TABULATA AND HELIOLITIDA FROM THE WELLINGTON DISTRICT, N.S.W.

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(Communicated by Dr. Ida A. Brown.)

With Plate I.

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SUMMARY.

The paper describes some corals collected in 1942 by Miss Basnett and Miss Colditz of Sydney University. Five species of *Favosites*, one of *Heliolites* and one of *Propora* are described, the genus *Pleurodictyum* is discussed and a new species described.

The fossils are from six different localities, and while the collections are too small in some cases to give positive evidence of the age, some indication can be given.

The corals obtained from various localities are as follow:

(A) Por. 82, Par. Mickety Mulga.

Favosites goldfussi d'Orbigny, *F. basalticus* (Goldfuss) var. *moonbiensis* Etheridge, *Pleurodictyum bifidum* sp. nov. The first of these ranges from the Lower to Middle Devonian, the second Middle Devonian, and is especially characteristic of the Nemingha and Moore Creek Limestones. Age: Middle Devonian.

(B) Por. 206, Par. Mickety Mulga.

Pleurodictyum bifidum sp. nov. Age: Probably Middle Devonian.

(C) Dubbo Road, 12 miles from Wellington.

Favosites bryani Jones. This form is very characteristic of the lower Middle Devonian Murrumbidgee beds and is also found in the Lower Devonian Garra beds.

(D) Por. 241, Par. Mickety Mulga, Wellington, N.S.W.

Propora sp. No deduction as to age.

(E) Por. 50, Par. Curra.

Favosites bryani. Age: Lower Middle Devonian or Lower Devonian.

(F) Por. 119, Par. Veech.

Favosites sp. sp. nov.? No deduction as to age can be drawn.

(G) Willowtree Creek, Attunga.

Favosites ? goldfussi d'Orbigny. Age: ? Devonian.

(H) One quarter mile N.E. of Apsley R.S. on the road to the dredge, Wellington.

Favosites richardsi Jones, *Heliolites daintreei* Nich. and Eth. (fourth group). The former is unknown outside the Upper Silurian and in fact this is the first

record outside the type area—Yass, N.S.W. The latter is known from the Upper Silurian of Yass, the Lower Devonian of Molong, N.S.W., and the Devonian of the Broken River, N. Queensland. The age may therefore be taken as Upper Silurian.

SYSTEMATIC DESCRIPTIONS.

MADREPORARIA TABULATA.

Genus Favosites Lamarck.

Favosites goldfussi d'Orbigny.

Favosites goldfussi (partim) d'Orbigny, 1850, p. 107 (fig. 3*b* of Goldfuss, 1829 only).

For synonymy, description and figures, see Jones, 1936 and 1937.

Remarks: *Favosites goldfussi* as a member of the *F. gothlandicus-F. goldfussi* group was discussed by Hill and Jones, 1940, pp. 191-3, where the similarity between *F. gothlandicus* forma *multipora* and *F. goldfussi* was pointed out. The specimen from Portion 82, Parish Mickety Mulga lies between *F. gothlandica* forma *multipora* and *F. gothlandica* forma *forbesi*, but nearer to the former, and might be called either *F. goldfussi* or *F. gothlandica* forma *multipora*. The adult corallites are 1·75 to 2·5 mm. in diameter, slightly smaller than usual; the walls are thick and the septal spines long and numerous, though somewhat obscured by recrystallisation; the tabulæ are complete, usually horizontal, 3 or 4 in a space of 3 mm.; the mural pores are in at least three rows.

A specimen from Willowtree Creek, Attunga, may be *F. goldfussi*. It is however excessively recrystalline, so that identification is very doubtful. Septa are numerous but apparently fairly short. The mural pores may be in two rows and there are 6 or 7 complete tabulæ in a space of 3 mm.

Range: Lower and Middle Devonian (Garra beds, and Nemingha and Moore Creek limestone).

Localities: Portion 82, Parish Mickety Mulga, Wellington District, N.S.W., and ? Willowtree Creek, Attunga, Tamworth District, N.S.W. (Univ. of Sydney Nos. 6252 and 5246.)

Favosites basalticus (Goldfuss) var. moonbiensis Etheridge.

Favosites basaltica (Goldfuss) var. *moonbiensis* Etheridge, 1899, pp. 164-5, pl. xxiv, figs. 1, 2.

For synonymy and description, see Jones, 1937, p. 96.

Remarks: The one specimen is poorly preserved but is typical of the variety *moonbiensis* in every way except that the spacing of the tabulæ is rather more variable than in the specimens from Tamworth—2 to 4 in 1 mm. The mural pores are about 0·25 mm. in diameter in one row in the centre of the faces.

Range: Middle Devonian.

Locality: Portion 82, Parish Mickety Mulga, N.S.W. (University of Sydney, 6250.)

Favosites bryani Jones.

Plate I, figures 1, 2.

Favosites bryani Jones, 1937, pp. 96-7, pl. xv, figs. 3-6.

Favosites bryani Hill and Jones, 1940, pp. 190-1, pl. v, fig. 2.

Remarks: A specimen from portion 206, Parish Mickety Mulga and one from portion 50, Parish Curra, Wellington district, belong to this species. The

corallites are 1 to 1·25 mm. in diameter, the walls moderately thick, and the corallite angles rounded. Both are recrystalline but the septal spines appear to be of the form typical of this species—long, slender, sharply pointed, upwardly directed spines. The arrangement of the mural pores is not apparent. The tabulæ are variable in number, 7 to 11 in a space of 3 mm.

Range: Lower Devonian to lower Middle Devonian.

Localities: Dubbo Road, 12 miles from Wellington, and Por. 50, Par. Curra, both in the Wellington district, N.S.W. (University of Sydney 6254 and 6253.)

Favosites sp. sp. nov. ?

Plate I, figures 3, 4.

Remarks: A specimen from portion 119, Parish Veech (University of Sydney No. 5290) is probably a new species, but being poorly preserved and a single specimen, I refrain from creating a new name for it.

The corallum is massive, the corallites regularly 1·5 mm. in diameter, the walls slightly dilated but the angles little rounded. No septa show in the transverse section but it is much recrystallised and there are indications in the longitudinal section that septa *may* be present. The mural pores are round, large—0·3 mm. in diameter—in a single row in the faces of the corallites. The tabulæ are complete, thin, regularly spaced, 7 or 8 in a space of 3 mm.

Locality: Portion 119, Parish Veech, Wellington, N.S.W. (University of Sydney 5290.)

Favosites richardsi Jones.

Plate I, figures 5, 6.

Favosites richardsi Jones, 1937, pp. 89-90, pl. xii, figs. 2, 3.

Remarks: The specimen (University of Sydney No. 7278) is completely typical of this species. The corallites are as usual of two orders of size, but this has been shown to be an environmental condition and not of specific value in *F. forbesi* (Jones, 1936) and unpublished work on *F. richardsi* confirms this. The larger corallites have 8 to 11 sides, thus becoming nearly round, and are 3·5 to 4 mm. in diameter. The smaller corallites have 4 to 6 sides and are 2 to 2·5 mm. in diameter, but there are also many young, smaller corallites, triangular or four-sided. The corallite walls are thin or very slightly dilated. The septal spines are numerous, short, with a broad base but sharply pointed. The tabulæ are complete, thin, 3 to 6 in 3 mm. The mural pores are in two rows on the faces of the smaller corallites but the arrangement has not been observed on the larger faces of this specimen.

Range: Upper Silurian.

Locality: A quarter of a mile north-east of Apsley R.S. on the road to the dredge, Wellington, N.S.W. (University of Sydney 7278.)

Genus **Pleurodictyum** Goldfuss.

Pleurodictyum Goldfuss, 1829, p. 113. Genoholotype: *P. problematicum*, *ibid.*, p. 113, pl. xxxviii, figs. 18 *a-g*. Lower Devonian, Eifel district and Nassau, Germany.

? *Michelinia* de Koninck, 1842, p. 29. Genolectotype (see Edwards and Haime, 1850, p. lx) *Calamopora tenuisepta* Phillips, 1836, p. 201, pl. ii, fig. 30. Lower Carboniferous, Holland and the Mendips.

Diagnosis: Cerioïd Favositidæ, walls dilated, septa spinose, the spines sometimes arising from the free axial edges of very short lamellæ, sometimes

directly from the walls ; tabulæ present, sometimes spinose ; mural pores numerous. Topotypes usually (? always) have a worm case in the base.

Remarks : The above diagnosis is based on four topotypes of the genotype (from Oberstatfeld, near Gerolstein, Eifel) which are all internal moulds, as is the case with all topotypes known. The deduction of the complete structure of the coral from these internal moulds is difficult but there is no doubt concerning the polygonal shape of the corallites, the thick walls and the presence of numerous small mural pores, which in *P. problematicum* are usually in two, sometimes three, rows. The septal spines show as numerous round pits which sometimes are situated in a single row in a longitudinal groove, representing a short lamella ; many of the spines, however, arose directly from the walls, there being no trace of any groove ; and the character varies from corallite to corallite and from specimen to specimen, some corallites having several grooves, most having only one groove in the centre, other pits to either side not being in grooves, one specimen I examined having as far as I could see only one groove on one corallite, none on the remainder.

In my opinion there were almost certainly tabulæ for, firstly, on many of the moulds of the corallites there are transverse striations which can only represent ridges left when tabulæ were broken away ; it may be thought remarkable that all the tabulæ were broken away before the corallites were filled and the other tissues dissolved, but the tabulæ were thin delicate structures while the walls were thick and the spines short ; perhaps the tabulæ were thinner and more delicate than usual in the Favositidæ ; further, the corallites were short and the corallum low and spreading, almost discoidal ; secondly, in the centre of each mould are a few corallites perpendicular to the bedding planes of the rock and in several instances the surface of these is covered with numerous small shallow pits which represent more or less vertical spines. The only structures on which these spines could have been based were tabulæ.

Roemer (1883, p. 425), Hall (1876), C. L. and M. A. Fenton (1936, p. 23), Lang, Smith and Thomas (1940, pp. 84 and 102) and others consider that *Michelinia* de Koninck is a synonym of *Pleurodictyum*, although Roemer considered that tabulæ were absent in the latter. This can only be finally decided by an examination of topotypes of *M. tenuisepta* (Phillips) de Koninck, the genotype of *Michelinia*. In the meantime, basing this opinion on published descriptions and figures, I agree that most species of *Michelinia* should be placed in *Pleurodictyum*. Nicholson (1879, p. 149) describes " intramural canals " in *P. stylophorum* (Eaton) but not in *P. problematicum*. I have not observed them in the latter species, nor so far as I know has any other writer. C. L. and M. A. Fenton do not mention them in *P. stylophorum*. Nicholson considers them to be of the same nature as similar structures which he described in *Columnopora*. Cox, 1936, refers the latter to *Calapoecia* Billings, and considers the " intramural canals " to be the result of some boring organism.

Pleurodictyum is not clearly distinct from the thick walled *Favosites*. Three features may be considered in this connection—lamellar septa, spinose tabulæ and strong holotheca. If the first be taken as diagnostic a number of forms, including that to be described below, without lamellar septa but with the other two features, must be removed from *Pleurodictyum* ; but the presence of spines on the tabulæ, a character which varies much from species to species, and the presence of a stronger holotheca than is usual in *Favosites* are not enough on their own to justify separation of the two genera. The whole group of forms stands in need of revision.

Pleurodictyum bifidum sp. nov.

Plate I, figures 7, 8.

Holotype : The specimen 6251 in the collection of the University of Sydney from Por. 82, Par. Mickety Mulga, Wellington, N.S.W. Age : Middle Devonian.

Diagnosis : Pleurodictyum with numerous spinose septa, some of which are bifid, numerous irregular complete and incomplete tabulæ, mural pores large and rare.

Description : The corallites are polygonal but the angles are rounded by the dilatation of the walls which makes them as much as 1·25 mm. in thickness. The diameter of the corallites is 4 to 6 mm. The septa are spinose and very numerous, arranged in longitudinal rows which number seven or more on each corallite face. The spines are stout but usually sharply pointed and about 5 per cent. divide near their axial ends into two (? sometimes three) branches, an unusual and important character, upon which I have based the trivial name. This appears to be a type of rhabdacanthine septa (Hill, 1936) but on a larger scale than any yet described, and unfortunately the coral is not sufficiently well preserved to observe the trabeculæ and confirm this suggestion. The tabulæ are thin, numerous, 10-13 in 5 mm., complete and incomplete in about equal numbers, horizontal or oblique, sometimes deeply invaginated. The mural pores are large, 0·25 mm. in diameter ; their arrangement has not been definitely observed, but there is some evidence to suggest two rows, each row fairly close to the corallite angle.

Remarks : I know of no species with which this is closely comparable, the very large number of septa and their frequent bifid nature are very striking characters.

Localities : Por. 82 and Por. 206, Par. Mickety Mulga, Wellington, N.S.W. (6251 and 5287 University of Sydney collection). Middle Devonian.

Madreporaria Heliolitida Jones and Hill.

Family **Heliolitidæ.**

Genus **Heliolites** Dana.

Heliolites daintreei Nicholson and Etheridge.

Plate I, figures 9, 10.

Heliolites daintreei Nicholson and Etheridge, 1879, p. 224, pl. xiv, figs. 3, 3*a*.

Heliolites daintreei Jones and Hill, 1940, pp. 199-203, pl. vi, figs. 1-5 ; pl. vii, figs. 1-5 ; pl. viii, figs. 1-8 ; pl. ix, fig. 1.

For synonymy, diagnosis, etc., see Jones and Hill, 1940.

Remarks : This is a variable, long-ranged species, divided by Jones and Hill into four, ill-defined groups. The specimen under consideration falls into group four. The tabularia are 1·75 to 2·5 mm. in diameter, rather larger than usual, with none to six rows of tubuli, and 0 to 4 mm. between the tabularia. The tabularia are in contact in only one place in the section and usually there are 2-3 rows of tubuli between. The walls of the tabularia, the tabulæ and sola are typical of the group. The septa are largely obscured by recrystallisation but show in places in the transverse section, arising from the wall between the slight angles formed where two tubuli meet the wall. The walls are sometimes crenulate, and then the septa arise from the crenulations. That the septa are long spines upturned axially is shown in transverse section by their abrupt truncation and the occasional occurrence of apparently detached fragments towards the centre of the tabularia.

Range: Group four ranges in Australia from Upper Silurian to Middle Devonian.

Locality: One quarter of a mile N.E. of Apsley on the road to dredge, Wellington, N.S.W. (University of Sydney 7272.)

Genus **Propora** Edwards and Haime.

Propora sp.

Plate I, figure 11.

Remarks: A single specimen is an undescribed species of *Propora*. The state of preservation is poor, but the transverse section shows the tabularia to be thick walled and crenulate with long septa, stout at the base but rapidly becoming thin, arising from the crenulations. The septa reach or nearly reach the centres of the tabularia and are prolonged in the other direction outside the tabularia into the reticulum. The longitudinal section is obscure so that the character of the septa cannot be determined. The reticulum consists of testæ, but beyond this the characters cannot be seen. Of described species it may be close to *Propora tubulata* Lonsdale but further comparison must await better specimens. It is quite unlike *P. conferta* Ed. & H., the only other species recorded from Australia (see Jones and Hill, 1940, p. 209).

Locality: Por. 241, Par. Mickety Mulga, Wellington, N.S.W. (University of Sydney 7279.)

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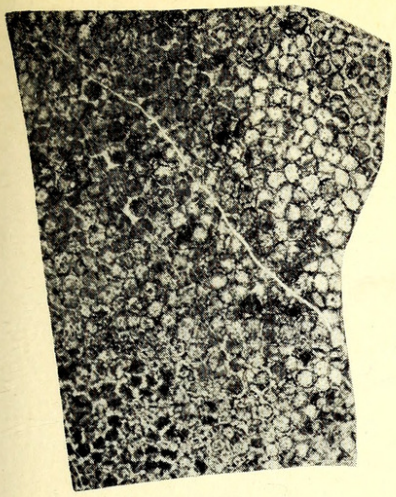

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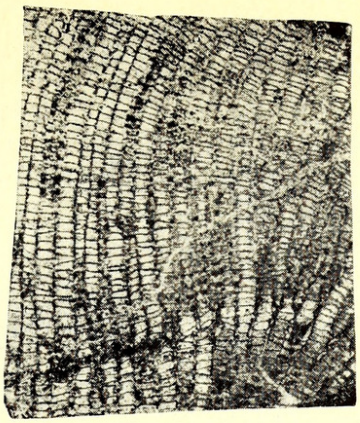

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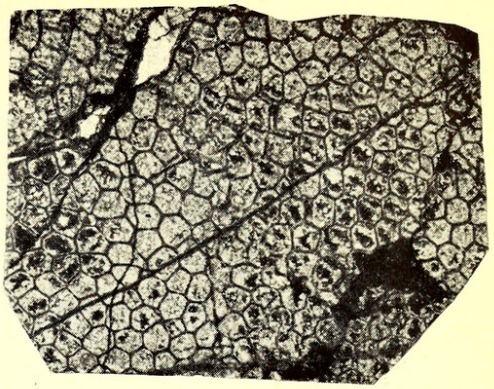

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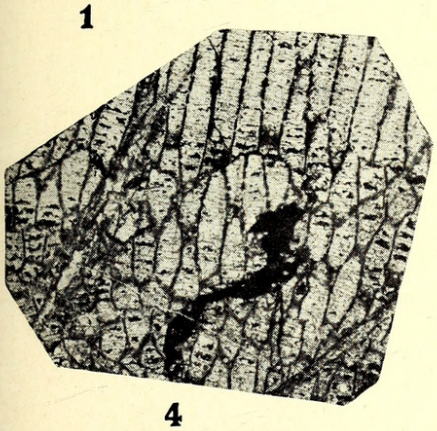

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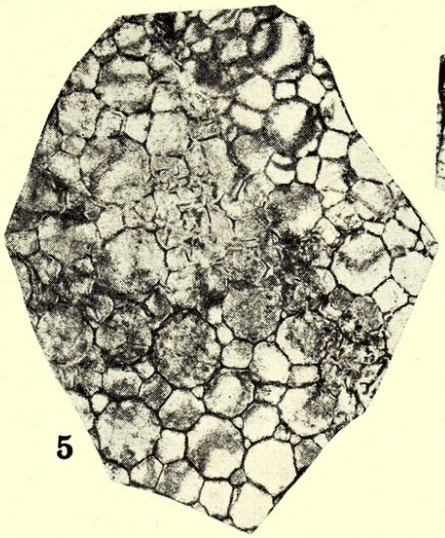

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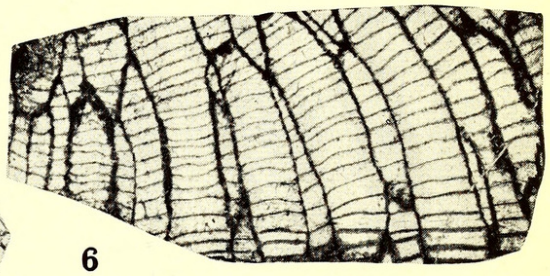

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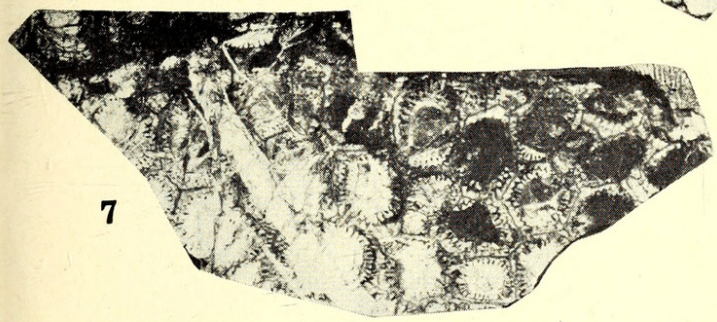

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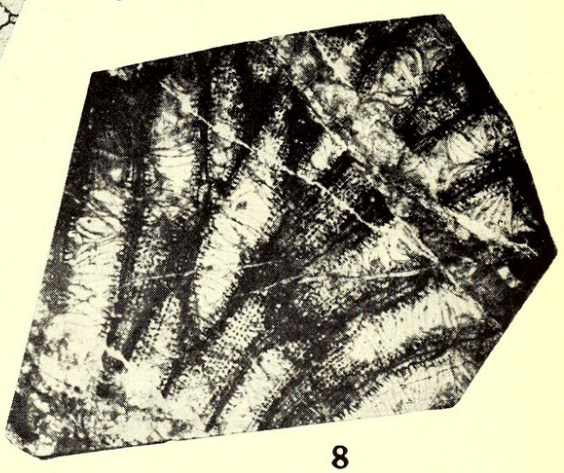

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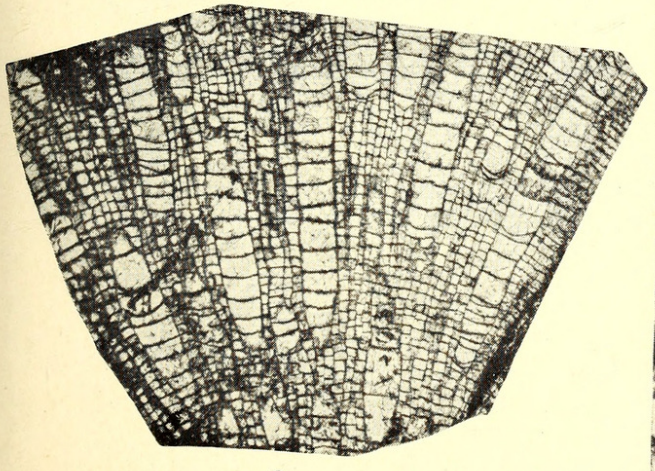

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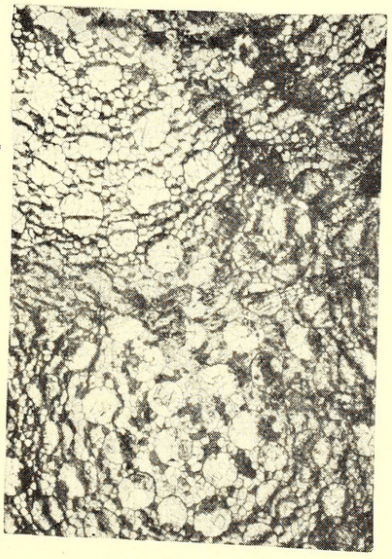

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11

Explanation of Plate.

All figures $\times 2$ approximately.

Figs. 1, 2.—*Favosites bryani* Jones. 1, transverse ; 2, longitudinal section. Dubbo Road, 12 miles from Wellington. (S.U. 6254.)

Figs. 3, 4.—*Favosites* sp. nov. ? 3, transverse ; 4, longitudinal section. Por. 119, Par. Veech, Wellington. (S.U. 5290.)

Figs. 5, 6.—*Favosites richardsi* Jones. 5, transverse ; 6, longitudinal section. One-quarter mile N.E. Apsley R.S. on road to dredge, Wellington. (S.U. 7278.)

Figs. 7, 8.—*Pleurodictyum bifidum* sp. nov. Holotype. 7, transverse ; 8, longitudinal section. Por. 82, Par. Mickety Mulga, Wellington. (S.U. 6251.)

Figs. 9, 10.—*Heliolites daintreii* Nich. & Eth. 9, transverse ; 10, longitudinal section. One-quarter mile N.E. Apsley R.S. on road to dredge, Wellington. (S.U. 7272.)

Fig. 11.—*Propora* sp., transverse section. Por. 241, Par. Mickety Mulga, Wellington. (S.U. 7279.)