

BIO 221

Invertebrate Zoology I

Spring 2010

Stephen M. Shuster
Northern Arizona University

Lecture 10

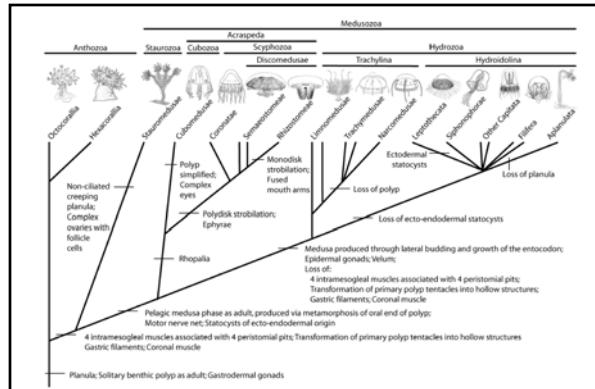
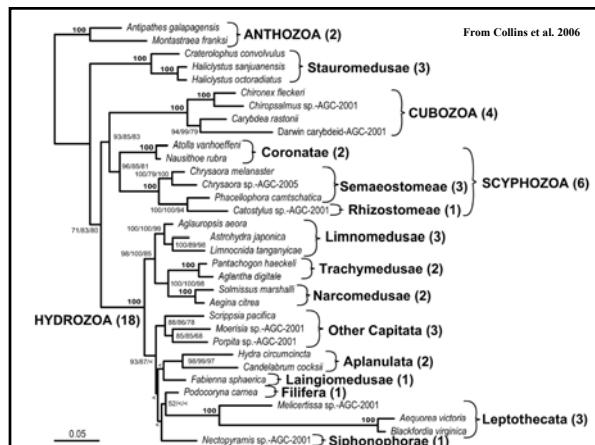


FIGURE 7. Working hypothesis for cnidarian relationships with selected hypothesized ancestral characters mapped at nodes. Diagrams representing taxa are after figures in Mayer (1910), with the exception of representatives of Octocorallia and Siphonophorae, which are modified from Hyman (1940), and Hexacorallia, which was drawn by Crissy Hulford.

From Collins et al. 2000

Cnidarian Classes

Hydrozoa

Scyphozoa

Cubozoa

Stauromedusae

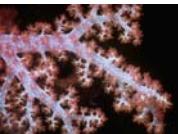
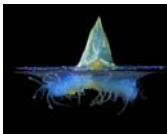
Anthozoa

Medusozoa

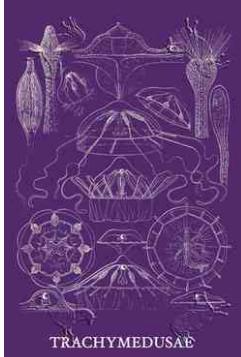
Class Hydrozoa



1. Includes over 2,700 species, many freshwater.
2. Generally thought to be most ancestral, but recent DNA evidence suggests this may not be so.



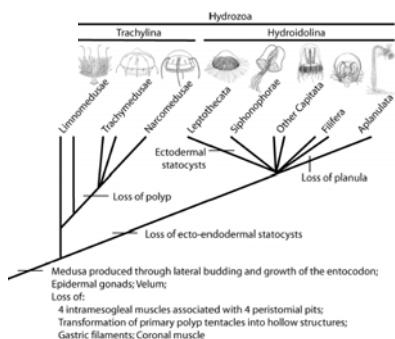
Class Hydrozoa



Trachyline Hydrozoa seem most ancestral – *within* the Hydrozoa.

1. seem to have mainly medusoid life stage
2. character (1): assumption of metagenesis

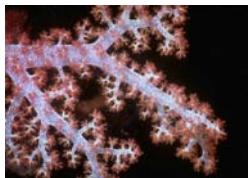
Class Hydrozoa



Trachyline
Hydrozoa seem
most ancestral.

1. seem to have mainly medusoid life stage
2. character (1): assumption of metagenesis

Class Hydrozoa



Other autapomorphies (see lab manual):

- i. 4 rayed symmetry.
- ii. ectodermal gonads
 - iii. medusae with velum.
- iv. no gastric septa
- v. external skeleton if present.
- vi. no stomadaeum
- vii. freshwater or marine habitats.

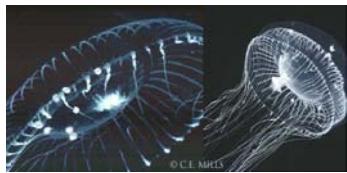
Class Hydrozoa - 7 Orders



1. Order
Trachylina -
reduced
polyps,
probably
polyphyletic

Voragonema pedunculata, collected by submersible at about 2700' deep in the Bahamas.

Class Hydrozoa - 7 Orders

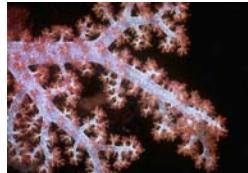


2. Order Hydrozoa - the "seaweeds."

a. Suborder Anthomedusae - also Athecata, Aplanulata, Capitata.

b. Suborder Leptomedusae - also Thecata

Class Hydrozoa - 7 Orders



3. Order Miliporina - fire corals.

4. Order Stylasterina - similar to fire corals; hold medusae.





Class Hydrozoa - 7 Orders



5. Order Siphonophora - floating colonies of polyps and medusae.



Class Hydrozoa - 7 Orders



6. Order Chondrophora - floating colonies of polyps

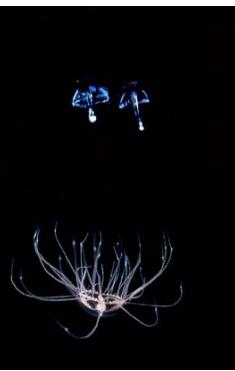


Class Hydrozoa - 7 Orders

7. Order Actinulida (Aplanulata)- solitary polyps, no medusae, no planulae



Order Trachylina



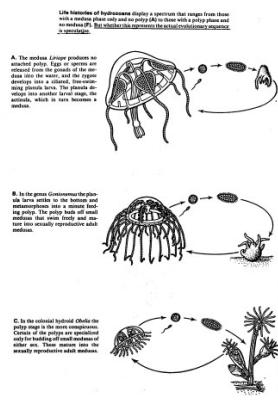
Trachymedusae includes *Lirope*
a. resemble the medusae of *Gonionemus*,

1. strongly developed velum - for propulsion in turbulent water

Order Trachylina

2. Entirely marine.
- b. Have life cycle that appears to represent ancestral hydrozoan (cnidarian?) condition.

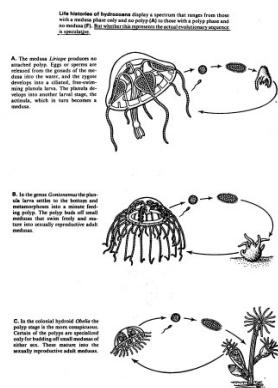
1. medusa -> egg (in situ) + sperm -> planula -> actinula
 - a. actinula looks like a stalkless polyp
 - b. never settles
 - c. flattens, metamorphoses into medusa.



Order Trachylina

Narcomedusae undergo similar cycle.

1. difference is that actinulae undergo asexual reproduction
2. bud off more actinulae before becoming medusae.



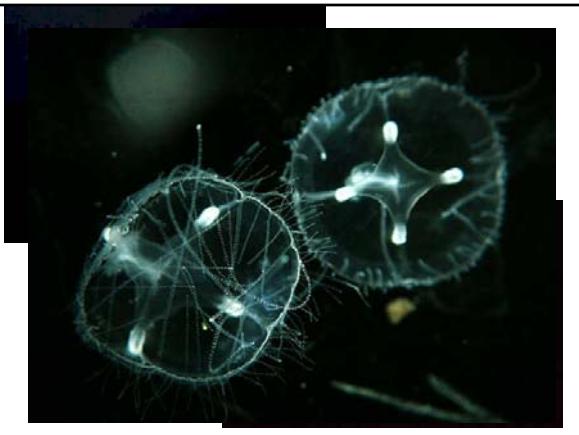
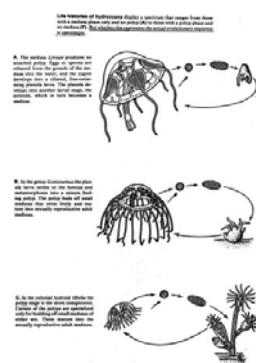
Order Trachylina

- 2. Other trachylines (Laingiomedusae or Limnomedusae)
 - a. include *Gonionemus*, *Craspedacusta*
 - 1. also with velum
 - 2. marine and freshwater



Order Trachylina

- b. Life cycle has actinula-like stage but becomes polyp
 - 1. medusa -> egg + sperm -> planula -> polyp
 - a. polyp buds off medusae - can do so as long as there is food.
 - b. potential for considerable asexual reproduction
 - c. trend remains for other hydrozoa



Order Hydroidida (Hydroidolina)

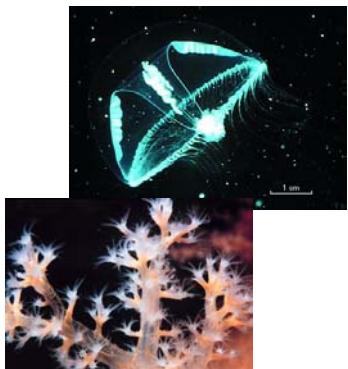


. "Hydroids" are composed of two orders - evidently convergent

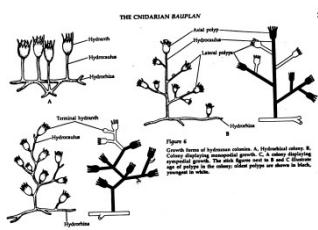
Thecate hydroids -
Obelia, Aequorea,
Gonothyrea,
Aglaophenia.

Order Hydroidea (Hydroidolina)

1. medusae generally flat (hence the name)
2. have a theca - surrounds polyps
 - a. specialization of polyps
 1. feeding - hydranth
 2. reproductive - gonangium



Order Hydroidea (Hydroidolina)



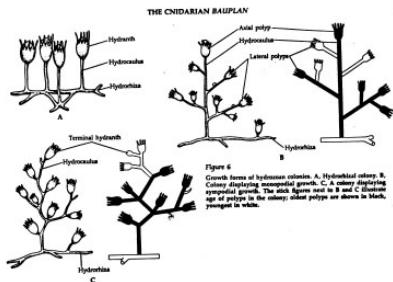
(7) b. colonial structure
permits feeding polyps
to provide
for rest of colony

1. connections to
hydranths -
hydrocaulus
2. base of colony -
hydrorhiza
3. all are connected by
coenocarc.
4. outer, nonliving
structure - perisarc

Note that the shape of the colony depends on the branching pattern.

Life cycle is familiar from lab.

a. medusa \rightarrow egg+sperm \rightarrow planula \rightarrow planula \rightarrow colony



“Anthomedusae”

Also Athecatae - *Tubularia, Hydractinia*

1. even more specialized polyps
 - a. include two types of stinging polyps
 - b. reproductive polyps don't produce medusae
 1. eggs and sperm shed into water
 2. planulae settle to form polyp.



“Anthomedusae”



2. Hydra belongs to this order as well (also now called Aplanulata)
 - a. the ultimate in reduced life history
1. appear derived from marine ancestors
2. polyp -> egg+sperm
-> polyp

“Anthomedusae”

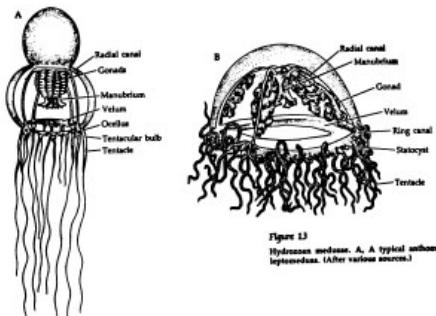


Figure 13
Hydrocetes medusae. A. A typical anthonomidess. B. A typical leptonomidess. (After various sources.)