

# Invertebrate Field Biology

ENY 3163/5164

Summer B

Mondays/Wednesdays 8:00-12:15

Instructor: Dr. Akito Kawahara

Office: McGuire 218





*Phanaeus vindex*

THIRD EDITION

# The **Invertebrates**

A SYNTHESIS

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D. W. Golding & J. I. Spicer



# THE KAWAHARA LAB

## INSECT SYSTEMATICS, EVOLUTION, AND GENOMICS



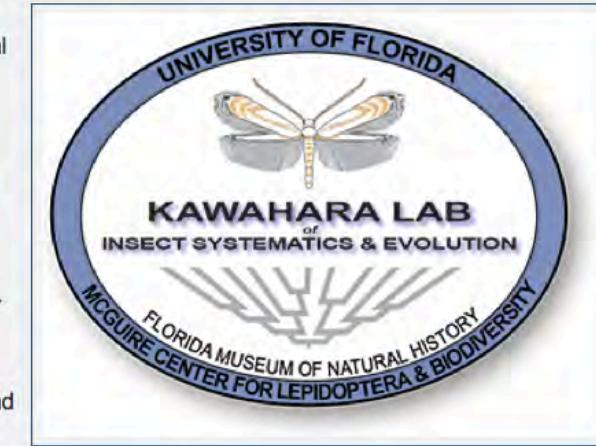
Florida Museum of Natural History, McGuire Center for Lepidoptera and Biodiversity

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The focus of our lab is the systematics, evolution, and behavior of arthropods, especially the butterflies and moths (Lepidoptera). Systematics is a fundamental discipline of biology that helps explain all of biodiversity, and the relationships among living organisms.

Utilizing genomics, traditional molecular approaches, and morphology, our research group examines evolutionary transitions in insects, such as historical shifts in life histories of leaf-mining moths, behavior of microlepidoptera, host-use evolution, caterpillar vibratory communication, and the evolution of hearing organs and bat evasion in hawkmoths. We also conduct comparative genomics to identify genes that are responsible for particular traits or behaviors.

Another main goal in the lab is to build on classification, and to link phylogeny with taxonomy. Our focus is on several different groups, namely the leaf-mining moths (Gracillariidae), twirler moths (Gelechiidae), hawkmoths (Sphingidae), and butterflies, but research is not restricted to these taxa. Many of these projects are being conducted in collaboration with [domestic and international collaborators](#).





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## Teaching

**Invertebrate Field Biology (ENY3163/5164):** This course will be offered during 2012 Summer Session B, through the Dept. of Entomology and Nematology. The course is for both undergrads and grad students, and focused on learning the invertebrate diversity of Florida. We will have many fun field trips to different collecting localities during the course. We will end the course by learning the marine inverts on a boat at Cedar Key. Click [here](#) for a course flier. [Course Materials](#).

**Phylogenetic Systematics Seminar (BOT6935/0332):** The goal of this seminar is to engage faculty and students and discuss recent papers in systematics/evolutionary biology. Faculty affiliated with the course come from a diverse background, and the format of the course includes the discussion of current papers of high interest/impact (e.g., Nature, Science, PNAS), papers on previously chosen topics (e.g., phylogeography; large phylogenetic trees; phylogenetics and climate change; systematics and conservation), or short research presentations by students. Additional information on the course can be found [here](#).

Additional courses will be listed as they become available.

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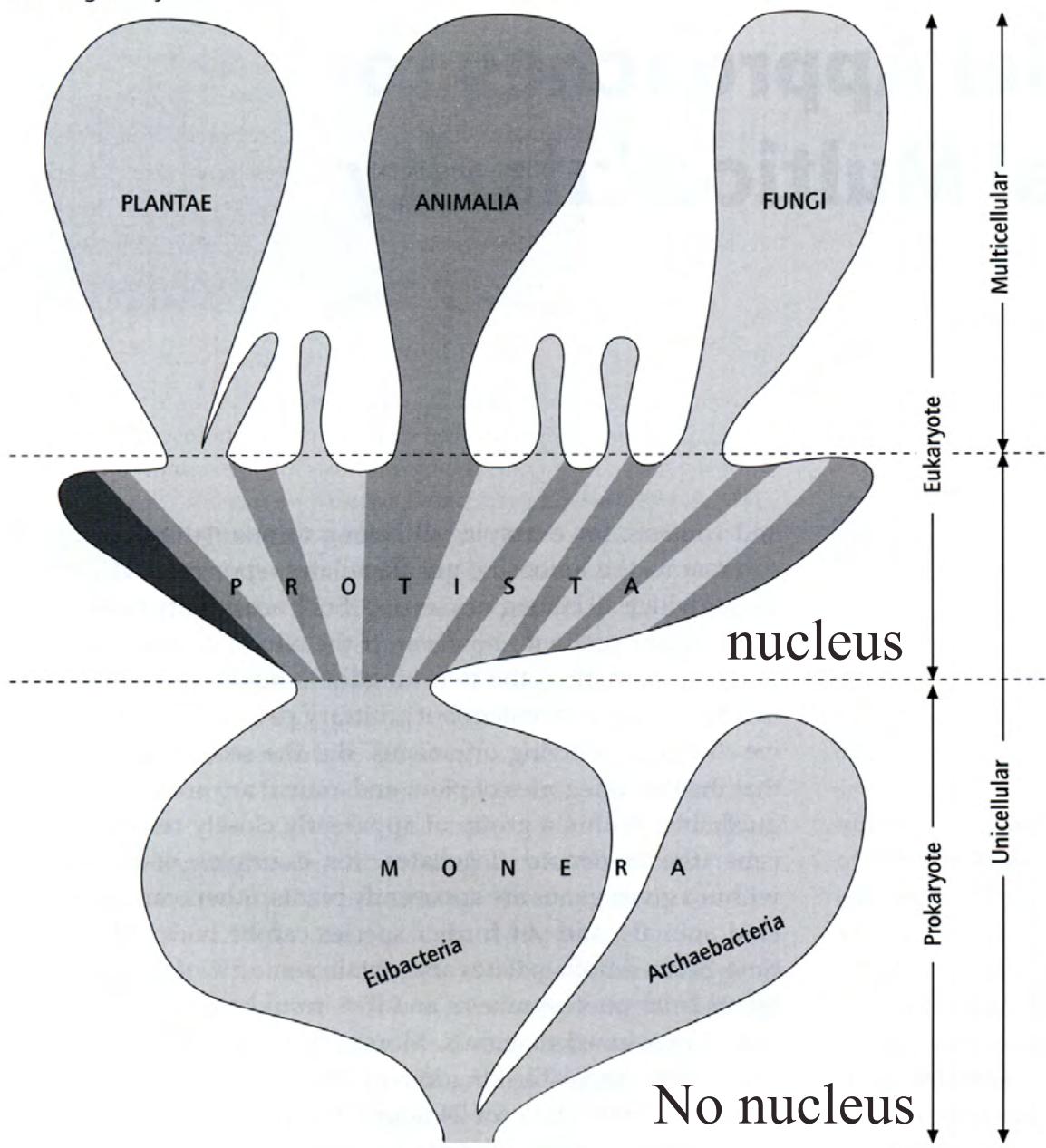
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## Protected: Invert Field Biology (ENY 3163/5164) – Course Materials

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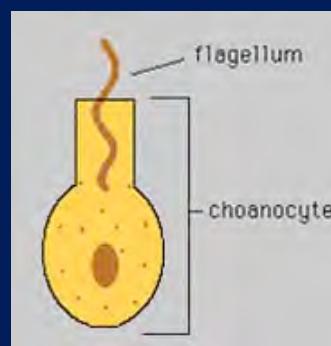
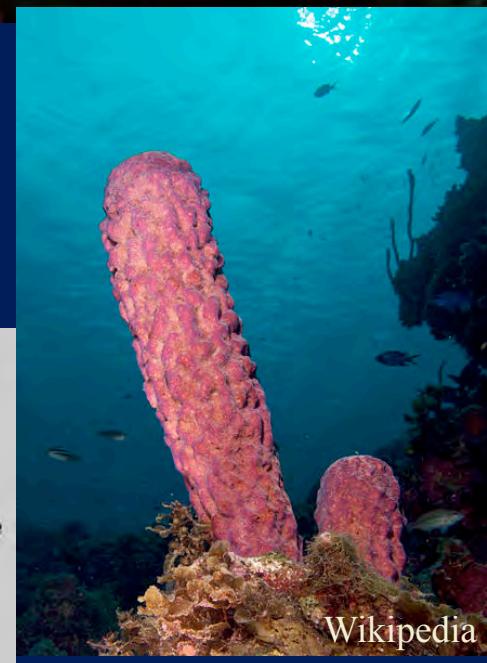
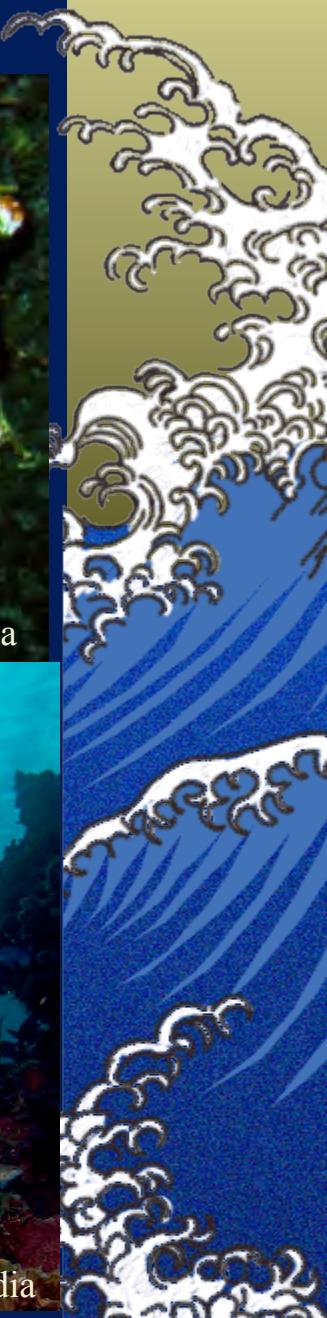
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## Five-kingdom system

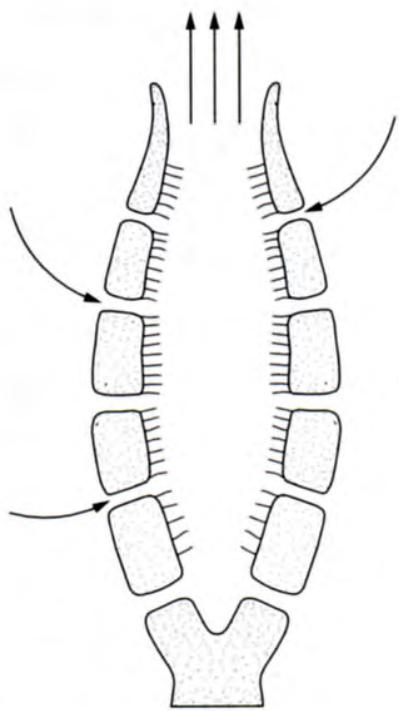


# Phylum Porifera: The Sponges

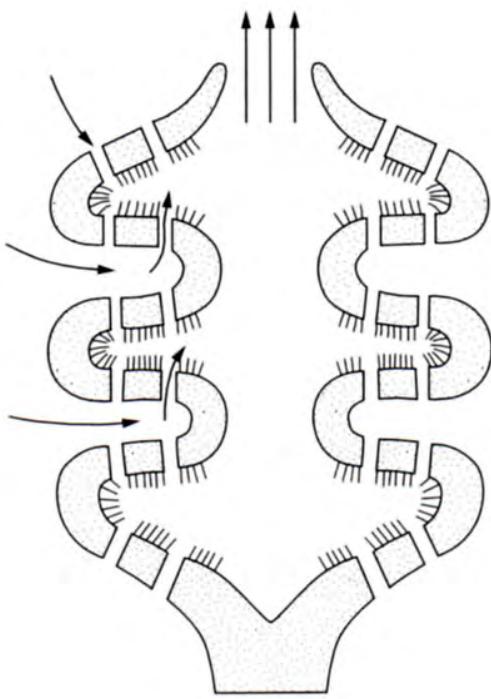
- ▶ Simple multicellular organisms
- ▶ Most are asymmetrical
- ▶ No organs, body built around a system of water canals
- ▶ Habitat: mostly marine, a few freshwater
- ▶ Choanocytes or collar cells along internal margins
- ▶ Usually Hermaphroditic



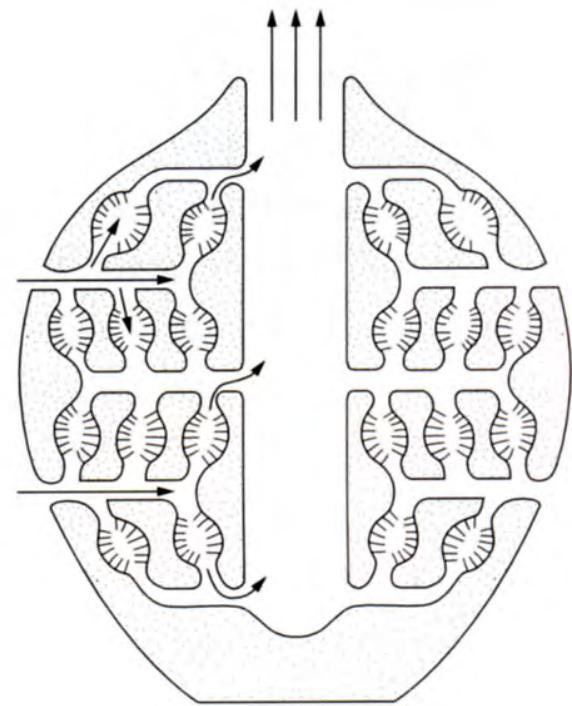
# Three types of bodily complexity in sponges



Asconoid

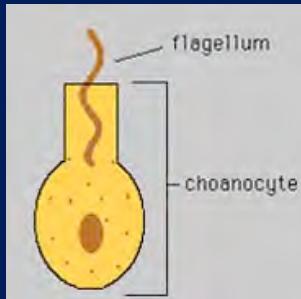


Syconoid



Leuconoid

Differs by the folding  
of the wall of the tube



# Longitudinal section of a sponge

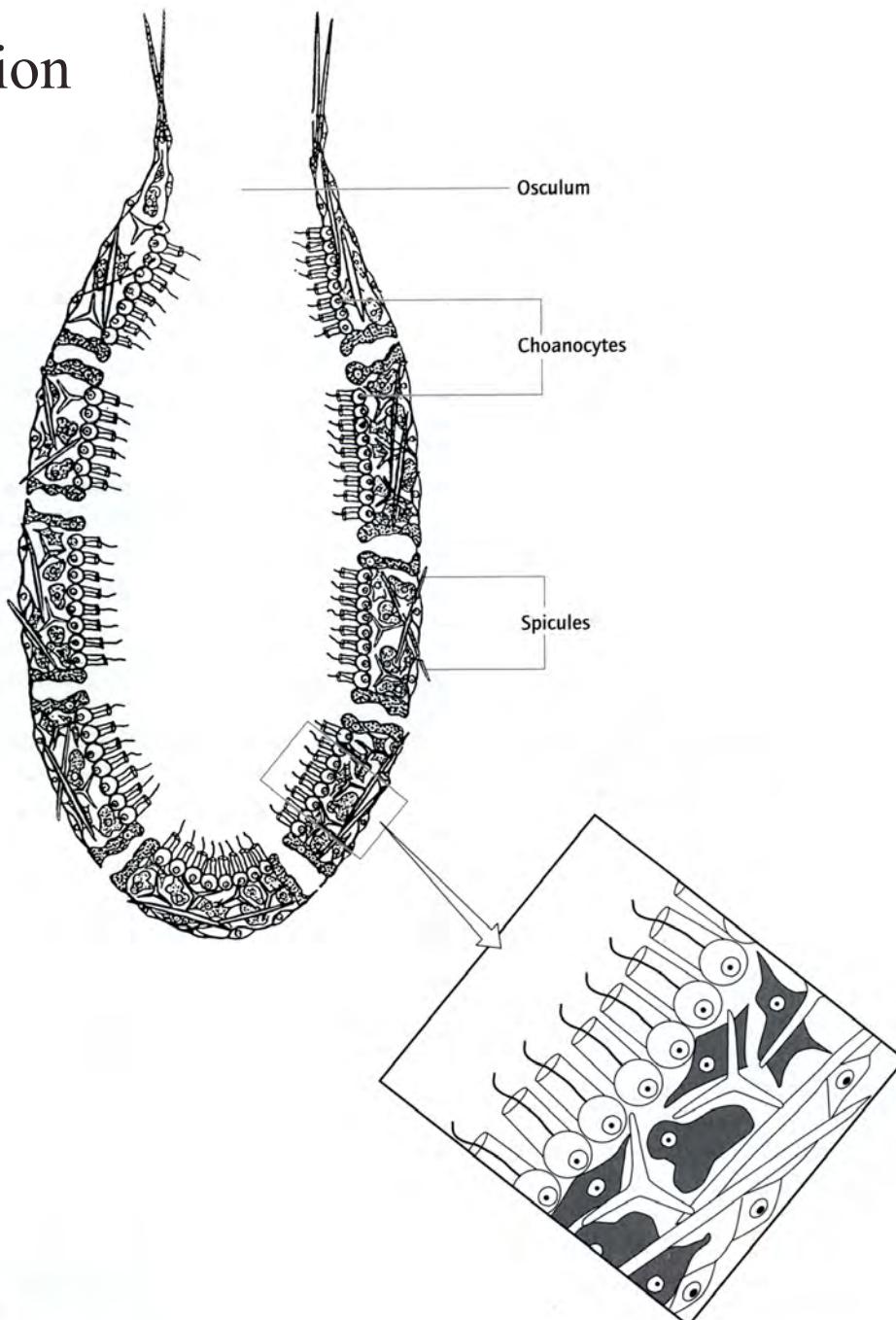
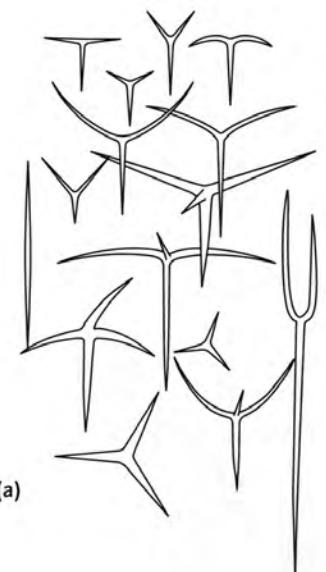


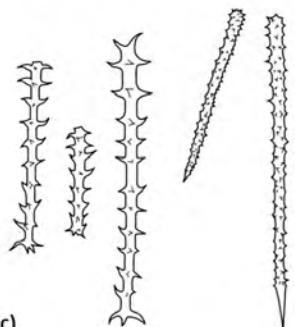
Fig. 3.3 Diagrammatic longitudinal section down the tube of a simple sponge (after Hyman, 1940).



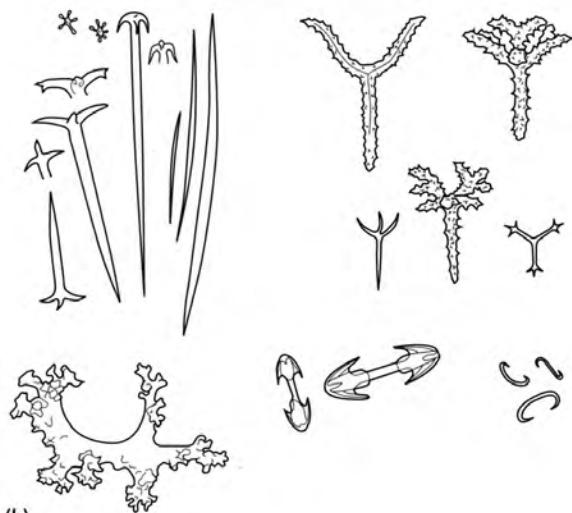
# Phylum Porifera: cellular sponges



(a)



(c)



(b)

Skeletal spicules



# Phylum Cnidaria: Hydras, Sea Anemones, Corals, Jellyfish

- ▶ Two epithelial layer:  
Gastrodermis and Epidermis
- ▶ Radial Symmetry
- ▶ Habitat: mostly marine
- ▶ Have a single opening to the  
coelenteron (body cavity)
- ▶ Stinging cells (nematocysts)



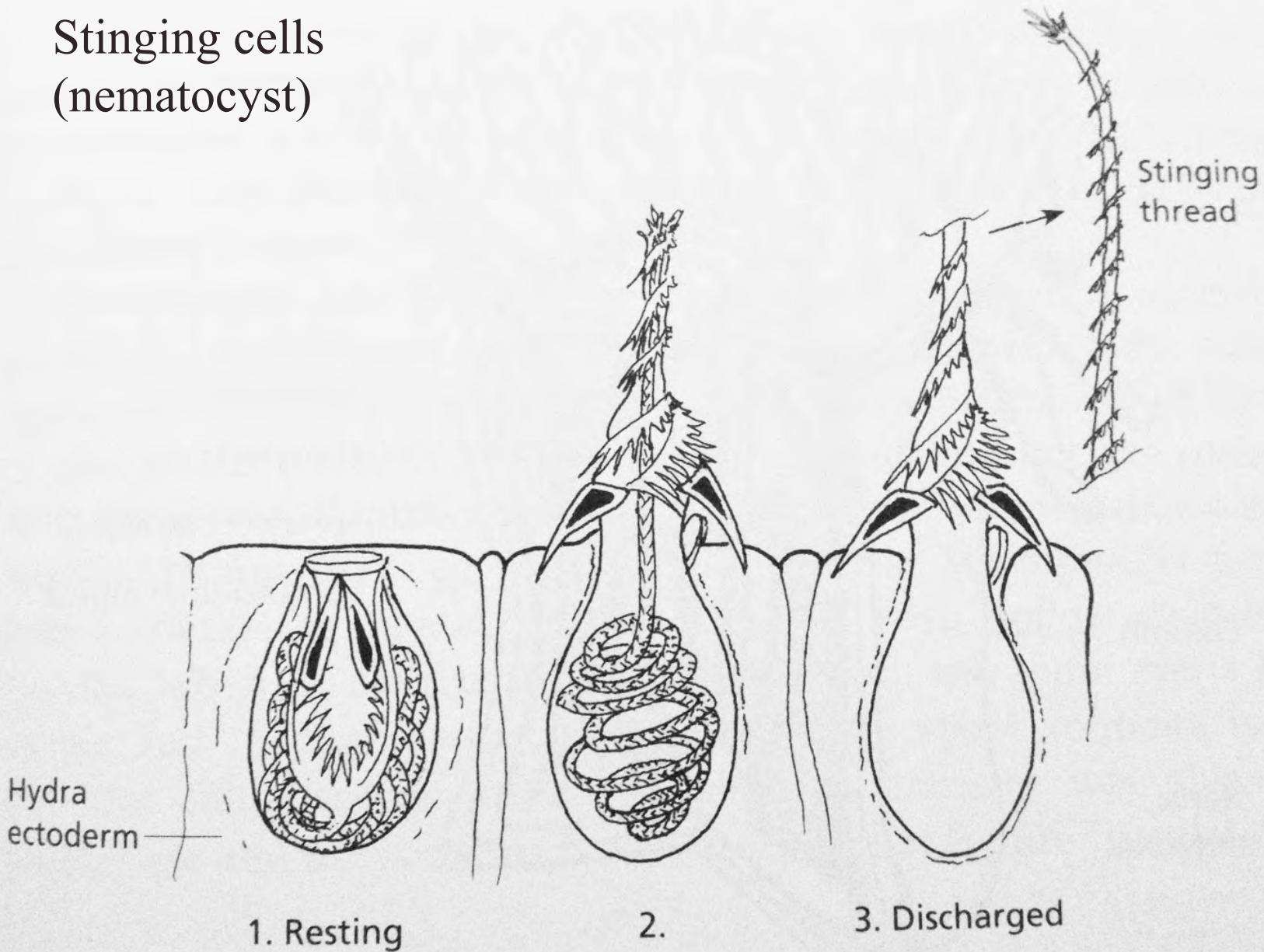
Coral



Siphonophore



# Stinging cells (nematocyst)





University of California

## Hydroids



University of California

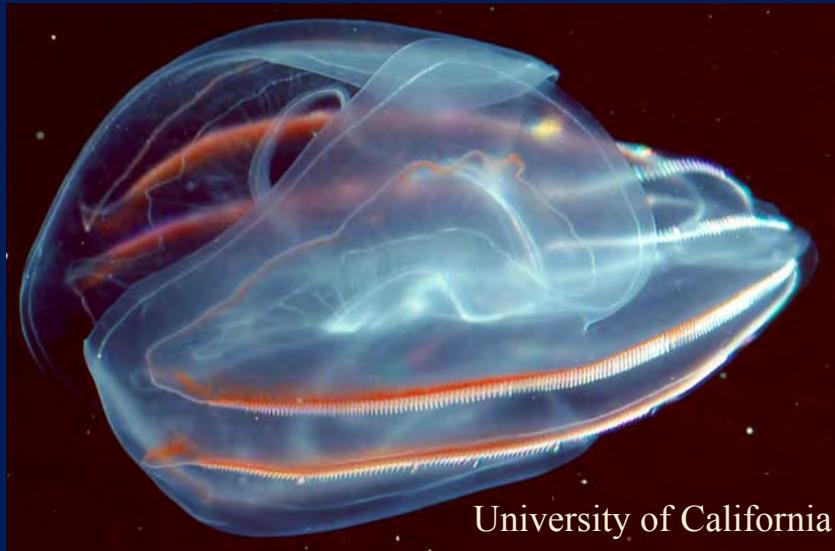
## Medusae Cnidarian

- ▶ Mouth is generally surrounded by stinging cells called nematocysts
- ▶ Generally Hermaphroditic



# Phylum Ctenophora: Sea Walnuts, Comb Jellies

- ▶ Eight longitudinal rows of ciliary combs or ctenes
- ▶ Not very large, but some up to 1.5 m!
- ▶ Use sticky collarblasts (no toxin) for prey capture
- ▶ Known for bioluminescence



- ▶ Habitat: Marine
- ▶ Hermaphroditic



# Collecting Methods

Hand Catch

Kill Jars

Aerial Net

Sweep Net

Aquatic Net

Aspirators

Pitfall Traps

Baited Traps

Beating Sheet

Berlese Funnel

Black Lights



# Extra Credit: Clearwing Hawkmoth: Must be collected alive, placed vial in freezer

