

A CATALOGUE OF THE MARINE BENTHIC ALGAE OF THE SISARGAS ISLANDS (N.W. IBERIAN PENINSULA, SPAIN)

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With 1 figure and 1 table

ABSTRACT. A first catalogue of the seaweeds of Sisargas Islands (A Coruña, N.W. Iberian Peninsula) is presented. We catalogue 231 taxa (12 Cyanophyta, 151 Rhodophyta, 42 Phaeophyta and 26 Chlorophyta). Several of these taxa are interesting from a biogeographical point of view: *Acrochaetium naumannii* -restricted until now to the Cape Verde Islands and the New Zealand coast-, *Amphiroa van-bosseae*, *Callithamniella tingitana* and *Lithophyllum frondosum*. Moreover, many other taxa are corologically noteworthy; p.e.: *Aphanocapsa elachista*, *Aglaothamnion diaphanum*, *A. gallicum*, *A. pseudobyssoides*, *A. tripinnatum*, *Antithamnion densum*, *Hildenbrandia crouanii*, *Osmundea truncata*, *Petrospongium berkeleyi*, *Scytosiphon dotyi*, *Ulva bifrons* and *Ulvella setchellii*.

KEY WORDS: Marine benthic algae, flora, Atlantic Ocean, Galicia, Iberian Peninsula.

INTRODUCTION

Research on marine benthic algae on the Atlantic coast of the Northwest of Iberian Peninsula traditionally are made inside the geological complexes called *rías*. On the stretch of coast near Sisargas Islands have been studied the Ría de Ferrol (GRANJA *et al.*, 1992), Ría de A Coruña (BÁRBARA *et al.*, 1995; 1996), Ría de Corme y Laxe (PÉREZ-CIRERA, 1976), Ría de Camariñas (FISCHER-PIETTE & SEOANE CAMBA, 1963), but we not have many data about the floristic richness of exposed coasts, only from the coast of Camelle (PÉREZ-CIRERA & MALDONADO, 1982), and specially from its islands. The low grade of alteration of Sisargas Islands (because of its inaccessibility) and the absolute ignorance of their marine flora increase

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the interest of its study.

The Sisargas Islands are situated on the Northwest coast of Iberian Peninsula ($43^{\circ}21'N$, $8^{\circ}23'W$) (see fig. 1). The archipelago is formed by three islands, separated 500 m from the continent. The total area of the archipelago is about 1 km² and the coastline takes up to 6,5 km long. Wave exposure grade is high, specially on the North side. Rocky bottoms are the most common and the sandy ones only appear in small areas.

From autumn to winter, the temperature of the seawater is homogeneous and ranges between 13-14°C, whereas in spring-summer thermic stratification forms the seasonal thermocline and the temperature at the surface reaches 17°C. The salinity of the seawater is about 35‰ all year round and in summer there are upwelling phenomenons of NACW (North Atlantic Central Water) full of nutrients (VALDÉS *et al.*, 1991).

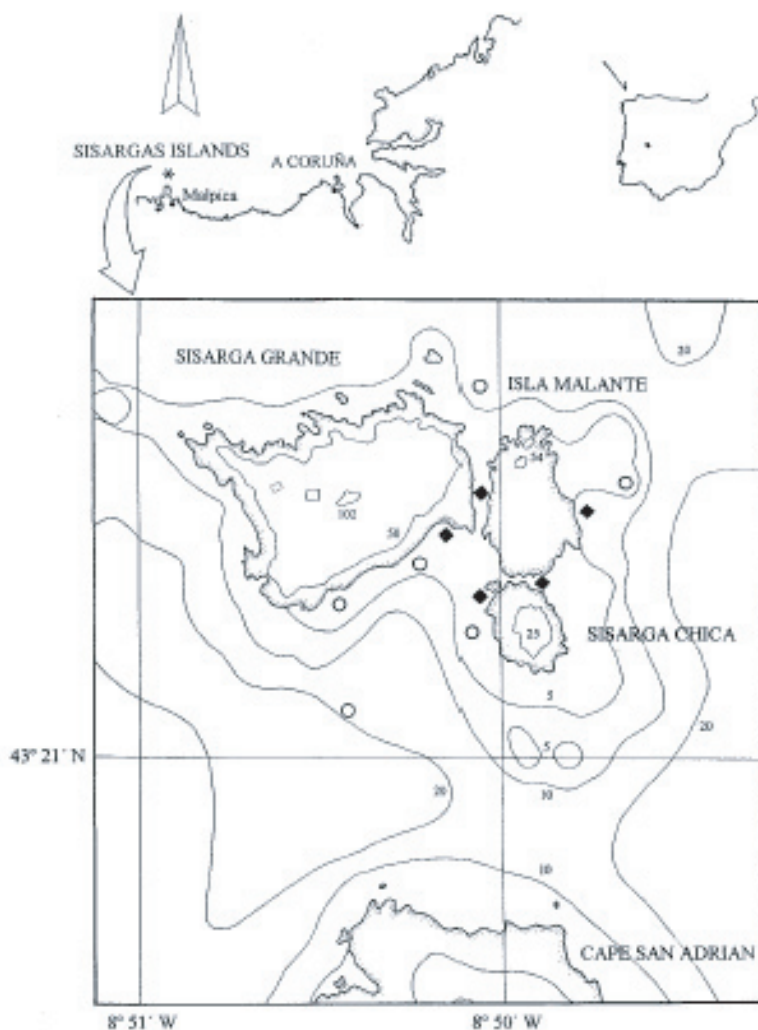


Fig. 1 - Location of Sisargas Islands on Iberian Peninsula coast, showing intertidal (◆) and sublittoral (○) sampling stations. Depths in meters.

MATERIAL AND METHODS

Seven sampling trips were made from 1993 to 1996, in a total of five intertidal and six sublittoral stations. Sublittoral stations were sampled by SCUBA diving till up to 22 meters of depth. Specimens were preserved in 4% formalin seawater at 4°C in the dark until its study. Voucher specimens (over 600 herbarium sheets) are deposited at the herbarium SANT-*Algae* of the University of Santiago de Compostela. Furthermore semi-permanent slides were prepared by mounting 20-25% aqueous Karo® corn-syrup.

RESULTS

Floristic catalogue

In total 231 taxa were identified, comprising 12 Cyanophyta, 151 Rhodophyta, 42 Phaeophyta and 26 Chlorophyta (Table 1).

Taxonomic treatment follows the classical criteria of GEITTLER (1942) for Cyanophyta. In Rhodophyta we follow GARBARY & GABRIELSON (1990), with the addition of Ahnfeltiales (MAGGS & PUESCHEL, 1989), Gracilariales (FREDERICQ & HOMMERSAND, 1989) and Plocamiales (SAUNDERS & KRAFT, 1994). In Acrochaetiales we follow a multigeneric view according to STEGENGA (1985). Phaeophyta are arranged according to BOLD & WYNNE (1985) and in Chlorophyta we follow HOEK *et al.* (1988). Families, genera and species are arranged alphabetically.

CONCLUSIONS

Several of the taxa found in this archipelago are interesting from a biogeographical or taxonomical points of view: *Acrochaetium naumannii* - restricted until now to the Cape Verde Islands and the New Zealand coast [as *A. interpositum* (HEYDRICH) BÖRGESSEN]- is a new record for the European Atlantic coast. *Amphiroa van-bosseae*, recently recorded for the first time for the same coast (CREMADES *et al.*, 1997) is a frequent species in the archipelago. In *Callithamniella tingitana* - second record for the Spanish Atlantic coast after SANTOLARIA *et al.* (1997)- the male reproductive organs were observed for the first time in the Atlantic after their description in Caribbean specimens (SCHNEIDER, 1984). *Lithophyllum frondosum*, a species previously unrecorded outside the Mediterranean, is very common on the South face of the archipelago. Finally, female gametophytes and carposporophytes of *Lomentaria orcadensis* -unknown in other zones of his distribution area - were described starting from specimens of the Sisargas Islands (BÁRBARA *et al.*, 1996).

Moreover, many other taxa are corologically noteworthy; p.e.: *Aphanocapsa elachista*, *Aglaothamnion diaphanum*, *A. gallicum*, *A. pseudobyssoides*, *A. tripinnatum*, *Antithamnion densum*, *Hildenbrandia crouanii*, *Osmundea truncata*, *Petrospongium berkeleyi*, *Scytosiphon dotyi*, *Ulva bifrons* and *Ulvella setchellii*.

TABLE 1 - Floristic Catalogue of the seaweeds of the Sisargas Islands.

CYANOPHYTA

CHROOCOCCALES

CHROOCOCCACEAE

Aphanocapsa elachista W. WEST & G.S. WEST*Microcrocis* sp.

CHAMAESIPHONALES

DERMOCARPACEAE

Dermocarpa prasina (REINSCH) BORNET & THURET*Dermocarpella leibleniae* (REINSCH) J. FELDMANN & G. FELDMAN

HORMOGONALES

OSCILLATORIACEAE

Microcoleus chthonoplastes THURET*Lyngbya gracilis* RABENHORST*Lyngbya semiplena* (C. AGARDH) J. AGARDH*Oscillatoria tenuis* C. AGARDH*Phormidium tenue* (MENECHINI) GOMONT*Spirulina subsalsa* OERSTED

RIVULARIACEAE

Brachytrichia quoyi (C. AGARDH) BORNET & FLAHAULT*Calothrix scopulorum* (WEBER & MOHR) C. AGARDH

RHODOPHYTA

COMPSOPGONALES

ERYTHROPELTIDACEAE

Porphyrostromium borganum (MONTAGNE) P. SILVA

AHNFELTIALES

AHNFELTIACEAE

Ahnfeltia plicata (HUDSON) FRIES

BANGIALES

BANGIACEAE

Bangia atropurpurea (ROTH) C. AGARDH*Porphyra leucosticta* THURET*Porphyra linearis* GREVILLE*Porphyra umbilicalis* (LINNAEUS) J. AGARDH

ACROCHAETIALES

ACROCHAETIACEAE

Acrochaetium naumannii (ASKENASY) ASKENASY*Acrochaetium virgatulum* (HARVEY) BORNET*Colaenema daviesii* (DILLWYN) STEGENGA*Rhodochorton purpureum* (LIGHTFOOT) ROSENVINGE

Rhodothamniella floridula (DILLWYN) J. FELDMANN

INCERTAE SEDIS

Schmitziella endophloea BORNET & BATTERS

NEMALIALES

GALAXAURACEAE

Scinaia furcellata (TURNER) J. AGARDH

GELIDIALES

GELIDIACEAE

Gelidium attenuatum (TURNER) THURET

Gelidium crinale (TURNER) LAMOUROUX

Gelidium latifolium (GREVILLE) BORNET & THURET

Gelidium pulchellum (TURNER) KÜTZING

Gelidium pusillum (STACKHOUSE) LE JOLIS

Gelidium pusillum var. *pulvinatum* (C. AGARDH) J. FELDMANN

Gelidium sesquipedale (CLEMENTE) THURET

Pterocradiella capillacea (GMELIN) SANTELICES & HOMMERSAND

HILDENBRANDIALES

HILDENBRANDIACEAE

Hildenbrandia crouanii J. AGARDH

Hildenbrandia rubra (SOMMERFELT) MENEGHINI

CORALLINALES

CORALLINACEAE

Amphiroa van-bosseae LEMOINE

Corallina elongata ELLIS & SOLANDER

Corallina officinalis LINNAEUS

Choreonema thuretii (BORNET) SCHMITZ

Halitilon squamatum (LINNAEUS) JOHANSEN, IRVINE & WEBSTER

Jania longifurca ZANARDINI

Jania rubens (LINNAEUS) LAMOUROUX

Lithophyllum frondosum (DUFOR) FURNARI, CORMACI & ALONGI

Lithophyllum incrustans PHILIPPI

Lithophyllum lichenoides PHILIPPI

Melobesia membranacea (ESPER) LAMOUROUX

Mesophyllum lichenoides (ELLIS) LEMOINE

Titanoderma pustulatum (LAMOUROUX) NÄGELI

GIGARTINALES

CAULACANTHACEAE

Catenella caespitosa (WITHERING) IRVINE

Caulacanthus ustulatus (TURNER) KÜTZING

CHOREOCOLACACEAE

Choreocolax polysiphoniae REINSCH

CYSTOCLONIACEAE

Calliblepharis ciliata (HUDSON) KÜTZING*Calliblepharis jubata* (GOODENOUGH & WOODWARD) KÜTZING*Rhodophyllis divaricata* (STACKHOUSE) PAPENFUSS

DUMONTIACEAE

Dilsea carnosa (SCHMIDEL) KUNTZE*Dumontia contorta* (GMELIN) RUPRECHT

GIGARTINACEAE

Chondracanthus acicularis (ROTH) FREDERICQ*Chondracanthus teedii* (ROTH) KÜTZING*Chondrus crispus* STACKHOUSE*Chondrus crispus* f. *filiformis* (HUDSON) THOMAS*Gigartina pistillata* (GMELIN) STACKHOUSE

HALYMENIACEAE

Cryptonemia lomation (BERTOLONI) J. AGARDH*Grateloupia dichotoma* J. AGARDH

KALLYMENIACEAE

Callocolax neglectus SCHMITZ ex BATTERS*Callophyllis laciniata* (HUDSON) KÜTZING*Kallymenia reniformis* (TURNER) J. AGARDH

PETROCELIDACEAE

Mastocarpus stellatus (STACKHOUSE) GUIRY*Petrocelis cruenta* J. AGARDH stadium

PEYSSONNELIACEAE

Peyssonnelia atropurpurea P. CROUAN & H. CROUAN*Peyssonnelia dubyi* P. CROUAN & H. CROUAN

PHYLLOPHORACEAE

Ahnfeltiopsis devoniensis (GREVILLE) SILVA & DECEW*Gymnogongrus crenulatus* (TURNER) J. AGARDH*Gymnogongrus griffithsiae* (TURNER) MARTIUS*Schottera nicaeensis* (LAMOUROUX ex DUBY) GUIRY & HOLLENBERG

SCHIZYMENIACEAE

Schizymenia dubyi (CHAUVIN ex DUBY) J. AGARDH*Haematocelis rubens* J. AGARDH stadium

SPHAEROCOCCACEAE

Sphaerococcus coronopifolius STACKHOUSE

GRACILARIALES

GRACILARIACEAE

Gracilaria gracilis (STACKHOUSE) STEENTOFT, IRVINE & FARNHAM

PTEROCLADIOPHILLACEAE

Gelidiocolax deformans SEOANE*Gelidiocolax margaritoides* (MARTIN & POCOCK) FAN & PAPENFUSS

BONNEMAISONIALES

BONNEMAISONIACEAE

Asparagopsis armata HARVEY*Falkenbergia rufolanosa* (HARVEY) SCHMITZ stadium*Bonnemaisonia asparagoides* (WOODWARD) C. AGARDH*Hymenoclonium serpens* (P. CROUAN & H. CROUAN) BATTERS stadium

PLOCAMIALES

PLOCAMIACEAE

Plocamium cartilagineum (LINNAEUS) DIXON

RHODYMENIALES

CHAMPIACEAE

Champia parvula (C. AGARDH) HARVEY*Chylocladia verticillata* (LIGHTFOOT) BLIDING*Gastroclonium ovatum* (HUDSON) PAPENFUSS*Gastroclonium reflexum* (CHAUVIN) KÜTZING

LOMENTARIACEAE

Lomentaria articulata (HUDSON) LYNGBYE*Lomentaria clavellosa* (TURNER) GAILLON*Lomentaria orcadensis* (HARVEY) COLLINS ex TAYLOR

RHODYMENIACEAE

Rhodymenia holmesii ARDISSONE*Rhodymenia pseudopalmata* (LAMOUROUX) SILVA

CERAMIALES

CERAMIACEAE

Aglaothamnion byssoides (ARNOTT ex HARVEY) L' HALOS & RUENESS*Aglaothamnion diaphanum* L'HARDY-HALOS & MAGGS*Aglaothamnion gallicum* (NÄGELI) L'HARDY-HALOS ex ARDRÉ*Aglaothamnion hookeri* (DILLWYN) MAGGS & HOMMERSAND*Aglaothamnion pseudobyssoides* (P. CROUAN & H. CROUAN) L'HARDY-HALOS*Aglaothamnion sepositum* (GUNNERUS) MAGGS & HOMMERSAND*Aglaothamnion tripinnatum* (C. AGARDH) MAZOYER*Antithamnion cruciatum* (C. AGARDH) NÄGELI*Antithamnion densum* (SUHR) HOWE*Antithamnionella spirographidis* (SCHIFFNER) WOLLASTON*Antithamnionella ternifolia* (HOOKER & HARVEY) LYLE*Bornetia secundiflora* (J. AGARDH) THURET*Callithamniella tingitana* (SCHOUSBOE) MAZOYER*Callithamnion granulatum* (DUCLUZEAU) C. AGARDH*Callithamnion tetragonum* (WITHERING) GRAY*Callithamnion tetricum* (DILLWYN) GRAY*Ceramium botryocarpum* GRIFFITHS ex HARVEY*Ceramium echionotum* J. AGARDH

Ceramium echionotum var. *mediterraneum* MAZOYER
Ceramium gaditanum (CLEMENTE) CREMADES
Ceramium nodulosum (LIGHTFOOT) DUCLUZEAU
Ceramium pallidum (NÄGELI ex KÜTZING) MAGGS & HOMMERSAND
Ceramium secundatum LYNGBYE
Ceramium shuttleworthianum (KÜTZING) RABENHORST
Ceramium strictum sensu HARVEY
Compsothamnion thuyoides (SMITH) NÄGELI
Crouania attenuata (C. AGARDH) J. AGARDH
Halurus equisetifolius (LIGHTFOOT) KÜTZING
Monosporus pedicellatus (SMITH) SOLIER
Pleonosporium borneri (SMITH) NÄGELI ex HAUCK
Plumaria plumosa (HUDSON) O. KÜNTZE
Pterothamnion crispum (DUCLUZEAU) NÄGELI
Pterothamnion plumula (ELLIS) NÄGELI
Ptilothamnion pluma (DILLWYN) THURET
Spermothamnion repens (DILLWYN) ROSENVINGE
Sphondylothamnion multifidum (HUDSON) NÄGELI

DASYACEAE

Dasya hutchinsiae HARVEY
Heterosiphonia plumosa (ELLIS) BATTERS

DELESSERIACEAE

Acrosorium venulosum (ZANARDINI) KYLIN
Apoglossum ruscifolium (TURNER) J. AGARDH
Cryptopleura ramosa (HUDSON) KYLIN ex NEWTON
Drachiella minuta (KYLIN) MAGGS & HOMMERSAND
Erythroglossum laciniatum (LIGHTFOOT) MAGGS & HOMMERSAND
Gonimophyllum buffhamii BATTERS
Hypoglossum hypoglossoides (STACKHOUSE) COLLINS & HERVEY
Nitophyllum punctatum (STACKHOUSE) GREVILLE
Polyneura bonnemaisonii (C. AGARDH) MAGGS & HOMMERSAND

RHODOMELACEAE

Boergeseniella martensiana (KÜTZING) ARDRÉ
Boergeseniella thuyoides (HARVEY) KYLIN
Brongniartella byssoides (GOODENOUGH & WOODWARD) SCHMITZ
Chondria coerulescens (J. AGARDH) FALKENBERG
Chondria dasyphylla (WOODWARD) C. AGARDH
Chondria scintillans MAZOYER
Falkenbergiella caespitosa POCOCK
Laurencia pyramidalis BORY ex KÜTZING
Ophidocladus simpliciusculus (P. CROUAN & H. CROUAN) FALKENBERG
Osmundea hybrida (A.P. DE CANDOLLE) NAM

Osmundea osmunda (GMELIN) NAM & MAGGS
Osmundea pinnatifida (HUDSON) STACKHOUSE
Osmundea truncata (KÜTZING) NAM & MAGGS
Polysiphonia atlantica KAPRAUN & NORRIS
Polysiphonia brodiaei (DILLWYN) SPRENGEL
Polysiphonia harvegi BAILEY
Polysiphonia fibrillosa (DILLWYN) HARVEY
Polysiphonia lanosa (LINNAEUS) TANDY
Polysiphonia nigra (HUDSON) BATTERS
Polysiphonia polyspora (C. AGARDH) J. AGARDH
Polysiphonia stricta (DILLWYN) GREVILLE
Pterosiphonia ardreana MAGGS & HOMMERSAND
Pterosiphonia complanata (CLEMENTE) FALKENBERG
Streblocladia collabens (C. AGARDH) FALKENBERG

PHAEOPHYTA

ECTOCARPALES

ECTOCARPACEAE

Bachelotia antillarum (GRUNOW) GERLOFF
Ectocarpus fasciculatus HARVEY
Feldmannia globifera (KÜTZING) HAMEL
Herponema velutinum (GREVILLE) J. AGARDH
Hincksia granulosa (SMITH) SILVA
Hincksia hincksiae (HARVEY) SILVA
Spongonema tomentosum (HUDSON) KÜTZING

RALFSIACEAE

Ralfsia verrucosa (ARESCHOUG) J. AGARDH

CHORDARIALES

LEATHESIACEAE

Petrospongium berkeleyi (GREVILLE) NÄGELI

ELACHISTACEAE

Elachista flaccida (DILLWYN) ARESCHOUG

Elachista fucicola (VELLEY) ARESCHOUG

CUTLERIALES

CUTLERIACEAE

Aglaozonia parvula (GREVILLE) ZANARDINI stadium

SPHACELARIALES

SPHACELARIACEAE

Sphacelaria cirrosa (ROTH) C. AGARDH

Sphacelaria plumula ZANARDINI

Sphacelaria rigidula KÜTZING

STYPOCAULACEAE

Halopteris filicina (GRATELOUP) KÜTZING

Stypocaulon scoparium (LINNAEUS) KÜTZING

DICTYOTALES

DICTYOTACEAE

Dictyopteris ambigua (CLEMENTE) CREMADES

Dictyopteris polypodioides (A.P. DE CANDOLLE) LAMOUROUX

Dictyota dichotoma (HUDSON) LAMOUROUX

DICTYOSIPHONALES

PUNCTARIACEAE

Punctaria latifolia GREVILLE

SCYTOSIPHONALES

SCYTOSIPHONACEAE

Colpomenia peregrina (SAUVAGEAU) HAMEL

Petalonia fascia (MÜLLER) KUNTZE

Scytosiphon dotyi WYNNE

Scytosiphon simplicissimus (CLEMENTE) CREMADES

DESMARESTIALES

DESMARESTIACEAE

Desmarestia aculeata (LINNAEUS) LAMOUROUX

Desmarestia ligulata (LIGHTFOOT) LAMOUROUX

LAMINARIALES

LAMINARIACEAE

Laminaria hyperborea (GUNNERUS) FOSLIE

Laminaria ochroleuca PYLAIE

Laminaria saccharina (LINNAEUS) LAMOUROUX

PHYLLARIACEAE

Phyllariopsis brevipes subsp. *pseudopurpurascens* PÉREZ-CIRERA, CREMADES,
BÁRBARA & LÓPEZ

Phyllariopsis purpurascens (C. AGARDH) HENRY & SOUTH

Saccorhiza polyschides (LIGHTFOOT) BATTERS

FUCALES

CYSTOSEIRACEAE

Bifurcaria bifurcata ROSS

Cystoseira baccata (GMELIN) SILVA

Cystoseira tamariscifolia (HUDSON) PAPENFUSS

FUCACEAE

Ascophyllum nodosum (LINNAEUS) LE JOLIS

Fucus spiralis LINNAEUS

Fucus vesiculosus LINNAEUS

Pelvetia canaliculata (LINNAEUS) DECAISNE & THURET

HIMANTHALIACEAE

Himanthalia elongata (LINNAEUS) GRAY

SARGASSACEAE

Sargassum muticum (YENDO) FENSHOLT

CHLOROPHYTA

CODIOLALES

CHLOROCYSTIDACEAE

Chlorochytrium cohnii WRIGHT

ULVALES

PRASIOACEAE

Prasiola stipitata SUHR ex JESSEN

ULVACEAE

Blidingia minima (NÄGELI ex KÜTZING) KYLIN

Enteromorpha compressa (LINNAEUS) GREVILLE

Enteromorpha flexuosa (WULFEN ex ROTH) J. AGARDH

Enteromorpha intestinalis (LINNAEUS) LINK

Enteromorpha muscoides (CLEMENTE) CREMADES

Enteromorpha prolifera (MÜLLER) J. AGARDH

Ulva bifrons ARDRÉ

Ulva olivascens DANGEARD

Ulva rigida C. AGARDH

Ulva rigida var. *fimbriata* (WELWITSH) J. AGARDH

Ulvaria obscura (KÜTZING) GAYRAL

ULVELLACEAE

Entocladia viridis REINKE

Ulvella setchellii DANGEARD

CLADOPHORALES

CLADOPHORACEAE

Chaetomorpha linum (MÜLLER) KÜTZING

Cladophora hutchinsiae (DILLWYN) KÜTZING

Cladophora laetevirens (DILLWYN) KÜTZING

Cladophora lehmanniana (LINDENBERG) KÜTZING

Cladophora pellucida (HUDSON) KÜTZING

Rhizoclonium tortuosum (DILLWYN) KÜTZING

BRYOPSIDALES

BRYOPSIDACEAE

Bryopsis plumosa (HUDSON) C. AGARDH

Pedobesia solieri ABÉLARD & KNOEPFFLER

CODIACEAE

Codium adhaerens (CABRERA) C. AGARDH

Codium tomentosum (HUDSON) STACKHOUSE

Codium vermilara (OLIVI) DELLE CHIAJE

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