

9.1.10. Living specimens

Sometimes, research is carried out on living specimens. They are put into culture for the study of life cycles, cell division, morphological variation in response to temperature, light, salinity, eutrophication, ... Therefore, small fragments (e.g. an apical branch) are isolated, delicately cleaned (to take away most of the epiphytes) and put in a large amount of seawater (+ same serial number as the herbarium specimen). In the laboratory, the fragments are brought in special vials (depending on the size of the seaweed), with enriched seawater. Depending on the research to be carried out they are brought into culture rooms with controlled light intensity, light cycle, temperature, ... This is a very intensive and time-consuming work as contamination by Bacteria or microalgae has to be checked continuously. On the herbarium label and in the data set '+L' should be added as to indicate that there is a living portion in culture. Of course this should be deleted from the data set as soon as the fragment died or is not kept in culture anymore. For further information on algal cultures, we refer to Andersen (2005).

9.1.11. Important remark

Although seaweeds are not included on the CITES-list of protected organisms, most countries require official authorisations for the export of specimens. The administration of an export permit can take up to several months. Furthermore, one should pay attention to import regulations specific to certain countries which may prohibit bringing living as well as dead plant material into the country (e.g. Australia, New Zealand). Therefore, inform yourself well and take care of starting up the necessary procedures well in advance.

9.2. Quantitative assessment of the macroalgal and seagrass flora of an area

For this chapter we refer to Leliaert & Coppejans (2004).

10. Divisions of Algae from Sri Lanka and general remarks

Voucher specimens of the taxa included in this Field Guide, collected by Eric Coppejans have been deposited in the herbarium of the Ghent University, Belgium (GENT); many more specimens, of taxa not included in this book, are also deposited in GENT. Specimens collected by Upali Mallikarachchi are deposited in the herbarium of the Botanical Garden of Peradeniya (PDA) and at the University of Ruhuna (Matara).

We do not provide identification keys as they may give the false impression that all taxa occurring along the Sri Lankan coast are included. This is definitely not the case: only the dominant species are presented.

Several genera are under monographic study in different research institutes all over the world. Molecular data indicate that the actual species concept in some of these genera (*Sargassum*, *Laurencia* / *Chondrophyucus*, *Portieria*, *Gelidium*, *Jania*, ...) have been superseded. In those cases we include some species without final identification but eventually with indication of their 'traditionally used' names.

10.1. Chlorophyta, Ulvophyceae - Green algae

Taxonomic overview of the species included in this guide. Taxa indicated with an asterisk have their type locality in Sri Lanka.

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Ulvaceae

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Ulva compressa Linnaeus

1753: 1163

Fig. 51

REFERENCES: Tseng (1984: 254, pl. 126, fig. 1, as *Enteromorpha*), Huisman (2000: 230, + figs, as *Enteromorpha*), Abbott & Huisman (2004: 48, fig. 5D, as *Enteromorpha*), Huisman *et al.* (2007: 162, + figs), Kraft (2007: 35, fig. 13).

TYPE LOCALITY: Probably Bognor, Sussex, England according to Hayden *et al.* (2003: 289).

Description - Plants gregarious, mostly in extensive (frequently monospecific) populations; thallus tubular to slightly compressed towards the apices, erect, 2-3 (-5) cm long, with some side branches or at least smaller proliferations at the (extreme) basis, generally unbranched in the upper part, monostromatic, light green to almost transparent (bleached); in surface view, the polygonal cells with rounded corners are not systematically arranged in longitudinal rows; they are about 10-15 µm in diameter; 1 (-2) pyrenoid(s) per cell.

Ecology - Epilithic on the bottom of shallow intertidal pools.

Distribution - Reported to occur globally.

Notes - *Ulva* was circumscribed to consist of green seaweeds with distromatic blades, and *Enteromorpha* was established for tubular forms. The taxonomy of both genera in Europe has been studied by Bliding (1963, 1969) and more recently by Maggs *et al.* (2007). Molecular phylogenetic studies have demonstrated that *Ulva* and *Enteromorpha* are not distinct evolutionary entities and therefore a single genus, *Ulva*, is presently recognized (Hayden *et al.* 2003).

Numerous tubular *Ulva* species have been collected in Sri Lanka, especially in lagoons. Only some are included here.

Fig. 51. *Ulva compressa*.

Ulva fasciata Delile

1813: 297, pl. 58: fig. 5

Figs 9A; 17C; 38A; 52

REFERENCES: Jaasund (1976: 5, fig. 9), Tseng (1984: 256, pl. 127, fig. 4), Trono (1997: 10, fig. 3), Abbott & Huisman (2004: 55, figs 10A-D), Coppejans *et al.* (2005: 42, fig. 9), Oliveira *et al.* (2005: 190, fig. p. 191), Huisman *et al.* (2007: 164, + fig.).

TYPE LOCALITY: Alexandria, Egypt.

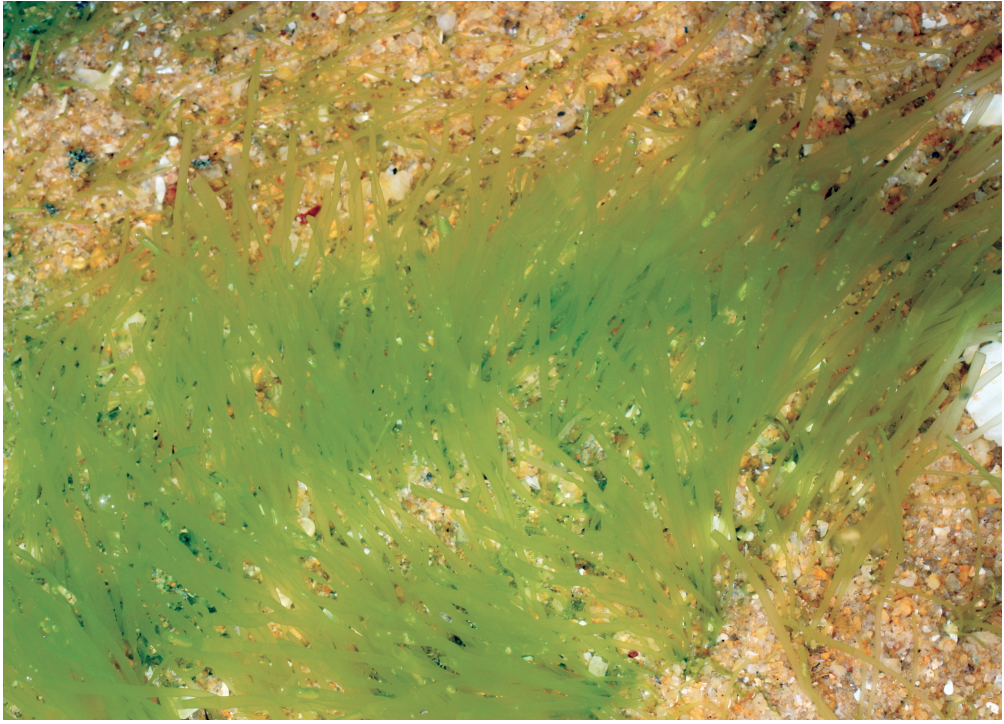
Description - Plants mostly gregarious, composed of rather tough blades, irregularly divided in long (up to 30 cm) strap-like divisions, 1-3 cm broad, gradually tapering towards their apices, undulated, especially at the margins (more rarely completely flat) and sometimes longitudinally contorted, bright green. Cells, in cross section, in two adhering layers, isodiametric or broader (parallel with the surface) than long; one (occasionally two) pyrenoid(s) per cell. Young specimens as well as plants growing in their upper ecological range, have rounded lobes and form pompon-like structures.

Ecology - Epilithic in the high intertidal zone, as well in pools as air-exposed and continuously wave-swept, frequently hanging down from vertical walls.

Distribution - Widespread in tropical to warm-temperate regions.

Note - Taxonomic details of *U. fasciata* are provided by Aguilar-Rosas (2005).

Fig. 52. *Ulva fasciata*.



Ulva intestinalis Linnaeus

1753: 1163

Figs 26B; 53

REFERENCES: Tseng (1984: 254, pl. 126, fig. 3, as *Enteromorpha*), Trono (1997: 8, fig. 2, as *Enteromorpha*), Abbott & Huisman (2004: 49, figs 7A-C, as *Enteromorpha*), Coppejans *et al.* (2005: 42), Skelton & South (2007: 231, figs 636-640).

TYPE LOCALITY: 'in Mari omni'.

Description - Plants gregarious, mostly in extensive (monospecific) vegetations, unbranched, but small proliferations can be present; thin cylindrical at the basis, becoming inflated to irregularly bulbose and constricted higher up, monostromatic; in sheltered lagoons, specimens become up to 30 cm long, the lumen being inflated with air bubbles, making the upper parts of the thallus floating on the water surface; bright green when young, bleached and yellowish green in older specimens. Cells in surface view irregularly arranged, 1-2 pyrenoids per cell.

Ecology - Epilithic in sheltered intertidal pools but best developed in sheltered lagoons where it can grow in huge quantities and seem loose-lying.

Distribution - Widespread globally.

Fig. 53. *Ulva intestinalis*.

Ulva lactuca Linnaeus

1753: 1163, pl. 2

Fig. 54

REFERENCES: Trono (1997: 12, fig. 4), Payri *et al.* (2000: 64, figs p. 65), Oliveira *et al.* (2005: 190, fig. p. 191), Kraft (2007: 46, fig. 18).

TYPE LOCALITY: Sweden.

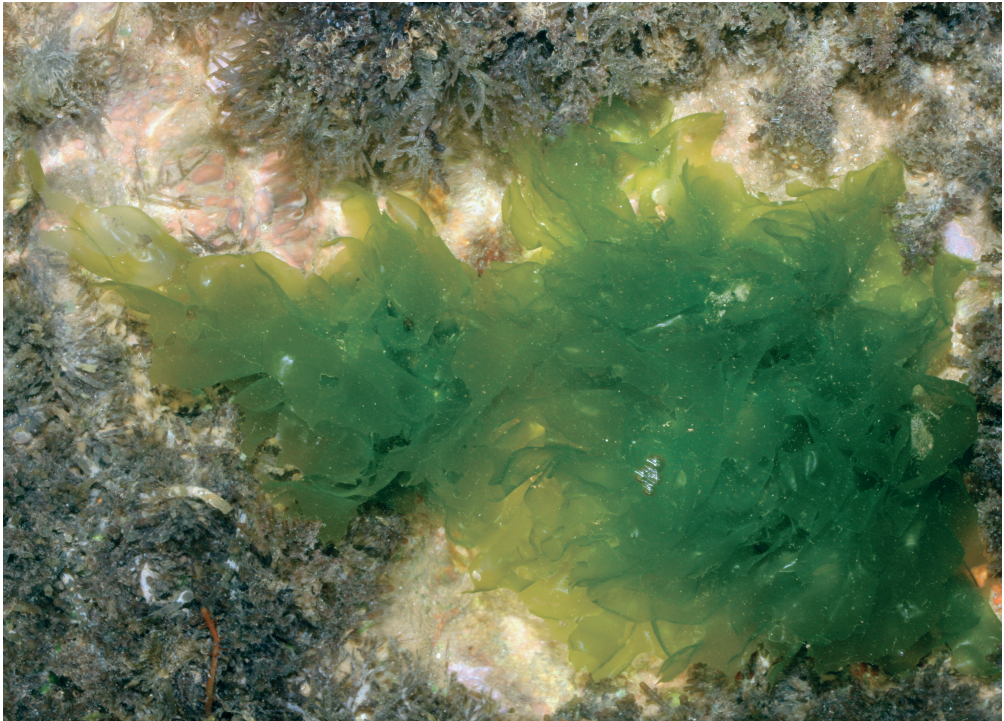
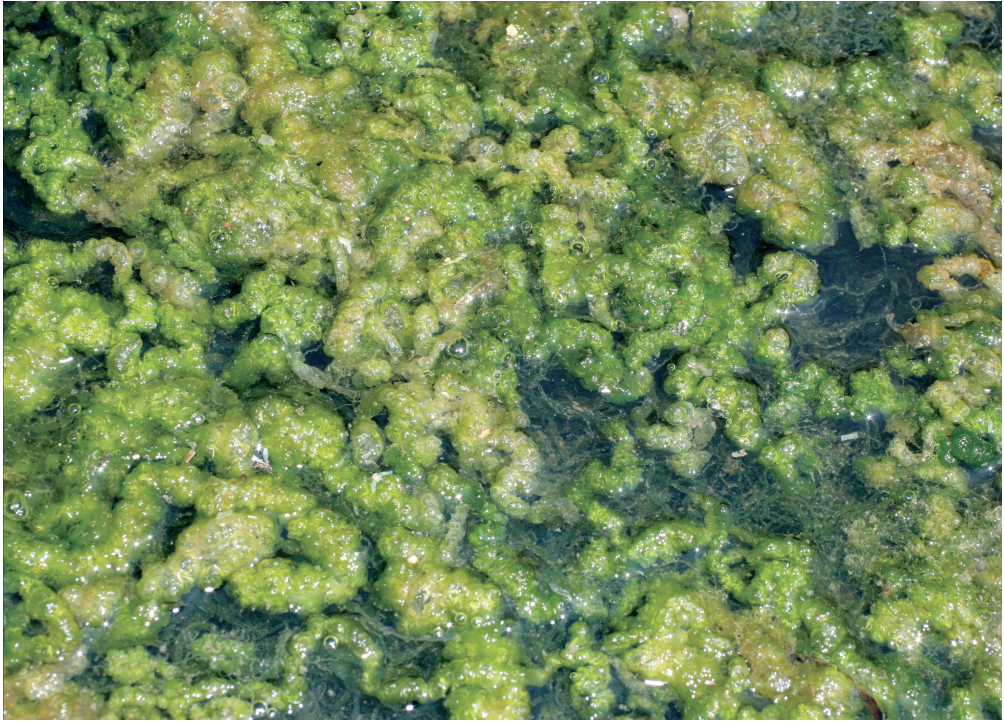
Description - Plants forming large, supple, orbicular to lobed, shortly stipitate blades, up to 20 cm long, markedly undulated all over, bright green; round perforations can be present; cells in surface view angular, mostly containing a single (but up to 2) pyrenoid(s); in transverse section the blade is 50-60 μm thick in the median part, up to 80-100 μm in the basal part where rhizoid-producing cells are abundant; cells isodiametric to slightly elongated, perpendicular to the blade surface.

Ecology - Epilithic in shallow intertidal pools.

Distribution - Reported globally.

Note - Extremely abundant in pools along the beach as a result of eutrophication, at sites with numerous hotels.

Fig. 54. *Ulva lactuca*.



***Ulva pertusa* Kjellman**

1897b: 4-7, pl. 1, pl. 3: figs 1-8

Fig. 55

REFERENCES: Jaasund (1976: 3, fig. 7), Tseng (1984: 258, pl. 128, fig. 2), Trono (1997: 13, fig. 5).

SYNTYPE LOCALITIES: Various in Japan.

Description - Thallus blade-like, rather thick and stiff, especially at the basis, thinner upwards, oval, sub-orbicular to irregularly lobed and lacerated, 10-15 cm long, undulated and wrinkled at the basis and at the margin, irregularly perforated with smaller and larger holes with smooth margin, light green when fully grown. Basis of the blade up to 500 µm thick as a result of the numerous rhizoids being formed between the two adhering cell layers, median parts about 100 µm, without internal rhizoids; on transverse section, cells elongated, perpendicular to the blade surface, about two to three times as long as wide resulting in a palisade-like appearance; chloroplasts 'cap-like' in surface view, those of cell pairs away from each other resulting in almost transparent lines where cells are arranged in short rows; 1-2 (-3) pyrenoids per cell.

Ecology - Epilithic in the intertidal and on coral debris on sand about mean low tide.

Distribution - Mentioned from several localities in the Indian Ocean, but also from the Pacific and Atlantic Ocean (California, Europe).

Notes - The morphology and distribution of *U. pertusa* is specified in López *et al.* (2007).

Typical for this species are the irregularly placed, isolated, small perforations of different sizes, with a smooth margin. Durairatnam (1961: 17, pl. 1: fig. 2, pl. 21, fig. 1) mentions *U. fenestrata* Postels et Ruprecht from Sri Lanka, a species described from Siberia. The perforations in the blades of the latter species are crenulate. *Ulva lactuca* Linnaeus, morphologically similar to *U. pertusa*, has only a single pyrenoid per cell (only rarely 2).

Fig. 55. *Ulva pertusa*.

***Ulva prolifera* O.F. Müller**

1778: 7, pl. DCCLXIII(1)

Fig. 56

REFERENCES: Tseng (1984: 256, pl. 127, fig. 1, as *Enteromorpha*), Abbott & Huisman (2004: 52, fig. 8D, as *Enteromorpha*).

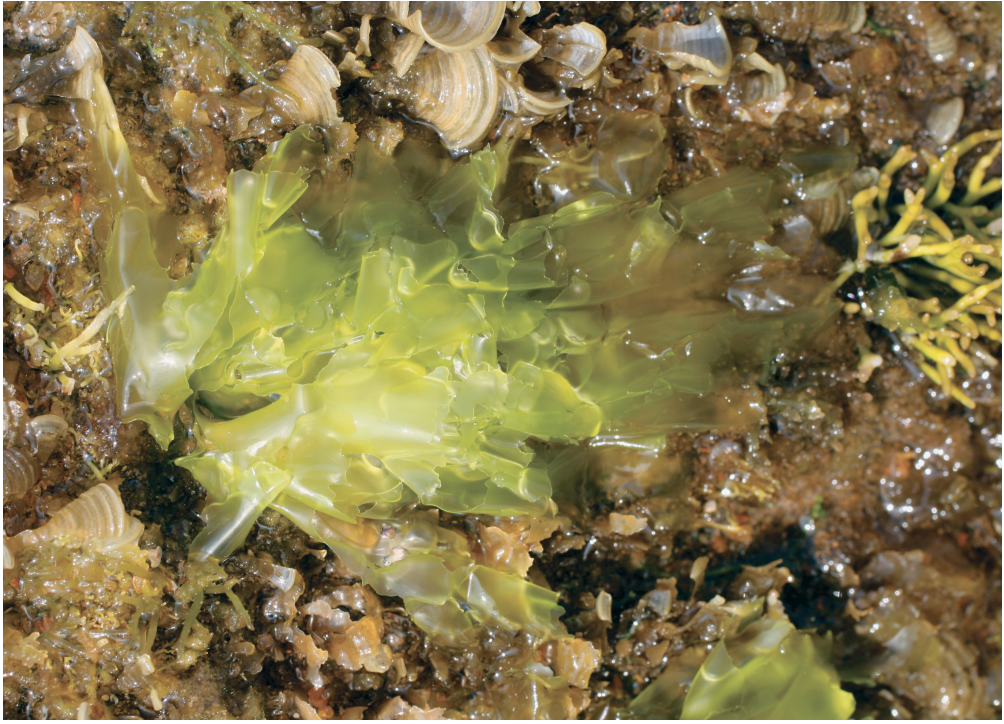
TYPE LOCALITY: Denmark.

Description - Plants growing in densely intricated masses, where individual specimens are difficult to separate, up to 10 cm long, light green; thalli regularly tubular (not constricted nor compressed), all axes extremely thin, slender and supple, with rather similar diameter (1 mm or less), the main axis richly, radially branched, the side branchlets not branched again; cells small, rectangular (about 9-12 x 8-9 µm) to square, markedly arranged in longitudinal rows and partly also in transverse rows; one (rarely two) pyrenoid(s) per cell.

Ecology - On shell fragments on the shallow, silty-sandy bottom at the margin of a sheltered lagoon.

Distribution - Reported worldwide.

Fig. 56. *Ulva prolifera*.



Ulva reticulata Forsskål

1775: 187

Figs 39C; 57

REFERENCES: Jaasund (1976: 3, fig. 5), Magruder & Hunt (1979: 33, fig. 2, p. 32), Moorjani & Simpson (1988: 16, pl. 29c), Calumpang & Meñez (1997: 101, + fig.), Trono (1997: 15, fig. 6), Abbott & Huisman (2004: 57, figs 11A-B), Oliveira *et al.* (2005: 190, fig. p. 191), Huisman *et al.* (2007: 163, + figs).

SYNTYPE LOCALITIES: «Gomfodae» (Al-Qunfudhah), Saudi Arabia, Mokha, Yemen.

Description - Thallus without recognizable holdfast, mostly strap-shaped, less frequently irregularly lobed, exceeding 30 cm in diameter, completely perforated, with larger and smaller holes side by side, up to the blade margin, resulting in a bright green net-like structure, the hole area exceeding the blade network; straps 3-10 mm wide; blade 40-80 µm thick, composed of two adhering layers of rectangular cells, perpendicular to the blade surface, resulting in a palisade-like appearance.

Ecology - Entangled to other algae in the whole intertidal zone and shallow subtidal.

Distribution - Reported from all over the Indian Ocean as well as from the western Pacific Ocean and South America (Chile and Venezuela).

Fig. 57. *Ulva reticulata*.

Ulva rigida C. Agardh

1823: 410-411

Fig. 58

REFERENCES: Jaasund (1976: 3, fig. 8), Littler & Littler (2000: 306, fig. p. 307), Abbott & Huisman (2004: 57, figs 12A-D), Coppejans *et al.* (2005: 44, fig. 11), Oliveira *et al.* (2005: 190, fig. p. 191), Kraft (2007: 46, fig. 19).

LECTOTYPE LOCALITY: Cádiz, Spain.

Description - Plants mostly gregarious, forming small rosettes of relatively stiff bladelets 2-3 cm in diameter at air- and surf-exposed sites, becoming up to 10 cm in more sheltered pools; bladelets orbicular, undulated, lobed, with smooth surface and small, pluricellular, marginal teeth; dark green. Cells, in cross section in two adhering layers, broader (parallel with the surface) than long to isodiametric close to the blade margins, to narrower than long towards the central part of the blades, then resulting in a palisade-like appearance. Two to five pyrenoids per cell.

Ecology - Epilithic, along surf-exposed coasts, mostly in the upper intertidal.

Distribution - Reported worldwide.

Fig. 58. *Ulva rigida*.



***Chaetomorpha antennina* (Bory de Saint-Vincent) Kützing**

1847: 166.

Figs 9D; 13F; 17A; 59

REFERENCES: Tseng (1984: 262, pl. 130, fig. 1), Lewmanomont & Ogawa (1995: 41, + fig.), Cribb (1996: 21, bottom fig. p. 20), Payri *et al.* (2000: 68, top fig. p. 69), Abbott & Huisman (2004: 66, figs 18A-D), Coppejans *et al.* (2005: 46, fig. 14), Huisman *et al.* (2007: 170, + figs), Kraft (2007: 51, figs 21A-D).

TYPE LOCALITY: Réunion.

Description - Plants forming 1-10 cm high, erect, isolated, characteristic brush-like tufts, composed of rigid, unbranched, septate filaments, dark to bright green. Attachment to the substratum by rhizoids sprouting from the base of the basal cells, resulting in a profusely branched, stoloniferous rhizoidal system. Basal holdfast cells elongated, thick walled, with proximal, annular constrictions, 400-700 µm in diameter at the distal end, up to 7.5 mm long. Other cells of the filaments subcylindrical, 400-750 µm in diameter, 700-1000 µm long, gradually becoming broader and barrel-shaped upwards. Filaments of reproductive specimens with white tips that erode easily, resulting in a gradual diminishing size of the plants.

Ecology - Epilithic in high intertidal, best developed on the seaward side of rocks along surf-exposed coasts.

Distribution - Widespread in tropical and subtropical seas.

Notes - Ten *Chaetomorpha* species have been recorded for Sri Lanka (Silva *et al.* 1996). *Chaetomorpha antennina* can be easily distinguished from other attached *Chaetomorpha* species in the region (e.g. *C. aerea*, *C. indica*) by the characteristic brush-like tufts and basal cell with annular constrictions. Some common *Chaetomorpha* species occurring in the Indian Ocean are discussed by Sartoni (1992).

Some tufts of *Chaetomorpha antennina* are pinkish as a result of numerous tiny red algal epiphytes (*Acrochaetium*).

Fig. 59. *Chaetomorpha antennina*.

***Chaetomorpha crassa* (C. Agardh) Kützing**

1845: 204

Figs 21A; 60

REFERENCES: Jaasund (1976: 5, fig. 10), Lawson & John (1987: 66), Moorjani & Simpson (1988: 14, pl. 19), Littler *et al.* (1989: 32, fig. 2, p. 33), Sartoni (1992: 299, fig. 4E), Lewmanomont & Ogawa (1995: 42, + fig.), Calumpong & Meñez (1997: 110, fig. p. 111), Trono (1997: 18, fig. 8), Oliveira *et al.* (2005: 194, figs p. 194).

SYNTYPE LOCALITIES: Trieste and Venezia, Italy; England.

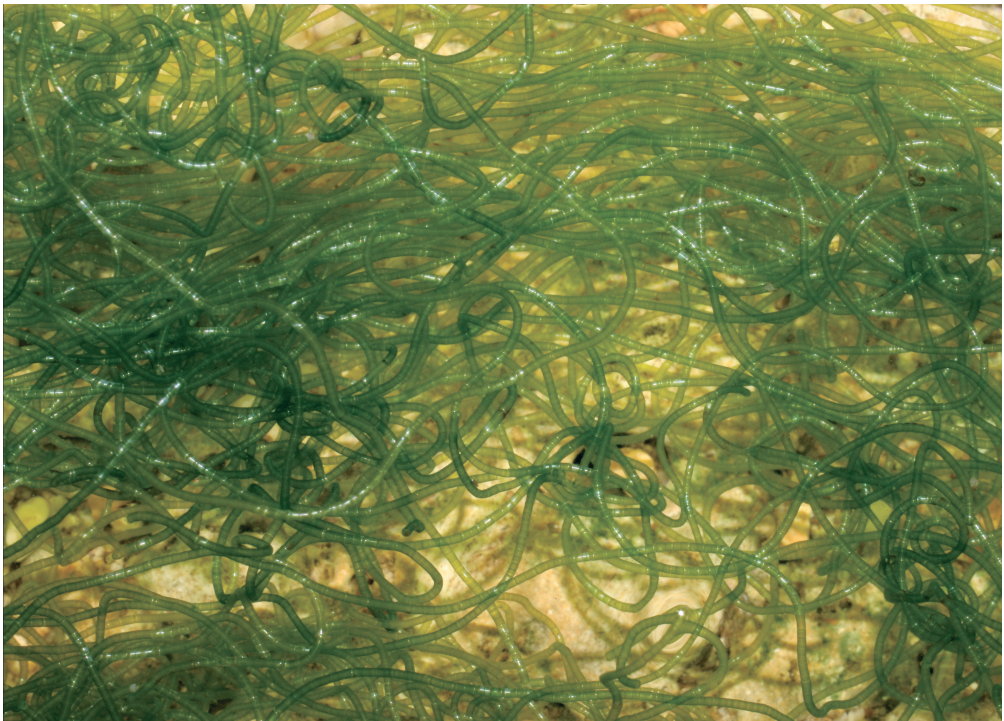
Description - Plants forming loose-lying clumps or entangled tufts with other algae of intricately thick, tough, curly, unbranched, mostly dark green filaments (sometimes with a bluish hue). Cells visible with the naked eye, (395-) 450-650 (-685) µm in diameter, mostly as long as broad, but up to twice as long (just before cell division even sometimes up to 1 mm long). Some specimens with marked constrictions at the transverse walls (resulting in barrel-shaped cells), others more cylindrical.

Ecology - Present in the whole intertidal zone, most frequent in low to middle intertidal pools, entangled with other algae.

Distribution - Pantropical.

Note - DNA sequence data has shown that *C. crassa* from Europe is conspecific with *C. linum* and that the tropical species, referred to as *C. crassa* constitutes a new species (Leliaert & Boedeker 2007). The latter can be easily distinguished from other unattached *Chaetomorpha* species by the coarse filaments.

Fig. 60. *Chaetomorpha crassa*.



Chaetomorpha spiralis Okamura

1903: 131-132, pl. XCV

Figs 35A; 61

REFERENCES: Tseng (1984: 262, pl. 130, fig. 3), Sartoni (1992: 299, fig. 5A), Coppejans *et al.* (2000: 62, fig. 24), Abbott & Huisman (2004: 70, fig. 19B).

TYPE LOCALITY: Nemoto, Boshu Province (Chiba Prefecture), Japan.

Description - Some plants gregarious, others solitary, 5-20 (-30) cm long, growing in open populations between other algae; basal parts of the stiff, unbranched filaments coiled or at least markedly sinuous, dark green; upper parts straight or slightly sinuous, light green; diameter in the basal parts 500-750 μm , where the cells are cylindrical and isodiametric, gradually becoming beadlike and reaching a diameter of 1 mm at the filament apices.

Ecology - In shallow, low intertidal rock pools with sandy bottom; continuously wave-swept.

Distribution - Tropical and temperate Indian and Pacific Ocean.

Fig. 61. *Chaetomorpha spiralis*.

Cladophora herpestica (Montagne) Kützing

1849: 415

Fig. 62

REFERENCES: Huisman (2000: 239, + figs), Coppejans *et al.* (2005: 54, fig. 22, as *Cladophoropsis herpestica*), Kraft (2007: 85-89, fig. 36), Skelton & South (2007: 245, figs 676-677).

TYPE LOCALITY: Bay of Islands, New Zealand.

Description - Plants forming compact, rigid, hemispherical to horizontally spread cushions, firmly attached to the substratum, about 2 cm thick, composed of densely set, rather stiff, straight, erect, radially arranged, strongly entangled branchlets; upper part light green, inner part dark green; attachment to the substratum by basal hapteroid rhizoids and by rhizoids sprouting from the proximal pole of cells in any part of the thallus; rhizoids in upper parts of the cushions horizontally directed and hereby consolidating the structure. Cells of the filaments generally each producing a single lateral at their apical pole, mostly unilaterally placed; at increasing distance from the apex a cell may give off a second branch; cross wall formation at the base of the laterals markedly delayed; older laterals eventually displacing the main axes, which then appear as lateral appendages. Filaments generally branching to the 1st or 2nd order. Apical cells and cells of the terminal branch systems subcylindrical, generally curved or sinuous, 120-450 μm in diameter, up to 10 mm long. Cell walls up to 90 μm thick in the basal cells, coarsely striated longitudinally. Tetrahedral protein crystals present in most cells.

Ecology - Epilithic, just above low water mark, air-exposed at low tide but continuously wave-swept; surf exposed coasts.

Distribution - Widely distributed in the tropical to subtropical Indo-Pacific.

Notes - This species has been placed in *Cladophoropsis* based on the typical branching pattern but is returned to its original genus by Leliaert *et al.* (2007) based on DNA sequence data.

Cladophora is a large and common green algal genus with a worldwide distribution in marine as well as freshwater habitats. The taxonomy of the genus has been studied by van den Hoek (1963, 1982), van den Hoek & Chihara (2000), Leliaert & Coppejans (2003) and Leliaert & Boedeker (2007). Molecular phylogenetic studies have demonstrated that the genus is polyphyletic (Leliaert *et al.* 2003, 2007).

This is a new species for Sri Lanka.

Fig. 62. *Cladophora herpestica*.



Cladophora prolifera (Roth) Kützing

1843: 271

Fig. 63

REFERENCES: Lawson & John (1987: 75, pl. 4, fig. 5); Moorjani & Simpson (1988: 14, pl. 22); Lewmanomont & Ogawa (1993: 44, + fig.); Leliaert & Coppejans (2003: 32-33, figs 6A-C), Oliveira *et al.* (2005: 195, fig. p. 195); Leliaert & Boedeker (2007: 166-167, figs 78, 79).

TYPE LOCALITY: "in mare Corsicam".

Description - Plants erect, coarse, growing as stiff tufts, 2-4 cm high, locally in extensive populations; thallus composed of densely branched, fastigiated filaments, dark green (blackish when dried); old cells in the basal and middle part of the thallus each giving off one rhizoid with annular constrictions at their basal poles; these rhizoids growing down along the cell or cells below, where they entangle and form a conspicuous stipe attaching to the substratum; growth by apical cell division, later combined with intercalary growth; each subapical cell forming a lateral, often immediately after being cut off from the apical cell: lower down a second or even a third lateral can be formed; apical cells cylindrical with rounded tip, 90-130 µm in diameter, length/width ratio 2,5-5,5; cells of the terminal branch systems cylindrical, 150-200 µm in diameter, l/w ratio 2,5-8, increasing towards the base of the thallus; cells of the main axes and basal cells elongated and club-shaped, up to 200 µm in diameter, l/w ratio 7-10; basal parts often with annular constrictions; rhizoids 40-100 µm in diameter.

Ecology - Epilithic in surf channels just under low water mark or in the wave-exposed lower intertidal.

Distribution - Widespread in tropical to warm temperate seas. Also recorded from the British Isles.

Fig. 63. *Cladophora prolifera*.

Cladophora sericea (Hudson) Kützing

1843: 264

Figs 17B; 64

REFERENCES: van den Hoek (1963: 77-92, pls 17-21), Abbott & Huisman (2004: 77, fig. 22E), Leliaert & Boedeker (2007: 172-174, fig. 84).

TYPE LOCALITY: Sheerness, Kent, Great Britain.

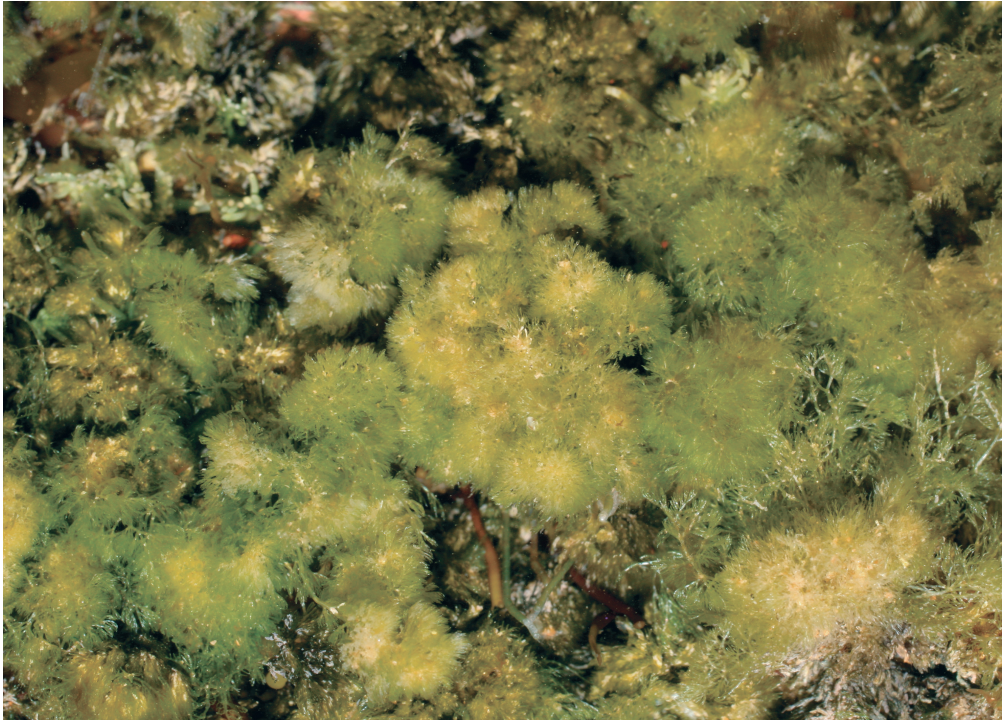
Description - Plants light green, forming lax tufts or threads, to 7 cm tall, frequently in dense populations covering large areas of rocks; thallus composed of pseudodichotomously branching main axes, densely set with branches of various lengths; attachment to the substratum by branching rhizoids developing from the basal cells; growth mainly by intercalary cell division, many new cells each producing a branch at their apical pole, thus giving rise to rows of branches that are similar in age, or young (shorter) ones intercalated between older (longer) ones. Cells generally producing a single branch, but older cells may produce a second or sometimes a third branch. Apical cells cylindrical to slightly tapering, diameter (22-) 25-35 (-38) µm; cells of the main axes cylindrical, up to 100 µm in diameter.

Ecology - Epilithic in the high intertidal, on the landward side of rock boulders along surf-exposed coasts; continuously wave-swept, but rarely really inundated.

Distribution - Reported worldwide; in the Indian Ocean this species has until now only been reported from Réunion, Singapore and South Africa.

Note - *Cladophora sericea* is part of a closely related species complex, also including *C. albida*, *C. capensis*, *C. flexuosa* and *C. opaca* (Bakker *et al.* 1995).

Fig. 64. *Cladophora sericea*. A. A population *in situ*; B. Detail of non-acropetal growth.



Cladophora socialis Kützing

1849: 416

Fig. 65

REFERENCES: Leliaert & Coppejans (2003: 51, fig. 3), Abbott & Huisman (2004: 78, figs 23A-C), Oliveira *et al.* (2005: 196, + fig.).

TYPE LOCALITY: Tahiti.

Description - Plants forming a dense, supple filamentous cover on the phorophyte, dark green; filaments densely branched, interwoven, well attached by uni- and multicellular rhizoids arising from the proximal poles of the short basal cells; upright branch systems 1-1.5 cm high, branching at wide angles (45-90°); mostly a single lateral per cell; newly formed laterals often without cross-walls at their base; in older laterals cross-walls are steeply inclined to the parent cell; apical cells cylindrical with rounded tip, 23-27 µm in diameter, l/w ratio 10-25; basal cells cylindrical, 60-120 µm in diameter.

Ecology - Epiphytic on *Galaxaura filamentosa*, in a rock pool in the low intertidal, continuously wave-swept.

Distribution - Widespread in tropical and subtropical waters.

Notes - *C. socialis* closely resembles *C. coelothrix* Kützing from which it differs by its smaller cell diameter. The latter is more frequent along the Sri Lankan shores. A new species for Sri Lanka.

Fig. 65. *Cladophora socialis*.

Cladophora vagabunda (Linnaeus) van den Hoek

1963: 144

Figs 21B; 66

REFERENCES: Sartoni (1992: 304; figs 6C-E), Trono (1997: 20, fig. 9), Coppejans *et al.* (2005: 50, fig. 19), Abbott & Huisman (2004: 79, figs 24A-D), Oliveira *et al.* (2005: 196, fig. p. 196), Kraft (2007: 80, fig. 33).

LECTOTYPE LOCALITY: Selsey, Sussex, England.

Description - Plants forming lax tufts, 1 to 3 cm tall, frequently in extensive populations; thallus composed of pseudodichotomously branching main axes, typically ending in densely branched fasciculate terminal branch systems, light green; attached to the substratum by branching rhizoids developing from the basal cells; terminal branch systems distinctly acropetally organized, (refracto-) falcate. Cells producing one to three (sometimes four) branches. Apical cells cylindrical, with rounded tips or slightly tapering, diameter (35-) 45-55 µm; cells of the main axes cylindrical, 180-210 µm in diameter.

Ecology - Epilithic or epiphytic (on *Gracilaria corticata*) in shallow, low intertidal pools.

Distribution - Reported worldwide.

Fig. 66. *Cladophora vagabunda* (herbarium specimens).



***Rhizoclonium africanum* Kützing**

1853: 21, pl. 67: fig. II

Figs 16D; 67

REFERENCES: Egerod (1974: 135-136, figs 10-12), Sartoni (1986: 361, fig. 3C; 1992: 305, fig. 7A), Lawson & John (1987: 80, pl. 5, figs 2-3), Cribb (1996: 35, top fig. p. 34), Payri *et al.* (2000: 70, top fig. p. 71), Abbott & Huisman (2004: 82, fig. 25A), Kraft (2007: 56, figs 22F-H), Skelton & South (2007: 241, figs 650-658).

TYPE LOCALITY: "Senegambien" (Senegal or Zambia).

Description - Forming woolly structures as a result of the intertwined, unbranched, curled filaments; light green; extremely well attached to the substratum by basal and intercalary hapteroidal holdfasts; filaments 70-85 µm in diameter, cells 2-3 times as long as wide with a stratified wall, 12-15 µm thick; remarkable are the abrupt changes in growth direction (frequently perpendicular) often after an enlarged cell.

Ecology - Crevices of eroded fossil coral platforms or beach sandstone, above high tide level (higher than the *Bostrychia* level and just under the lowermost terrestrial plants); not covered by seawater for long periods; accumulating terrestrial debris; mostly along vertical walls, the tips of the filaments hanging like beard-like structures out of the crevices, but also in small cavities of the horizontal surface where the plants form woolly tufts.

Distribution - Widespread in tropical regions.

Fig. 67. *Rhizoclonium africanum*. A. Habit *in situ*; B. Microscopic detail.

***Boergesenia forbesii* (Harvey) J. Feldmann**

1938: 1503-1504

Fig. 68

REFERENCES: Jaasund (1976: 15, fig. 31), Tseng (1984: 272, pl. 135, fig. 3), Sartoni (1992: 306, fig. 7b), Lewmanomont & Ogawa (1995: 27, + fig.), Cribb (1996: 11, bottom fig. p. 10), Calumpong & Meñez (1997: 92, fig. p. 93), Trono (1997: 21, fig. 10), Leliaert *et al.* (1998: 184, fig. 13), Huisman (2000: 237, + fig.), Littler & Littler (2003: 202, middle fig. p. 203), Oliveira *et al.* (2005: 198, + fig.), Ohba *et al.* (2007: 18, + figs), Skelton & South (2007: 249, fig. 669).

SYNTYPE LOCALITIES: Ryukyu-retto, Japan; Sri Lanka.

Description - Plants mostly gregarious, radially arranged, more rarely solitary; thalli composed of a single, inflated, club-shaped and curved cell (at least at the basis), 2-4 cm long, 10-15 mm in diameter at the widest part, bright light green; presence of basal annular constrictions differentiating them from *Valonia*-species; attachment by small pad-like structures but clustered cells connected with each other by a septate stoloniferous rhizoidal system.

Ecology - Epilithic in the mid-intertidal, air-exposed at low tide but continuously wave-swept. Not frequently observed along the studied Sri Lankan coast.

Distribution - Widespread in the tropical Indo-Pacific.

Fig. 68. *Boergesenia forbesii*.