

Practical No.-8-

Plankton Capture and Salinity Measuring

Objectives:

1. to collect, identify and classify the different types of plankton.
2. To determine the salinity of seawater.

Introduction.

Plankton

Plankton includes plants and animals that float or drift with the movements of the water.

-Plant plankton is called **phytoplankton**, and animal plankton is known as **zooplankton**.

-**Nekton**, animals that swim freely and purposefully in the sea.

-**Benthos**, organisms that live attached to the bottom or in the bottom.

A glossary of terms used in describing marine organisms:

Term	Description
-Plankton	-Free-floating organisms with limited power of locomotion.
-Phytoplankton	-The plant, primarily algae, component of plankton.
-Zooplankton	-Animal component of plankton.
-Bacterioplankton	-Plankton bacteria.
-Holoplankton	-Permanent members of the plankton.
-Meroplankton	-Temporary members of the plankton e.g. many larval stages of benthic organisms.
-Neuston	-Small planktonic organisms inhabiting the ultra-thin sea surface layer.
-Nekton	-Organisms capable of swimming against water currents, e.g. fish, squid, whales.

-Plankton and Plankton Communities:

-Planktonic organisms are animals and plants have such limited powers of locomotion that they are at the mercy of revealing water movements, and include all organisms that drift with the ocean currents. Plankton is usually

collected by means of nets or filters. Since these have a standard mesh or pore size.

-The plankton includes larger animals and plants such as Jellyfish, slugs, and Sargassum, which are classified as macroplankton (1mm) and megaplankton (some feet's). Smaller microplankton (0.07-1 mm) can be captured in fine-meshed silk plankton nets. Nanoplankton (less than 75 μ) include the smallest plants that are too small to be filtered from the water by a silk net and must be removed by other types of microfilters. This is in contrast to the *nekton*, which comprise the strong swimming animals of the open sea, capable of exercising movement against the prevailing water flow. Plankton may be further subdivided. Phytoplankton comprises the free-floating plants of the sea that are capable of photosynthesis. Zooplankton is the various free-floating animals. Bacterioplankton include the various minute bacteria and blue-green algae.

-Plankton is also classified according to what portion of their life cycle they spend within the plankton community. Organisms such as planktonic diatoms and copepods that spend their entire life in the plankton are holoplankton. Other organisms, the meroplankton, spend a portion of their life cycle as plankton.

-Also there is a functional classification of the plankton into autotrophic and heterotrophic species.

1-The phytoplankton (autotrophic plankton)

-Phytoplankton is primarily single-celled organisms although they can occur as chains or small colonies of cells. The photoautotrophs (those that use sunlight as an energy source) are the principal primary producers in the sea and they can only grow when they have using energy obtained from a variety of simple compounds and elements, including ammonia, methane, iron and sulfur. This process, chemosynthesis, can occur in the absence of light. Both types of organism absorb carbon dioxide, water and essential nutrients, like nitrate and phosphate, from the water surrounding them.

-Traditionally, it has been the largest of autotrophic plankton, the microplankton, which have the most intensely investigated. The two most dominant members of this group -that is, those normally captured in nets- are the *diatoms* and *dinoflagellates*.

2-Heterotrophic Plankton:

-We can divide this group into zooplankton and microheterotrophs like bacteria and protozoa.

-The zooplankton:

In contrast to the phytoplankton, which consist of a relatively small variety of plants, the zooplankton are extremely diverse, consisting of a host of larval and adult forms representing most of the animal and many of the protistan phyla. As with the phytoplankton, two groups can be identified: the larger "net" zooplankton and the smaller microzooplankton (nanozooplankton and

picozooplankton). Marine biologists have long considered this larger net zooplankton to be the most important grazers of the phytoplankton. Among the “net” zooplankton one group stands out as being more important than the others. The class Copepoda (subphylum Crustacean, phylum Arthropoda) is small holoplanktonic crustaceans that dominate the net zooplankton throughout the world’s oceans (**Fig- -**). These small animals are of vital importance in the economy of ecosystems in the oceans, because they are one of the primary herbivore animals in the sea. It is they who graze upon the aquatic pastures constituted by the larger phytoplankton, especially in coastal waters, and provide one of the links between the primary production of the plants and the numerous large and small carnivores. Some zooplankters spend their life in the plankton (holoplankton) while only the eggs and larvae of otherwise benthic animals may be planktonic (meroplankton).

-The zooplankton are either herbivore, grazing on the phytoplankton, or carnivores feeding on other members of the zooplankton. They may move vertically in the water column, but, like the phytoplankton, the currents also transport them. Zooplankton may reproduce three to five generations a year in warm water, where food supplies are abundant and higher temperatures accelerate life processes. At high latitudes, where the season for the phytoplankton growth is brief, the zooplankton may produce only a single generation in a year.

-**Foraminiferans** and **radiolarians** are single-celled microscopic members of the zooplankton; (**Fig- -**). The swimming snails are **pteropods**, modified **mollusks** that may or may not have a small shell, but they all have a transparent, gracefully undulating “wing” (**Fig- -**). Some pteropods are herbivores, and some are carnivores. Comb jellies or **ctenophores** (carnivores) (**Fig- -**) float in the surface water. True jellyfish resemble comb jellies, but they come from another unrelated group of animals, the Cnidaria or **coelentrates**. Sea animals produce larvae in enormous numbers, and so this meroplankton is an important food source for the zooplankton and other animals. Larvae often look very unlike the adult forms into which they will develop (**Fig- -**).

-Importance of plankton:

1-by using plankton, it’s possible to determine biomass and the harvesting, to be the base of food chain in oceans.

2-By determining the plankton quantities, it is possible to identify the most suitable one for fish farming.

3-The correlations of changes happen in plankton, may used to correlate with fish biology and migration.

4-It is possible to study changes in environment by studying the plankton.

5-By studying the biochemical of different species of plankton and factors affecting its growing, its possible to select some species of plankton to be

used as food source in fish farming, where plankton consists of 40-50% protein + 20-40% carbohydrates + 20-25% fat.

The practical part:

Part –I–

1. Try to collect 3–5 Lit of sea water according to the following periodical program:
 - a. at 7 morning
 - b. at 12 noon
 - c. at 5 p.m.
2. Prepare the specific net used for filtering the seawater.
3. Try to collect the plankton present.
4. By using Microscope try to differentiate between the Zooplankton and Hpytoplankton.
5. Draw what you can see.

Note: Remember that two factors affecting distribution of plankton:

1. Velocity of water.
2. Light intensity.

High density is found at early morning and in the evening.

Part –II–

- Try to collect 3 liters of sea water
- Separate one liter alone in a container.
- Boil sea water at boiling point.
- Weigh the remaining salt.**
- Determine the salinity of water.**