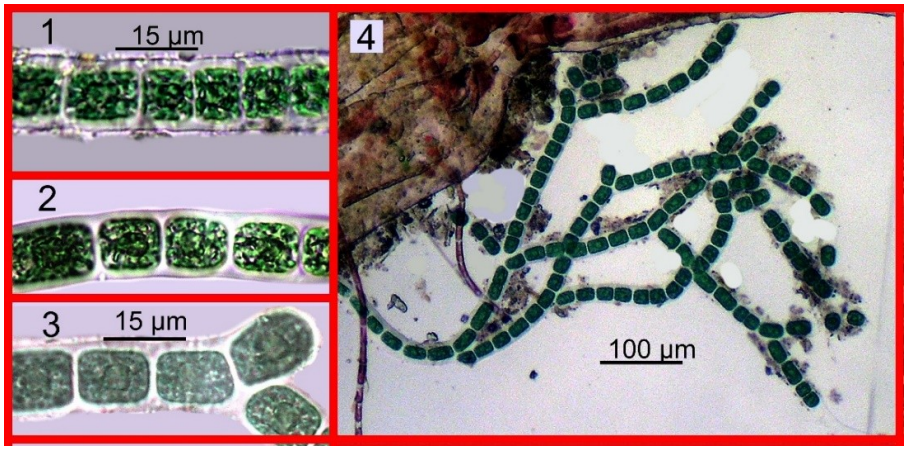
Supplementary. Epiphytic algae widespread in the South China and East China seas (Ch, Chlprophyta; He, Heterokontophyta; Rh, Rhodophyta)

Phylum RHODOPHYTA

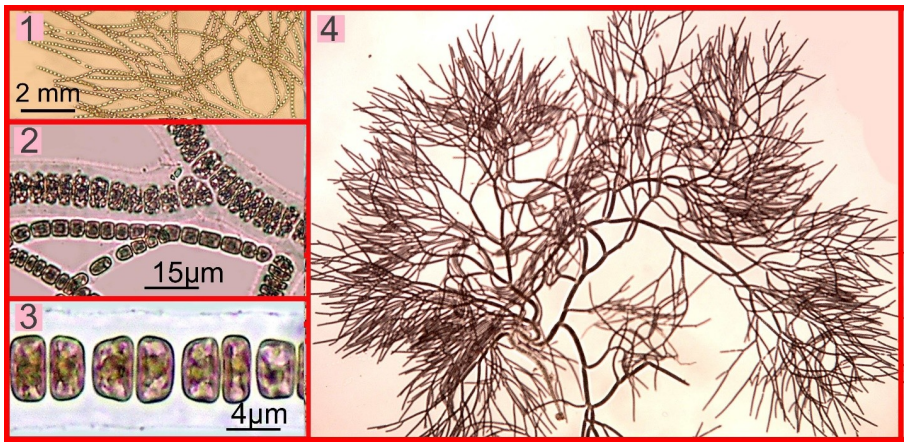
Class **Stylonematophyceae**
Order **Stylonematales**
Family **Stylonemataceae**
Chroodactylon ornatum (C. Agardh) Basson



1, 2, 3, enlarged fragments showing cells with stellate chloroplasts containing a central pyrenoid.
4, habit, epiphytic on *Herposiphonia tenella*

Thallus microscopic, filamentous, in tufts, 0.2–1.0 mm high. Filaments uniseriate, simple or sparsely branched. Branching irregularly alternate or subdichotomous. Filaments 10–20 µm in diameter, composed of cylindrical to ovoid cells embedded in a mucilaginous sheath. Cells (6–)10 µm in diameter, 7.5–15 µm long at the basal portion, 10 µm in diameter, 10–20(–30) µm long above, bright bluish-green, grayish to brownish. Chloroplast stellate, with a central pyrenoid. Reproduction by akinetes transformed from cells of filaments. Attachment by an inconspicuous basal cell. Found grown epiphytically on *Cladophora socialis*, *C. laetevirens*, *Dictyosphaeria cavernosa*, *Parvocaulis exiguus* (Ch), *Dictyota bartayresiana*, *Sargassum polycystum* (He), *Ceramium marshallense*, *Ceratodictyon intricatum*, *Chondria armata*, *Gayliella flaccida*, and *Gelidium pusillum* (Rh), as well as on dead coral fragments.

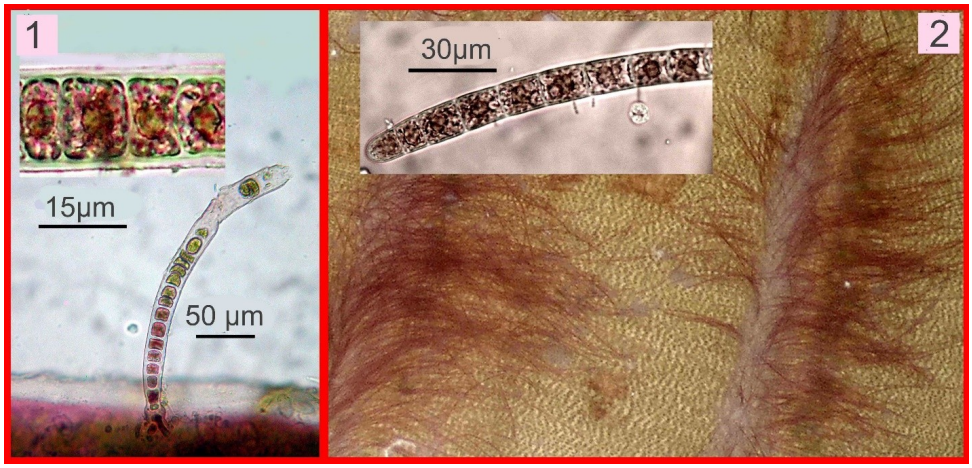
Stylonema alsidii (Zanardini) K. M. Drew



1, fragment.
2, 3, details showing cells with stellate chloroplast containing a central pyrenoid.
4, habit

Thallus microscopic, filamentous, 0.1–4(–6) mm high, pinkish- to purplish-red, branching irregular, alternate to pseudodichotomous with wide axils. Filaments 12–25(–30) µm in diameter, consist of uniseriate rows of closely adjacent shortly cylindrical or spherical cells embedded in a thick mucilaginous sheath. Cells in surface view rectangular, quadrate, visibly shortened, with round or angular corners, (5.5–)7–13 µm in diameter, 4–16 µm long. Chloroplasts stellate, with a central pyrenoid. Attachment by basal thickened cell. Noted growing epiphytically on *Anadyomene wrightii*, *Bryopsis pennata*, *Cladophora* spp., *Codium repens*, *Dictyosphaeria cavernosa* (Ch), *Canistrocarpus cervicornis*, *Feldmannia mitchelliae*, *Padina australis*, *Sargassum* spp., *Sphacelaria* spp., *Turbinaria ornata* (He), *Centroceras clavulatum*, *Ceratodictyon intricatum*, *Gelidium pusillum*, *Hypnea spinella*, *Jania pumila*, *Leveillea jungermannioides*, *Melanothamnus ferulaceus*, *Parviphycus adnatus*, *Polysiphonia* spp., *Tolypiocladia condensata*, and *Vertebrata reptabunda* (Rh), as well as on dead coral fragments.

Class **Compsopogonophyceae**
Order **Erythropeltales**
Family **Erythrotrichiaceae**
Erythrotrichia carnea (Dillwyn) J. Agardh

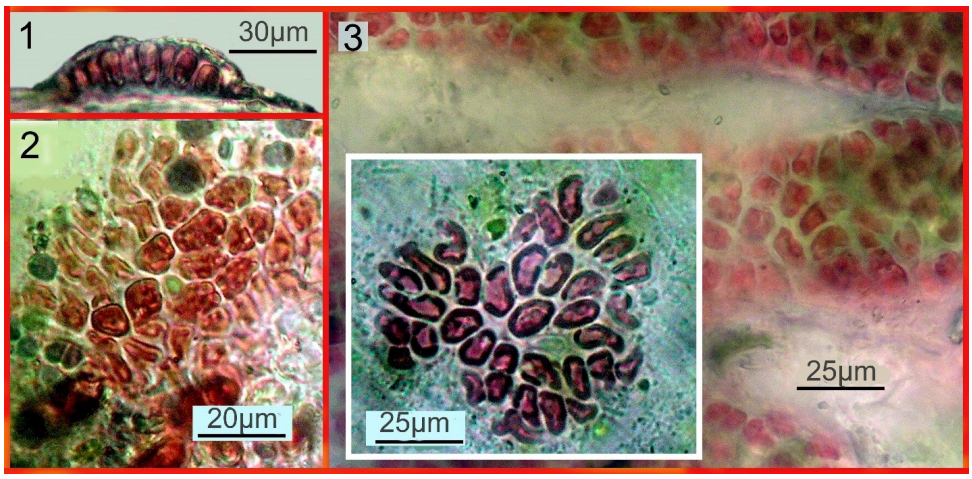


1, 2, habit, on *Padina australis*.

Inserts:
details showing cells with stellate chloroplasts containing a large pyrenoid

Thallus erect, 0.5–5(–8) mm high, fine filamentous. Filaments simple, unbranched, cylindrical, uniseriate, 10–20(–27) µm in diameter, rose-red. Cells quadrangular to roundish rectangular, 0.5–2 diameters long. Cell walls thin, gelatinous. Chloroplast stellate, with a central pyrenoid. Monosporangia develop in the upper portion of filaments. Attachment by a single, lobed extension of a basal cell. Commonly epiphytic on *Caulerpa serrulata*, *C. sertularioides*, *Halimeda cuneata*, *Parvocaulis exiguus*, *Phyllodictyon anastomosans*, *Valoniopsis pachynema* (Ch), *Dictyota bartayresiana*, *Padina* spp., *Sphacelaria rigidula*, *Sargassum aquifolium*, *S. polycystum* (He), *Actinotrichia fragilis*, *Bostrychia binderi*, *Centroceras minutum*, *Ceramium macilentum*, *Champia parvula*, *Gelidiella acerosa*, *Hypnea spinella*, *Pterocladiella caerulescens*, and *Spyridia filamentosa* (Rh), as well as on dead coral fragments.

Erythrocladia irregularis Rosenvinge

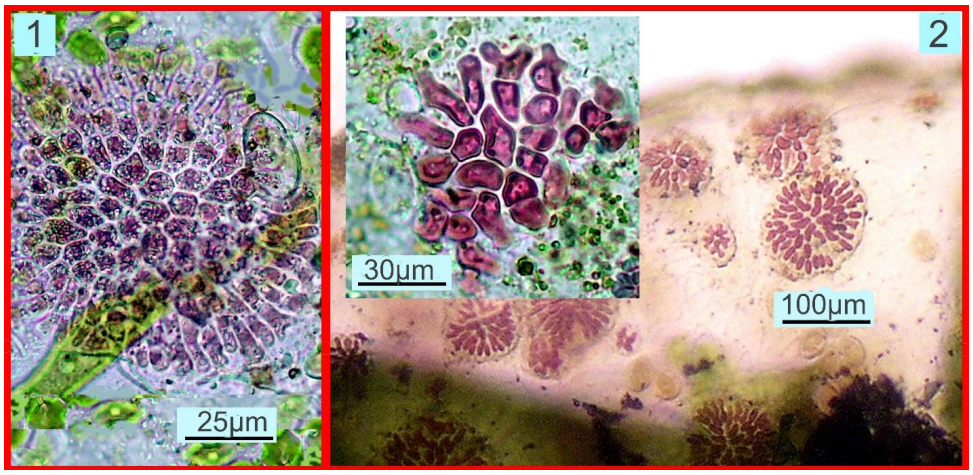


1, transverse section of a young disc.
2, 3, habit, on *Caulerpa serrulata*.

Insert:
cells in surface view

Thallus microscopic, forming an irregular disc (50–300 µm in diameter), consisting of branched filaments, tightly arranged in the inner portion and loose at the periphery. The disc monostromatic, becoming of 2–3 cells thick in central portion. Cells irregular in shape, polygonal in surface view, 1.5–6(–7.5) × 10–12.5 µm, 1–2.5 diameters long. Chloroplast blade-like, parietal with one pyrenoid. Reproduction by monospores (~ 5 µm in diameter) formed in sporangia cut off from inner cells of polystromatic portion of the disc. Commonly epiphytic on *Anadyomene wrightii*, *Caulerpa serrulata*, *Cladophora catenata*, *Phyllodictyon anastomosans* stalk, *Siphonocladus rigidus*, and *Valoniopsis pachynema* (Ch).

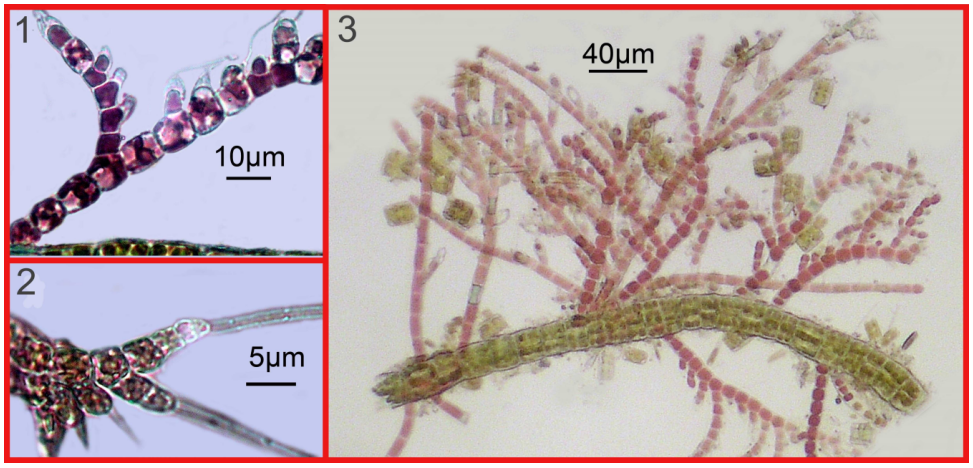
Sahlingia subintegra (Rosenvinge) Kornmann



1, adult alga epiphytic on *Phyllodictyon anastomosans* stalk.
2, young crusts.
Insert:
marginal bifurcate cells

Thallus forms monostromatic, prostrate disc with entire margins, 45–60(–300) μm across, becoming 2–3 cells thick in central portion. The disc consists of irregularly to subdichotomously branched filaments, dark rose-red to violet. Cells oblong, rectangular, irregular in young discs; polygonal, isodiametric in central portion, (2.5–)3.5–5 μm in diameter, 6–12.5 μm long in adult discs. Marginal cells bifurcate, up to 17.5 μm long. Chloroplast band- or bowl-shaped, with a single pyrenoid. Reproduction by globose monospores (up to 6 μm in diameter) forming in the middle (inner portion of the disc) by oblique divisions of vegetative cells. Commonly epiphytic on *Bryopsis australis*, *B. pennata*, *Chaetomorpha aerea*, *C. linum*, *Cladophora catenata*, *C. vagabunda*, *Cladophoropsis membranacea*, *Halimeda cuneata*, *Parvocaulis clavatus* stalk, *Phyllodictyon anastomosans* stalk, *Siphonocladus rigidus*, *Valoniopsis pachynema* (Ch), *Canistrocarpus cervicornis* (He), *Chondria repens*, *Hypnea pannosa*, *H. spinella*, *Jania adhaerens*, *J. pumila*, *Polysiphonia scopulorum*, and *Pterocladiella capillacea* (Rh), on hydroids, and sometimes on hard and smooth substrata.

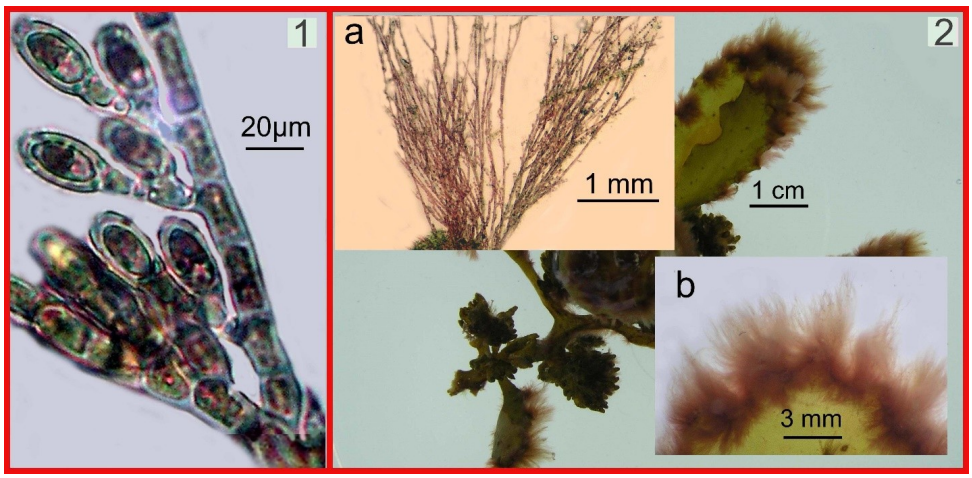
Class **Florideophyceae**
Order **Acrochaetiales**
Family **Acrochaetiaceae**
Acrochaetium microscopicum (Nägeli ex Kützing) Nägeli



1, habit showing lateral hairs.
2, upper portion with hairs.
3, plants epiphytic on *Sphacelaria novae-hollandiae*

Thallus small, microscopic, 50–200 μm high. Branches arcuate, sparse, irregular, secund, frequently terminating in colorless unicellular hairs. Cells moniliform, barrel-shaped to cylindrical, (5–)7.5–10(–13) μm in diameter, 3–10(–13) μm long, becoming smaller near apices. Chloroplast single, parietal or stellate, with one pyrenoid *per* cell. Hairs terminal, lateral, 50–100 μm long, 2.5 μm in diameter at base. Monosporangia lateral or terminal, sessile or pedicellate, ellipsoid, 4–7.5 μm in diameter, (5–)10–15 μm long, single or rarely in pairs, adaxially seriate. Spermatangia rare, in dense terminal clusters on the top of lateral branchlets. Attachment by a single basal cell, which give raise to only one erect axis. Found growing epiphytically on *Acrocladus herpesticus*, *Bryopsis pennata* (Ch), *Padina australis*, *Sphacelaria novae-hollandiae*, *S. rigidula*, *S. tribuloides* (He), *Ceramium marshallense*, *C. vagans*, *Chondria repens*, *Corallophila kleiwegii*, *Gayliella mazoyerae*, *Herposiphonia secunda*, *Hypnea pannosa*, *Melanothamnus ferulaceus*, *M. sphaerocarpus*, *Millerella pannosa*, and *Pterocladiella caerulescens* (Rh).

Order **Colaconematales**
Family **Colaconemataceae**
Colaconema daviesii (Dillwyn) Stegenga

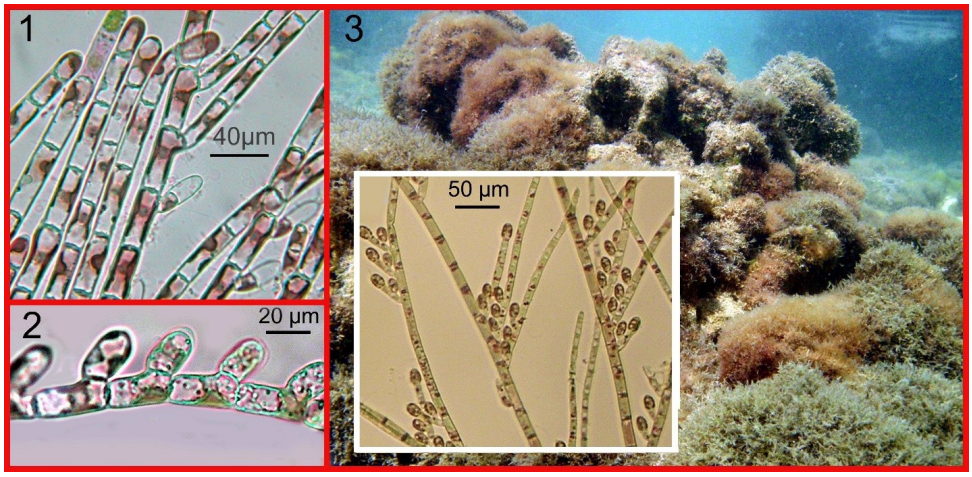


1, detail showing monosporangia.
2, plants epiphytic on *Sargassum* sp.

Inserts:
a, b, plants epiphytic on *Sargassum* phylloid margin

Thallus 0.7–1.3(–4) mm high. Erect branches arising from monostromatic disc consisting of prostrate filaments. Erect filaments 8.2–10(–13) µm in diameter. Branching dense, irregular, lateral or alternate. Cells cylindrical, 7–8(–11) µm in diameter, 1.5–4(–5.5) diameters long. Chloroplast occupy all body of cell, sometimes lobed, with one large pyrenoid. Determinate branchlets in tufts, develop laterally, alternate and in axils of indeterminate branches. Monosporangia ovoid, sessile or stalked, 8–12 µm in diameter, 14–20 µm long, develop at the base of branches or terminally on short 1–5-celled lateral (adaxial) branchlets. Colorless multicellular hairs occur on branchlets bearing sporangial clusters in axils of branches. Noted growing epiphytically on *Padina* spp. and *Sargassum* spp. (He).

Colaconema hypneae (Børgesen) A. A. Santos & C. W. N. Moura

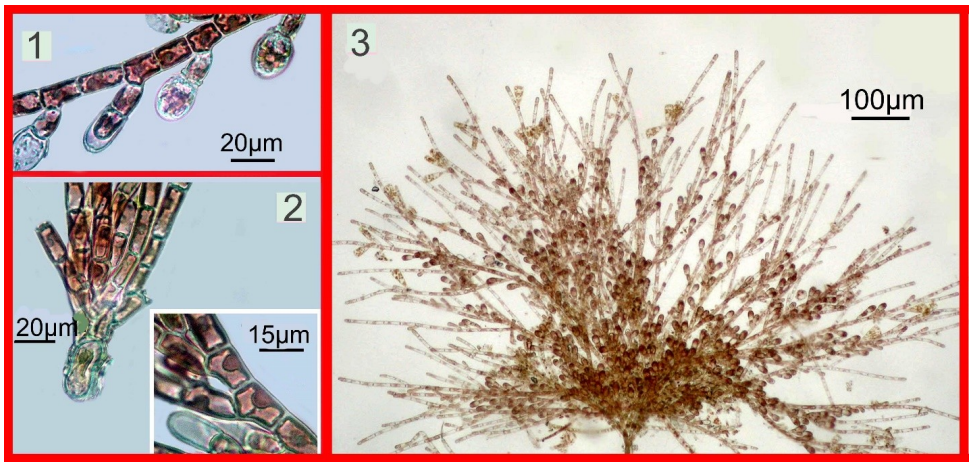


1, 2, detail showing chloroplasts with large lateral pyrenoids.
3, in habitat, epiphytic on *Gelidium pusillum*.

Insert:
fragment showing branching pattern and arrangement of monosporangia

Thallus microscopic, filamentous, in dense tufts, 0.45–1 mm high. The basal part consists of short creeping filaments forming a small disc. Branching from all sides at the lower portion and unilateral above. Filaments 11 µm in diameter at the base, gradually taper upwards, to 6–7.5 µm in diameter near tips. Cells 16–22.5(–30) µm long in main axes, 12.5–15(–17) µm long in branches. Chloroplast parietal, with a large lateral pyrenoid. Monosporangia ovate, sessile or pedicellate (1–2-celled stalk), 5–7(–9) µm in diameter, 10–12.5–15 µm long, borne adaxially seriate, from each cell. Found growing epiphytically on *Cladophora laetevirens* (Ch), *Padina australis*, *Sphacelaria tribuloides*, *Sargassum sanyaense* (He), *Ahnfeltiopsis flabelliformis*, *Amphiroa fragilissima*, *Ceramium marshallense*, *Ceratodictyon intricatum*, *Dichotomaria marginata*, *Gelidium pusillum*, *Herposiphonia tenella*, and *Millerella pannosa* (Rh).

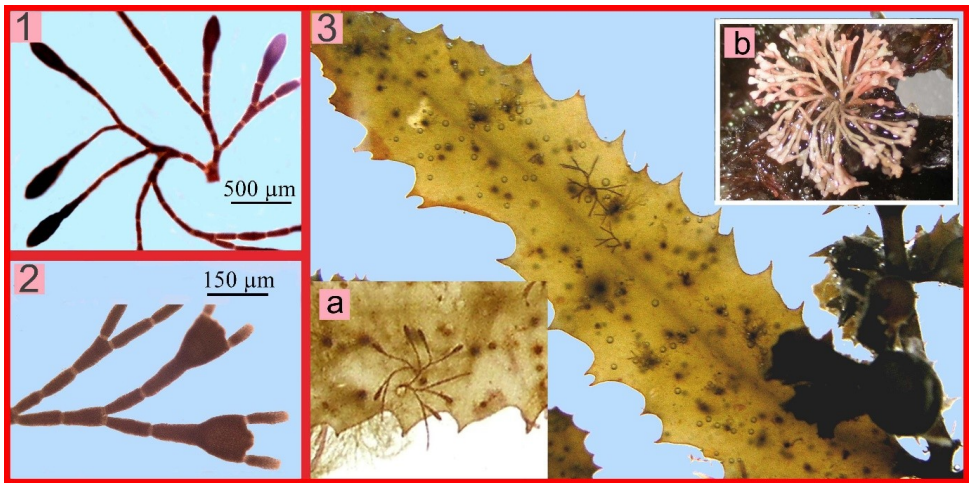
Colaconema robustum (Børgesen) Huisman & Woelkerling



1, branch with monosporangia.
2, the basal part showing filaments fusing together. Insert: detail showing large lateral pyrenoid and stalked monosporangia.
3, habit

Thallus in tufts, (0.3–)1.0–2.0(–3) mm high. Erect filaments 10–12.5(–14) μm in diameter, tapering gradually to apices to (3.0–)5.0–7.5 μm in diameter. Cells 8–10(–12) μm in diameter, 15–22.5–26.5(–32) μm long. Branching irregular, lateral and alternate, in the lower part from all sides. Chloroplast parietal, with a large lateral pyrenoid. Monosporangia oval, oblong, arranged unilaterally, adaxially seriate (in series of 4–5 cells), or alternately, on 1–2-celled stalk or sessile, 6–9(–14) μm in diameter, 17.5–19(–22) μm long. Attachment by a single basal cell, (10–)15–17 × 25 μm, partially penetrating in the host tissue. Basal cell slightly constricted at the medium portion. Noted growing epiphytically on *Bryopsis pennata*, *Phyllodictyon anastomosans* (Ch), *Padina australis*, *Sargassum* spp. (He), *Ceramium borneense*, *Corallophila kleiwegii*, *Hypnea valentiae*, *Melanothamnus sphaerocarpus*, and *Pterocladiella caerulescens* (Rh).

Order **Corallinales**
Family **Corallinaceae**
Jania pumila J. V. Lamouroux

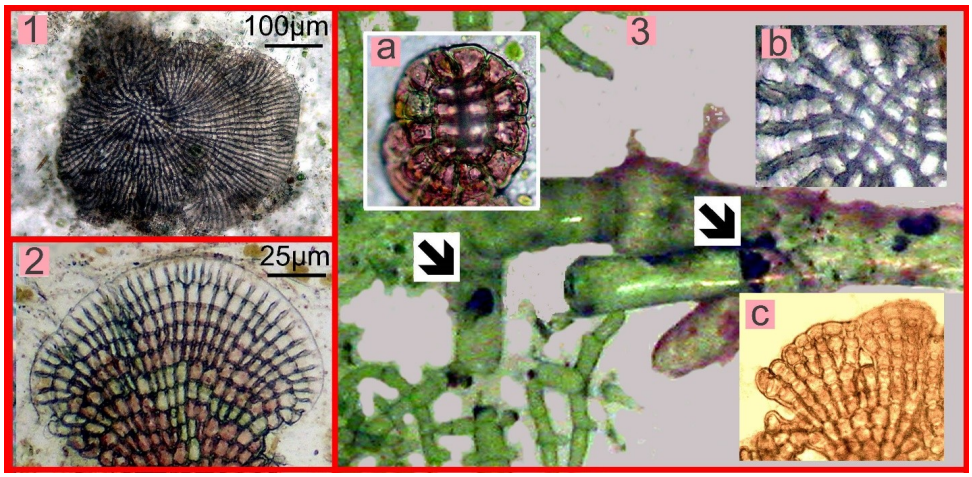


1, habit.
2, detail showing carposporangia.
3, habit (on phylloid of *Sargassum* sp.).

Inserts:
a, b, enlarged fragments

Thallus bushy, very small, erect or partially prostrate, forming small tufts, up to 1 cm in diameter, of several (8–10) erect branches arising from disc, pinkish-red or whitish-pink. Branching dichotomously (a few dichotomies). Segments subcylindrical, (60–)80–150 μm in diameter, calcified, short, 2–3 diameters long. Joints flexible, uncalcified, at regular intervals between segments. Conceptacles 230–325 μm wide, 300–465 μm long. Tetrasporangial conceptacles triangular, with two horn-like segments and apical pore. Tetrasporangia elongated oval, zonately divided. Carposporangial conceptacles obovate. Attachment by small roundish disk-like holdfast, up to 400 μm in diameter. Commonly epiphytic on *Hydroclathrus clathratus*, *Padina* spp., *Sargassum* spp., and *Turbinaria ornata* (He); also found on small shells and hard substratum.

Pneophyllum fragile Kützing

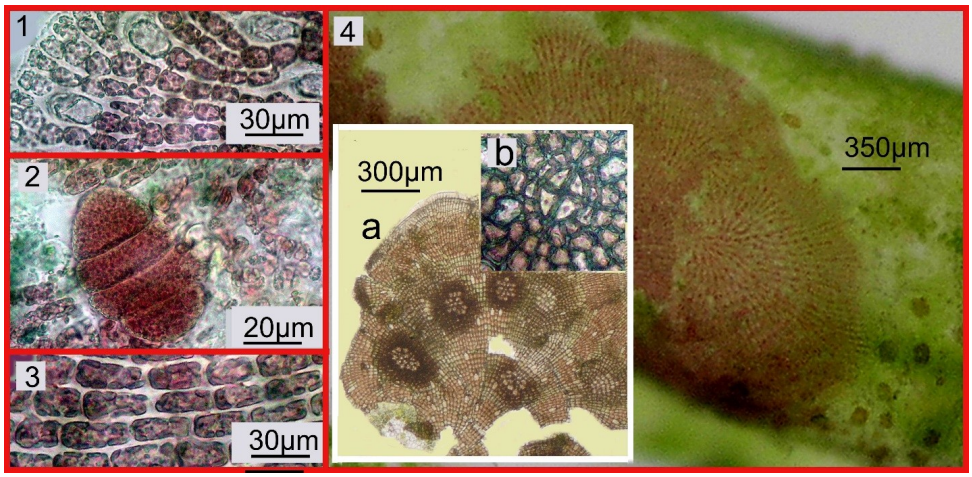


1, habit.
2, marginal blade.
3, habit, on *Phyllodictyon anastomosans* stalk.

Inserts:
a, b, germinating disc with eight initial cells;
c, detail showing cap cells

Thallus forms roundish or irregularly fan-shaped, fragile, thin calcified crusts, 0.1–2 mm in diameter, dark or pale pink. Vegetative crusts consist of a single layer of branched filaments, which form from initial 8-celled structure. Older crusts consist of 2–4 cells, thick, often merging together and overlapping each other. Cells in the surface view square, rectangular, 5–10 μm wide and 6–20 μm long, radially arranged. Cap cells broader than long: 3.5–8 μm wide, 1.5–3.5 μm long. Trichocytes rare, intercalary in cell rows, 6–10(–13.5) μm in diameter, 11–20 μm long, colorless. Sporangial and cystocarpic conceptacles slightly elevated or hemispherical, (70–)150–180(–280) μm in diameter, with central pore. Tetrasporangia elongated, 18–50 μm in diameter, 33–80 μm long, zonately divided. Noted growing epiphytically on *Caulerpa nummularia*, *Phyllodictyon anastomosans*, *Ulva clathrata*, *Valonia fastigiata*, *Valoniopsis pachynema* (Ch), *Sargassum polycystum* (He), *Ceramium borneense*, *C. marshallense*, *C. vagans*, *Chondria repens*, *Gelidium pusillum*, and *Hypnea pannosa* (Rh), as well as on hard substratum.

Family **Hydrolithaceae**
Hydrolithon farinosum (J. V. Lamouroux) Penrose & Y. M. Chamberlain

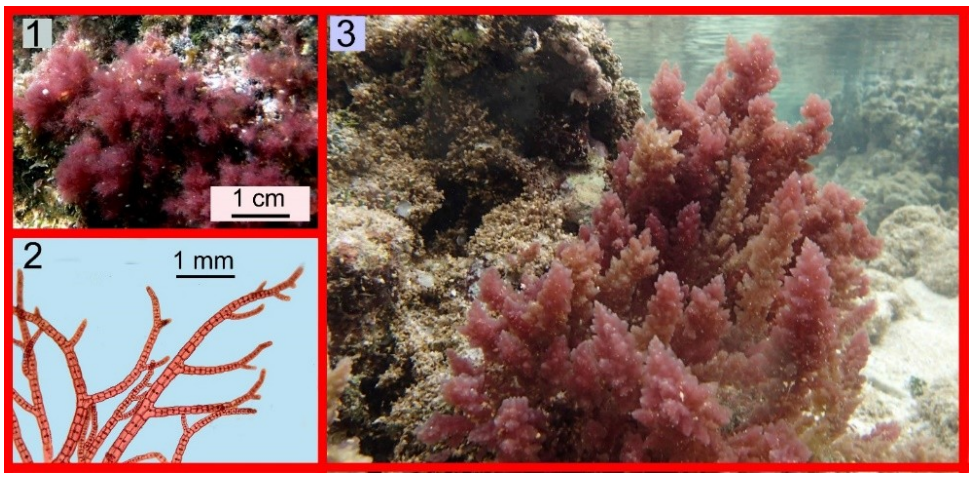


1, fragment showing trichocytes.
2, zonately divided tetrasporangium.
3, cells from surface.
4, habit, on *Cladophora catenata*.

Inserts:
a, habit with conceptacles;
b, germinating disc with four initial cells

Thallus forms calcareous, fragile, lightly calcified, small crust, up to 5 mm in diameter, pink or whitish. Vegetative crusts consist of a single layer of branched filaments, which form from initial 4-celled disc (with cells of 20 × 35 μm) surrounded by 12 pericentral cells. Cells in the surface view irregularly shaped, subrectangular, 7.5–12(–20) μm wide and 20–37(–45) μm long, radially arranged. Cap cells roundish (10 μm in diameter) or oval (6 × 10 μm). Trichocytes colorless, oval, ovoid, 10–30 × 22–40 μm. Tetrasporangial conceptacles hemispherical, (100–)140–250(–280) μm in diameter, with a single ostiole. Tetrasporangia 20–50 × 35–85 μm, zonately divided. Found growing epiphytically on *Acetabularia calyculus*, *Anadyomene wrightii*, *Bryopsis pennata*, *Boergesenia forbesii*, *Caulerpa racemosa* stolons, *C. serrulata*, *Cladophora catenata*, *Cladophoropsis fasciculata*, *Dictyosphaeria cavernosa*, *Phyllodictyon anastomosans* stalk, *Siphonocladus rigidus*, *Valonia ventricosa*, *Valoniopsis pachynema* (Ch), *Canistrocarpus cervicornis*, *Colpomenia sinuosa*, *Hydroclathrus clathratus*, *Padina boryana*, *Sargassum polycystum*, *Turbinaria ornata* (He), *Ceratodictyon intricatum*, *Gelidiella acerosa*, *Gelidium pusillum*, and *Palisada parvipapillata* (Rh).

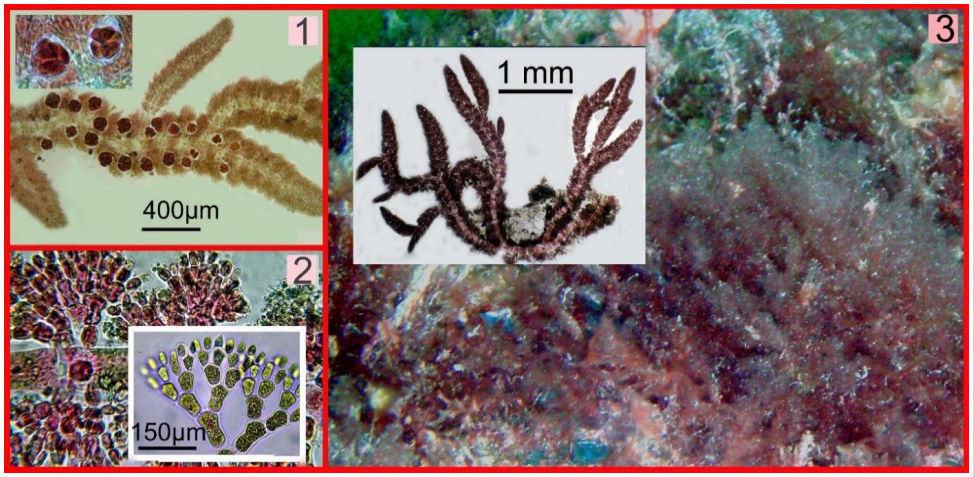
Order **Bonnemaisoniales**
Family **Bonnemaisoniaceae**
Asparagopsis taxiformis (Delile) Trevisan



1, 2, *Falkenbergia*-phase plant on *Actinotrichia fragilis*.
3, in habitat

Thalli mostly gregarious, caespitose, dark red, purplish red, or purple-violaceous, with creeping stolons (cylindrical, intricate, and irregularly branched) giving rise to erect axes 6–20 cm high. Erect axes stout, sparingly divided, naked below or with the stubs of lateral branches and densely covered with numerous plumose branchlets on all sides above (pyramidal outline). Branchlets soft, delicate, repeatedly alternately divided. Apices extremely fine. Growing on hard substrata in low intertidal and upper subtidal zones, exposed to moderate and strong wave action. Tetrasporophytic plants small, filamentous, in tufts consisting of prostrate and erect filaments, 1–2 cm high, pinkish-red. Branching irregular to alternate; branches cylindrical. Sporangia solitary, tetrahedral. Attachment by branched holdfast. Noted growing on dead coral fragments, in turf communities, and epiphytically on *Padina australis* (He), *Actinotrichia fragilis*, *Ceratodictyon intricatum*, *Chondria repens*, *Griffithsia japonica*, *Hypnea pannosa*, and *Palisada parvipapillata* (Rh).

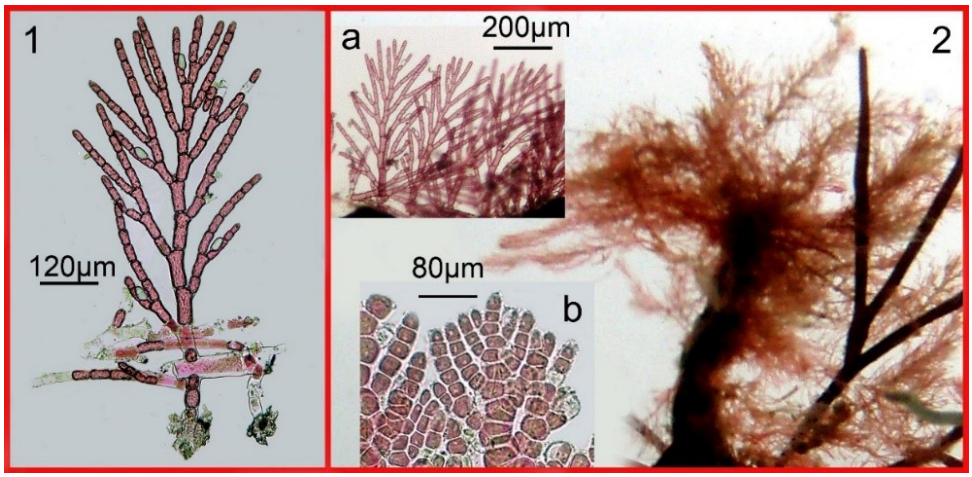
Order **Ceramiales**
Family **Callithamniaceae**
Crouania attenuata (C. Agardh) J. Agardh



1, habit of tetrasporangial plant. Insert: tetrasporangia.
2, axial cells. Insert: detail showing apical portion.
3, in habitat. Insert: habit

Thallus minute, consists of creeping axis giving rise to erect branches, 2–4 mm high, soft because of gelatinous cover, lightly calcified, bright red. Branching irregular. Axial cells cylindrical, up to 100 µm in diameter, 180 µm long; each cell bears a whorl of 4 branchlets below the upper end of the axial cell. Branchlets 100–130 µm long, with cells 25–30 µm in diameter and 2–4 diameters long, tapering to apices to 6–8 µm in diameter. Tetrasporangia spherical, 70–75 µm in diameter, to oval, 50–60 × 70–85 µm, tetrahedrally divided, borne singly on a basal cell of lateral branchlets. Found growing on dead coral fragments and epiphytically on *Anadyomene wrightii*, *Bryopsis australis* (Ch), *Turbinaria ornata* phylloids (He), *Amphiroa fragilissima*, and *Hypnea pannosa* (Rh).

Family **Ceramiaceae**
Antithamnion antillanum Børgesen

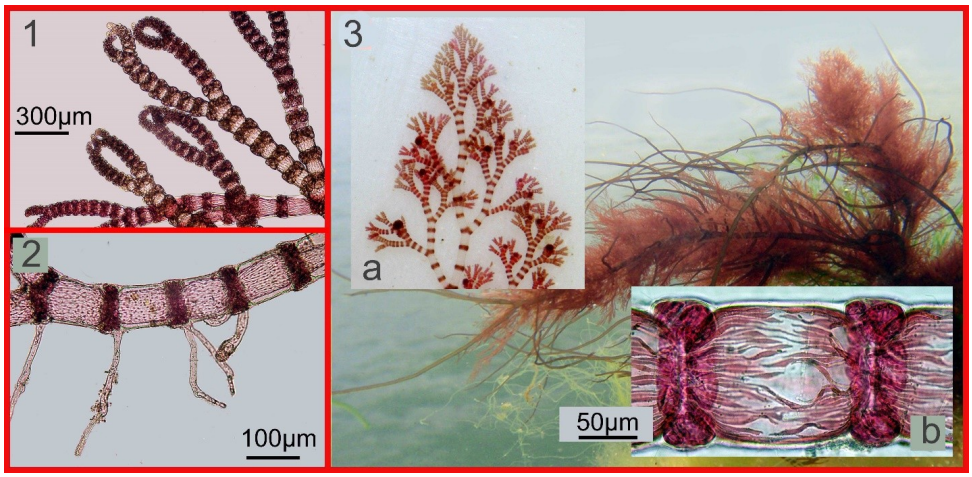


1, plant showing branching pattern, gland cells and rhizoids.
2, habit, on *Amphiroa fragilissima*.

Inserts:
a, detail showing branching pattern;
b, detail showing axial cells

Thallus consists of creeping axes and erect branches, 0.5–2.5 mm high, rose-red. Creeping axes (40–50 µm in diameter) consist of cells 70–200 µm long. Erect branches fine filamentous, 25–40 µm in diameter. Cells 50–75(–120) µm long; basal cell shorter, spherical, ~ 20 µm in diameter. Branching alternate; branches of the first order develop from every cell, in one plane; branchlets of the second order 1(–2) *per* branchlet, 3–5 cells long, and bearing gland cells. Gland cells solitary, borne on inner side of branchlets, in contact with the first and second cells from base of the branchlets, 13–18 µm in diameter, 20–25 µm long. Attachment by rhizoids issuing from distal end of cells of creeping axes, opposite erect branches. Rhizoids consist of uniseriate moniliform cells, terminating in digitate holdfast. Tetrasporangia oval, 20–40 µm in diameter, 45–90 µm long, cruciately divided, develop in axils of branchlets. Noted growing epiphytically on *Cladophora vagabunda* (Ch), *Amphiroa fragilissima*, *Bryocladia cervicornis*, and *Mastophora rosea* (Rh).

Ceramium cimbricum H. E. Petersen

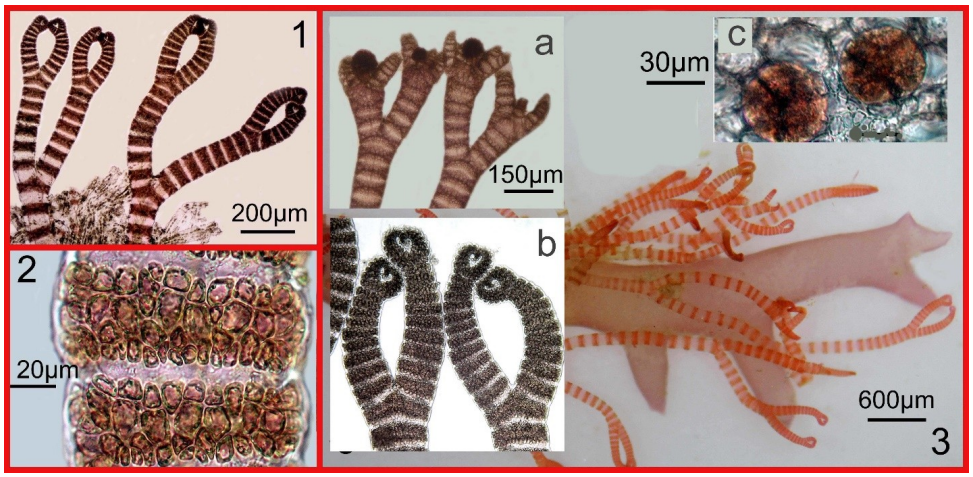


1, detail showing apical portions.
2, fragment of axis with rhizoids.
3, in habitat, epiphytic on *Grateloupia filicina*.

Inserts:
a, branching pattern;
b, internodes and cortical bands

Thalli fine filamentous, bushy, 0.5–3.5(–10) cm high, purple to dark red. Branching irregularly dichotomous, with straight or slightly incurved apices. Internodes 50–160 µm in diameter, 150–250(–500) µm long, striated, lightly pigmented. Nodes 50–170 µm in diameter, 30–60 µm long, swollen, heavily pigmented, composed of two cell layers in young plants – upper layer of small cells, ~ 7.5 µm in diameter, and lower layer of large cells, 17–20 × 25 µm – and 4–6 rows in old thalli with small upper cells and larger ones in lower rows. Tetrasporangia prominent, spherical, tetrahedrally divided, up to 65 µm in diameter, solitary or in rows at nodes. Attachment by unicellular rhizoids issuing from nodes of creeping axes. Found growing on hard substrata and epiphytically on large algae *Canistrocarpus cervicornis*, *Colpomenia sinuosa*, *Padina australis*, *Pseudochnoospora implexa*, *Rosenvingea endiviifolia*, *Sargassum polycystum*, *Turbinaria ornata* phylloids (He), *Centroceras clavulatum*, *Grateloupia filicina*, *Hypnea* spp., *Jania capillacea*, and *Tolypiocladia glomerulata* (Rh), in low intertidal and upper subtidal zones, as well as on sheltered and semi-protected coasts.

Ceramium marshallense E. Y. Dawson

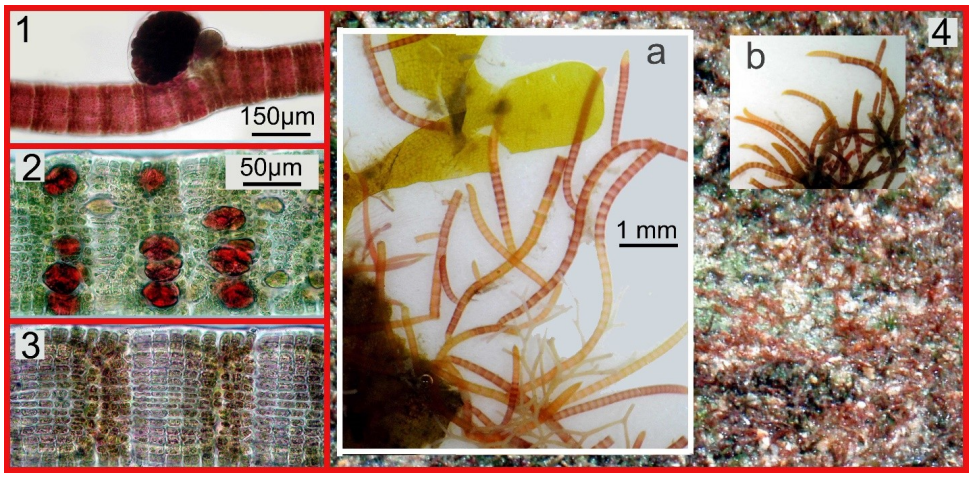


1, detail showing branching pattern.
2, cortical nodes.
3, plants epiphytic on *Hypnea pannosa*.

Inserts:
a, branches with cystocarps;
b, detail showing branching pattern;
c, tetrahedrally divided tetrasporangia

Thallus filamentous, 2.2–20 mm high, dark red, initially creeping. Creeping axes 165 μm in diameter. Erect filaments 90–100(–180) μm in diameter. Branching regularly dichotomous, pseudo-dichotomous. Cortical nodes (25–75 μm long) consist of three bands of large angular cells (22.5–27 × 22–32 μm) in the middle (central ring of 5–6 cells) and small angular cells (7–15 × 17 μm) above and below. Internodes 60–150 μm long at the lower portion and shortening to 45 μm at the upper. Branch tips circinate, inwardly curved. Tetrasporangia borne abaxially, 1–3 *per* node, tetrahedrally divided, spherical or subspherical, 35–40(–50) μm in diameter, surrounded by involucres. Cystocarps 125 × 150 μm. Rhizoids on ventral side of creeping axes, 2–4 rhizoids from each node, 75–150 μm long, 7.5–15(–25) μm in diameter, 1–2-celled, ending into blunt or disc-like attachment. Noted growing on upper intertidal to shallow subtidal rocks, and epiphytically on *Padina australis*, *Pseudochnoospora implexa*, *Rosenvingea endiviifolia*, *Turbinaria ornata* (He), *Amphiroa foliacea*, *Ceratodictyon scoparium*, *Coelothrix irregularis*, and *Hypnea pannosa* (Rh).

Corallophila kleiwegii Weber Bosse

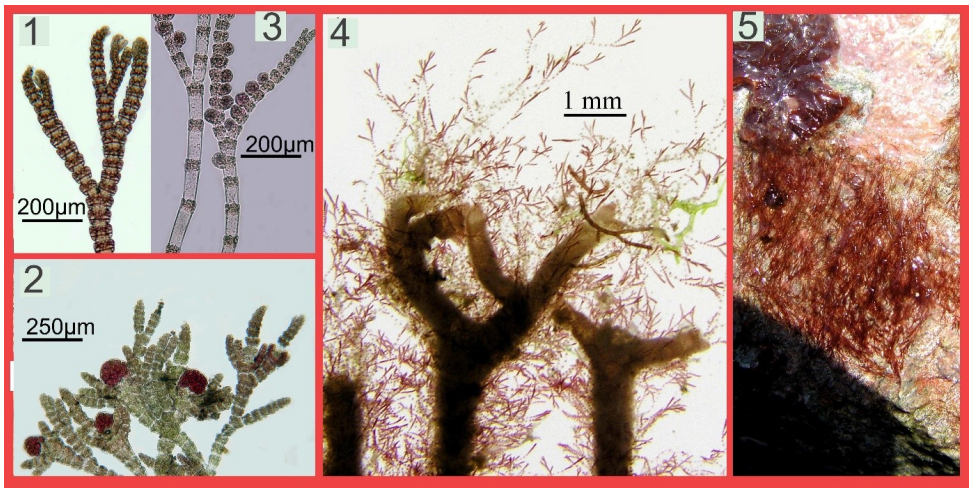


1, fragment of axis with cystocarp.
2, cruciately divided tetrasporangia.
3, surface cortical cells arranged in parallel longitudinal rows.
4, in habitat.

Inserts:
a, b, habit, epiphytic on *Padina* sp.

Thallus consists of prostrate and erect axes 110–160(–170) μm in diameter, composed of axial cells (30–)70–100(–155) μm in diameter, surrounded by 6–10 pericentral cells, 20–25 μm in diameter. Branching irregular, alternate. Apices apiculate, non-forcipate, apical cell protruding (up to 12 × 18 μm), with transverse segmentation below. Surface cortical cells arranged in 18–24(–32) parallel longitudinal rows, composed of elongated cells, 12.5–20 μm in diameter. Rhizoids single or abundant, issuing from corticating cells of prostrate axes, 12–17(–30) μm in diameter, up to 400–500 μm long, simple or ending into finger-like outgrowth or multicellular lobed disc. Tetrasporangia spherical, (25–)30–35(–40) μm in diameter, cruciately divided, borne within corticated segments near apices of erect axes. Found growing on dead corals among turf algae, and epiphytically on *Caulerpa racemosa*, *Dictyosphaeria cavernosa* (Ch), *Colpomenia sinuosa*, *Lobophora variegata*, *Padina* spp., *Sargassum polycystum* (He), *Ceratodictyon intricatum*, *Gelidium pusillum*, *Hypnea pannosa*, *Jania ungulata* f. *brevior*, and *Peyssonnelia rubra* (Rh), in low intertidal to upper subtidal zone.

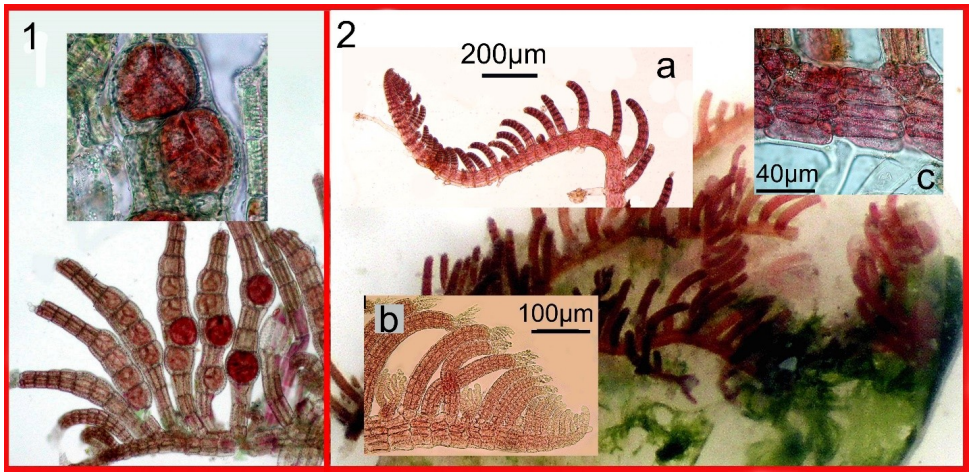
Gayliella flaccida (Harvey ex Kützing) T. O. Cho & L. J. McIvor



1, detail showing branching pattern.
2, apical branchlets with cystocarps.
3, fragment of the plant with tetrasporangia.
4, habit, on *Hypnea pannosa*.
5, in habitat

Thallus fine filamentous, up to 2 cm high, pinkish-red to reddish-brown, forming loose or dense tufts. Branching pseudodichotomous. Cortical nodes 50–120(–250) μm in diameter, (20–)50–60 μm long, consisting of basipetal transversely elongated cells and acropetal (1–2 rows) small roundish to angular cells. Internodes 100–150(–300) μm long at the lower portion and shortening to apices. Branch tips inwardly curved, often forcipate. Rhizoids unicellular with simple or digitate tips, 1(–3) *per* node of creeping axis. Tetrasporangia tetrahedrally divided, spherical, 30–45 μm in diameter, unilateral, 1(–2) *per* node, partially covered by involucre. Cystocarps terminal, spherical, up to 150 μm in diameter. Noted growing on rocks, epiphytic on large algae *Anadyomene wrightii*, *Boergesenia forbesii*, *Caulerpa serrulata* stolons (Ch), *Canistrocarpus cervicornis*, *Colpomenia sinuosa*, *Dictyota friabilis*, *Lobophora variegata*, *Padina australis*, *P. boryana*, *Sargassum polycystum*, *S. sanyaense*, *Turbinaria ornata* (He), *Acanthophora spicifera*, *Actinotrichia fragilis*, and *Liagora ceranoides* (Rh), in upper intertidal to shallow subtidal zone.

Family **Rhodomelaceae**
Herposiphonia parca Setchell

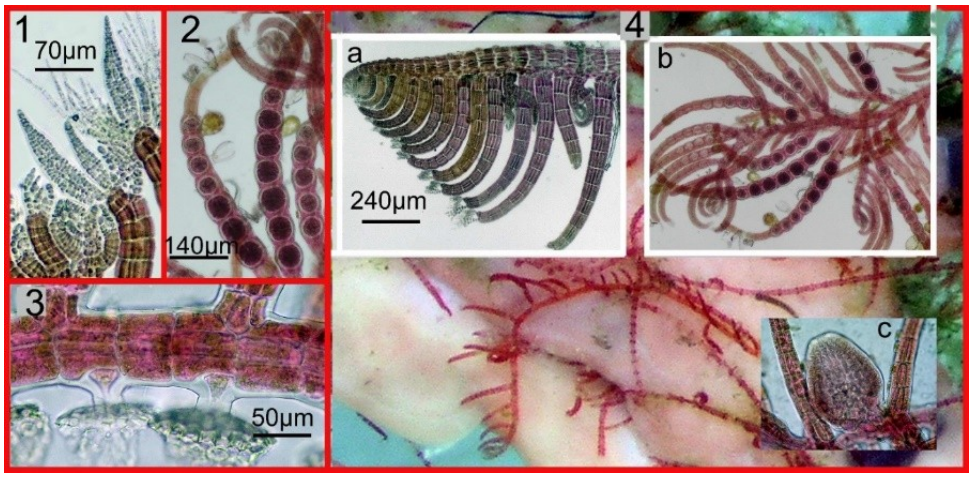


1, determinate branches with tetrasporangia.
2, habit, on *Dictyosphaeria cavernosa*.

Inserts:
a, fragment of the plant;
b, detail showing branch tips with trichoblasts;
c, fragment showing creeping axis with rhizoids

Thallus consists of creeping axes bearing erect filaments from each segment in regular pattern of three determinate branches alternated with one indeterminate branchlet, dark orange-brown or purplish, small, about 0.6–10 mm high. Creeping axes polysiphonous, 8–9 pericentral cells, 90–150 μm in diameter, with upcurved tips. Determinate branches arching distally, simple, unbranched, 40–90 μm in diameter, 11–12 segments long, with blunt truncated tips when young. Segments consist of 8–11 pericentral cells. Trichoblasts in clusters of 2–3 at branch tips. Tetrasporangia tetrahedrally divided, spherical, subspherical, 40–80(–120) μm in diameter, borne in series on determinate branches. Attachment by rhizoids on ventral side of creeping axes. Rhizoids simple or ending in digitate holdfast. Found growing on intertidal rocks and epiphytically on *Dictyosphaeria cavernosa*, *Phyllodictyon anastomosans*, *Valonia fastigiata* (Ch), *Dictyota cervicornis*, *Hydroclathrus clathratus*, *Turbinaria ornata* (He), *Actinotrichia fragilis*, and *Amphiroa fragilissima* (Rh).

Herposiphonia tenella (C. Agardh) Ambronn

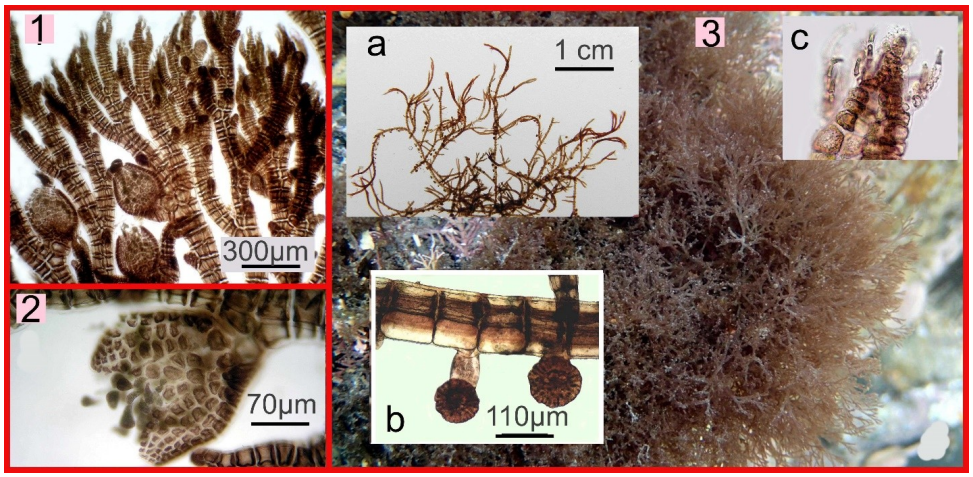


1, branch tips with spermatangial branchlets and trichoblasts.
2, branches with tetrasporangia.
3, rhizoids.
4, in habitat.

Inserts:
a, branch tips with trichoblasts;
b, fragment of the plant with tetrasporangia;
c, cystocarp

Thallus consists of creeping axes bearing erect filaments from each segment in regular pattern of three determinate branches alternated with one indeterminate branchlet, dark reddish-brown. Creeping axes polysiphonous, 8–9 pericentral cells, 100–135 µm in diameter, with segments (40–)60–195 µm long. Erect filaments 65–100 µm in diameter, 18–22 segments long (~ 1.1 mm high), with segments 35–70 µm long and terminating into tips with trichoblasts. Tetrasporangia tetrahedrally divided, spherical, subspherical, 60 × 70–75(–80) µm, one *per* segment, in straight series in the upper portion of erect branches. Attachment by rhizoids originating almost from every distal end of periaxials cells on ventral side of creeping axes. Rhizoids (12–)25–60 µm in diameter and 30–100(–200) µm long, simple or ending into branched discoid or digitate holdfast. Noted growing epiphytically on *Cladophora vagabunda*, *Phyllodictyon anastomosans* (Ch), *Dictyota friabilis*, *Lobophora variegata* (He), *Amphiroa foliacea*, *Griffithsia metcalfii*, and *Hypnea pannosa* (Rh), as well as on hard substratum.

Melanothamnus ferulaceus (Suhr ex J. Agardh) Díaz-Tapia & Maggs

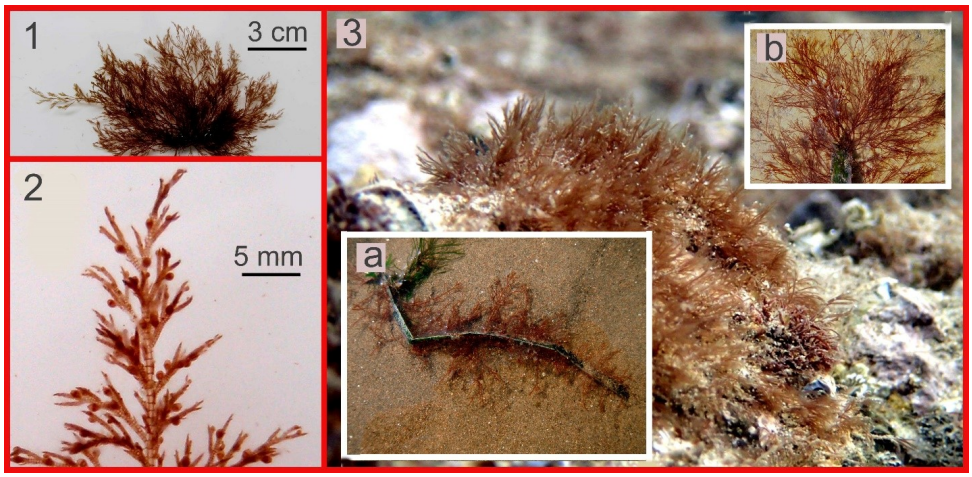


1, fragment of the plant with cystocarps.
2, ruptured mature cystocarp with spores.
3, in habitat.

Inserts:
a, habit;
b, rhizoids;
c, apical part

Thallus filamentous, consists of creeping axes bearing erect branches, dark red-brown. Creeping axes up to 300 µm in diameter. Branching lateral, alternate. Erect branches of four pericentral cells, 8–10 mm high, up to 300 µm in diameter below, gradually tapering to acute tips. Apical cell prominent, 10 × 10 µm. Trichoblasts up to 300 µm long, pale brown, branching 1–2(–4) times, with segments 25 µm in diameter at base, 60 µm long, gradually tapering to apices to 5–8 µm in diameter. Scar cells present in every segment. Rhizoids borne single or in pairs from proximal ends of segments, cut off pericentral cells, unicellular, 55 µm in diameter, terminating into lobed or digitate holdfast. Tetrasporangia 75–85 µm in diameter, in spiral series. Cystocarps 275 × 280 µm. Found growing epiphytically on *Anadyomene wrightii*, *Caulerpa serrulata* (Ch), *Canistrocarpus cervicornis*, *Colpomenia sinuosa*, *Hydroclathrus clathratus*, *Padina* spp., *Pseudochnoospora implexa*, *Sargassum* spp., *Turbinaria ornata* (He), *Betaphycus gelatinus*, and *Hypnea spinella* (Rh), as well as on hard substratum.

Melanothamnus japonicus (Harvey) Díaz-Tapia & Maggs

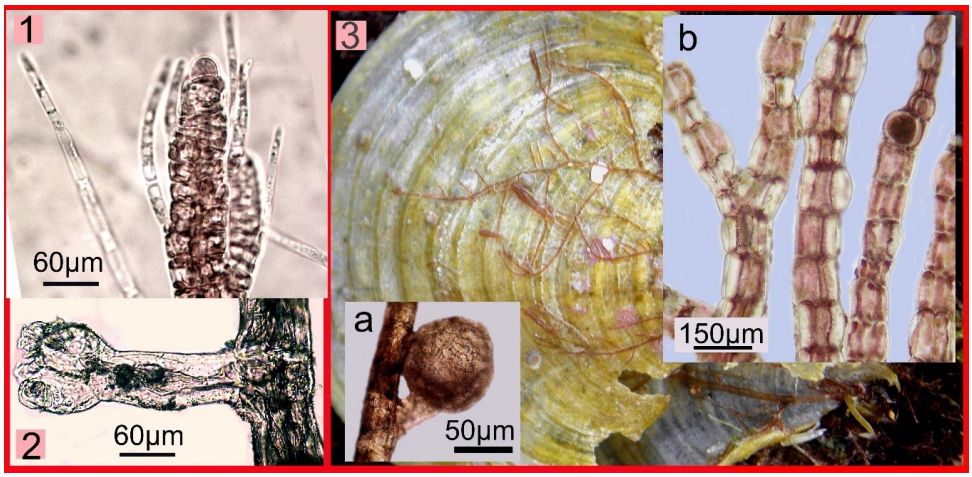


1, habit.
2, fragment of the plant with cystocarps.
3, in habitat.

Inserts:
a, b, on a leaf of seagrass *Zostera marina*

Thallus erect, coarse filamentous, bushy (of pyramidal or spherical outlines), solitary or in tufts, 3–5(–12) cm high, dark reddish-brown. Branching dichotomous below to irregularly alternate or unilateral above. Erect axes and branches, up to 1 mm in diameter, polysiphonous, composed of 4 pericentral cells, corticated below or sometimes corticated throughout thallus except ultimate branchlets. Branches of the first order long, widely angled. Branches of the following orders narrowly angled. Ultimate branchlets short, 120–190 μm in diameter, tapering near tips. Trichoblasts deciduous, occurring alternately from each segment in spiral sequence with one-fourth divergence. Tetrasporangia spherical, 80–115 μm in diameter, tetrahedrally divided, develop in the middle portion of ultimate branchlets. Cystocarps scattered on ultimate branchlets, broadly oval, near to spherical, 350–500 × 460–580 μm. Attachment by a disc-like holdfast or by rhizoids from prostrate axes. Noted growing on hard substrate, or epiphytically on *Anadyomene wrightii*, *Caulerpa serrulata* (Ch), *Canistrocarpus cervicornis*, *Colpomenia sinuosa*, *Hydroclathrus clathratus*, *Padina australis*, *P. boryana*, *Pseudochnoospora implexa*, *Sargassum* spp., and *Turbinaria ornata* (Rh).

Polysiphonia subtilissima Montagne

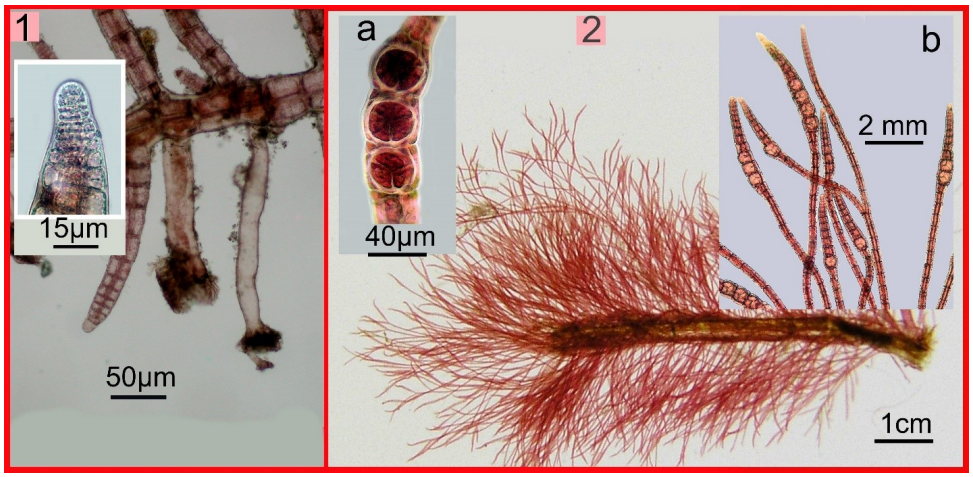


1, apical part with trichoblasts.
2, fragment showing rhizoids.
3, habit, on *Padina* sp.

Insert:
a, cystocarp;
b, tetrasporangia

Thallus filamentous, consisting of prostrate and erect axes, purplish-brown. Main axes (70–)87–130 μm in diameter, of four pericentral cells, ecorticate. Segments in main axes 110–140(–275) μm long, gradually decreasing in length and diameter in branches from the first order to the third. Apical cell obvious, 10–12.5 × 10–12.5 μm. Trichoblasts poorly developed, tapering to delicate apices, up to 400 μm long, 1–2 times dichotomously branched, deciduous. Scar cells present, inconspicuous. Branching alternate (from each sixth segment) with angles of 15–30° (lateral branchlets replacing apical filament). Rhizoids numerous, unicellular, ending into lobed holdfast, 10–17.5 μm in diameter, in open connection with parent cells (without cell wall), proximal on pericentral cells. Tetrasporangia spherical, 50–70 × 50–75 μm, tetrahedrally divided, in straight series. Cystocarps globose, 80 × 100 μm. Found growing on dead coral fragments and epiphytically on *Dictyota friabilis*, *Padina* sp., *Turbinaria decurrens*, *T. ornata* (He), and *Tolypiocladia glomerulata* (Rh).

Polysiphonia villum J. Agardh

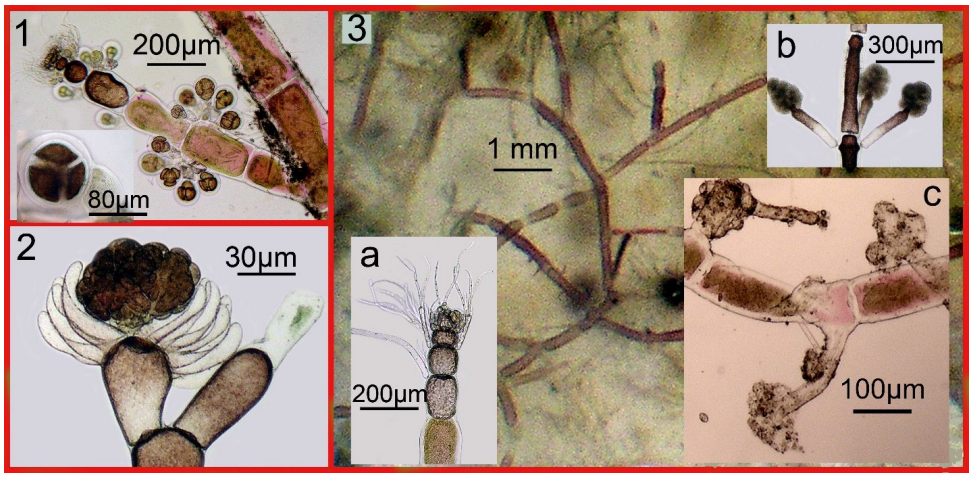


1, creeping axis bearing rhizoids and erect branches. Insert: apical portion of erect branch.
2, habit, on *Sphacelaria rigidula*.

Inserts:
a, b, branches with tetrasporangia

Thallus filamentous, in tufts, consisting of prostrate and erect branches arising at intervals of 4–6 segments, pale red to dark red. Prostrate axes 3–5 mm long, 60–100 µm in diameter, segments 70–75 µm long. Erect branches arise endogenously, simple or sparsely branched, 0.5–3.5(–8) mm high, (40–)65–80 µm in diameter, of four pericentral cells. Segments 55–62 µm long in lower half, becoming shorter towards apices, to 30 µm long. Apical cell prominent. Segments in the middle portion commonly longer than broad. Trichoblasts up to 0.75 mm long, dichotomously, subdichotomously branched (5–7 times), gradually decreasing in diameter and length towards apices with every dichotomy. Tetrasporangia spherical, 45–50 µm in diameter, tetrahedrally divided, in straight series of the upper portions of erect branches. Noted growing on *Dictyota implexa*, *Lobophora variegata*, *Padina minor*, *Sphacelaria novae-hollandiae*, *S. rigidula* (He), *Champia parvula*, and *Gracilaria salicornia* (Rh).

Family **Wrangeliaceae**
Anotrichium tenue (C. Agardh) Nägeli



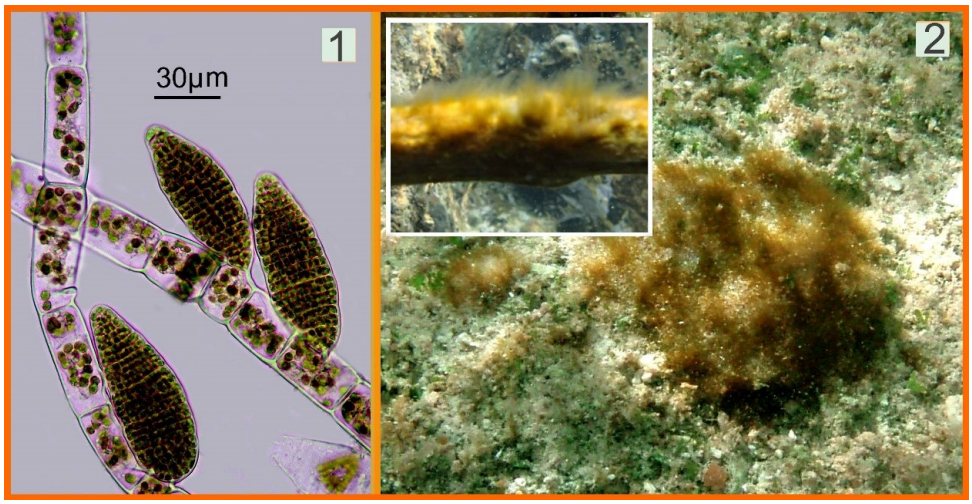
1, tetrasporangia.
2, detail showing cystocarp.
3, plant epiphytic on *Sargassum polycystum*.

Inserts:
a, apical part of filament with trichoblasts;
b, part of filament showing spermatangial branchlets;
c, fragment with rhizoids

Thallus fine, filamentous, consists of prostrate (up to 250 µm in diameter) and erect filaments, 100–200 µm in diameter, 0.2–1.5 cm high, pale red. Branching sparse, lateral, commonly at right angle to prostrate filaments, from proximal ends of parent cells. Cells cylindrical, elongated, up to 1 mm long, with well visible pit-connections; apical cells domed, bearing whorls of 8–12 trichoblasts. Trichoblasts up to 400 µm long, branching 2–3 times. Tetrasporangia spherical, 60–100 µm in diameter, tetrahedrally divided, shortly stalked, whorled at distal end of parent cells. Cystocarps shortly stalked, borne on the top of apical cells, 50 × 70 µm; stalk whorled. Attachment by unicellular rhizoids originating from proximal ends of cells of creeping axes. Commonly epiphytic on *Caulerpa serrulata* stolons, *Cladophora socialis* (Ch), *Colpomenia sinuosa*, *Padina australis*, *P. minor*, *Sargassum polycystum*, lower side of *Lobophora variegata* (He), *Ceramium marshallense*, and *Tolypiocladia glomerulata* (Rh).

Phylum HETEROKONTOPHYTA

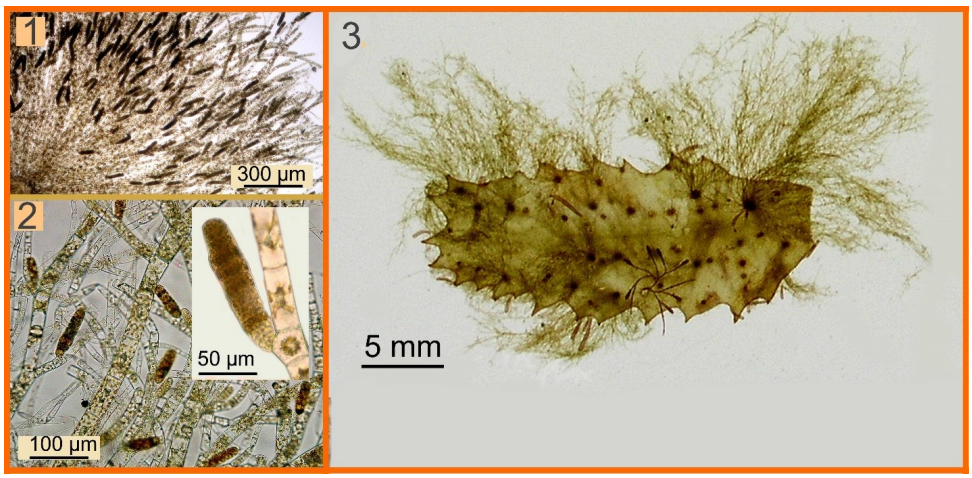
Class **Phaeophyceae**
Order **Ectocarpales**
Family **Acinetosporaceae**
Feldmannia irregularis (Kützing) G. Hamel



1, plurilocular sporangia. 2, in habitat

Thallus filamentous, forming soft loose tufts of uniseriate filaments, yellowish-brown, up to 2 cm high. Branching irregular. Filaments 23–30(–40) µm in diameter. Intercalary meristems develop in lower half of axes. Cells 19–21(–30) µm in diameter, 0.5–1.0 diameters long in the meristematic zone, 1–3 diameters long in lower half, and up to 5 diameters long in upper half of thallus, with numerous discoid chloroplasts, each containing one pyrenoid. Plurilocular sporangia develop below the meristematic zone of each filament, sessile, cone-shaped, ~ 25–40 µm in diameter, 50–75(–150) µm long, with attenuate tips. Found growing in the middle intertidal to upper subtidal zones on rocks and buoys, and epiphytically on *Codium repens* (Ch), *Colpomenia sinuosa*, *Padina australis*, *Sargassum polycystum*, and *Turbinaria ornata* (He).

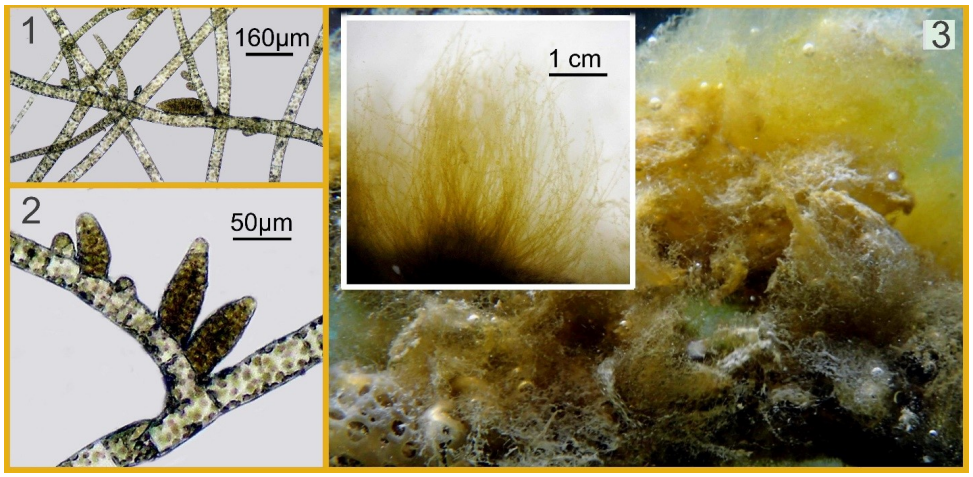
Feldmannia mitchelliae (Harvey) H.-S. Kim



1, 2, plants with plurilocular sporangia. Insert: sessile plurilocular sporangia.
3, habit, on *Sargassum* phylloid

Thallus filamentous, forming dense, soft, velvety tufts 1.5–5(–8) cm high. Branching alternate, secund. Filaments 22.5–30(–50) µm in diameter, slightly constricted at cell walls, tapering to 6–10 µm to apices, often ending in short hairs. Cells in main axes 25–45 µm in diameter, 2–3 diameters long, with numerous discoid chloroplasts. Meristematic cells 10–12.5 µm long, in series of up to 16 cells. Plurilocular sporangia elongated, ellipsoidal to linear cylindrical, sessile (rarely stalked), (18–)25–35 µm in diameter, 50–150 µm long, with subspherical tips. Plurilocular sporangia sessile, oval, (45–)55–90(–100) µm long, 20–36 µm in diameter. Noted growing on stones, dead coral fragments, shells, ropes, buoys, and epiphytically on *Colpomenia sinuosa*, *Hormophysa cuneiformis*, *Padina australis*, *P. minor*, *Sargassum mcclurei*, *S. polycystum*, *S. sanyaense*, *Turbinaria ornata* (He), *Acanthophora muscoides*, and *Hypnea valentiae* (Rh).

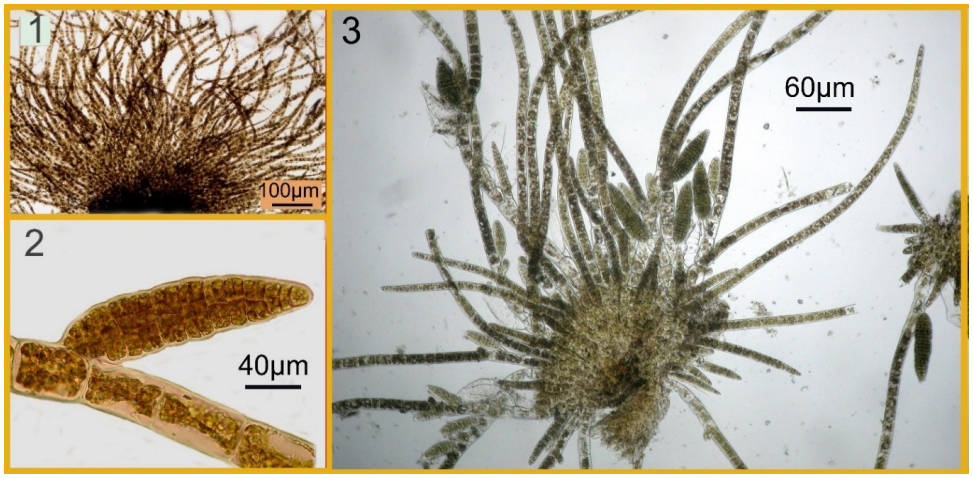
Hincksia conifera (Børgesen) I. A. Abbott



1, 2, details showing elongated-conical sporangia.
3, in habitat

Thallus forms filamentous tufts up to 9 mm high. Filaments up to 40 μm in diameter, arising from prostrate axes. Cells (0.5–)1–4 diameters long. Main axes and branches terminate into hair-like, almost colorless cells, to 12 μm in diameter. Chloroplasts disc-like, numerous. Branches grow at almost right or acute angle to main filament and commonly curved upwards. Branching irregular secund, alternate. Plurilocular sporangia elongate-conical, sessile, (40–)70–90(–115) μm long, 25–27(–40) μm in diameter, develop in sinuses of branches, mostly in series of 2–6(–9), and sometimes directly on main axes. Unilocular sporangia ovoid, solitary develop in axils of branches. Attachment by rhizoids issuing from the lowermost cells of filaments. Found growing in middle and low intertidal zones, on stones, dead coral fragments, shells, ropes, buoys, and often epiphytically on *Padina* spp. and *Sargassum* spp. (He).

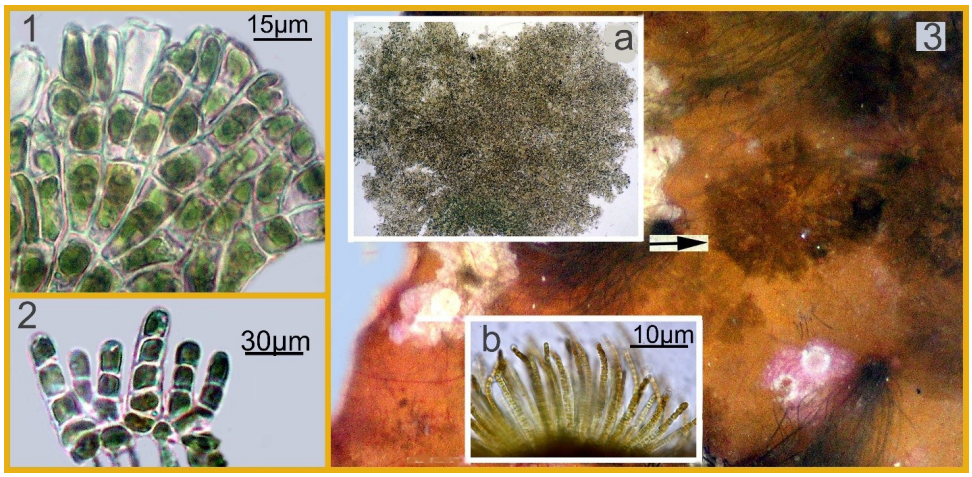
Family **Chordariaceae**
Kuetzingiella elachistaeformis (Heydrich) M. Balakrishnan & Kinkar



1, 3, habit.
2, plurilocular sporangium

Thallus soft, filamentous, composed of prostrate axes, (10–)12.5–18 μm in diameter, forming irregular disc and erect loose fine filamentous tufts, 1–7.5 mm high, light brown to dark brown. Erect filaments, simple or branched at the basal portion, 17.5–20 μm in diameter, tapering to hair-like colorless apical cells, 5–6 μm in diameter, 100 μm long. Cells in filaments 1–3(–4) diameters long, with parietal band-shaped or disc-shaped plastids. Unangia oval, 42 × 85 μm. Plurilocular sporangia sessile or shortly stalked, elongated lanceolate, spindle-like or narrowly conical, 15–25(–37) μm in diameter, (63–)110–185(–250) μm long, commonly develop at lower portion of erect filaments. Noted growing on fragments of dead branched corals, and epiphytically on *Valonia ventricosa* (Ch), *Colpomenia sinuosa*, *Sphacelaria novae-hollandiae*, *Sargassum* spp., and *Turbinaria ornata* (He).

Myrionema strangulans Greville

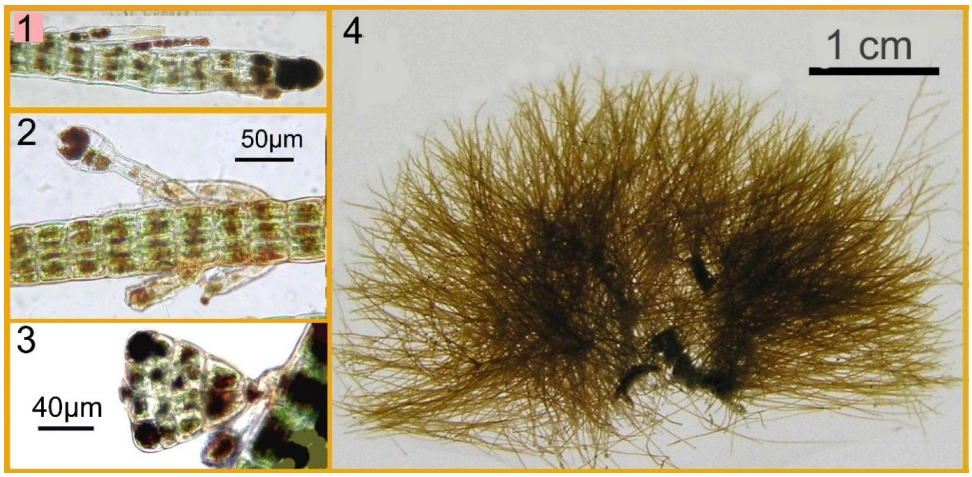


1, basal monostromatic layer.
2, fragment showing erect free filaments and basal cells with rhizoids.
3, habit, on *Sargassum sanyaense*.

Inserts:
a, surface view;
b, erect assimilatory filaments

Thalli forming small, dark greenish-brown velvety spots of (0.2–)0.6 × 1.0 mm, composed of basal monostromatic layer, and erect filaments 30–50(–100) μm high. Surface cells roundish angular, 3–6 μm in diameter. The basal layer consists of subdichotomous, radiating, closely adjacent filaments (7.5–10 μm in diameter) tightly adhering to the host surface. Marginal cells of the basal layer 10 μm in diameter, 20–22 μm long. Erect assimilatory filaments composed of (3–)5–7 cells, arising from every cell of the basal layer. Cells 5–11 μm in diameter, (5–)10–12 μm long, with several discoid or irregularly shaped chloroplasts containing 1(–2) pyrenoids. Unangia basal, sessile or on one-cell stalk, ellipsoidal or obovate, 20–24(–35) × 35–65 μm. Gametangia sessile or shortly stalked, cylindrical with blunt tips, 7–11 × 15–50 μm. Attachment by rhizoids issuing from basal cells. Found growing epiphytically on *Padina minor*, *P. australis*, and *Sargassum* spp. phylloids (He).

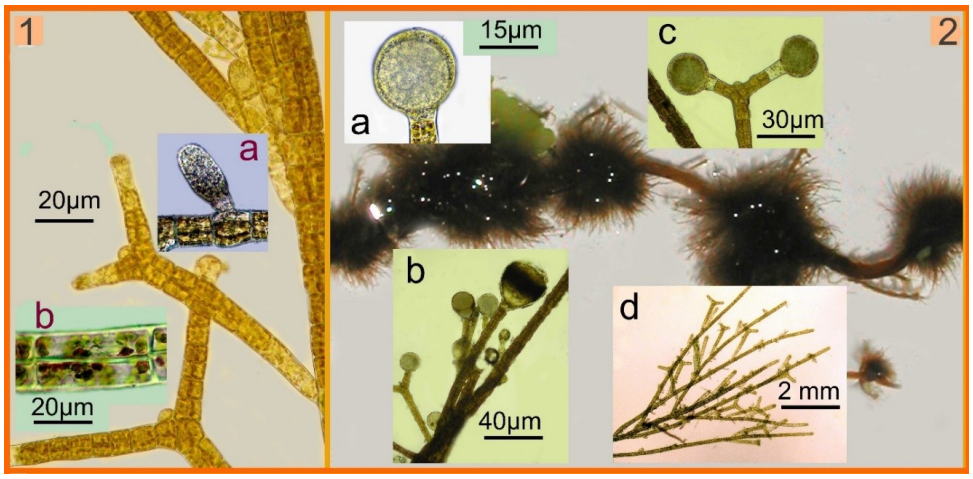
Order **Sphacelariales**
Family **Sphacelariaceae**
Sphacelaria novae-hollandiae Sonder



1, fragment showing apical cell.
2, detail showing segments.
3, propagula.
4, habit

Thallus filamentous, dark brown, forming dense tufts, (0.65–)2–3 cm high, arising from stoloniferous base. Sparingly branching with numerous short and long branchlets at narrow angles. Filaments straight, cylindrical, from 40–50 μm below to 80–87(–90) μm in diameter above, of almost equal diameter thorough, slightly tapering toward apices, terminating in well-developed apical cells, to 40–50 μm in diameter. Segments 25–35(–42) μm long, with 3–5 longitudinal walls. Hairs frequent, 10–12.5 μm in diameter. Propagules stalked (1–3-celled), (100–)150–200 μm long (from lenticular cell on the top between corner cells to the bottom), 80–120 μm across (from left to right corner). Corner cells divided by two walls at right angle or by a single straight wall cutting off terminal cells. Noted growing on vertical side of dead coral blocks in low intertidal zone, or epiphytically on *Anadyomene wrightii*, *Caulerpa serrulata* (Ch), *Colpomenia sinuosa*, *Lobophora variegata*, *Padina arborescens*, *P. boryana*, *Rosenvingea endiviifolia*, *Sargassum* spp., *Turbinaria ornata* (He), and *Acanthophora spicifera* (Rh).

Sphacelaria rigidula Kützing

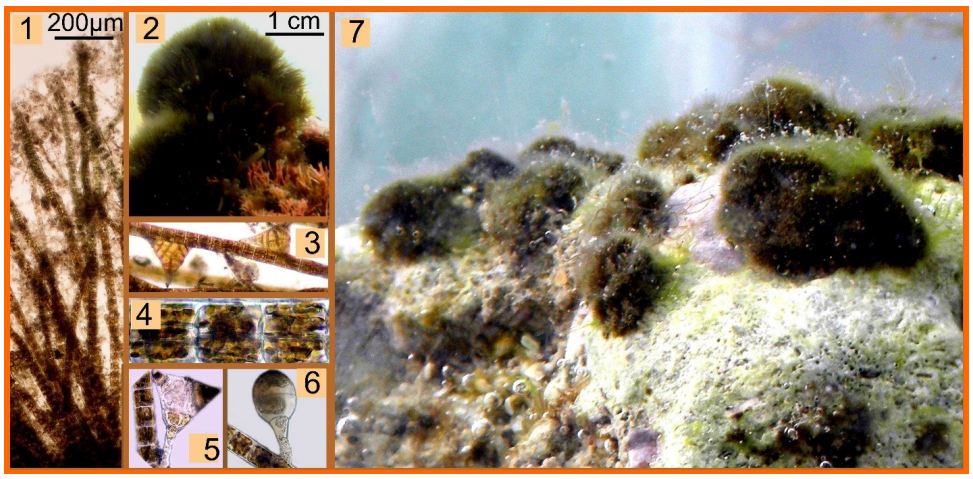


1, fragment with propagules.
Inserts:
a, plurilocular sporangium;
b, detail showing segments.
2, plants epiphytic on *Chorda filum*.

Inserts:
a, b, c, unangia;
d, branch with propagules

Thallus filamentous, forming dense tufts, 0.3–3.0 cm high, yellowish- or olive-brown to dark brown. Branching irregular, sparse to dense at narrow angles. Erect filaments straight, (15–)25–45 μm in diameter, commonly of almost equal diameter (35 μm) throughout or slightly tapering toward apices to 25 μm. Segments with 1–3 longitudinal walls, 2–3 diameters long, becoming shorter to apices (to 17.5 μm). Hairs lateral or apical, 20 μm in diameter, up to 700 μm long, deciduous. Propagules bifurcate [bearing two cylindrical arms, up to 25 μm in diameter, slightly tapering to apices, 150–400(–520) μm long]. Stalk ~ 800 μm long, (19–)25–46 μm in diameter. Plurilocular sporangia ovoid, on 1-celled stalk, 24–30 × 45–65 μm. Attachment by basal disc and stolons. Found growing on low intertidal rocks, dead corals, plastic buoys, or epiphytically on *Caulerpa serrulata* (Ch), *Chorda filum*, *Colpomenia sinuosa*, *Hormophysa cuneiformis*, *Hydroclathrus clathratus*, *Lobophora variegata*, *Padina* spp., *Pseudochnoospora implexa*, *Sargassum* spp., *Turbinaria ornata* (He), and *Lithophyllum pygmaeum* (Rh).

Sphacelaria tribuloides Meneghini

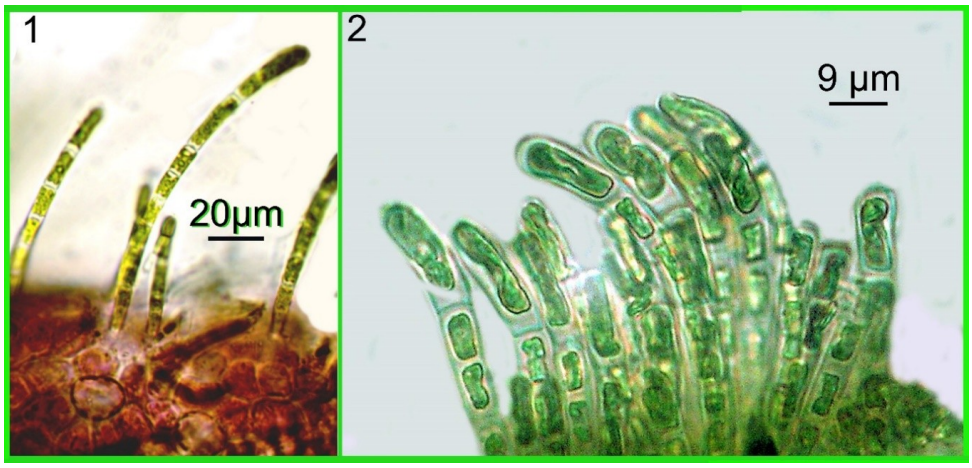


1, 2, habit.
3, fragment with propagules.
4, detail showing segments.
5, propagula.
6, newly formed propagula.
7, in habitat

Thallus filamentous, dark brown, forming dense hemispherical tufts, (2.3–)6.5–10 mm high. Branching irregular from all sides. Multiseriate filaments straight, cylindrical, (25–)30–40(–60) μm in diameter. Segments 1.0–1.5 diameters long with 1–3 or more longitudinal walls. Hairs terminal, numerous, colorless, 10–15 μm in diameter. Propagules broadly triangular in side view, with two conical arms, on 1–3-celled stalk, 125–200 μm long (from lenticular cell on the top between corner cells to the bottom), 140–160 μm across (from left to right corner). Unangia spherical, ellipsoidal, 65–80 μm in diameter, on 1-celled stalk, scattered or in groups. Plurilocular sporangia oval, on 1–4-celled stalk, borne laterally on branchlets at lower part of thallus. Attachment by intertwined rhizoids. Noted growing on dead corals blocks, stones at low intertidal and epiphytic zone, *Sargassum* spp., and *Turbinaria ornata* (He).

Phylum CHLOROPHYTA

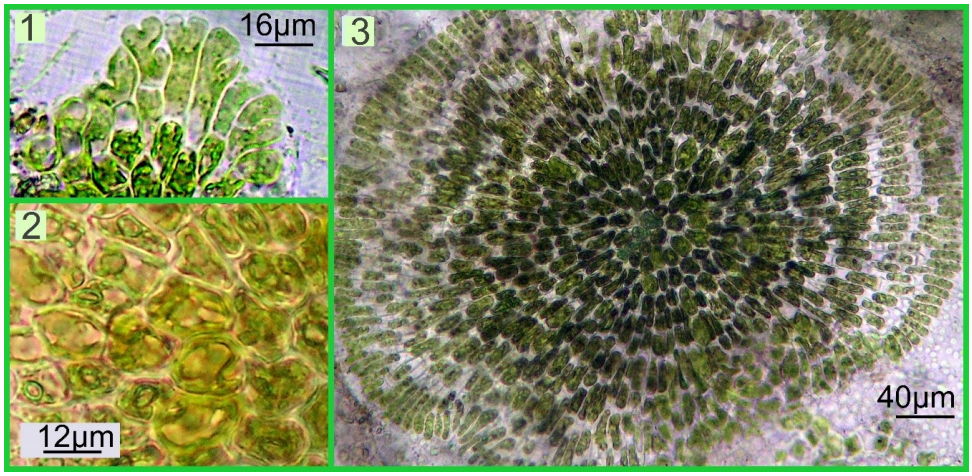
Class **Chlorophyceae**
Order **Chaetophorales**
Family **Uronemataceae**
Uronema marinum Womersley



1, plants epiphytic on *Hypnea spinella*.
2, plants epiphytic on *Anadyomene wrightii*

Thallus composed of erect, straight, or slightly curved, uniseriate and unbranched filament, up to 400 µm high, originating from conical base, forming tomentose spots, light to dark green. Filaments cylindrical, increasing in diameter from base upwards, slightly constricted (or not constricted) at cross walls, apical cell with rounded top. Cells 15–25 µm long; 5.0 µm in diameter at base and 7.5 µm in diameter at apical cells. Chloroplast single, commonly with one large pyrenoid (rarely two). Cell walls about 1 µm thick. Found growing epiphytically on *Anadyomene wrightii* (Ch), *Ceratodictyon intricatum*, *Galaxaura divaricata*, *Gelidiella acerosa*, *Gelidium pusillum*, *G. pusillum* var. *cylindricum*, *Herposiphonia secunda*, *Hypnea nidulans*, and *H. spinella*, in lower intertidal zone.

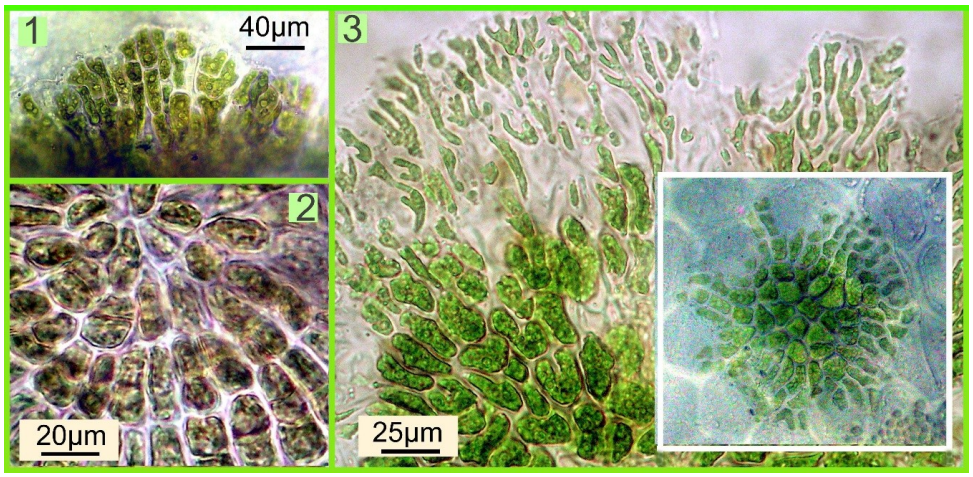
Order **Ulvales**
Family **Ulvellaceae**
Ulvella lens P. L. Crouan & H. M. Crouan



1, fragment showing marginal cells.
2, surface cells.
3, habit, epiphytic on *Siphonocladus rigidus*

Thallus microscopic, forming bright green disc-like crusts up to 5 mm in diameter, parenchymatous, at first monostromatic, 2–3 cells thick in middle portion and one-layer thick in margins. Marginal cells from surface view radially elongated, rectangular, often cuneate and distally forked, 3–8 × 10–30 µm. Cells in the middle portion irregularly arranged, almost isodiametric from surface view, 5–10(–15) µm in diameter. Hairs absent; one pyrenoid (if present). Rhizoids absent, crusts tightly adhering to substratum by whole lower surface. Noted growing on intertidal shells, on capron rope, and epiphytically on *Boergesenia forbesii*, *Cladophora catenata*, *Phyllodictyon anastomosans*, *Siphonocladus rigidus*, *Valonia ventricosa* (Ch), *Gelidium pusillum*, and *Laurencia* spp. (Rh).

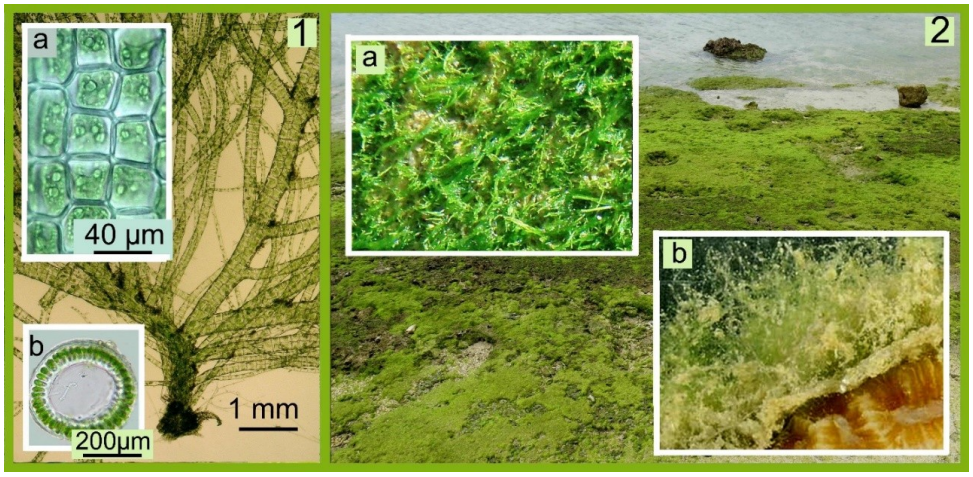
Ulvella scutata (Reinke) R. Nielsen, C. J. O'Kelly & B. Wysor



1, fragment showing marginal cells.
2, detail central portion of the disc.
3, marginal portion of the disc. Insert: habit

Thallus disc-like or of irregular shape, up to 1–2 mm in diameter, pseudo-parenchymatous, one-layer thick, bright green. Central cells roundly rectangular, cylindrical or oval, extending vertically, 6–10 × 10–12.5(–20) µm. Cells from central portion to margins in radiating series, radially elongated, rectangular or triangular (clinoid), 12–25(–30) µm long, 4–11 µm wide, often forked at periphery. Chloroplast parietal, with single pyrenoid, rarely with two pyrenoids in long cells. Colorless hairs 12–25(–30) µm long, 4–11 µm in diameter, developing in central portion of the disc, only observed in young thalli. Sporangial cells in surface view isodiametric, 22 × 38 µm. Found growing epiphytically on large algae *Caulerpa racemosa* (on bladders), *Phyllodictyon anastomosans*, *Valoniopsis pachynema* (Ch), *Padina boryana*, *P. minor* (He), *Gelidium pusillum*, and *Melanothamnus sphaerocarpus* (Rh), on seagrasses and hydroids.

Family **Ulvaceae**
Ulva clathrata (Roth) C. Agardh

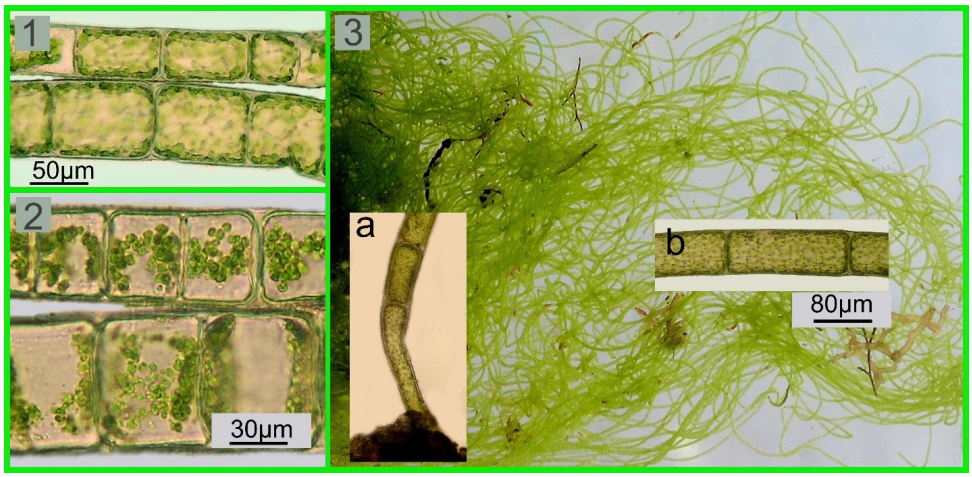


1, lower portion of the plant.
Inserts:
a, surface view showing pyrenoids;
b, transverse section.
2, in habitat.

Inserts:
a, b, habit

Thallus soft, flaccid, bright, light green to pale green, 0.5–4.5(–10) cm high, much ramified, forms dense tufts or mats. Main axis multiseriate, tapering gradually to apex. Branching irregular, repeatedly abundant. Branches initially uniseriate, becoming multiseriate below, cylindrical, hollow. Cells in surface view rectangular, quadrangular, rounded polygonal, 20–30 µm wide, 25–40(–53) µm long, in longitudinal rows in narrow branches, somewhat in transverse rows in uppermost portions of branches and unordered near the base and in mature plants. Pyrenoids 2–4(–8) *per* cell. Attachment by discoid holdfast composed of descending rhizoidal cells. Noted growing on hard substrate in middle and low intertidal zones, or epiphytically on *Cladophora* spp. (Ch), *Sargassum* spp. (He), *Bostrychia binderi*, and *Hypnea* spp. (Rh).

Family **Cladophoraceae**
Chaetomorpha ligustica (Kützing) Kützing

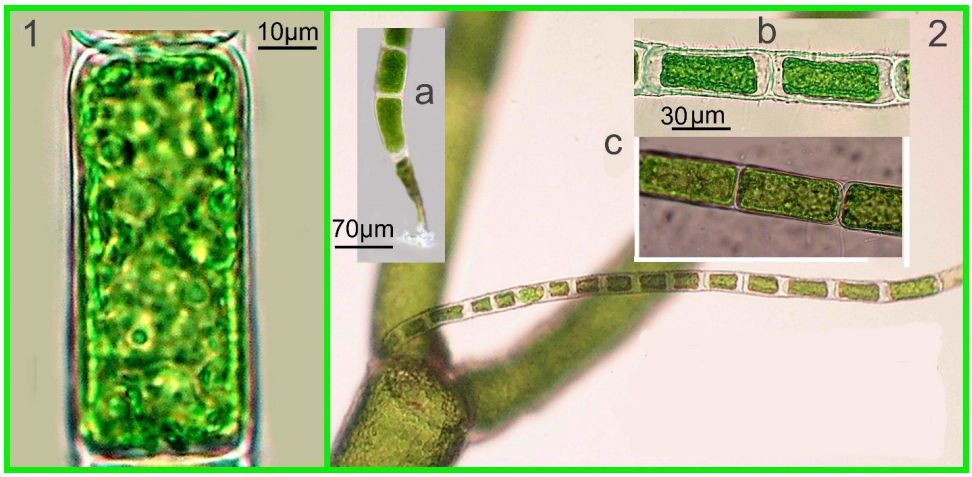


1, 2, detail showing cells with chloroplasts.
3, habit.

Inserts:
a, basal portion of filament;
b, detail showing cells

Thallus filamentous, dark green, 5–10 cm long. Filaments rather coarse, tangled, intertwined (40–)65–80(–100) µm in diameter. Cells cylindrical, 1–3(–4) diameters long. Cell walls 2–3(–5) µm thick, not constricted at joints. Basal cell 50 µm in diameter, up to 200 µm long, ending into fine, slightly lobed attachment. Found growing on hard substrata in the lower intertidal zone among turf algae, sometimes on soft grounds, or epiphytically on other algae, such as *Sargassum* spp., at sheltered sites and near to estuaries.

Chaetomorpha minima F. S. Collins & Hervey

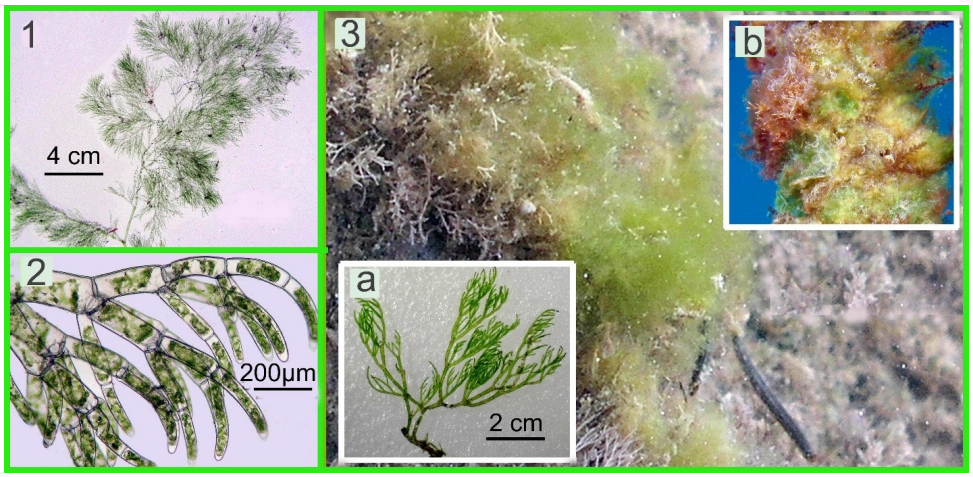


1, cell details.
2, filament epiphytic on *Cladophora vagabunda*.

Inserts:
a, basal part;
b, c, fragments of filament

Thallus filamentous, unbranched, uniseriate, epiphytic, yellowish green to dark green, up to 5(–10) mm in height, cylindrical, sometimes slightly constricted at cell walls, (10–)22.5–30(–40) µm in diameter. Cells (20–)45–80 µm long, 2–4 diameters long. Basal cell 12.5–15 µm in diameter, up to 55 µm long, ending into small disc or lobed disc-like holdfast. Noted growing on hard substratum, or epiphytically on *Cladophora vagabunda* (Ch), *Sargassum* spp. (He), *Bostrychia tenella*, and *Hypnea charoides* (Rh).

Cladophora vagabunda (Linnaeus) Hoek

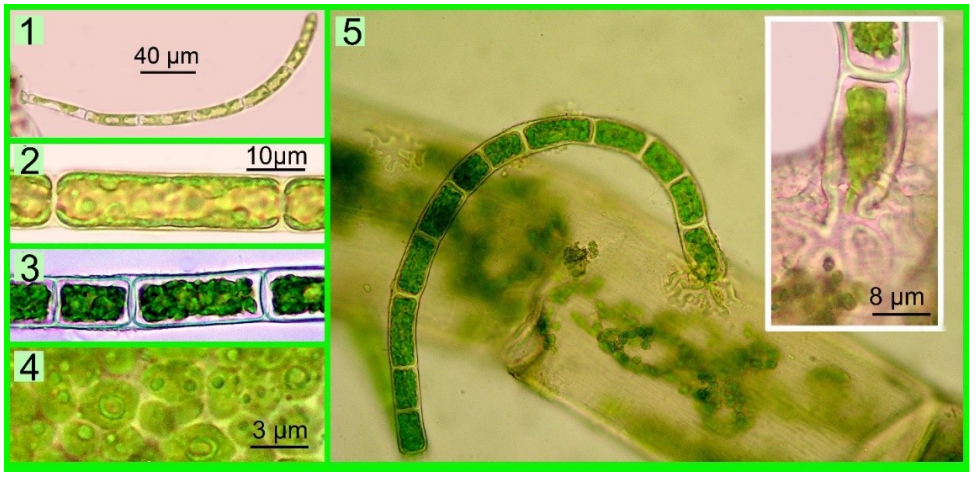


1, habit.
2, terminal branching pattern.
3, in habitat.

Inserts:
a, habit;
b, on the rope of lobster farm construction

Thallus filamentous, bushy, forming spherical masses or tufts, 3–20(–30) cm high, pale green to light green. Branching pseudo-dichotomously below, sparingly alternately, unilaterally or verticillate above (up to 5–6 branchlets), ending into densely branching terminal fascicles. Terminal branchlets arranged mainly unilaterally. Angle of ramification 50°–90°(–140°) in main axes and 25–55° in the upper portion. Cells cylindrical, barrel-shaped or clavate, slightly constricted at joints, 80–200(–300) μm in diameter, 1.5–12(–14) diameters long in main axes, above tapering to 80–130(–160) μm in diameter, 1.5–5.5(–15) diameters long. Apical cells cylindrical, curved, with rounded tips or slightly tapering, (13.5–)40–60 μm in diameter, 3.5–5(–20) diameters long. Rhizoids fine, branched, develop from basal cells. Found growing on hard substrata, shells, in intertidal rocky pools, and epiphytically on large algae *Hydroclathrus clathratus*, *Sargassum* spp. (He), *Gelidiella acerosa*, and *Hypnea cervicornis* (Rh).

Rhizoclonium riparium (Roth) Harvey



1, habit. 2, 3, fragments showing cells.
4, enlarged fragment showing chloroplast with pyrenoids.
5, habit, plant epiphytic on *Cladophora laetevirens*. Insert: basal portion

Thallus filamentous, unbranched, without lateral rhizoids, light green, up to 3 mm long. Filaments 12.5 μm in diameter at base and 17.5–19.5 μm above. Cells (10–)15–19(–20) μm in diameter, 2.5–5(–6) diameters long. Chloroplast reticulate, with numerous pyrenoids. Attachment by finger-like holdfast. Noted mostly growing epiphytically on large algae *Cladophora laetevirens*, *Ulva prolifera* (Ch), *Turbinaria ornata* (He), *Bostrychia tenella*, *Ceramium borneense*, *C. cingulatum*, *Centroceras clavulatum*, *Gracilaria salicornia*, *Millerella pannosa*, and *Pseudoceramium tenerrimum* (Rh).