Boring activity of littoral isopod, \textit{Sphaeroma annandalei} Stebbing and its interspecific relationship with \textit{Cirolana willeyi} Stebbing

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\textit{S. annandalei} showed maximum boring activity in salinities \(10.5-17.5 \times 10^{-3}\) (seawater). An inverse relationship existed between the size of the animal and the burrows it excavated in laterite slabs. Observations made on the interspecific competition between \textit{S. annandalei} and \textit{Cirolana willeyi} in occupying the boreholes showed that the latter was always successful in its attempt when compared with the slow-moving \textit{S. annandalei}. During a field survey in the Akathumuri backwaters, southwest coast of India, it is observed that laterite slabs which are used as embankments in the backwaters are bored through and colonised by large numbers of the littoral boring isopod, \textit{Sphaeroma annandalei}. These animals cause considerable destruction to wooden structures such as harbour and jetty piles and they bore also into laterite blocks and hard clay\(^3\). The free-living isopod \textit{Cirolana willeyi}, a scavenger, which occurs along with \textit{S. annandalei}, is also seen in large numbers in the tunnels excavated by the latter. Since the salinity of the backwaters in this region fluctuates greatly depending on the monsoon rains and also on the opening of the sand bar to the adjoining sea, tests have been conducted in the laboratory to check the effect of salinity of the medium on the boring activity of \textit{S. annandalei}.

For this study, 11 saline media ranging from 0 (distilled water) to \(35 \times 10^{-3}\) sal. (seawater) were prepared (Table 1). Lots of 20 adult \textit{S. annandalei} were introduced into 500 ml of each of the above media (3.5, 7, 10.5, 14, 17.5, 21, 24.5, 28, 31.5, \(35 \times 10^{-3}\)) in glass troughs and acclimated in the respective media for 3 d. Later small blocks of laterite were kept in each medium. Observations on the activity of these isopods were made for 15 d (Table 1). The boring activity of the sphaeromatid was maximum in \(10.5-17.5 \times 10^{-3}\) seawater. In this range they were very active and as soon as the substratum was offered, they swam towards it and started crawling all over and were seen choosing favourable sites for excavation. With the help of their powerful mandibles, they began removing the particles and the loose soil was tunnelled off through the ventral side of the abdominal region using frequent movements of the appendages. On confronting a comparatively hard surface, which was difficult to excavate, they moved over to another suitable spot. In media of low salinity they became sluggish and motionless and eventually died in \(3.5 \times 10^{-3}\) seawater. Thus, lower salinities \((7 \times 10^{-3})\) seem to act as stress, adversely affecting their normal activity. In higher salinities \((21 \times 10^{-3})\) they were quite active and after a period of acclimation of 3 to 4 d, 50\% of the animals showed a tendency to burrow, while the rest preferred to hide beneath the stones. Moulting was also quite frequent when exposed to salinities.

\begin{table}[h]
\centering
\begin{tabular}{|c|c|}
\hline
Medium sal. & Observations \\
\hline
\((\times 10^{-3})\) & \\
\hline
0 & Totally inactive, no borehole was made. Mortality started within 24 h of exposure and after 120 h no animal was alive \\
(distilled water) & \\
\hline
35 & Slightly active; no burrows excavated and mortality started after 48 h of exposure; moulting noticed in many specimens \\
& \\
7 & Slightly active; no burrows excavated and these animals preferred to hide beneath the stones \\
& \\
10.5-17.5 & Very active and no mortality noticed; within 24 h exposure burrowing started \\
& \\
21, 24.5 & All active and alive; a delay of about 2 to 3 d in initiating burrowing activity noted \\
& \\
28 & \\
& \\
31.5 & All active and alive; a delay of about 2 to 3 d in initiating the burrowing activity noted, frequent moulting also occurred \\
& \\
35 & \\
& \\
\hline
\end{tabular}
\caption{Burrowing activity of \textit{S. annandalei} in different salinities}
\end{table}
verse relationship seems to exist between the size of body length of 9 mm could make a bore of 5 mm di-

m. Having a body length of 7 mm could excavate a bur-

row. A borehole left out by C. willeyi was occupied after 1 h. In the 2nd set, C. willeyi readily occupied all the burrows and S. annandalei on release began to excavate fresh ones. In the 3rd one, an interesting case of competition between the 2 species in occupying the burrows was observed. Invariably C. willeyi was quicker in taking possession of them and rarely 1 out of 10 S. annandalei could get successful entry, the rest moving away hiding beneath the stones without any tendency to work on a borehole. Similar trends were seen in the 4th set also. In the 5th set, however, both the groups were seen initially occupying various sites beneath the stones and congregation of both these groups were seen in small crevices of the stones. Later S. annandalei slowly dispersed and began to excavate.

Another interesting observation made during the present study was, that if one Sphaeroma occupying a burrow came out, it was immediately occupied by a waiting C. willeyi. Any effort to evict C. willeyi was not shown by the pill bug, but rather preferred to move off to another spot for excavating a fresh burrow. A borehole left out by C. willeyi was occupied promptly by another C. willeyi and the pillbug did not exhibit any interest in occupying it.

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Reference