

COMMONWEALTH OF AUSTRALIA

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**PROTOCHARA, A NEW GENUS OF CHARACEAE FROM
WESTERN AUSTRALIA**

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By H. B. S. WOMERSLEY and I. L. OPHEL *

[Read 13 November 1947]

During a post-session excursion following the 1947 Australasian Science Congress in Perth, a remarkable number of the Characeae was collected by the first author from a small, shallow swamp on top of the peneplain of the "break-away" country above the Irwin River, near Minginew, Western Australia. The habit of the plant, and the enormous size of the cells, was unlike any of the Characeae commonly found in such localities. Most striking, however, was the complete absence of stipulodes, bract-cells and bracteoles, a characteristic of no previously described genus of Characeae.

Nandor Filarski (1937) described (in a Hungarian journal) two Western Australian Charophytes from specimens sent to him by G. O. Allen. These specimens were from the collection of J. Groves at the British Museum, and had been collected originally by Miss N. T. Burbidge. Filarski founded a new genus, *Charina*, on one of these specimens, although he had no fertile material. (See later notes.) The other specimen he referred to *Nitellopsis* as *N. inflata* Filarski and Allen. Unfortunately, it has not been possible to examine material of *N. inflata*, as no specimens exist in Australian herbaria, and Filarski's figures (reproduced in fig. 2) are inadequate in many details. From Filarski's figures, however, *N. inflata* appears to be closely related to our own species, also showing complete lack of stipulodes, bract-cells and bracteoles, but differing in several important details (see later).

It is therefore proposed to find a new genus, *Protochara*, with *P. australis* n. sp. as the type, and to transfer *N. inflata* to this genus as *P. inflata* (Fil. and Allen) comb. nov.

Protochara australis n. sp.

Plant dioecious, totally ecorticate, to 10 cm. high, light green in colour, with no calcareous incrustation; attached by branched, colourless, several-celled rhizoids (fig. 1 B). Stem stout, simple or with a few axillary branches, bearing 4 to 7 whorls of branchlets; stem internodes 1 to 3 cm. long, 0.9-1.5 mm. thick. Branchlets stout, slightly incurved, in whorls of 4 to 7, of 3 or 4 segments; terminal segment consisting of a small mucronate cell, 110-200 μ long, ringed at the base by 5 or 6 peripheral nodal cells (fig. 1 D); subterminal segment large, 2-3 mm. long, 1-1 $\frac{1}{4}$ mm. broad, asymmetrically inflated with the inflated side distant from the stem (fig. 1 A, B, D); intermediate segments $\frac{1}{2}$ -1 cm. long, almost as thick as the stem, slightly inflated when young. Nodes consisting of 10 to 12 peripheral cells surrounding a plate of inner cells (fig. 1 C, D, G). Stipulodes, bract-cells and bracteoles completely absent. Chloroplasts minute, forming vertical series in the cells (fig. 1 C).

Oogonia verticillate in the axils of the upper whorls of branchlets, or borne singly or geminately at the nodes of upper branchlets (fig. 1 A); each oogonium arising from a separate peripheral cell of a node. Mature oogonia (fig. 1 A, E) ovoid-cylindrical, 760-940 μ long, 600-780 μ wide; corona about 75 μ high, 225 μ broad, of 5 small mucronate cells, thickened at the apices; spiral cells showing 6 or 7 convolutions, each cell encircling the oospore slightly more than once. Oospore black, cylindrical-oblong when ripe, 490-560 μ long, 310-390 μ broad, showing 4 or 5 ridges (fig. 1 E, F).

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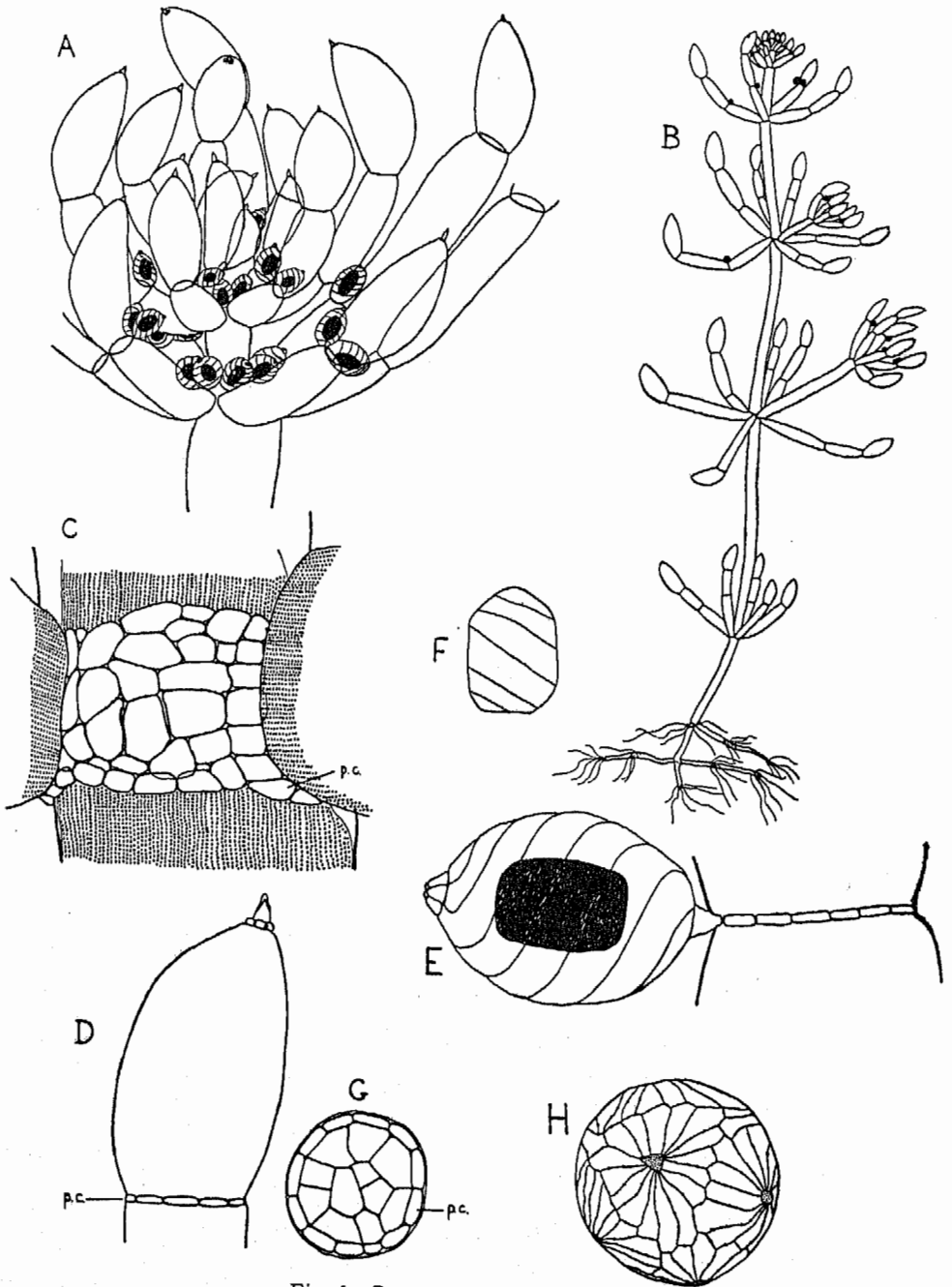


Fig. 1 *Protochara australis* n. sp.
 A, Apex of branch of a female plant, showing branch arrangement and position of oogonia. B, Antheridial plant showing general habit (natural size). C, Appearance of nodal cells with a branchlet removed, the main stem being vertical, and with longitudinal rows of chloroplasts in the cells. D, Terminal mucronate cell and subterminal inflated cell of a branchlet, showing the peripheral cells of the nodes. E, Mature oogonium attached to peripheral cell of a node. F, Oospore with spiral ridges (not quite mature). G, Section of node of a branchlet, showing arrangement of central and peripheral cells. H, Antheridium. p.c., peripheral cells of node. (All drawings by camera lucida.)

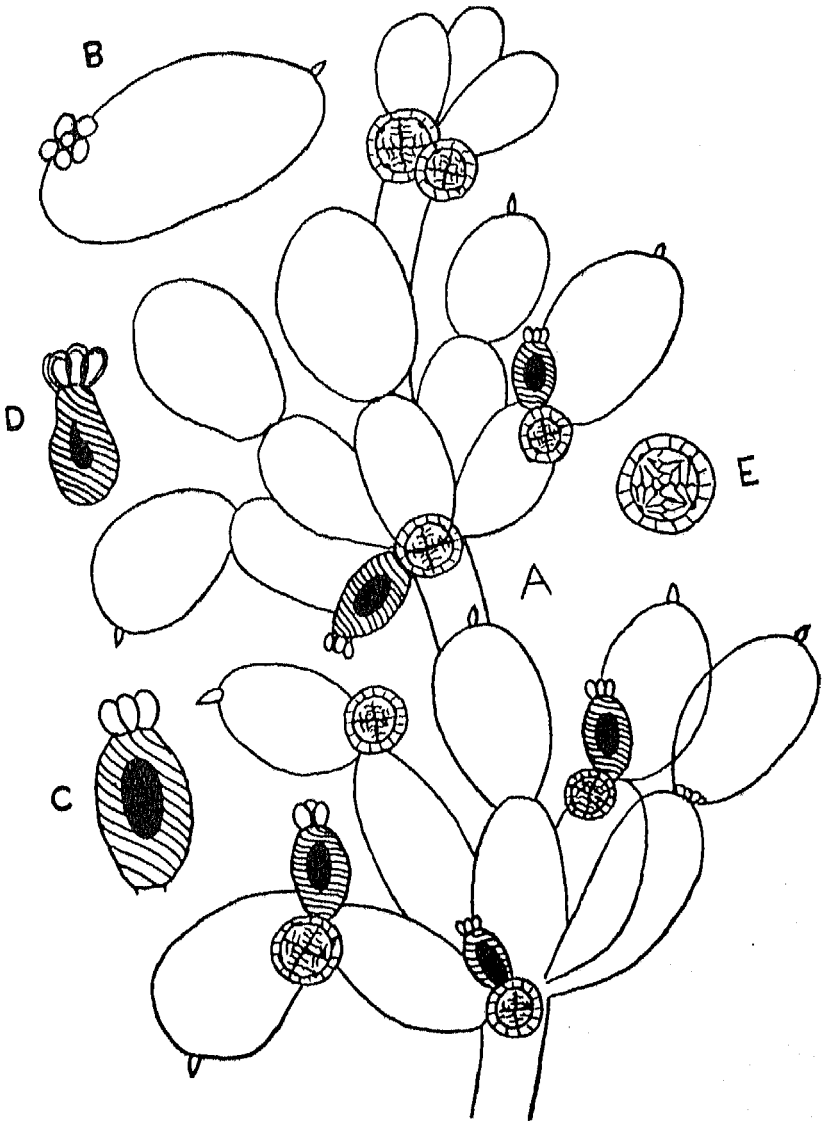


Fig. 2 *Protochara inflata* (Filarski and Allen) comb. nov.

A, Part of a plant showing the whorls of branchlets, together with oogonia and antheridia. B, End segment of a branchlet, showing the mucro and basal cells of the node. C, Mature oogonium. D, Misshapen oogonium. E, Antheridium. (After Filarski.)

Antheridia borne similarly to the oogonia, octoscutate, 800-1,150 μ in diameter.

As far as could be ascertained from limited material, the structure and development of vegetative parts and sexual organs agrees with that described for the Characeae by Fritsch (1935).

Habitat—In swampy areas of shallow water (10-40 cm. deep) on top of the peneplain of the "breakaway" country between Mingenew (about 15 miles from Mingenew) and the Irwin River coal seam, south-east of Geraldton, Western Australia.

Collected—28 August 1947.

From the same locality *Lamprothamnion macropogon* (Braun) Ophel comb. nov.,⁽¹⁾ and *Nitella gelatinosa* Braun were collected.

The type specimen (No. A 5,917 a) has been deposited in the herbarium of the Botany Department, University of Adelaide. Cotype specimens have been sent to the Herbarium of the Botany Department, University of Western Australia, and to the Herbarium of the Royal Botanic Gardens, Kew, England.

PROTOCHARA INFLATA (Filarski and Allen) comb. nov.

The following description of this species (as *Nitellopsis inflata*) is given by Filarski.

Plantulae monoicae omnino ecorticatae. Folia in verticillis 4-6, uniarticulata, segmentum ultimum bicellulare, cellula ejus infima ut articulus unicus maxime inflata, ellipsoidea aut globosa-doliiformis, articulo aequilonga, cacumine mucrone minima acuta praedita. Foliola in nodo folii unico paucicellulari inevoluta, aut in nodo numeris 3-4 evoluta, papillaeformia, minima ventralia (anteriora). Corona stipularis in fundo verticillorum foliorum nusquam evoluta. Oogonia solitaria aut bina nodo folii et basi foliorum orta; coronula oogonii e cellularum majorum verticillo pentamero unico; antheridia oogonis majora solitaria aut pluralia, hypogyna, in verticillis superioribus plerumque tantum modo evoluta. Plantulae propter folia maxime tumida, inflata, habitu eximie differunt a Characeis ceteris; tantum *Nitellam praeclaram* Groves et Steph., plantulas Africanas juxta oppidum <Cape Town> crescentes quodammodo in mentem revocant praecipue propter cellulas nonnulas internodii foliorum interdum similiter valde tumidas, fere globosas, sed folia loco mucronis corona minutissima foliolis 3 composita praedito).

Habitat—The following locality notes, given by Miss N. T. Burbidge, apply to both *P. inflata* and *Charina verticillata* (see later).

The specimens were collected from shallow water in Lake Parkeyerring, about 5 miles south of Wagin, Western Australia. The water of the lake is brackish, especially in a dry season. Collection dates given by Filarski are X. 1933 for *P. inflata* and 5-6-35? for *Charina verticillata*. On later visits Miss Burbidge was unable to find further specimens.

Filarski's figures of this species are reproduced as outline tracings in fig. 2. Details of nodal cells and antheridia are very indistinct in the original figure.

The habit of *P. inflata* is very like that of *P. australis*, as will be seen from a comparison of fig. 1 and 2. Both species show simple, whorled branchlets, large, often inflated cells, and complete absence of stipulodes, bract-cells and bracteoles. The position of the sex organs is similar in both species, and neither species shows any development of cortical cells. The species may be distinguished as follows:

1. *P. australis* is dioecious, *P. inflata* monoecious.
2. Coronal cells of the oogonium are small in *P. australis*, large and conspicuous in *P. inflata*. *P. australis* shows 6 or 7 convolutions of the spiral cells, *P. inflata* 14 or 15.
3. The sub-terminal internodal cells of the branchlets of *P. australis* show more pronounced asymmetry, and the lower cells are less inflated than in *P. inflata*.

Filarski states in his description of *P. inflata* that the antheridia are situated below the oogonia, but his figures (see fig. 2 A) show some below and some alongside the oogonia. He also describes the ultimate branch segments as bicellular, the

⁽¹⁾ See Ophel: Notes on the Genera *Lychnothamnus* and *Lamprothamnium*. Trans. Roy. Soc. S. Aust., 71, (2), 318.

terminal cell being small and mucronate. In *P. australis* a distinct ring of nodal cells occurs at the base of the terminal mucronate cell, and it seems possible, in view of the close relationship between the two species, that close examination may show this to be the case in *P. inflata*.

Why Filarski placed his plant in the genus *Nitellopsis* is not clear. The one species of *Nitellopsis* (*N. obtusa* J. Groves, from Europe) is distinguished by the presence of very long, thick "bract-cells" which arise from the nodes of the branchlets and are almost as large as the ultimate branchlet segment (Groves and Bullock-Webster 1924). "Starch stars," large, thickened, star-shaped nodes on the rhizoids are also characteristic of *N. obtusa*. The absence of bract-cells places both the Western Australian species in a distinct genus from *Nitellopsis*.

The corona of 5 cells surmounting the oogonium places *Protochara* in the tribe Chareae, as distinct from the Nitelleae which have a corona of 10 cells. It is necessary, however, to modify the description of the Chareae given by Groves and Bullock-Webster (1924) and Groves and Allen (1934), in that the branchlets usually produce bract-cells at their nodes, but not in *Protochara*.

The relationship of the genera of the Chareae, including *Protochara*, is given in the following synopsis (modified from Groves and Bullock-Webster).

- | | |
|---|------------------------------------|
| 1. Stipulodes and bracteoles absent. | |
| 2. Bract cells absent. Branchlets of 3 or 4 segments | <i>Protochara</i> n. gen. |
| 2. Bract-cells 1-2, very long. Branchlets of 2-3 very long segments | <i>Nitellopsis</i> Hy. |
| 1. Stipulodes always present, sometimes rudimentary. Branchlets simple, of 4 or more segments. Bract-cells normally 4 or more. | |
| 3. Oogonia and antheridia produced from separate peripheral cells of the node ^(*) (i.e., situated side by side). Stem corticate | <i>Lychnothamnus</i>
Leonhardi |
| 3. Oogonia and antheridia produced from the same peripheral cell of the node. | |
| 4. Oogonium normally situated below the antheridium
Stem ecorticate | <i>Lamprothamnium</i>
J. Groves |
| 4. Oogonia situated above the antheridium. Stem corticate or ecorticate | <i>Chara</i> L. |

The genera of the Chareae form an evolutionary sequence with *Protochara* as the most primitive, showing an advance in vegetative construction through *Nitellopsis*, where only bract cells occur, to *Lamprothamnium*, *Lychnothamnus* (which possesses a rudimentary cortex) and *Chara*, where bract-cells, bracteoles and stipulodes occur. The Diplostephanae-triplostichae section of *Chara* represents the culmination of the evolutionary series, showing complete 3-ranked cortication and two well developed whorls of stipulodes.

The tribe Nitelleae is best considered as a separate evolutionary series parallel to the Chareae. No genus so far described provides a satisfactory link between the two tribes.

Besides the absence of stipulodes, bract-cells and bracteoles, *Protochara* shows another primitive character in the small number of convolutions (5 or 6) of the spiral cells of the oogonium of *P. australis*. The oogonium of *P. inflata*, however, shows 14 or 15 convolutions, and must be considered less primitive than *P. australis*. According to Groves and Bullock-Webster (1924) *Nitellopsis*

(*) See Ophel, loc. cit.

obtusa shows about 9 convolutions, whereas most species of *Chara* show more than 12. Fossil oogonia attributed to Characeae, judging from figures given by Groves and Bullock-Webster, commonly show a relatively small number of convolutions (as low as 5 or 6).

The relatively few segments to the branchlets, and the general simplicity of the thallus, also point to the primitive nature of *Protochara*.

The naming of most fossil Characeous remains (usually oogonia), as species of *Chara*, makes *Chara* in this sense a very much wider genus than the *Chara* of living species. It is quite likely that fossil remnants would prove to belong to *Protochara* if thallus structure were better preserved.

It is evident that *Protochara* is the most primitive genus yet described of present-day Characeae, and appears to be more primitive than any genus of the Nitelleae. The general habit of the plant, however, consists of the stem with whorled branchlets that is so typical of the group as a whole, and the oogonia and antheridia are of the highly specialized type common to all species. The relationship and position of the Characeae amongst other plants remains as obscure as ever.

LATIN DIAGNOSES

PROTOCHARA n. gen.

Plantulae omnino ecorticatae. Stipulodae, bractae-cellulae et bracteolae omnino absentia. Monoecae aut dioecae, oogonia et antheridia a nodi perimetrotis cellulis orta. 5 cellularum corona.

Protochara australis n. sp.

Plantulae dioecae, omnino ecorticatae, usque ad 10 cm. alta, subvirides, non incrustatae; radiculae ramulis et multicellulariae. Caulis crassus, simplex aut ramulorum verticillis 4-7; internodia caulis 1-3 cm. longa, 0.9-1.5 mm. lata. Ramulae crassae paucis incurvatae, in verticillis 4-7, quisque articularum 3-4; segmentum mucroniformis ultimum longum 110-200 μ , perimetrotis nodi cellulis 5-6 in fundo; segmentum subultimum magnum non aequaliter inflatum; segmenta inferiora longa $\frac{1}{2}$ -1 cm., lata $\frac{3}{4}$ -1 $\frac{1}{4}$ mm. Nodi perimetrotis cellulis 10-12. Stipulodae, bractae-cellulae et bracteolae omnino absentia.

Oogonia in superiorum verticillorum ramulorum axillibus verticillata, solitaria aut bina nodis ramulorum; a perimetrotis cellulis propriis orta. Oogonia oviformia-cylindriformia longa 760-940 μ , lata 600-780 μ ; corona oogonii alta circiter 75 μ , lata 225 μ , composita cellularum 5 parvarum mucroniformium; cellulae spirilles convolutis 6-7. Oospora nigra, cylindriformia-oblongata, longa 490-560 μ , lata 310-390 μ , rugis 4-5.

Antheridia modo oogoniorum simili orta, octoscutata, diam. 1,150 μ .

NOTES ON FILARSKI'S GENUS CHARINA

In the same paper as *Nitellopsis inflata* was described, Filarski founded a genus *Charina*, based on the one species *C. verticillata* Fil. and Allen, from Wagin, Western Australia. None of the specimens on which the genus was named was fertile.

Filarski's reasons for founding a new genus are not clear, but were apparently based on the vegetative form of the plant. His figures show a slender, verticillately branched plant bearing numerous whorled, 2-celled dactyls. The occurrence of two- (sometimes more, rarely one) celled dactyls such as these on the branchlets is a characteristic feature of the Nitelleae, as distinct from the

Chareae which bear only one-celled bracteoles on the branchlets. Filarski laid considerable stress on the apparent dimorphism shown by different branches (or plants?) of *Charina*; some branches bore only one-celled, blunt-ended, dactyls instead of the two-celled, mucronate type. A feature of some species of *Nitella*, however, is that the terminal cell of the dactyl is often deciduous, and this is probably the reason for the apparent dimorphism stressed by Filarski.

From the figures given, the general appearance of the plant and its vegetative construction offer no feature to exclude it from the genus *Nitella*. In fact, Filarski adds a note that J. Groves had suggested the plant was close to *Nitella subtilissima* Braun, and in the absence of fruiting material the naming of a new genus was hardly justified. Fertile material must be collected to prove whether *Charina* can be retained or not, and it is to be hoped that both this species and *Protochara inflata* will be rediscovered by Western Australian collectors.

ACKNOWLEDGMENTS

The authors are indebted to Miss N. T. Burbidge for information on the locality where she collected *P. inflata* and *Charina verticillata*. Mr. G. G. Smith, Department of Botany, Western Australia, also collected some of the material of *P. australis*.

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3b. MARINE ALGAE

By H. B. S. WOMERSLEY*

The collection of marine algae listed below was made by Mr. J. H. Willis, Botanist on the 1950 Australian Geographical Society expedition to the Recherche Archipelago, during November 1950. Apart from a few specimens from rock pools, all were collected from the drift. A small collection from near Israelite Bay, on the mainland, is also included.

This list, as far as I am aware, provides the first records of marine algae from the Recherche Archipelago, and although the collection is a small one it does widen our knowledge of the distribution of several southern Australian species. The following species were previously known only from the eastern half of the southern Australian region: *Sphaelaria biradiata*, *Polycyrea nigrescens*, *Sargassum cristatum*, *Corallina pilifera*, *Jania natalensis*, *Melobesia cymadoceae*, *Neomonospora elongata* and *Polysiphonia dasyoides*. These are listed with prefixing sign †.

The following species, *Carpoglossum quercifolium*, *Cystophora browii*, *Cystophora pectinata*, *Carpogeltis elata* and *Laurencia cruciata* are of Western Australian affinities, while the remainder are either generally distributed around southern Australia or are cosmopolitan.

Specimens of all species have been deposited in the Algal Herbarium of the Department of Botany, University of Adelaide. Some duplicates have been deposited in the National Herbarium, Melbourne.

The classification below is that used by Womersley 1950, where additional references will also be found. To avoid redundancy, the word "Island" has been deleted from all citations of Figure-of-Eight and North Twin Peaks Islands.

CHLOROPHYTA

ULVALES

ULVACEÆ

Ulva lactuca L. *Sitchell & Gardner* 1920, 265. *Smith* 1944, 45-265—Figure-of-Eight. A few small specimens of forma *rigida*.

Blidingia minima (Kütz.) *Kylin* 1949, 30. *Enteromorpha minima* *Kütz.* *Bliding* 1938, 84—Shallow pools, Combe Island. Larger specimen than normal (to 4 or 5 cm. high), with a very few branches, and agreeing well in cell structure with this species.

CLADOPHORALES

CLADOPHORACEÆ

Cladophora valonioides *Sonder*. *Harvey* 1859, pl. 78—Pt. Malcolm, south-west of Israelite Bay.

SIPHONOCLADALES

VALONIACEÆ

Dietyosphaeria sericea *Harvey* 1860b, 339, pl. 196A—Limestone Bay, Middle Island (south-eastern sector).

SIPHONALES

CODIACEÆ

Codium mamillosum *Harvey* 1858, pl. 41—North Twin Peaks.

Codium muelleri *Kütz.* 1856, 34, t. 95, f. 2. *Womersley* 1950, 145—Israelite Bay.

PHAEOPHYTA

SPHACELARIALES

SPHACELARIACEÆ

† *Sphaelaria biradiata* *Askenasy* 1894, 15, pl. 2, f. 12. *Sauvageau* 1914, 163-166—Figure-of-Eight, on *Cystophora*.

DICTYOTALES

DICTYOTACEÆ

Dictyota furcellata *Agardh*. *J. Agardh* 1848, 90. *De Toni* 1895, 280. *Womersley* 1950, 150—Goose Island.

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- Pachydictyon furcellatum* (Harvey) J. Agardh 1894a, 83. *Dictyota furcellata* Harvey 1858, pl. 38. *Womersley* 1950, 151—North Twin Peaks.
Pachydictyon paniculatum J. Agardh 1894a, 84. *De Toni* 1895, 283—Figure-of-Eight.
Lobosiphia bicuspidata Areschoug. Harvey 1858, pl. 34—Goose Island.
Pocockiella nigrescens (Sonder) Papenfuss 1943, 467, f. 15—Goose Island. I am very doubtful whether this species is specifically distinct from *P. variegata*. The differences lie in the darker colour (usually black when dried) and more erect, branched fronds of *P. nigrescens*, but both these characters are rather variable.
Pocockiella variegata (Lamx.) Papenfuss 1943, 467, f. 1-14—Combe Island.
Zonaria spiralis (J. Agardh) Papenfuss 1944, 341. *Homocostrichus spiralis* J. Agardh 1894b, 89—Figure-of-Eight.

CHORDARIALES

CHORDARIACEÆ

- † *Polycyrea nigrescens* (Harvey) Kylin 1940, 36, f. 20 A-B; t. 7, f. 16—Goose Island and North Twin Peaks.

DICTYOSIPHONALES

PUNCTARIACEÆ

- Asperococcus bullosus* Lamx. Newton 1931, 172, f. 107—North Twin Peaks, on *Posidonia*.
Hydroclathrus clathratus Bory. Setchell & Gardner 1925, 543. *H. cancellatus*, Harvey 1859, pl. 98—North Twin Peaks.

LAMINARIALES

ALARIACEÆ

- Ecklonia radiata* (Ag.) J. Agardh. Lucas 1936, 95, f. 52. *Womersley* 1950, 157—Figure-of-Eight and North Twin Peaks.

FUCALES

NOTHEIACEÆ

- Hormosira banksii* (Turn.) Dcne. Harvey 1860a, pl. 135—Figure-of-Eight and North Twin Peaks.

FUCACEÆ

- Scytothalia dorycarpa* (Turn.) Greville. Harvey 1858, pl. 9—Figure-of-Eight.
Carpoglossum quercifolium (R. Br.) J. Agardh. Harvey 1858, pl. 43—Figure-of-Eight and Cave Islet (in rock pool).
Cystophora brownii (Turn.) J. Agardh. Harvey 1860a, pl. 169—Figure-of-Eight.
Cystophora grevillei (Ag.) J. Agardh. Harvey 1862, pl. 183—Pt. Malcolm, south-west of Israelite Bay.
Cystophora monilifera J. Agardh. Harvey 1863, pl. 245—Figure-of-Eight.
Cystophora pectinata (Grev. & Ag.) J. Agardh. Lucas 1936, 71. *Kützing* 1860, t. 74, f. 2—Figure-of-Eight.
Cystophora retorta (Mert.) J. Agardh 1848, 243. Lucas 1936, 72—Goose Island.
Cystophora subfarinata (Mert.) J. Agardh 1848, 240. Lucas 1936, 74—North Twin Peaks.
Cystophyllum muricatum (Turn.) J. Agardh? *De Toni* 1895, 154. Lucas 1936, 74—Cave Islet (in rock pool). A stunted, sterile specimen, lacking vesicles.
Sargassum bifforme Sonder? J. Agardh 1889, 75, pl. 23, f. 3. Lucas 1936, 67—Figure-of-Eight.
† *Sargassum cristatum* J. Agardh 1889, 84, pl. 25, f. 5. Lucas 1936, 67—Pt. Malcolm, south-west of Israelite Bay.
Sargassum merrielfieldii J. Agardh 1889, 115, pl. 30, f. 4. Lucas 1936, 68—Figure-of-Eight. Insufficient material for a firm determination.
Sargassum varians Sonder. J. Agardh 1889, 49, pl. 16, f. 1-8. Lucas 1936, 64—Figure-of-Eight.
Sargassum verruculosum (Mert.) Agardh. J. Agardh 1889, 53, pl. 18. *Sargassum raoulii*, Harvey 1859, pl. 110—Figure-of-Eight.
Scaberia agardhii Greville. Harvey 1860a, pl. 164. Lucas 1936, 76—Figure-of-Eight and North Twin Peaks.

RHODOPHYTA

CRYPTONEMIALES

CORALLINACEÆ

- Corallina cuvieri* Lamx., var. *crispata* (Lamx.) Areschoug. Harvey 1847, 106. Lucas & Perrin 1947, 399. *Womersley* 1950, 166—Limestone Bay, Middle Island (south-eastern sector) and Goose Island.
† *Corallina pilifera* Lamx. *Kützing* 1858, t. 74, c-d. Lucas & Perrin 1947, 400—Figure-of-Eight and North Twin Peaks.
Jania micrarthrobia Lamx. Lucas & Perrin 1947, 397—North Twin Peaks and Goose Island.
† *Jania natalensis* Harvey 1847, 107. *Kützing* 1858, t. 79, II—Figure-of-Eight.

CORALLINACEÆ (contd.)

- Metagoniolithon charoides* (Lamx.) W. V. Bosse. *Amphiroa charoides*, Harvey 1847, 96, pl. 39—Figure-of-Eight, Goose and Middle Islands (at Limestone Bay).
Metagoniolithon stelligera (Lamx.) W. V. Bosse. *Amphiroa stelligera*, Harvey 1862, pl. 230—Figure-of-Eight, North Twin Peaks and Goose Island.
Metamastophora flabellata (Sonder) Setchell. *Womersley* 1950, 167. *Mastophora flabellata* Harvey 1847, 108—Figure-of-Eight and Goose Island.
† *Melobesia cymodoceæ* Foslie. *De Toni* 1905, 1767—On *Cymodocea* antarctica. Figure-of-Eight, North Twin Peaks and Goose Island.

GRATELOUPIACEÆ

- Carpopeltis elata* (Harvey) Schmitz. *Acropeltis elata* Harvey 1860a, pl. 122—Figure-of-Eight and North Twin Peaks.

GIGARTINALES

PLOCAMIACEÆ

- Plocamium nidificum* (Harvey) J. Agardh 1876, 346. *Lucas & Perrin* 1947, 213—Figure-of-Eight.

SOLIERIACEÆ

- Solieria robusta* (Grev.) Kylin 1932, 18. *Solieria australis* Harvey 1860a, pl. 149—Pt. Malcolm, south-west of Israelite Bay.

RHABDONIACEÆ

- Rhabdonia coccinea* Harvey 1858, pl. 54. *Lucas & Perrin* 1947, 171, f. 42—Pt. Malcolm, south-west of Israelite Bay.

HYPNEACEÆ

- Hypnea seticulosus* J. Agardh 1851, 446. *De Toni* 1900, 476—Pt. Malcolm, south-west of Israelite Bay.
Hypnea episcopalis H. & H. Harvey 1858, pl. 23. *Lucas & Perrin* 1947, 191, f. 58—Figure-of-Eight.

DICRANEMACEÆ

- Dicranema grevillei* Sonder. Harvey 1859, pl. 120. *Lucas & Perrin* 1947, 157, f. 29—North Twin Peaks.

RHODYMENIALES

RHODYMENIACEÆ

- Botryocladia obovata* (Sonder) Kylin. *Chrysymenia obovata*, Harvey 1858, pl. 10. *Lucas & Perrin* 1947, 203, f. 67—Goose Island.

CERAMIALES

CERAMIACEÆ

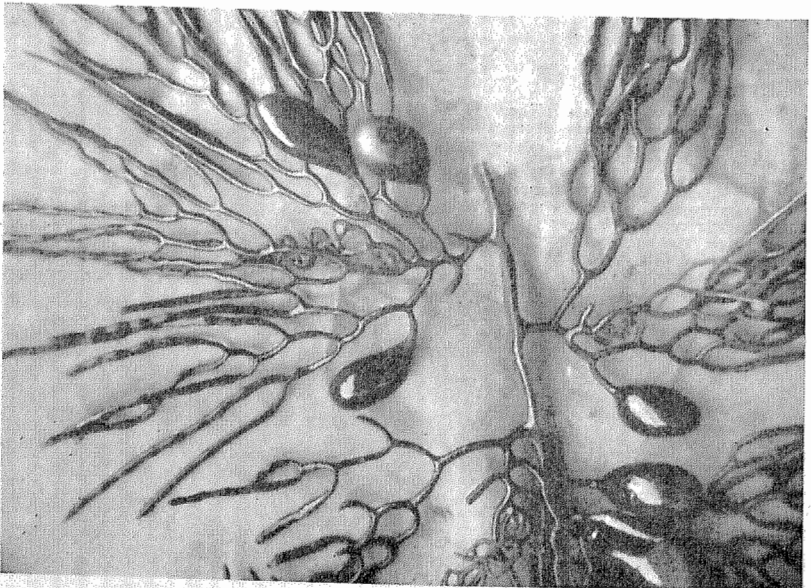
- † *Neomonospora elongata* (Harvey) *Womersley* 1950, 177—Cave Islet, on *Cystophyllum*.
Wrangelia myriophylloides Harvey 1862, pl. 224—North Twin Peaks.

RHODOMELACEÆ

- † *Polysiphonia dasyoides* Zanardini. *Lucas & Perrin* 1947, 266. *Womersley* 1950, 184—Figure-of-Eight (on *Hormosira*) and Cave Islet.
Laurencia cruciata Harvey 1854, 544. *Yamada* 1931, 198, pl. 5a, f. E.—Goose Island. A single specimen, of the *Palisadae* group, which agrees reasonably well with *Yamada's* figure of this species.
Laurencia forsteri (Mert.) *Greville*? *Kützing* 1865, t. 47, d, e. *Yamada* 1931, 213, pl. 13a—Figure-of-Eight. Two specimens which seem to be a slender form of *L. forsteri*, although lenticular thickenings are very few, if any, in the cells.

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Cystophora retorta (Mert.) J. Ag.—a brown seaweed,
 seldom bearing vesicles.

Photo: R. D. Lee (material from Sorrento, Vic.)