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On the Occurrence of Tetradium in  
the Gordon River Limestone,  
Tasmania

BY

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Issued under the authority of

The Honourable Sir NEIL ELLIOTT LEWIS, K.C.M.G.  
Minister for Mines for Tasmania



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## LETTER OF TRANSMITTAL.

Launceston, 13th August, 1919.

SIR,

I HAVE the honour to transmit for publication as a Geological Survey Record a memoir by Mr. Frederick Chapman, A.L.S., F.R.M.S., Palæontologist, National Museum, Melbourne, and Honorary Palæontologist to the Geological Survey of Victoria.

The work describes a fossil coral new to the southern hemisphere, *Tetradium tasmaniense*, sp. nov., collected by Mr. L. Keith Ward and myself on a journey to Zeehan in 1909. The organism was met with in the limestone on the Smelters-road, opposite the smelting works.

Mr. Chapman makes some important remarks on the associated remains recorded from the Zeehan and other beds of limestone belonging to this geological horizon, and his observations confirm the view that these sediments occupy an age position well down in the Silurian; he says that the evidence is in favour of an upper Ordovician or basal Silurian age.

These limestones are known in Tasmania as the Gordon River series, the geological age of which has been successively recorded in departmental publications as Lower Silurian, Ordovician, and finally Silurian.

With our present knowledge we are able to define the stratigraphical succession of the groups of this system as being in ascending order, (1) West Coast Range conglomerate as the base; followed by (2) the pipestem or tubicolar sandstone; (3) the Gordon River limestone series; and (4) the upper fossiliferous beds of sandstones and slates.

We are indebted to Mr. Chapman for much valuable information given by him from time to time in connection with Tasmanian fossils, and I am pleased to be able to take this opportunity of expressing our appreciation of his assistance.

I have the honour to be,

Sir,

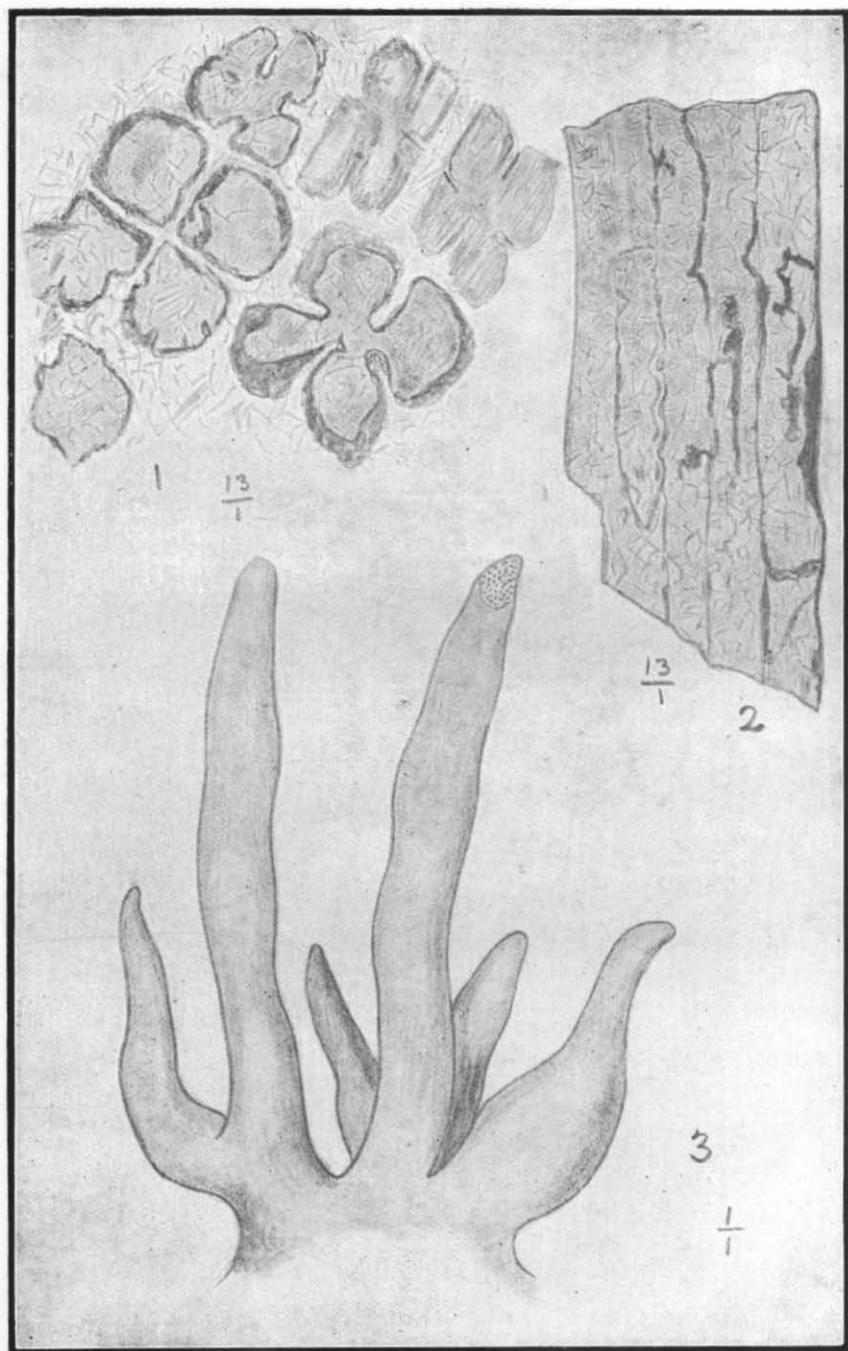
Your obedient Servant,

W. H. TWELVETREES,

Government Geologist.

W. H. WALLACE, Esq., Secretary for Mines, Hobart.

5 cm



F.C. ad nat. del.

To face page 5.

TETRADIUM TASMANIENSE, Sp. nov. L. PALEOZOIC. ZIEHAN.

# On the Occurrence of *Tetradium* in the Gordon River Limestone, Tasmania.

By FREDERICK CHAPMAN, A.L.S., F.R.M.S., Palaeontologist,  
National Museum, Melbourne, and Honorary Palaeontologist,  
Geological Survey, Victoria.

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## Affinities of the Genus.

THE genus *Tetradium* was established by Dana in 1846<sup>(1)</sup> for an unlocalized fossil in the collection at Yale College, Newhaven. Since then numerous related specimens have been found, all of which occur in the Ordovician strata of North America, with one exception in the Richmond series (basal Silurian).

The Scottish fossil described by Nicholson and Etheridge<sup>(2)</sup> under the name of *Tetradium peachii* has since been determined as synonymous with a calcareous alga of supposed corallinean affinities, namely, *Solenopora compacta*, Billings sp.<sup>(3)</sup>

The present specimens, in common with those already described, show the generic characters as laid down by Dana:—"Coralla massive, consisting of four-sided tubes and cells, with very thin septa or parietes; cells stellate, with four narrow laminae."

(<sup>1</sup>) Wilkes' U.S. Exploring Exped., 1838-42, Vol. VII., 1846, p. 701.

(<sup>2</sup>) Ann. and Mag. Nat. Hist., Ser. 4, Vol. XX., 1877, p. 166, fig. on p. 163, d-g.

(<sup>3</sup>) *Stromatopora compacta*, Billings, 1865, Pal. Fossils, Vol. I. Geol. Surv. Canada, pp. 55, 212. See also A. Brown, Geol. Mag., Dec. IV., Vol. I., 1894, p. 146, figs. 1, 2.

### Described Species.

The following are the already determined and valid species of the genus *Tetradium*:—<sup>(1)</sup>

- T. approximatum*, Ulrich. This includes Nicholson's *T. minus* (non Safford) and *T. huronense*, Foord (pars). Age.—Richmond series (base of Silurian).
- T. cellulolum*, J. Hall sp. Age.—Black River series (Lower Ordovician).
- T. columnare*, J. Hall sp. Age.—Trenton series (Lower Ordovician).
- T. fibratum*, Safford. Age.—Cincinnati; Marysville (Upper Ordovician).
- T. halysitoides*, Raymond. Age.—Black River series (Lower Ordovician).
- T. minus*, Safford. Age.—Trenton series (Lower Ordovician).
- T. racemosum*, Raymond. Age.—Trenton series (Lower Ordovician).
- T. syringoporoides*, Ulrich. Age.—Chazy; Stones River (Lower Ordovician).

### General Remarks on the Tasmanian Species.

The genus *Tetradium*, as already seen, is new to the southern hemisphere. The specimens of limestone containing the new coral, *Tetradium tasmaniense*, were obtained from the Smelters-road, Zeehan, and collected on the 12th October, 1911. On a cursory examination the fossil, which was sent to the National Museum by Mr. W. H. Twelvetrees, the Director of the Tasmanian Geological Survey, was doubtfully referred to an archæocyathoid, but when microscope sections were prepared, showing the nature of the corallites, they were seen to belong to *Tetradium*. From an earlier paragraph it will be seen that *Tetradium* is restricted to North America, and is found ranging from Lower Ordovician (Chazy Group or Arenig) to the base of the Silurian (Richmond series).

A comparative study of the known species (*vide postea*) shows *Tetradium tasmaniense* to most nearly approach *T.*

(<sup>1</sup>) Full references are given in Bulletin 92, U.S. National Museum, 1915. "Bibliographical Index of American Ordovician and Silurian Fossils." R. S. Bassler, Vol. II., p. 1264-6.

*racemosum*, Raymond, and *T. celluloseum*, J. Hall sp. In *T. racemosum*, however, the corallites number 30 to the bundle, amongst other characters, whilst in *T. celluloseum* there are still fewer and larger corallites. *T. tasmaniense* has a closely packed bundle averaging perhaps 60 to 90 corallites. Both of the North American related forms are found in the Lower Ordovician. The form of the Tasmanian corallum is perhaps nearest that of *T. celluloseum*, but is more erect.

### Associated Tasmanian Fauna.

The fauna which accompanies this limestone of Zeehan comprises a somewhat mixed facies of Silurian as well as Ordovician fossils, as known from other widely removed areas. It includes the following genera:—*Favosites* (Ordovician-Carboniferous); *Tetradium* (Ordovician and Silurian); *Cornulites* (Ordovician-Devonian); *Rhynchotreta borealis* (Silurian); *Leptodomus* (Silurian); *Palaeoneilo* (Silurian); *Hormotoma* (Ordovician and Silurian); *Raphistomina* (Ordovician); *Trochonema* (Cambrian-Silurian); *Orthoceras* (Silurian-Trias); *Asaphus* (Ordovician); *Illænus* (Ordovician and Silurian); *Pliomeria* = *Amphion* (Ordovician); *Dalmanites* (Silurian and Devonian).

Of the restricted genera of this fauna, three are Ordovician (*Raphistomina*, *Asaphus*, and *Amphion*), and three are Silurian (*Rhynchotreta borealis*, *Leptodomus*, and *Palaeoneilo*), or 23 per cent. each of the total. Of those genera ranging from the Silurian to older there are six (*Favosites*, *Tetradium*, *Cornulites*, *Hormotoma*, *Trochonema* and *Illænus*), and, including the Ordovician forms (*Raphistomina*, *Asaphus*, and *Amphion*), this gives us 69 per cent. Of those genera ranging from Silurian upwards there are four (*Favosites*, *Cornulites*, *Orthoceras*, and *Dalmanites*), giving 30 per cent. It will thus be seen that the balance of evidence is in favour of an Ordovician-Silurian facies, with a bias towards Ordovician, and may be regarded on these facts as Upper Ordovician or basal Silurian. This is in accordance with many other instances where, in Australia, the passage beds between the great formations are more highly developed, faunally and stratigraphically, than the normal deposits of the European divisions, and which, not without reason, have given rise to such terms as Siluro-Devonian and Devono-Carboniferous.

**Description of *Tetradium Tasmaniense*,  
Sp. Nov.**

Corallum composed of a group of loosely arranged cylindrical branches radiating and springing from an irregular base, probably attached to a foreign body. Sides of branches as seen in section not parallel, but constricted at intervals. Corallites small, four-sided, with the septal laminae completely dividing the calyx into four compartments. Septa thick, thickest at edge of cup, thus giving the appearance of a four-petalled Tudor rose in horizontal section. In vertical section the corallites are seen to be closely parallel. The walls of the corallites appear in places to be double, and are then usually undulate in section; this is undoubtedly due to coenenchymal gemmation. Tabulae thin, irregularly spaced, not numerous; occasionally oblique, curved or discontinuous across the cell.

*Dimensions.*—Diameter of a branch of the corallum, 11 mm. Length of branches from about 18 to 60 mm. Average diameter of calyx about 1.44 mm.

*Comparisons and Relationships.*—

In *Tetradium approximatum* the septa are less pronounced. Tabulae much more numerous. Corallum hemispherical or amorphous.

*T. cellulosum* has a similar digitate or ramulose habit, but the corallum is much larger and the structure coarser.

*T. columnare* is apparently non-septate and non-tabulate, according to J. Hall, the original describer of the species, whilst Safford states that the septa or lamellae are indistinct.

*T. fibratum* has a hemispherical corallum, with diverging tubes which measure about the same as the Tasmanian species; the form of the corallum, with its diverging corallites, separates it from the latter.

*T. halysitoides.*—The corallum is roughly hemispherical. Corallites join into intersecting and anastomosing laminae of single or double layers of tubes united along the whole of the adjoining sides. Septa extend halfway to the centre.

*T. minus.*—This species has also a hemispherical corallum. The septa are more irregular than in the

Tasmanian species, and the diameter of the corallites is slightly smaller. Tabulæ also more closely set, there being three in the space of 2 mm.

*T. racemosum*.—The corallum consists of elongate, irregular, bifurcating bundles of tubes. There are about thirty cells to the bundle. One bundle measures 11 mm. in diameter. The corallites vary from the square section in places. The septa are thin and unusually short. Tabulæ are scarce and perhaps entirely absent.

*T. syringoporoides*.—This species is a single-tubed form, according to Ulrich (Ulrich, in Stose, U.S. Geol. Surv. Geologic Atlas of the U.S., Folio 170, 1910, p. 8). This species was founded on a figure given by Bassler in Geol. Surv. Virginia, Bull. 2a, 1909, pl. IV., fig. 2.<sup>(5)</sup>

*Locality*.—Smelters-road, Zeehan, Tasmania.

*Age*.—Upper Ordovician or basal Silurian.

(Types in the National Museum, Melbourne.)

### Description of Rock in which *Tetradium Tasmaniense* Occurs.

In hand specimens the rock is a compact, blue-black limestone, with occasional patches of white calcite generally associated with the infillings of fossils.

Under the microscope the matrix is finely granular or crystalline. Here and there are patches of dolomitized limestone, showing characteristic rhombohedra, the crystals often outlined by a ferruginous deposit. The corallum of *Tetradium* is seen to be infilled with small calcitic crystals showing twinning and cleavage. Veins representing fracture-lines are seen to traverse the rock in various directions, but occasionally in parallel groups, and are filled with clear calcite. Isolated fragments of the *Tetradium* coenenchyma are scattered through the matrix, as though disturbance had taken place during the period of sedimentation and consolidation. The fracture-lines are, of course, subsequent to consolidation, and point to slow earth-movements affecting the mass of the limestone. The fracture-lines are even later than the dolomitization, as the veins are seen to cut through the dolomite crystals in places. Ostracoda and

<sup>(5)</sup> This work is not in any Melbourne library.

gasteropod fragments were noticed in sections of the limestone. The specimens examined formed part of a reef limestone, which has been rendered dark and slightly bituminous by the organic remains entombed within. It emits a fetid odour when struck with the hammer.

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### EXPLANATION OF PLATE.

- FIG. 1.—*Tetradium tasmaniense*, sp. nov. Horizontal section across corallum, showing five corallites. Cotype. Upper Ordovician or basal Silurian. Smelters-road, Zeehan, Tasmania. X. 13.
- FIG. 2.—*T. tasmaniense*, sp. nov. Vertical section of corallum, showing expanse of about two corallites. On the left the double undulate wall indicates coenenchymal gemmation. The tabulae are perfect or imperfect, and oblique, curved or straight. Cotype. Same locality. X. 13.
- FIG. 3.—*T. tasmaniense*, sp. nov. A restored hypothetical representation of the corallum, based on a fragmentary specimen seen in a sliced sample of limestone. Same locality. Natural size.