

OBJECTIVE:

Collection and identification of benthos from inland water bodies.

Introduction

The heterogeneous assemblage of organisms attached or resting on the bottom or living in the bottom sediments of a body of water are known as benthos. Phytobenthos and zoobenthos are the terms used for benthic plants and animals respectively. The term benthos is widely referred to flora and fauna which are intimately associated with sediments in an aquatic system. Benthic environment represents bacteria, plants and animals including bottom living fishes from all phyla and their sizes widely varied. Benthic organisms are, in general sessile and slow moving in nature. About 75% of benthic animals live on firm substrates (rocks, corals), 20% occur in sandy / muddy bottoms and only 15% of the total are planktonic.

Most of the benthic organisms are detritivores and form an important life in the food chain on account of their ability to convert low quality and low energy detritus into better quality food for higher organisms in the food web. By virtue of being relatively stationary, they are constantly exposed to changes in the mud-water interface and respond very well to it. Therefore, several pollution indices have been proposed using qualitative and quantitative change in benthic populations.

Collection

In the collection of benthos the samplers should be such that they penetrate well into the sediments to a sufficient depth in order to capture the organisms inhabiting in that area. The benthic samplers are of mainly two types, viz., grabs and core samplers.

Peterson grab : It is consisting of two hinged pincer like buckets which are sent down to the sediments in open condition. As the drawing line slackness, the release mechanism is activated. In retrieval, the two buckets come together and thus a semi-circular section of sediment is cut and entrapped. The drawing line is then pulled and the grab which is now in a closed condition is made open in a tray or bucket.
(Draw a Figure)

Ekman- Birge grab : This is the commonest grab devised for use in muddy bottoms by Ekman (1911) and Birge (1922). The two shovels which are kept open against very strong spring action by means of two chains are closed from the above by means of a weight (metallic messenger). Immediately after this operation, one can pull the grab out of the bottom and finally out of the water column. It is very heavy and made of brass in order to avoid rusting in the water. The upper portion is box shaped and it is closed by two movable covers which fall in under the pressure of the water when the grab is sent down. The basal surface of this grab is about 250cm². Van Veen's grab : It is also a very convenient and reliable grab devised by Van Veen (1936). The working principle of this grab is more or less similar to Ekman-Birge. However, it is held open by a small bar and is not operated by a metallic messenger. During operation, the grab is sent down the bottom when the two shovels out so that the bar is released automatically. The draw rope is attached in such a way that with the pull from above, the two shovels of

the grab are made to close tightly with mud sample entrapped in it. The basal area of this grab may be $1/20\text{m}^2$. (Draw a Figure)

Core sampler : It consists of metallic tube of 50 cm length and 3cm diameter and is loaded at the top with a heavy lead weight. A valve present at its upper end allows the water in the tube to escape upwards when the corer is sent down to the bottom and it closes again when the tube is pulled up. The lead weight drives the tube strongly in to the mud, so that a profile of the bottom sediment is cut out. The sample is later removed from the tube with a rod.

Identification of benthos and draw figures

1. Chaetogaster

Body very transparent, anterior part broader, postomium well developed, in some bluntly pointed with stiff sensory hairs, dorsal setae totally absent, 2 bundles of hooked setae on the ventral side of each segment, no bristles in the segments 3 to 5, blood colourless, commonly associated with tubes of insect larvae.

2. Nais

Head distinct, both dorsal and ventral setae present, dorsal setae long, hair like, start at segment 6, not serrate, similar in length, ventral setae short and with cleft ends, of segments 2 to 5 mostly well differentiated than the posterior segments, posterior end not forming retractile appendages, blood yellow or red, only anterior body segments with lateral commissural blood vessels, spermathecae in the same segments where testes are situated, body somewhat transparent.

3. Dero

Setae similar to Nais, posterior end modifies into a ciliated gill bearing retractile respiratory organ, the branchial area without long process or palps, blood reddish, eyes absent often in tubes.

4. Aulophorus

Dorsal and ventral setae as in Nais, posterior end modified into the respiratory organ, the branchial area, ventral margin of branchial area with long processes or palps.

5. Stylaria

Prostomium long, tentacles like, forming a long conspicuous narrow proboscis, a pair of eye spots present, setae an in Nais, dorsal setae begin in 5th or 6th segment.

6. Lumbriculus

Worms usually red or brown in colour, prostomium not elongated into a proboscis, paired setae on both surfaces of the segments, all of one form, forked at the end, distal tooth smaller than the proximal, dorsal blood vessels with paired contractile blind appendages, two pairs of sperm ducts with a pair of openings.

7. Branchura

Body may be reddish, fairly stout, very contractile, prostomium bluntly conical, ventral setae cleft, dorsal bundles comprised of 1-3 hairs, 5-8 needles forked in anterior region, anterior segments smaller, increasing posteriorly, with small at the tip, posterior segments with a dorsal and a ventral gill, gills non-ciliated, last segment without gill, live in tubes.

8. Tubifex

Worms reddish, coils into balls by slight disturbance, anterior end embedded in mud, waves the posterior end in water for aeration, segments clearly demarcated, prostomium short, triangular, tips pointed, eye spot and cilia absent, dorsal bundles with forked and usually hair setae, setae on ventral bundles usually forked, two lateral teeth of dorsal pectinate setae widely divergent, live in tubes.

9. Tipula

Larvae large, about 3 cm or more when extended, head retractile, head capsule broad and massive, non-sclerotized posteriorly and often also ventrally, last abdominal segment has rectangular plate surrounded by 6 to 8 lobes, anal gills not pinnately branched, pupa with long breathing horns.

10. Antocha

Head capsule slender, spiracular disc with 2 ventral elongated lobes and the rest reduced or vestigial, spiracles lacking or vestigial, larva and pupa enclosed in silken case, pupal respiratory tube 6 to 8 branched.

11. Psychoda

Body more or less cylindrical, without sucker discs, intermediate body segments without spiracles, thoracic and abdominal segments secondarily divided, at least terminal abdominal segments with sclerotized plates, preanal or prosternal plates absent, adanal region with a transverse plate, dorsal plates usually less than 26.

Mollusca

12. Lymnaea

Shell thin with a prominent acute spirae, dextral, large often flaring aperture, columella hoisted, tentacles flattened on pair with eyes at their base, lip simple, acute, inner lip of aperture smooth, radula composed of 3 pieces, one large transversely elongated and two small, foot rounded behind.

13. Gyraulus

Shell discoid, small, apparently dextral, orbicular above, flat beneath, whorls few, rounded to carinate, rapidly increasing, shell with rounded periphery, shell compressed vertically so that aperture is much greater in breadth than height (oblique), somewhat deflected, tentacles cylindrical, jaws in 3-segments, radula with numerous teeth.

14. Pisidium

Shell small, oval to round thin, greenish or yellowish, 3 cardinals, one cardinal in the right and 2 in the left wall, siphon two, short consolidated into a single tube, umbo back of the middle, directed backwardly, foot flattened, tongue shaped, capable of great extension.

15. Lamellidens

Shell nacreous, equivalve, oval, anterior end rounded posterior more or less pointed, umbo towards the anterior end, hinge teeth consisting of cardinals and posterior lateral, siphones short, complete, adductor muscles two, equal in size, foot large, byssus in young, cosmopolitan, freshwater in habit.