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The "Devonian Foraminifera" from Tamworth, New South Wales

by

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In view of the general rarity of well authenticated calcareous Foraminifera in rocks of Devonian and earlier age, the fossils described by Chapman[1] from Devonian limestones have some importance. Three genera, *Psammosphaera*, *Valvulina* and *Pulvinulina* were recorded, with five species in all, of which three were considered new to science.

During a visit to Australia, supported by a grant from the Royal Society and Nuffield Foundation, I was able, by courtesy of Mr. E. D. Gill, Curator of Fossils, to examine the type specimens preserved in the National Museum of Victoria, Melbourne. It was clear that these supposed foraminifera are oolite grains, more or less affected by dolomitization and by mechanical distortion.[2]

The rock is a fine grained, partially dolomitized, oolite, with limonite often present in the interior of the ooids, and forming a delicate tracery around the dolomite crystals. The matrix is clear, well crystallized, and free from limonite, except along later shear cracks. Considerable variation is seen in the dolomitization of the ooids, some being affected around their periphery, others in their centre (Fig. 3). The undolomitized portion is either a fine grained mineral, dusky in transmitted light, probably calcite, or light brown limonite. Radial structure is rarely seen. Some ooids are distorted, and may be drawn out into fantastic shapes along movement planes, the planes themselves being sometimes invisible as they traverse the matrix. The rock has a complex history, the matrix probably being re-crystallized before the dolomitization of the ooids, but precise evaluation of the conditions of deposition and diagenesis is not necessary for the present purpose. No fragments of organic origin were seen in the slides.

[1]F. Chapman, 1918. "Devonian Foraminifera: Tamworth District, New South Wales," Proc. Linn. Soc. N.S.W. 43 (2): 385–394.

[2]When, at a later time, I visited the Bureau of Mineral Resources, Canberra, I found that Miss Irene Crespin had long been of the opinion that these bodies were not Foraminifera, though she had not examined the types.

The following comments on Chapman's figures will make the position clear:—

PLATE XXXIX

Fig. 1. "*Psammosphaera neminghensis.*" An ooid with a rim of dolomite, penetrating to the centre in the lower half of the specimen. The distinct wall shown in the lower right hand side of Chapman's figure is not visible in the specimen, though an increase of crystal size does give the impression of a wall in the upper half. The aperture is relatively smaller than figured, and not so deep. It appears to be accidental. Slide P 13048.

Fig. 2. "*P. neminghensis.*" An ooid dolomitized around the periphery, the interior filled with a fine grained deposit. Slide P 13048, specimen marked "b".

Fig. 3. "*Valvulina plicata.*" The apparent infolding of the wall is an accident of dolomitization, and is nowhere so clear as delineated, while the wall itself is the result of re-crystallization, and is not so uniform in thickness as would appear from the figure. Slide P 13052, specimen labelled "h".

Fig. 4. "*V. plicata.*" A double ooid, dolomitized on the outside and also near the centre. A shear line lies nearby, and it is probable that this is a case of mechanical juxtaposition of two ooids. Slide P 13048, specimen marked "a".

Fig. 5. "*V. bulloides.*" An ooid without any distinct structure, irregularly re-crystallized, and probably fractured. Slide P 13053.

Fig. 6. "*V. bulloides.*" Either a compound ooid, or one affected by a minute shear. The interior is filled partly by dolomite crystals, partly by limonite. On the lower left hand side the infilling crystals reach the outer boundary, and at this point there is no possibility that a wall is present. The apparent wall seen elsewhere is due to more finely crystalline calcite or dolomite. Slide P 13054, specimen marked "g".

Fig. 7. "*V. bulloides.*" An ooid with one side more re-crystallized than the other. The indentation shown at the base does occur, though it is relatively smaller, and the faint dark band extending towards the interior is present also. The tube leading towards it from the interior cannot be distinguished. Slide P 13052.

PLATE XL

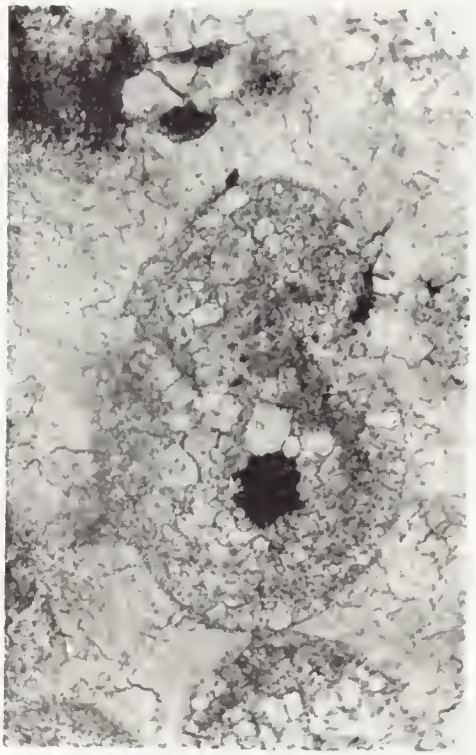
Fig. 8. "*Valvulina oblonga.*" A compound ooid, the centre of the larger component being filled with limonite. The remainder is irregularly dolomitized. The dark band shown on the right hand side of Chapman's figure is present, though it does not appear to separate a wall from an infilling. It cannot be traced round the curved base. Slide P 13048, specimen marked "c".

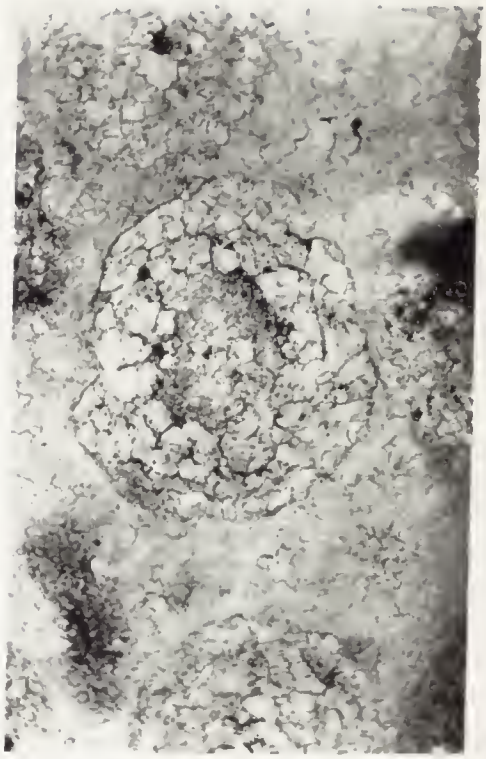
The original of "*Pulvinulina bensoni*" has not been seen.

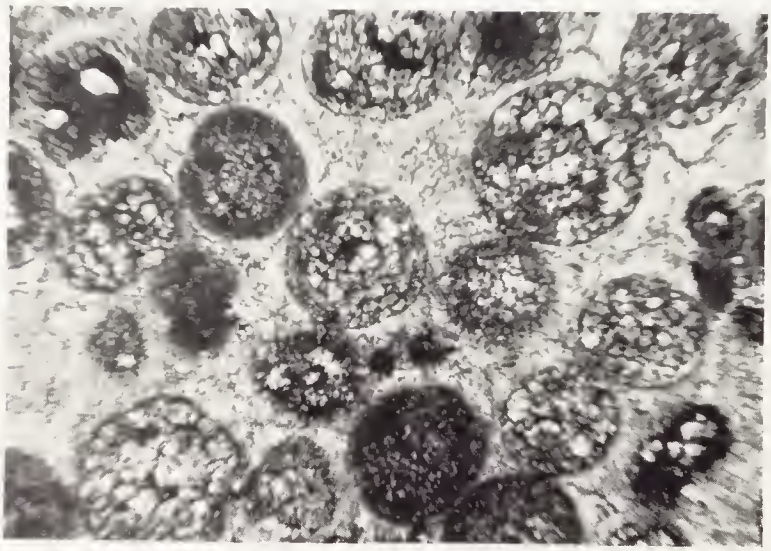
Two further points are worthy of mention. First, the dolomite crystals stand out boldly against the less highly refractive matrix, partly because of their limonitic coating. This led Chapman to imagine he could see the objects in

three dimensions, and, as it were, look inside the curved wall of a *Psammosphaera*. This appearance is clearly an optical illusion, since the specimens are large compared with the thickness of the section. Secondly, comparison of the three photographs illustrating Chapman's paper will show that he interpreted two different things as the wall of *Psammosphaera*. In figure 10 the larger crystals are inside the "wall", and are interpreted as infilling, while in figure 11 it is the large crystals that make the wall, as they do in figure 12.

Finally, the fact that the crystals making the wall are secondary, and are not the primary quartz crystals of an agglutinated test, is sufficient in itself to show that these objects are not Foraminifera.







DESCRIPTION OF PLATE 1.

Figure 1.—Original of Chapman's figure 2 on his plate XXXIX. To show coarse dolomite crystals around a fine grained interior.

Figure 2.—Original of Chapman's figure 8 on his plate XL. Showing irregular dolomitization, and fine grained exterior.

Figure 3.—General view to show varied character of ooids.

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