Muellerisphaerids from the Llandovery of western Mid Wales

DAVID K. LOYDELL[1], IAN McMILLAN[2] & HUGH F. BARRON[3]

[1]Geology Dept., U.C.W. Aberystwyth, Dyfed

[2]202, Tudor Drive, Kingston-on-Thames, Surrey

[3]B.G.S., Keyworth, Nottingham

ABSTRACT- Muellerisphaerids are described and illustrated from Britain for the first time. The mechanical processing method used in their extraction is described. They are preserved as pyrite internal moulds and thus lack the necessary morphological detail (i.e. spines) to be identified to family level. Other microfossils occuring in the samples are also briefly described.

INTRODUCTION

Aldridge and Armstrong (1981) applied the informal name mazuelloid to a group of phosphatic, spinose microspheres of unknown affinities from the Silurian of Greenland and Czechoslovakia and the Devonian of Germany. Kozur (1984) created the Order Muellerisphaerida to accommodate these specimens and similar material from the Silurian and Lower Devonian of Hungary. Burrett (1985), Holmer (1987) and Priewalder (1987)have subsequently recognised muellerisphaerids from the Ordovician

of Tasmania, the Ordovician of Västergötland (Sweden) and the Silurian of Austria respectively.

This paper reports the occurrence of muellerisphaerids, preserved as pyrite internal moulds, from Llandovery mudstones from western Mid Wales.

MATERIAL AND METHODS

The material examined consisted of the residues from three mudstone samples collected from the following localities and horizons:-

i)Rheidol Gorge. O.T.Jones (1909) locality F17 (SN754797). Middle Llandovery, Derwenlas Formation (*magnus* Zone). Black mudstone with abundant pyrite internal moulds of graptolites.

ii)Hafren Forest. SN842883. Middle Llandovery, Derwenlas Formation (Upper *triangulatus* or *magnus* Zone). Black mudstone with pale siltstone stripes - pyrite internal moulds of graptolites abundant.

iii)Cliffs near Cormorant Rock, Aberystwyth. SN583829. Upper Llandovery, Aberystwyth Grits Formation (most probably *turriculatus* Zone). Inter-turbidite mudstone disturbed by a network of pyritised burrows.

The following mechanical processing method was used:-

1)Dry lumps of rock were crushed using a steel pestle and mortar. Fines were sieved through a 30 mesh onto a 240 mesh (500µm and 63µm respectively)

2)Any material remaining on the 30 mesh was crushed again.

3)When all the residue was on the 240 mesh sieve the sample was washed slowly and the material on the sieve rubbed between finger and thumb to remove fine grained matter.

4)If any fine grained material still adhered to the pyrite residue the sample was boiled with Quaternary Ammonium Detergent and the rubbing process repeated. (For the particularly indurated sample from O.T.Jones Loc. F17 this process of boiling and rubbing was repeated several times.)

The residues were examined under the light microscope and in the S.E.M..

DESCRIPTION

The Aberystwyth Grits Formation material yielded nothing but fragments of burrow and pyrite framboids (Pl. fig.1).

The samples from the Derwenlas Formation, however, yielded a large number of microfossils all preserved as pyrite internal moulds. These fall into three morphological groups:-

1)Smooth spheres (Pl. figs.2-3) with an average diameter of 100μm, some showing evidence of collapse prior to the formation of pyrite (Pl. fig.3). These are of unknown taxonomic status.

2)Muellerisphaerids, 100-150μm in diameter with a variable number of small dome-shaped protuberances (maximum height < 10μm) regularly spaced over the surface of the sphere (Pl. figs.4-8). These domes represent infillings of the hollow lower portions of the muellerisphaerids' spines.

3)Spheres, of a similar size to the muellerisphaerids, with a surface broken by a continuous pattern of dome-shaped protuberances (Pl. fig.9). Whilst these bear a superficial resemblance to framboids, they may be internal moulds either of muellerisphaerids with a rather denser

ornament of spines (cf. Aldridge and Armstrong (1981), fig.1f), or possibly of radiolaria.

DISCUSSION

This is the first record of muellerisphaerids from the British Isles and the first ever account of this order recovered from mechanically processed Lower Palaeozoic rocks.

In this form of preservation the muellerisphaerids may be distinguished from acritarchs principally by their greater size. The muellerisphaerid calcium phosphate wall, described by Aldridge and Armstrong (1981) and subsequently by Kozur (1984) and Burrett (1985), has not been seen on any specimen. Whether it was lost prior to, or during, processing is not known.

It is interesting to note that all records of muellerisphaerids have so far been from deep-water sediments. Whilst it may be that they were restricted to the planktonic environment of the open sea, it may be that their preservation potential in shallow-water sediments is very low (due to the delicate nature of their skeletons).

Kozur (1984) subdivided the order Muellerisphaerida into two classes, the Aldridgeisphaeridae and the Armstrongisphaeridae, the former with broad spines and the latter with narrow spines. Obviously, on the basis of internal moulds it is impossible to decide as to which family the described material belongs as several armstrongisphaerids have broad spine bases before tapering to a much narrower spine termination. Thus it is not possible to augment Kozur's preliminary biostratigraphical observations.

ACKNOWLEDGEMENTS

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Explanation of Plate

All x300

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Fig.1. Framboid, Stub UCWG 947 from cliffs near Cormorant Rock (SN583829).

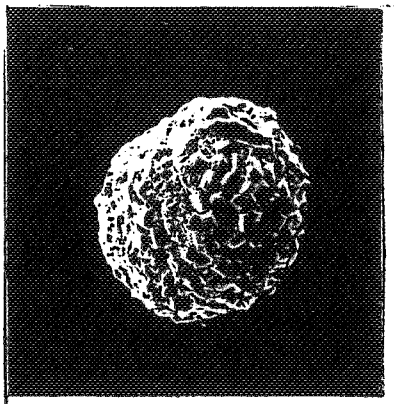
Fig.2. Smooth sphere, UCWG 946.

Fig.3. Smooth sphere showing collapse prior to pyrite formation, UCWG 951.

Figs.4-8. Muellerisphaerids. Fig.4, UCWG 952. Figs.5-6, UCWG 948. Figs.7-8, UCWG 952.

Fig.9. Sphere with numerous dome-shaped protuberances, UCWG 952.

(Figs.2,3,7-9 from the Hafren Forest (SN842883)
Figs.4-6 from O.T.Jones Loc. F17 in the Rheidol Gorge (SN754797)).



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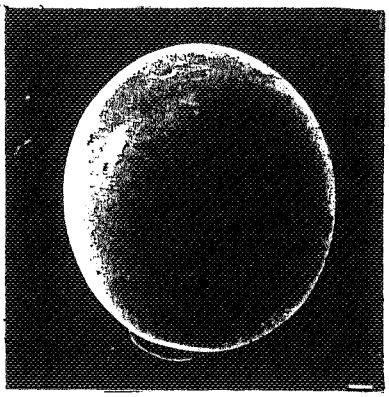

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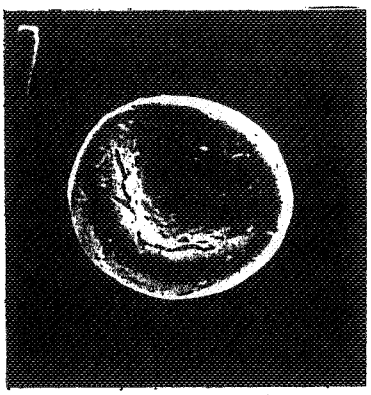

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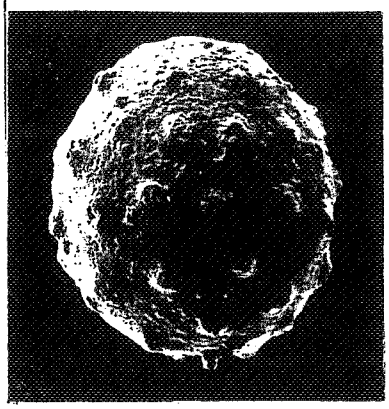

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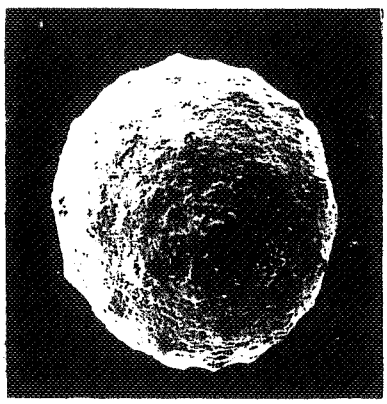

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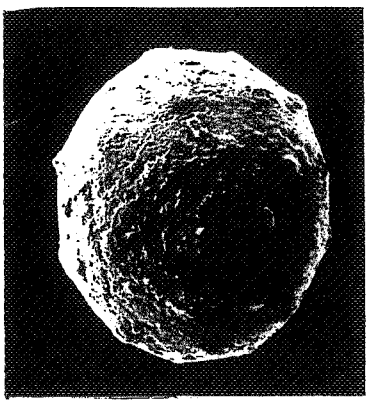

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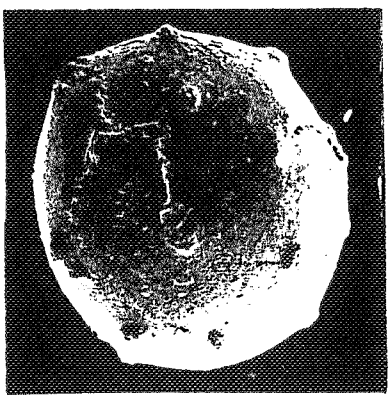

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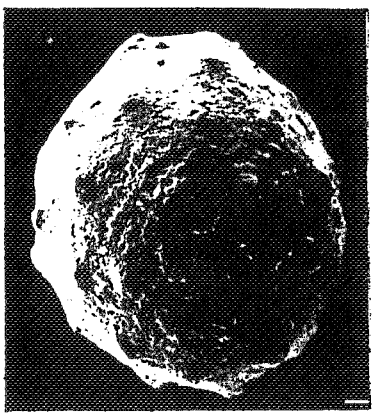

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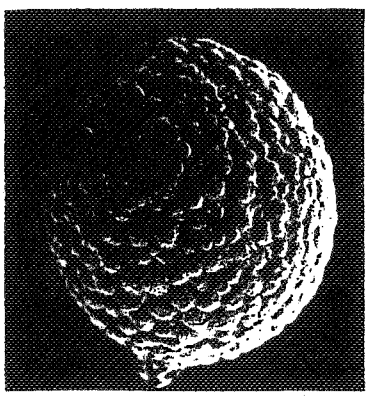

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