

SUBSTRATUM HETEROGENEITY AND INDICATOR MACROZOOBENTHOS OF THE EASTERN NAYAR, GARHWAL, CENTRAL HIMALAYA

**ANOOP K. DOBRIYAL¹, V.P. BALODI¹, H.K.JOSHI¹, A.THAPLIYAL¹,
PANKAJ BAHUGUNA², S.P.UNIYAL³ AND C.B.KOTNALA¹**

¹Department of Zoology, HNB Garhwal University Campus, Pauri Garhwal-246001, UK

²Department of Zoology, LMS Govt. PG College Pithoragarh, UK

³Department of Zoology, Govt. PG College Gopeshwar Distt. Chamoli Garhwal, UK

Received-19.3.2009

Accepted-28.10.2009

Accepted-28.10.2009

ABSTRACT

Substratum plays an important role in the thriving of biota at the bottom. It is the medium upon which insects move, find shelter and seek food. In fact it determines to a large extent the micro-environmental conditions under which the insect live. Present Contribution is based on study of substratum and some indicator zoo-benthic species of the river Eastern Nayar from Garhwal Himalaya.

Key Words-River Eastern Nayar, Substratum, Indicator Zoobenthos.

INTRODUCTION

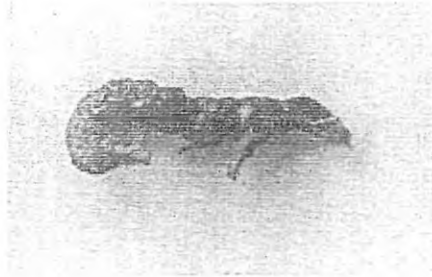
Substratum is the medium upon which the aquatic insects move rest, find shelter and seek food. According to Minshall (1984) the substratum is a stage upon which the drama of aquatic ecology is acted upon. It consists of various types of organic and inorganic materials which is sufficiently stable for insects to crawl on, cling to or burrow in. In fact the substratum provides different micro-environmental conditions for insect community. Majority of research on substratum-biota relationship is attributed to marine and lentic freshwater ecosystems. Such studies are rare in the lotic environment (Cummins, 1966; Hynes, 1970; Tolcamp, 1980, Minshall, 1984, Kumar and Dobriyal, 1998 and Kumar et. al., 1999). In the present communication an attempt has been made to study the substratum of river Eastern Nayar in relation to its benthic biota.

OBSERVATIONS AND DISCUSSION

Substratum heterogeneity

Substratum of Eastern Nayar in its upper stretch (Thalisain) was observed unstable having cobbles and boulders in general. However, at some places the large

substrate were preferred more than the smaller ones. Percival and Whitehead (1929) found the low density of insects on the bare stones, intermediate on the algae (*Cladophora* mesh) and the highest on the thick moss and river weeds. We also support this statement.



Philopotamid

Diptera

Among the dominant riffle dwelling benthic forms through out the winter months were the members of the *Simulium* sp. According to Minshall (1984) the sedentary insects like *Simulium* requires attachment site for feeding and growth. The *Chironomus* sp was also present along the organically enriched silty sites of the rivers. It is a biological indicator of pollution (eutrophication) in the streams. Our observation with Chironomids was supported by Cummins (1964) and Tolkamp (1980).

Coleoptera

Among the coleoptera (*Psephenus* sp) waters penny, larvae of riffle beetle showed its presence through out the year (specially during the winter months), except monsoon and were usually present in all the samples. The members of the family *Dytiscidae* (*Potamonectus*, *Hydroglphus* and *Hydroporous* sp.) were the main forms living beneath the substratum and were making use of land/water interphase.



Psephanus

Plecoptera

Among the Plecoptera the *Neoperla* sp had the maximum density and they dwelt riffles with rich periphyton growth.

Odonata

The damselfly naiads (*Ischnura* sp and *Argia* sp) were the main forms dwelling in slow to medium runs and were mostly seen beneath the large cobbles and boulders.

Hemiptera

The fast moving and swimming Naucorid bugs was utilizing the land/water interaction sites.

Megaloptera

A large predacious larvae (length 6 cm or more) of Damsal fly (Corydalidae) were seen mostly in runs and riffles.

Turbellaria

The only turbellarian was observed *Polycelis* which preferred muddy, rich algal and detrital surroundings. It was observed attached underneath the pebbles and cobbles.

Thus in conclusion to this study it is successfully opined that for healthy benthic insect population it is essential to be a stable and complex substratum heterogeneity with moderate water temperature, slow current velocity and rich dissolved oxygen required for healthy respiration.

REFERENCES

- Chutter, F.M. 1969. The effects of silt and sand on the invertebrate fauna of streams and rivers. *Hydrobiologia* 34:57-76.
- Cummins, K.W. 1962. An evaluation of some technique for the collection and analysis of benthic samples with a special emphasis on lotic waters. *Amer. Midl. Nat.* 67: 477-504.
- Hynes, H. B. N. 1970. *The Ecology of Running waters*. Liverpool University Press. 543 pp.

- Kumar, N., Kumar, B. and Dobriyal, A. K. 1998. Geomorphic influences on the distribution of benthic diversity in two hillstreams of the Garhwal Himalaya. Proceedings of Indo-US Workshop Punjab University Chandigarh. pp. 53-66.
- Kumar, N and Dobriyal, A.K. 1999. Correlation of some environmental variables with adaptive net spinning strategies in stream larval *Hydropsychids* (Trichoptera) in Garhwal Himalaya. *Tropical Freshwater Biology*. Nigeria. 8 : 27-30
- Leopold, L.B., Wolman, M.G., and Miller, J.P. 1964. Fluvial process in geomorphology. W B Freeman and Company, San Fransisco. 522 pp.
- Leudtke, R.J. and Brusven, M. A. 1976. Effects of sand sedimentation on colonization of stream insects. *Journal of the Fisheries Research Board of Canada*. 33: 1881-86.
- Minshall, G.W. and Minshall, J.N. 1977. Microdistribution of benthic invertebrates in a Rocky Mountain (U.S.A.) stream. *Hydrobiologia* 55:231-249.
- Minshall, G.W. 1984. Aquatic insect-substratum relationships. In: *The Ecology of Aquatic Insects*. Resh., V.H. and Rosenberg, D.M. (eds.), Praeger 625 pp.
- Moon, H.P. 1939. Aspects of the ecology of aquatic insects. *Transactions of the British Entomological society*, 6 : 39-49.
- Percival, E and Whitehead, H 1929. A quantitative study of the fauna of some type of stream bed. *Journal of Ecology*, 17: 282-314.
- Tolkamp, H.H. 1980. Organism-substrate relationships in lowland streams. Agricultural Research Report 907, Agricultural University, Wageningen, The Netherland. 211 pp.