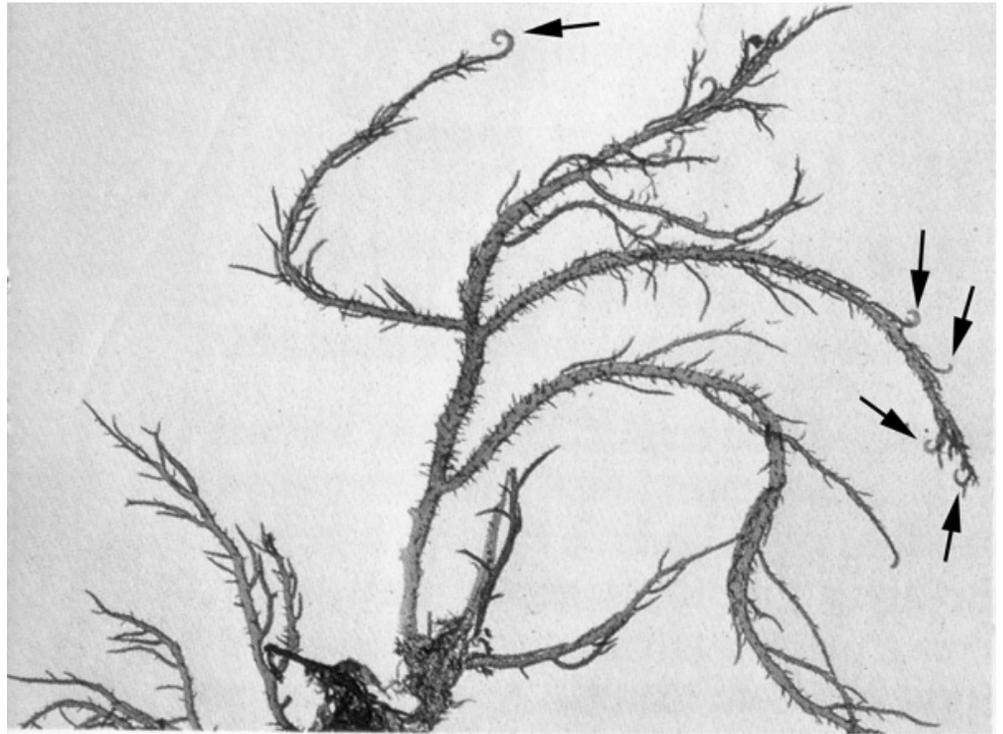
*Sargassum filipendula*<sup>20</sup>

# Red Algae

Kingdom Protista, Phylum Rhodophyta



*Gracilaria tikvahiae*



*Hypnea musciformis*

# References/Additional Reading

- Dawes, C.J. 1998. Marine Botany. Second Edition. John Wiley & Sons, New York. 480 pp.
- Dawes, C.J. and A.C. Mathieson. 2008. Seaweeds of Florida. University of Florida Press, Gainesville, FL, 656 pp.
- Hoyer, M.V., D.E. Canfield, Jr., C.A. Horsburgh, and K. Brown. 1996. Florida Freshwater Plants: Handbook of Common Aquatic Plants in Florida Lakes. 264 pp.
- Littler, D.S. and M.M. Littler. 2000. Caribbean Reef Plants: An Identification Guide to the Reef Plants of the Caribbean, Bahamas, Florida and Gulf of Mexico. Offshore Graphics, Inc., Washington, D.C. 542 pp.
- Littler, D.S., M.M. Littler, and M.D. Hanisak. 2008. Submersed Plants of the Indian River Lagoon. OffShore Graphics, Inc. 286 pages.
- Tomas, C.R. 1997. Identifying Marine Phytoplankton, Academic Press, New York. 858 pp.

## Highly Recommended Websites

<http://aquat1.ifas.ufl.edu/>  
<http://www.seaweed.ie/>  
<http://www.algaebase.org>