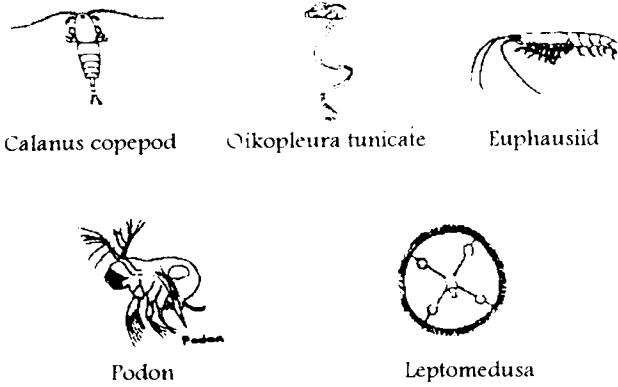
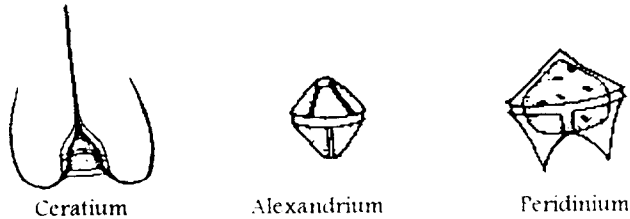


Permanent Zooplankton: live in the **photic** zone year round. Most consume many diatoms as a part of their regular diet. Copepods also eat other zooplankton in addition to diatoms.

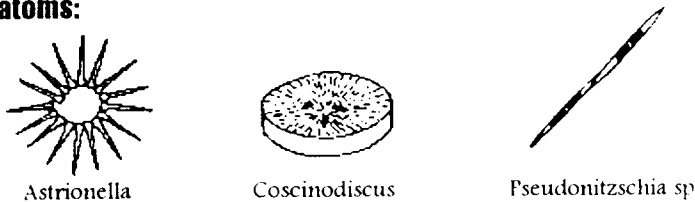


Phytoplankton require: energy from sunlight, **dissolved CO₂** and nutrients like **phosphate** and **nitrate** from the water to produce their own food (**autotrophs**) through photosynthesis.

dinoflagellates:



diatoms:



Temporary Zooplankton: few marine fish and invertebrates provide any parental care beyond some early larval stage. Most bottom-dwelling marine invertebrates off Dana Point produce free-swimming larva that feeds from the plankton. **Phytoplankton blooms** regulate the timing of spawning and larval release.

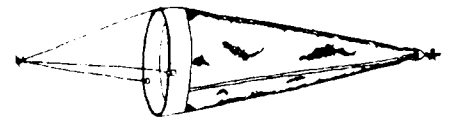
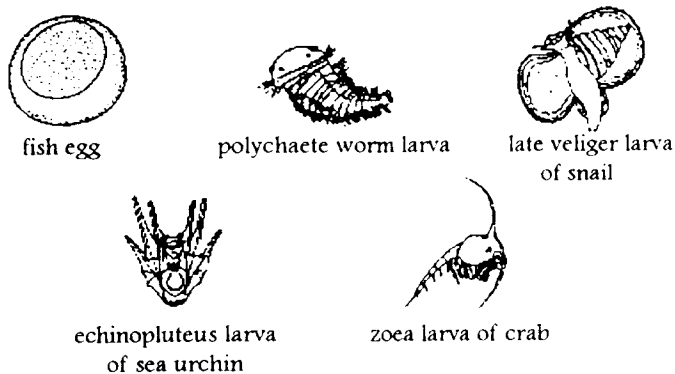


Figure 1: Onboard the *R/V Sea Explorer* your group will collect plankton using a plankton net.

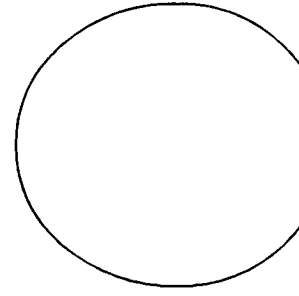
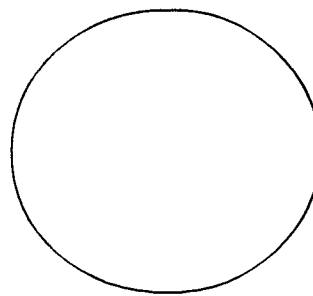
What to expect during an El Nino year:

The effects of *El Nino* episodes on plankton populations is significant due to the increased sea surface temperatures. Plankton productivity decreases rapidly in warm water temperatures as nutrients are rapidly consumed by phytoplankton (warm water increases their metabolism). At the same time the warm surface waters create a barrier to the deep cooler nutrient-rich waters so there is no water replenishment of nutrients. This repression of upwelling caused by *El Nino* also reduces the amount of macrozooplankton by late summer. The surface waters are likened to a desert during *El Nino* episodes.

Directions: Using the clues about plankton on left and your weather predictions from *Activity 1*, predict which plankters will be present during Spring, Summer, an El Nino event, and the day of your program. Draw the plankton in the petrie dishes below:

Spring ?

Summer ?



The Day Of Your Program ?

During An El Nino?

