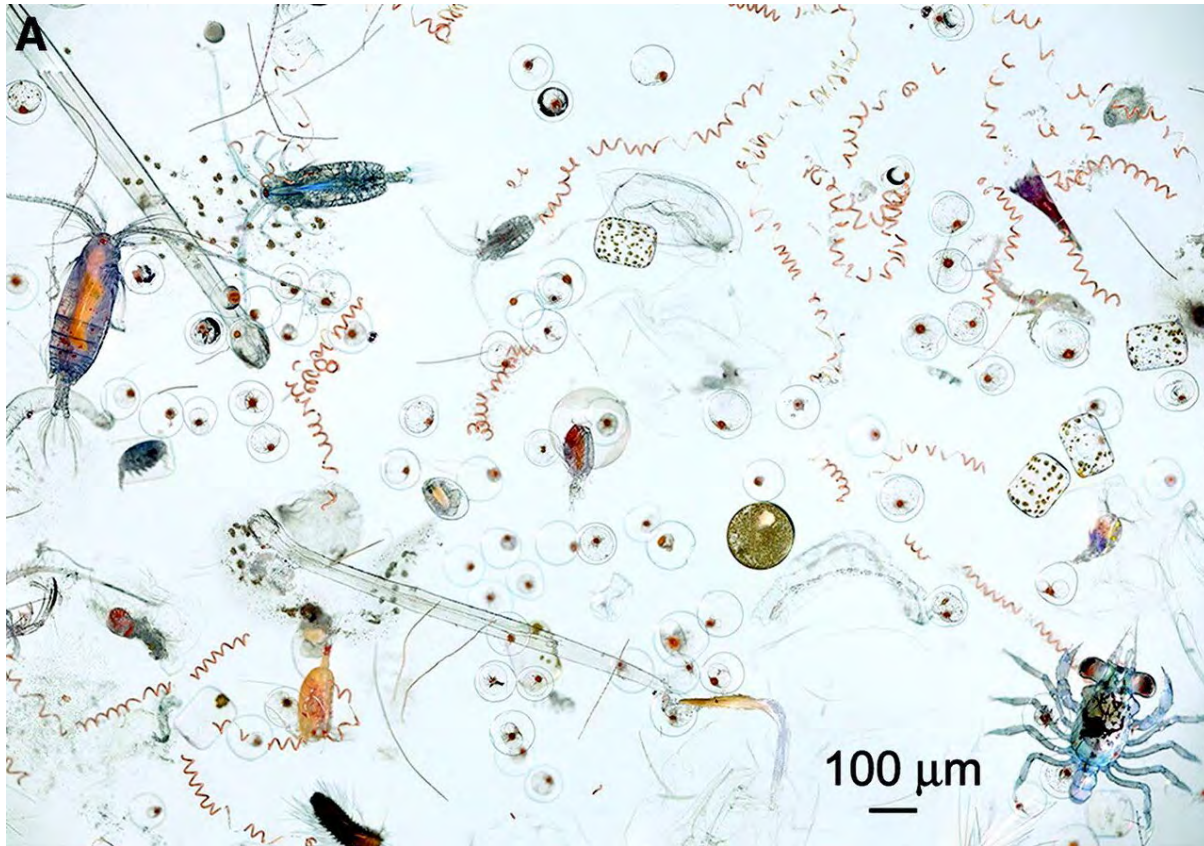


PHYTOPLANKTON

PLANKTON



Nekton



ZOO PLANKTON

Arthropoda



Copepod Nauplius
Larva



Barnacle Nauplius
Larva



Crab Zoea Larva



Copepod (Adult)



Barnacle Cyprid
Larva



Crab Megalops
Larva

Cnidaria



Sea Jelly
Ephyra Larva



Obelia sp.
Medusa (Adult)

Echinodermata



Sea Urchin
Pluteus Larva



Brittle Star
Pluteus Larva

Annelida



Polychaete Larva

Mollusca



Veliger Larva

Chordata



Tunicate Larva



Fish Larva

PHYTO PLANKTON

Dinoflagellates



*Noctiluca**



*Akashiwo**



*Alexandrium**



*Lingulodinium**



*Dinophysis**



Prorocentrum



Ceratium

Diatoms



*Pseudo-nitzschia**



Coscinodiscus



Chaetoceros



Asterionellopsis



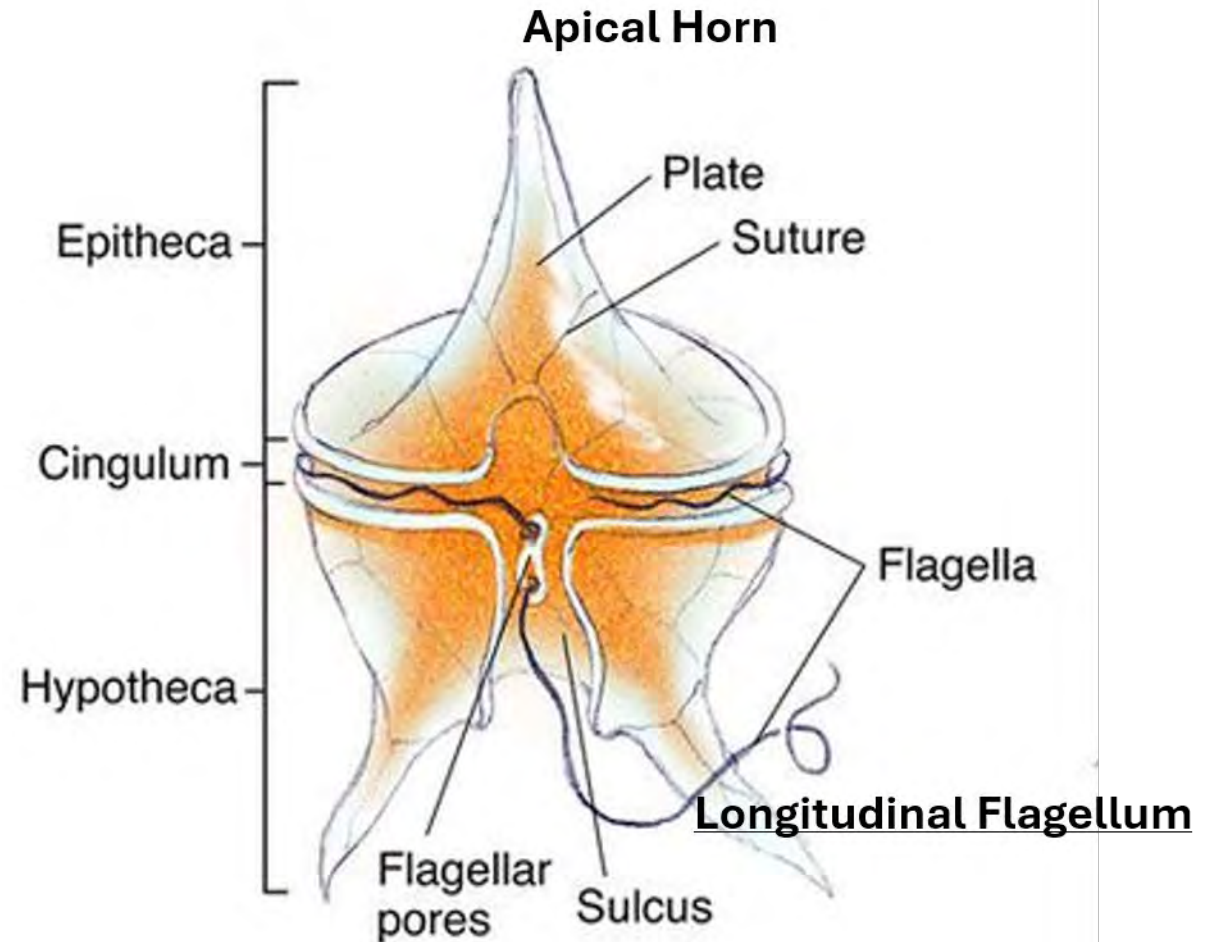
Laderia



Pleurosigma

Dinoflagellates the whirling whips

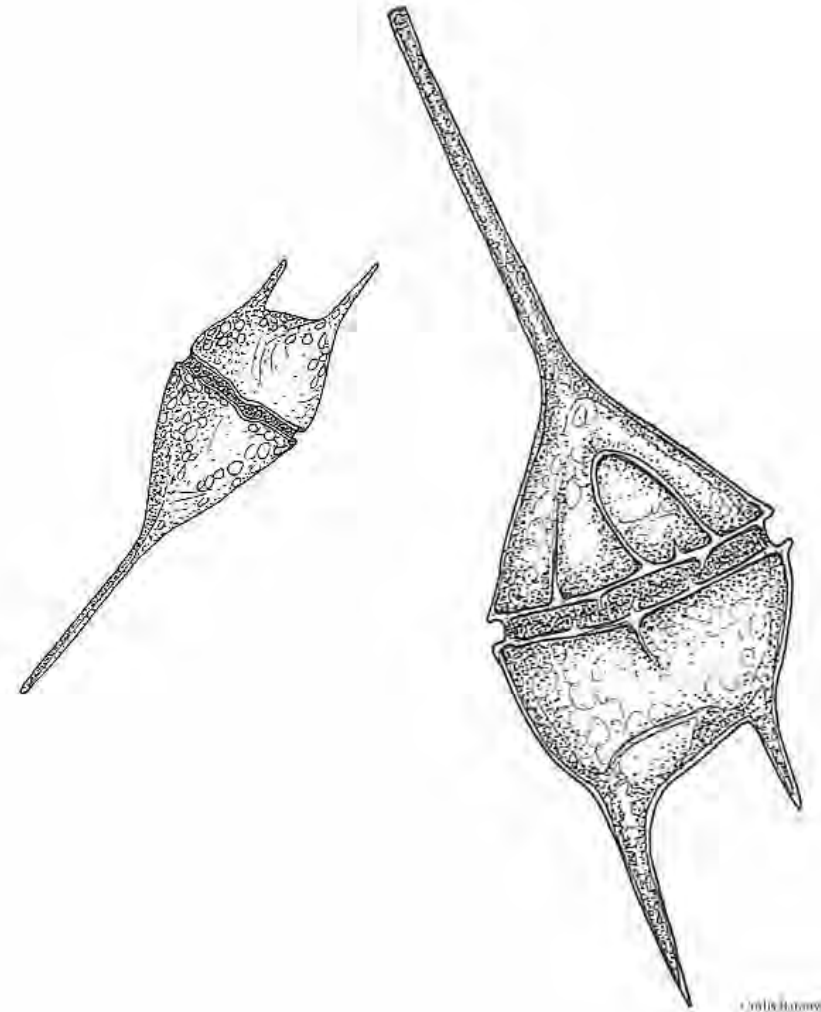
- o Primarily single-celled organisms
- o Have two distinct whip-like structures (flagella).
- o One flagellum wraps around the cell to spin, and the other propels them forward
- o Often dominate in warmer, nutrient-depleted environments



Protooperidinium



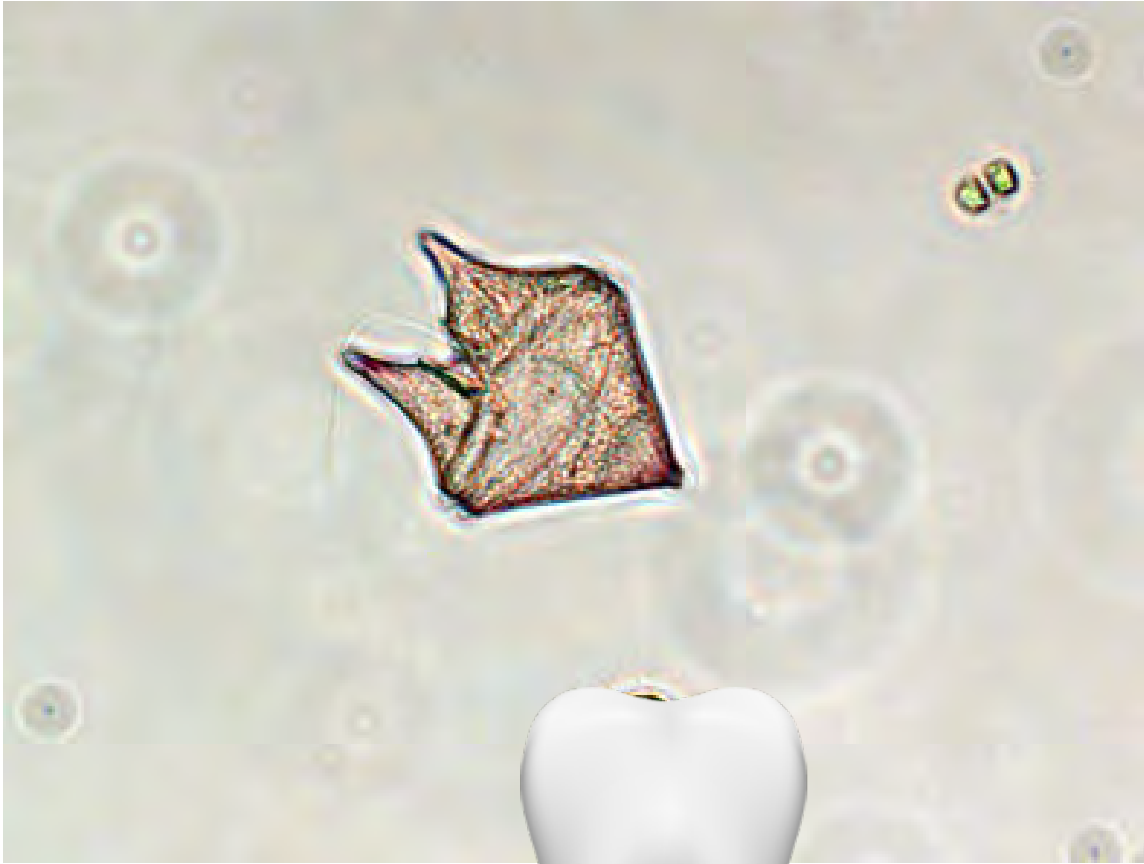
Dinoflagellates



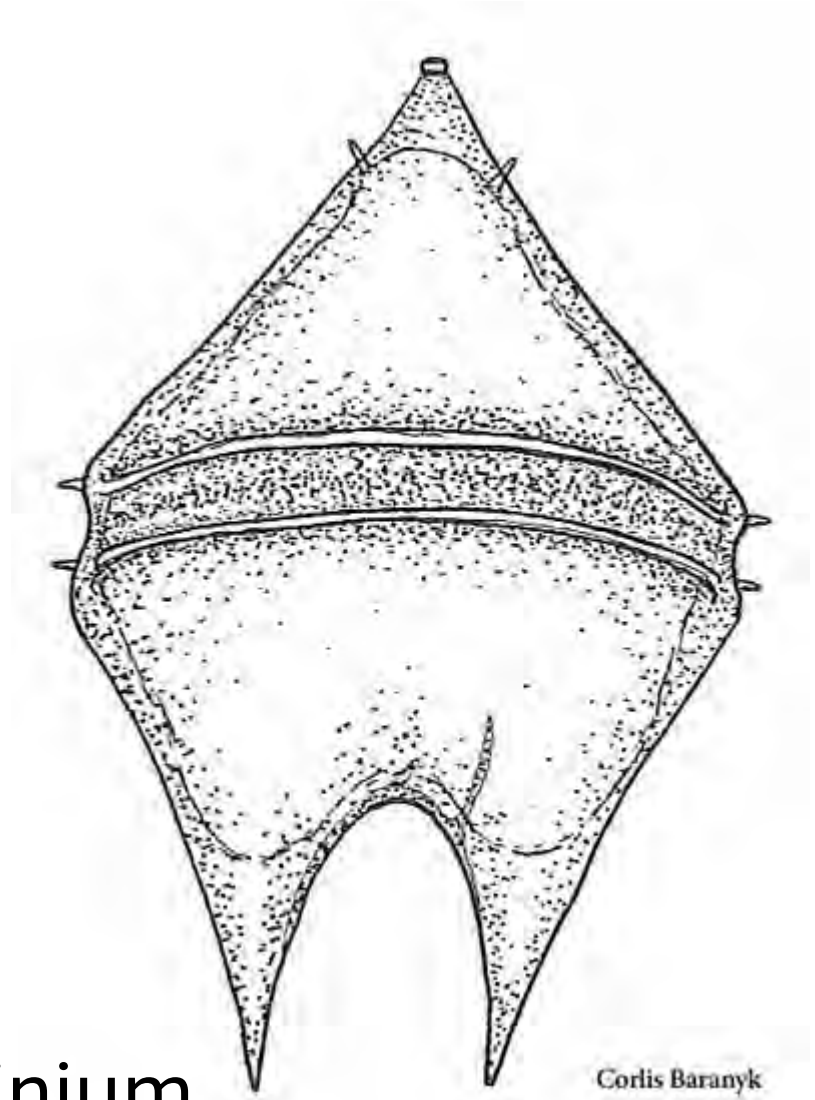
Ceratium furca
“headless rubber chicken”



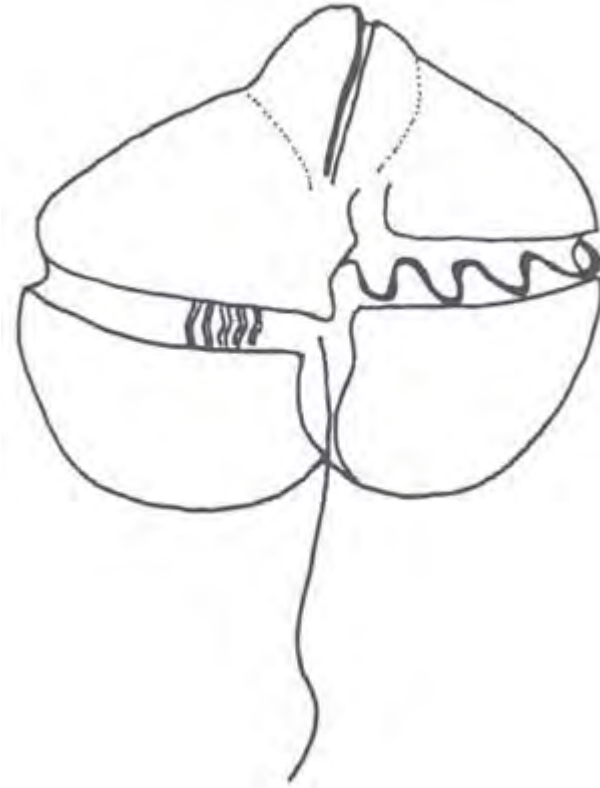
Dinoflagellates



Protoperidinium
“whirling tooth”

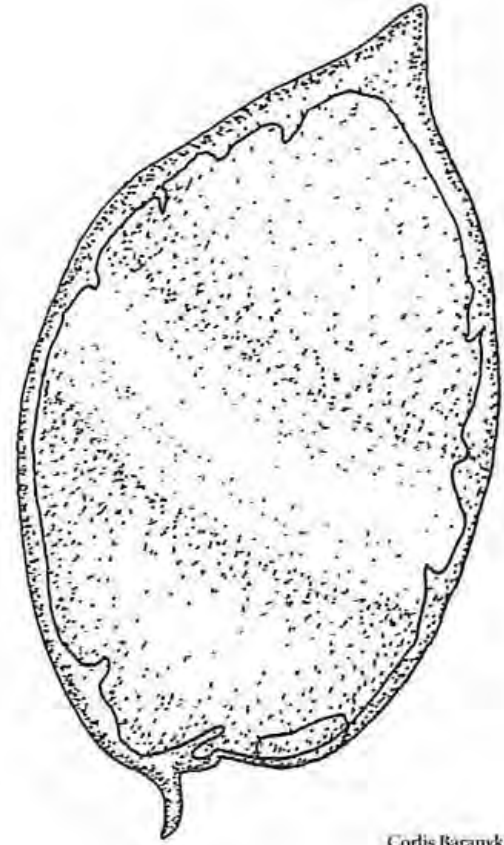


Dinoflagellates



Karenia brevis
“tiny acorn”

Dinoflagellates



Prorocentrum micans
“leaf”

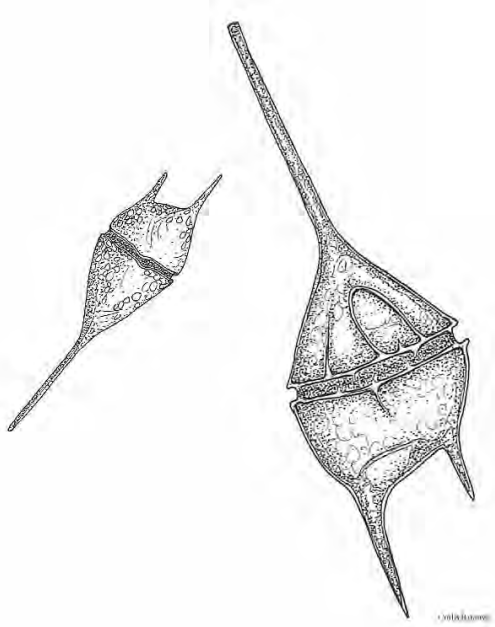
Dinoflagellates



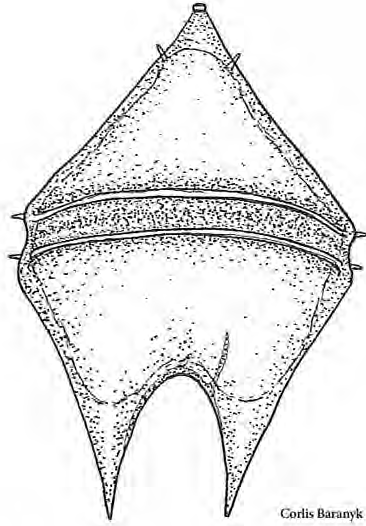
Dinophysis



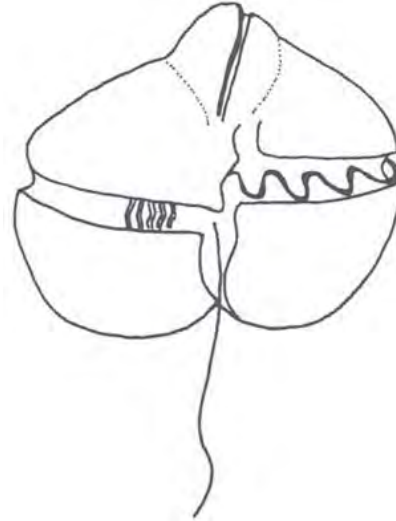
Dinoflagellates



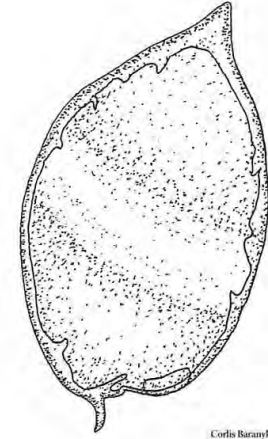
Ceratium
furca



Protoperidinium



Karenia
brevis

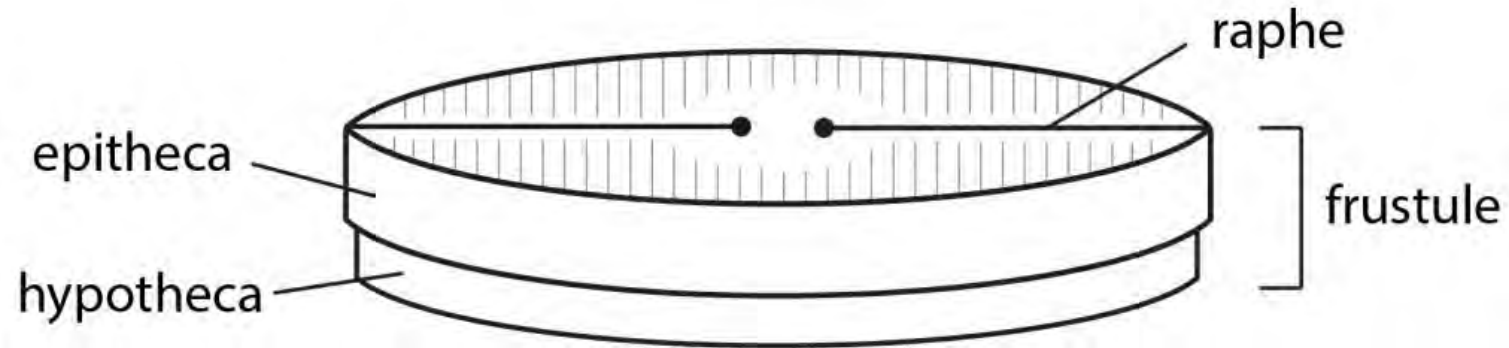


Prorocentrum
micans

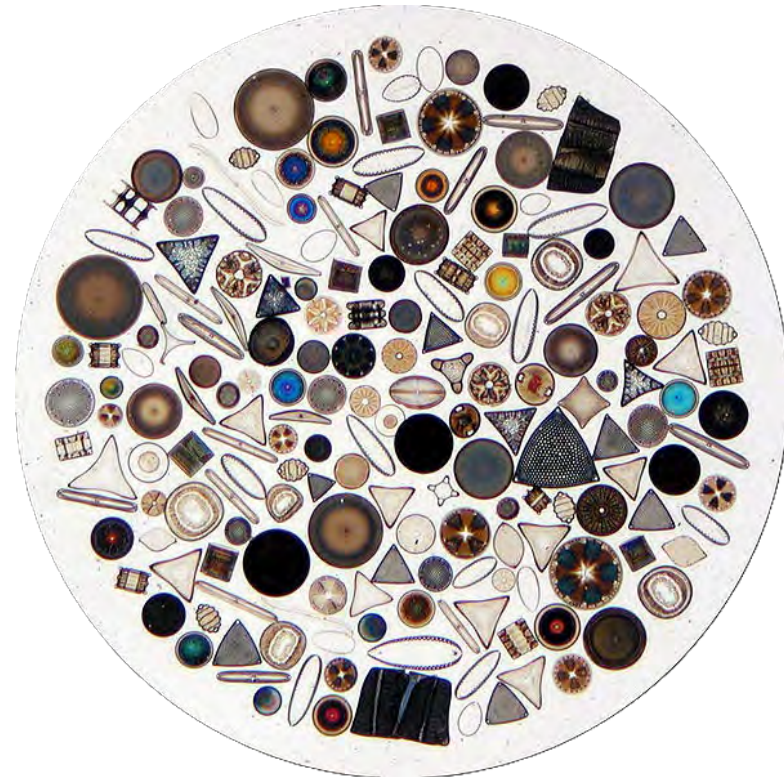


Dinophysis

Diatoms cut in half



- o Single-celled
- o Encased in a rigid, **glass-like** cell wall made of silica
- o Do not possess flagella for movement
- o Thrive in nutrient-rich, well-lit waters



Pleurosigma

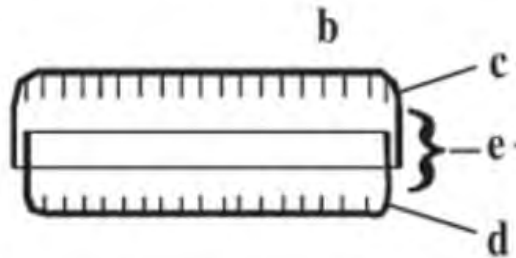
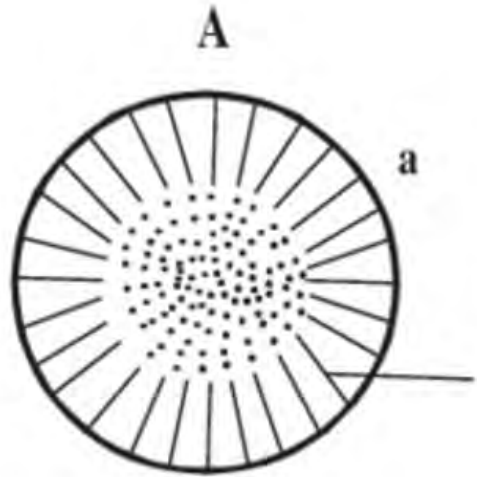


Bacillaria



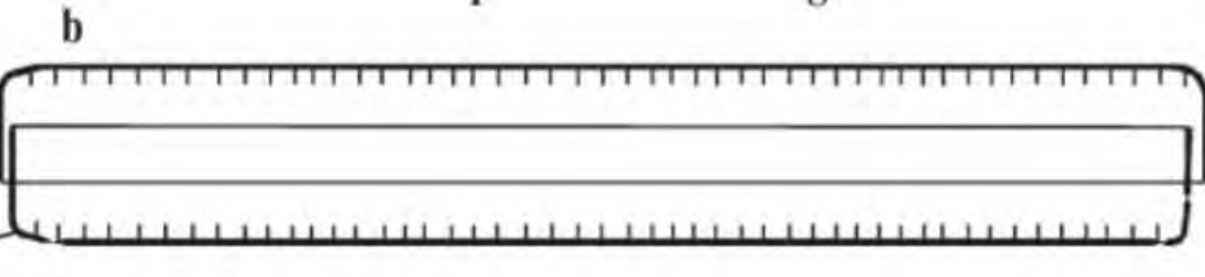
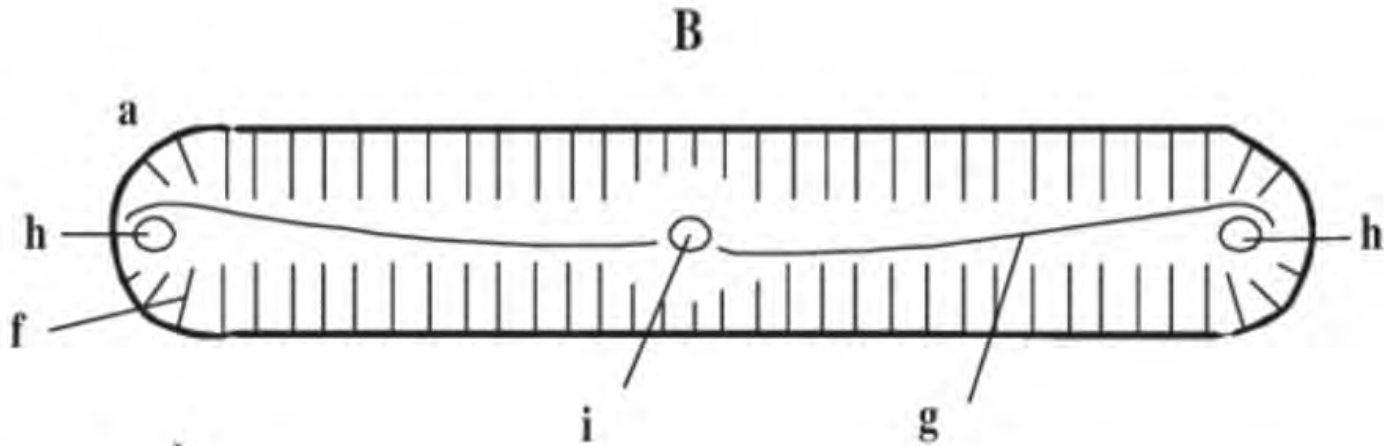
Diatoms

Centric



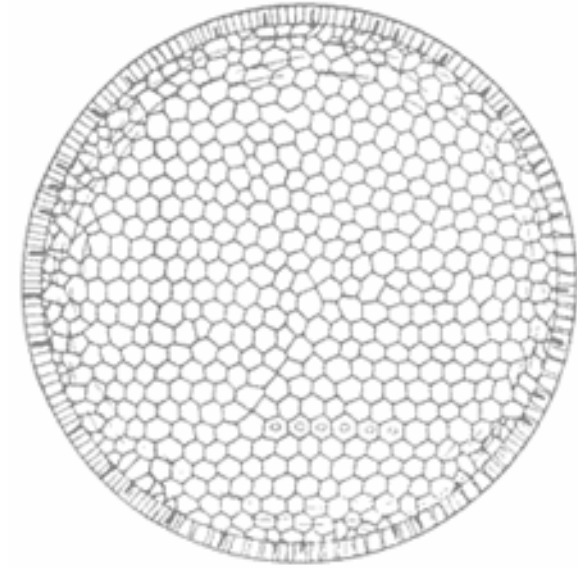
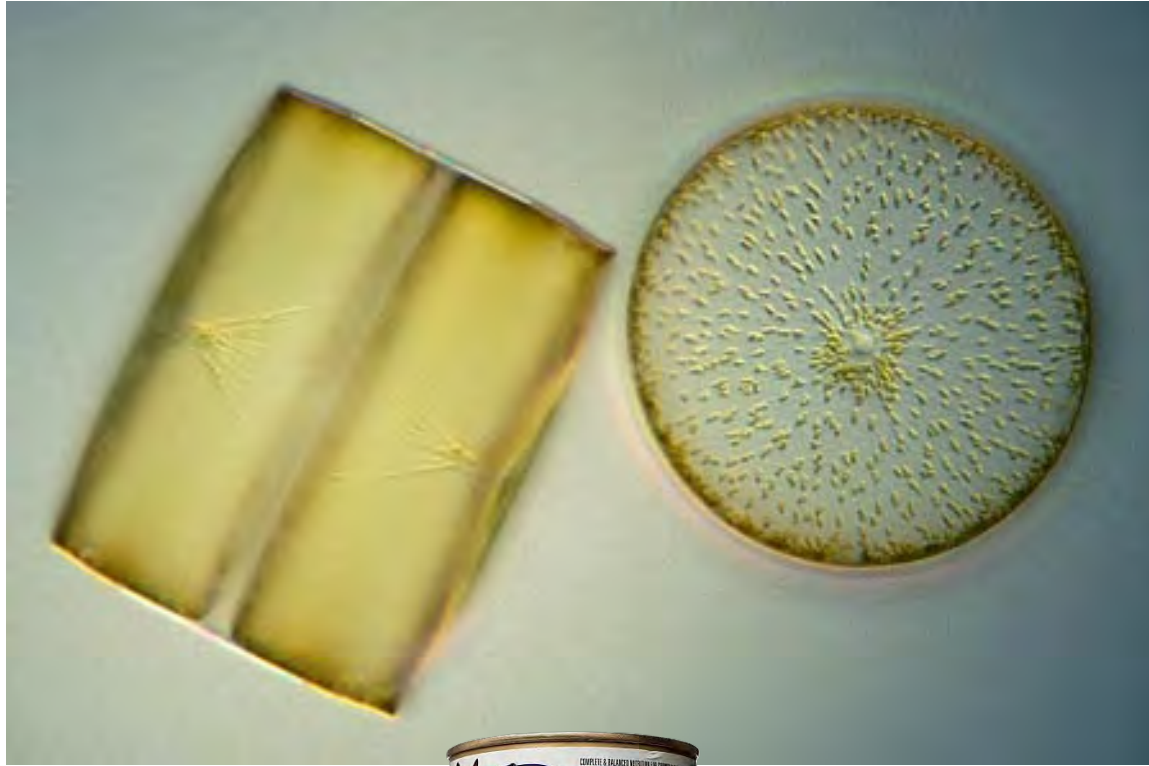
- a = face of the diatom cell (valve face)
- b = side view of the cell (girdle view)
- c = upper part of the cell (frustule), 'the lid' (epitheca)
- d = lower part of the frustule, 'bottom' (hypotheca)
- e = girdle bands

Pennate



- f = ornamentation of the frustule
- g = raphe
- h = terminal nodule
- i = central nodule

Diatoms (centric, chain forming)

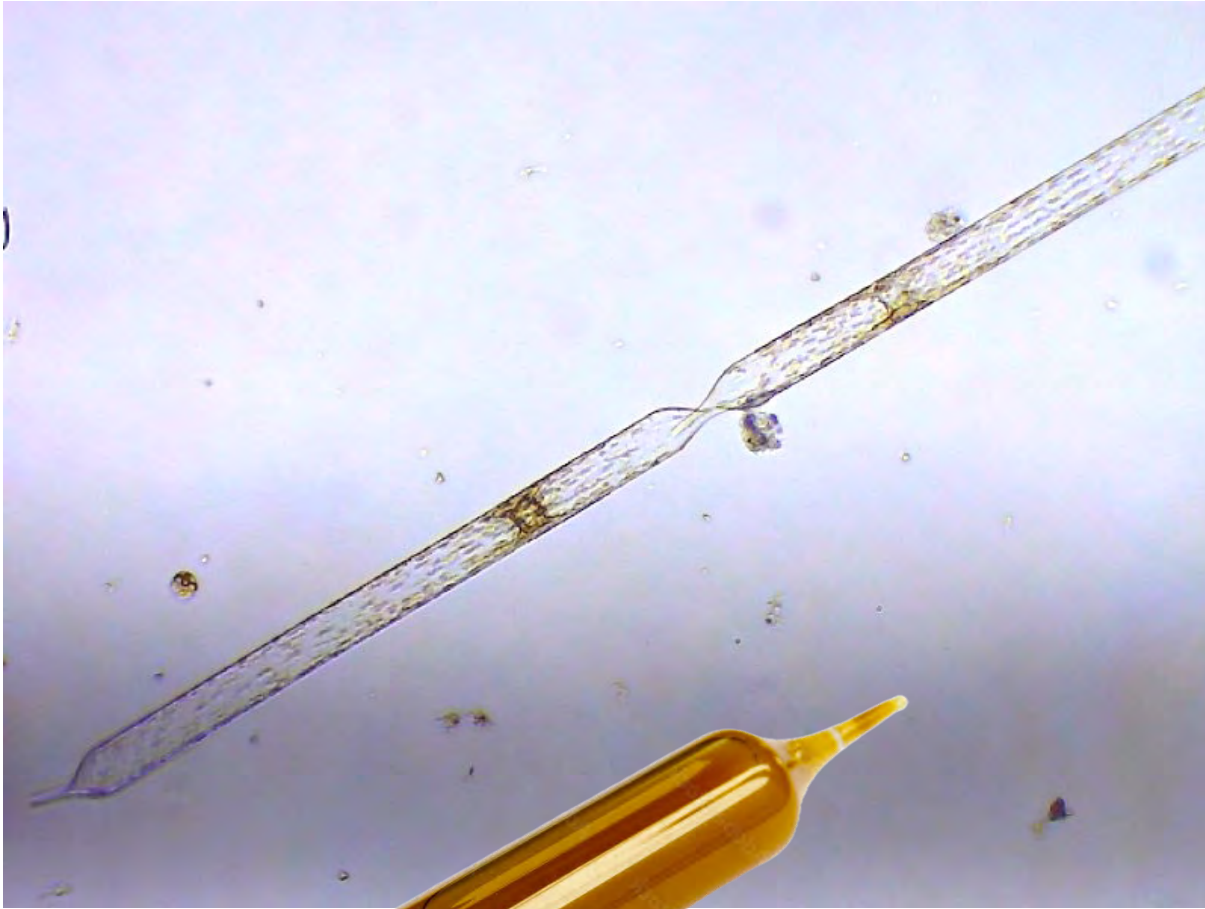


30 - 500 μm (W)



Coscinodiscus sp.
“tuna cans”

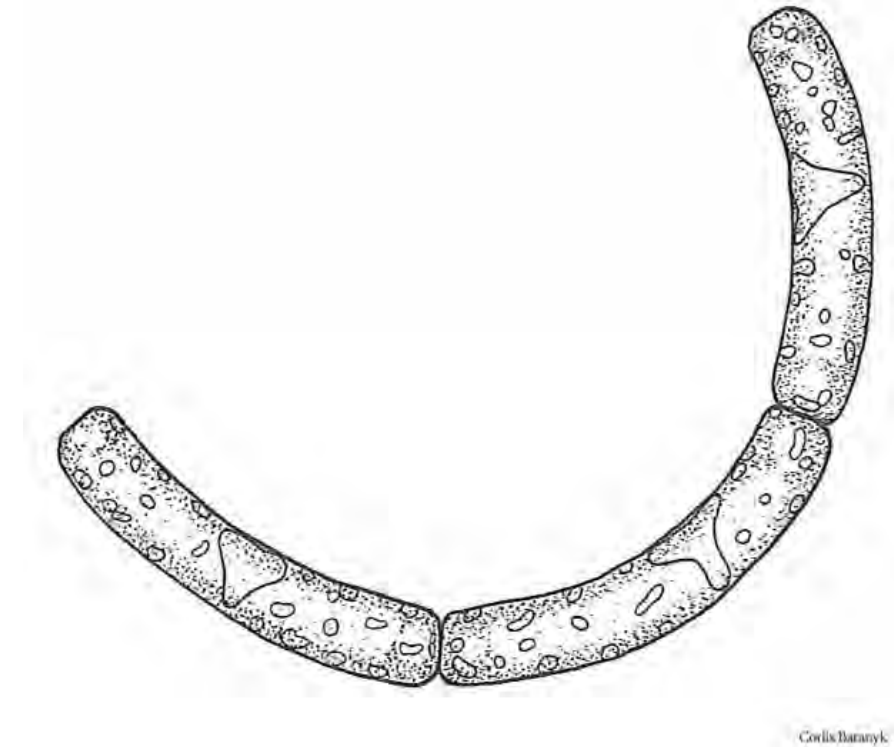
Diatoms (centric, chain forming)



Rhizosolenia sp.
“ampule”

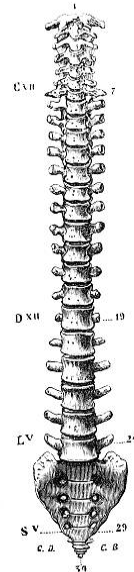


Diatoms (centric, chain forming)



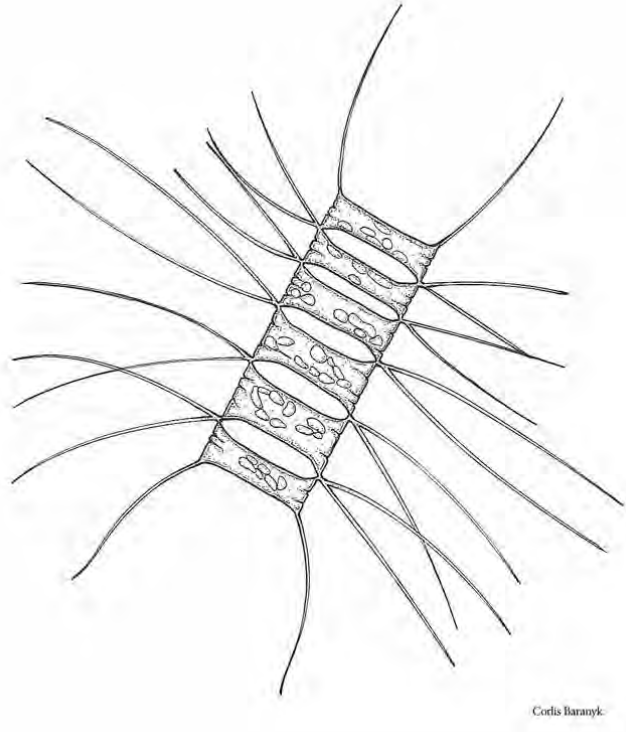
Guinardia sp.
“bracelet”

Diatoms (centric, chain forming)



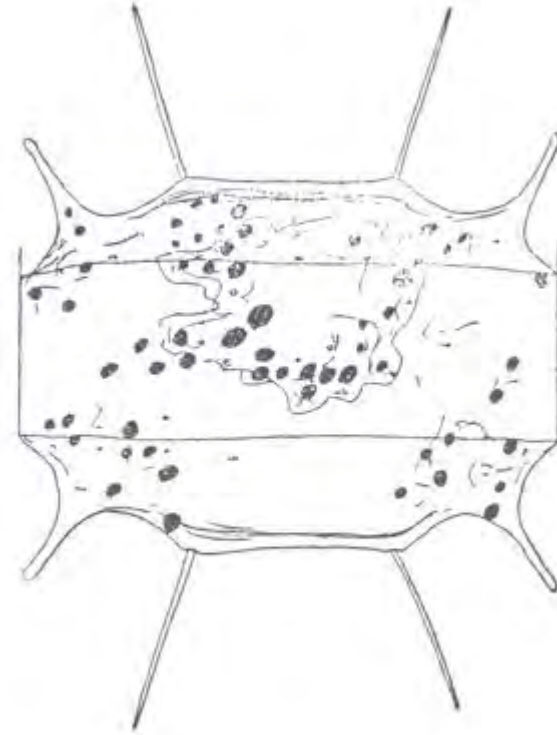
Skeletonema
“spine”

Diatoms (centric, chain forming)



Chaetoceros sp.
“millipede”

Diatoms (centric- not in a chain)



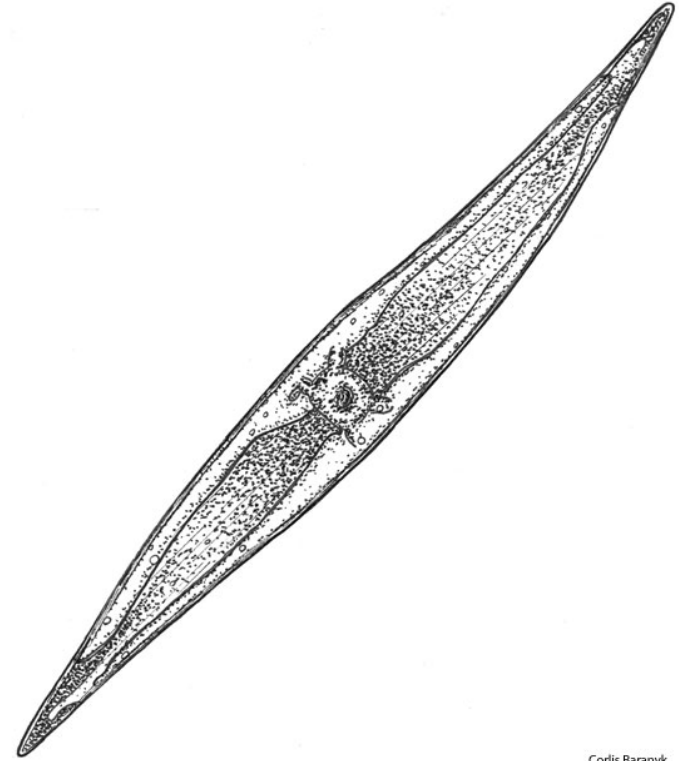
Odontella sp.
“bug splat”

Diatoms (pennate, non-chain forming)



Nitzschia
“kayak”

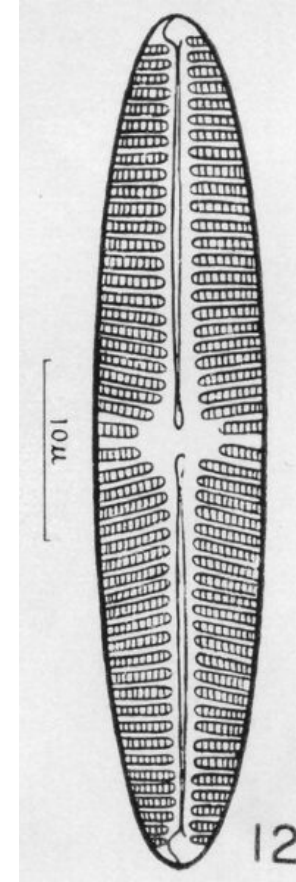
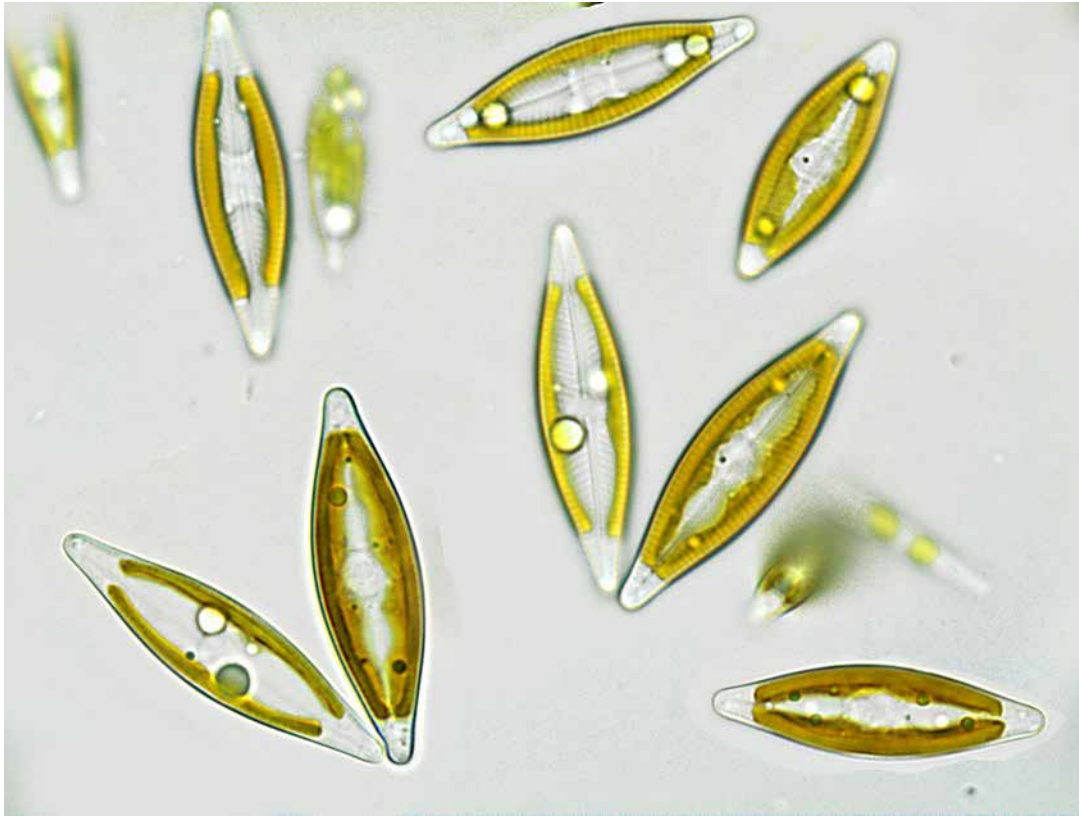
Diatoms (pennate, non-chain forming)



Corlis Baranyk

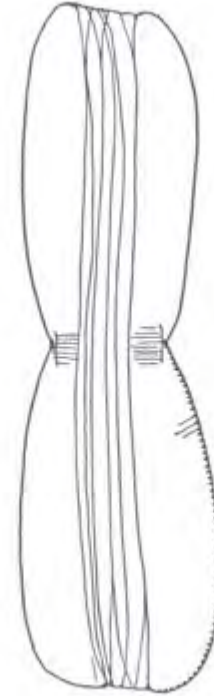
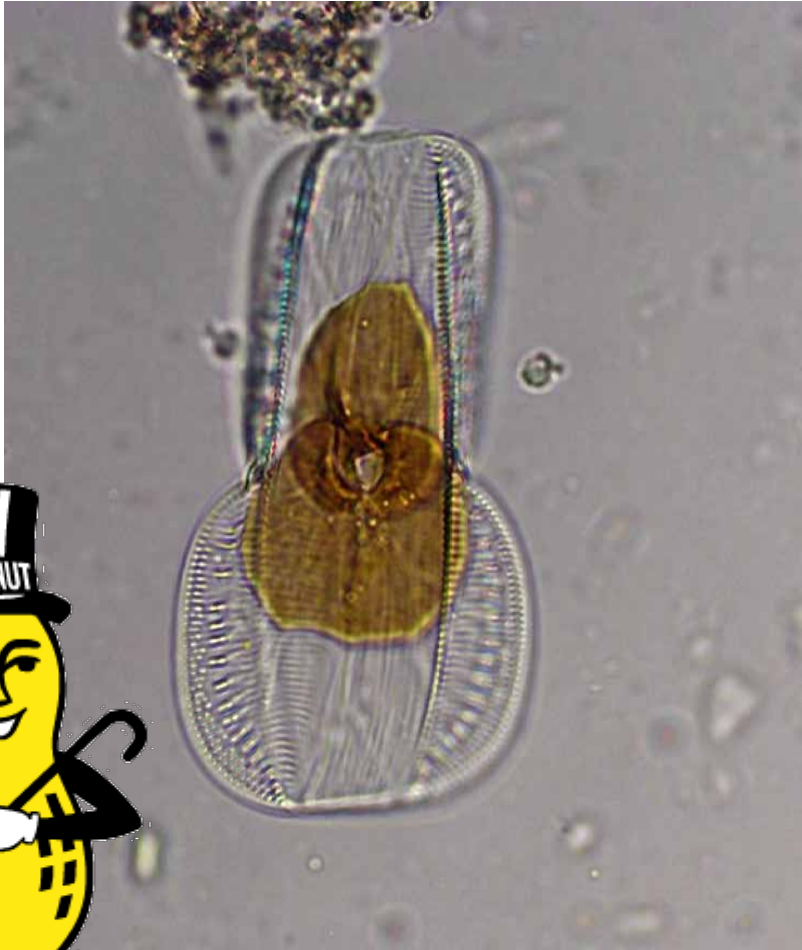
Pleurosigma
“curvy kayak”

Diatoms (pennate, non-chain forming)



Navicula
“seed”

Diatoms (pennate)



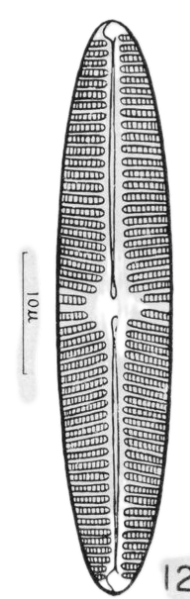
Entomoneis
“Mr. Peanut”

Diatoms (pennate)

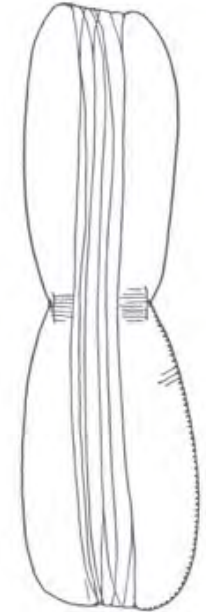


Nitzschia
“kayak”

Pleurosigma
“curvy kayak”

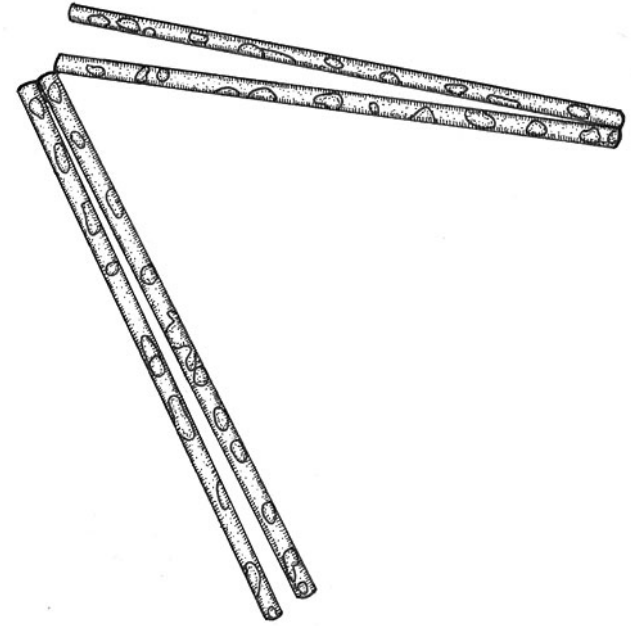


Navicula
“seed”



Entomoneis
“Mr. Peanut”

Diatoms (pennate, chain forming)



Corlis Baranyk

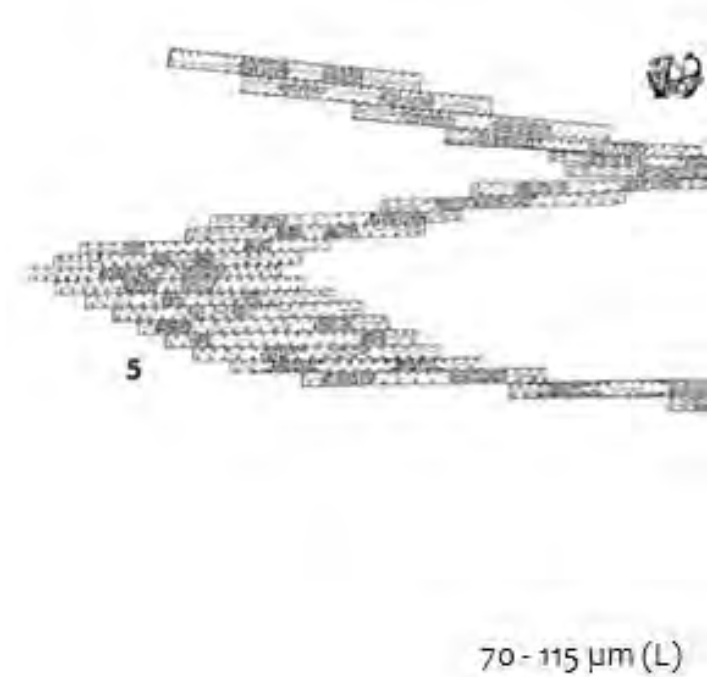
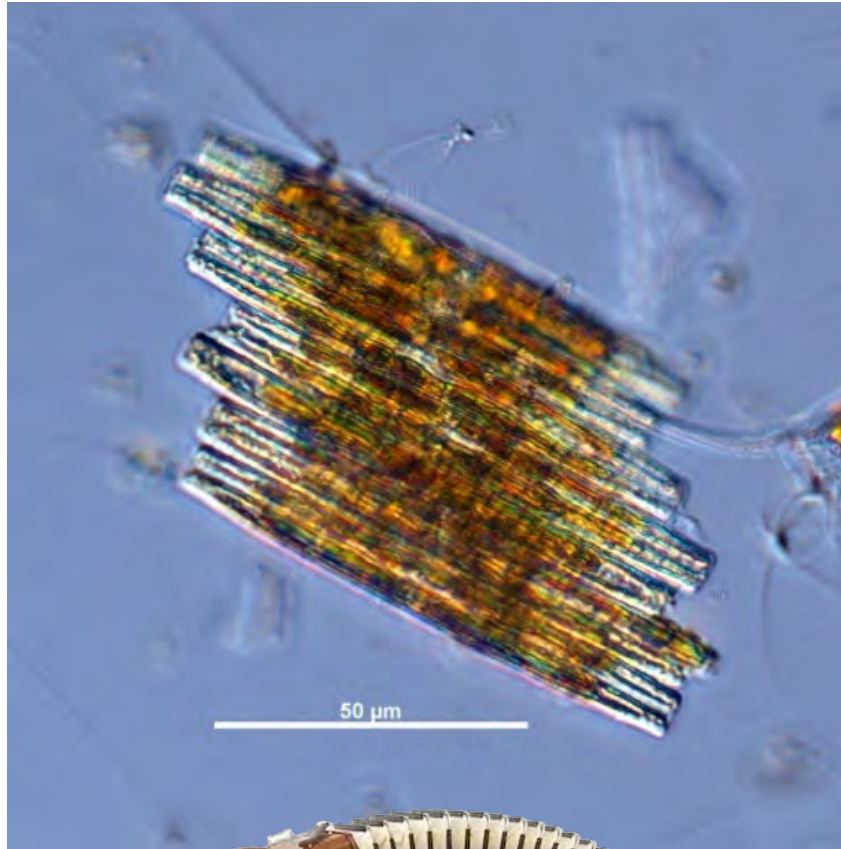
Thalassionema sp.
“zig zag rods”

Diatoms (pennate, chain forming)



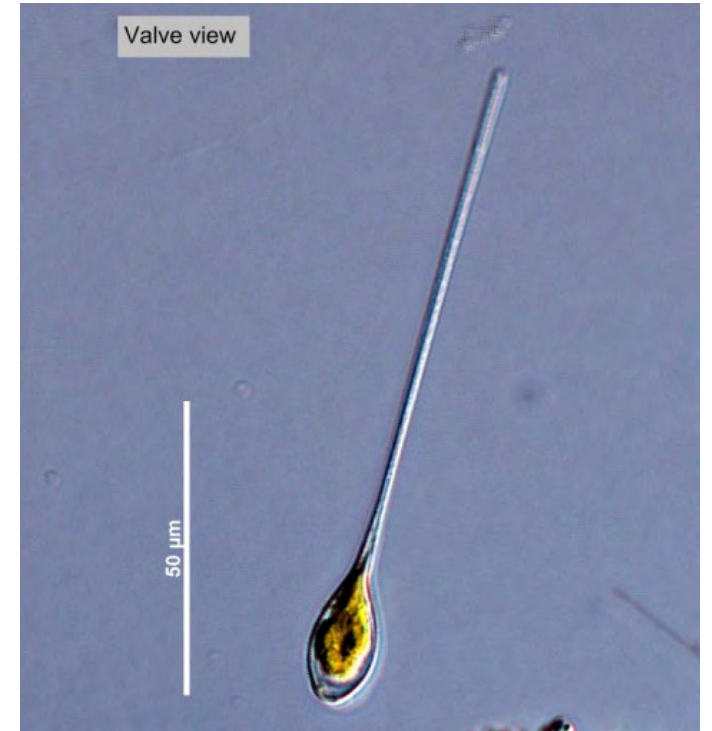
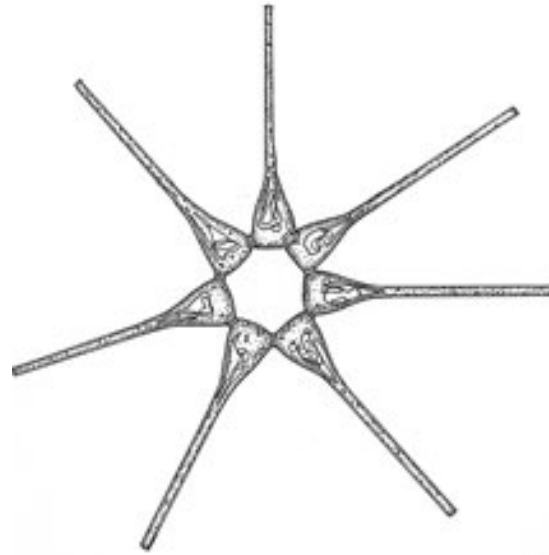
Pseudo-nitzschia
“roof tiles”

Diatoms (pennate, chain forming)



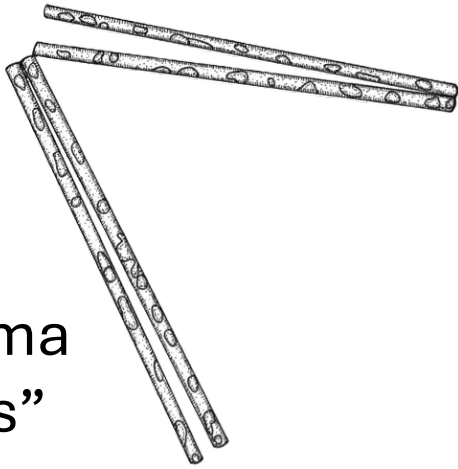
Bacillaria
“accordion”

Diatoms (pennate, chain forming)

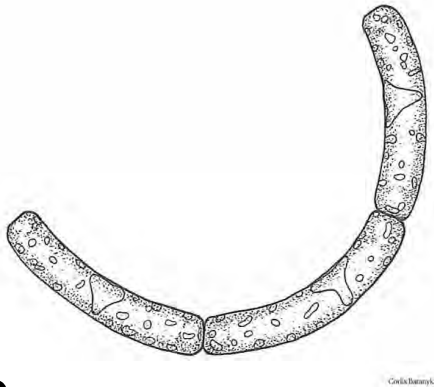


Asterionellopsis sp.
“stars”

Thalassionema
“zig zag rods”



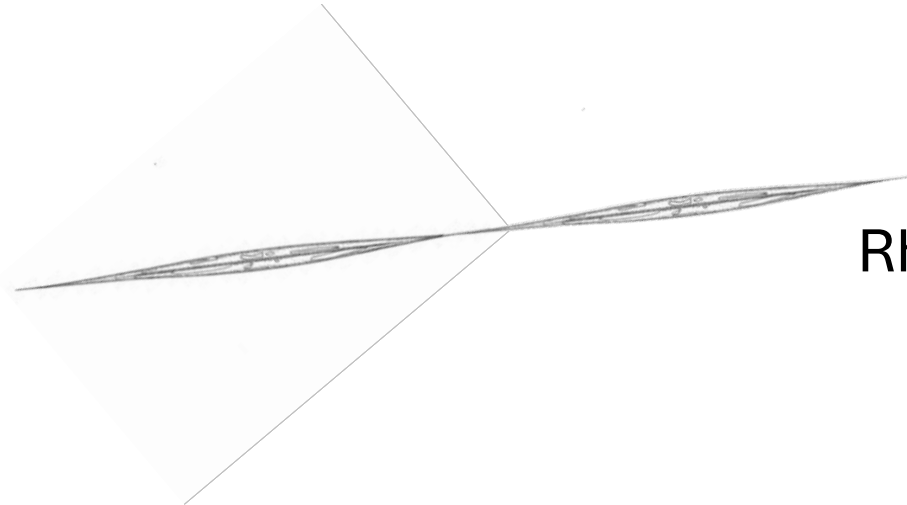
Guinardia sp.
“bracelet”



Pseudo-nitzschia
“roof tiles”



Bacillaria
“accordion”



Rhizosolenia sp.
“glass rods”

Other **PLANKTON**

Acantharians/Radiolarians



Acanthometra



Radiolarian

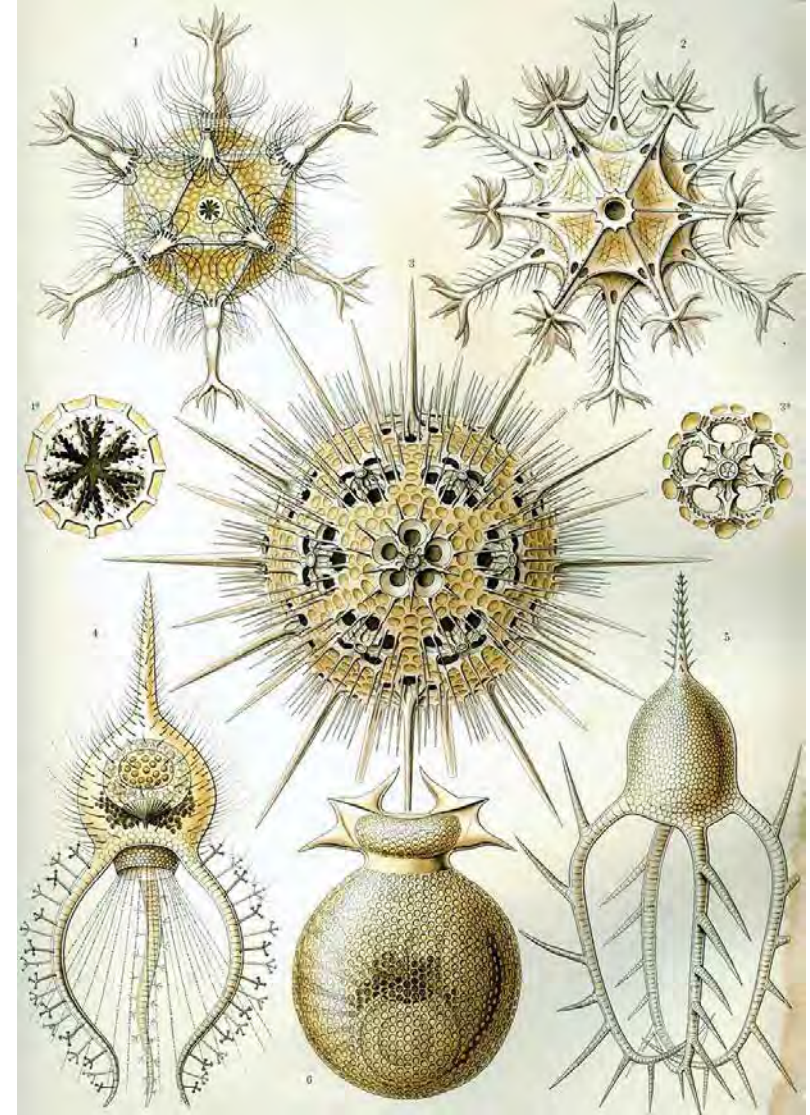
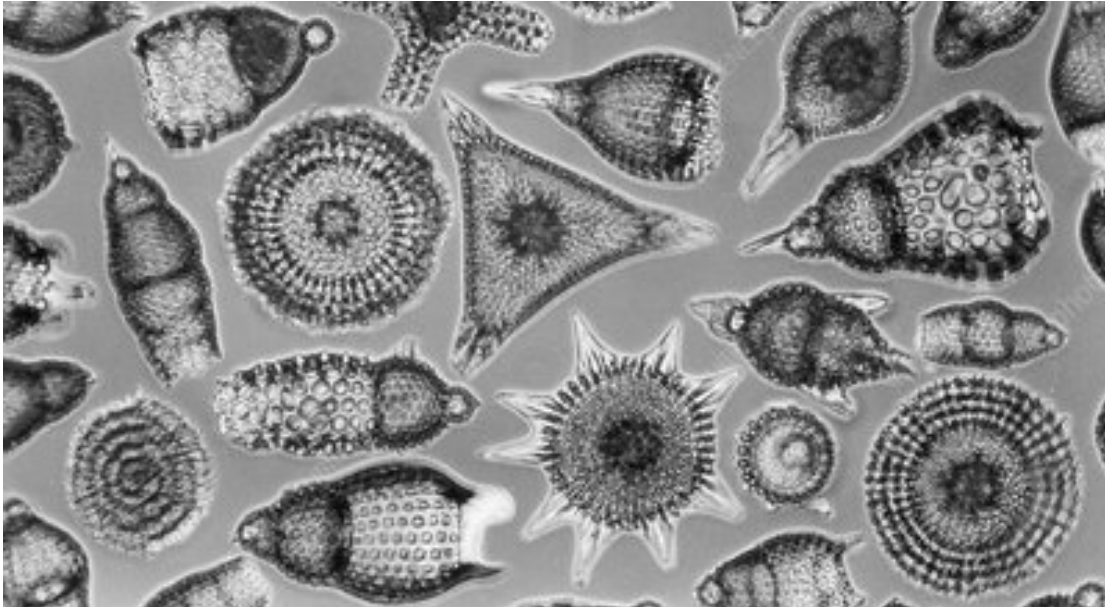
Ciliates



Tintinnid

Radiolarians radiant spikes

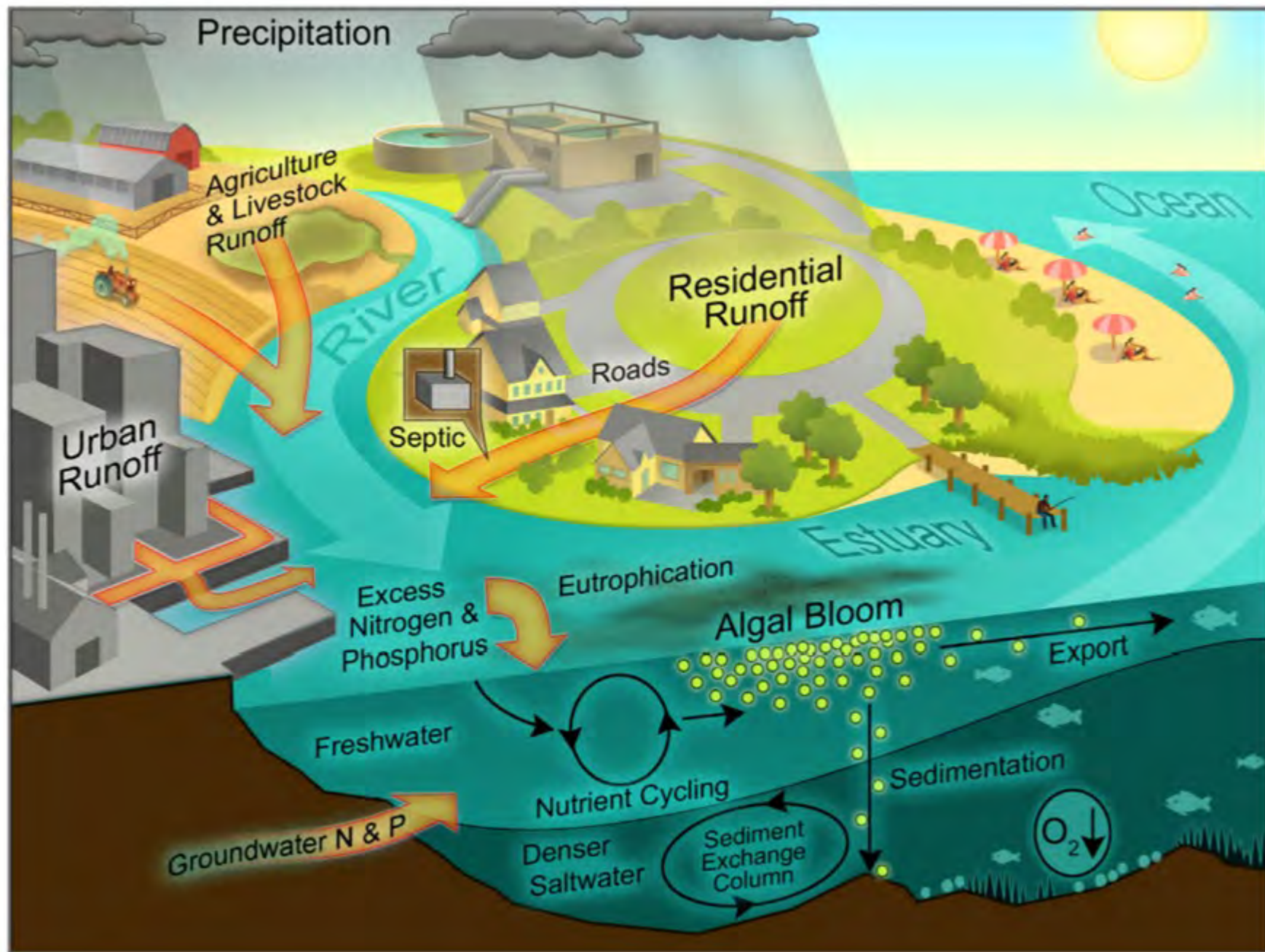
- o Mineral skeleton (silica)
- o Mixotrophs
- o Often contain symbiotic algae,
- o Needle-like pseudopods supported by bundles of microtubules



Ciliates they have cilia

- o Not an animal, plant, or fungus
- o Used to be a separate taxonomic kingdom known as Protista
- o Now spread across several large clades known as supergroups
- o Hair-like organelles called cilia







haddock@mbari.org



<http://lifesci.ucsb.edu/~biolum>

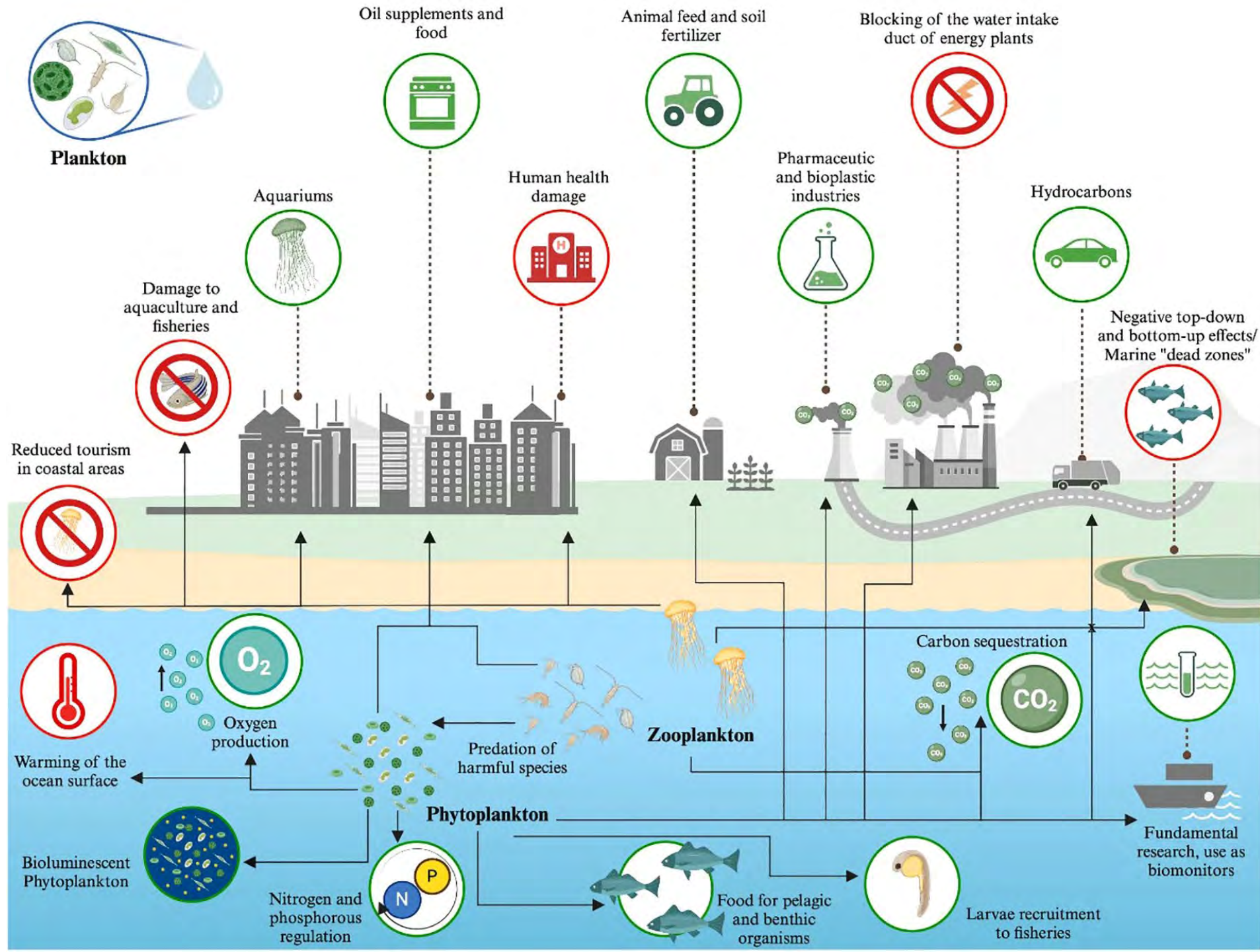


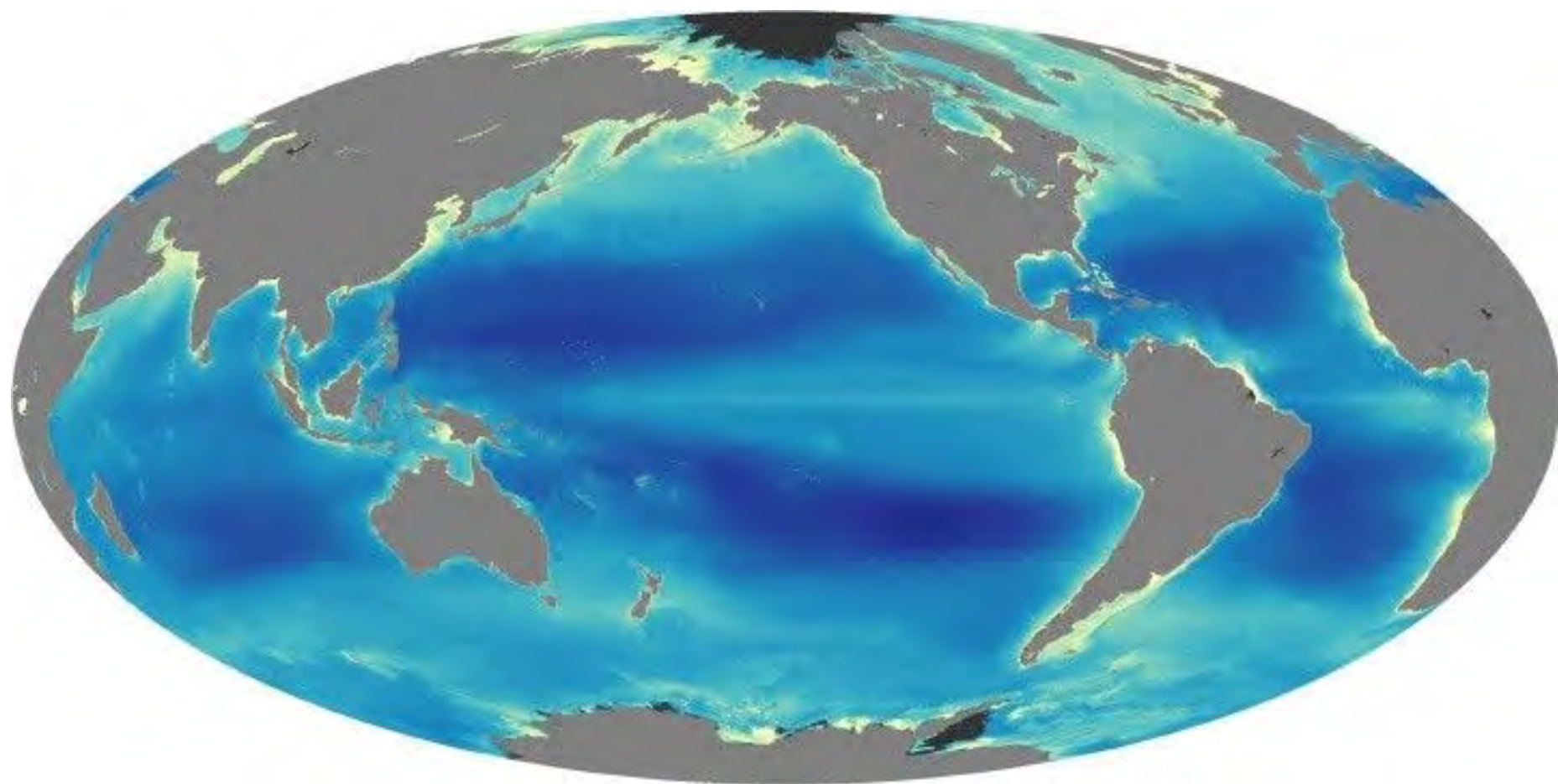
<http://jellywatch.org>



Akashiwo sanguinea	Dense blooms	Clogs gills, O ₂ depletion
Alexandrium monilatum	Saxitoxin	Paralytic shellfish poisoning
Tripos (Ceratium) furca	Dense blooms	“red tides”, O ₂ depletion
Chaetoceros spp	Dense blooms	Damage to gills
Cochlodinium	Mechanism unknown	Large scale mariculture losses
Dinophysis spp	Okadaic acid	Diarrhetic Shellfish Poisoning
Karenia spp	Brevetoxins	Neurologic shellfish poisoning
Karlodinium spp.	Karlotoxin	Cause membrane permeabilization (fish)
Lingulodinium polyedrum	Yessotoxin	“red tides”, mass shellfish die-off
Prorocentrum spp.	Fast-acting toxin (FAT)	Neurotoxic compounds
Pseudo-nitzschia	Domoic acid	Amnesic Shellfish Poisoning
Pyrodinium bahamense	Saxitoxin	Paralytic shellfish poisoning

- Ingestion of saxitoxin by humans, primarily through eating shellfish, can result in numbness, ataxia, incoherence, and in extreme cases, respiratory paralysis and death.
- Domoic acid is toxic to marine mammals, seabirds, and to humans.
- Brevetoxins: intoxication can occur due to inhalation of aerosols produced by breaking waves at the shoreline

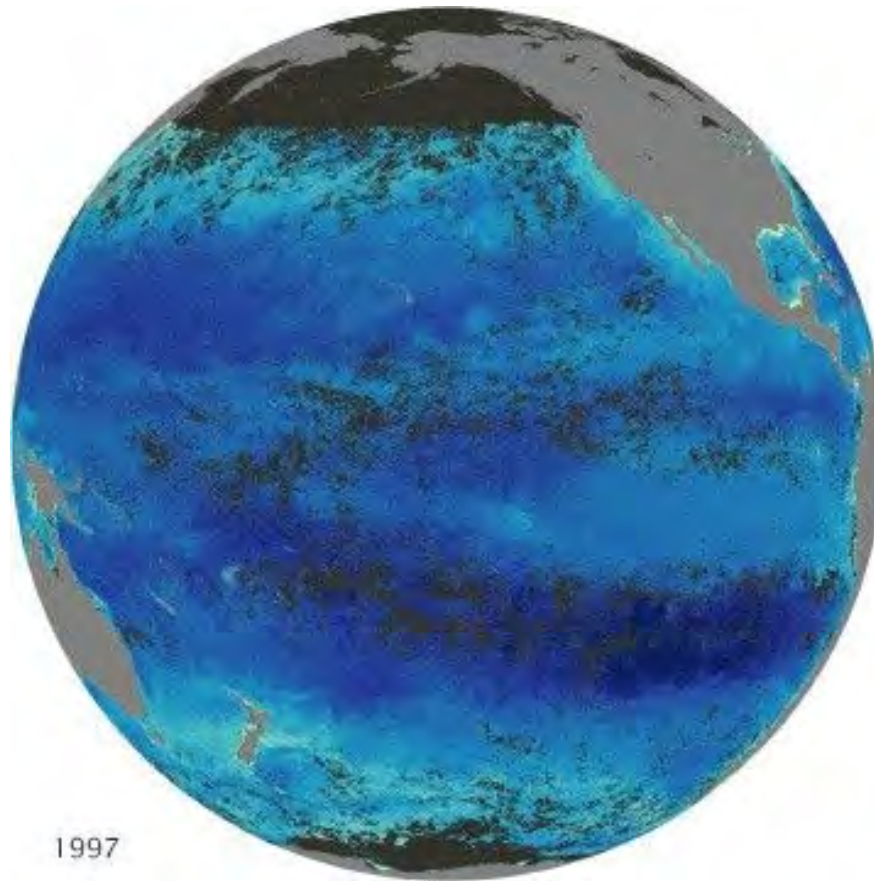




Chlorophyll Concentration (mg/m³)



El Nino



La Nina

