

## MICROPALAEONTOLOGY NOTEBOOK

*Fissurina* as an ectoparasiteJ. D. COLLEN<sup>1</sup> & P. NEWELL<sup>2</sup><sup>1</sup>School of Earth Sciences, Victoria University of Wellington, Wellington, New Zealand. <sup>2</sup>Biology Department, University of the South Pacific, Suva, Fiji.

For such a large and ecologically diverse group of organisms, foraminifera have produced remarkably few examples of parasites. They have, however, been recorded as ectoparasites on other foraminifera (Le Calvez, 1947; Haynes, 1981) and on bivalve molluscs (Todd, 1965; Alexander and Delaca, 1987). With respect to foraminiferal hosts, Le Calvez (1947) described *Entosolenia* (= *Fissurina*) *marginata* as an ectoparasite that fed on granules from the pseudopodial reticulum of *Discorbis villardeboanus*. He observed specimens of *F. marginata* positioning themselves over the aperture of *Discorbis*, either moving there on their own or being carried along by the host's pseudopodia, and remaining until leaving to undertake vegetative reproduction. After secretion of their tests, the new gamonts returned onto *Discorbis*. From his studies of mixed cultures, Le Calvez considered *Fissurina marginata* to be restricted to this single host and to die in its absence. It is thus apparently an obligate parasite with high host specificity.

Haynes (1981), apparently from unpublished data, considered both *Fissurina* and *Lagena* to be ectoparasitic on other foraminifera, with their tests and apertural regions evolved for parasitic feeding. However, to the best of our knowledge, the observations outlined above have not been repeated and there are few recent reports of an ectoparasitic lifestyle for *Fissurina* (see Haward & Haynes, 1976).

Specimens of *Fissurina* spp. are not uncommon in Fijian sediments. During the study of a sample of recent sediment collected from Bligh Water off Viti Levu, Fiji, a specimen of *Fissurina*, here referred to *F. submarginata* (Boomgart), was found attached near the apertural area on the dorsal side of a small specimen of *Rosalina bradyi* (Cushman) (Plate 1). The sample was preserved in alcohol upon collection and stained with Rose Bengal. Both specimens clearly showed compact areas of red-stained protoplasm within their chambers and were thus certainly alive when collected. They remained joined during collection, preservation and transport, and storage for three months in alcohol followed by final washing and drying. Fairly vigorous brushing did not separate them and they remained together during electron microscopy.

*Fissurina submarginata* is attached with its aperture adjacent to the test of the *Rosalina*. Enlargement (Plate 1, fig. 3) shows what appear to be dried strands of protoplasm, possibly pseudopodia, between the apertural regions of each specimen. Small fragments of debris are also visible, and a larger mass of material supports the lower side of the *Fissurina*. Without observing living specimens, it is not possible to be certain about the interpretation of these micrographs. However, the position of the *Fissurina* in aperture to aperture juxtaposition with *Rosalina*, the angle of projection of its test outwards and the durability of its attachment strongly suggest that this is not simply the fortuitous discovery of one foraminiferan drying onto another.

When the latter occurs, the positions are clearly randomly oriented and the specimens are easily separated. Further, foraminifera that are alive when collected and preserved normally show the withdrawal of all protoplasm into the inner chambers of their tests. The possible preservation of protoplasm external to the tests in this case may suggest an interlocking of pseudopodia that prevents their complete withdrawal.

The micrographs thus appear to show the chance discovery of an individual *Fissurina* preserved in the act of feeding on the pseudopodia of *Rosalina bradyi*, and imply that the feeding process may involve strong attachment.

Both *Fissurina* and *Discorbis* belong to genera with incompletely known taxonomy. Without illustrations or more detailed descriptions, it is not possible to be sure whether Le Calvez (1947) was referring to *Fissurina marginata sensu stricto* or one of the varieties more recently raised to specific rank. His host species *Discorbis villardeboanus* is likewise uncertain, but is in any case similar to *Rosalina*. The illustrations here, therefore, both support Le Calvez's observations and extend them to another pair of species of similar types. Observations such as these are important, as the lack of observations of parasitism may well be due to the paucity of observations of living individuals and their relationships. Alternatively, of course, parasitism may indeed be very rare among foraminifera.

## ACKNOWLEDGEMENTS

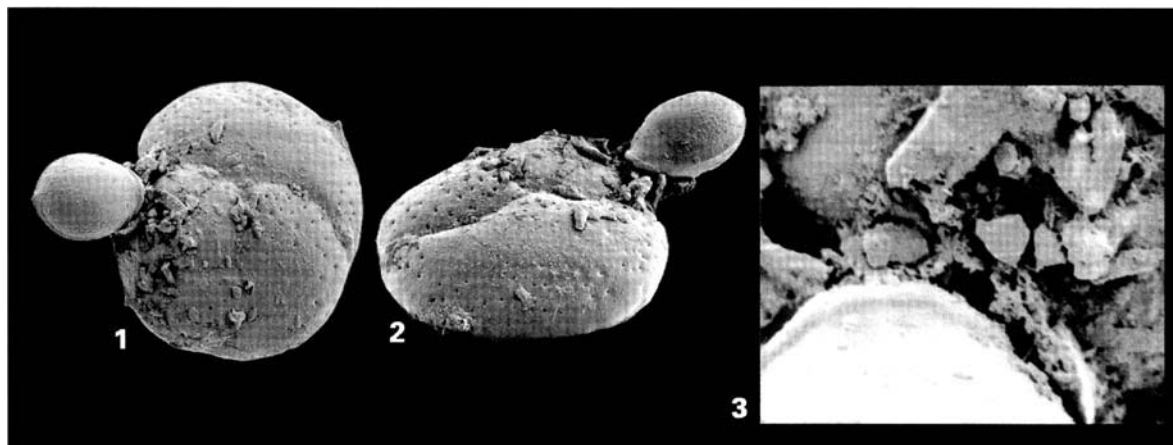
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## Explanation of Plate 1

*Fissurina submarginata* (Boomgart) attached to *Rosalina bradyi* (Cushman) (Victoria University of Wellington catalogue number VF 1206), from Golden Sunset Reef, Bligh Water, off northwest Viti Levu, Fiji. Sand samples were collected on 13 September 1996 from around the base of the coralline alga *Halimeda* sp. This was growing on a ledge at 10 m on the isolated coral pinnacle situated at 17°19'57"S and 178°35'68"W known widely in the diving world as 'E-6'. **fig. 1.** Dorsal view,  $\times 190$ . **fig. 2.** Lateral view,  $\times 190$ . **fig. 3.** Detail of apertural region of *Fissurina*, showing dried pseudopodia and debris adhering to the surface of the *Rosalina* test,  $\times 1100$ .