

MICROPALAEONTOLOGY NOTEBOOK

A bisected *Pelosina* rejoined!

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INTRODUCTION

During a NIVA (Norwegian Institute for Water Research) environmental monitoring cruise along the Norwegian Skagerrak coast, a 16 mm long specimen of the foraminifer *Pelosina arborescens* Pearcey, 1914, was found in light brown, bioturbated, soft muddy sediment collected with a Gemini corer on 29 May 2008, in 350 m water depth SE of Arendal, Norway (58° 24.177' N, 9° 01.648' E). In an effort to pull the individual out of the sediment with forceps, it was accidentally cut into two separate parts (the 'root' and the dendritic part). The two pieces were isolated in a 180 ml, 72 mm diameter, plastic container with about 1 cm of sea water and stored in a fridge at near-ambient temperature (about 7°C). On return to the lab four days later (2 June), the two test-pieces had rejoined in their original position and were photographed using a Nikon Coolpix 990 digital camera attached to a Nikon SMZ1000 binocular microscope. The mended fracture (where the two pieces had rejoined) was clearly visible (Fig. 1). The individual was kept in a fridge at 9–10°C and, two days later (4 June), it was still in one piece, even when the water in the container was carefully swirled. The plan was to cut the individual one more time (this time deliberately) to see if the process of rejoining the two pieces would be repeated. However, when manipulating the test to take a new picture, it broke at the old fracture. The test looked worn and the individual was presumed to be dead. While carrying it back to the fridge for later observations, the two pieces slid several centimetres apart in the container. Five days after the second breakage (9 June), the two pieces had joined again but this time not in the original position. The terminal end of the dendritic part was hidden in a sediment clump together with the

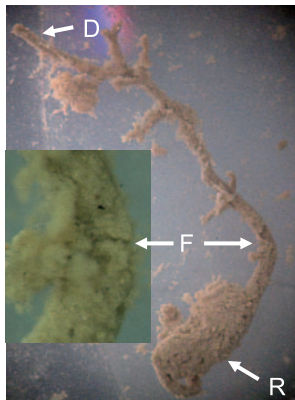


Fig. 1. A 16 mm long specimen of *Pelosina arborescens* Pearcey, 1914, after rejoining of the test-fragments four days after the individual was cut into two separate pieces. Insert-figure and horizontal arrows show detail and position of mended fracture (F) area. D, upper, dendritic part; R, 'root'.

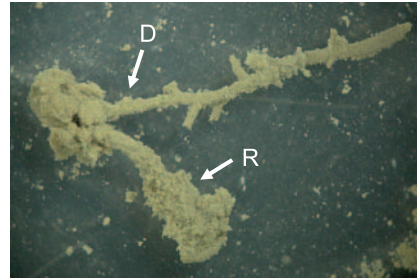


Fig. 2. Two pieces of an originally 16 mm long *Pelosina arborescens* Pearcey, 1914, rejoined five days after it was cut into two for the second time. The terminal (upper), dendritic part (D), has joined with the lower part in a reverse orientation (R, 'root').

terminal end of the 'root' part (Fig. 2). Nine days later (18 June) the individual was definitely dead. Parts of the test had collapsed, the 'branches' almost disintegrated, and the two pieces of the test were detached. As John Murray later commented, 'it is a pity the individual died after all that effort of remaking itself!'

DISCUSSION

The individual was cut in two just where its test, in life-position, crosses the sediment–water interface. Consequently, one part represented the 'root-system' contained in the sediment, the other part represented the dendritic terminal end of the test extending into the overlying water. Pearcey (1914) observed that *Pelosina arborescens* repaired several of the damaged terminal tubular branches. The present observation reflects a more fundamental process since the 'root-system' makes up about a third of the length of the test, i.e. a substantial part of the cytoplasm must have been separated from the rest. Still, the two parts managed (carrying their respective pieces of test) to find each other and join up. A similar phenomenon was recorded by Cushman (1922, p. 7): 'Portions of the same specimen, however, when separated by cutting, threw out pseudopodia rapidly, and when those of one part touched those of the other they quickly anastomosed and the two masses moved toward one another and coalesced'. The fact that our Skagerrak-individual remade itself twice after having been cut in two, confirms Cushman's observation and shows that in *P. arborescens*, the parts may find each other even when separated by >c. 2 cm. It is not clear which species Cushman (1922) refers to, but *P. arborescens* was not among the species he kept under observation. Motility is reported to occur in isolated cytoplasmic masses (satellites) for several hours, satellite formation appears to be a general feature of foraminiferan reticulopods and separate satellites can combine to form larger ones (Travis & Bowser, 1991). Consequently, the ability to rejoin test-fragments is probably a characteristic feature for benthic foraminifera and represents a good survival

strategy, particularly for larger forms. Still, the present *P. arborescens* died after having being cut for the second time. As it survives for months at 10–12°C and in aquaria without sediment (Cedhagen, 1993), temperature and lack of sediment were not the reasons. Its death was probably due to exhaustion.

The present observations show that even if broken into two larger parts, *Pelosina arborescens* has the ability to rejoin the pieces, either in the original or in another position. The latter leaves an abnormal morphology (e.g. Fig. 2). Cedhagen (1993) found a few specimens with two parallel ‘necks’ projecting from the common basal part. This was suggested to ‘result from damage by trawling and macrofauna, or as a result of somatic division’ (Cedhagen, 1993, p. 155). The present results provide evidence for the first explanation, i.e. damage by physical disturbance. It has been speculated that abundant macrofauna (e.g. ophiuroids) may disturb the sediment to an extent that it prevents *P. cf. arborescens* from establishing itself (Gamito *et al.*, 1988). Disturbance caused by biogenic sediment mound construction seems to have similar effects (Levin *et al.*, 1991). Consequently, natural physical disturbance or disturbance caused directly (e.g. trawling) or indirectly (high abundance of macrofauna caused by eutrophication) by human activity may have negative effects on *P. arborescens*. One effect is absence or strongly reduced abundance, another is abnormal morphology. Thus, the presence of deformed specimens of *Pelosina arborescens*, and probably of other tubular, more easily fossilizable forms, may be used as an indication of physical disturbance of the sea floor both today and in the past.

ACKNOWLEDGEMENTS

This research is part of a larger study, the PES project (no. 184870/S40), funded by the Research Council of Norway. The

author thanks the crew at the University of Oslo’s research vessel *FF Trygve Braarud* and Jarle Håvardstun and Merete Schøyen (both NIVA) for kind assistance on the cruise, John W. Murray (University of Southampton) for encouraging discussions and comments on the manuscript, and the reviewers Tomas Cedhagen (Aarhus University) and Martin Langer (University of Bonn) for useful comments.

Manuscript received 8 January 2009

Manuscript accepted 29 June 2009

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