Late Precambrian Microfossils

SIR – Dr Muir kindly allowed me to see the manuscript of her Essay Review on Late Precambrian Microfossils (published in this Part of the *Geological Magazine*) and I would like to comment as follows.

Her review raises questions concerning the biogenicity of the acid-resistant organic-walled microstructures ascribed by Vidal (1976*a*) to *Bavlinella faveolata*. Further she appears to suggest that *B. faveolata* is the same thing as *Pyritosphaera* Love 1962; i.e. an organic residue from pyrite framboids. Aware as I am of the important role played by pyrite framboids in the, in many cases, monstrous deformation of organic-walled microfossils (cf. Vidal, 1974) I considered this possibility when I first saw the specimens of *B. faveolata* in Dr Timofeev's collections. The number of specimens of *B. faveolata* found in the rocks of the Visingsö Beds is far from large (Vidal, 1976*a*). Therefore, for a long time, I doubted its biogenicity. However, when examining the organic residues from rocks of the Upper Precambrian–Lower Cambrian Torneträsk Group (north Sweden) and of the Tillite Group in East Greenland (Vidal, 1976*b*), where *B. faveolata* is extremely abundant, I obtained sufficiently abundant material for study. Pyritous and non-pyritous samples containing *B. faveolata* were examined both before and after HNO_3 treatment. Despite this pyrite infillings were never observed. However, since previous studies had proved that structures, previously ascribed to framboidal pyrite growing inside organic-walled microfossils, were present on microfossils found in pyrite-free clays of the lower unit of the Visingsö Beds (Vidal, 1974, p. 9), I still was very suspicious of the nature of *B. faveolata*. By that time I had been able to examine a very large number of samples throughout the Upper Proterozoic Eleonore Bay Group and Tillite Group and of the Lower Cambrian Bastion Formation and Ella Ø Formation in East Greenland. Surprisingly, *B. faveolata* was never found in the units of the Eleonore Bay Group, despite the fact that the rock samples were collected for two purposes: i.e. investigation of the distribution of stratiform sulphide mineralization and for micropalaeontological studies. This may give an impression of the pyrite contents of some of the investigated samples! *B. faveolata*, plentiful in the samples from the Tillite Group, has never been found in the investigated Lower Cambrian units.

Again surprisingly, the investigated samples of the Ella Ø Formation contain numerous specimens of baltisphaerids showing clearly developed pyrite framboids inside their vesicles. Still not completely convinced, I decided to try to get information about what was hidden beneath the small spheres on the surface of *B. faveolata*. Samples with high concentrations of *B. faveolata* were chosen and under the stereo-microscope, with the aid of an eyelash, I tried to crack some specimens. This was like trying to hit an ant with a machine-gun. However, if you try often enough, you will hit some. The specimens that had been hit were examined in the SEM. This painstaking work proved to be unnecessary as defective, and/or partly broken specimens with detached 'external cells' were recovered from the rather scanty Visingsö material (Vidal, 1976*a*, p. 17, Fig. 7: B–C). As easily observed in the SEM photomicrographs in Vidal (1976*a*, p. 17, Fig. 7: C) the 'external cells' are more or less spherical and as my experiment on the Greenland material proved, they can be detached artificially or naturally. Regarding the internal structure of *B. faveolata* it seems as if it worked after the principle of dissemination of 'external cells' and replacement of them from the inside. I do not understand what it may be, but at the moment I refuse to believe that it could be the result of framboidal pyrite. To the present I have processed a few thousands of Proterozoic and Lower Cambrian samples. So far, I have never found *B. faveolata* in typically Riphaean acritarch assemblages. On the contrary it is always found with Vendian (or possibly Vendian) acritarch taxa.

Dr Muir says in her review: 'however, Vidal points out that his sampling was designed to give abundant microfossils, and he tended to choose basically fine grained rocks.' However, my intention was the contrary (p. 6). Further, she states: 'He was, therefore, only looking at a limited number of lithologies. . .' Examination of my sections and the position of sampling spots on them may clarify that the intention of the investigation is completely the opposite – as a matter of fact, I cannot think of any lithology present in the Visingsö Beds not included in my sampling (and processing). On the contrary, one may argue that I was a fool spending lots of valuable time trying to get microfossils from clean quartz sands (Vidal, 1974) and arkosic sandstones (Vidal, 1976*a*).

Geol. Mag. **114** *(5), 1977, pp. 393–394. Printed in Great Britain.*

References

Love, L. G. 1962. Further studies on microorganisms and the presence of syngenetic pyrite. *Palaeontology* **5**, 444–59.

Vidal, G. 1974. Late Precambrian microfossils from the basal sandstone unit of the Visingsö beds, south Sweden. *Geol. Palaeont.* **8**, 1–14.

Vidal, G. 1976*a*. Late Precambrian microfossils from the Visingsö Beds in southern Sweden. *Fossils and Strata*, **9**, 1–57.

Vidal, G. 1976*b*. Late Precambrian acritarchs from the Eleonore Bay Group and Tillite Group in East Greenland. A preliminary report. *Grønlands Geologiske Undersøgelse Rapport Nr* 78, 1–19. Copenhagen.

Dept. of Historical Geology and Palaeontology G. VIDAL
Sölvegatan 13
S-223 62 Lund
SWEDEN
20th February 1977