

# BIO 221

## Invertebrate Zoology I

### Spring 2010

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Northern Arizona University

<http://www4.nau.edu/isopod>

## Lecture 10

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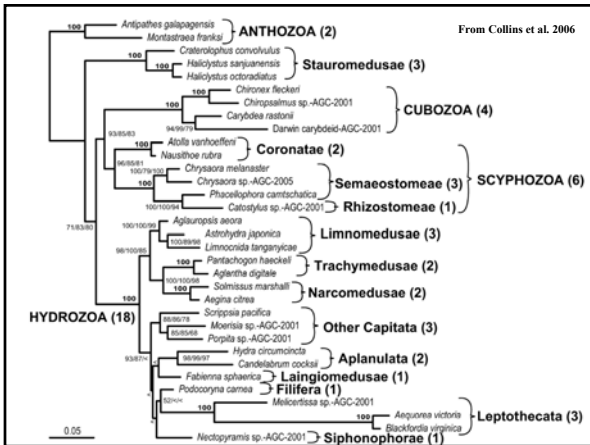
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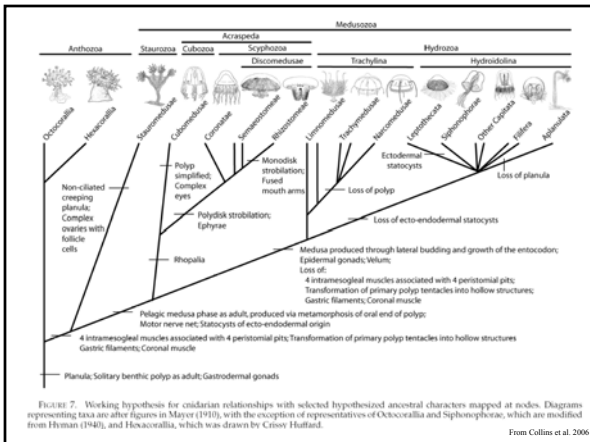


FIGURE 7. Working hypothesis for cnidarian relationships with selected hypothesized ancestral characters mapped at nodes. Diagrams representing taxa are after figures in Mayor (1910), with the exception of representatives of Octocorallia and Siphonophorae, which are modified from Hyman (1940), and Hexacorallia,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

From Collins et al. 2006

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## Cnidarian Classes

Hydrozoa

Scyphozoa

Cubozoa

Stauromedusae

Anthozoa

Medusozoa

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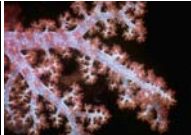
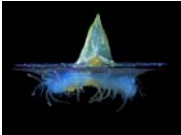
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## Class Hydrozoa



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.



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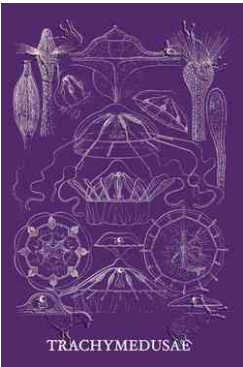
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## Class Hydrozoa



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

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

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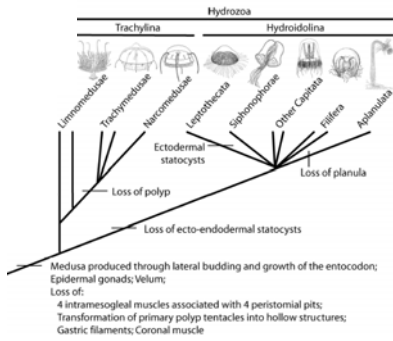
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## Class Hydrozoa



Trachylina  
Hydrozoa seem  
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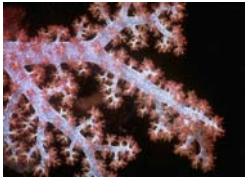
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## Class Hydrozoa



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.

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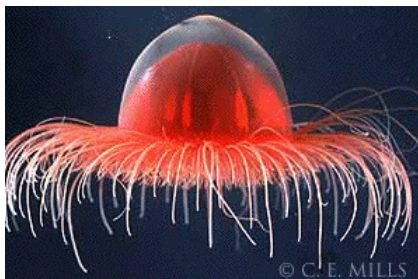
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## Class Hydrozoa - 7 Orders



1. Order  
Trachylina -  
reduced  
polyps,  
probably  
polyphyletic

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

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## Class Hydrozoa - 7 Orders



2. Order Hydroida - the "seaweeds."

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



b. Suborder Leptomedusae - also Thecata

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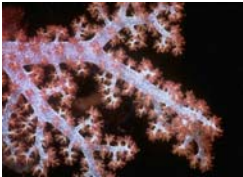
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## Class Hydrozoa - 7 Orders



3. Order Miliporina - fire corals.

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



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## Class Hydrozoa - 7 Orders



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



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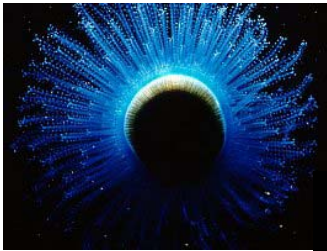
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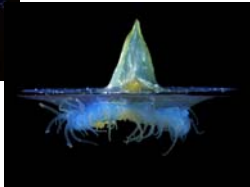
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## Class Hydrozoa - 7 Orders



6. Order  
Chondrophora -  
floating colonies of  
polyps



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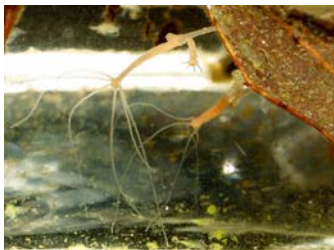
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## Class Hydrozoa - 7 Orders

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



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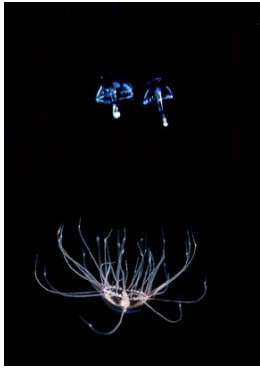
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## Order Trachylina



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

1. strongly developed velum - for propulsion in turbulent water

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## Order Trachylina

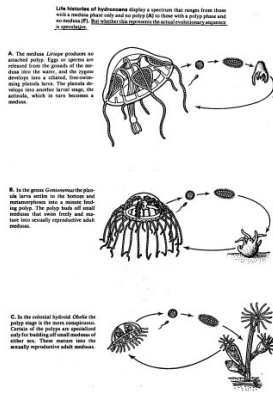
2. Entirely marine.

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.




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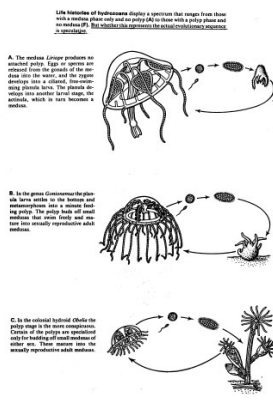
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## Order Trachylina

Narcomedusae undergo similar cycle.

1. difference is that actinulae undergo asexual reproduction

2. bud off more actinulae before becoming medusae.




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## Order Trachylina

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



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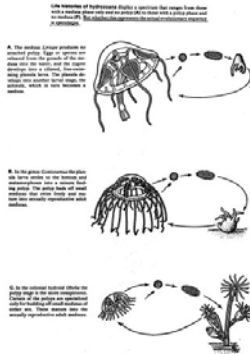
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## Order Trachylina

- 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



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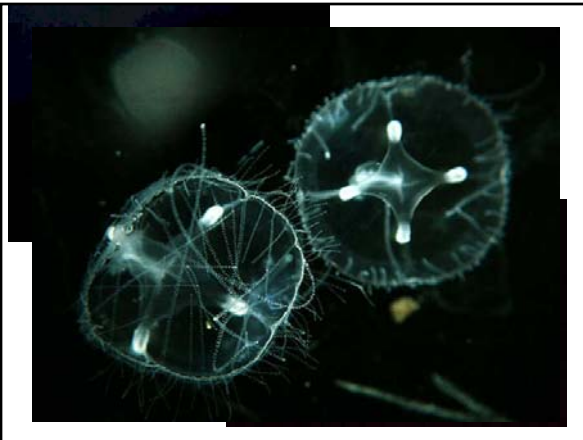
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## Order Hydroida (Hydroidolina)



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

a. Leptomedusae –

Thecate hydroids –  
*Obelia*, *Aequorea*,  
*Gonothyrea*,  
*Aglaophenia*.

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## Order Hydroida (Hydroidolina)

1. medusae generally flat (hence the name)

2. have a theca - surrounds polyps

a. specialization of polyps

1. feeding - hydranth

2. reproductive - gonangium




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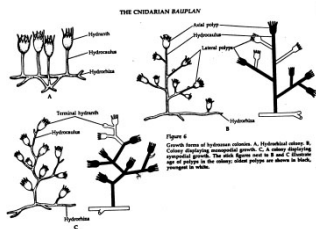
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## Order Hydroida (Hydroidolina)



(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

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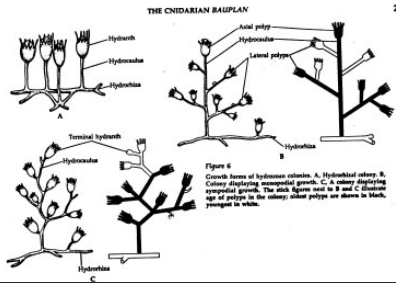
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Note that the shape of the colony depends on the branching pattern.

Life cycle is familiar from lab.

a. medusa -> egg+sperm -> planula -> planula -> colony




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## “Anthomedusae”

Also Athecatea -  
*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.




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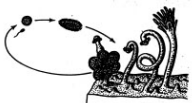
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## “Anthomedusae”



D. In the hydroids *Hydractinia* the medusae are small and short-lived. From a colony of these planulae a branching colony with the typical hydroid structure is formed. The colony has a central axis, which bears the stinging, tentacles, or other organs, and from this the only a few polyps. The planulae are small and settle to form a new colony.



E. The colonial hydroid *Hydractinia* forms colonies of the hydroids and the medusae. Medusae are small and short-lived. From a colony of these planulae a branching colony with the typical hydroid structure is formed. The colony has a central axis, which bears the stinging, tentacles, or other organs, and from this the only a few polyps. The planulae are small and settle to form a new colony.



F. In *Hydra*, presumably evolved from marine ancestors with more than one sessile stage, the planulae are small and short-lived. From a colony of these planulae a branching colony with the typical hydroid structure is formed. The colony has a central axis, which bears the stinging, tentacles, or other organs, and from this the only a few polyps. The planulae are small and settle to form a new colony.

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

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# “Anthomedusae”

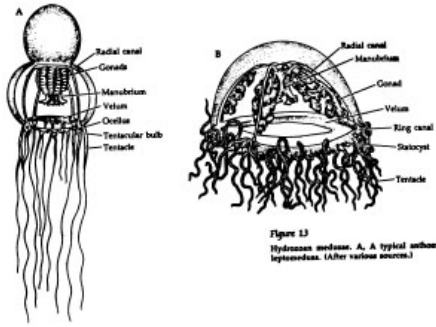


Figure 13  
Hydromedusae. A, A typical anthomedusa. B, A typical leptomedusa. (After various sources.)

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