

Kane'ōhe Bay Plankton Guide



Copepod
Pg. 10



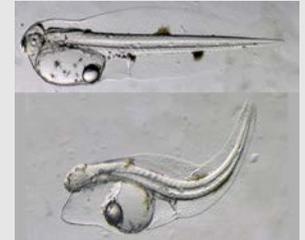
Crab Larvae (zoea)
Pg. 14



Clam Larvae
(Veliger)
Pg. 17



Fish Eggs
Pg. 23



Fish Larvae
Pg. 23



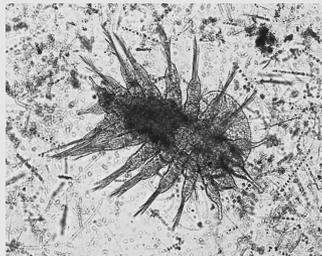
Shrimp Relatives
Pg. 11-12



Chaetognath
Pg. 18-19



Lucifer
Pg. 13



Worm Larvae
Pg. 16



Ostracod
Pg. 9



Larvacean
Pg. 21



Ascidiands (sea squirts)
Pg. 22

ZOOPLANKTON VS PHYTOPLANKTON

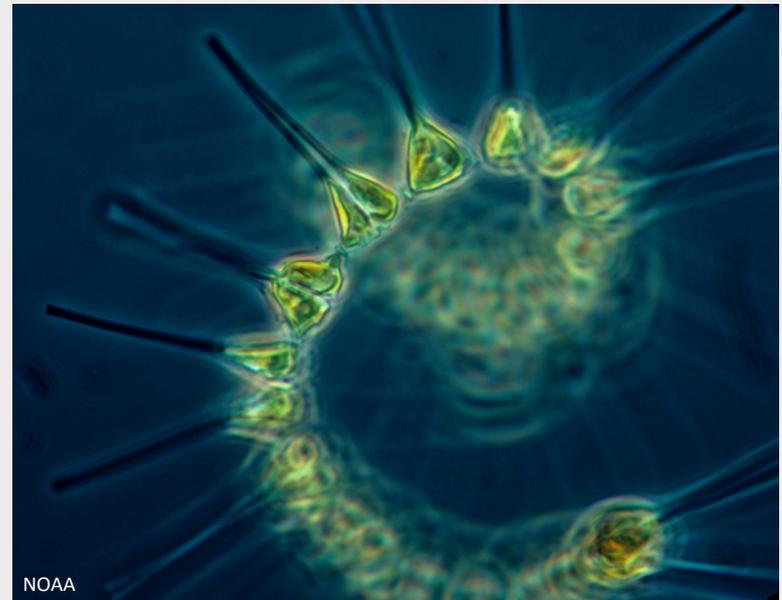
ZOOPLANKTON

- Belong to Kingdom Animalia
- Main food source is phytoplankton
- 80% of reef fish and invertebrates start out as plankton
- Like phytoplankton, indicate ocean health



PHYTOPLANKTON

- Belong to Kingdom Plantae
- Create food through photosynthesis
- Responsible for 50% of the world's oxygen supply
- Foundation of life in the oceans; basis of the food chain



HOLOPLANKTON VS MEROPLANKTON

HOLOPLANKTON

- Zooplankton that remain planktonic for their entire lifecycle.
- Stay in the water column, drifting with ocean currents.



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Juvenile copepod (nauplii)



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Adult copepod

MEROPLANKTON

- Zooplankton that start as plankton when young, but will change into larger, familiar ocean creatures as they grow up.



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Zoea



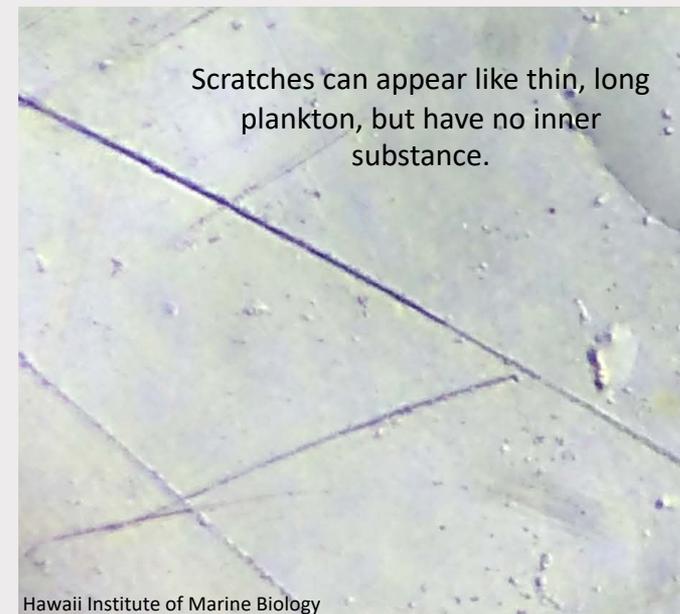
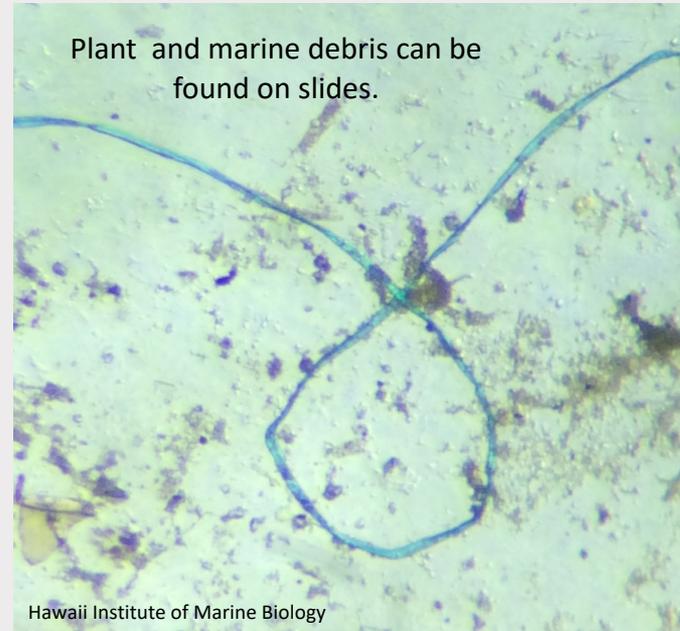
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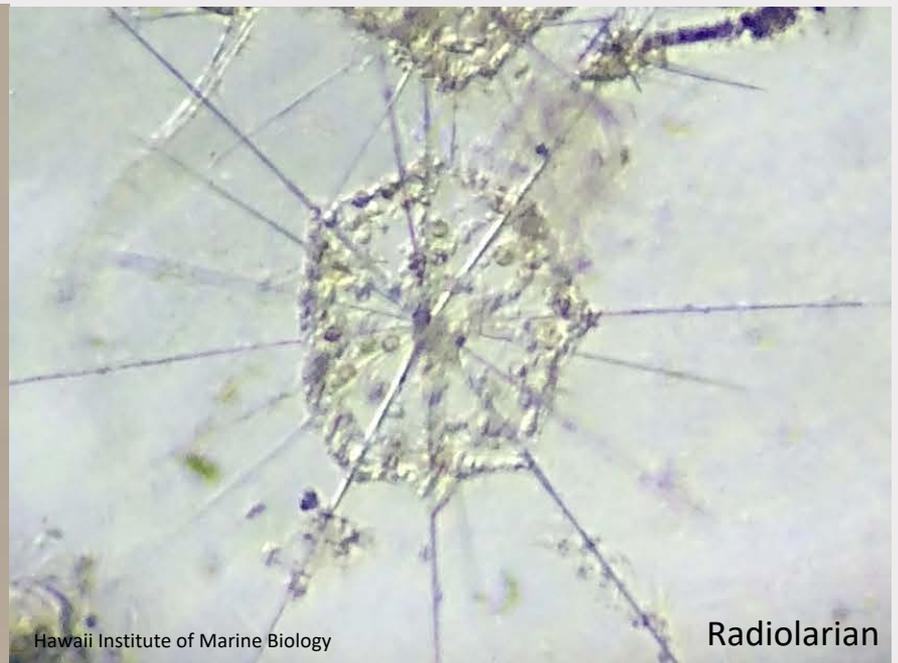
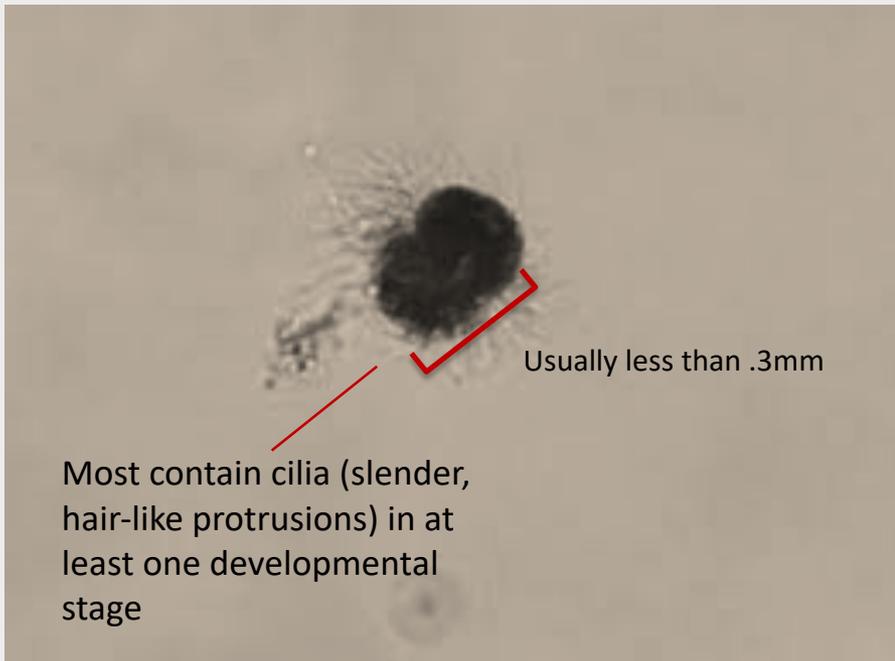
Crab



Plankton you will most likely find are marked by the blue star.

THINGS YOU MIGHT MISTAKE FOR PLANKTON





PROTOZOANS

Kingdom: Protozoa

Zooplankton Type: Holoplankton

Cool things:

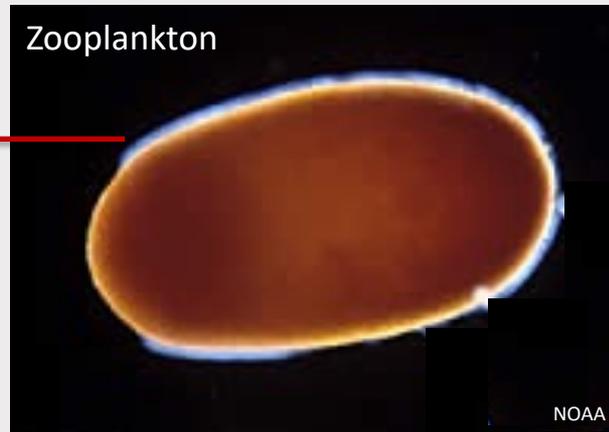
- Tiny (even under our scopes).
- Single celled organism that can move, catch food, and reproduce.
- Although tiny, many protozoans are the “large” predators of bacteria, which make up whole communities tinier than them.
- Protozoans such as the ciliates, can reproduce every 4 hours, building mass populations quickly if food is available.

Under the microscope:

- Can be **extremely small and very hard to see** – look like a little black dot swimming through the sample.

Cylindrical or egg-shaped with numerous cilia, less than 5mm

Zooplankton



Zooplankton coral larvae drifting in the water column settles onto the bottom and becomes an adult in polyp form



Adult coral spawning



Adult



CORAL LARVAE

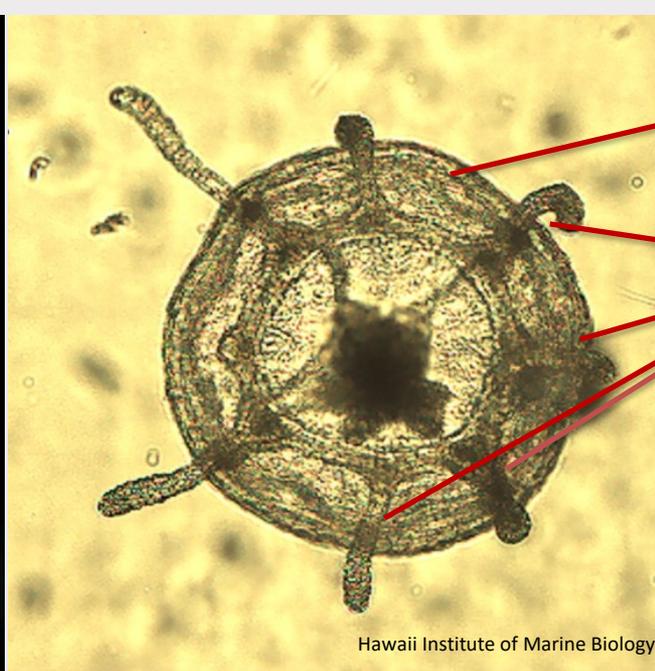
Phylum: Cnidaria
Zooplankton Type:
Meroplankton

Cool things:

- Grow up from the size of a pencil dot, to be huge coral colonies.
- When a larva finds a suitable place such as coralline algae, it will settle out, stop swimming, attach to the bottom and develop into a coral polyp.
- Depending on the species, coral larvae can either remain planktonic for several weeks (broadcast spawning) or settle out straight away (brooding corals).

Under the microscope:

- Looks like a moving **fuzzy oval egg**.



Bell used for swimming

Tentacles with nematocysts (stinging cells) for defense



SEA JELLY

Phylum: Cnidaria

Zooplankton Type: Holoplankton
or Meroplankton

Cool things:

- Bodies are always symmetric, look like tiny jellies right off in the planktonic form.
- Some nearshore jellies have an anemone-like life stage on the ocean floor that buds off the planktonic jelly stage. Other jellies are always planktonic, young and adult.
- Box jellies have a rounded square-like shape and can move faster than others - 6 meters per minute to actively hunt prey. They have 4 true eyes with retinas, corneas, and lenses.

Under the microscope:

- Look for **the round bell shape and tentacles** projecting outward.

Small bristles protruding from side and rear



Curved, arrow-like head with circular body

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BARNACLES

Phylum: Arthropoda

Zooplankton Type:

Meroplankton



Cool things:

- Free-floating as planktonic larvae, but cannot move on their own as adults - attach to objects and stay there permanently.
- Related to crabs and shrimp.
- Usually small, but can reach 10mm within area between tide marks.
- Filter feed through plates and feather leg-like appendages.

Under the microscope:

- Look for compacted, round body with bristles extending out from its rear- **not very common in our plankton.**

OSTRACODS

Phylum: Arthropoda

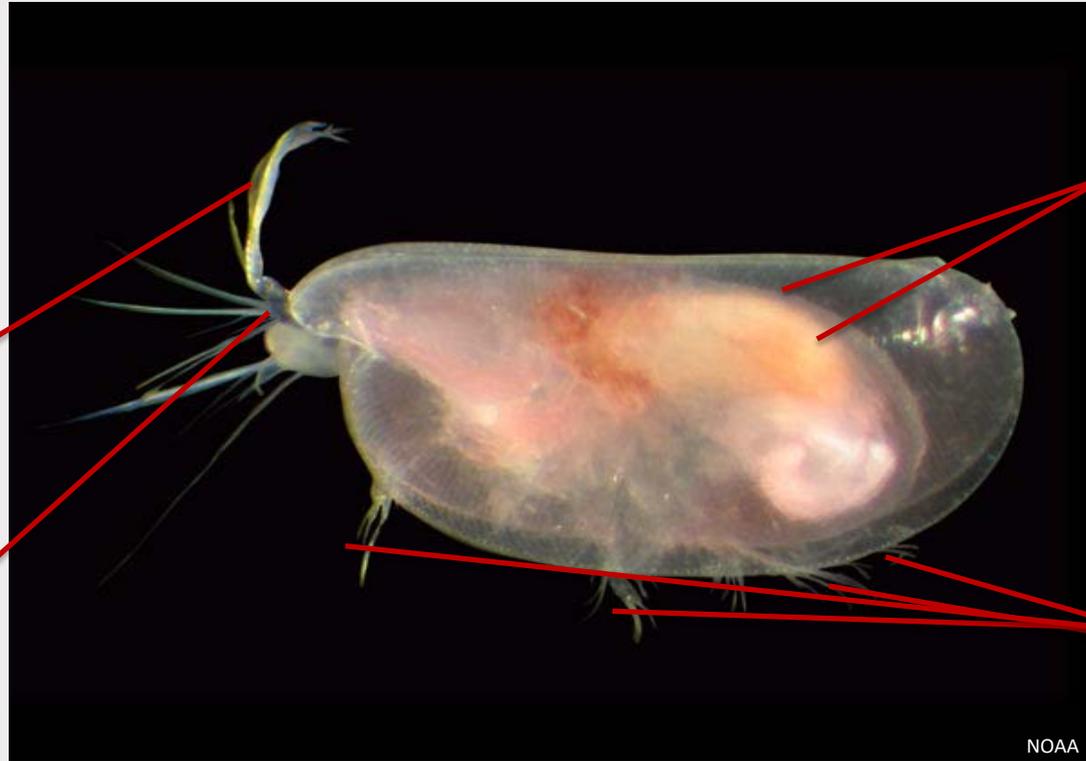
Zooplankton Type:

Holoplankton



Antennae

Single eye spot



Body
encased in
two
exoskeletal
sections

Jointed legs

Cool things:

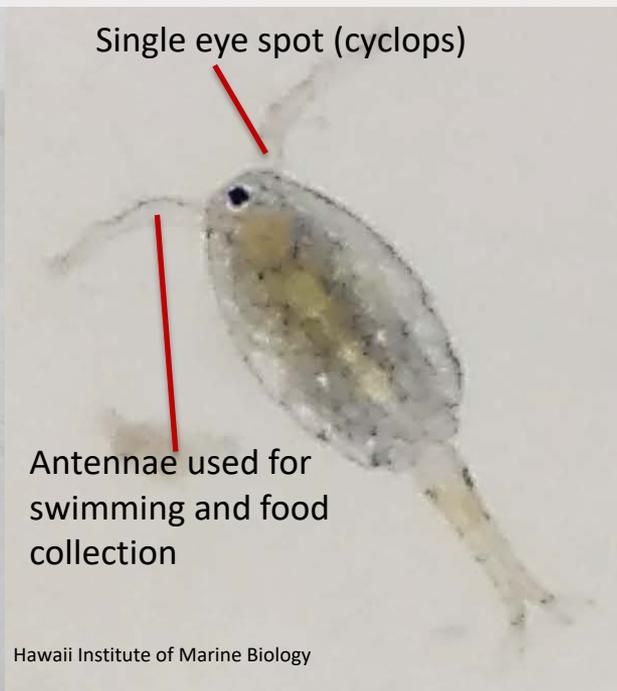
- Looks similar to a clam shell, but belong to the crab/shrimp group, has jointed legs and appendages that come out of the shell-like body (exoskeleton).
- Some emit bioluminescence, producing a bright blue light when disturbed. You may notice these on beaches at night in Hawai'i.
- Remain bioluminescent after they have died if water is added. People have used dead, dried Ostracods for emergency lighting.

Under the microscope:

- Often mistaken for a clam shell.
- Can usually see their **jointed legs** moving.



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Jenny Davis
(Western Australian Museum)

COPEPOD

Phylum: Arthropoda

Zooplankton Type: Holoplankton

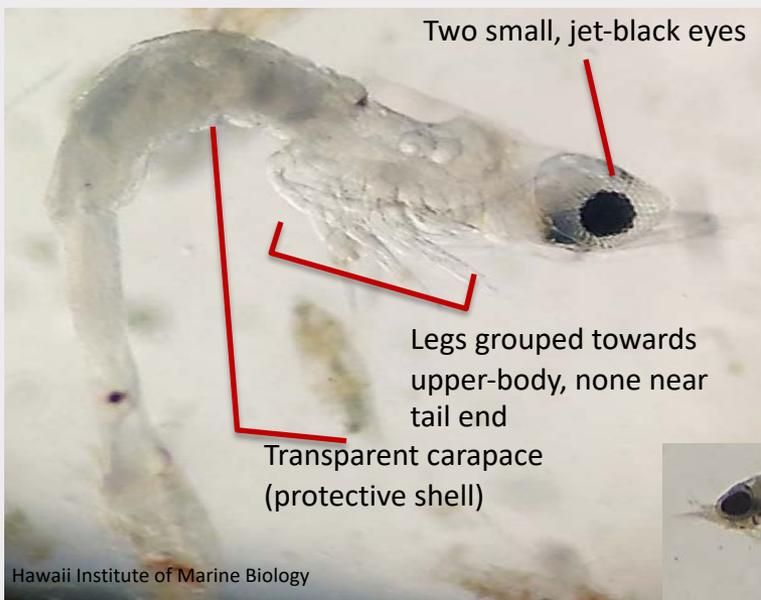


Cool things:

- “Cows of the sea” 🐮 - mainly feed on phytoplankton, although some eat each other.
- Related to shrimp and crabs.
- Copepods are the worlds most powerful animal jumpers- can accelerate to a speed of 500 body-lengths per second!

Under the microscope:

- Twitchy motions (helps to escape predators).
- **Most common zooplankton** - Think you can count them? Go ahead and try!



MYSIDS



Phylum: Arthropoda

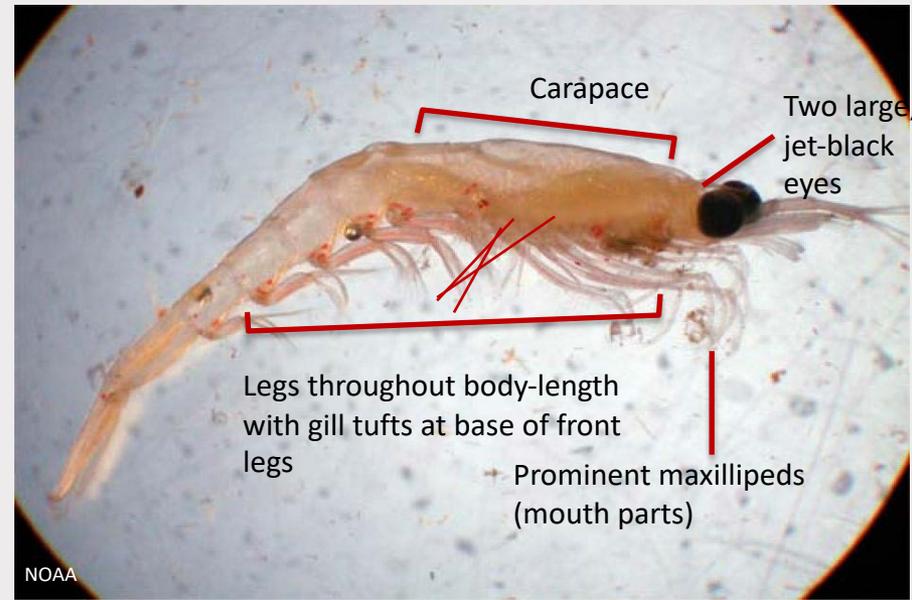
Zooplankton Type: Holoplankton

Cool Things:

- Will not grow into larger shrimp, remain planktonic their whole life (holoplankton).
- At night, swarms rise from the bottom of the water column towards the surface.
- It is safer for them at night. Fish can't see them to eat them.

Under the microscope:

- Look for shrimp-like forms with **legs only on the top-half of its body!**



EUPHAUSIID

Phylum: Arthropoda

Zooplankton Type: Holoplankton

Cool things:

- Antarctic Krill (type of euphausiid) makes up an estimated biomass of 379 million tons - half eaten by whales, seals, penguins, and fish.

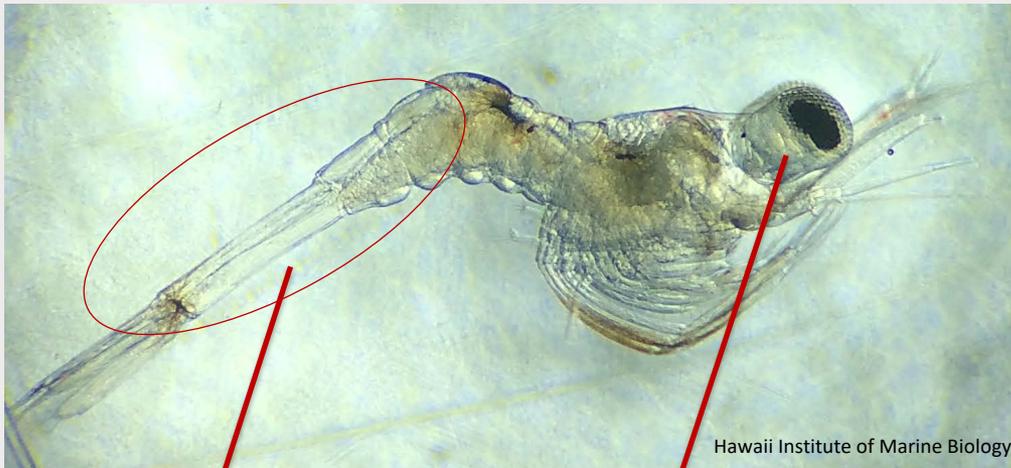
Under the microscope:

- Have external gills- looks like "hairy armpits" around the base of the carapace.
- Look for **legs throughout on the entire length of the body!**

SHRIMP LARVAE

Phylum: Arthropoda

Zooplankton Type: Meroplankton



Elongated,
segmented
tail

Large black eyes



Cool things:

- Grow to be various types of the common decapod (ten leg) shrimp that we are familiar with.
- These will grow up to be any type of shrimp from the small clear glass shrimps on docks and floats, to coral shrimps, to the shrimp we eat.
- Many are predators on other plankton.

Under the microscope:

- Often mistaken for Mysids or Euphausiids.
- Look for the **rostrum, a horn-like projection between its eyes!**



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Two bulbous eyes

Serrated mouths
for tearing prey

10 legs, including
those with claws

3650µm

Slotwinski/TAFI/UTAS

Cool things:

- A special common type of predaceous planktonic shrimp.
- Fully digests food within 10 minutes gaining instantaneous energy and making room for more.
- Lifespan of 30-40 days. Most are eaten by larger marine fish, such as *Encrasicholina purer* (Hawaiian Anchovy).

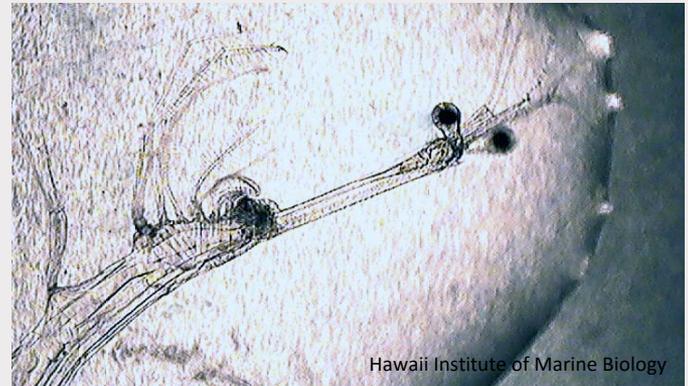
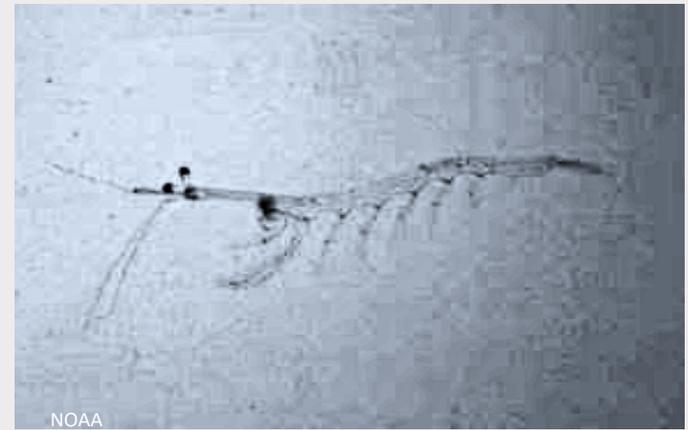
Under the microscope:

- Up to ½ inch long and may look like a **stick** at first - see if you can find its big eyes!

LUCIFER

Phylum: Arthropoda

Zooplankton Type:
Holoplankton



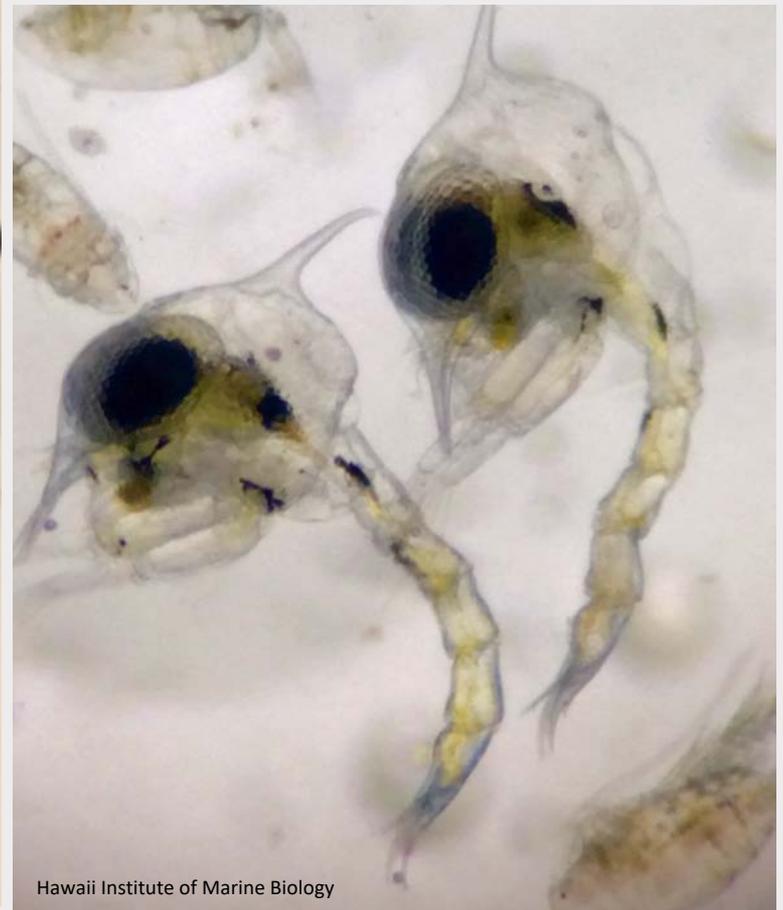
Long, pointed rostrum (horn like projection)

Two large eyes

Dorsal spine - "spike head" provides protection and prevents sinking

Tail curled under body

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CRAB LARVAE

(Zoea)



Phylum: Arthropoda

Zooplankton Type: Meroplankton

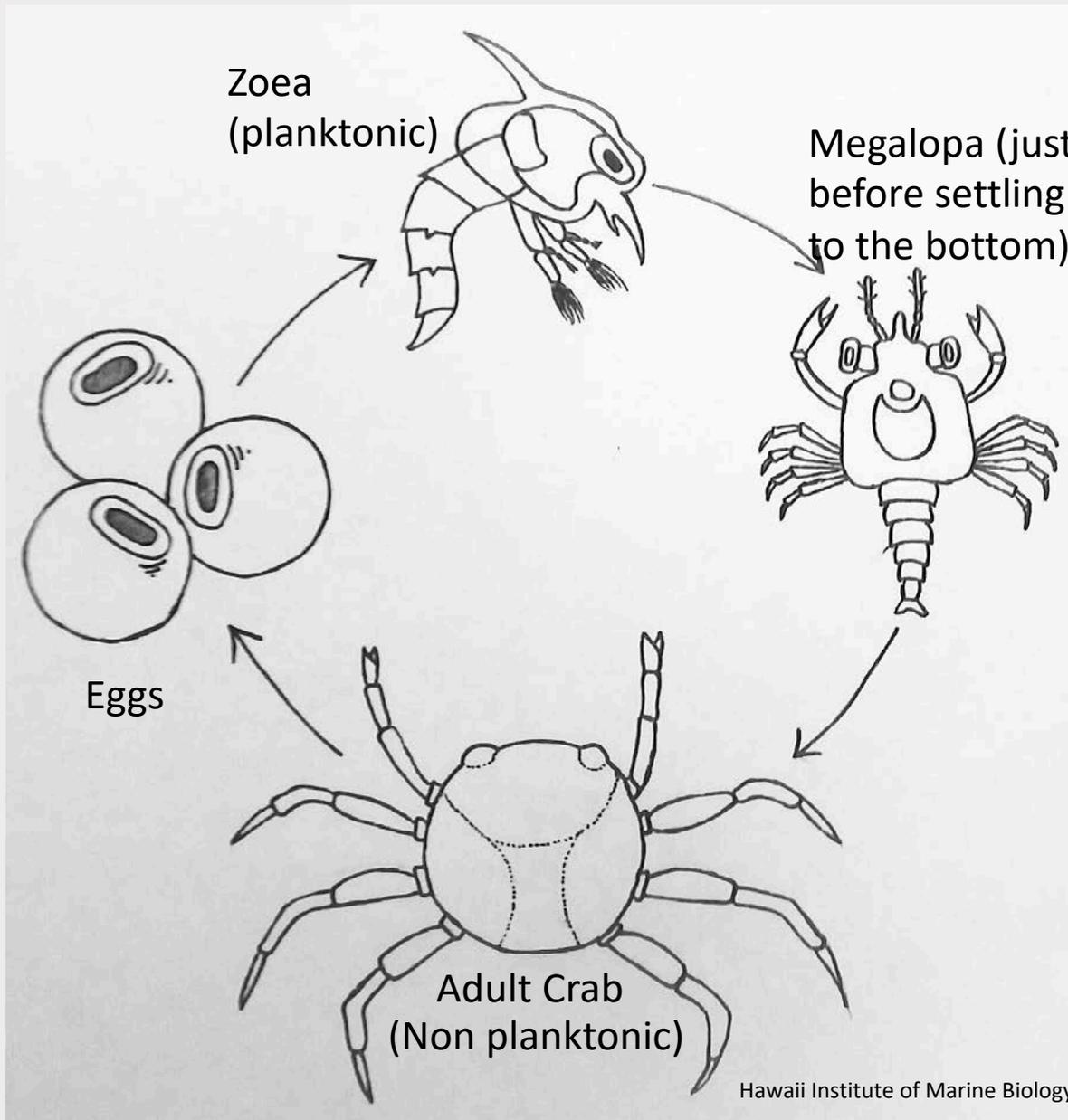
Cool Things:

- Grow up to be our familiar bottom dwelling crabs. Note the shrimp-like tail.
- Omnivores (feed on phytoplankton and other zooplankton).

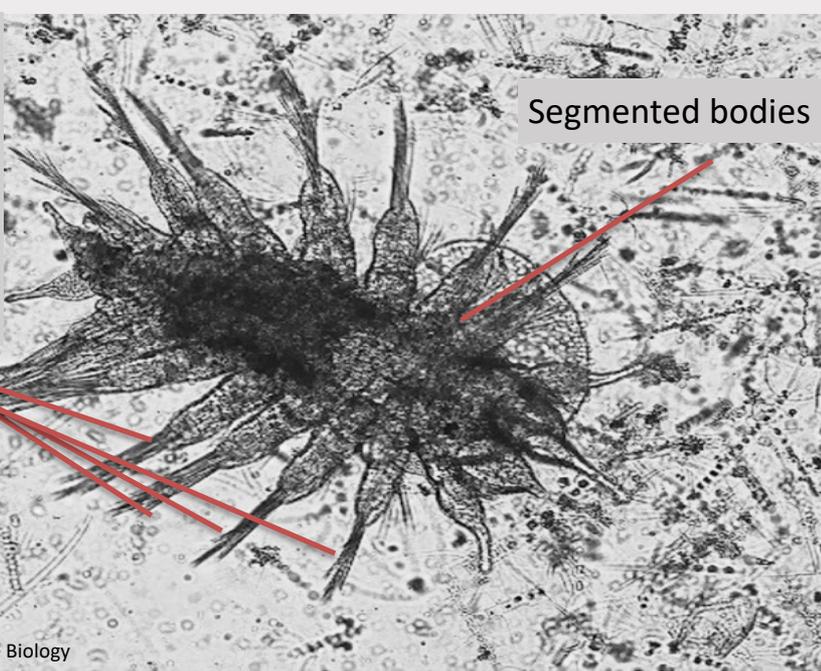
Under the microscope:

- Move in jerky, zig-zag, or spinning movements - highly energetic, the "break dancers" on your slides.
- Often called **spike heads**- can you spot the spikes?

LIFE CYCLE OF CRABS



Parapodia
(leg-like protrusions)
with bristles
used for
swimming
and defense



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★ WORM LARVAE

Phylum: Annelida

Zooplankton Type: Meroplankton

Cool things:

- Class name is Polychaeta which means “many bristles”.
- Will grow into worms (meroplankton) on the reef.
- Some do not feed, live entirely on stored yolk (food source) before settling out.
- Each family has different larval appearance, rarely resembling adult forms.

Under the microscope:

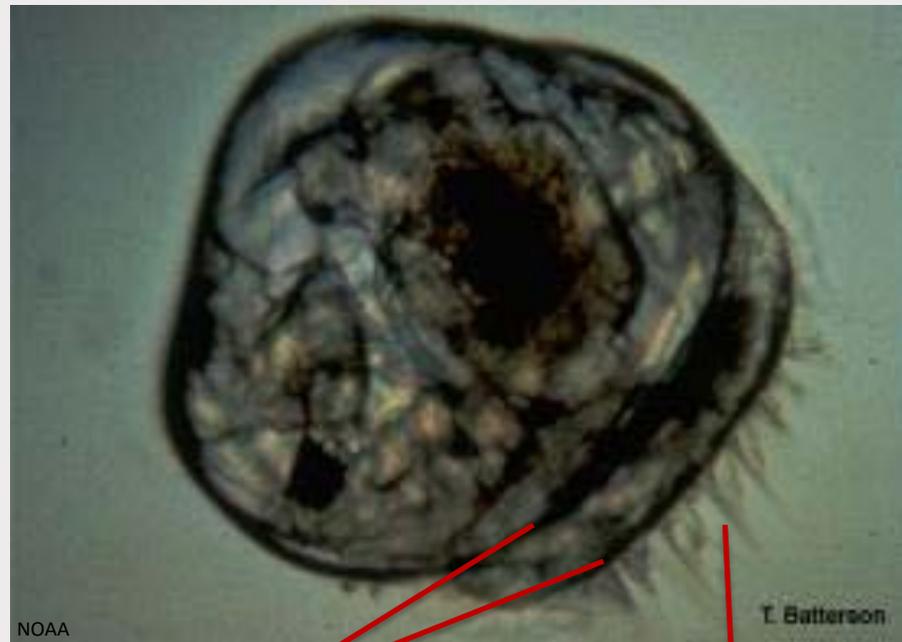
- Look for **segmented bodies and bristles sticking out.**



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CLAM LARVAE (Veliger) ★

Phylum: Mollusca
Zooplankton Type:
Meroplankton

Body encased in two valves - Bivalvia "two hinged valves"

Slender, hair-like cilia for swimming

Cool Things:

- Planktonic first stage of clams – They swim rather than burrow at this stage.
- Related to other shell bearing Molluscs like snails.
- Planktonic young allow clams to broaden their range of settlement to new, far away areas.
- May swim long distances and land several times before finding a suitable substrate (surface material) to settle on.

Under the microscope:

- Resemble ostracods **without** antennae, eye spot, and jointed legs.
- Watch them swim via their frill of cilia.

Chaetognatha (Arrow Worm)

Relatively large, 1-2cm

Spine-like
hooks around
mouth to catch
prey*

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Cool things:

- PREDATORS to other plankton, such as copepods.
- Motionless when hunting, waits to ambush prey, then venom on jaws subdues the captured animal to be swallowed whole as the jaws fold in.

Under the microscope:

- These are **LARGE** (1/2 inch or 1.25cm).
- Look for the **outline of the body**. Like many plankton, they are transparent.

CHAETOGNATH

Phylum: Chaetognatha

Zooplankton Type:

Holoplankton



CHAETOGNATH UNDER THE MICROSCOPE

Tail



Middle

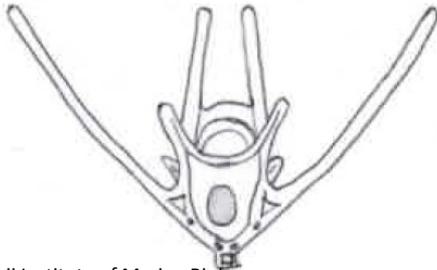


Head



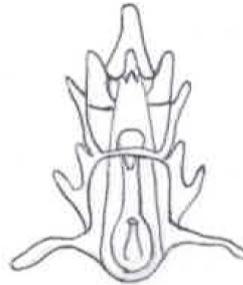
Due to the large size of their body, you will probably only see part of it under the microscope at one time.

pluteus



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bipinnaria



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Sea cucumber larvae



Sea urchin



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Sea star



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Sea cucumber



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Cool Facts

- Echinoderm larvae are usually planktonic with bilateral symmetry. During the process of maturing, many of these organisms shift to radial symmetry

Under the Microscope

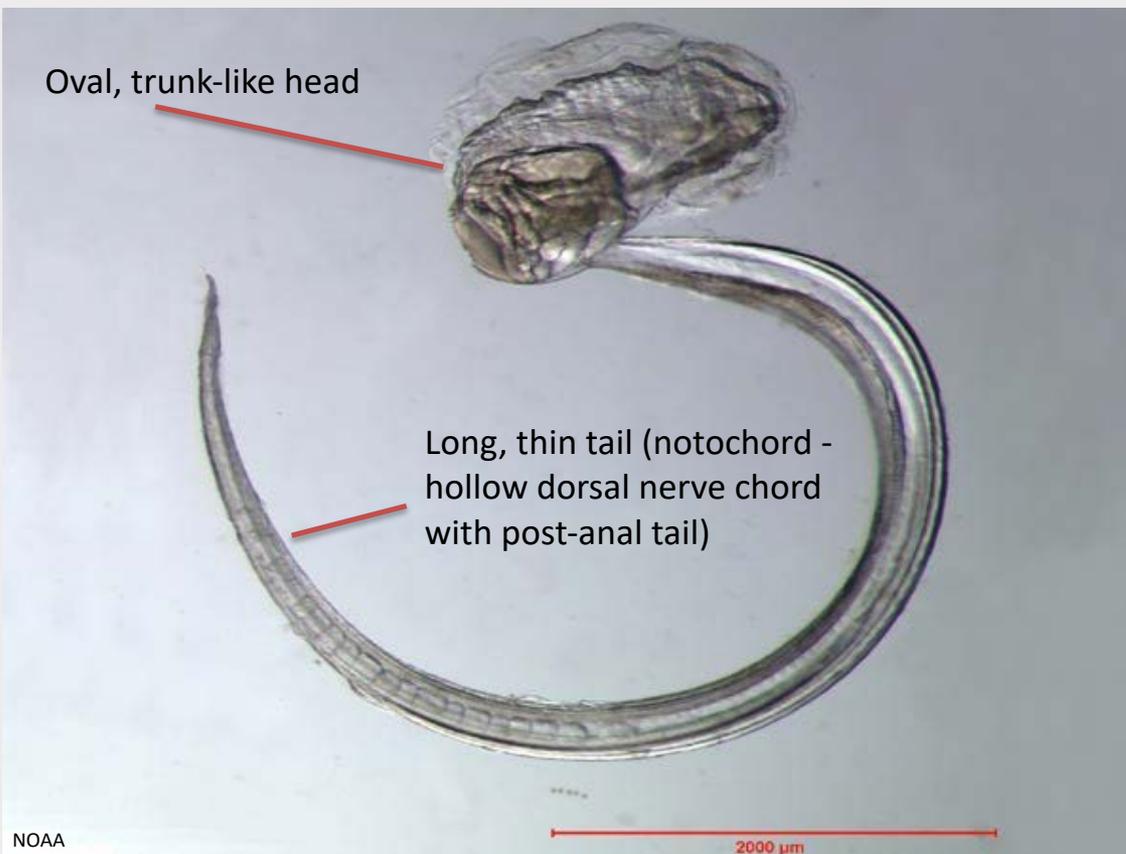
- Echinoderms come in all different shapes and sizes- but are **not very common in our samples.**

ECHINODERM LARVAE

Phylum: Echinodermata

Zooplankton Type:

Meroplankton



Cool things:

- Every 3-4 hours, creates a new mucus net around itself - used to filter food from the water.
- Mucus nets in the open ocean sink slowly to great depths creating "Marine Snow", a food source for deep sea creatures.
- Are in the phylum Chordata – related to vertebrates like us.

Under the microscope:

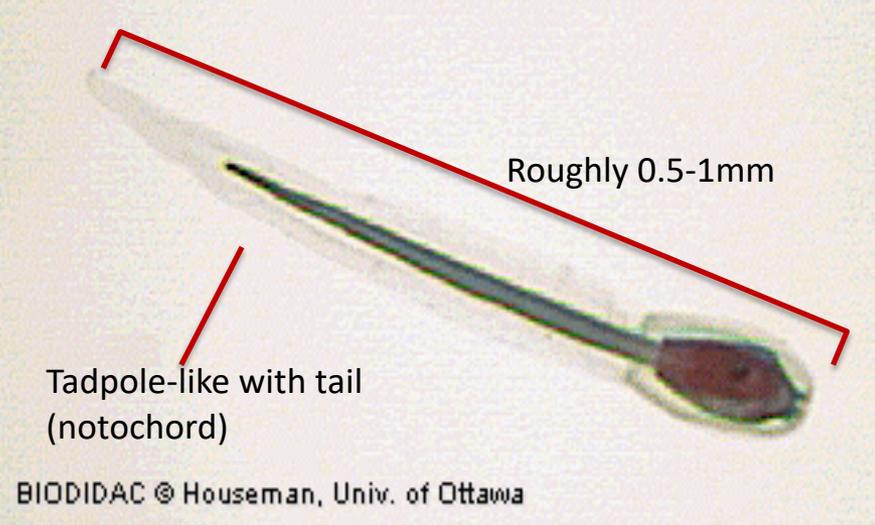
- Look for **the alien-like head!**

★ **LARVACEAN**
(Oikopleura spp.)

Phylum: Chordata

Zooplankton Type: Holoplankton

Tadpole sea squirt larvae



ASCIDIANS (Sea squirts)

Phylum: Chordata

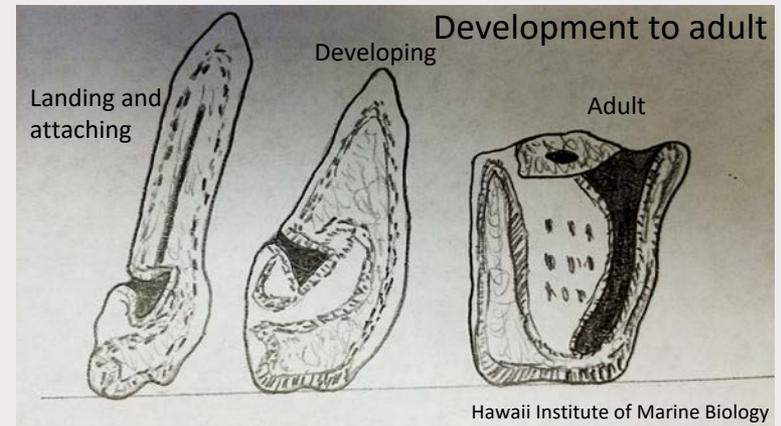
Zooplankton Type: Meroplankton

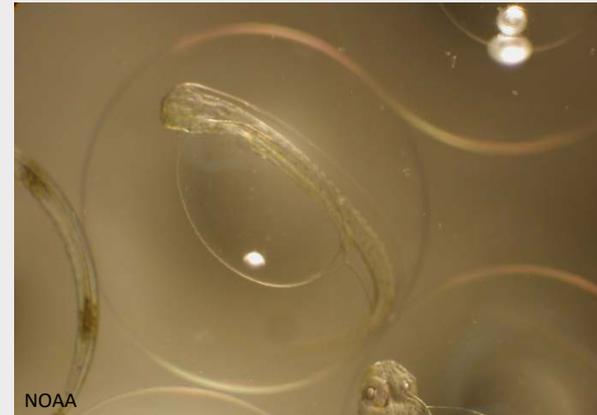
Cool things:

- Sea squirt larvae swim down to attach to a surface and transform as they grow older from a swimming planktonic stage to a non-moving filter feeding adult.
- Chemical cues from other sea squirts signal the larvae to settle on that area.

Under the microscope:

- Resemble tadpoles or fish larvae- **Not very common.**





Cool Things:

- Most reef fishes release their eggs into the water column for a planktonic start.
- Fish larvae start small, but change in size and appearance quickly as they grow into juveniles and adults.
- Known as Ichthyoplankton; they are found in the upper 200m of the water column or at the surface.
- Once hatched, fins can be present and growth of fish scales has begun.
- Good indicators of population size – easier detection when population sizes decrease.

Under the microscope:

- Think you've only found an air bubble? Check again!
- Larvae may look like tadpoles or sea squirt larvae – look for the **nerve chord and backbone!**

FISH EGGS AND LARVAE

Phylum: Chordata

Zooplankton Type: Meroplankton

THE KANE'OHE BAY PLANKTON GUIDE

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References

Content:

Young, Craig M., ed. *Atlas of Marine Invertebrate Larvae*. San Diego: Academic Press, 2002.

Johnson, William S., and Dennis M. Allen. *Zooplankton of the Atlantic and Gulf Coasts: A Guide to Their Identification and Ecology*. Second ed. Johns Hopkins UP, 2012

Photos:

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<http://www.hawaii.edu/himb/>

National Oceanic and Atmospheric Administration
<http://www.noaa.gov/>