

ON A NEW SPECIES OF *ZOOTHAMNIUM* STEIN (PROTOZOA :
VORTICELLIDAE) FROM THE GREY MULLET,
MUGIL TADE FORSK.

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INTRODUCTION.

One of us, while examining a collection of Grey Mulletts, *Mugil tade* Forsk., obtained from a fresh water tank at Contai (Midnapore Dist., W. Bengal) in April 1949, came across a cluster of *Zoothamnium* colonies which are described here as representing a new species. They were found attached to the scales on the latero-ventral surface of one of the specimens, a little above its vent. It may be of interest to note that this is the first record of a fully described species of *Zoothamnium* from India. Bhatia (1936) in the *Fauna of British India* does not record any species of this genus as occurring in India, while Jones and Job (1938) only report an unidentified species from the brackish water fish *Acentrogobius neilli* (Day) collected from Buckingham Canal at Madras.

The material was accidentally fixed in 5 per cent. formalin along with the fish and was later stained with Delafield haematoxylin for permanent preparations.

We have great pleasure in naming this species after Dr. S. L. Hora, Director, Zoological Survey of India, to whom we are deeply indebted for his valuable guidance and encouragement.

DESCRIPTION OF THE SPECIES.

Zoothamnium horai, SP. NOV.

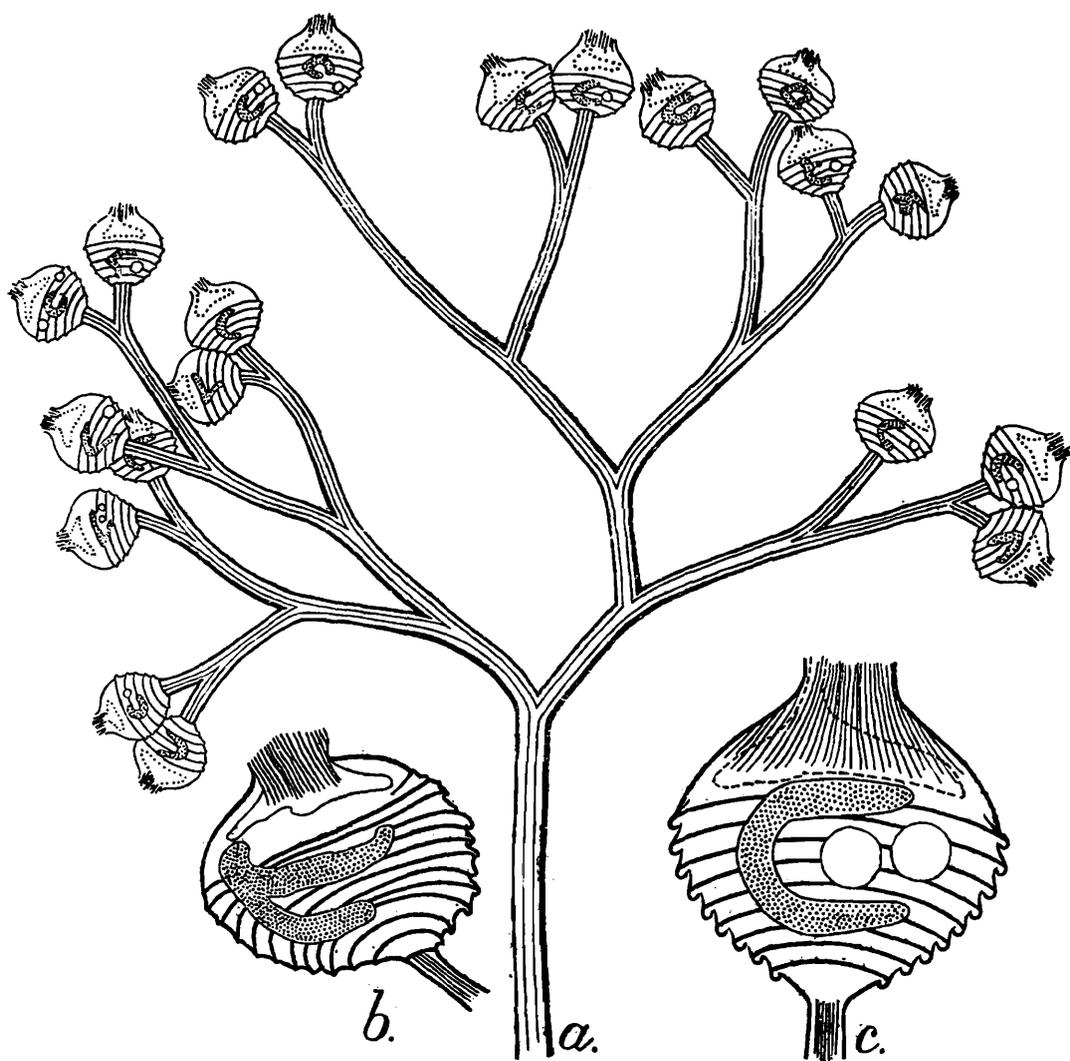
The colonies fixed in formalin are whitish in colour and are firmly attached to the scales of the fish by means of roots arising from the main stem. The main stem (pedicle) branches dichotomously and the daughter branches usually show a progressive increase in length towards the apex (text-fig. 1, *a*). As a rule, there are only two branches at a node, but one exception was met with, where there appeared to be three. The stalks of the zooids may be equal to, shorter, or longer than the zooids and thus do not bear any constant relationship with the diameter of the latter.

The zooids are all of the same shape and form, but varied considerably in size. The body-form of a zooid (text-fig. 1, *b* & *c*) is more or less globular, with the antero-posterior diameter slightly less than the diameter at right angles to it. The peristomial field is located in the middle of the anterior border and occupies about $\frac{1}{3}$ of it. A distinguishing feature of the species is the very strongly marked transverse cuticular furrows and

ridges on the posterior region of the zooids. This design is visible on about $\frac{1}{2}$ to $\frac{2}{3}$ of the body of the zooid. The anterior region appears longitudinally striated on account of the presence of the roots of the membranelle of the adoral zone. There is no reduction in the number of membranelle in this zone, as is the case in certain other species of *Zoothamnium*. The nucleus is very long and generally horse-shoe shaped, but, in some cases, was found to be variously coiled. In the preserved material the contractile vacuoles could not be distinguished from the food vacuoles.

Measurements in microns.—

Type specimen (zooid)	47.7 × 38.6
Variations of 30 zooids	Range.—36.4—72.7 × 31.6—63.6
				Mean—54.5 × 46.1



Text-fig. 1.—*Zoothamnium horai*, sp. nov.—a. a colony of *Z. horai* × 275 approx. (semi-diagrammatic); b. the type zooid × 1000 (camera lucida drawing); c. a typical zooid × 1050 approx. (diagrammatic).

GENERAL REMARKS.

The specimens, as already mentioned, were collected from a fresh water tank, where Grey Mulletts are cultured in association with carps as described by Pillay (1948). Out of a total of 25 specimens of fish collected from the tank in April, 1949, only a single specimen had the

protozoan on it. They were totally absent in the fish collected from the sea and the estuary. Further collections of Mulletts were made from the tank in the months of May and June, 1949, but no more specimens of the protozoan could be obtained. From this, it would appear that the association is of rare or accidental occurrence. *M. tade* is a very active fish in its natural habitats, the sea and the estuary, and have been observed to swim against strong currents. In the confined and stagnant waters of tanks, they naturally become less active, and this may probably have been responsible for the association of the protozoan with it.

The colony was seen attached to the exposed portion of the scales and had no contact with its living tissue. Apparently the animalcule could not have been harmful to the fish. It, however, derived the benefit of free locomotion and, by virtue of its position of attachment, probably was able to feed on the faecal matter of the fish as it was passed out through the vent. The *Zoothamnium* observed by Jones and Job (*op. cit.*) was found attached inside the mouth of the fish which would enable it to share the food of the fish. It will be of interest to note that in both these cases, the animalcules had attached themselves to only that part of the body of the fish, from where it can obtain food material : in one case by directly sharing its food, in the other by feeding upon its faecal matter. Since the protozoan is benefited by the association and the fish is neither benefited nor harmed, the association can be termed Synoecy (Borradaile, 1922).

AFFINITIES.

As *Z. horai* possesses zooids of similar shape and form, it belongs to the homomorphic series as distinguished from the polymorphic series, where the zooids are dissimilar. Species of the homomorphic series are easily distinguished from our new species, as none of them have zooids which in combination show the characters of a long and bent nucleus, strongly marked cuticular creases, and narrow peristomial field which are the chief characters of the species under discussion. Allied species of *Zoothamnium* described in the literature accessible to us are arranged in a key as follows :—

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| 1. (2) Colony unbranched, zooids arising in a cluster from the top of the main stem | <i>Z. simplex</i> Kent. |
| 2. (1) Colony branched | 3. |
| 3. (12) Pedicle articulated or at least in the contracted condition cross-striated | 4. |
| 4. (5) Pedicle articulated, not cross-striated | <i>Z. nutans</i> Cl. & L. |
| 5. (4) Pedicle both articulated and cross-striated, or only cross-striated | 6. |
| 6. (11) Pedicle only cross-striated, not articulated | 7. |
| 7. (8) Pedicle cross-striated only in the contracted condition | <i>Z. affine</i> Stein. |
| 8. (7) Stalk thicker and cross-striated | 9. |
| 9. (10) Fresh water form. Zooid 76—90 μ . | <i>Z. d'udekemi</i> Kahl. |
| 10. (9) Marine form. Zooid 30—35 μ . | <i>Z. nanum</i> Kahl. |
| 11. (6) Pedicle both articulated and finely cross-striated | <i>Z. glesnicum</i> Cl. & L. |
| 12. (3) Pedicle neither cross-striated nor articulated . | 13. |

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| 13. (22) Nucleus much elongated and bent | 14. |
| 14. (17) Zooids marked with transverse ridges and furrows | 15. |
| 15. (16) Zooids in expanded condition strongly marked with transverse ridges and furrows. Zooids globular. Peristome narrow. Nucleus longer | <i>Z. horai</i> , sp. nov. |
| 16. (15) Zooids in expanded condition faintly cross-striated. Body funnel-shaped. Peristome broad. Nucleus smaller | <i>Z. adamsi</i> Stokes. |
| 17. (14) Zooids not marked with transverse ridges and furrows | 18. |
| 18. (19) Stalks much longer than the zooids | <i>Z. elegans</i>
D'Udekem. |
| 19. (18) Stalks not longer than the zooids | 20. |
| 20. (21) Nucleus smaller, transversely placed. Found on Cyclops and other Entomostracans | <i>Z. parasiticum</i>
Stein. |
| 21. (20) Nucleus larger, with its major portion longitudinally placed. Found on <i>Carinogammarus</i> | <i>Z. varians</i> Stiller. |
| 22. (13) Nucleus oval or round | <i>Z. marinum</i>
Mereschk. |

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