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A note on the rugose coral *Entelophyllum latum* from the Early Silurian Yarralumla Formation of Canberra

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Natural History in all its Branches

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ABSTRACT

The rugose coral species *Entelophyllum latum* is described from the Yarralumla Formation of Canberra. As the species was first recognised in the Glenbower Formation a little to the north of Canberra, and does not occur anywhere else in the Canberra-Yass region, it confirms correlation of the two formations, which on recently revised conodont data are now very likely to be of Sheinwoodian (mid-Wenlock) age.

INTRODUCTION

The Yarralumla Formation, defined by Öpik (1954, 1958), is a discontinuous unit of up to 300 m thickness, comprising predominantly tuffaceous and calcareous mudstone and siltstone (see Abell, 1991, pp. 30-31 for a detailed description). The complex geology of the Canberra area, with its many faults and mostly temporary exposures, has led to considerable past uncertainty regarding stratigraphic relationships (e.g Talent *et al.* 2003). As a result of the detailed mapping summarised by Abell, the Yarralumla Formation's stratigraphic relationships are now reasonably well established (Abell 1991 fig. 8): it unconformably overlies the Hawkins Volcanic Suite, and is conformably overlain by the Deakin Volcanics, part of the Laidlaw Volcanic Suite (see Wyborn *et al.* 1981), which in turn is overlain by the Canberra Formation. North of Canberra the Laidlaw Suite overlies both the Glenbower Formation and a southern extension of the Yass Formation (Fig. 1), and it is therefore apparent that the Yass, Glenbower and Yarralumla Formations are approximately coeval (Owen and Cas 1980).

AGE

The brachiopod fauna of the Yarralumla Formation was described by Strusz (1984), the trilobites by Chatterton and Campbell (1980). All these authors relied on correlation with the Yass Formation to the near north, and the conodont data in Link and Druce (1972), who deduced an earliest Ludlovian age for that unit. However, the conodont data have since been extensively re-evaluated, the results being detailed by Percival (2012) and Percival and Zhen (2017). Some of the previous uncertainty (see Talent *et al.* 2003, pp. 196-197) stems from a report by Link (1970, p. 719) of the Ludlovian conodont *Kockella variabilis* in a sample from Öpik's Riverside Formation (now part of the Canberra Formation). As reported by Strusz (1983, p. 163) the single

specimen has been lost, and so its identification cannot be verified. All other samples from Canberra Silurian limestones have proved barren. Determination of the age of the Yarralumla Formation therefore still relies heavily on stratigraphic correlation, based on detailed mapping.

Entelophyllum latum was originally described from Glenbower, on the Murrumbidgee River between Yass and Canberra. The strata here are now placed in the Glenbower Formation, which Percival (2012, p. 1875) considered on conodonts to be "most likely early Wenlock (latest Sheinwoodian) in age". Percival's re-assessment of the age of the Hawkins Volcanics, Yass Formation, and Laidlaw Volcanics is that these units "most likely range from earliest Wenlockian (early Sheinwoodian) to mid-Wenlockian (early to mid Homerian)." It follows that the Glenbower Formation and Yass Formation are of approximately the same age. *Entelophyllum latum* does not occur in the Yass Basin sequence (McLean 1976). In the Canberra-Yass region, therefore, the occurrence of this species in the Yarralumla Formation reinforces close correlation between the Glenbower and Yarralumla Formations.

As a consequence of the above discussion, I consider the Yarralumla Formation to be almost certainly of Sheinwoodian (mid-Wenlock) age, not early Ludlovian.

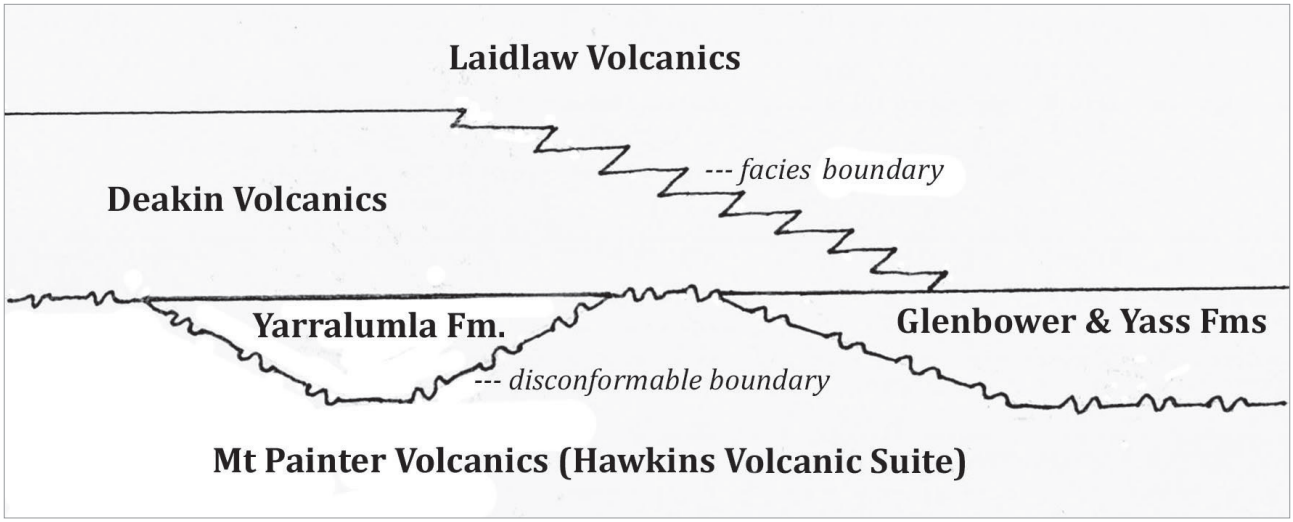

Figure 1. Stratigraphic relationships of the Yarralumla, Glenbower, and Yass Formations. Based on Abell, 1991, Fig. 8.

MATERIAL

The specimens described herein were collected by Commonwealth Bureau of Mineral Resources geologists from three numbered localities (prefixed CC) in the suburbs of Weston and Yarralumla, and were initially sectioned and provisionally identified a few years later. The opportunity has now arisen to more carefully examine the sections. They were scanned as transparencies using an Epson V600 photo scanner, and the images were processed using Adobe Photoshop Elements. The specimens have now been entered into the Commonwealth Palaeontological Collection, housed by Geoscience Australia, specimen numbers prefixed CPC.

The collection localities are shown in Figure 2; grid references are to the Canberra 1:100 000 topographic sheet 8727, and are as precise as the original information will allow.

CC16: FA 873.893; north side of the Canberra city to Cotter Reserve road (old alignment), about 200 m west of the Tuggeranong Parkway; collected 1955 by J. Gilbert-Tomlinson.

CC27, 28: approximately FA901.904; former brick-shale quarry, Canberra Brickworks; detailed collecting by C. Gatehouse and I. Lambert in 1960, but precise positions are no longer available.

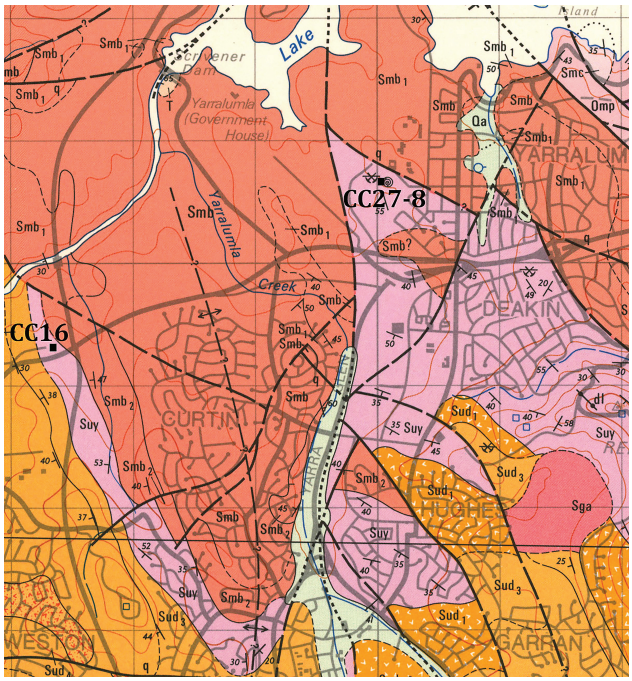

Figure 2. Geological map showing the collecting localities CC16, 27 and 28. Suy = Yarralumla Formation, Smb = Mt Painter Volcanics (Hawkins Volcanic Suite), and Sud = Deakin Volcanics (Laidlaw Volcanic Suite). Grid interval is 1000m. Modified from Henderson, 1980.

SYSTEMATIC PALAEONTOLOGY

Family Entelophyllidae Hill, 1940
Genus *Entelophyllum* Wedekind, 1927

Type species

Madreporites articulatus Wahlenberg, 1821; subsequent designation by Lang, Smith and Thomas, 1940, p. 57. Silurian, Gotland.

Diagnosis (modified after Munson and Jell 2016, p. 302)

Solitary, phaceloid or dendroid rugosans with long, generally radially arranged smooth or zigzag-carinate septa, counter-cardinal septa rarely distinguishable; major septa generally slightly withdrawn from axis, minor septa may be contraclined or contratingent; tabularium wide, with broadly domed axial area often centrally depressed, surrounded by marginal trough of horizontal to concave tabellae; dissepiments numerous, small, generally globose and steeply inclined inwards, rarely lonsdaleoid.

Remarks

I follow Munson and Jell 2016, in including solitary species in this genus rather than in *Nanshanophyllum* Yü, 1956. I agree with their conclusion, which followed that of Jell and Sutherland (1990, p. 776) who also remarked on the "continuum of variation in the thickening and carination of the septa" in entelophyllids, that no useful purpose would be served by keeping that genus distinct as a subgenus of *Entelophyllum*.

Entelophyllum latum Hill, 1940

Synonymy

Entelophyllum latum Hill, 1940, pp. 413-414, pl. 13, figs 8-10.
Entelophyllum sp. Hill, 1942, p. 4, pl. 2, figs 1a, b.
Entelophyllum latum Hill, 1940; Strusz, 1961, pp. 338-339, pl. 42, figs 3-5.
Entelophyllum latum Hill 1940; Munson and Jell, 2016, pp. 306-307, figs. 18A-D.

Diagnosis

Solitary *Entelophyllum* with numerous mostly thin and often weakly carinate septa, and axial structure almost as wide as tabularium.

Specimens

CPC45621 to 45631 from locality CC16, CPC45632 from locality CC27, CPC45633 from locality CC28. Yarralumla Formation, Canberra.

Description

Solitary, cylindrical; all the specimens are at least partly worn, and several are encrusted by tabulate corals. Diameter 25 to 31 mm, with 82 to 92 septa. Major septa either meet axially, where they may be moderately rotated, or more often are slightly withdrawn; minor septa are confined to the dissepimentarium, generally not quite reaching the tabularium. Septa may be smooth or finely zig-zag, with weakly developed xyloid carinae. They are always thin peripherally, but otherwise are thin to moderately thickened. Tabularium slightly less than half the corallite diameter. The raised axial complex of tabellae is about 4/5 the tabularial diameter, with steep margins separated from the dissepimentarium by a narrow zone of concave tabellae. Dissepiments are steeply inclined to vertical in longitudinal section. The upper surface of the axial complex is gently depressed. Trabeculae are not readily discernible in the available material.

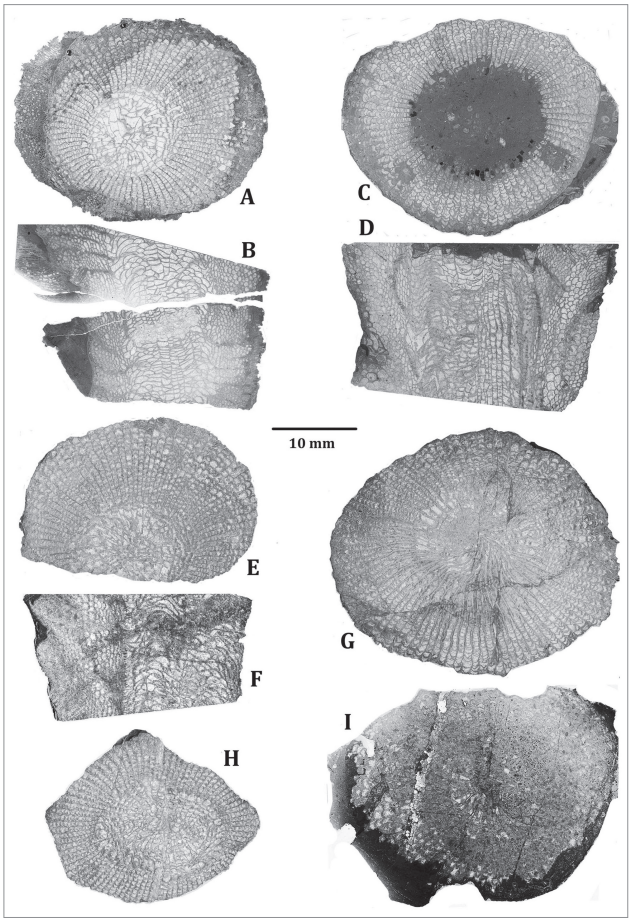

Figure 3. *Entelophyllum latum* Hill, 1940 from the Sheinwoodian Yarralumla Formation of Canberra. A, B, CPC45622, transverse and longitudinal sections of favositid-encrusted corallite; C, D, CPC4625, transverse section through calice, and longitudinal section showing domed floor of calice; E, F, CPC45626, transverse and longitudinal sections; G, CPC45629, transverse section of corallite with thickened septa slightly rotated at axis; H, CPC45630, transverse section of corallite with relatively strongly carinate septa; I, CPC45633, transverse section of poorly preserved corallite with irregularly worn exterior. A-H from locality CC16, west of Yarralumla, I from locality CC28 in the former Yarralumla brick-shale quarry. All sections to same scale.

Remarks

Hill's rather worn specimens from the Glenbower Formation are somewhat smaller than those from Canberra, reaching 18 mm in diameter; Munson's specimens from the Jack Formation of North Queensland reach 22 mm, but have a similar number of septa, while Strusz's specimen from the Narragal Limestone south of Wellington, N.S.W., is larger, at 40 mm with 102 septa. The Canberra material

is intermediate in size and septal number between these specimens. Structurally, all are very similar, so the size differences may be ascribed to the varying environments as well as geographic distance and age differences.

Similar in size, and in general appearance in thin section, is *Stereoxylodes multicarinatus* McLean, 1975, from the late Llandoverian Rosyth Limestone. Pedder (1976, p. 291) referred the species to *Stereoxylodes (Nanshanophyllum)* Yü, 1956, and following Munson and Jell (2016) it could therefore be considered a solitary species of *Entelophyllum*. However, it differs from *E. latum* in the much more complex structure of the outer parts of the septa.

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