Short Communications

Association of a Bivalve with Mollusc

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Presence of the lamellibranch, *Modiolus metcalfei* (Hanley) within the test of the ascidian, *Herdmania pallida* (Heller) is reported. It is likely that *M. metcalfei* gets protection from predators because of this association.

Several animals are associated with different species of ascidians. Some of them have become parasites on the ascidians while others remain as commensals or symbionts. Among the commensals, molluscs form an important group. Several gastropods and lamellibranchs are found lodged within the test of ascidians. Occurrence of lamellibranch mollusc within the test of *Herdmania pallida* (Heller) and *H. momus* (Savigny), collected from the sea adjoining Tuticorin, has been reported. The settlement of the molluscan larvae on the ascidian may be stimulated by a chemical secretion, and it is found that the settlement takes place even when an eviscerated test is offered.

The association of a bivalve with an ascidian was noticed during collections of *Herdmania pallida* from the Tuticorin seas. A number of large-sized *H. pallida* were cut open for study and most of them had the lamellibranch, *Modiolus metcalfei* (Hanley) within their tests (Fig. 1). *M. metcalfei* is of common occurrence along the east coast of India. The number of these molluscs varied in individuals, maximum being 10. They were found lodged in all parts of the test. Within the left half there are 3 *Modiolus*, and part of their shells project out on the inner side of the test because this part of the test is comparatively thin (Fig. 1). Within the right half 7 *Modiolus* are lodged, but the test being thicker only 4 of the molluscs are dimly visible to the eye, the others being hidden by the test substance.

The size of *H. pallida* (Fig. 1) was 9 cm × 7 cm × 3 cm. *M. metcalfei* showed different sizes, the biggest being 2.5 cm × 1.5 cm × 1 cm and the smallest, 2 cm × 1.2 cm × 0.8 cm. Considering the sizes of the mussel it is only reasonable to suppose that too many of them cannot thrive within the test of a single ascidian. The mussel is fully lodged within the ascidian test and no part projects outside. The outer side of the test opposite the

![Fig. 1—Inside view of the left (T₁) and right (T₂) halves of the test of *H. pallida* (M, location of *M. metcalfei*)](image)

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place where the mussel is embedded shows a depression, and within it there is a short opening of about 0.5 cm through which the mussel communicates with the outside.

Is this association of Modiolus with Herdmania a case of commensalism or symbiosis? In commensalism there must be a benefit at least to one of the partners if not for both, and in symbiosis both partners are mutually benefitted. One of the chief advantages in such a partnership is the procurement of food. The ascidian is a fixed animal. The mussel is extremely slow moving, and when once it is attached to a substratum it does not move unless dislodged by external force. Both are filter feeders capturing food by their own effort, and so one is not benefitted by the other in any way. The term commensalism or symbiosis does not appear to be true in this sort of association. But the lamellibranch like Modiolus, lodged completely inside the test of the ascidian may get protection from predators like starfishes which can rip open the shells and consume the soft parts. It is more reasonable to consider the entry of Modiolus into the test of Herdmania by accidental contact of its settling larvae, in the same way as the ascidian larvae are found to settle on other animals like molluscs, barnacles, ascidians and so on.

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Marine Microplankton from Sierra Leone (West Africa)
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The microplankton species (141) inhabiting inshore and offshore waters of Sierra Leone comprise diatoms (95), dinoflagellates (42), silicoflagellates (2) and blue green algae (2). Diatoms are more abundant in inshore waters, while dinoflagellates are more frequent in offshore waters. Among epibionts on Chaetoceros a ciliate, Vorticella oceanica, and peridinian, Pauvselnia chaeotoceratis, are new records for the Gulf of Guinea. The common estuarine species of Coscinodiscus is established as C. jonesianus (Grev.) Ostenf.

Composition and seasonal variations of the microplankton of inshore and offshore waters of Sierra Leone (Fig. 1) are less known compared to other West African waters such as those of Senegal1-2 or Ivory Coast3. Bainbridge4 has described qualitative and quantitative changes in the plankton of the Sierra Leone River Estuary. Taylor5 has added little more information on the phytoplankton of the same, while information on the microplankton in offshore waters remains almost unknown. Hydrography of Sierra Leone River Estuary is also known6-7.

Preliminary studies on the inshore and offshore microplankton of Sierra Leone together with some ecological observations are presented in this communication. No attempt is made to quantitate the microplankton in this report.

Horizontal and vertical offshore plankton hauls were collected by Apstein or standard phytoplankton nets in various stations during the cruises of R V Awefu during February, May, November 1970 and January-March, June 1971. Inshore samples were collected more frequently during 1971 and 1972 by smaller crafts.

The mean monthly temperatures of surface water in Sierra Leone vary between 26.6 and 29.6°C. Seasonal changes in temperature and salinity in territorial waters are attributed to the precipitation cycle and wind. Southwest winds predominate in the Gulf of

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Fig. 1—Freetown Peninsula and Sierra Leone River Estuary [Inset shows location of Sierra Leone in the Gulf of Guinea]