

Destruction of Laterite & Hard Clay Embankments by Boring Sphaeromatids (Isopoda : Flabellifera)

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Destruction of laterite and hard clay bunds and embankments by *Sphaeroma* sp. is reported for the first time from the backwaters namely the Ashtamudi and the Kadinamkulam, Anjengo-Akathumuri system along the southwest coast of India. The nature of tunnelling and the salient features of the morphology of *Sphaeroma* sp. (*S. annandalei* Stebbing?) involved are described. The feeding biology of sphaeromatids is discussed in the light of the present observation on its boring activity using laterite and hard clay as substrata.

Significant contributions have been made on the systematics and some aspects of biology and ecology of the sphaeromatid fauna of India¹⁻⁶. This interest is chiefly on account of the fact that some species bore into wooden structures causing serious destruction along the waterfront, particularly in the estuaries, backwaters and mangroves⁷⁻¹⁰. Five species and a variety of *Sphaeroma*, namely *S. terebrans*, *S. annandalei*, *S. annandalei* var. *travancorensis*, *S. tuberculatum*, *S. triste* and *S. walkeri* are reported from India. Hitherto, no report on any species of *Sphaeroma* boring into laterite blocks and hard clay in natural conditions has been published from India.

The present paper reports the boring activity of sphaeromatids in laterite and hard clay embankments of the Ashtamudi backwaters and the Kadinamkulam, Anjengo-Akathumuri backwater system in the southwest coast of India. During an ecological survey of these backwaters carried out in March 1981, we have recorded heavy incidence of sphaeromatids burrowing into laterite and hard clay embankments. Normally, sphaeromatids are known to occur in a wide range of habitats and may be found on or burrowing into wood, soft stone or mud, sand, beneath stones and in or among weeds, sponges, bryozoans, oysters and tunicates^{11, 12}.

Along the backwaters of Kerala, embankments made out of laterite blocks are common for reclamation, protection and for a variety of other purposes. Natural banks formed of hard clay also occur in several localities and burrowing activity of sphaeromatids has been widespread in certain isolated localities.

Numerous specimens of sphaeromatids were recovered from the burrows on embankments at several localities. On specific examination, most of them were found to differ conspicuously from all the

species of *Sphaeroma* known from India (the exact identity of these specimens is under detailed study). However, in the nature and arrangement of tubercles on the posteriodorsal surface of the body, they resemble *Sphaeroma annandalei* Stebbing. The apex of telson is angular resembling that of *Sphaeroma terebrans* Bate. The exopod of uropod contains 5 teeth including the toothed apex. Until the exact identity of the species is determined, it will be referred to as *Sphaeroma* sp. The same species has also been noticed boring into wood in a few localities in these backwaters. Very few of the specimens recovered from laterite blocks and hard clay were found to be *Sphaeroma annandalei* which is a habitual wood borer. The population of *Sphaeroma* sp. in laterite blocks included adults with larvae in their brood pouches and specimens of different growth stages including recently released juveniles. This indicates that *Sphaeroma* sp. is a true stone and hard clay borer as well and that it can use stone, clay or mud as a suitable substratum.

The burrows of *Sphaeroma* sp. in hard laterite blocks resemble those of *S. terebrans* in wood reported earlier³, except that in laterite blocks they are much more deeper. This may be the result of prolonged burrowing activity at the same site for long periods. Inside these burrows, normally one or two individuals are found. But, in soft laterite blocks and in hard clay, the tunnels are long, frequently curved, and uniformly cylindrical maintaining a constant diameter from end to end. Adjacent burrows may occasionally meet unlike the condition reported in shipworms. In such burrows, adult specimens ranging in number from 1 to 5 were noticed, along with several juveniles excavating their own burrows from the sides of the parent burrow itself. Tunnels of 10 to 12 cm length are very common in both soft laterite blocks and hard clay. Such a type of burrowing activity rapidly reduces the

strength of the embankments and impart a honey-combed nature to the substrata comparable to pieces of wood heavily riddled by shipworms.

The zone of maximum intensity of attack by *Sphaeroma* sp. is in the intertidal area. The destructive activity is at its maximum at the mid water mark which decreases gradually downwards. Considerable burrowing activity is discernible at and up to a little above the high water marks also. The dense attack and rapid tunnelling by *Sphaeroma* sp. aided by the mechanical effects of water cause erosion of the embankments in the intertidal zone.

Although *Sphaeroma* sp. is found almost all along the banks of the Ashtamudi and Kadinamkulam, Anjengo-Akathumuri backwaters wherever suitable substrata are available, they occur in dense concentrations in localities shaded by vegetation growing on the bank and in areas protected from wave action. Near the mouth of these backwaters through which they open into the Arabian sea, incidence of *Sphaeroma* sp. has been rare. They are abundant in regions where rivers or canals join these backwaters. In the Ashtamudi, incidence of *Sphaeroma* sp. is high in localities such as Manakadavu, Pattanthuruthu, Poopani, Perungalam and Arinalloor and all these places lie in the vicinity of the confluences of the Kallada river with the backwaters. In the Kadinamkulam, Anjengo-Akathumuri backwater system, boring into hard clay is very common in the vicinity of the mouth of the Vamanapuram river and Anjengo, while laterite block destruction is also very severe in some isolated regions of Akathumuri and Kadinamkulam (Fig. 1).

Fecundity of *Sphaeroma* sp. ranged between 22 and 35 which is based on the counts of eggs and larvae contained in the brood pouches of about 50 large specimens. Some specimens brought to laboratory and kept in a bowl containing 100 ml of brackish water and a small laterite stone started boring into it immediately (Fig. 2). They were living for more than 50 days without any change of medium or additional supply of food. Under such conditions also, normal development of larvae took place in the brood pouches and the bred juveniles also thrived well for several days in the same bowl.

The stone-mud boring activity of sphaeromatids throws some light on their food and feeding habits, about which there have been different views¹³⁻¹⁵. Some have suggested that they are capable of digesting cellulose and demonstrated the presence of cellulase in their digestive tract⁵. Sphaeromatids are also known to feed on algae, fungi and plankton. The water filtering ability of a boring species *S. quayanum* has also been reported¹⁴. Laterite blocks consist mostly of inorganic material and naturally *Sphaeroma* sp. must be capable

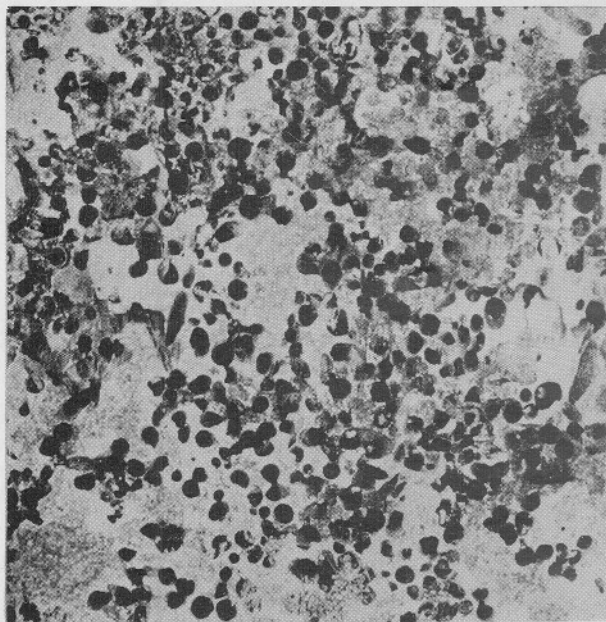


Fig. 1—Portion of a laterite block attacked by *Sphaeroma* sp. in the Akathumuri backwater

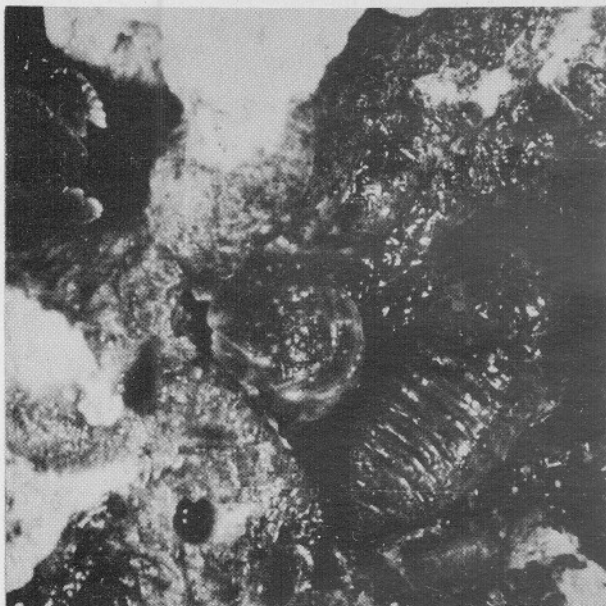


Fig. 2—*Sphaeroma* sp. effecting entry into a hard laterite block

of deriving its nutritional requirements either by filtering the water or by browsing on the algae, fungi and or detrital matter settling over the walls of their burrows. While boring into hard clay and mud, *Sphaeroma* sp. would probably be feeding on the organic matter and or the algae and fungi lining the burrows. Additional nutritional requirements may be met by filtering the suspended material in the ambient medium.

The destructive activity of sphaeromatids deserves detailed study since it causes severe damage to wooden waterfront structures and accentuates erosion in the

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backwater systems. For a clear understanding, the nature of distribution of these pests in relation to environmental characteristics, their breeding biology and fecundity and the purpose of boring into these substrata are to be investigated in detail.

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