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SOUTH FLORIDA BENTHIC MARINE ALGAE:

KEYS AND COMMENTS

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PREFACE

The luxuriance and bewildering variety of marine plants in shallow tropical seas is one of the strongest impressions of a first underwater experience off Southern Florida or in the West Indies. The more one looks, the more one finds: prairies of marine grasses and green algae; rock-making crusts of red corallines; sediment-trapping films of scum-like blue-greens; tiny filaments boring into every fragment of shell or coral; brilliant symbionts coloring nourishing reef corals. But to go beyond these first, arresting impressions has been difficult until now. To learn how to identify the elements of this varied flora one needs keys, descriptions, illustrations. Yet the existing keys and descriptions are so widely scattered in the botanical literature, written in such specialized language, and so often incomplete, that neophytes find them difficult if not impossible to use. This publication aims at filling the need for a relatively simple, yet comprehensive key to the marine algae of Southern Florida, which fortunately includes most of the Western Atlantic flora.

Appropriately, the compilation developed from Dr. Woelkerling's teaching visits to South Florida and therefore had the benefit of practical testing both in the field and laboratory. In hopes of still further refinements, Woelkerling solicits comments from users.

These well-illustrated keys, with the useful glossary and guide to the specialized literature will help newcomers to identify tropical algae, and learning the names and some anatomy opens the door to the challenging problems of zonation, ecology, and the relationship with invertebrates and sediments.

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I. GENERAL COMMENTS

Introduction

This document provides illustrated keys to the genera of green, brown, and red algae and to the genera and species of blue green algae commonly found in marine benthic communities of Florida. It has been designed primarily for student use in short courses and classroom situations, and in no way should it be considered a monographic treatment of Florida marine algae. Species keys have not been provided for the green, brown, and red algae because of their availability elsewhere (e.g. Dawes 1974 and Taylor 1960) and because species concepts in many genera still remain uncertain. The absence of clear cut species concepts coupled with the polymorphic behavior of many marine algae often frustrate inexperienced students who attempt to identify specimens to species, and generic concepts appear to be more readily grasped by individuals at the start. Species reference lists for the green, brown, and red algae recorded from Florida by Dawes (1974) and Taylor (1960) are provided in Tables following the respective generic keys.

In addition to the keys, this report also includes a glossary of morphological terms used in the keys and contains a bibliography of important references. The remainder of this general section considers briefly the literature of Florida marine algae, provides brief comments on marine algal habitats and communities, gives instructions for the collection, preservation, and examination of algal material, and makes suggestions for use of the keys.

Literature

Reference already has been made to two works (Dawes 1974, Taylor 1960) dealing with Florida marine algae, and both contain extensive bibliographies. Dawes' book includes comprehensive species keys and a glossary, avoids extensive use of technical terminology, and provides considerable ecological information, all of which make it an attractive volume for students. It deals, however, only with the Gulf of Mexico Coast of Florida and thus is of limited value for use in identifying material from the more floristicly diverse Atlantic Coast. Taylor's book, in contrast, includes the entire Florida region and contains an excellent series of illustrations. Most students, unfortunately, find Taylor's book difficult to use because of the extensive use of technical terminology and the absence of comprehensive generic keys. In addition, the work does not cover the blue-green algae. Nevertheless, individuals

interested in attempting identification of algae to species almost invariably must turn to one or both of these volumes.

Several other publications are of prime importance. Taylor (1928) provides an illustrated account of Florida algae which should be particularly helpful for work in the Florida Keys, although it is now somewhat dated. The papers of Boergesen (1913, 1914, 1915-1920) on Virgin Islands algae likewise are dated, but they include an excellent series of illustrations and provide species accounts with a minimum of technical language. Unfortunately, keys to species are given for relatively few genera. Beyond these works, one must turn to the periodical literature for detailed records.

Among the text books currently available, Dawson (1966) and Fritsch (1935, 1945) provide good accounts of algal morphology and systematics, while Hedgpeth (1957) and Moore (1959) provide more generalized ecological accounts of the marine environment. Stephenson and Stephenson (1950, 1952) present descriptive accounts of the rocky intertidal ecology of the Florida Keys and North Florida, and much of this material has been summarized in a recent book (Stephenson and Stephenson 1972). Calcareous algae also have been dealt with from the geological standpoint in several recent documents (Ginsburg et al. 1972, Ginsburg 1972).

Habitats and Communities

Dawes (1974) and Taylor (1960) provide good accounts of the various habitats present in Florida and the algal communities present in them. A comprehensive account of U. S. Coastal ecosystems (Odum et al. 1974) also contains valuable information on the Florida region and includes a detailed classification of habitat types.

For classroom purposes, it may be convenient to consider the habitats from the standpoints of exposure to wave action and to substrate. Thus one can examine and compare the algal communities of sheltered (e.g. lagoons, swamps) and exposed situations and look at the lithic (rocky and other solid substrata), pelic (sand, mud and other particulate substrata), and aufwuchs (epibiotic and endobiotic algae) components in each case.

Most students are apt to be impressed initially if introduced to the algal communities of sandy and muddy regions which usually harbor a variety of large green algae that are readily identifiable. Rocky substrates can be considered subsequently, and the aufwuchs community may best be considered last since it is here one commonly encounters a wealth of stunted or small plants which are more difficult to identify.

Collection, Processing and Examination of Marine Algae

Detailed information on the collection, processing, and examination of marine algae appears in a number of publications (e.g. Dawson 1956, 1966; Taylor 1960), but a few matters require emphasis:

1. Collection - Good collections of material can be obtained with or without the aid of snorkeling and/or scuba equipment, but the use of such gear markedly extends collection capabilities. For snorkelers and scuba divers, a fine mesh collecting bag which can be clamped or zippered shut will be needed, and a few Whirl-pak or similar sealable plastic bags should be taken along for housing smaller specimens. A scraping knife and/or geological pick often facilitate collection of material attached to rock. All of the safety rules for snorkelers and divers (e.g. see Ginsburg 1972) should, of course, be followed.

   When collecting inshore by means of wading, a plastic pail and a few small plastic bags will be needed for the specimens, and a scraping knife and geological pick will prove useful.

   PROTECTION FROM THE SUN IS OF VITAL IMPORTANCE. In the tropics one easily can become severely burned or be overcome with heat exhaustion or sunstroke suddenly. Even with an overcast sky, reflection from the water can cause problems. Long sleeve shirts, slacks, and hats are advised for waders and for snorkelers and divers when in boats. Use of good quality suntan creams is strongly recommended.

2. Processing - Preservation of material is NOT essential if specimens are examined upon return to shore or if they are placed in a holding tank with running sea water. Under other conditions preservation can be easily effected by using a solution of 1:10::formalin:sea water and storing material in the dark to avoid loss of color in the specimens. Excess fluids can be drained from the preserving containers after several hours, and the algae can be packed drip wet in plastic bags for transport. For information on herbarium processing, consult Dawson (1956, 1966) or Taylor (1960).

   For Cyanophyta (blue green algae), Drouet (1968) recommends that all material be air dried directly on paper rather than preserving first with formalin so as to avoid possible changes in cytological features utilized in taxon identification. Air dried specimens readily assume the form of living material when moistened with water.

3. Examination - Entire plants should be available for study, and plants bearing reproductive structures are of more value than sterile plants. For most work, a good quality dissecting

microscope and a compound microscope are essential. In addition, dissecting tools, a forceps, glass slides, cover slips, dropper bottles with water and 0.1N HCl, and a razor blade or scapel will be needed. With a little practice, good cross-sections of plants can be obtained in free hand fashion using a sharp, single edge razor blade. Fresh or liquid preserved material should be used whenever possible as dried herbarium specimens present problems of restoration (see Dawson 1956, 1966).

Keys for Identification

The taxonomic keys contained in this document are strictly dichotomous in organization and are presented in the progressive indentation format to facilitate use by students. Technical terminology has been minimized, but the glossary in Chapter 2 should be consulted when necessary. For many genera, reference is made in the keys to one or more illustrations (indicated in parentheses after the generic name) of Florida representatives. These drawings are numbered sequentially and are included in Chapter 8 at the end of this volume. Additional references to illustrations are provided in the species reference tables following each key.

Whenever possible, entire plants in good condition should be utilized for identification. Fragmentary specimens, young or markedly stunted plants, and damaged material often do not exhibit key characters clearly. In the vast majority of cases, sterile specimens can be used; in some cases, however, reproductive structures are needed for proper generic identification.

Most students quickly learn to sight recognize characters of the four algal divisions and can proceed directly to the appropriate generic key. (A key to the major groups of algae, however, is provided at the end of this section and should be consulted when necessary.) Similarly, the presence or absence of calcium carbonate (lime) incrustations soon becomes obvious. In cases where divisional status or calcification status present problems, the following tests can be utilized in conjunction with key characters:

1. Boiling water test - Because of variability in pigmentation, some red algae can appear brownish and greenish. Red-algae can readily be distinguished by boiling a bit of tissue in water. If the tissue changes color to a pale green or grass green (caused by the extraction of water soluble reddish pigments present), the alga belongs to the Rhodophyta. The absence of such a color change (due to the absence of these water soluble pigments) indicates that the specimen is not a red alga.

2. Starch test - Green algae normally are distinguishable from other algal groups dealt with here in that they usually store starch as a food reserve. To test for the presence of starch, add a drop of iodine solution (KI-2 gm; I_2-1 gm; water - 25 ml) to the tissue. If starch is present, the tissues will turn blue to blue-black.

3. Acid test for calcium carbonate (lime) - Calcareous algae can often be recognized by touch or by inspection with the dissecting microscope. In uncertain cases, several drops of dilute acid (e.g. 0.1N HCl) can be added to a bit of tissue. If bubbles (of CO_2) are released, calcareous deposits are present. This test should always be carried out with the aid of a dissecting microscope to make sure the bubbles are coming from tissue regions rather than from extraneous fragments of lime entrapped in the plant tissues from the sediments.

Although the keys presented here have been classroom and field tested in Florida, they should not be regarded as foolproof, and the author heartily welcomes any errors being called to his attention. Similarly, suggestions for improvements will be appreciated.

Key to Algal Divisions

1a. Plants procaryotic; cells lacking an apparent internal organization and pigments diffused throughout the cytoplasm. .Division Cyanophyta . . . . . (Blue-green Algae), Section 6, p. 67

1b. Plants eucaryotic; cells possessing an internal organization with pigments contained in plastids.

2a. Plants green; plastids more or less grass-green; starch present . . . . . .(Division Chlorophyta) . . . . . (Green Algae), Section 3, p. 14

2b. Plants reddish, brownish, whitish, red-olive; plastids not grass green; starch absent.

3a. Plastids brown and plants brown; pigments not soluble in boiling water . . . . . .Division Phaeophyta . . . . . .(Brown Algae), Section 4, p. 29

3b. Plastids red to purple to bluish to red-olive; pigments soluble in boiling water causing plant to become greenish when boiled . . . . . .Division Rhodophyta . . . . . .(Red Algae), Section 5, p. 39

II. MARINE ALGAE - GLOSSARY OF SELECTED TERMS

This glossary provides definitions of many of the more common terms used in keys to various groups of marine algae. It is by no means exhaustive, and for more comprehensive coverage, the glossaries of Jackson (1928) and Stearn (1966) should be consulted. In some cases reference is made to particular illustrations in Chapter 8 of this document.

acuminate - pointed

alternate - branching in which each cell of the axis bears a single later branch

anastomoses - cross connections (e.g. Fig. 60)

anticlinal - radiating outwards from the center (e.g. Fig. 151, 208a)

apical cell - the embryonic cell at the apex of a thallus, whose division in ancestral to all other cells of the thallus (e.g. Fig. 222)

apical depression - a pit-like cavity at the tip of a branch (e.g. Fig. 216, 263)

articulate - jointed (e.g. Fig. 259)

assimilators - erect, photosynthetic units of a thallus (e.g. Fig. 101)

attenuate - tapering

auxiliary cell - in most red algae, a cell of the carpogonial filament or a related filament which fuses with the carpogonium or an outgrowth of the carpogonium, and may subsequently give rise to the gonimoblasts

basipetal - growth toward the base

benthic - attached to a definite substrate or anchored in sand or mud

bipinnate - twice-branched, with both primary and secondary branches pinnately divided

biseriate - in two rows

bispore - one of two spores borne in pairs

bladder - a hollow, inflated, gas-filled tissue (e.g. Fig. 108)

caespitose - in tufts

calcareous - encrusted with lime (calcium or magnesium carbonate)

capitate - having a head-like end (with a neck-like constriction)

carpogonium - the female sex organ in the red algae

carposporophyte - a mass of tissue derived from a diploid zygote (fertilized carpogonium) and giving rise to carpospores (e.g. Fig. 259, 277)

cartilaginous - hard and tough, often shiny

central axis - the filament in the thallus of some red algae which gives rise to all other cells of the thallus - often visible in cross section as a single centrally located cell (e.g. Fig. 126, 127, 133, 14, 165)

clathrate - lattice-like, perforated

clavate - club-shaped

coenocytic - a type of thallus construction characterized by the absence of cross walls (e.g. Fig. 11-13)

conceptacle - a cavity (containing reproductive cells) with an opening to outside (e.g. Fig. 108)

constructed - narrowed or contracted (e.g. Fig. 150)

cordate - heart-shaped

coriaceous - leathery

cortex - the outer portion of a fleshy organ, assuming a central medulla is distinguishable (e.g. Fig. 208, 309-310)

cortication - filamentous or pseudoparenchymatous outgrowths which conjoin at least in part and form a new outer covering of the thallus or stipe

cruciate - having contents of a tetrasporangium divided in 2 or 3 planes at right angles to one another (e.g. Fig. 121, 228)

crustose - crust-like

cuneate - wedge-shaped

cystocarp - a reproductive structure in the red algae, bearing carpospores or tetraspores or formed after fertilization of the carpogonium

decumbent - lying flat, but with the summit ascending

dentate - toothed

determinate - having limited growth

dichotomous - branched by repeated forkings into two equivalent parts

dioecious - having distinct male and female plants

distichous - in two vertical ranks or rows

ditrichotomous - branching both in a dichotomous and a trichotomous manner

divaricate - extremely divergent

dorsiventral - having distinct dorsal and ventral surfaces (e.g. Fig. 254, 255)

ecortication - without cortication

endogenous - arising from internal tissues

epidermis - the surface layer of cells

eucaryotic - possessing membrane bound organelles such as a nucleus and chromoplasts

exogenous - arising from surface tissues

falcate - sickle-shaped

fasciculate - in tufts

filiform - thread-like

flabellate - fan-shaped (e.g. Fig. 4, 64, 93)

flaccid - limp, flabby

fountain type - multiaxial construction with numerous axial filaments forming the core of a thallus (e.g. Fig. 298)

fusiform - spindle-shaped

gelatinous - slippery and mucilaginous

gland cell - a secretory cell, often appearing opalescent (e.g. Fig. 121, 124, 179, 180)

gonimoblast - a short filament from the auxiliary cell or the carpogonium base, usually curving upwards and terminating in a carposporangium

hapteron - an attachment organ; in many red algae a unicellular or multicellular organ in which the tip is markedly flattened where it is in contact with the substrate (e.g. Fig. 177, 196, 279)

heterocyst - a cell which is conspicuously larger than and often thicker walled than adjacent vegetative cells

holdfast - a basal structure or cell specialized as an organ of attachment

hyaline - clear and colorless

indeterminate - having more or less unlimited growth

intercalary - within

internode - as applied to algae, the interval on a (stem-like) thallus between two joints or "nodes" (e.g. Fig. 159, 160, 181)

irregular - without a defined branching pattern

lamellate - made up of thin plates or sheets

lanceolate - shaped like a lance point

linear - narrow, ribbon-like

medulla - central core area of a massive thallus or stipe (e.g. Fig. 151, 189, 208, 219, 229)

midrib - a raised, usually cylindrical "nerve" of the thallus surface

moniliform - barrel-shaped or bead-like (e.g. Fig. 129)

moniecious - both sexes present in same individual

monosiphonous - uniseriate (e.g. Fig. 130, 313)

monospore - an asexual unicellular spore (e.g. Fig. 130-131)

mucronate - possessing a short, straight point (e.g. Fig. 157)

multiaxial - growth from a group or core of central filaments (e.g. Fig. 208, 266, 267, 297, 298)

multiseriate - in a number of rows

nemathecium - a wart-like projection bearing reproductive bodies

node - the point from which a branch arises; the junction of two cells; a joint between two levels or segments of the thallus

opposite - branching in which lateral branches regularly arise from a node in pairs

orbicular - like a disc, circular

ovate - having the outline of a longitudinal section of an egg (2 dimensional)

ovoid - shaped like an egg (3 dimensional)

papillate - covered with wart-like projections

paraphyses - sterile hairs (e.g. Fig. 106)

parenchymatous - a tissue resulting from cell divisions in more than one plane (e.g. Fig. 99-100)

parietal - appressed to the outer wall, or towards the outside

pericarp - the outer wall of an enclosed cystocarp

pericentral cells - cells arranged in regular tiers about the central axial cell in certain red algae

pinnate - having distichous branchlets arranged like the barbs of a feather

pit connection - a cytoplasmic strand connecting two adjoing cells through a pit in their respective walls

plumose - feather-like

plurilocular sporangium - a sporangium with numerous distinct walled cells, with walls which persist even after the spores have been shed

polysiphonous - in red algae, a type of construction in which the central axial cell is surrounded by 3 or more pericentral cells of similar length and arranged in regular tiers (e.g. Fig. 276, 279, 301)

procarp - a unit group of reproductive cells in some red algae consisting of carpogonium and the auxiliary cell as well as certain adjacent cells

procaryotic - without membrane bound organelles as the nucleus, chromoplast, etc.

procumbent - lying along the substrate

propagule - a few-celled branch of definite form which can break loose from the parent plant and form a new plant by vegetative means (e.g. Fig. 112-113)

prostrate - horizontal in relation to the substrate

pseudoparenchyma - tissue resulting from a compact arrangement of filaments in which the identity of individual filaments is more or less obscured

pulvinate - cushion-like or cushion-shaped (e.g. Fig. 45, 73)

pyrenoids - small, rounded, colorless, shiny structures embedded within the chromoplast

pyriform - pear-shaped

ramuli - branches

reniform - kidney-shaped

reticulate - netted or covered with a layer which is net-like

rhizines - slender, thick walled filaments

rhizoid - a slender, descending filament

scar cell - a small cell at the base of a trichoblast where it adjoins the thallus (e.g. Fig. 301)

secund - arranged in a single plane

septum - a partition or wall

seta - a hair or bristle

simple - unbranched

sinuate - with a deep wavy margin

siphon - a more or less tubular structure resembling a filament but without cell cross walls

sorus - a cluster, usually on the thallus surface, of sporangia or other reproductive bodies (e.g. Fig. 80, 81, 83)

spermatium - a non-motile male cell of the red algae

sporangium (sporangia) - a spore producing structure

stellate - star-shaped

stichidium - a specialized branch bearing reproductive organs

stipitate - having a stipe or stalk

stoloniferous - stolon-like; forming runners along the surface of the substrate from which the erect portions arise

sublittoral - the biological zone below the low tide mark

terete - cylindrical, in cross section circular

ternate - in threes

tetrad - in fours

tetrahedral - having the contents of a tetrasporangium divided triangularly so that only three of the tetraspores can be seen at once (e.g. Fig. 256, 313-315)

tetrasporangium - a spore producing organ whose contents divide into 4 parts

tetraspore - a meiospore in red algae

thallus - the entire plant body of an alga

torulose - beaded

trabeculae - simple or forked wall protuberances, often appearing as a meshwork (e.g. Fig. 21-22)

transversely divided - division in a plane perpendicular to the long axis

trichoblast - a simple or branched monosiphonous filament arising from or near the apex in the family Rhodomelaceae (Rhodophyta)

trichogyne - thread-like upper portion of a carpogonium

trichome - a hair (sometimes branched); in blue-green algae, the filament without its surrounding sheath

trichothallic - a form of growth involving the division of intercalary cells in a group of terminal filaments, with subsequent adhesion of the basal parts of the filaments

trichotomous - branched by repeated forkings into three equivalent parts

truncate - cut off

uniaxial - having only one axial filament in the thallus

unilocular - having only one cavity, i.e., not divided up by numerous persistent crosswalls as in a plurilocular structure

uniseriate - in a single row

urceolate - shaped like a pitcher with a protruding mouth

utricle - inflated ends of coenocytic filaments which are grouped to form an outer layer, as in Codium (Fig. 24, 25)

vesicular - sac-like, commonly more or less spherical

whorled - branching in which 3 or more lateral branches regularly arise from a node

zonate - having contents of a tetrasporangium lying in a row as a result of division in 3 parallel planes (e.g. Fig. 311b, 311c)

III. CHLOROPHYTA: KEY AND SPECIES REFERENCE LIST

Introductory Remarks

Although the Chlorophyta or green algae occur predominantly (in terms of species diversity) in fresh water environments, approximately 20% of the known taxa are marine, and 47 genera and 135 species have been recorded from Florida (Table 1, p.20) by Dawes (1974) and/or Taylor (1960). The most conspicuous developments of green algae in Florida waters usually occur in sublittoral muddy or sandy regions and most of the genera found in these substrates possess lime encrusted tissues. (A total of 9 genera and 28 species of calcified Chlorophyta occur in Florida.) Certain genera of the families Codiaceae (e.g. Halimeda, Penicillus, Udotea) and Dasycladaceae (e.g. Acetabularia, Cymopolia) commonly form extensive meadows, and their calcareous remains constitute an important element of the Florida marine sediments (see Ginsburg 1972, Ginsburg et al. 1972). Green algae also occur commonly on sublittoral rocks and can be found as members of the aufwuchs community. A few taxa (e.g. Enteromorpha, Ulva) also occur frequently in the intertidal zone.

Most genera of green algae found in Florida marine waters are distinctive and readily identifiable, but in some cases (e.g. Cladophora, Enteromorpha) species concepts require considerable refinement and present taxon limits are poorly defined.

Generic Key to the Chlorophyta

1a. Plants encrusted with lime (calcareous deposits react with dilute acid to release bubbles of CO_2; test on a clean piece of tissue and watch reaction with a dissecting microscope).

2a. Plants distinctly segmented, with flexible uncalcified joints.

3a. Apices bearing a tuft of uncalcified, branched filaments. . . . . .Cymopolia (Figs. 37-39)

3b. Apices lacking tufts of uncalcified, branched filaments. . . . . Halimeda (Figs. 50-52)

2b. Plants not segmented, lacking flexible uncalcified joints.

4a. Plants composed of a simple stalk bearing a disc at the apex.

5a. Spores not calcified. . . . . Acetabularia (Fig. 1)

5b. Spores calcified.

6a. Spores (borne in rays of the disc) embedded in a solid mass of lime. . . . . .Acicularia (Fig. 2)

6b. Spores individually calcified, not embedded in a solid mass of lime. . . . . .Chalmasia

4b. Plants lacking a terminal disc of cells on a simple stalk.

7a. Plants rarely over 3 cm tall; main axis bearing dense whorls of heavily calcified branches. . . . . .Neomeris (Fig. 59)

7b. Plants usually over 3 cm tall; main axis not bearing dense whorls of heavily calcified branches.

8a. Main axis terminated by a tuft of unconsolidated dichotomously branched filaments. . . . . Penicillus (Figs. 56-57)

8b. Main axis terminated by one or more blade-like expansions.

9a. Blades numerous, more or less radially arranged around the stalk and usually composed of a single layer of tissue. . . . . Rhipocephalus (Fig. 58)

9b. Blades usually single (sometimes with proliferations), composed of several layers of tissue. . . . . .Udotea (Fig. 64)

1b. Plants not encrusted with lime.

10a. Plants unicellular or composed of spherical cells irregularly embedded in a gelatinous maxtrix.

11a. Setae present. . . . . Diplochaete (Fig. 44)

11b. Setae absent

12a. Cells embedded in clusters in a gelatinous mat. . . . . .Pseudotetraspora

12b. Cells solitary, not embedded in clusters in a gelatinous matrix. . . . . .Halicystis (Fig. 49)

10b. Plants multicellular or coenocytic and of more complex morphology.

13a. Plants vesicular or forming erect foliar or netted sheet-like expanses of 1 - several cell layers.

14a. Plants vesicular, the sac-like structures occasionally rupturing and becoming saucer shaped.

15a. Plants composed of angular cells mostly 0.1-1.0 mm in diameter and much smaller lenticular cells interspersed between them; attached to substrate by several celled rhizoids . . . . . .Dictyosphaeria (Fig. 45)

15b. Plants composed of ovoid to angular cells mostly over 1 mm in diameter; lenticular cells usually absent; plant attached to substrate by small peg-like haptera cells or by irregular rhizoidal cells . Valonia (Fig. 65)

14b. Plants forming more or less erect foliar or net-like expanses.

16a. Plants parenchymatous, without any evidence of filamentous construction; cells of more or less uniform size and each containing 1-2 pyrenoids.

17a. Plants 1 cell thick . . . . . .Monostroma (Figs. 54-55

17b. Plants 2 cells thick. . .Ulva (Fig. 67)

16b. Plants of evident filamentous construction, with vein-like series of cells forming a net or present in the foliar, sheet-like expanse; cells usually of variable size and lacking pyrenoids.

18a. Plants perforated or completely net-like

19a. Plants forming perforated, sheet-like expanses . . . . . Cystodictyon (Fig. 43)

19b. Plants forming net-like expanses without any solid parenchyma-like areas. . . . . .Microdictyon (Fig. 60)

18b. Plants forming a solid thallus without perforations or a net-like appearance. . . . . .Anadyomene (Fig. 3)

13b. Plants filamentous or forming small crustose discs or of more complex construction, but not vesicular or forming 1 - several layered foliar, or net-like expanses.

20a. Plants forming crustose discs.

21a. Discs of 1 cell layer throughout; cells each with one pyrenoid.

22a. Central cells enlarging to form sporangia. . . . . Pringsheimiella

22b. Central cells not developing into sporangia. . . . . .Protoderma

21b. Discs of more than 1 cell layer, at least in part; cells lacking pyrenoids.

23a. Plants 0.1-0.5 cm in diameter; marginal filaments 3-4 (-15) µm broad. . . . . .Ulvella (Fig. 66)

23b. Plants 2-6 cm in diameter; marginal filaments 300-850 µm broad. . . . . .Petrosiphon

20b. Plants filamentous or of more complex construction but not forming crustose discs.

24a. Plants forming branched or unbranched multicellular filaments.

25a. Filaments creeping upon or within the substrate, without an evident holdfast.

26a. Filaments bearing ovoid, thick-walled sporangia; plants usually perforating wood or shells. . . . . Gomontia

26b. Filaments lacking ovoid, thick-walled sporangia; plants usually epi- or endo-phytic.

27a. Cells bearing unicellular hairs. . . . . .Phaeophila

27b. Cells lacking unicellular hairs. . . . . .Entocladia

25b. Filaments more or less erect. [Go to 28a].

28a. Plants unbranched or bearing only short, rhizoidal branches.

29a. Cells commonly over 100 μm in diameter (except in one species); filaments unbranched, stiff, a mass not collapsing completely upon removal from water. . . . . Chaetomorpha (Figs. 31-34)

29b. Cells under 100 μm in diameter; filaments simple or with a few short branchlets, a mass completely collapsing upon removal from water.

30a. Cells with 1 pyrenoid; cells under 10 μm in diameter; plants usually under 1 mm tall. . . . . Stichococcus

30b. Cells with numerous pyrenoids; cells over 10 μm in diameter; plants usually over 1 mm tall. . . . . Rhizoclonium

28b. Plants moderately to profusely branched.

31a. Cells of axes divided locally in a parenchymatous fashion. . . . Siphonocladus (Fig. 61)

31b. Cells not dividing parenchymatously; filaments uniseriate.

32a. Plants forming a distinctive stalk-like main axis readily distinguished from the lateral branches.

33a. Branching whorled.

34a. Branching whorled throughout; each cell bearing an apical whorl of cells. . . . . Ernodesmis (Fig. 48)

34b. Branching of main axis whorled; main axial cell bearing a number of whorls of laterals which are further branched in a dichotomous or ditrichotomous manner.

35a. Whorled branches closely set; sporangia single and terminal on the basal cell of each branch cluster. . . Dasycladus (Figs. 40-42)

35b. Whorls of branches distant; sporangia several, clustered along the branch axes. . . . . Batophora (Figs. 5-8)

33b. Branching irregular, unilateral, opposite, but not regularly whorled.

36a. Main axis terminated by several more or less net-like expanses of branched filaments. . . . . .Struvea (Figs. 62-63)

36b. Main axis terminated by a tuft of branched brush-like filaments. . . . . .Chamaedoris (Fig. 29)

32b. Plants lacking a distinctive stalk-like main axis.

37a. Ultimate branches without cross walls at the base. . . . . Cladophoropsis (Figs. 35-36)

37b. Ultimate branches with cross walls at the base. . . . . Cladophora (Figs. 26-28)

24b. Plants parenchymatous or coenocytic (lacking cross walls) and of varying appearance.

38a. Plants parenchymatous; composed of numerous small cells compactly arranged; plant body tubular-hollow to flattened. . . . . Enteromorpha (Fig. 46)

38b. Plants coenocytic, without evidence of numerous cross walls; plant body various in form.

39a. Plants stoloniferous, composed of a distinct rhizome-like portion bearing the erect portions of the plant.

40a. Erect portions of various aspect; internal portions traversed by a series of trabeculae (simple or forked wall protuberances, often appearing as a meshwork). . . . . Caulerpa (Figs. 15-22)

40b. Erect portions appearing as tube-like filaments which may be simple or dichotomously forked; trabeculae absent . . . . . Derbesia

39b. Plants without a distinct differentiation into stoloniferous and erect portions.

41a. Branching plumose, feather-like. . . . . .Bryopsis (Figs. 9-14)

41b. Branching irregular, dichotomous, or not readily apparent, but not plumose.

42a. Surface of plant composed of a continuous layer of inflated utricles (terminal sac-like inflations of the tubular filaments). .

43a. Utricles laterally coherent. . . . . Pseudocodium

43b. Utricles contiguous but not adherent. . Codium (Figs. 23-25)

42b. Surface of plant not composed of a continuous layer of utricles.

44a. Plants prostrate, not organized into massive thalli with erect blade like portions.

45a. Siphons 4-10 (-40) µm in diameter, irregular in form and variable diameter; branches lacking regular basal construction; plants penetrating limestone or shells. . . . . Ostreobium (Fig. 53)

45b. Siphons (40-) 45-90 µm or more in diameter, more or less dichotomously branched; branches constricted at the base; plants generally in mud, not penetrating limestone or shells. . . Boodleopsis

44b. Plants erect, organized into massive thalli with blade-like erect portions.

46a. Erect portion differentiated into a distinct cortex and medulla. . . . . .Cladocephalus (Fig. 30)

46b. Erect portion without differentiation into cortex and medulla. . . . . .Avrainvillea (Fig. 4)

TABLE 1. Chlorophyta Species Reference List (Records of species occurrence in Florida as reported in Dawes 1974 and Taylor 1960).

Taxon	Dawes (1974)	Taylor (1960)
1. *Acetabularia crenulata* Lamouroux	p. 92 - fig. 41	p. 105 - pl. 4, fig. 5, pl. 6, fig. 12
2. *Acetabularia farlowii* Solms-Laubach	p. 93	p. 105
3. *Acetabularia pusilla* (Howe) Collins	----	p. 104 - pl. 6, fig. 13
4. *Acicularia shenckii* (Möbius) Solms-Laubach	p. 93	p. 107 - pl. 6, fig. 11
5. *Anadyomene menziesii* Harvey	p. 90	----
6. *Anadyomene stellata* (Wulfen) C. Agardh f. *prototypa* Howe	p. 91 - fig. 40	p. 125 - pl. 7, fig. 2, pl. 8, fig. 2
7. *Avrainvillea asarifolia* Børgesen	p. 78	p. 161
8. *Avrainvillea elliottii* A. et E. S. Gepp	p. 79	----
9. *Avrainvillea levis* Howe	p. 79	p. 162
10. *Avrainvillea nigricans* Decaisne f. *fulva* Howe	p. 79 - fig. 33	p. 160 - pl. 19, fig. 2, pl. 25, figs. 11, 12
11. *Batophora oerstedi* J. Agardh v. *occidentalis* (Harvey) Howe	p. 94 - fig. 42	p. 98 - pl. 4, figs. 3, 4, pl. 5, fig. 4, pl. 6, figs. 3, 9
12. *Boodleopsis pusilla* (Collins) Taylor, Joly et Bernatowicz	p. 79	----
13. *Bryopsis duchassaignii* J. Agardh v. *filicina* Collins and Hervey	----	p. 133
14. *Bryopsis hypnoides* Lamouroux f. *prolongata* J. Agardh	p. 72	p. 130
15. *Bryopsis pennata* Lamouroux	p. 72 - fig. 28	p. 132 - pl. 9, fig. 12

TABLE 1. con't.

Taxon	Dawes (1974)	Taylor (1960)
16. *Bryopsis plumosa* (Hudson) C. Agardh	p. 73	p. 131- pl. 9, fig. 11
17. *Bryopsis ramulosa* Montagne	----	p. 131
18. *Caulerpa ashmeadii* Harvey	p. 73 - fig. 29	p. 142 - pl. 11, fig. 4, pl. 18, fig. 9
19. *Caulerpa cupressoides* (West) C. Agardh	p. 74	p. 146 - pl. 14, figs. 3, 4, 6, pl. 15, figs. 1-4, pl. 18, figs. 11-13
20 *Caulerpa fastigiata* Montagne v. *confervoides* Crouan ex Weber-van Bosse	p. 74	p. 136 - pl. 10, fig. 12
21. *Caulerpa floridana* Taylor	----	p. 143 - pl. 11, figs. 5, 6, pl. 18, fig. 10
22. *Caulerpa lanuginosa* J. Agardh	p. 74	p. 145 - pl. 14, figs. 1-2
23. *Caulerpa mexicana* (Sonder) J. Agardh	p. 74 - fig. 30	p. 141 - pl. 12, figs. 2-5
24. *Caulerpa microphysa* (Weber-van Bosse) J. Feldman	----	p. 155 - pl. 17, fig. 5, pl. 18, fig. 6
25. *Caulerpa paspaloides* (Bory) Gerville	p. 75	p. 149 - pl. 16, figs. 1-4, pl. 18, figs. 8, 14, 15
26. *Caulerpa peltata* Lamouroux f. *imbricata* (Kjellman)	p. 75	p. 155 - pl. 17, fig. 2, pl. 18, fig. 1
27. *Caulerpa prolifera* (Forsskål) Lamouroux	p. 77 - fig. 31	p. 140 - pl. 11, figs. 1-3
28. *Caulerpa racemosa* (Forsskål) J. Agardh	p. 77 - fig. 32	p. 151 - pl. 17, figs. 1, 3, 4, 6, 7, pl. 18, figs. 2-5, 7
29. *Caulerpa sertularioides* (Gmelin) Howe	p. 77	p. 144 - pl. 13, fig. 1-7
30. *Caulerpa verticillata* J. Agardh f. *charoides* (Harvey) Weber-van Bosse	----	p. 138 - pl. 10, figs. 1, 2
31. *Caulerpa vickersiae* Børgesen	----	p. 137 - pl. 10, figs. 3-9

TABLE 1. con't.

Taxon	Dawes (1974)	Taylor (1960)
32. *Caulerpa webbiana* Montagne	----	p. 139 - pl. 10, fig. 10
33. *Chaetomorpha aerea* (Dillwyn) Kützing	p. 87	----
34. *Chaetomorpha brachygona* Harvey	p. 87	p. 70 - pl. 2, fig. 9
35. *Chaetomorpha clavata* (C. Agardh) Kützing	----	p. 73
36. *Chaetomorpha gracilis* Kützing	----	p. 70
37. *Chaetomorpha linum* (Müller) Kützing	p. 87	p. 71 - pl. 2, fig. 8
38. *Chaetomorpha minima* Collins et Hervey	p. 88	----
39. *Chalmasia antillana* Solms-Laubach	----	p. 103
40 *Chamaedoris peniculum* (Ellis and Solander) Kuntze	----	p. 115 - pl. 5, fig. 2
41. *Cladocephalus luteofuscus* (Crouan) Børgesen	----	p. 163 - pl. 29, figs. 8, 9
42. *Cladophora catenata* (Linneaus) Kützing	p. 88	----
43. *Cladophora deliculata* Montagne	p. 88	p. 87
44. *Cladophora fascicularis* (Mertens) Kützing	p. 88 - fig. 39	p. 91 - pl. 3, fig. 3
45. *Cladophora flexuosa* (Dillwyn) Harvey	----	p. 89
46. *Cladophora frascatii* Collins et Hervey	p. 88	----
47 *Cladophora fuliginosa* Kützing	----	p. 83 - pl. 2, fig. 3, pl. 3, fig. 4
48. *Cladaphora glaucescens* (Griffiths ex Harvey) Harvey	p. 88	p. 86
49. *Cladophora gracilis* (Griffiths ex Harvey) Kützing	p. 89	p. 90
50. *Cladophora hutchinsiae* (Dillwyn) Kützing	----	p. 90
51. *Cladophora longicellulata* van den Hoek	p. 89	----

TABLE 1. con't.

Taxon	Dawes (1974)	Taylor (1960)
52. *Cladophora luteola* Harvey	----	p. 88
53. *Cladophora polyacantha* Montagne	----	p. 86
54. *Cladophora prolifera* (Roth) Kützing	----	p. 91 - pl. 3, fig. 5
55. *Cladophora repens* (J. Agardh) Harvey	p. 90	p. 82
56. *Cladophora scitula* (Suhr) Kützing	----	p. 90
57. *Cladophoropsis macromeres* Taylor	----	p. 118 - pl. 2, fig. 2
58. *Cladophoropsis membranacea* (C. Agardh) Børgesen	p. 92	----
59. *Codium decorticatum* (Woodward) Howe	p. 80	p. 188 - pl. 26, figs. 1, 2
60. *Codium intertextum* Collins and Hervey	----	p. 185
61. *Codium isthmocladium* Vickers subspec. *clavatum* (Collins and Hervey) Silva	p. 80	p. 186 - pl. 26, fig. 3
62. *Codium repens* Crouan in Vickers	----	p. 186
63. *Codium taylori* Silva	p. 80 - fig. 34	p. 188 - pl. 26, fig. 4
64. *Cymopolia barbata* (Linnaeus) Lamouroux	----	p. 102 - pl. 4, fig. 1, pl. 6, fig. 1
65. *Cystodictyon pavonium* J. Agardh	p. 92	p. 124 - pl. 1, fig. 1, pl. 8, fig. 4
66. *Dasycladus vermicularis* (Scopoli) Krasser	----	p. 99 - pl. 4, fig. 2, pl. 6, figs. 2, 8
67. *Derbesia vaucheriaeformis* (Harvey) J. Agardh	p. 70	p. 128
68. *Dictyosphaeria cavernosa* (Forsskål) Børgesen	----	p. 116 - pl. 7, fig. 5
69. *Diplochaete solitaria* Collins	p. 65	----
70. *Enteromorpha chaetomorphoides* Børgesen	p. 67	----

TABLE 1. con't.

Taxon	Dawes (1974)	Taylor (1960)
71. *Enteromorpha clathrata* (Roth) J. Agardh	p. 67	p. 58
72. *Enteromorpha compressa* (Linnaeus) Greville	p. 67	p. 60
73. *Enteromorpha flexuosa* (Wulfen) J. Agardh f. *submarina* (Wulfen) J. Agardh	p. 67	p. 61
74. *Enteromorph intestinalis* (Linnaeus) Link	p. 67 - fig. 26	----
75. *Enteromorpha lingulata* J. Agardh	p. 68	p. 60 pl. 1, fig. 3
76. *Enteromorpha linza* (Linneaus) J. Agardh	p. 69	----
77. *Enteromorpha plumosa* Kützing	----	p. 58
78. *Enteromorpha prolifera* (Müller) J. Agardh	p. 69	p. 59
79. *Enteromorpha ramulosa* (J. E. Smith) Hooker	p. 69	p. 60
80. *Enteromorpha salina* Kützing v. *polyclados* Kützing	p. 69	p. 56
81. *Entocladia flustrae* (Reinke) Batters	p. 65	----
82. *Entocladia viridis* Reinke	p. 65	p. 50
83. *Ernodesmis verticillata* (Kützing) Børgesen	----	p. 113 - pl. 1, fig. 2, pl. 6, fig. 10
84. *Gomontia polyrhiza* (Lagerheim) Bornet and Flahault	p. 64	p. 53
85. *Halicystis osterhoutii* L. R. and A. H. Blinks	----	p. 109 - pl. 7, fig. 3
86. *Halimeda discoidea* Descaisne v. *platyloba* Børgesen	p. 81	p. 179 - pl. 24, fig. 2
87. *Halimeda gracilis* Harvey v. *opuntiodes* Børgesen	----	p. 177
88. *Halimeda incrassata* (Ellis) Lamouroux	p. 81 - fig. 35	p. 181 - pl. 23, figs. 1, 4

TABLE 1. con't.

Taxon	Dawes (1974)	Taylor (1960)
89. *Halimeda monile* (Ellis and Solander) Lamouroux	p. 82	p. 182 - pl. 23, fig. 2
90. *Halimeda opuntia* (Linnaeus) Lamouroux	p. 82	p. 176 - pl. 23, fig. 3, pl. 24, fig. 1
91. *Halimeda scabra* Howe	----	p. 180 - pl. 25, figs. 10, 13, 14
92. *Halimeda simulans* Howe	----	p. 180 - pl. 24, fig. 4
93. *Halimeda tuna* (Ellis and Solander) Lamouroux f. *platydisca* (Descaisne) Barton	----	p. 178 - pl. 24, fig. 5
94. *Microdictyon boergesenii* Setchell	----	p. 120 - pl. 8, fig. 1
95. *Microdictyon curtissiae* Taylor	----	p. 121
96. *Monostroma oxyspermum* (Kützing) Doty	p. 69	p. 64
97. *Neomeris annulata* Dickie	----	p. 101 - pl. 5, fig. 5, pl. 6, figs. 4-6
98. *Ostreobium quecketii* Bornet et Flahault	p. 87	----
99. *Penicillus capitatus* Lamarck	p. 83 - fig. 36	p. 171 - pl. 21, fig. 2, pl. 25, fig. 4
100. *Penicillus dumetosus* (Lamouroux) Blainville f. *expansus* Børgesen	p. 84	p. 172 - pl. 21, fig. 4, pl. 25, fig. 15
101. *Penicillus lamourouxii* Descaisne v. *gracilis* A. and E. S. Gepp	p. 84	p. 172 - pl. 21, fig. 1, pl. 25, fig. 2
102. *Penicillus pyriformis* A. and E. S. Gepp f. *explanatus* Børgesen	----	p. 170 - pl. 21, figs. 3, 5, pl. 25, fig. 1
103. *Petrosiphon adhaerens* Howe	----	p. 117
104. *Phaeophila dendroides* (Crouan) Batters	p. 65	p. 48 - pl. 2, fig. 4

TABLE 1. con't.

Taxon	Dawes (1974)	Taylor (1960)
105. *Pringsheimiella scutata* (Reinke) Schmidt et Petrak	p. 66	----
106. *Protoderma marinum* Reinke	p. 66	p. 52
107. *Pseudocodium floridanum* Dawes et Mathieson	p. 84 - fig. 37	----
108. *Pseudotetraspora antillarum* Howe	p. 64	----
109. *Rhipocephalus oblongus* (Decaisne) Kützing	----	p. 173 - pl. 22, fig. 1, pl. 25, fig. 7
110. *Rhipocephalus phoenix* (Ellis and Solander) Kützing	p. 84	p. 174 - pl. 22, figs. 2, 5
111. *Rhizoclonium hookeri* Kützing	p. 90	p. 77 - pl. 2, fig. 5
112. *Rhizoclonium kochianum* Kützing v. *kerneri* (Stockmayer) Hamel	p. 90	----
113. *Rhizoclonium riparium* (Roth) Harvey v. *implexum* (Dillwyn) Rosenvinge	p. 90	p. 76
114. *Siphonocladus rigidus* Howe	----	p. 114 - pl. 6, fig. 7
115. *Siphonocladus tropicus* (Crouan) J. Agardh	----	p. 114 - pl. 7, fig. 1
116. *Stichococcus marinus* (Wille) Hazen	p. 66	----
117. *Struvea anastomosans* (Harvey) Piccone v. *caracasana* (Grunow ex Murray and Boodle) Collins	----	p. 122 - pl. 5, fig. 1, pl. 9, fig. 2
118. *Struvea elegans* Børgesen	----	p. 123 - pl. 9, figs. 1, 8, 9
119. *Struvea pulcherrima* (J. E. Gray) Murray and Boodle	p. 92	p. 123
120. *Udotea conglutinata* (Ellis and Solander) Lamouroux	p. 84 - fig. 38	p. 165 - pl. 20, fig. 3, pl. 25, fig. 5

TABLE 1. con't.

Taxon	Dawes (1974)	Taylor (1960)
121. *Udotea cyathiformis* Decaisne	p. 86	p. 166 - pl. 22, fig. 4
122. *Udotea flabellum* (Ellis and Solander) Lamouroux	p. 86	p. 168 - pl. 20, figs. 4, 5, pl. 25, fig. 3
123. *Udotea occidentalis* A. and E. S. Gepp	----	p. 169
124. *Udotea spinulosa* Howe	----	p. 167 - pl. 20, fig. 2, pl. 25, figs. 6, 16, 17
125. *Udotea sublittoralis* Taylor	----	p. 165 - pl. 22, fig. 6
126. *Udotea wilsoni* Gepp and Howe	----	p. 167 - pl. 25, fig. 18
127. *Ulva fasciata* Delile	p. 70	p. 66 - pl. 1, fig. 4
128. *Ulva lactuca* Linnaeus	p. 70 - fig. 27	p. 65
129. *Ulva profunda* Taylor	----	p. 67 - pl. 8, fig. 3
130. *Ulvella lens* Crouan	p. 66	p. 52 - pl. 2, fig. 7
131. *Valonia aegagropila* C. Agardh	----	p. 111 - pl. 7, fig. 6
132. *Valonia macrophysa* Kützing	----	p. 110 - pl. 2, fig. 6, pl. 7, fig. 4
133. *Valonia ocellata* Howe	----	p. 111 - pl. 9, figs. 6, 7
134. *Valonia utricularis* C. Agardh	----	p. 112 - pl. 9, fig. 10
135. *Valonia ventricosa* J. Agardh	p. 92	p. 110 - pl. 9, figs. 4, 5

IV. PHAEOPHYTA: KEY AND SPECIES REFERENCE LIST

Introductory Remarks

The Phaeophyta are confined almost exclusively to marine environments, and in tropical waters they occur largely in the sublittoral zone. This contrasts markedly with the situation in temperate regions where certain brown algae dominate the intertidal vegetation. In Florida, 34 genera and 66 species (Table 2, p. 34) have been recorded by Dawes (1974) and/or Taylor (1960), but only one genus - Padina - is calcified. Thus, brown algae are inconsequential in terms of sediment contributors.

A number of brown algae occur mostly commonly on rock (e.g. Cystoseira, Sargassum, Dictyota, Sporochnus) while others develop primarily in the aufwuchs community (e.g. Herponema, Myriotrichia, Eudesme). Two species of Sargassum (S. fluitans and S. natans) are known only in the pelagic state and comprise the vast bulk of the vegetation of the so-called Sargasso Sea which borders the Atlantic Coast of Florida.

The state of our systematic knowledge of Florida Phaeophyta is extremely uneven, and species concepts in a number of groups remain unclear. Critical studies are needed in such taxa as Sargassum, the families Ectocarpaceae and Myrionemataceae, among others, and the current uncertain state therefore often causes problems with species identification.

In the following key, the suggestions of Cardinal (1964) have been adopted in delimiting genera within the Ectocarpaceae. This places the occurrence of Herponema in Florida in doubt since H. tortugensis (Taylor) Taylor reportedly (Taylor 1960, p. 204) has band shaped chromoplasts (characteristic of Ectocarpus) rather than discoid chromoplasts (characteristic of Herponema). Further study appears necessary to settle the matter.

Generic Key to the Phaeophyta

1a. Vegetative portions of plants 1 cell wide throughout; composed of branched filaments without cortication or pseudoparenchymatous organization.

2a. Reproductive organs intercalary (within) in vegetative branches. . . . . .Bachelotia

2b. Reproductive organs terminal.

3a. Chromoplasts 1-several; elongate, simple or forked bands each with several pyrenoids. . .Ectocarpus (Figs. 85-87)

3b. Chromoplasts numerous; discoid, or rod shaped with a single pyrenoid.

4a. Basal filaments endobiotic, penetrating at least beneath the surface layer of cells. . . . . Herponema

4b. Basal filaments not penetrating the substrate.

5a. One or several zones of intercalary growth clearly delimited; branches commonly arising at right angles to the main axis. . . . . .Acinetospora

5b. Zones of intercalary growth not usually clearly delimited; branches arising at acute angles from main axis. . . . . Giffordia (Figs. 89-92)

1b. Vegetative portions of plants more than one cell wide, at least in part; of various form and with cortication or pseudoparenchymatous or parenchymatous construction present.

6a. Plants either entirely hollow or with hollow stems, bladders or other structures.

7a. Plants more or less prostrate, varying from hollow spheres to expanded, convoluted partially hollow structures with a smooth to perforated surface.

8a. Plant surface entire. . . . . .Colpomenia (Fig. 73)

8b. Plant surface clathrate (appearing lattice-like or perforated). . . . . Hydroclathrus

7b. Plants more or less erect, with partially to entirely hollow stems or bearing hollow bladders or other strucures.

9a. Plants composed of cylindrical to compressed stem-like portions; not differentiated into stems and spine-like, leaf-like, or pyramid-like foliar organs.

10a. Plants branched.

11a. Plants locally hollow; a single central axis clearly visible in younger portions of branches . . . . . .Nemacystus

11b. Plants hollow throughout except near the base of branches; central axis not discernible. . . Rosenvingea (Figs. 103-106)

10b. Plants unbranched. . . . Scytosiphon (Fig. 109)

9b. Plants composed of stems and spine-like, leaf-like, or pyramid-like portions.

12a. Stems bearing spine-like foliar organs; smaller branches inflated into hollow, bladder-like parts. . . . . Cystoseira

12b. Stems bearing leaf-like or pyramid-like foliar organs; bladders not borne within the stem.

13a. Foliar organs leaf-like. . . . . Sargassum (Figs. 107-108)

13b. Foliar organs pyramid-like. . . . . Turbinaria (Figs. 117)

6b. Plants without distinctly hollow structures.

14a. Plants forming thin, firm, more or less woody-appearing crusts. . . . . Ralfsia (Figs. 101-102)

14b. Plants erect or forming pulvinate (cushion-like) or tufted thalli which do not resemble thin woody-appearing crusts.

15a. Plants parenchymatous, without evidence of filamentous construction (examine in cross section) or of uniseriate branch tips; thalli more or less compressed, linear-strap shaped to broadly fan-shaped.

16a. Plants forming entire or lobed fan-shaped segments or consisting of a series of 1- several unbranched strap-like erect portions.

17a. Plants more or less fan-shaped.

18a. Plants usually calcified; growing margin inrolled. . . . . Padina (Figs. 93-98)

18b. Plants not calcified; margins not inrolled. . . . . Lobophora (Syn. Pocockiella) (Figs. 99-100)

17b. Plants composed of 1- several unbranched strap-like portions. . . . . Petalonia

16b. Plants branched or split into a number of distinct segments which may be linear to foliar or somewhat fan-shaped.

19a. Growth at branch tips from a single apical cell.

20a. Thallus structure throughout of one layer of large medullary cells and a single smaller celled cortical layer. . . Dictyota (Figs. 77-81)

20b. Medulla of more than one cell layer, at least near the margins. . . . . .Dilophus (Figs. 82-84)

19b. Growth at branch tips from a marginal row of many apical cells.

21a. Plants with a prominent midrib. . . . . Dictyopteris (Figs. 74-76)

21b. Plants lacking a midrib.

22a. Plants with conspicuous concentric zones of hairs and sporangia; commonly iridescent when submerged in living state.Stypopodium . . . . . .(Fig. 116)

22b. Plants lacking concentric zones of hairs and sporangia; not iridescent.Spatoglossum . . . . . .(Fig. 110)

15b. Plants with evidence of filamentous construction and/or with uniseriate branch tips; plants more or less cylindrical erect or forming tufts or pulvinate expanses.

23a. Plants forming pulvinate (cushion-like) or tufted thalli which rarely exceed 5 cm in extent.

24a. Growth from a conspicuous apical cell; branches largely covered with cells arranged in regular tiers. . . . . Sphacelaria (Figs. 111-113)

24b. Growth from the base of hair-like filaments (look for small cells at base); branches not covered with cells arranged in regular tiers.

25a. Erect filaments usually over 1.0 mm long. . . . . .Myriotrichia

25b. Erect filaments, if present, usually under 0.5 mm long.

26a. Plants prostrate, discoid and pulvinate; base distinctly discoid.

27a. Plants bearing elongate, hyaline paraphyses. . Ascocyclus (Figs. 71-72)

27b. Plants lacking elongate, hyaline paraphyses.

28a. Basal disc of 1 cell layer throughout. .*Myrionema*

28b. Basal disc of 2 cell layers, at least in part. . . .*Hecatonema*

26b. Plants tufted, more or less erect; base irregular, of congested filaments. . . . . *Elachista*

23b. Plants forming erect or spreading more or less cylindrical thalli which usually exceed 10 cm in length (reportedly 3-8 cm. in *Stictyosiphon*).

29a. Tips of branches with conspicuous tufts of free (separated) filaments.

30a. Sporangia confined to swollen portions of branch tips just below the tufts of filaments; holdfast fibrous. . . . . *Sporochnus* (Fig. 114)

30b. Sporangia scattered over the branches; holdfast discoid. . . . . *Nereia*

29b. Tips of branches lacking conspicuous tufts of free filaments.

31a. Branch tips composed of numerous axial filaments.

32a. Filaments of medulla firmly joined into a pseudoparenchymatous core. . . . . *Cladosiphon* (Figs. 68-70)

32b. Filaments of medulla easily separated from one another. . . . . *Eudesme* (Fig. 88)

31b. Branch tips composed of a single or only several (up to 4-5) axial filaments.

33a. Cross section showing a medulla of 4 large cells surrounded by a cortex of smaller cells. *Stictyosiphon*

33b. Cross section showing a medulla of numerous cells not markedly larger than the cortex.

34a. Branch tips with a single axial filament; plants slimy and soft. . . . . .Nemacystus

34b. Branch tips with several axial filaments; plants stiff and relatively brittle. . . . . Stilophora (Fig. 115)

TABLE 2. Phaeophyta Species Reference List (Records of species occurrence in Florida as reported in Dawes 1974 and Taylor 1960).

Taxon	Dawes (1974)	Taylor (1960)
1. *Acinetospora crinita* (Carmichael) Kornmann	p. 96	----
2. *Ascocyclus orbicularis* (J. Agardh) Magnus	p. 106	----
3. *Bachelotia antillarum* (Grunow) Gerloff	p. 96	p. 197, as *Pylaiella* (Syn.: *Bachelotia fulvescens*, p. 198)
4. *Cladosiphon occidentalis* Kylin	p. 105 - fig. 47	p. 248
5. *Colpomenia sinuosa* Derbès and Solier	p. 110	p. 260 - pl. 36, fig. 1
6. *Cystoseira myrica* Gmelin) J. Agardh	----	p. 267
7. *Dictyopteris delicatula* Lamouroux	p. 100	p. 227 - pl. 33, fig. 3
8. *Dictyopteris justii*	----	p. 226 - pl. 33, fig. 1
9. *Dictyopteris plagiogramma* (Montagne) Vickers	----	p. 229 - pl. 33, fig. 2
10. *Dictyota bartayresii* Lamouroux	----	p. 219 - pl. 30, fig. 2
11. *Dictyota cervicornis* Kützing	p. 100	p. 22 - pl. 31, fig. 2
12. *Dictyota ciliolata* Kutzing v. *bermudensis* Taylor	p. 100	p. 223 - pl. 32, fig. 3, pl. 59, fig. 1
13. *Dictyota dentata* Lamouroux	p. 100	p. 224 - pl. 30, figs. 4, 5
14. *Dictyota dichotoma* (Hudson) Lamouroux v. *menstrualis* Hoyt	p. 101 - fig. 43	p. 218 pl. 31, fig. 5
15. *Dictyota divaricata* Lamouroux	p. 101 - fig. 44	p. 221 - pl. 31, figs. 3, 4
16. *Dictyota indica* Sonder in Kützing	----	p. 221 - pl. 31, fig. 1
17. *Dictyota linearis* (C. Agardh) Greville	p. 102	----

TABLE 2 con't.

Taxon	Dawes (1974)	Taylor (1960)
18. *Dilophus alternans* J. Agardh	p. 102	p. 216 - pl. 30, fig. 3
19. *Dilophus guineensis* (Kützing) J. Agardh	----	p. 216 - pl. 30, fig. 1
20. *Ectocarpus dasycarpus* Kuckuck	p. 97	----
21. *Ectocarpus elachistaeformis* Heydrich	p. 97	p. 202
22. *Ectocarpus intermedius* Kützing	p. 97	p. 200 as *E. confervoides*
23. *Ectocarpus siliculosus* (Dillwyn) Lyngbye	p. 98	p. 199
24. *Elachistea minutissima* Taylor	----	p. 245 - pl. 29, fig. 11
25. *Eudesme zosterae* (J. Agardh) Kylin	p. 106, as *Cladosiphon*	p. 247
26. *Giffordia conifera* (Børgesen) Taylor	p. 98	----
27. *Giffordia indica* (Sonder) Papenfuss et Chihara	p. 98	p. 207 - pl. 29, fig. 10 as *G. duchassaigniana*
28. *Giffordia mitchellae* (Harvey) Hamel	p. 98	p. 206 - pl. 29, figs. 1, 2
29. *Giffordia rallsiae* (Vickers) Taylor	p. 99	----
30. *Hecatonema floridana* (Taylor)	----	p. 241
31. *Herponema tortugensis* (Taylor)	----	p. 204
32. *Hydroclathrus clathratus* (Bory) Howe	----	p. 261 - pl. 36, fig. 5
33. *Lobophora variegata* (Lamouroux) Womersley	p. 102	p. 231 - pl. 33, fig. 4 (as *Pocockiella*)
34. *Myrionema strangulans* Greville	p. 106	p. 240

TABLE 2 con't.

Taxon	Dawes (1974)	Taylor (1960)
35. *Myriotrichia occidentalis* Børgesen	p. 110	----
36. *Myriotrichia subcorymbosa* (Holden) Bomquist	p. 111	----
37. *Nemacystus howei* (Taylor) Kylin	p. 107	p. 249 - pl. 29, figs. 12-14
38. *Nereia tropica* (Taylor) Taylor	----	p. 252 - pl. 29, fig. 1
39. *Padina gymnospora* (Kützing) Vickers	----	p. 237
40. *Padina pavonica* (Linnaeus) Thivy	----	p. 234
41. *Padina sanctae - crucis* Børgesen	----	p. 237 - pl. 34, fig. 2
42. *Padina vickersiae* Hoyt	p. 103 - fig. 45	p. 236 - pl. 34, fig. 1
43. *Petalonia fascia* v. *caespitosa* (J. Agardh) Taylor	----	p. 258
44. *Ralfsia expansa* J. Agardh	----	p. 243
45. *Rosenvingea floridana* (Taylor) Taylor	----	p. 262 - pl. 29, figs. 7, 8
46. *Rosenvingea intricata* (J. Agardh) Børgesen	p. 111 - fig. 50	p. 262 - pl. 36, fig. 2
47. *Rosenvingea sanctae - crucis* Børgesen	----	p. 263
48. *Sargassum acinarium* (Linnaeus) C. Agardh	----	p. 271
49. *Sargassum cymosum* C. Agardh	----	p. 278 - pl. 38, fig. 4
50. *Sargassum filipendula* C. Agardh	p. 112 - fig. 51	p. 270 - pl. 37, fig. 3, pl. 40 fig. 2
51. *Sargassum fluitans* Børgesen	p. 112	p. 281 - pl. 39, fig. 2, pl. 40, fig. 7
52. *Sargassum hystrix* J. Agardh	p. 114	p. 279 - pl. 37, fig. 1, pl. 38, fig. 2, pl. 40, fig. 6
53. *Sargassum natans* (Linnaeus) J. Meyen	p. 114	p. 281 - pl. 37, fig. 2, pl. 40, figs. 3, 8

TABLE 2 con't.

Taxon	Dawes (1974)	Taylor (1960)
54. *Sargassum polyceratium* Montagne v. *ovatum* (Collins) Taylor	p. 114	p. 276 - pl. 40, fig. 1
55. *Sargassum pteropleuron* Grunow	p. 115 - fig. 52	p. 274 - pl. 39, fig. 1, pl. 40, figs. 4, 9
56. *Sargassum vulgare* C. Agardh v. *foliosissimum* (Lamouroux) J. Agardh	----	p. 273 - pl. 38, fig. 1, pl. 40, fig. 5
57. *Scytosiphon lomentaria* (Lyngbye) C. Agardh	----	p. 259
58. *Spatoglossum schroederi* (Mertens) Kützing	p. 104 - fig. 46	p. 225 - pl. 33, fig. 5
59. *Sphacelaria furcigera* Kützing	p. 99	p. 210 - pl. 29, fig. 5
60. *Sphacelaria tribuloides* Meneghini	p. 99	p. 211 - pl. 29, fig. 6
61. *Sporochnus bolleanus* Montagne	p. 108	p. 253 - pl. 35, figs. 2, 3
62. *Sporochnus pedunculatus* (Hudson) C. Agardh	p. 109 - fig. 49	p. 253 - pl. 35, figs. 4, 5
63. *Stictyosiphon subsimplex* Holden	p. 110	----
64. *Stilophora rhizoides* (Ehrhart) J. Agardh	p. 107 - fig. 48	p. 250
65. *Stypopodium zonale* (Lamouroux) Papenfuss	----	p. 232 - pl. 28, fig. 1
66. *Turbinaria turbinata* (Linnaeus) Kuntze	----	p. 285 - pl. 39, figs. 3-5

V. RHODOPHYTA: KEY AND SPECIES REFERENCE LIST

Introductory Remarks

The vast majority of Rhodophyta occur only in marine environments, and in tropical and subtropical regions, red algae grow both in the intertidal and sublittoral zones. A total of 93 genera and 248 species (Table 3, p. 53) have been reported for Florida waters by Dawes (1974) and/or Taylor (1960). Although relatively few red algae are calcified, members of the family Corallinaceae (see Kylin 1956) are of considerable geological significance (see Ginsburg et al. 1972, Hedgpeth 1957) in terms of coral reef building. In present day reefs, coralline algae function as the chief cementing agents, binding coral skeletons and other debris into a consolidated reef.

The state of systematic knowledge of red algae, like that of brown algae, is very uneven, and critical studies are needed on a number of taxa with representatives in Florida waters. In the following key, the suggestions of Wynne and Taylor (1973) have been incorporated regarding the use of the generic names Agardhiella, Neoagardhiella, and Soleria. Similarly, following Taylor (1960, p. 449), the generic name Gracilariopsis is referred to Gracilaria. Finally, taxa of the Acrochaetiaceae have not been dealt with at the generic level since several recent studies (Woelkerling 1971, 1973) indicate that Florida representatives of the group must be examined critically before generic realignment of these taxa is effected. Older generic names for the Acrochaetiaceae, however, have been used in Table 3.

Rhodophyta: Key to Genera

1a. Plants calcified (i.e., encrusted with lime; if in doubt test tissue with dilute acid; if lime is present CO_2 bubbles will be released).

2a. Plants crustose, forming prostrate expanses on the substratum.

3a. Plants more or less loosely attached to substrate by rhizoids growing from ventral surface; sporangia on surface of thallus. . . . . Peyssonnelia

3b. Plants firmly attached to substrate, ventral rhizoids absent; sporangia sunken in conceptacles.

4a. Roof of sporangial conceptacles perforated by numerous pores.

5a. Vegetative portion of thallus largely or entirely 1 cell thick. . . . . .Melobesia

5b. Vegetative portion of thallus more than 1 cell thick. . . . . Lithothamnium

4b. Roof of sporangial conceptacles perforated by a single pore.

6a. Vegetative portions 1-3 cells thick (rarely to 10 cells thick. . . . . .Fosliella

6b. Vegetative portions of numerous cell layers.

7a. Heterocysts (cells which are conspicuously larger and often thicker walled than ordinary vegetative cells) present. . . . . Goniolithon

7b. Heterocysts absent. . . . . .Lithophyllum

2b. Plants erect, upright or ascending.

8a. Plant body distinctly segmented; joints articulate, uncalcified.

9a. Conceptacles scattered over the surface of the segments. . . . . .Amphiroa

9b. Conceptacles marginal or terminal.

10a. Branching strictly dichotomous. . . . . Jania (Figs. 257-259)

10b. Branching opposite, alternate, or irregular. . . . . Corallina (Figs. 181-183)

8b. Plant body not differentiated into calcified segments and uncalcified joints.

11a. Branches with apical depressions. . . . . .Galaxaura (Figs. 216-218)

11b. Branches lacking apical depressions.

12a. Plants stony, rigid.

13a. Sporangial conceptacles perforated by numerous pores. . . . . .Lithothamnium

13b. Sporangial conceptacles perforated by single pore.

14a. Heterocysts present. . Goniolithon

14b. Heterocysts absent. . Lithophyllum

12b. Plants soft, flexible.

15a. Outer cortex filamentous; gland cells absent. . . . . .Liagora (Figs. 265-269)

15b. Outer cortex parenchymatous; gland cells present. . . . . Titanophora

1b. Plants not calcified; without encrustations of lime.

16a. Plants crustose, forming a thin expanse on the substrate.

17a. Thallus mostly 1 cell thick, usually epiphytic. . . . . .Erythrocladia

17b. Thallus more than 1 cell thick, usually on rock.

18a. Plants firmly adherent; tetrasporangia irregularly zonate and borne in conceptacles. . .Hildenbrandia

18b. Plants attached by rhizoids on underside; tetrasporangia cruciate and borne in a superficial layer. . . . . .Peyssonnelia

16b. Plants generally erect, not forming a crustose expanse of cells.

19a. Plants composed of uniseriate filaments; never bearing groups of cells about the nodes, but sometimes with older cells corticated by rhizoids.

20a. Pit connections between cells absent.

21a. Filaments simple. . . . . Erythrotrichia

21b. Filaments branched.

22a. Filaments procumbent, creeping horizontally on the substrate. . . . . .Erythrocladia

22b. Filaments erect.

23a. Cells longer than broad, greenish gray in color. . . . . .Asterocytis (Fig. 128)

23b. Cells more or less isodiametric or shorter than broad, usually reddish in color. . . . . Goniotrichum (Figs. 223-226)

20b. Pit connections between cells present.

24a. Plants attached to substrate by means of single cells or by multicellular filaments which may or may not become congested; without special hapteral cells; cells with 1 - several chromoplasts. . . . . Audouinella-Colaconema complex (Family Acrochaetiaceae) (Figs. 129-131)

24b. Plants attached to substrate by means of special hapteral cells; cells of filaments with numerous discoid chromoplasts.

25a. Plants showing a clear distinction between larger indeterminate branch axes and shorter determinate branches arranged in a whorled fashion.

26a. Whorl-branches in groups of 3. . . . . Crouania (Figs. 194-196)

26b. Whorl-branches in groups of 4-5. . Wrangelia (Figs. 322-325)

25b. Plants without a clear distinction between indeterminate axes and determinate branchlets.

27a. Branching opposite and/or secund.

28a. Ultimate branches arranged in a secund series. . . . . .Gymnothamnion

28b. Ultimate branches not secund.

29a. Gland cells present; tetrasporangia curciate. . . . . Antithamnion . . (Figs. 121-124)

29b. Gland cells absent; tetrasporangia tetrahedral. . . . . Spermothamnion (Figs. 312-315)

27b. Branching alternate, dichotomous, trichotomous, or irregular.

30a. Cells macroscopic, commonly over 800 µm long. . . . . Griffithsia (Figs. 234-236)

30b. Cells microscopic, rarely over 600 µm long.

31a. Asexual reproductive spores borne in chains. . Seirospora . . . (Figs. 304-305)

31b. Asexual reproductive spores borne singly.

32a. Branching regularly alternate, with a branch arising from each cell of the main axis, at least above. .Callithamnion (Figs. 143-145)

32b. Branching not regularly alternate. . . . . Spermothamnion (Figs. 312-315)

19b. Plants more than one cell broad; minimally bearing parenchyma-like whorls of cells about the nodes.

33a. Thallus hollow throughout or with hollow structures or parts.

34a. Thallus differentiated into solid, wiry axes and inflated grape-like branches. . . . . .Botryocladia (Figs. 135-137)

34b. Thallus of more or less uniform structure throughout.

35a. Plants entirely hollow; without evidence of internal septations at the base of branches or elsewhere.

36a. Plants forming densely branched cushions up to 5 cm tall; branches firm, almost wiry. . . . . Coelothrix (Figs. 178-180)

36b. Plants 5-30 cm tall, not forming densely branched cushions; branches soft, almost gelatinous.

37a. Upper portions of plant plumose (feather-like). . . . . Falkenbergia . . .(Asparagopsis stage) (Figs. 125-127)

37b. Upper portions of plant not plumose. . . . . Chrysymenia (Figs. 166-168)

35b. Plants septate, at least at the base of branches.

38a. Plants regularly constricted into series of more or less moniliform segments by regular internal septation. . . . . Champia

38b. Plants not constricted into moniliform segments; septae mostly at the base of branches. . . . . . Lomentaria (Figs. 270-274)

33b. Thallus solid; without a distinctly hollow internal structure.

39a. Branch tips with apical depressions.

40a. Plants showing (in cross section) a distinct central axis surrounded by 5 pericentral cells. . . . . Chondria (Figs. 162-165)

40b. Plants in cross section without a distinct central axis and without pericentral cells. . . . . .Laurencia (Figs. 263-264)

39b. Branch tips without apical depressions.

41a. Vegetative portions of plants predominantly cylindrical or only very slightly compressed or only locally flattened such as at points of branching; axes more or less circular in cross section. [41b is on page 48].

42a. Plants polysiphonous; pericentral cells externally visible or evident in cross sections of at least the younger portions of branches. [42b is on page 45].

43a. Ultimate branches anastomosing to form a mesh-like network.

44a. Network supported by a distinct axis with 4 pericentral cells. . . . . Dictyurus (Figs. 198-202)

44b. Network without a central supporting axis; polysiphonous structure evident only in branches bearing reproductive structures. . . . . .Halodictyon

43b. Ultimate branches not anastomosing to form a mesh-like network.

45a. Plants bearing monosiphonous, pigmented branchlets or bearing polysiphonous branchlets which grade into monosiphonous, pigmented multicellular segments near the tips.

46a. Younger branches with externally visible, transversely divided pericentral cells. . .Bostrychia (Figs. 132-134)

46b. Younger branches corticated or with externally visible non-transversely divided pericentral cells.

47a. Pericentral cells 4.

48a. Plants without cortication. . . . . Murrayella (Figs. 289-294)

48b. Plants more or less corticated.

49a. Trichoblasts absent. . . . . .Cottoniella (Figs. 169-177)

49b. Trichoblasts or their scar cells present.

50a. Trichoblasts distichous, laterally branched; tetrasporangial branches lacking trichoblasts. . . . . .Lophocladia (Figs. 275-279)

50b. Trichoblasts spirally branched; tetrasporangial branches with long, unbranched trichoblasts. . . . .Wrightiella (Figs. 326-328)

47b. Pericentral cells 5 or more.

51a. Apices of monosiphonous filaments mucronate. . . . . Brongniartella

51b. Apices of monosiphonous filaments rounded to acute.

52a. Entire plants densely beset with monosiphonous branches on all sides. . . . . Dasya (Fig. 197)

52b. Monosiphonous branches largely confined to younger portions of the plants. . . . . Heterosiphonia (Figs. 245-251)

45b. Plants polysiphonous throughout except for apical cells; with or without colorless monosiphonous trichoblasts.

53a. Plants entirely or almost entirely corticated in a parenchymatous fashion; filamentous nature of cortication completely obscured.

54a. Pericentral cells visible only in the shorter lateral branches. . . . .Digenia (Figs. 203-205)

54b. Pericentral cells visible throughout the plant.

55a. Pericentral cells 7-9; branchlets primarily in 2-4 ranks. . Bryothamnion (Figs. 138-142)

55b. Pericentral cells 5; branching more or less radial.

56a. Axes bearing wart-like branchlets. . . . . Acanthophora (Figs. 118-120)

56b. Axes bearing cylindrical branchlets. . . . . Chondria (Figs. 163-165)

53b. Plants ecorticate or corticated to a greater or lesser extent in a rhizoidal fashion; filamentous nature of cortication evident.

57a. Plants with 3 pericentral cells. . . . . Falkenbergia (Figs. 209-213)

57b. Plants with 4 or more pericentral cells.

58a. Plants with a dorsiventral organization; erect axes unbranched or sparingly branched and sharply determinate.

59a. Branching endogenous; erect axes occasionally bearing lateral branches. . . . . .Lophosiphonia (Figs. 280-283)

59b. Branching exogenous; erect axes unbranched.Herposiphonia (Figs. 241-244)

58b. Plants with a radial organization; erect axes branched and not all determinate.

60a. Main axes bearing numerous short more or less determinate axes. . . . . Bryocladia (Figs. 135-137)

60b. Main axes gradually giving rise to laterals without sharp distinctions . . . . . Polysiphonia (Figs. 300-302

42b. Plants without external or internal evidence of polysiphonous construction.

61a. Central axis clearly visible throughout the plant, at least in cross section.

62a. Branches with whorls of spines at the nodes. . . . . .Centroceras (Figs. 153-157)

62b. Branches lacking whorls of spines.

63a. Central axis surrounded by a cortex of branched monosiphonous filaments which are often whorled.

64a. Cortex very loosely organized; outer cortical cells without unicellular hairs. . . . . Acrosymphyton

64b. Cortex densely compact; outer cortical cells commonly bearing unicellular hairs. . . . Naccaria

63b. Central axis corticated by groups of parenchyma-like cells.

65a. Sporangia borne in marginal stichidia; cortication not arising at the nodes. Cyclospora

65b. Sporangia not in stichidia; cortication arising from the nodes.

66a. Main axes completely corticated; ultimate branches corticated only by bands of cells about the nodes. . . . . Spyridia (Figs. 316-318)

66b. Main axes and lateral branches more or less uniformly corticated with the cortication in most cases restricted to the nodes. . . . . Ceramium (Figs. 158-161)

61b. Central axis not clearly visible throughout the plant.

67a. Medulla clearly filamentous.

68a. Plants clavate (club-shaped) or irregularly constricted.

69a. Erect axes simple or rarely forked; plants clavate. . . . . Corynomorpha (Figs. 184-187)

69b. Erect axes branched; plants irregularly constricted. Catenella (Figs. 149-152)

68b. Plants more or less cylindrical; erect axis usually repeatedly branched.

70a. Plants very soft and gelatinous.

71a. Cortex filamentous. . . . . Helminthocladia

71b. Cortex parenchymatous.

72a. Epidermis composed solely of tightly compacted, enlarged cells. . . . . Scinaia (Figs. 306-307)

72b. Epidermis composed of loosely compacted cells which are not noticeably enlarged. . . Gloiopholea

70b. Plants firm to cartilaginous.

73a. Tetrasporangia cruciate . . . . . Gigartina

73b. Tetrasporangia zonate.

74a. Branches constricted at the base, never bearing spines; cystocarps immersed in thallus . . . Soliera (syn:Agardhiella) . . . . . (Figs. 308-311)

74b. Branches not constricted at the base, but commonly bearing spines; cystocarps in stalk-like papillar. . . . .Eucheuma . . . . . (Figs. 206-208)

67b. Medulla composed of mixed filaments and parenchyma or entirely parenchymatous.

75a. Branches beset with monosiphonous ramuli. . . . . Dasyopsis

75b. Branches lacking monosiphonous ramuli.

76a. Plants fleshy to cartilaginous; main axes generally 5 mm or more in diameter.

77a. Tetrasporangia zonate . . . . . .Hypnea (Figs. 252-253)

77b. Tetrasporangia cruciate . . . . Gracilaria (incl. Gracilariopsis) . . . . . (Figs. 227-230)

76b. Plants wiry; main axes generally under 5 mm in diameter.

78a. Rhizines (slender thick-walled filaments) present.

79a. Rhizines mostly in inner medulla; cystocarps with a single cavity . . . . . .Pterocladia

79b. Rhizines mostly in outer medulla; cystocarps with two cavities. . .Gelidium

78b. Rhizines absent.

80a. Branch tips multiaxial.

81a. Sporangia zonate; cells of central medulla thin-walled. . . . . .Wurdemannia . . .(Figs. 329-332)

81b. Sporangia cruciate or irregular; cells of central medulla somewhat thick-walled. . . . . .Gelidiopsis

80b. Branch tips with a single apical cell. . . . . .Gelidiella (Figs. 219-222)

41b. Vegetative portions of plants predominantly compressed or flattened, commonly forming strap-like or blade-like expanses.

82a. Plants with blades which are largely 1-2 cells thick.

83a. Blades with an evident midrib or veins.

84a. Blade apices terminated in a monosiphonous hair; basal creeping portions of plant polysiphonous. . . . . Taenioma (Figs. 319-320)

84b. Blade apices not ending in a monosiphonous hair; basal portions not polysiphonous.

85a. Blades unbranched foliar expanses. . . . . Grinnellia (Fig. 237)

85b. Blades branched, strap-like to foliar.

86a. Blades with veins but without a raised midrib; branching lateral.Cryptopleura

86b. Blades with a raised midrib in part at least; branching from the midrib.

87a. Tetrasporangia developing on or along the midrib. . . . . .Hypoglossum (Figs. 254-256)

87b. Tetrasporangia formed on the lateral part of the blade. . . Caloglossa (Figs. 146-148)

83b. Blades without an evident midrib.

88a. Pit connections present between cells.

89a. Blades forming partially net-like grids and partially entire expanses. . Martensia (Figs. 284-285)

89b. Blades entire throughout. . . Nitophyllum (Fig. 299)

88b. Pit connections absent. . . . . .Porphyra (Fig. 303)

82b. Blades mostly more than 2 cells thick.

90a. Blades in cross section showing a distinct midrib bearing a central axis surrounded by 5 pericentral cells.

91a. Branching opposite. . . . . Enantiocladia

91b. Branching alternate.

92a. Blades corticated throughout; margins toothed. . . . . Vidalia (Fig. 321)

92b. Blades corticated only along the midrib; margins not toothed. . . . Amansia

90b. Blades in cross section without a midrib bearing a central axis surrounded by 5 pericentral cells.

93a. Blades showing a distinct central axis (no midrib); sporangia in marginal stichidia. . . . . .Cyclospora

93b. Blades without a distinct central axis; sporangia, where known, not in marginal stichidia.

94a. Medulla parenchymatous throughout.

95a. Medulla composed entirely of large, more or less isodiametric cells.

96a. Sporangia in nemathecial sori; cortex with distinct anticlinal organization. . . . Fauchea

96b. Sporangia scattered over the thallus; cortex without an obvious anticlinal organization. . . . . Gracilaria and Gracilariopsis (Figs. 227-230)

95b. Medulla composed of large cells interspersed with small cells. . Agardhinula

94b. Medulla filamentous or a mixture of cells and filaments or partly hollow.

97a. Epidermis composed in part of enlarged cells (i.e., cells much larger in size than those of subepidermal layers). . . . . .Scinaia . . .(Figs. 306-307)

97b. Epidermis composed of cells not noticeably larger than those of the subepidermal layers.

98a. Cells of outer cortex arranged in more or less anticlinal (radiating from the center) rows.

99a. Central axis visible in younger parts of plant. . .*Catenella* (Figs. 149-152)

99b. Central axis absent.

100a. Sporangia zonate.

101a. Plants repeatedly branched; branches strap-like.*Eucheuma*

101b. Plants foliose, at most cleft or lobed. . . . .*Meristotheca* (Figs.286-288)

100b. Sporangia cruciate; cystocarps immersed in the thallus. . . . . *Grateloupia* . . (Figs. 231-233)

98b. Cells of outer cortex not arranged in anticlinal rows.

102a. Medulla containing some or less star shaped cells.

103a. Tetrasporangia scattered over the thallus; medulla of scattered filaments with few stellate cells. . . . . *Halymenia* . .(Figs. 238-240)

103b. Tetrasporangia largely confined to special marginal leaflets; medulla congested, with numerous stellate cells. *Cryptonemia* . . . . (Fig. 193)

102b. Medulla lacking star-shaped cells.

104a. Gland cells present in inner cortex; cells of outer cortex 1-3 layers, abruptly and distinctly smaller than those of inner cortex. . . . . *Cryptarachne* . . (Figs. 188-192)

104b. Gland cells absent; cells of outer cortex small, gradually giving way to a large-celled inner cortex.

105a. Sporangia zonate; medulla composed of loosely organized filaments. . *Neoagardhiella* (Figs. 294-298)

105b. Sporangia cruciate; medulla of firmly compact filaments or a mixture of cells and filaments. . *Kallymenia* (Figs. 260-262)

TABLE 3. Rhodophyta Species Reference List (Records of species occurrence in Florida as reported by Dawes 1974 and Taylor 1960).

Taxon	Dawes (1974)	Taylor (1960)
1. *Acanthophora muscoides* (Linnaeus) Bory	p. 151	p. 619 - pl. 72, fig. 3
2. *Acantophora spicifera* (Vahl) Børgesen	p. 151 - fig. 74	p. 620 - pl. 71, fig. 3, pl. 72, figs. 1, 2
3. *Acrochaetium avrainvilleae* Børgesen	p. 118	----
4. *Acrochaetium leptonema* (Rosenvinge) Børgesen	----	p. 308
5. *Acrochaetium sargassi* Børgesen	p. 118	p. 306
6. *Acrochaetium seriatum* Børgesen	p. 118	----
7. *Acrochaetium thuretii* (Bornet) Collins et Hervey	p. 118	----
8. *Acrosymphyton caribaeum* (J. Agardh) Sjostedt	----	p. 366
9. *Agardhinula browneae* (J. Agardh) Detoni	----	p. 482
10. *Amansia multifida* Lamouroux	----	p. 608 - pl. 70, fig. 5
11. *Amphiroa brasiliana* Decaisne	----	p. 405 - pl. 48, fig. 2
12. *Amphiroa fragilissima* (Linnaeus) Lamouroux	p. 122 - fig. 54	p. 403 - pl. 47, figs. 1, 2
13. *Amphiroa rigida* Lamouroux v. *antillana* Børgesen	p. 122	p. 404 - pl. 47, fig. 3, pl. 48, fig. 1
14. *Amphiroa tribulus* (Ellis and Solander) Lamouroux	----	p. 406 - pl. 47, figs. 4, 5
15. *Antithamnion plumula* (Ellis) Thuret	----	p. 500
16. *Asterocytis ramosa* (Thwaites) Gobi	p. 117	p. 287
17. *Bostrychia binderi* Harvey	p. 152 - fig. 75	p. 598
18. *Bostrychia calliptera* Montagne	p. 152	----

TABLE 3 con't.

Taxon	Dawes (1974)	Taylor (1960)
19. *Bostrychia montagnei* Harvey	----	p. 598 - pl. 74, fig. 1
20. *Bostrychia moritziana* (Sonder) J. Agardh	p. 153	p. 596
21. *Bostrychia radicans* Montagne f. *moniliforme* Post.	p. 153	p. 595
22. *Bostrychia rivularis* Harvey	----	p. 595
23. *Bostrychia scorpioides* (Gmelin) Montagne	p. 153	p. 597
24. *Bostrychia tenella* (Vahl) J. Agardh	p. 154	p. 599
25. *Botryocladia occidentalis* (Børgesen) Kylin	p. 141 - fig. 66	p. 483 - pl. 64, fig. 1
26. *Botryocladia pyriformis* (Børgesen) Kylin	----	p. 483 - pl. 64, fig. 2
27. *Brongniartella mucronata* (Harvey) Schmitz	p. 154	p. 590 - pl. 66, figs. 11, 12
28. *Bryocladia cuspidata* (J. Agardh) DeToni	p. 154	p. 586
29 *Bryocladia thyrsigera* (J. Agardh) Schmitz	----	p. 585
30. *Bryothamnion seaforthii* (Turner) Kützing f. *imbricata* J. Agardh	----	p. 587 - pl. 73, fig. 3
31. *Bryothamnion triquetrum* (Gmelin) Howe	----	p. 587 - pl. 72, fig. 6, pl. 73, fig. 4
32. *Callithamnion byssoides* Arnott ex Hooker	p. 143	----
33. *Callithamnion cordatum* Børgesen	p. 143	----
34. *Callithamnion halliae* Collins	----	p. 505
35. *Callithamnion roseum* (Roth) Harvey	p. 143	----
36. *Caloglossa leprieurii* (Montagne) J. Agardh v. *hookeri* (Harvey) Post.	p. 149 - fig. 72	p. 544 - pl. 68, fig. 1
37. *Catenella repens* (Lightfoot) Batters	p. 133 - fig. 61	p. 462 - pl. 66, fig. 13

TABLE 3. con't.

Taxon	Dawes (1974)	Taylor (1960)
38. *Centroceras clavulatum* (C. Agardh) Montagne	p. 143 - fig. 68	p. 537
39. *Ceramium brevizonatum* H. E. Petersen v. *caraibica* Petersen and Børgesen	----	p. 527 - pl. 67, figs. 7-9
40. *Ceramium byssoideum* Harvey	p. 143 - fig. 69	p. 528 - pl. 67, figs. 1-3
41. *Ceramium codii* (Richards) Feldmann - Mazoyer	p. 145	----
42. *Ceramium corniculatum* Montagne	p. 145	p. 530
43. *Ceramium diaphanum* (Lightfoot) Roth f. *strictoides* H. E. Petersen	----	p. 532
44. *Ceramium fastigiatum* (Roth) Harvey f. *flaccida* H. E. Petersen	p. 145	p. 526 - pl. 67, figs. 4-6
45. *Ceramium floridanum* J. Agardh	p. 145	p. 534
46. *Ceramium nitens* (C. Agardh) J. Agardh	----	p. 535 - pl. 66, fig. 14
47. *Ceramium strictum* (Kützing) Harvey	p. 146	p. 530
48. *Ceramium subtile* J. Agardh	p. 146	p. 527 - pl. 65, figs. 5, 6
49. *Ceramium tenuissimum* (Lyngbye) J. Agardh	----	p. 531
50. *Champia parvula* (C. Agardh) Harvey	p. 139 - fig. 65	p. 490 - pl. 61, fig. 4
51. *Champia salicornoides* Harvey	----	p. 491 - pl. 61, fig. 5
52. *Chondria atropurpurea* Harvey	----	p. 613
53. *Chondria baileyana* (Montagne) Harvey	----	p. 614
54. *Chondria cnicophylla* (Melvill) DeToni	p. 154	p. 614 - pl. 74, fig. 3
55. *Chondria collinsiana* Howe	p. 154	p. 617
56. *Chondria dasyphylla* (Woodward) C. Agardh	p. 155	p. 616

TABLE 3. con't.

Taxon	Dawes (1974)	Taylor (1960)
57. *Chondria floridana* (Collins) Howe	p. 155	p. 616 - pl. 74, fig. 4
58. *Chondria leptacremon* (Melvill) DeToni	p. 155	p. 615
59. *Chondria littoralis* Harvey	p. 155	p. 612
60. *Chondria polyrhiza* Collins and Hervey	----	p. 617
61. *Chondria sedifolia* Harvey	p. 155	p. 615
62. *Chondria tenuissima* (Goodenough and Woodward) C. Agardh	p. 156 - fig. 76	p. 613
63. *Chrysymenia enteromorpha* Harvey	p. 141	p. 479 - pl. 62, fig. 2
64. *Chrysymenia halymenioides* Harvey	----	p. 479 - pl. 62, fig. 1
65. *Coelothrix irregularis* (Harvey) Børgesen	----	p. 488 - pl. 45, fig3, pl. 46, fig. 4
66. *Compsopogon caeruleus* (Balbis) Montagne	----	p. 296
67. *Corallina cubensis* (Montagne) Kützing	p. 122	p. 409 - pl. 50, figs. 3, 4
68. *Corynomorpha clavata* (Harvey) J. Agardh	----	p. 429 - pl. 64, fig. 3
69. *Cottoniella filamentosa* (Howe) Børgesen	----	p. 550
70. *Crouania attenuata* (Bonnemaison) J. Agardh	p. 146	p. 495
71. *Crouania pleonospora* Taylor	----	p. 496
72. *Cryptarachne agardhii* (Harvey) Kylin	----	p. 480 - pl. 63, fig. 2
73. *Cryptarachne planifrons* (Melvill) Kylin	----	p. 481 - pl. 63, fig. 1
74. *Cryptonemia crenulata* J. Agardh	----	p. 427 - pl. 58, fig. 4
75. *Cryptonemia luxurians* (Mertens) J. Agardh	----	p. 428 - pl. 58, fig. 3
76. *Cryptopleura fimbriata* (Greville) Kützing	p. 150	----
77. *Cyclospora curtissiae* J. Agardh	----	p. 546

TABLE 3. con't.

Taxon	Dawes (1974)	Taylor (1960)
78. *Dasya caraibica* Børgesen	----	p. 560
79. *Dasya collinsiana* Howe	----	p. 558
80. *Dasya corymbifera* J. Agardh	p. 164	p. 559
81. *Dasya crouaniana* J. Agardh	----	p. 561 - pl. 71, fig. 1
82. *Dasya harveyi* Ashmead	----	p. 561
83. *Dasya mollis* Harvey	----	p. 562
84. *Dasya pedicellata* (C. Agardh) C. Agardh	p. 165 - fig. 80	p. 562
85. *Dasya ramosissima* Harvey	----	p. 561
86. *Dasya rigidula* (Kützing) Ardissone	----	p. 558 - pl. 72, fig. 4
87. *Dasyopsis antillarum* Howe	p. 165	p. 564
88. *Dictyurus occidentalis* J. Agardh	----	p. 567 - pl. 70, figs. 1, 2
89. *Digenia simplex* (Wulfen) C. Agardh	p. 156 - fig. 77	p. 589
90. *Enantiocladia duperreyi* (C. Agardh) Falkenberg	----	p. 610
91. *Erythrocladia subintegra* Rosenvinge	p. 117	p. 290 - pl. 41, fig. 1
92. *Erythrotrichia carnea* (Dillwyn) J. Agardh	p. 117	p. 292
93. *Eucheuma acanthocladum* (Harvey) J. Agardh	p. 135	p. 458 - pl. 50, fig. 5
94. *Eucheuma echinocarpum* Areschoug	----	p. 458
95. *Eucheuma gelidium* (J. Agardh) J. Agardh	----	p. 459
96. *Eucheuma isiforme* (C. Agardh) J. Agardh	p. 135 - fig. 63A	p. 459 - pl. 45, fig. 11, pl. 50, figs. 6, 7
97. *Eucheuma nudum* J. Agardh	p. 137 - figs. 63 B, C	----
98. *Falkenbergia hillebrandii* (Bornet) Falkenberg	p. 157	p. 571 - pl. 72, fig. 8
99. *Fauchea hassleri* Howe and Taylor	p. 142 - fig. 67	----

TABLE 3. con't.

Taxon	Dawes (1974)	Taylor (1960)
100. *Fauchea peltata* Taylor	p. 142	----
101. *Fosliella atlantica* (Foslie) Taylor	p. 123 - fig. 55	----
102. *Fosliella farinosa* (Lamouroux) Howe	p. 123	p. 388
103. *Fosliella lejolisii* (Rosanoff) Howe	p. 124	p. 387
104. *Galaxaura cylindrica* (Ellis and Solander) Lamouroux	----	p. 341 - pl. 44, fig. 1
105. *Galaxaura flagelliformis* Kjellman	----	p. 338
106. *Galaxaura lapidenscens* (Ellis and Solander) Lamouroux	----	p. 337
107. *Galaxaura marginata* (Ellis and Solander) Lamouroux	----	p. 343 - pl. 44, fig. 2, pl. 45, figs. 7, 8
108. *Galaxaura oblongata* (Ellis and Solander) Lamouroux	----	p. 341
109. *Galaxaura obtusata* (Ellis and Solander) Lamouroux v. *major* Taylor	p. 119	p. 342 - pl. 44, figs. 4, 5, pl. 45, fig. 5
110. *Galaxaura rugosa* (Ellis and Solander) Lamouroux	----	p. 340
111. *Galaxaura squalida* Kjellman	----	p. 339 - pl. 44, fig. 3, pl. 45, fig. 6
112. *Galaxaura subverticillata* Kjellman	----	p. 339 - pl. 44, fig. 6, pl. 45, fig. 9
113. *Gelidiella acerosa* (Forsskål) Feldmann and Hamel	p. 119	p. 351 - pl. 46, fig. 5
114. *Gelidiopsis intricata* (C. Agardh) Vickers	----	p. 353
115. *Gelidium corneum* (Hudson) Lamouroux	----	p. 356
116. *Gelidium crinale* (Turner) Lamouroux v. *platycladum* Taylor	p. 120	p. 355

TABLE 3. con't.

Taxon	Dawes (1974)	Taylor (1960)
117. *Gelidium floridanum* Taylor	----	p. 357
118. *Gelidium pusillum* (Stackhouse) LeJolis v. *conchicola* Piccone and Grunow	p. 120	p. 354 - pl. 45, fig. 4
119. *Gigartina acicularis* (Wulfen) Lamouroux	----	p. 473 - pl. 60, fig. 6
120. *Gloiophlaea halliae* Setchell	----	p. 332
121. *Goniolithon accretum* Foslie and Howe	----	p. 396
122. *Goniolithon boergesenii* Foslie	----	p. 397 - pl. 76, fig. 2
123. *Goniolithon decutescens* (Heydrich) Foslie	p. 124	p. 398
124. *Goniolithon mamillare* (Harvey) Foslie	----	p. 397
125. *Goniolithon solubile* Foslie and Howe	----	p. 396 - pl. 76, fig. 3
126. *Goniolithon spectabile* Foslie	----	p. 399 - pl. 78, fig. 1
127. *Goniolithon strictum* Foslie v. *nanum* Foslie and Howe	----	p. 399 - pl. 48, fig. 4, pl. 77, figs. 1, 2
128. *Goniotrichum alsidii* (Zanardini) Howe	p. 118	----
129. *Gracilaria armata* (C. Agardh) J. Agardh	p. 128	p. 441
130. *Gracilaria blodgettii* Harvey	p. 128	p. 449 - pl. 56, fig. 1
131. *Gracilaria cervicornis* (Turner) J. Agardh	p. 129	p. 445
132. *Gracilaria compressa* (C. Agardh) Greville	p. 129	p. 444
133. *Gracilaria crassissima* Crouan ex J. Agardh	----	p. 443 - pl. 55, fig. 4, pl. 57, fig. 4
134. *Gracilaria curtissiae* J. Agardh	----	p. 449 - pl. 54, fig. 1
135. *Gracilaria cylindrica* Børgesen	p. 129	p. 450 - pl. 56, fig. 3
136. *Gracilaria damaecornis* J. Agardh	p. 129	p. 443 - pl. 55, fig. 2

TABLE 3. con't.

Taxon	Dawes (1974)	Taylor (1960)
137. *Gracilaria debilis* (Forsskål) Børgesen	p. 129	p. 442 - pl. 45, fig. 10, pl. 57, fig. 3
138. *Gracilaria ferox* J. Agardh	----	p. 444 - pl. 56, fig. 4
139. *Gracilaria foliifera* (Forsskål) Børgesen v. *angustissima* (Harvey) Taylor	p. 130 - fig. 58	p. 446 - pl. 55, fig. 1
140. *Gracilaria mammillaris* (Montagne) Howe	p. 131 - fig. 59	p. 447 - pl. 59, fig. 4
141. *Gracilaria sjoestedtii* Kylin	p. 132 as *Gracilariopsis*	p. 449
142. *Gracilaria verrucosa* (Hudson) Papenfuss	p. 132 - fig. 60	p. 441 - pl. 56, fig. 2
143. *Grateloupia filicina* (Wulfen) C. Agardh	p. 126	p. 424 - pl. 54, figs. 2, 3
144. *Grateloupia gibbesii* Harvey	----	p. 425
145. *Griffithsia globulifera* Harvey	p. 146 - fig. 70	p. 517
146. *Griffithsia tenuis* C. Agardh	p. 146	p. 516
147. *Grinnellia americana* (C. Agardh) Harvey	p. 150 - fig. 73	----
148. *Gymnothamnion elegans* (Schousboe) J. Agardh	----	p. 522 - pl. 66, figs. 1-4
149. *Halodictyon mirabile* Zanardini	----	p. 567 - pl. 72, fig. 5
150. *Halymenia agardhii* DeToni	p. 126	p. 417 - pl. 51, figs. 1, 2
151. *Halymenia bermudensis* Collins and Howe	----	p. 419 - pl. 53, fig. 1
152. *Halymenia floresia* (Clemente) C. Agardh	p. 126 - fig. 57	p. 418 - pl. 45, fig. 12, pl. 51, fig. 3
153. *Halymenia floridana* J. Agardh	----	p. 420 - pl. 53, fig. 2
154. *Halymenia gelinaria* Collins and Howe	p. 127	p. 420
155. *Halymenia pseudofloresia* Collins et Howe	p. 127	----
156. *Helmintocladia calvadosii* (Lamouroux) Setchell	----	p. 324 - pl. 43, fig. 5

TABLE 3. con't.

Taxon	Dawes (1974)	Taylor (1960)
157. *Herposiphonia pecten - veneris* (Harvey) Falkenberg v. *laxa* Taylor	----	p. 603
158. *Herposiphonia secunda* (C. Agardh) Ambronn	p. 157	p. 604 - pl. 72, figs. 10, 11
159. *Herposiphonia tenella* (C. Agardh) Ambronn	p. 158	p. 604 - pl. 72, fig. 12
160. *Heterosiphonia gibbesii* (Harvey) Falkenberg	----	p. 566 - pl. 72, fig. 7, pl. 73, fig. 5
161. *Heterosiphonia wurdemanni* (Bailey ex Harvey) Falkenberg v. *laxa* Børgesen	----	p. 565 - pl. 72, fig. 9
162. *Hildenbrandia prototypus* Nardo	p. 122	p. 369
163. *Hypoglossum involvens* (Harvey) J. Agardh	----	p. 545 - pl. 68, fig. 4
164. *Hypoglossum tenuifolium* (Harvey) J. Agardh v. *carolinianum* Williams	p. 151	p. 545 - pl. 68, fig. 2
165. *Hypnea cervicornis* J. Agardh	p. 138	p. 466 - pl. 73, fig. 2
166. *Hypnea cornuta* (Lamouroux) J. Agardh	p. 138	p. 467
167. *Hypnea musciformis* (Wulfen) Lamouroux	p. 138 - fig. 64	----
168. *Hypnea spinella* (C. Agardh) Kützing	p. 138	----
169. *Jania adherens* Lamouroux	p. 124	p. 413 - pl. 49, figs. 1, 2
170. *Jania capillacea* Harvey	p. 125 - fig. 56	p. 412 - pl. 49, fig. 4
171. *Jania pumila* Lamouroux	p. 125	p. 414 - pl. 49, fig. 5
172. *Jania rubens* (Linnaeus) Lamouroux	----	p. 413 - pl. 49, fig. 3
173. *Kallymenia limminghii* Montagne	p. 128	p. 432 - pl. 80, fig. 2
174. *Kallymenia perforata* J. Agardh	p. 128	p. 432 - pl. 60, fig. 3

TABLE 3. con't.

Taxon	Dawes (1974)	Taylor (1960)
175. *Kylinia crassipes* (Børgesen) Kylin	p. 119	p. 300
176. *Kylinia liagoriae* (Børgesen) Papenfuss	----	p. 301
177. *Laurencia corallopsis* (Montagne) Howe	----	p. 623
178. *Laurencia gemmifera* Harvey	p. 158	p. 624
179. *Laurencia intricata* Lamouroux	p. 158	p. 626
180. *Laurencia microcladia* Kützing	p. 158	p. 627
181. *Laurencia obtusa* (Hudson) Lamouroux	p. 158	p. 626
182. *Laurencia papillosa* (Forsskål) Greville	p. 159	p. 623 - pl. 74, fig. 2
183. *Laurencia poitei* (Lamouroux) Howe	p. 159 - fig. 78	p. 625
184. *Liagora ceranoides* Lamouroux	----	p. 326 - pl. 43, fig. 1, pl. 45, fig. 1
185. *Liagora farinosa* Lamouroux	----	p. 326 - pl. 43, fig. 3, pl. 45, fig. 2
186. *Liagora mucosa* Howe	----	p. 328
187. *Liagora pedicellata* Howe	----	p. 329
188. *Liagora pinnata* Harvey	----	p. 329
189. *Liagora valida* Harvey	----	p. 327 - pl. 43, fig. 2
190. *Lithophyllum bermudense* Foslie and Howe	----	p. 393
191. *Lithophyllum intermedium* (Foslie) Foslie	----	p. 391
192. *Lithophyllum prototypum* Foslie	----	p. 392
193. *Lithophyllum pustulatum* (Lamouroux) Foslie	----	p. 392
194. *Lithothamnium floridanum* Foslie	----	p. 383
195. *Lithothamnium heteromorphum* (Foslie) Foslie	----	p. 383

TABLE 3. con't.

Taxon	Dawes (1974)	Taylor (1960)
196. *Lithothamnium incertum* Foslie	----	p. 384 - pl. 78, fig. 2
197. *Lithothamnium mesomorphum* Foslie v. *ornatum* Foslie and Howe	----	p. 382
198. *Lithothamnium occidentale* Foslie v. *effusa* (Foslie) Foslie	p. 126	p. 385 - pl. 79, fig. 2
199. *Lithothamnium syntrophicum* Foslie	p. 126	p. 381
200. *Lomentaria baileyana* (Harvey) Farlow	p. 140	p. 487
201. *Lomentaria rawitscheri* Joly	p. 140	----
202. *Lophocladia trichoclados* (Mertens in C. Agardh) Schmitz	----	p. 590
203. *Lophosiphonia cristata* Falkenberg	p. 160	----
204. *Lophosiphonia saccorhiza* Collins et Hervey	p. 160	----
205. *Martensia pavonia* (J. Agardh) J. Agardh	----	p. 555 - pl. 68, fig. 3
206. *Melobesia membranacea* (Esper) Lamouroux	----	p. 379
207. *Meristotheca floridana* Kylin	p. 138	p. 460
208. *Murrayella periclados* (C. Agardh) Schmitz	p. 160	p. 593
209. *Naccaria corymbosa* J. Agardh	----	p. 347
210. *Neoagradhiella ramosissima* (Harvey ex Kützing) Wynne and Taylor	p. 133, as *Agardhiella*	p. 457 - pl. 58, fig. 5, as *Agardhiella*
211. *Nitophyllum punctatum* (Stackhouse) Greville v. *ocellatum* (Lamouroux) J. Agardh	----	p. 551 - pl. 69, fig. 2
212. *Peyssonnelia rosenvingii* Schmitz	----	p. 373
213. *Peyssonnelia rubra* (Greville) J. Agardh	p. 122	p. 371
214. *Polysiphonia binneyi* Harvey	----	p. 577

TABLE 3. con't.

Taxon	Dawes (1974)	Taylor (1960)
215. *Polysiphonia denudata* (Dillwyn) Kützing	p. 160	----
216. *Polysiphonia echinata* Harvey	p. 161	p. 579
217. *Polysiphonia exilis* Harvey	----	p. 581
218. *Polysiphonia ferulacea* Suhr	p. 161	p. 578
219. *Polysiphonia fracta* Harvey	----	p. 576
220. *Polysiphonia gorgoniae* Harvey	p. 161	p. 576
221. *Polysiphonia hapalacantha* Harvey	p. 161	p. 579
222. *Polysiphonia havanensis* Montagne v. *mucosa* J. Agardh	p. 161	p. 577
223. *Polysiphonia howei* Hollenberg	p. 161	p. 582
224. *Polysiphonia macrocarpa* Harvey	p. 162	p. 578
225. *Polysiphonia opaca* (C. Agardh) Moris and De Notaris	p. 162	p. 583
226. *Polysiphonia ramentacea* Harvey	p. 162	p. 580
227. *Polysiphonia subtilissima* Montagne	p. 162 - fig. 79	p. 575
228. *Polysiphonia tepida* Hollenberg	p. 162	----
229. *Porphyra leucosticta* Thuret	----	p. 295
230. *Porphyra umbilicalis* (Linnaeus) J. Agardh	----	p. 295
231. *Pterocladia americana* Taylor	p. 120 - fig. 53	p. 360 - pl. 46, fig. 3
232. *Scinaia complanata* (Collins) Cotton v. *intermedia* Børgesen	p. 119	p. 334 - pl. 42, fig. 3
233. *Seirospora occidentalis* Børgesen	p. 147	p. 510
234. *Soleria tenera* (J. Agardh) Wynne and Taylor	p. 135 - fig. 62, as *Agardhiella*	p. 456, as *Agardhiella*

TABLE 3. con't.

Taxon	Dawes (1974)	Taylor (1960)
235. *Spermothamnion gorgoneum* (Montagne) Bornet	----	p. 521 - pl. 65, fig. 2
236. *Spermothamnion turneri* (Mertens) Areschoug v. *variabile* (C. Agardh) Ardissone	p. 148	p. 519
237. *Spyridia aculeata* (Schimper) Kützing	----	p. 541 - pl. 66, fig. 16, pl. 71, fig. 5
238. *Spyridia clavata* Kützing	----	p. 541
239. *Spyridia filamentosa* (Wulfen) Harvey v. *refracta* (Wulfen) Harvey	p. 148 - fig. 71	p. 539 - pl. 66, fig. 15
240. *Taenioma nanum* (Kützing) Papenfuss	p. 151	p. 548, as *T. macrourum*
241. *Titanophora incrustans* (J. Agardh) Børgesen	----	p. 437
242. *Vidalia obtusiloba* (Mertens) J. Agardh	----	p. 609 - pl. 70, figs. 3, 4
243. *Wrangelia argus* Montagne	----	p. 502 - pl. 66, figs. 7, 8
244. *Wrangelia bicuspidata* Børgesen	----	p. 503 - pl. 66, figs. 9, 10
245. *Wrangelia penicillata* C. Agardh	----	p. 503 - pl. 66, figs. 5, 6, pl. 74, fig. 5
246. *Wrightiella blodgettii* (Harvey) Schmitz	----	p. 591
247. *Wrightiella tumanowiczi* (Gatty) Schmitz	p. 163	p. 592
248. *Wurdemannia miniata* (Draparnaud) Feldmann and Hamel	p. 120	p. 361

VI. CYANOPHYTA: KEY AND NAME REVISIONS LIST

Introductory Remarks

The Cyanophyta or blue green algae are ubiquitous, and many taxa occur both in marine and freshwater environments. Dawes (1974) records 34 taxa from Florida marine waters, but Taylor (1960) does not provide an account of this group. Blue greens grow in muds and sands, on rocks, and in the aufwuchs. In some localities, certain taxa form extensive blackish coatings on rocks in the littoral and supralittoral zones, and they usually crop up in most collections.

The taxonomy of blue green algae is currently in a state of flux, and considerable controversy exists (see discussions Carr and Whitton 1973, Desikachary 1972) over the merits of the drastic reduction of taxa to synonomy by Drouet (1968, 1973) and Drouet and Daily (1956). The recent account of Dawes (1974) for the Florida Gulf Coast incorporates the proposals of Drouet (1968) and Drouet and Daily (1956), but apparently it had gone to press before the revision (Drouet 1973) of the families Scytonemataceae and Rivulariaceae (placed by Drouet in the Nostocaceae) became available.

The series of keys presented below differs from those to the Chlorophyta, Phaeophyta and Rhodophyta in several respects. First, a series of keys is given - to orders and families and then a second series is presented for the genera and species of each family. The entire series of keys, however, are coordinated through sequential numbering. Wherever possible, the revisions of Drouet (1968, 1973) and Drouet and Daily (1956) have been incorporated as indicated in notes at the beginning of the generic and specific keys. All species recognized by Drouet have been included in the keys and those recorded from Florida have been noted with an asterisk. For groups not yet dealt with by Drouet, older literature sources (especially Dawes 1974, Desikachary 1959, and Taylor 1928) have been used, and only Florida taxa have been included. Table 4 summarizes name revisions for taxa reported from Florida by Dawes (1974) and Taylor (1928).

Considerable study will be needed before the proposals of Drouet can be fully evaluated, and for those who prefer not to accept them until further evidence supporting their soundness becomes available, the more "conservative" account of Desikachary (1959) can be consulted for taxon identification. Similarly, the Drouet revisions and Desikachary (1959) should be utilized for illustrations.

The Cyanophyta:

Key to Orders and Families

1a Plants unicellular or forming non-filamentous colonies. . . . . Order Chroococcales . . 2

2a Cells of the colonies not separated from each other by sheath materials . . . . . .Family Clastidiaceae . . 10

2b Cells separated from one another by sheath materials

3a Cell divisions resulting in daughter cells of equal size . . . . . Family Chroococcaceae . . 11

3b Cell divisions giving rise to daughter cells of unequal size and further developing into cushions of radial structure . . . . . Family Chamaesiphonaceae . . 6

1b Plants filamentous. . . . . .Order Nostocales . . 4

4a Trichomes (filaments minus the sheaths) unbranched (not exhibiting true branching)

5a Heterocysts absent. . . . . Family Oscillatoriaceae . . 28

5b Heterocysts usually present (if absent, trichomes moniliform or torulose). . . . . Family Nostocaceae . . 51

4b Trichomes branched (i.e. true branching). . . . . .Family Stigonemataceae . . 57

Family Chamaesiphonaceae

One Genus: Entophysalis

Key to Species

This key is based on the taxonomic revision of Drouet and Daily (1956). Taxa marked with an asterisk [*] are reported from Florida marine waters.

6a Marine taxa

7a On rocks, wood, and shells. . . . . E. deusta*

7b On larger algae and living animals

8a Cells 1-2 µm in diameter, yellowish in color . . . . . .E. endophytica*

8b Cells larger, blue-green, violet, or red in color . . . . . .E. conferta*

6b Freshwater taxa

9a On rocks, wood, and shells. . . . . .E. rivularis

9b On larger plants. . . . . E. lemaniae

Family Clastidiaceae:

Key to Genera and Species

This key is based on the taxonomic revision of Drouet (1956). Taxa marked with an asterisk [*] are reported from Florida marine waters.

10a Plants terminating above in a hair-like extension of the sheath. . . . . Genus Clastidium - one species, C. setigerum

10b Plants smooth at the apex . . . . . .Genus Stichosiphon - one species, S. sansibaricus

Family Chroococcaceae:

Key to Genera and Species

This key is based on the taxonomic revision of Drouet and Daily (1956). Taxa marked with an asterisk [*] are reported from Florida marine waters.

11a Cells before division ovoid to cylindrical, longer than broad, each dividing in a plane perpendicular to the long axis. . . . . Genus Coccochloris

12a Cells before division ovoid to cylindrico-elliptic, up to 3 times as long as broad

13a Cells 7-45 µm broad. . . . . .C. aeruginosa

13b Cells (3-) 4-8 µm broad. . . . . C. stagnina*

12b Cells before division cylindrical, up to 8-12 times as long as broad

14a Cells straight, usually quasi truncate at the ends, 2-6 µm broad . . . . . .C. elabens*

14b Cells commonly curved, rotund or tapering at the ends, 1-3 µm broad. . . . . C. peniocystis

11b Cells before division spherical, ovoid, discoid, cylindrical, or pyriform, never dividing in planes perpendicular to the long axis

15a Cell division confined to a single plane; cells arranged in a single linear series within a gelatinous matrix. . . . . Genus Johannesbaptista - one species, J. pellucida*

15b Cells dividing in more than one plane; cells forming flat or curved sheets or irregularly distributed in a gelatinous matrix.

16a Cell division occurring in three planes; cells distributed in a three dimensional gelatinous matrix in an irregular manner or in a series of rows in 3 planes .Genus Anacystis

17a Cells containing pseudovacuoles, forming water blooms

18a Cells 0.5-2.0 µm in diameter. . . . . A. incerta

18b Cells (2.5-) 3-7 (-10) µm in diameter .A. cyanea

17b Cells lacking pseudovacuoles, not developing as water blooms

19a Cells 0.5-2.0 µm in diameter. . . . . .A. marina

19b Cells larger

20a Cells up to 6 µm in diameter (larger when parasitized by fungi; gelatinous matrix variously pigmented in aerial and subaerial habitats . . . . . .A. montana*

20b Cells 6 µm or more in diameter; gelatinous matrix hyaline

21a Cells (8-) 12-50 µm in diameter, usually remaining angular after division. . . . . .A. dimidiata*

21b Cells chiefly 6-12 µm in diameter, soon becoming spherical after division

22a Plants marine, usually macroscopic . . . . . .A. aeruginosa*

22b Plants of fresh water, usually microscopic . . . . A. thermalis*

16b Cell division occurring in two planes; cells distributed through a flat or curved surface

23a Plants spherical or ovoid. . . . Genus Gomphosphaeria

24a Cells containing pseudovacuoles, 3-5 µm in diameter; plants developing as water blooms in fresh water . . . . . .G. wichurae

24b Cells lacking pseudovacuoles, 2-15 µm in diameter; plants not developing as water blooms

25a Cells 2-4 µm in diameter . . . G. lacustris

25b Cells 4-15 µm in diameter. . . .G. aponina*

23b Plants forming flat on curved plates

26a Cells regularly arranged in series of rows perpendicular to each other . . Genus Agmenellum

27a Cells 1-3.5 µm in diameter; plants 1-256 celled . . . . . A. quadruplicatum*

27b Cells 4-10 µm in diameter; plants larger and often foliose. . . . . A. thermale*

26b Cells irregularly arranged. . . . . . Genus Microcrocis - one species, M. geminata

Family Oscillatoriaceae:

Key to Genera and Species

This key is based on the taxonomic revision of Drouet (1968). Taxa marked by an asterisk [*] are reported from Florida marine waters.

28a Trichomes appearing unicellular; cross walls apparently absent. . . . . Genus Spirulina - one Species, S. subsala*

28b Trichomes multicellular; cross walls present

29a A layer of granules present on either side of each cross wall

30a Outer wall of terminal cell thin, never beocming thickened . . . . . .Genus Arthrospira

31a Terminal cell conical; cells mostly 3 or more times as broad as long . . . . . A. brevis*

31b Terminal cell hemispherical; cells about as long as broad. . . . . A. jenneri

30b Outer wall of terminal cell becoming thickened. . . . . .Genus Microcoleus

32a Dense protoplasm and granules present along both side walls and cross walls. . . . . .M. lyngbyaceus*

32b Dense protoplasm and granules present only along cross walls

33a Trichomes conspicuously attenuated at the tips . . . . . M. vaginatus*

33b Trichomes not or at most slightly attenuated at the tips. . . . . M. irriguus*

29b No (or at most 2) granules present on either side of each cross wall

34a Outer wall of the terminal cell becoming thickened. . . . . Genus Oscillatoria

35a Cells at least 1/3 as long as broad

36a Cells with numerous, conspicuous pseudovacuoles. . . . . .O. erythraea*

36b Cells lacking or occasionally with isolated pseudovacuoles

37a Outer wall of terminal cell low conical or hemispherical. . . . . .O. submembranacea*

37b Outer wall of terminal cell slightly convex

38a Cells broader than long, the terminal cell short truncate conical or short-cylindrical . . . . . .O. lutea*

38b Cells usually as long as or longer than broad, the terminal cell long-truncate-conical . . . . . .O. retzii

35b Cells less than 1/3 as long as broad

39a Trichomes becoming conspicuously attentuated near the tips. . . . . O. princeps*

39b Trichomes not or only slightly attenuated near the tips. . . . . O. lutea*

34b Outer wall of terminal cell thin, never becoming thickened

40a Trichomes not attenuate except for the terminal cell . . . . . Genus Schizothrix

41a Terminal cell becoming rotund, at least at the tip, and very slightly if at all attenuate

42a Terminal cell hemispherical or almost spherical

43a Trichomes up to 3.5 µm in diameter . . . . . S. calcicola *

43b Trichomes 4-60 µm in diameter . . . . . S. mexicana*

42b Terminal cell becoming cylindrical and rotund at the tip . . . . . S. friesii

41b Terminal cell becoming conical

44a Terminal cell becoming blunt or acute conical

45a Trichomes becoming constricted at the cross walls . . . . . S. arenaria*

45b Trichomes not constricted at the cross walls . . . . . .S. rubella

44b Terminal cell becoming acuminate conical

46a Terminal cell short-acuminate . . . . . S. monticulosa

46b Terminal cell long acuminate. . . . . .S. tenerrima*

40b Trichomes attenuate, the attenuation involving several to many cells. . . . . Genus Porphyrosiphon

47a Trichome becoming capitate at the tips

48a Terminal cell several times longer than broad. . . . . .P. splendidus

48b Terminal cell about as long as broad . . . . . P. miniatus*

47b Trichome becoming attenuate conical at the tips

49a Terminal cell rotund to acute conical

50a Cells mostly less than 1/3 as long as broad . . . . . .P. kurzii*

50b Cells mostly 1/3 as long as broad or longer. . . . . .P. notarisii *

49b Terminal cell acuminate conical. P. animalis

Family Nostocaceae:

Key to Genera and Species

This key incorporates the recent revision of Drouet (1973) of those Nostocaceae with cylindrical trichomes (formerly constituting the Syctonemataceae and Rivulariaceae) and includes all taxa recognized by Drouet. Taxa marked with an asterisk are reported from Florida. The portion of the key dealing with the moniliform or torulose members of the Nostocaceae is based on older sources and includes only those taxa recorded from Florida marine waters. See Desikachary (1959) for more detailed keys to these groups.

51a Trichomes normally cylindrical

52a Terminal vegetative cells (not heterocysts) becoming almost spherical. . . . . Genus Scytonema - one species, S. hofmannii*

52b Terminal vegetative cells conical or cylindrical

53a Terminal vegetative cells becoming blunt-conical or cylindrical with rotund tips. . . . . .Genus Calothrix

54a Trichocomes gradually attenuated towards the tips; fresh water plants . . . . . .C. parietina*

54b Trichomes abruptly attenuated near the tips; marine plants . . . . . .C. crustacea*

53b Terminal vegetative cells becoming more or less acute-conical . . . Genus Raphidiopsis - one species, R. curvata

51b Trichomes normally moniliform or torulose

55a Trichomes without a firm sheath; sheath if present watery . . . . . .Genus Anabaena, A. fertilissima

55b Trichomes with a firm sheath

56a Trichomes single within a sheath . . . . . .Genus Nodularia, N. spumigera

56b Trichomes in parts of the thallus more than one in a sheath. . . . . Genus Hormothamnion, H. enteromorphoides

Family Stigonemataceae:

Key to Genera and Species

Recorded from Florida Marine Waters

57a Trichomes uniseriate throughout; heterocysts terminal . . . . . .
. . . . . .Genus Mastigocoleus, M. testarum*

57b Trichomes in part biseriate or multiseriate; heterocysts intercalary. . . . . .Genus Stigonema, S. aerugineum*

Note: Drouet (1973) regards Scytonema ocellatum as a species of Stigonema.

Table 4. Name Revisions for Marine Florida Cyanophyta. Recent monographic work by Drouet has resulted ina drastic reduction of taxa to synonomy. The following list includes older names used for taxa reported from Florida marine waters and the revised names used in the keys and in the Drouet papers.

OLDER NAME		REVISED NAME
Calothrix aeruginea	=	*Calothrix crustacea*
Calothrix confervicola	=	*Calothrix crustacea*
Calothrix longifila	=	*Calothrix crustacea*
Calothrix parasitica	=	*Calothrix crustacea*
Calothrix pilosa	=	*Scytonema hofmannii*
Calothrix rosea	=	*Calothrix crustacea*
Calothrix scopulorum	=	*Calothrix crustacea*
Chroococcus membraninus	=	*Anacystis thermalis*
Chroococcus turgidis	=	*Anacystis dimidiata*
Dermocarpa prasina	=	*Entophysalis conferta*
Dermocarpa solitaria	=	*Entophysalis conferta*
Dichothrix fucicola	=	*Calothrix crustacea*
Dichothrix olivacea	=	*Scytonema hofmannii*
Dichothrix penicillata	=	*Calothrix crustacea*
Gloeocapsa fuscolutea	=	*Coccochloris stagnina*
Hydrocoleum lyngbyaceum	=	*Microcoleus lyngbyaceus*
Hyella caespitosa	=	*Entophysalis deusta*
Lyngbya confervoides	=	*Microcoleus lyngbyaceus*
Lyngbya hyalina	=	*Oscillatoria lutea*
Lyngbya rosea	=	*Schizothrix mexicana*

Lyngbya semiplena	=	*Microcoleus irregularus*
Lyngbya versicolor	=	*Schizothrix calcicola*
Merismopedia convoluta	=	*Agmenellum thermale*
Microcoleus chthonoplastes	=	*Schizothrix arenaria*
Microcoleus tenerrimus	=	*Schizothrix tenerrima*
Oscillatoria corallinae	=	*Microcoleus lyngbyaceus*
Oscillatoria laetevirens	=	*Schizothrix arenaria*
Phormidium calothrichoides	=	*Schizothrix calcicola*
Phormidium fragile	=	*Schizothrix calcicola*
Phormidium nostochoides	=	*Schizothrix calcicola*
Phormidium persicinum	=	*Schizothrix calcicola*
Phormidium terebrans	=	*Schizothrix calcicola*
Phormidium valderianum	=	*Schizothrix calcicola*
Polythrix corymbosa	=	*Calothrix crustacea*
Rivularia atra	=	*Calothrix crustacea*
Rivularia nitida	=	*Calothrix crustacea*
Rivularia polyotis	=	*Calothrix crustacea*
Schizothrix longiarticulata	=	*Schizothrix arenaria*
Schizothrix taylorii	=	*Porphyrosiphon notarisii*
Spirulina rosea	=	*Spirulina subsalsa*
Spirulina subtilissima	=	*Spirulina subsalsa*
Symploca laete-virides	=	*Schizothrix arenaria*
Symploca profunda	=	*Schizothrix mexicana*
Trichodesmium thiebautii	=	*Oscillatoria erythraea*
Xenococcus schousboei	=	*Entophysalis conferta*

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VIII. ILLUSTRATIONS

Most of the following 332 illustrations have been redrawn from earlier publications and due acknowledgment is provided in the accompanying figure legends. The figures are designed to assist in identification at the generic level and thus only selected species have been included. Data on size, range and habitat are provided for most genera in the legends, and a scale of approximate magnification factors appears at the bottom of each page containing figure legend data. For purposes of habitat data, the term lithos refers to rocky niches, the term pelos refers to sandy and muddy niches, and the term aufwuchs refers to epibiotic and endobiotic niches.

Sincere thanks are due Ms. Jan MacKenzie for drawing Figs. 1-117, 125, 147, 148, 162-164, 166-168, 241-244, 260, 280, 284, 285, 299, and 322-325 and Ms. Briony Foy for drawing the remaining 193 figures. Without their assistance, these illustrations could not have been included in the manual.

A generic index to the illustrations follows Fig. 332. The Chlorophyta are depicted in Figs. 1-67; the Phaeophyta in Figs. 68-117, and the Rhodophyta in Figs. 118-332. Within each group, genera are dealt with in alphabetical order.

FIG. 1. ACETABULARIA CRENULATA LAMOUROUX

(After Boergesen 1913). Habit.
Species of Acetabularia reach heights of 1-70 mm and bear discs 1-8 mm broad. Plants most commonly occur on rock, coral or shell fragments in lagoons and other areas sheltered from wave action.

FIG. 2. ACICULARIA SCHENCKII (MÖBIUS) SOLMS-LAUBACH

(After Boergesen 1913). Habit.
Acicularia plants seldom exceed heights of 2 mm, and they bear 3-8 mm broad discs. Specimens occur in niches similar to those of Acetabularia.

FIG. 3. ANADYOMENE STELLATA (WULFEN) C. AGARDH

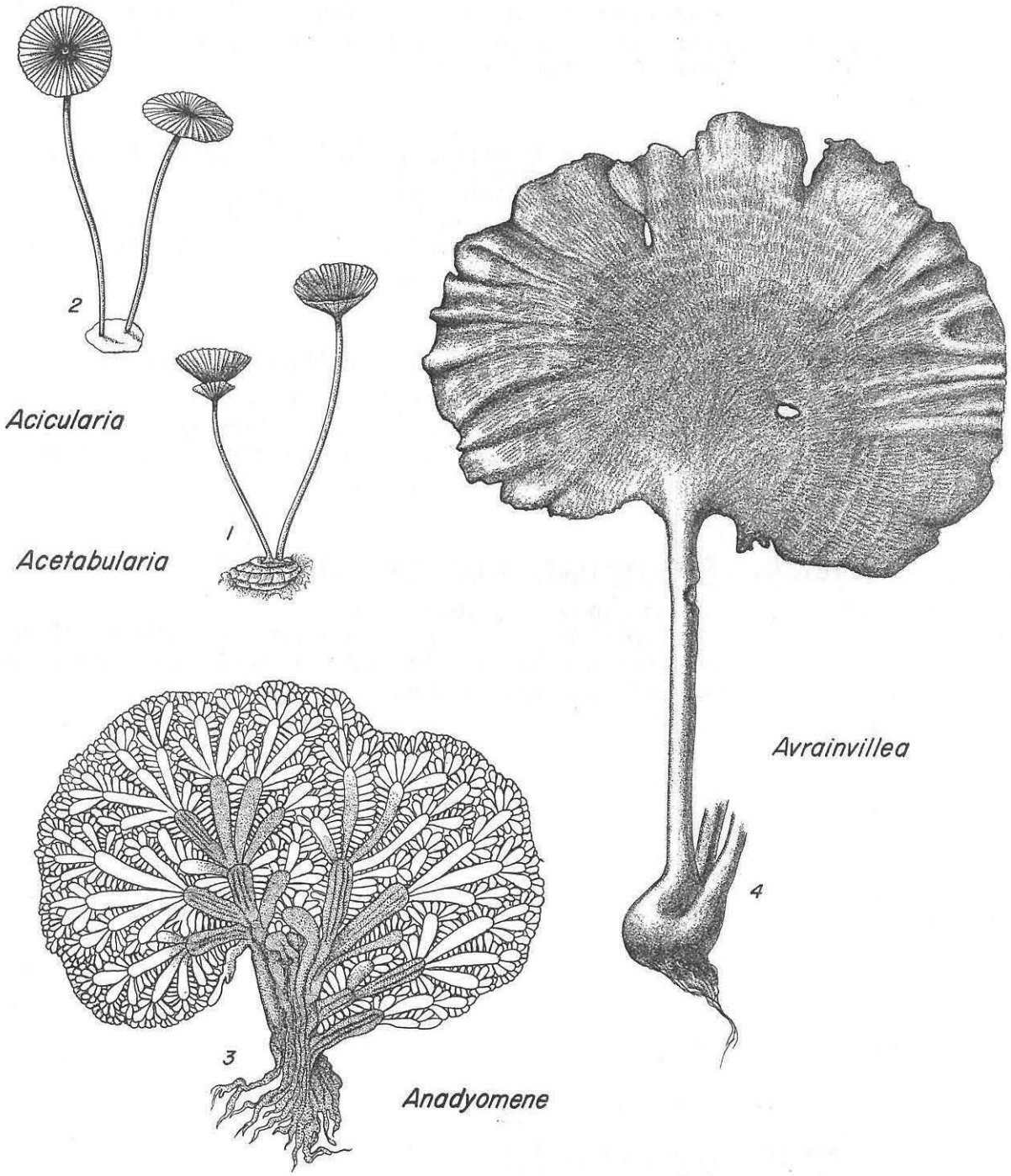
(After Oltmanns 1922). Habit.
Fan shaped plants can reach diameters of 10 cm and occur most commonly on shaded rocks or mangrove roots in both sheltered and exposed localities.

FIG. 4. AVRAINVILLEA NIGRICANS DECAISNE

(Original). Habit.
Avrainvillea species reach maximum heights of 10-30 cm and are usually found in sand or muddy areas of slight to moderate wave action.

MAGNIFICATION FACTORS:

Fig. 1: 1.2×; Fig. 2: 2.5×; Fig. 3: 0.9×; Fig. 4: 0.7×.


2
Acicularia
1
Acetabularia
Avrainvillea
4
3
Anadyomene

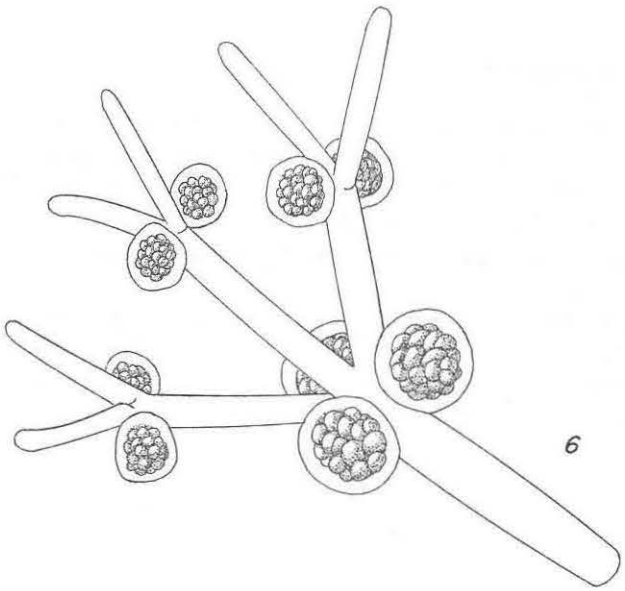
FIGS. 5-8. BATOPHORA OERSTEDI J. AGARDH

(After Boergesen 1913 [Fig. 5] and Harvey 1858 [Figs. 6-8] as Dasycladus occidentalis). Habit showing sterile and fertile axes (5); sporangia on fertile branchlets (6-7); cross section of main axis showing branching pattern (8).

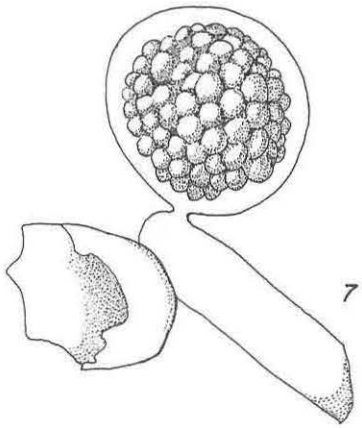
Plants of Batophora commonly grow to 3-10 cm and are found in greatest abundance in protected lagoons and mangrove thickets. They can occur on small stones, shell fragments, mangrove roots, etc.

MAGNIFICATION FACTORS:

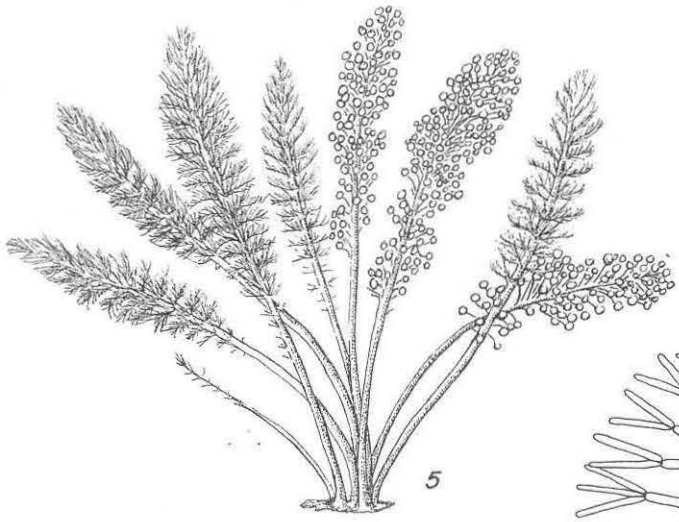
Fig. 5: 0.7×; Fig. 6: 50×; Fig. 7: 75×; Fig. 8: 20×.



6

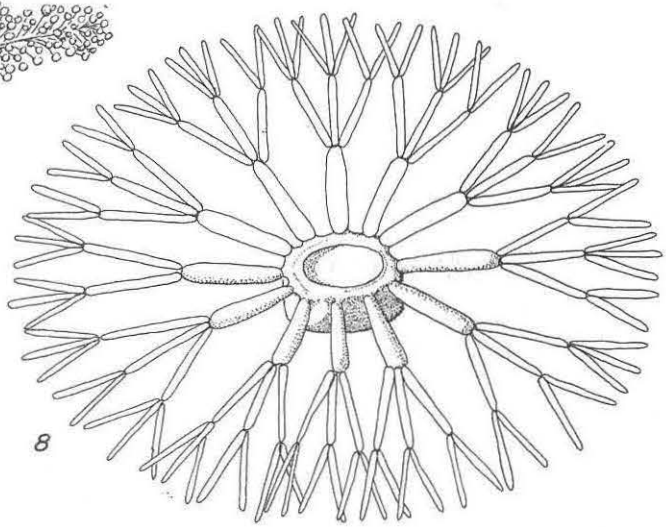


7



5

Batophora



8

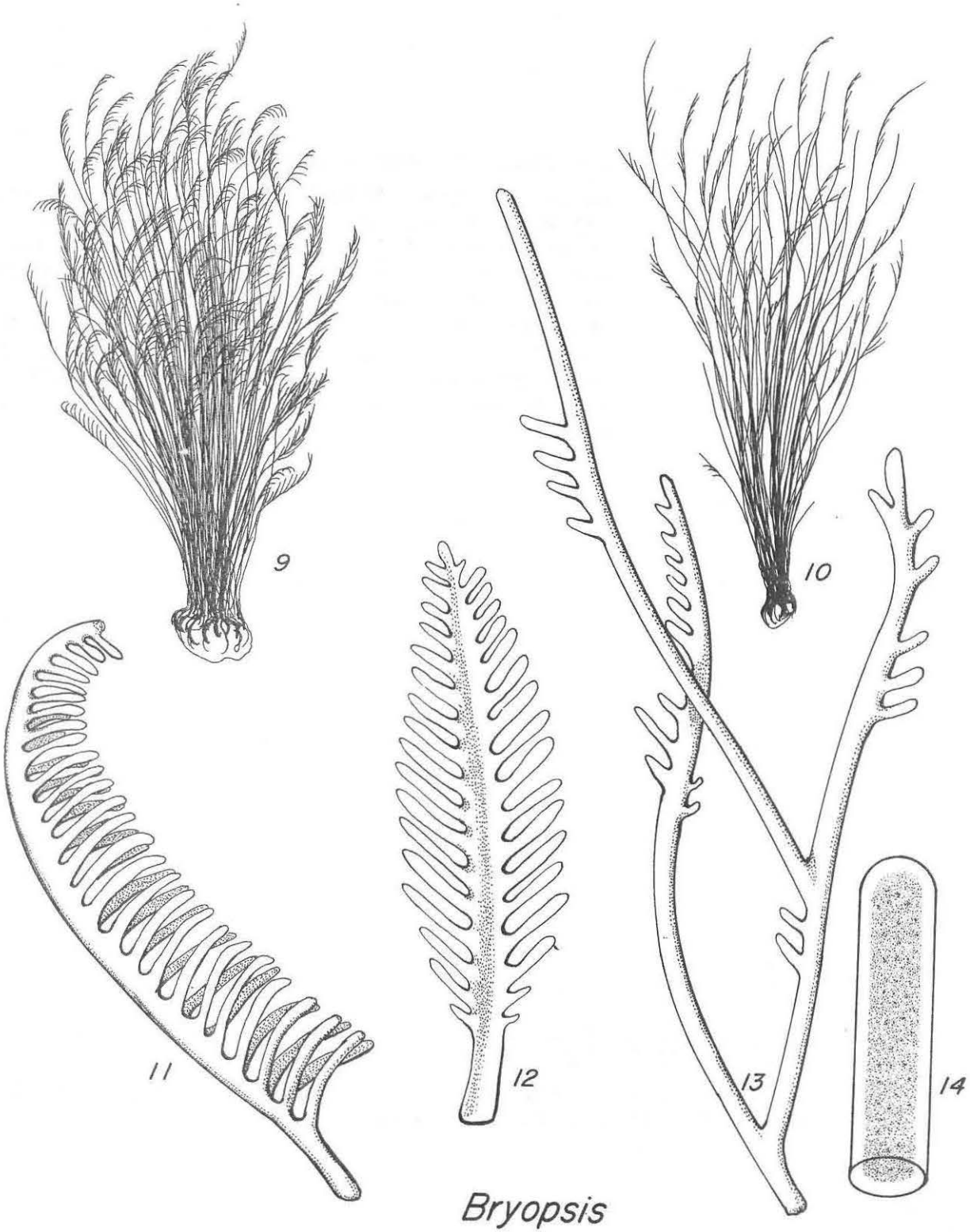
FIGS. 9-14. BRYOPSIS PLUMOSA (HUDSON) C. AGARDH

(After Harvey 1858). Habits of pinnately (9) and irregularly branched specimens; branch tips of pinnately (11-12) and irregularly (13) branched specimens; greatly enlarged segment of a siphon (14).

Bryopsis plants attain heights of 5-12 cm. Most species occur in lagoons and very sheltered waters, but B. plumosa occasionally occurs in moderate surf. In most cases, plants are components of the lithos community.

MAGNIFICATION FACTORS:

Fig. 9: 1.0×; Fig. 10: 1.0×; Fig. 11: 25×; Fig. 12: 25×; Fig. 13: 25×; Fig. 14: 60×.



Bryopsis

FIG. 15. CAULERPA PROLIFERA (FORSSKÅL) LAMOUROUX
(After Harvey 1858). Habit.

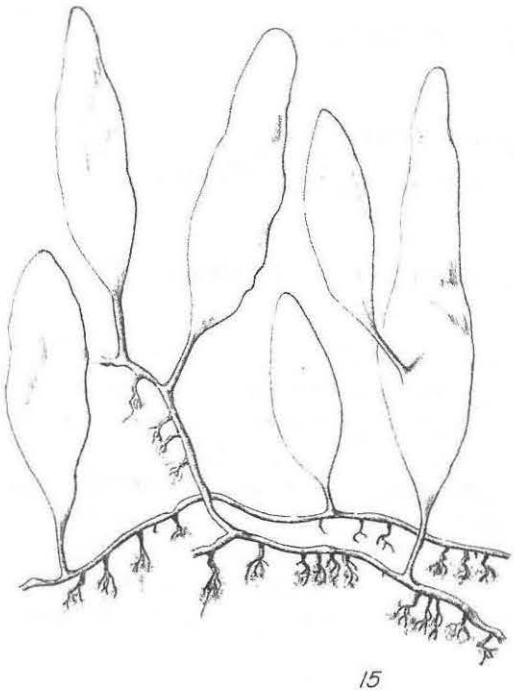
FIG. 16. CAULERPA LANUGINOSA J. AGARDH
(After Harvey 1858, as C. lycopodium).

FIG. 17. CAULERPA MEXICANA (SONDER) J. AGARDH
(After Harvey 1858).

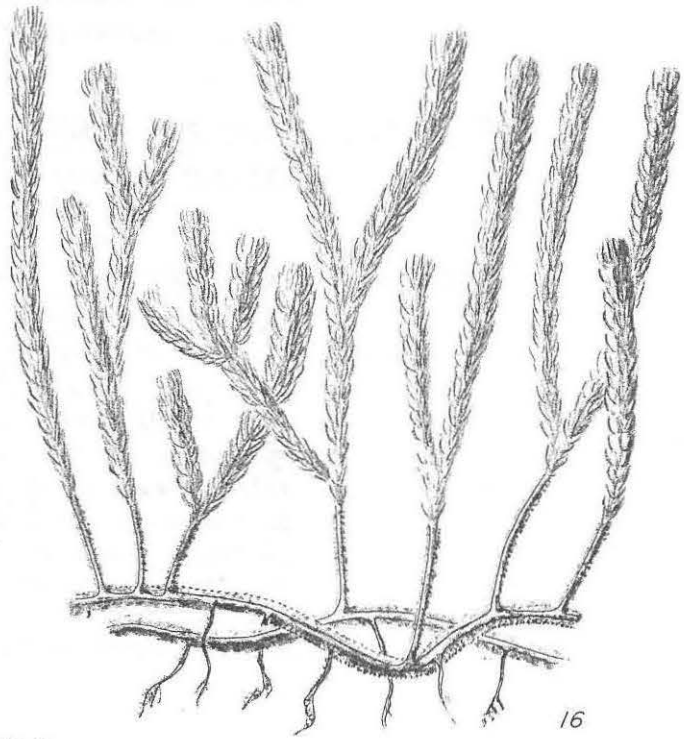
Species of Caulerpa occur in both the lithos and pelos and grow both under sheltered and exposed wave conditions. In general a greater diversity of species occurs in quiet waters with sandy or muddy substrates, and plants growing under these conditions appear more luxuriant and reach a greater size than do those found under the more harsh conditions of wave washed areas. Plants of some species commonly attain heights of 20 cm while those of other species rarely exceed 5 cm.

MAGNIFICATION FACTORS:

Fig. 15: 0.75×; Fig. 16: 0.6×; Fig. 17: 0.6×.

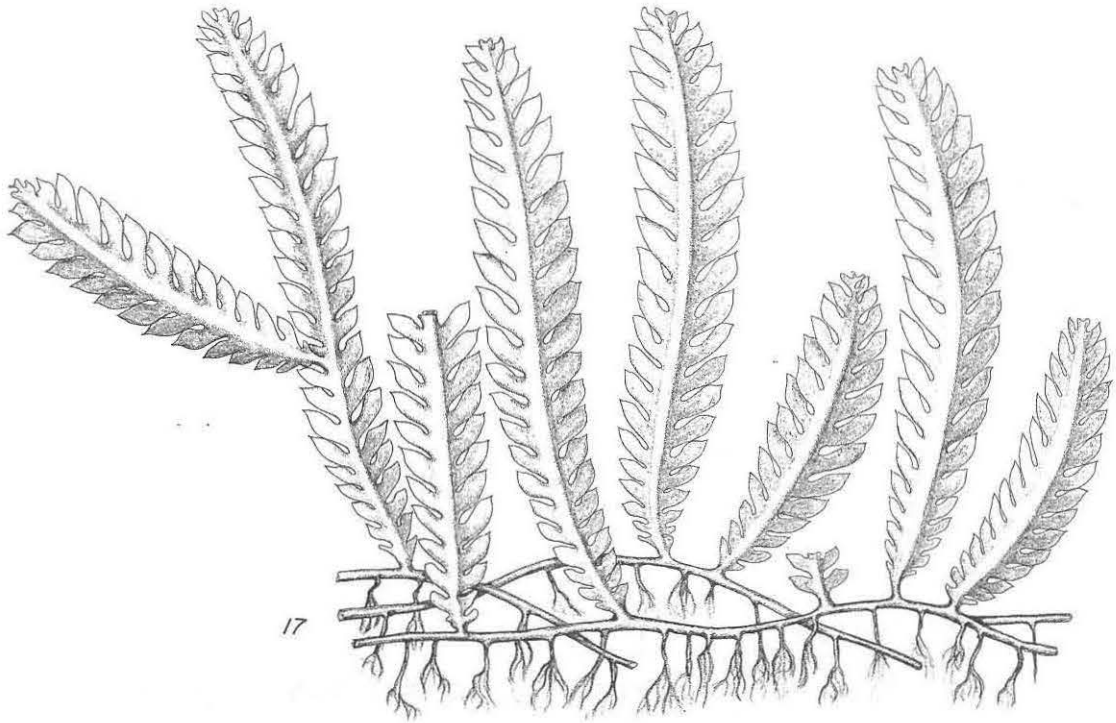


15



16

Caulerpa



17

FIG. 18. CAULERPA CUPRESSOIDES (WEST) C. AGARDH VAR. ERICIFOLIA (CROUAN) WEBER VAN BOSSE (After Harvey 1858). Habit.

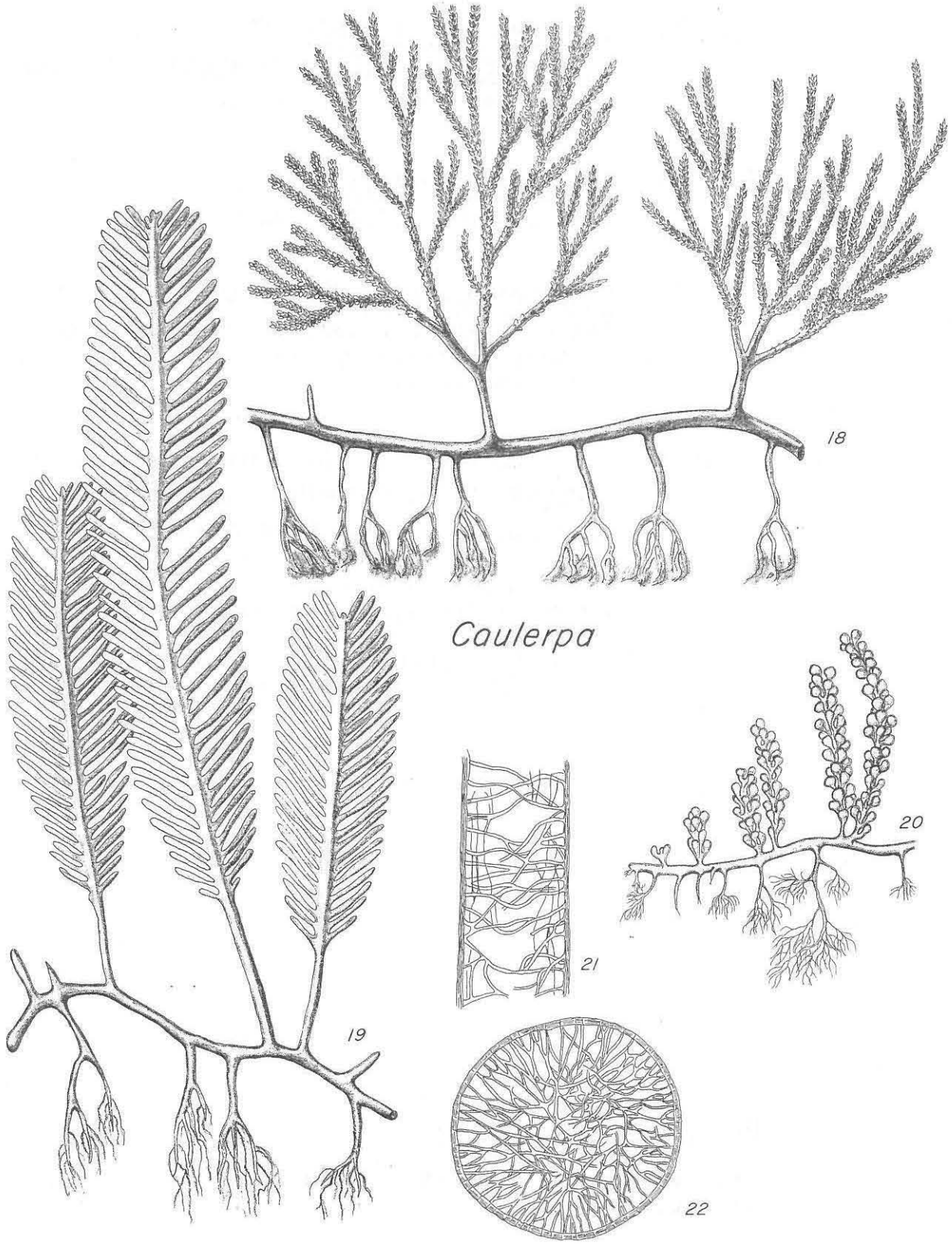
FIG. 19. CAULERPA ASHMEADII HARVEY (After Harvey 1858). Habit.

FIG. 20. CAULERPA RACEMOSA (FORSSKÅL) J. AGARDH (After Boergesen 1913). This is an extremely variable species both as to size and appearance.

FIGS. 21-22. LONGITUDINAL (21) AND CROSS (22) SECTION OF CAULERPA SIPHONS SHOWING MESH WORK OF TRABECULAE. (After Oltmanns 1922).
Habitat and size information on Caulerpa is provided in the legend for Figs. 15-17. Of the various species of Caulerpa, C. racemosa is found under a greater variety of conditions than other species and exhibits greater morphological variation than almost all other Caulerpa species.

MAGNIFICATION FACTORS:

Fig. 18: 0-6×; Fig. 19: 1.0×; Fig. 20: 0.75×; Fig. 21: 7×; Fig. 22: 10×.


18
Caulerpa
19
20
21
22

FIGS. 23-25. CODIUM SP.

(After Oltmanns 1922). Habit of plant (23); utricles bearing sporangia and hairs (24-25).
Codium occurs in rocky situations both in deep and shallow waters of exposed coasts. Some species form mats; others are erect and reach heights of 50 cm.

FIGS. 26-28. CLADOPHORA SP.

(After Harvey 1858). Habit (26); branches (27-28).
Species of Cladophora are poorly defined in Florida waters. Plants occur mostly on rocks and grow both in the intertidal and sublittoral zones.

FIG. 29. CHAMEDORIS PENICULUM (ELLIS & SOLANDER) KUNTZE. (After Harvey 1858). Habit of plant.
This species occurs primarily in deep waters but occasionally grows under shallow water rock ledges; plants attain heights of up to 20 cm.

FIG. 30. CLADOCEPHALUS LUTEOFUSCUS (CROUAN) BOERGESEN

(After Boergesen 1913). Habit of plant.
Known only from deeper waters in Florida; specimens grow to 10 cm.

FIGS. 31-34. CHAETOMORPHA SP.

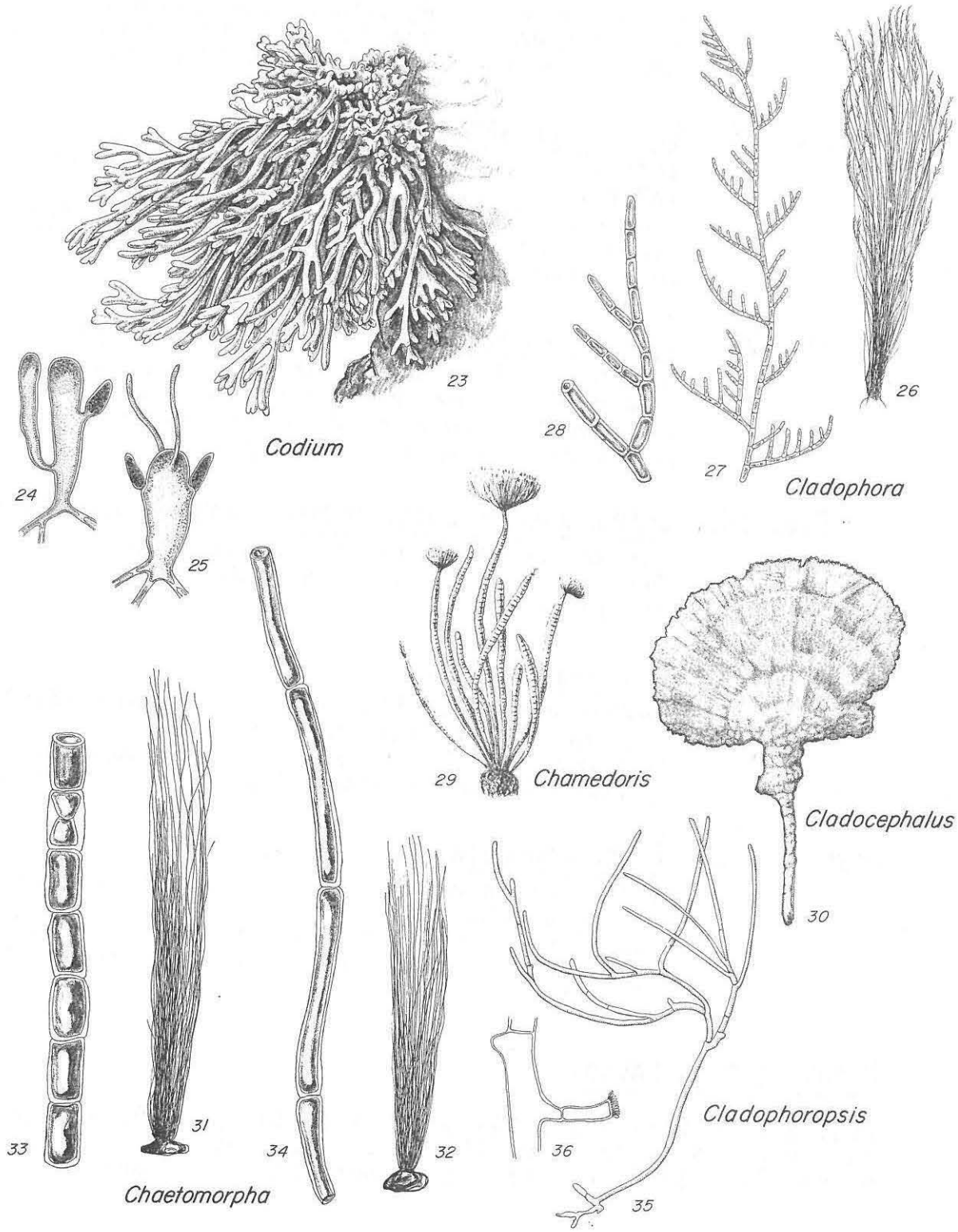
(After Harvey 1858). Habit of plants (31-32); enlargement of filaments (33-34).
Various species occur on rocks or in the aufwuchs of tidepools and localities of moderate wave exposure.

FIGS. 35-36. CLADOPHOROPSIS SP.

(After Oltmanns 1922). Habit of plant (35); enlarged cell (36).
Cladophoropsis occurs in very sheltered situations on mud or stones or woodwork. Plants can reach heights of 15 cm.

MAGNIFICATION FACTORS:

Fig. 23: 0.25×; Figs. 24-25: 2.5×; Fig. 26: 0.3×; Fig. 27: 10×; Fig. 28: 15×; Fig. 29: 0.5×; Fig. 30: 0.6×; Figs. 31-32: 0.75×; Fig. 33: 40×; Fig. 34: 40×; Fig. 35: 3×; Fig. 36: 20×.


23
Codium
24
25
28
27
26
Cladophora
29
Chamedoris
Cladocephalus
30
33
31
34
32
Chaetomorpha
36
35
Cladophoropsis

FIGS. 37-39. CYMOPOLIA BARBATA (LINNEAUS) LAMOUROUX

(After Harvey 1858). Habit (37); branch tip (38); cross section (39) with sporangia.
Cymopolia plants grow to 25 cm and occur primarily on stones in warm waters just below the low tide mark. They are known primarily from the lower Florida Keys.

FIGS. 40-42. DASYCLADUS VERMICULARIS (SCOPOLI) KRASSER

(After Oltmanns 1922). Habit of group of plants (40); plants with sporangia (41); branches bearing sporangia (42).
Plants reach heights of 2-4 cm and grow on rocks in areas of moderate wave action.

FIG. 43. CYSTODICTYON PAVONIUM J. AGARDH

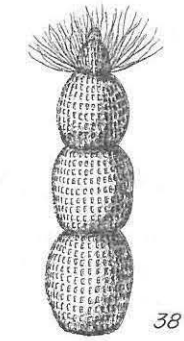
(After Collins 1909). Habit of portion of plant.
Plants up to 14 cm across occur in deep waters, but seldom are found.

FIG. 44. DIPLOCHAETE SOLITARIA COLLINS

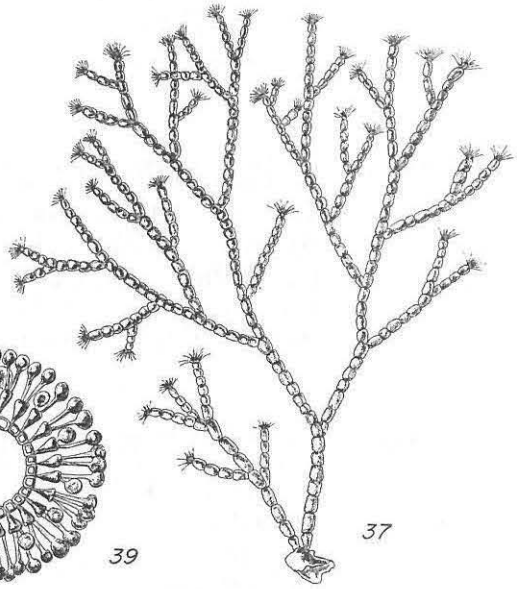
(After Collins 1909). Habit.
Specimens are known exclusively as epiphytes on other algae growing in shallow water; cells are mostly 30 µm or less broad.

MAGNIFICATION FACTORS:

Fig. 37: 0.3×; Fig. 38: 3×; Fig. 39: 25×; Fig. 40: 0.4×; Fig. 41: 1×; Fig. 42: 16×; Fig. 43: 7×; Fig. 44: 270×.

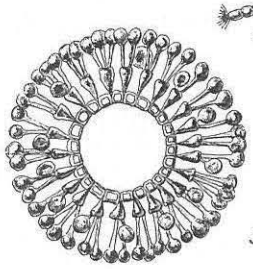


38

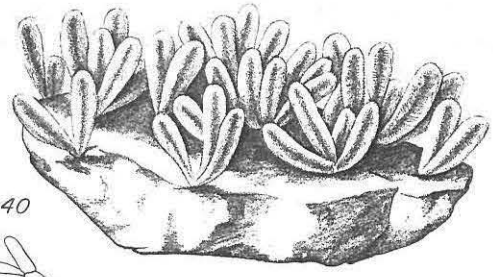


37

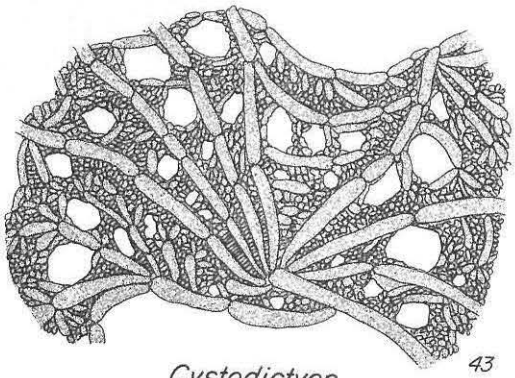
Cymopolia



39

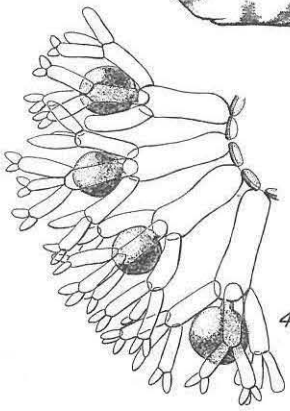


40

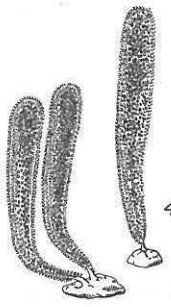


43

Cystodictyon

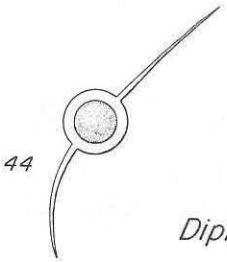


42



41

Dasycladus



44

Diplochaete

FIG. 45. DICTYOSPHAERIA CAVERNOSA (FORSSKÅL) BOERGESEN
(After Boergesen 1913).
Plants up to 12 cm across develop in shallow water rocky situations.

FIG. 46. ENTEROMORPHA LINGULATA J. AGARDH
(Original).
Plants usually occur in the intertidal zone on rocks and can reach lengths of over 30 cm.

FIG. 47. DICTYOSPHAERIA VAN BOSSEAE BOERGESEN
(After Boergesen 1913). This species occurs in Jamaica and the Virgin Islands and can be expected in the Florida Keys.

FIG. 48. ERNODESMIS VERTICILLATA (KÜTZING) BOERGESEN
(After Boergesen 1913).
Plants grow to 6 cm tall and occur primarily in shallow, sheltered, shaded lagoons.

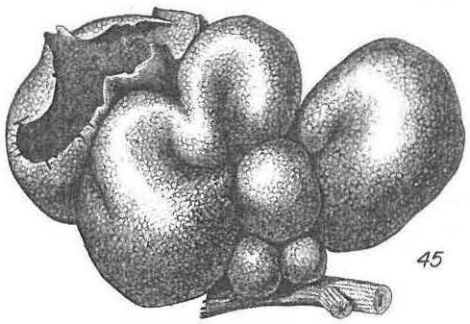
FIG. 49. HALICYSTIS OVALIS (LYNGBYE) ARESCHOUG
(After Oltmanns 1922). Figure included to show form of plants; material of Florida species has not been available.
Florida plants reportedly are 4-7 mm broad and occur on shaded rocks.

FIGS. 50-51. HALIMEDA SIMULANS HOWE
(Original and after Boergesen 1913, as H. incrassata var. simulans).

FIG. 52. HALIMEDA INCRASSATA (ELLIS) LAMOUROUX
(After Boergesen 1913).
Various Halimeda species occur on rocks or in the pelos and can reach heights of 25 cm or more. Halimeda is among the more common algae of southern Florida.

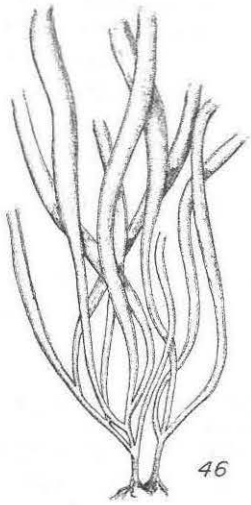
MAGNIFICATION FACTORS:

Fig. 45: 0.9×; Fig. 46: 0.75×; Fig. 47: 6×; Fig. 48: 4×; Fig. 49: 1.2×; Fig. 50: 0.5×; Fig. 51: 0.35×; Fig. 52: 0.5×.



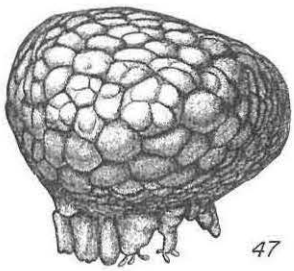
45

Dictyosphaeria



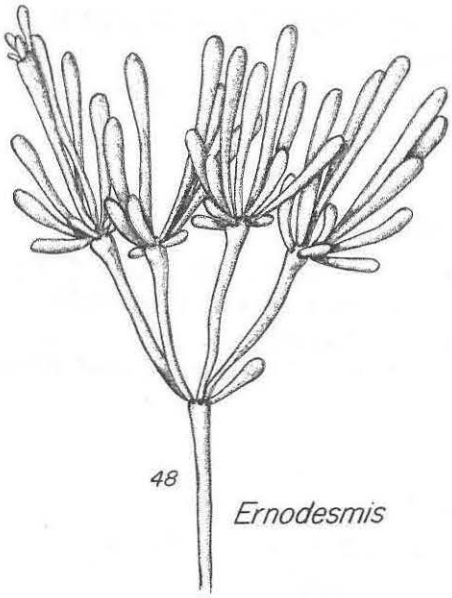
46

Enteromorpha



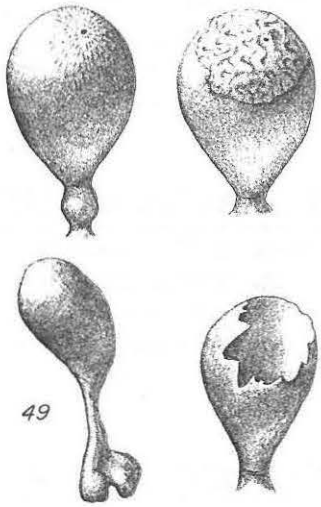
47

Dictyosphaeria



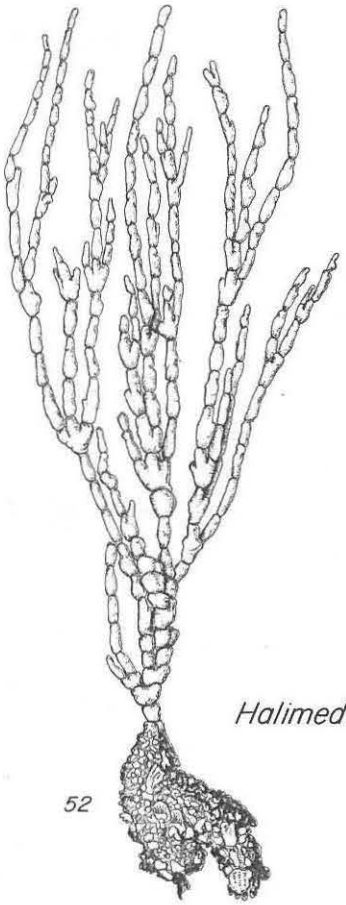
48

Ernodesmis



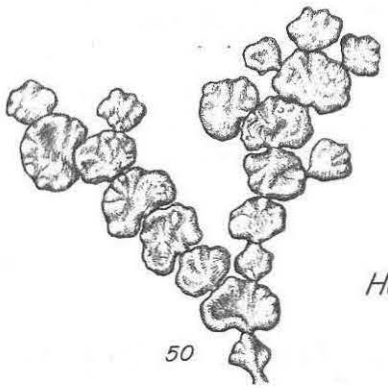
49

Halicystis



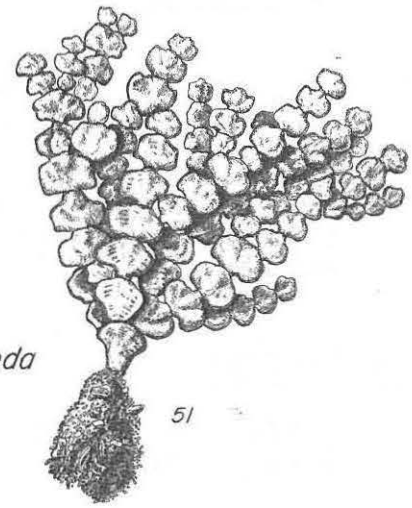
Halimeda

52



50

Halimeda



51

FIG. 53. OSTREOBIUM QUEKETTII BORNET AND FLAHAULT
(After Collins 1909).
Microscopic plants grow within old or dead shells.

FIGS. 54-55. MONOSTROMA SP.
(After Oltmanns 1922). Note blade-like habit and monostromatic construction.
Plants usually up to 10 cm tall occur on various objects in shallow water and tidepools.

FIG. 56. PENICILLUS PYRIFORMIS A. AND E. S. GEPP
(After Boergesen 1913).
Penicillus plants occur commonly in sand and mud and can reach heights of 15 cm.

FIG. 57. PENICILLUS CAPITATUS LAMARC
(After Boergesen 1913).

FIG. 58. RHIPOCEPHALUS PHOENIX (ELLIS AND SOLANDER) KUTZING. (After A. and E. S. Gepp 1911).
Plants rarely exceed 6 cm in length and occur in sand or mud.

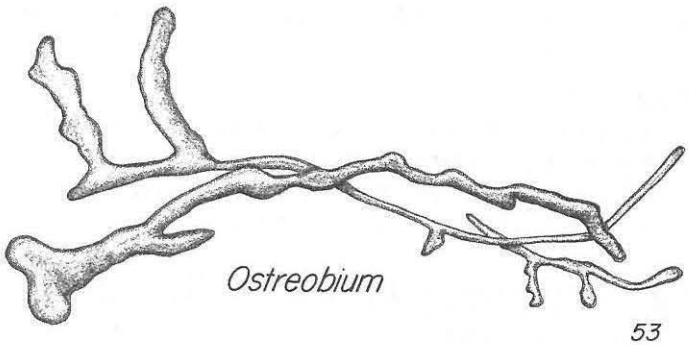
FIG. 59. NEOMERIS ANNULATA DICKIE
(Original).
Plants generally grow to 1-2 cm tall and occur on stones in shallow water; they can stand moderate wave action.

FIG. 60. MICRODICTYON BOERGESENII SETCHELL
(After Setchell 1925). Portion of a plant showing netlike habit.
Plants of indefinite size and shape occur on stones or in the aufwuchs, usually in deeper water.

FIG. 61. SIPHONOCLADUS TROPICUS (CROUAN) J. AGARDH
(After Boergesen 1918). Habit of plant.
Plants usually do not grow over seven cm tall and occur in the aufwuchs or in loose lying clumps in very sheltered localities.

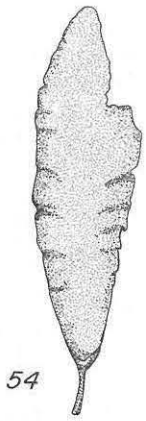
MAGNIFICATION FACTORS:

Fig. 53: 250×; Fig. 54: 0.7×; Fig. 55: 375×; Fig. 56: 0.5×; Fig. 57: 0.5×; Fig. 58: 1.0×; Fig. 59: 4×; Fig. 60: 6×; Fig. 61: 2×.



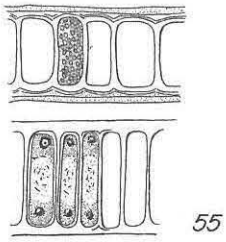
Ostreobium

53

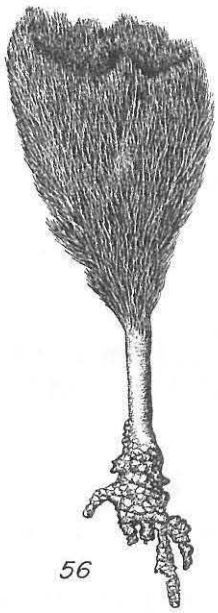


54

Monostroma

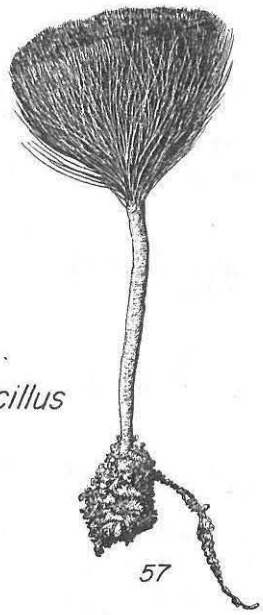


55



56

Penicillus

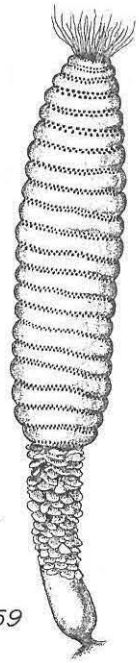


57



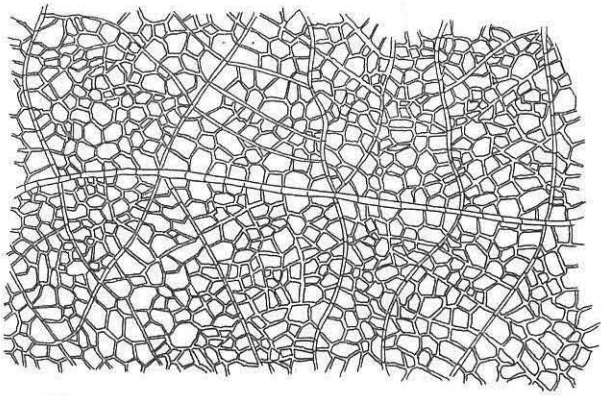
58

Rhipocephalus



59

Neomeris



60

Microdictyon



61

Siphonocladus

FIGS. 62-63. STRUVEA SP.

(After Oltmanns 1922). Habit of young and reasonably mature individuals.
Plants grow to 15 cm and occur on rocks, often in deeper waters.

FIG. 64. UDOTEA FLABELLUM (ELLIS AND SOLANDER) LAMOUROUX. (Original). Habit.
Plants reach heights of over 20 cm and occur in the pelos of both sheltered and exposed habitats. Large plants are common in lagoons.

FIG. 65. VALONIA VENTRICOSA J. AGARDH

(After Boergesen 1913). Habit of young plant.
Most species are less than 4 cm across and can occur in the lithos or aufwuchs in both sheltered and exposed localities. They are common on vertical rock faces just below the low tide mark.

FIG. 66. ULVELLA LENS CROUAN

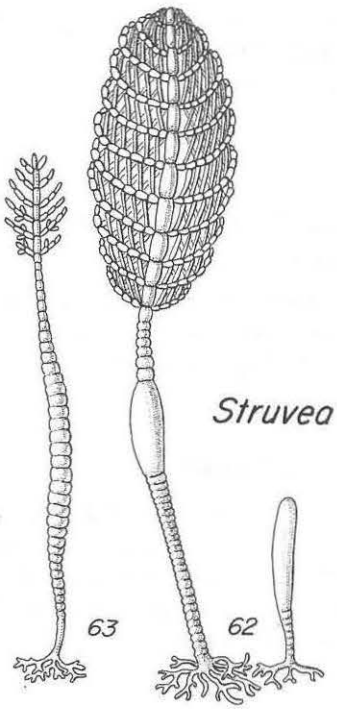
(After Collins 1909). Habit.
Plants form colonies 1-5 mm broad on stones or other algae.

FIG. 67. ULVA LACTUCA LINNEAUS

(After Oltmanns 1922). Habit.
Plants can attain lengths of over 1 mm and occur on stones, coral fragments, mangrove roots and other objects most commonly in the intertidal zone both in sheltered and exposed localities.

MAGNIFICATION FACTORS:

Fig. 62: 0.9×; Fig. 63: 0.9×; Fig. 64: 0.3×; Fig. 65: 50×; Fig. 66: 300×; Fig. 67: 0.2×.



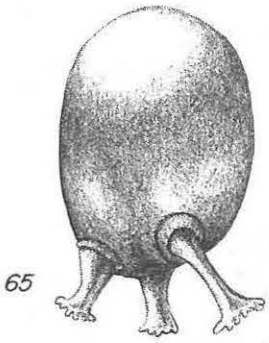
Struvea

63 62



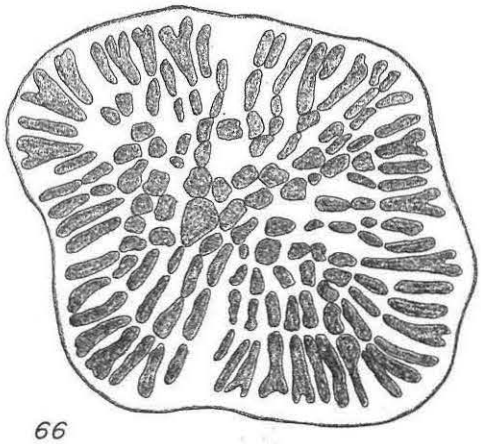
64

Udotea



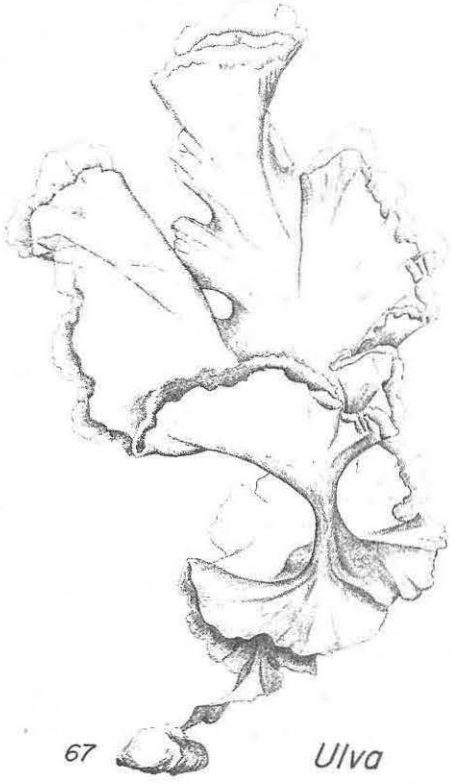
65

Valonia



66

Ulvella



67

Ulva

FIGS. 68-70. CLADOSIPHON OCCIDENTALIS KYLIN

(After Boergesen 1914 as Castagnea zosterae). Assimilators and plurilocular sporangia (68); Longitudinal section of plant (69); unilocular sporangium (70).
Plants attain heights of 15-20 cm and usually occur in the aufwuchs on sea grasses or other algae in shallow water.

FIGS. 71-72. ASCOCYCLUS ORBICULARIS (J. AGARDH) MAGNUS

(Original). Habit on a sea grass (71); portion of thallus (72) showing erect filaments.
Plants rarely exceed 3 mm in diameter and usually occur on sea grasses or algae in shallow water.

FIG. 73. COLPOMENIA SINUOSA (ROTH) DERBÈS AND SOLIER

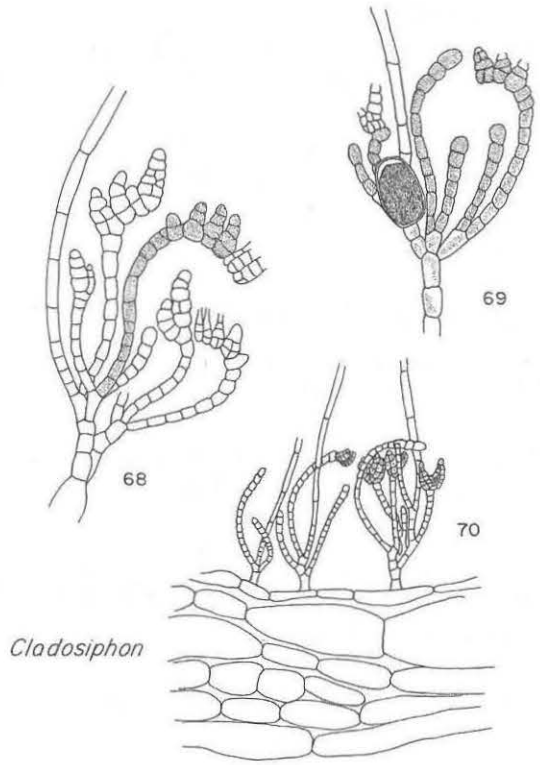
(After Oltmanns 1923). Habit.
Colpomenia plants grow to 12 cm across and are most common on intertidal rocks in exposed habitats.

FIGS. 74-76. DICTYOPTERIS DELICATULA LAMOUROUX

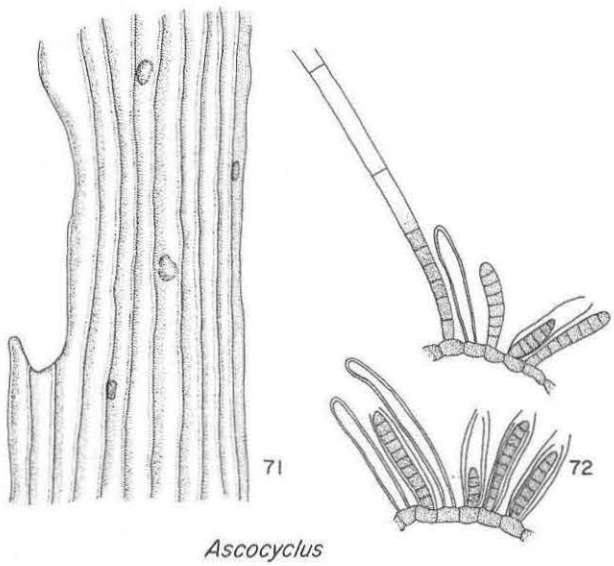
(After Boergesen 1914). Habit, part of thallus (74); cross sections of thallus (75-76). Note hairs (75).
Species of Dictyopteris range from 5 to over 40 cm tall. Certain species grow on rocks in areas of moderate wave action; others occur as epiphytes on larger algae.

MAGNIFICATION FACTORS:

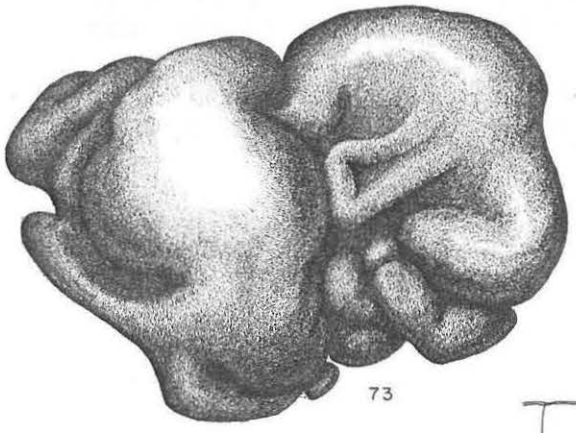
Fig. 68: 200×; Fig. 69: 170×; Fig. 70: 60×; Fig. 71: 1×; Fig. 72: 140×; Fig. 73: 1.2×; Fig. 74: 2.8×; Figs. 75: 12×; Fig. 76: 15×.



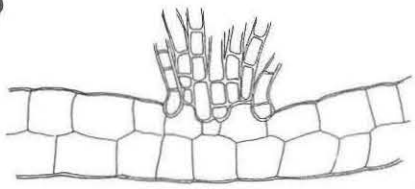
Cladosiphon

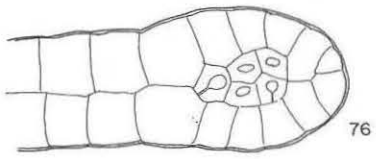


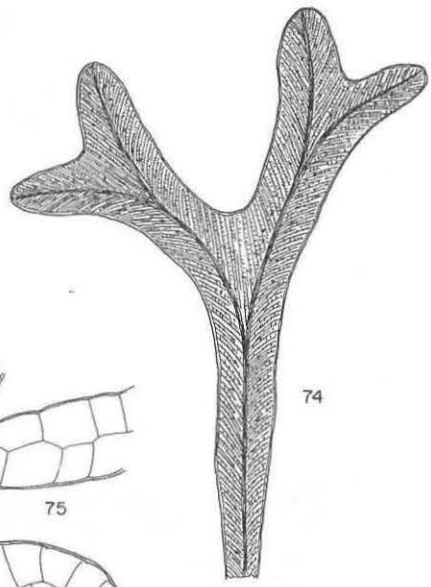
Ascocyclus



Colpomenia







Dictyopteris

FIGS. 77-79. DICTYOTA DICHOTOMA (HUDSON) LAMOUROUX

(After Oltmanns 1922). Habit of portion of plant (77). Branch tips (78-79). Note apical cells.

Plants of Dictyota vary from 5-35 cm or more tall and generally occur on rocks in shallow water in the upper sublittoral zone. Certain species seem to do better in more exposed habitats; others prefer more sheltered localities.

FIGS. 80-81. DICTYOTA CRENULATA J. AGARDH

(After Boergesen 1914). Cross section (80) showing female reproductive organs; cross section (81) showing male reproductive organs. Note: This taxon occurs in the neighboring Virgin Islands.

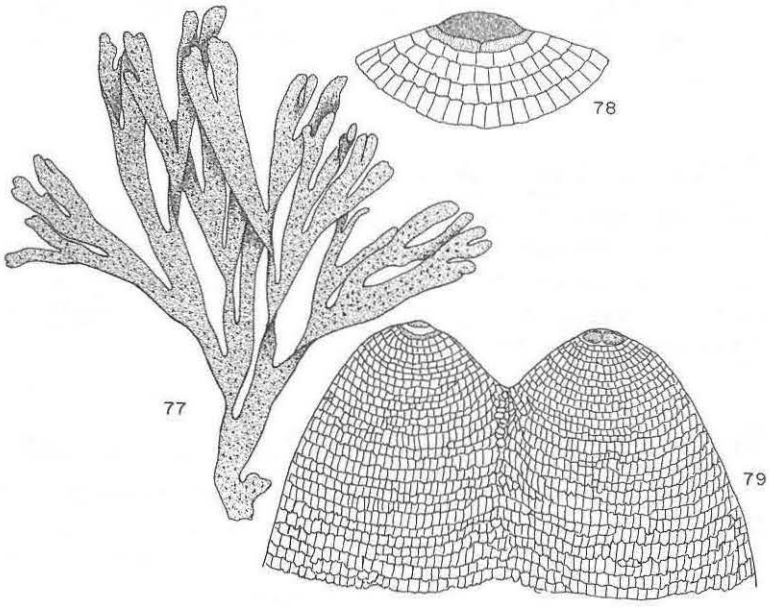
FIGS. 82-84. DILOPHUS QUINEENSIS (KUTZING) J. AGARDH

(After Boergesen 1914). Cross section (82) near tip showing sporangia and hairs; branch tip (83) with sporangia; cross section of older part of thallus (84).

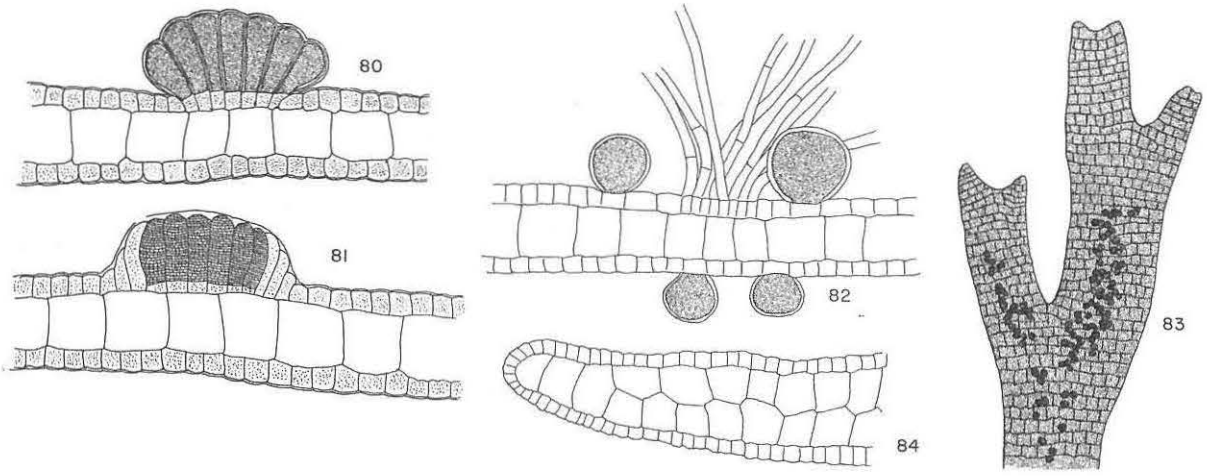
Plants rarely reach 15 cm in length and most commonly occur on upper sublittoral rocks on open coasts. Deeper water collections (to 26 m) are also known.

MAGNIFICATION FACTORS:

Fig. 77: 0.6×; Fig. 78: 30×; Fig. 79: 8×; Fig. 80: 75×; Fig. 81: 75×; Fig. 82: 80×; Fig. 839×; Fig. 84: 80×.



Dictyota



Dilophus

FIGS. 85-87. ECTOCARPUS SILICULOSUS (DILLWYN) LYNGBYE

(Original). Habit (85); branches bearing sporangia (86-87).

Some species of Ectocarpus rarely grow over 1.5 mm tall; others attain heights of 60 cm. The plants occur in a variety of habitats and are common in both the aufwuchs and lithos communities. Sporangia occur on most plants throughout the year and may be one celled or many celled.

FIG. 88. EUDESME ZOSTERAE (J. AGARDH) KYLIN

(After Boergesen 1914). Erect filaments showing trichothallic growth.

Plants of Eudesme consist of numerous filaments more or less firmly united in a common mucilage to form a more or less cylindrical thallus up to 10 (-30) cm tall. Specimens most commonly occur as epiphytes in shallow, sheltered habitats.

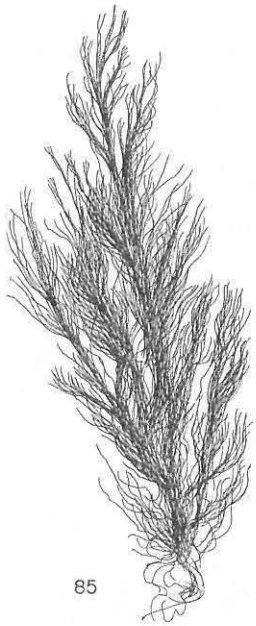
FIGS. 89-92. GIFFORDIA MITCHELLAE (HARVEY) HAMEL

(After Boergesen, as Ectocarpus). Erect branches (89, 92) with sporangia (89); cells with chromoplasts (90, 91).

Giffordia plants show the same size range, habitat distribution and reproductive cycles as do species of Ectocarpus (see above).

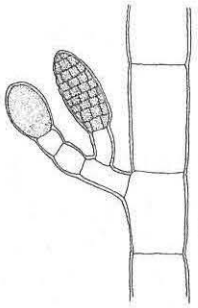
MAGNIFICATION FACTORS:

Fig. 85: 0.5×; Fig. 86: 70×; Fig. 87: 250×; Fig. 88: 125×; Fig. 89: 70×; Figs. 90-91: 70×; Fig. 92: 155×.



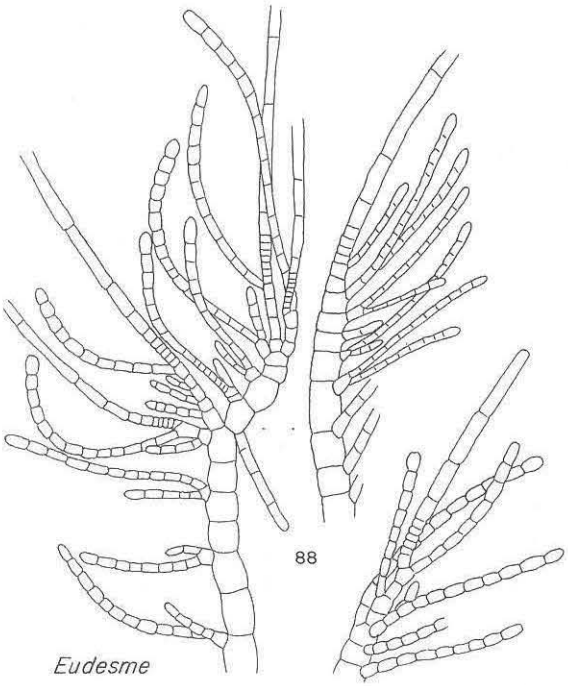
85

Ectocarpus



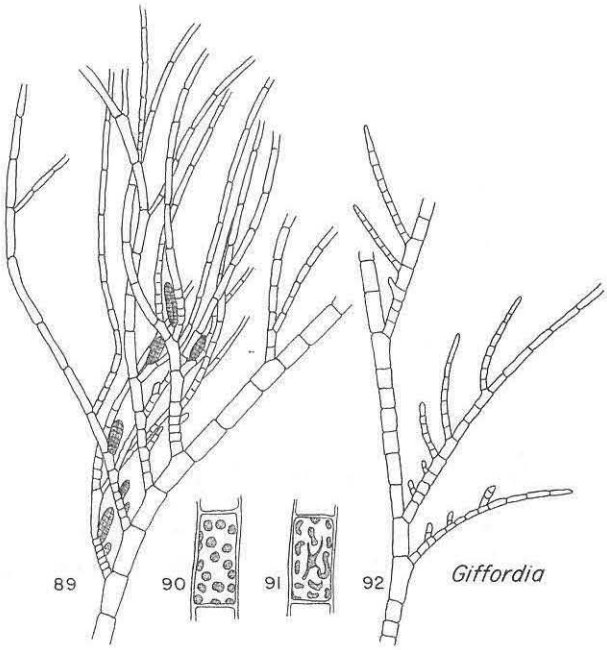
87

86



88

Eudesme



89 90 91 92

Giffordia

FIGS. 93-98. PADINA PAVONICA (LINNEAUS) THIVY IN TAYLOR

(After Harvey 1852, as P. pavonis). Habit of plant (93); surface of blade (94); close up of a sorus (95) and spores (97); close up of surface hairs (96, 98). Figs. 97, 98 also show thallus cross sections.

Padina is the only brown alga in Florida with a calcified thallus. Blades up to 10 cm across occur on rocks, usually in shallow water with slight to moderate wave action.

FIGS. 99-100. LOBOPHORA VARIEGATA (LAMOUROUX) WOMERSLEY

(After Boergesen 1914, as Zonaria variegata). Cross section (99) of thallus with sporangia in a sorus (top) and empty sori (bottom); cross section of young thallus (100).

Fan shaped blades up to 8 cm tall occur most commonly on intertidal rocks of exposed coasts.

FIGS. 101-102. RALFSIA EXPANSA J. AGARDH

(After Boergesen 1914). Cross section showing sporangia (101); cross section near edge of thallus (102).

Ralfsia plants form tar-like crusts on rocks and other hard objects in shallow water, mostly in areas of moderate wave action.

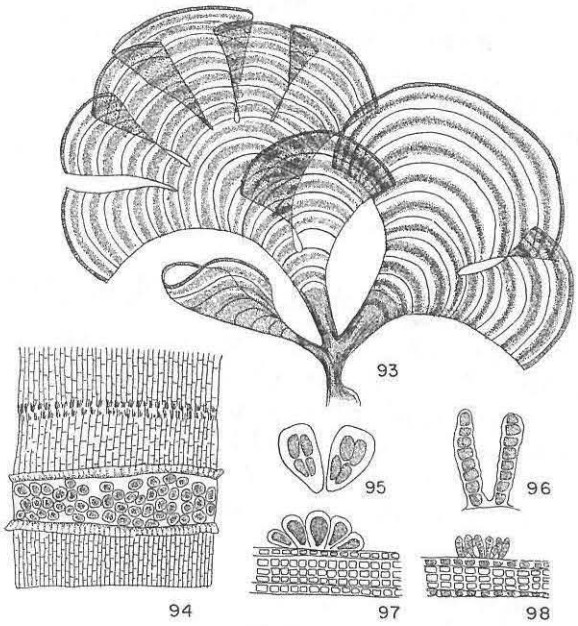
FIGS. 103-106. ROSENVINGEA SANCTAE-CRUSIS BOERGESEN

(After Boergesen 1941). Habit of plant (103); longitudinal section of thallus showing cell types (104); cross section of thallus (105); cross section showing plurilocular sporangia (106).

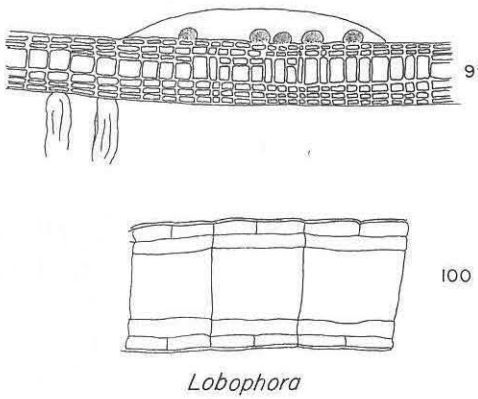
Plants normally reach heights of 20-40 cm, depending upon the species, and most commonly occur on rocks in shallow water. One species is found in sheltered locations; the others grow in more exposed habitats.

MAGNIFICATION FACTORS:

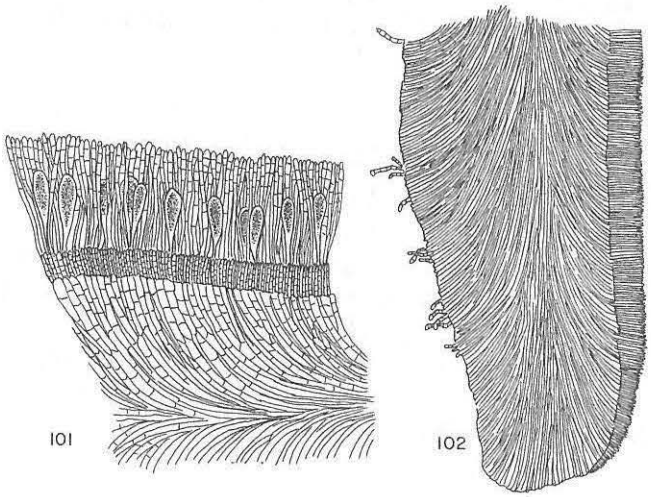
Fig. 93: 0.5×; Fig. 94: 10×; Fig. 95: 300×; Fig. 96: 100×; Fig. 97: 50×; Fig. 98: 50×; Fig. 99: 40×; Fig. 100: 70×; Fig. 101: 45×; Fig. 102: 30×; Fig. 103: 0.4×; Fig. 104: 140×; Fig. 105: 125×; Fig. 106: 110×.



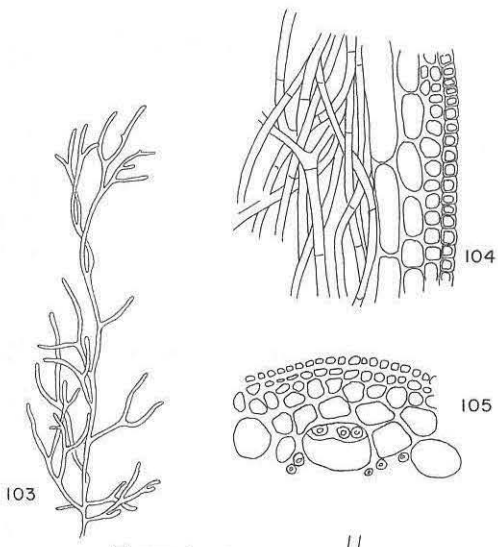
Padina



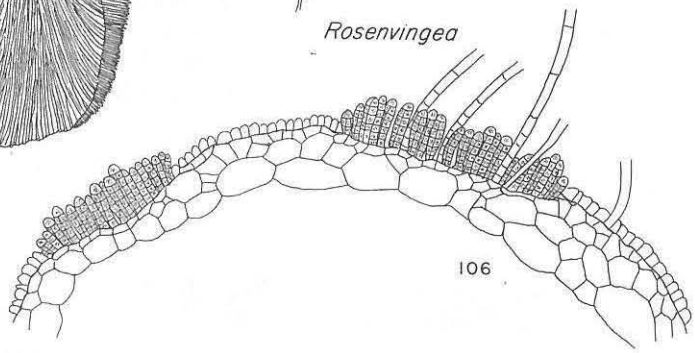
Lobophora



Ralfsia



Rosenvingea



FIGS. 107-108. SARGASSUM FILIPENDULA C. AGARDH VAR. MONTAGNEI (BAILEY) GRUNOW. (Harvey 1852, as S. montagnei). Habit of plant (107); branch showing leaf, vesicles (air bladders), and receptacles (108).
Most species of Sargassum occur on rocks in the sublittoral zone of rocky coasts and can attain heights of over 100 cm. Two species occur in an unattached state and are responsible for the naming of the Sargasso Sea. These two are always sterile, lack holdfasts, and are usually covered with bryozoans.

FIG. 109. SCYTOSIPHON LOMENTARIA (LYNGBYE) C. AGARDH (After Oltmanns 1922). Habit
Plants normally do not exceed 50 cm in length and occur on sublittoral rocks in areas protected from strong wave action.

FIG. 110. SPATOGLOSSUM SCHROEDERI (MERTENS) KÜTZING (Original). Habit.
Plants of Spatoglossum often appear irridescent when growing; they attain heights of 10-30 cm and usually occur on rocks in areas of slight to moderate wave action.

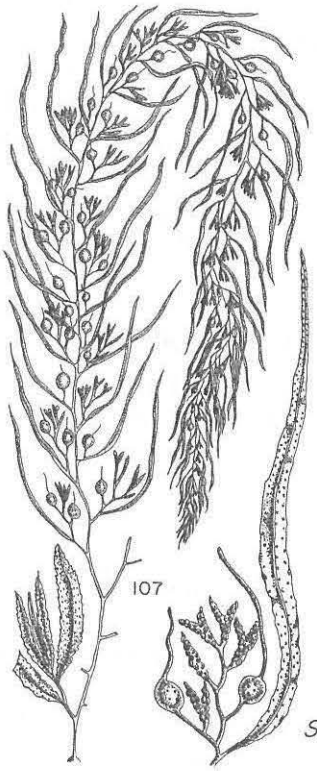
FIG. 111. SPHACELARIA SP. SHOWING APEX AND GROWTH PATTERN. (After Oltmanns 1922).

FIG. 112. SPHACELARIA TRIBULOIDES MENEGHINI (After Oltmanns 1922). Showing propagule.

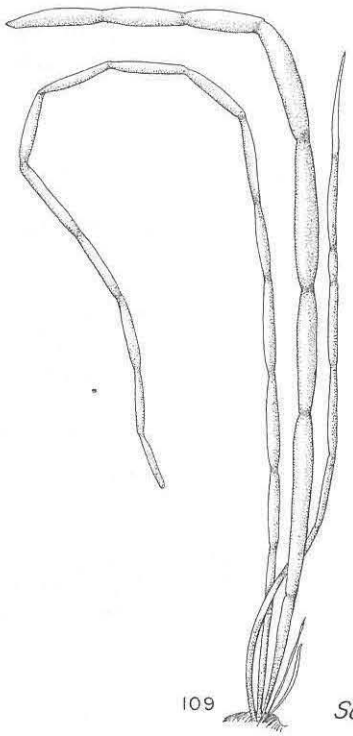
FIG. 113. SPHACELARIA FUCIGERA KÜTZING (After Oltmanns 1922). Branch bearing a number of propagulae.
Sphacelaria plants vary from 5 mm to 3 cm in height and appear as coarse tufts of filaments in the aufwuchs and lithos of exposed coasts. The polysiphonous-like appearance of the branches makes them readily recognizable.

MAGNIFICATION FACTORS:

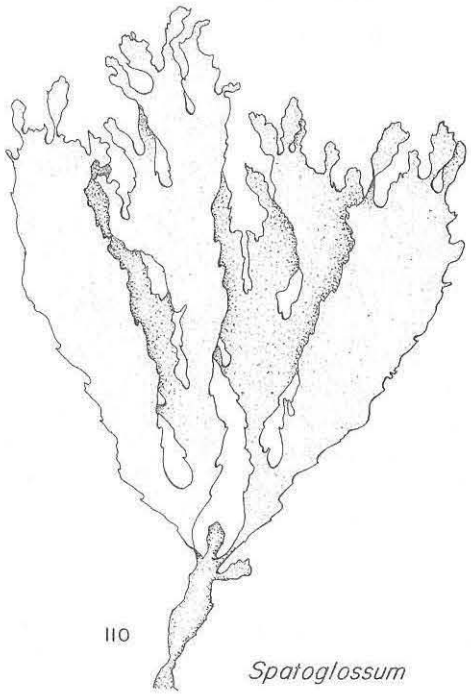
Fig. 107: 0.2×; Fig. 108: 1.0×; Fig. 109: 0.3×; Fig. 110: 0.3×; Fig. 111: 135×; Fig. 112: 120×; Fig. 113: 100×.



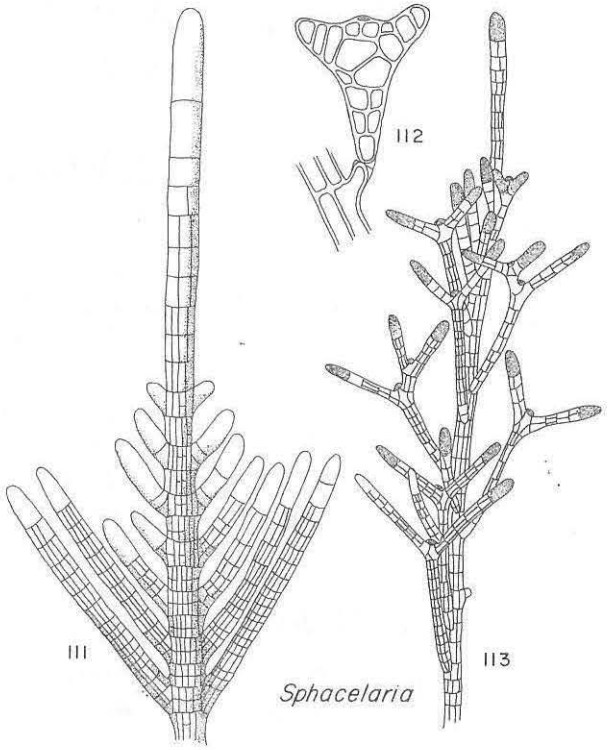
Sargassum



Scytosiphon



Spatoglossum



Sphacelaria

FIG. 114. SPOROCHNUS BOLLEANUS MONTAGNE

(Original). Habit.

Sporochnus plants often reach heights of over 80 cm and occur on rocks along open coasts. One species is known only from deep water, but the other can occur close to the low tide mark in shallow water. It is among the most elegant of brown algae.

FIG. 115. STILOPHORA RHIZOIDES (EHRHART) J. AGARDH

(Original). Habit of plant.

Stilophora plants can grow to 30 cm tall and often appear stiff and brittle. They occur most commonly in the lithos of sheltered localities.

FIG. 116. STYPOPODIUM ZONALE (LAMOUROUX) PAPENFUSS

(Original). Habit of plant.

Stypopodium plants commonly are irridescent when growing and attain lengths of 40 cm. They usually occur in shallow water on exposed coasts and can be present in abundance.

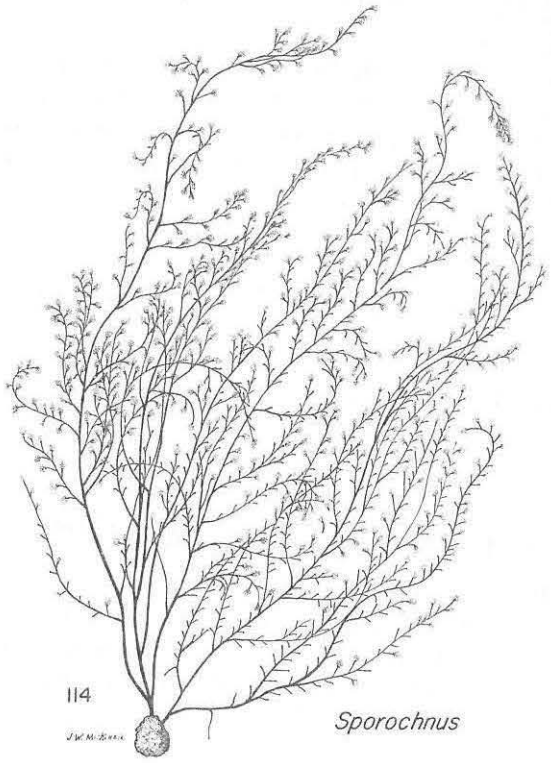
FIG. 117. TURBINARIA TURBINATA (LINNEAUS) KUNTZE

(After Boergesen 1914). Portion of thallus showing turbinate leaves.

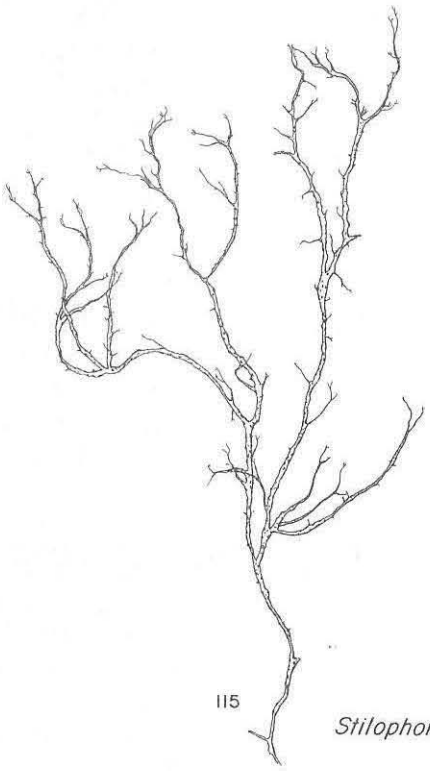
Turbinaria can grow to 40 cm or more and is found on rocky coasts both in the sublittoral and intertidal zones, often in tide pools.

MAGNIFICATION FACTORS:

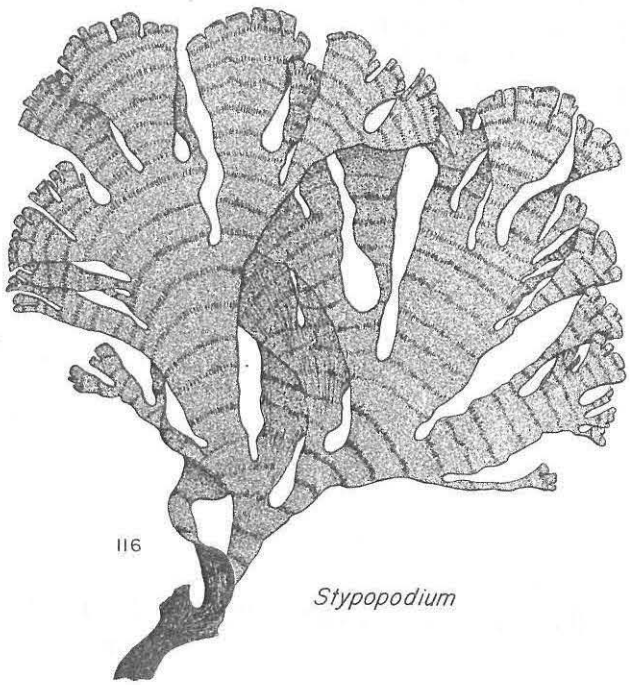
Fig. 114: 0.1×; Fig. 115: 0.4×; Fig. 116: 0.2×; Fig. 117: 1.1×.



114 *Sporochnus*



115 *Stilophora*



116 *Stypopodium*



117 *Turbinaria*

FIGS. 118-120. ACANTHOPHORA SPICIFERA (VAHL) BOERGESEN

(After Boergesen 1915-1920 [119, 120] and Harvey 1853 [118, as A. thierii]). Habit of portion of plant (118); cross section of branch (119); axis showing spinose-warty ultimate branchlets (120).

Plants grow to 25 cm tall and are common in shallow water of rocky coasts both in exposed and sheltered localities.

FIGS. 121-124. ANTITHAMNION ANTILLANUM BOERGESEN

(After Boergesen 1930). Drawings of a species from the Virgin Islands to be expected in Florida. Portions of erect axes bearing mature (121, 124) and immature (123) tetrasporangia; spermatangia (122).

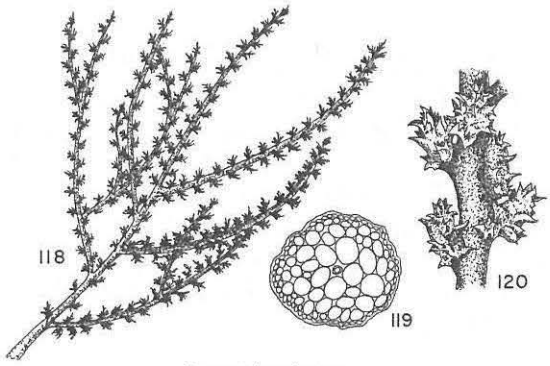
Plants commonly reach 5-12 cm in length and occur both in the lithos and aufwuchs of both sheltered and exposed coasts.

FIGS. 125-127. ASPARAGOPSIS TAXIFORMIS (DELILE) COLLINS AND HERVEY. (Original [125] and after Boergesen 1915-1920 [126-127]). Habit and sections of branches of sexual plants.

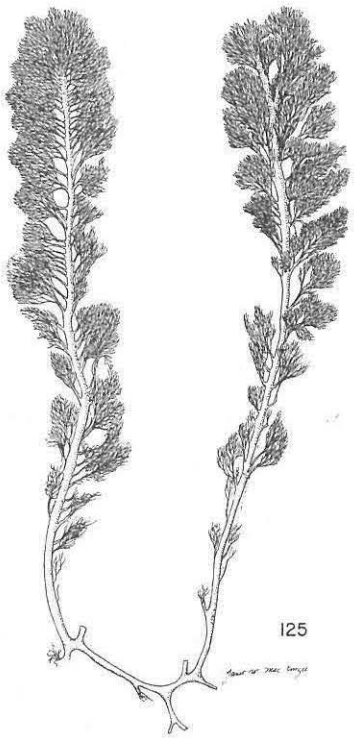
To date, only tetrasporophyte plants of this taxon have been reported for Florida, and these have been placed under the name Falkenbergia (See Chihara 1960 for details on the life cycle). See also Figs. 209-215.

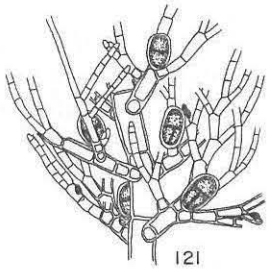
MAGNIFICATION FACTORS:

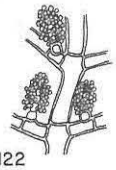
Fig. 118: 0.9×; Fig. 119: 20×; Fig. 120: 4×; Fig. 121: 75×; Fig. 122: 120×; Fig. 123: 25×; Fig. 124: 65×; Fig. 125: 0.7×; Fig. 126: 23×; Fig. 127: 30×.



Acanthophora



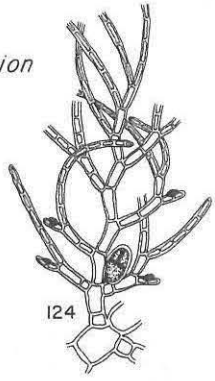


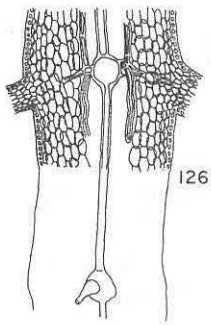


Asparagopsis

Antithamnion







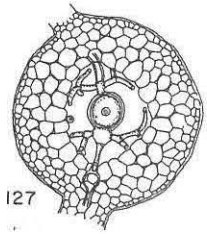


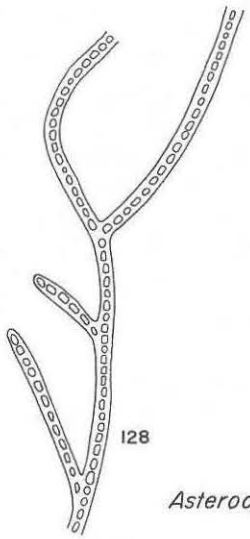
FIG. 128 ASTEROCYTIS RAMOSA (THWAITES) GOBI (After Boergesen 1915-1920). *Plants rarely exceed 15 mm in length and occur in the aufwuchs communities of shallow water.*

FIGS. 129-131. THREE TAXA OF THE AUDOUINELLA COMPLEX (ACROCHAETIACEAE). (After Boergesen 1915-1920). Fig. 129: Audouinella microscopica (Naegeli in Kutzing) Woelkerling; Fig. 130: Acrochaetium globosum Boergesen; Fig. 131: Audouinella liagorae (Boergesen) Woelkerling. *Acrochaetioid algae are common in aufwuchs samples but are often missed because of their small size. Certain species only grow to 20 µm tall; others reach 5 mm. Endophytic forms are completely immersed in host tissue and thus become hidden. These algae occur in all sublittoral environments and occasionally are found in the lower intertidal zone.*

FIGS. 132-134. BOSTRYCHIA. (Figs. 132, 134: B. montagnei Harvey) (After Harvey 1853) showing habit (132) and branch with tetrasporangia (134). Fig. 133: B. tenella (Vahl) J. Agardh (after Boergesen 1915-1920) showing cross section of branch. *Most species of Bostrychia reach heights of 2-7.5 cm. They are especially common in the intertidal zone on mangrove roots, but also occur commonly on intertidal rocks under both sheltered and exposed conditions.*

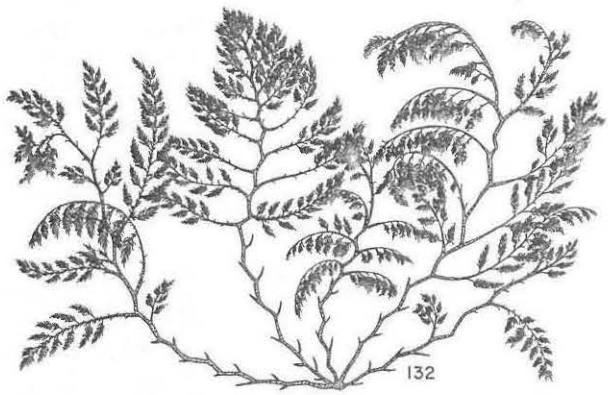
MAGNIFICATION FACTORS:

Fig. 128: 80×; Fig. 129: 500×; Fig. 130: 50×; Fig. 131: 120×; Fig. 132: 0.75×; Fig. 133: 60×; Fig. 134: 12×.



128

Asterocytis



132

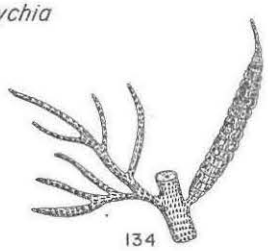
Bostrychia



129

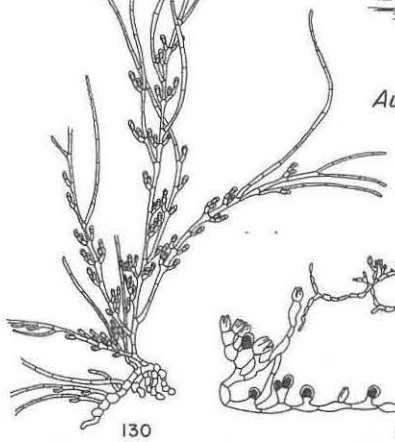


133



134

Audouinella



130

131

FIGS. 135-137. BOTRYOCLADIA PYRIFORMIS (BOERGESEN) KYLIN

(After Boergesen 1915-1920, as Chrysymenia pyriformis). Habit (135, 136) and cross section of branch (137).

Botryocladia plants occur on rocky shores from the low intertidal down and can reach lengths of 25 cm.

FIGS. 138-142. BRYOTHAMNION. B. triquetrum (Gmelin) Howe

(After Harvey 1853, Figs. 138-140, 142), as Alsidium triquetrum). Figs. 138-139: Habit and individual branch; Fig. 140: Tetrasporangial branchlets; Fig. 142: cross section. B. seaforthii (Turner Fig. 141 (after Boergesen 1915-1920). Cross section of branch.

Plants attain lengths of 25 cm and occur on rock in the upper sublittoral zone of open coasts.

FIGS. 143-145. CALLITHAMNION BYSSOIDES ARNOTT IN HOOKER

(After Boergesen 1915-1920). Habit of tetrasporangial plant (143); cell with chromoplast (144); branch with spermatangia (145).

Plants grow to 10 cm tall and occur in the aufwuchs and lithos.

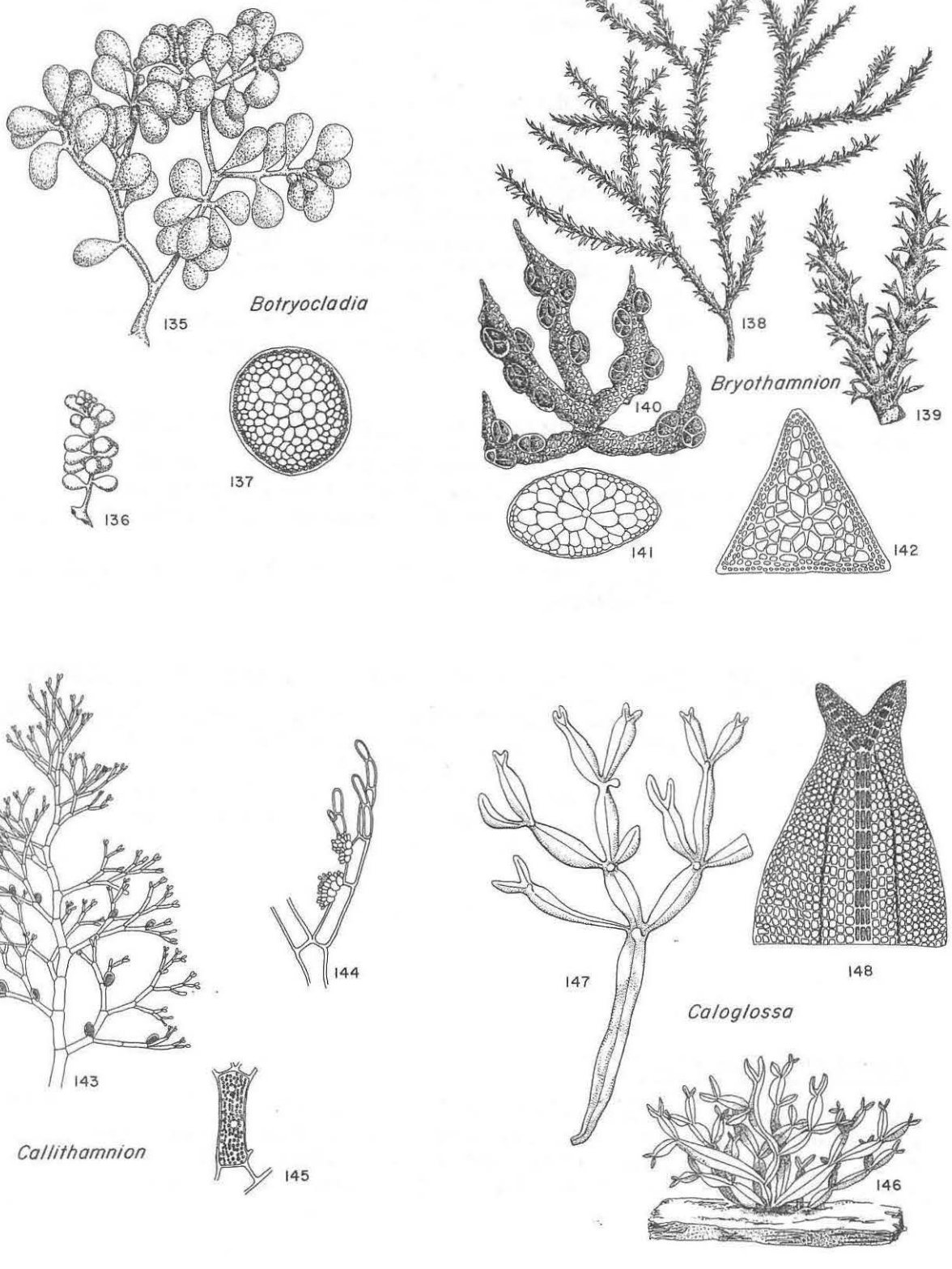
FIGS. 146-148. CALOGLOSSA LEPRIEURII (MONTAGNE) J. AGARDH

(After Harvey 1853, as Delesseria leprieurii) showing habit (146); a branch system (147); and a branch tip (148).

Caloglossa plants commonly grow in sheltered intertidal communities on rocks or on mangroves and often form clumps 4-5 cm across.

MAGNIFICATION FACTORS:

Fig. 135: 0.9×; Fig. 136: 0.6×; Fig. 137: 25×; Fig. 138: 0.6×; Fig. 139: 1.3×; Fig. 140: 40×; Fig. 141: 12×; Fig. 142: 15×; Fig. 143: 40×; Fig. 144: 265×; Fig. 145: 65×; Fig. 146: 1×; Fig. 147: 2×; Fig. 148: 16×.


135
Botryocladia
136
137
138
Bryothamnion
139
140
141
142
143
Callithamnion
144
145
146
147
Caloglossa
148

FIGS. 149-152. CATENELLA REPENS (LIGHTFOOT) BATTERS

(After Harvey 1853, as Catenella pinnata). Habit (149); branch showing constrictions (150); cross section (151) and longitudinal section (152) of a branch.

Catenella plants rarely exceed 3 cm in height and are most common in the intertidal zone on mangroves in lagoons.

FIGS. 153-157. CENTROCERAS CALAVULATUM (C. AGARDH) MONTAGNE

(Original [155] and after Harvey 1853 [153, 154, 156, 157]). Habit (153); successive enlargements of branches (154-156) and a node showing 2 celled spines (157).

Plants reach lengths of 10-20 cm and commonly occur in sheltered localities either attached or in loose lying masses. Specimens are exceedingly variable.

FIGS. 158-161. CERAMIUM BYSSOIDEUM HARVEY

(Original [158] and after Collins and Hervey 1917 [159-161], as C. transversale). Vegetative filaments (158-160) and tetrasporangia (161).

Species of Ceramium vary from under 1 cm to over 15 cm long and occur in the aufwuchs and lithos of almost all communities. They are especially common in shallow water and the banding of cells about the nodes often can be seen with the unaided eye. Certain species are almost completely corticated.

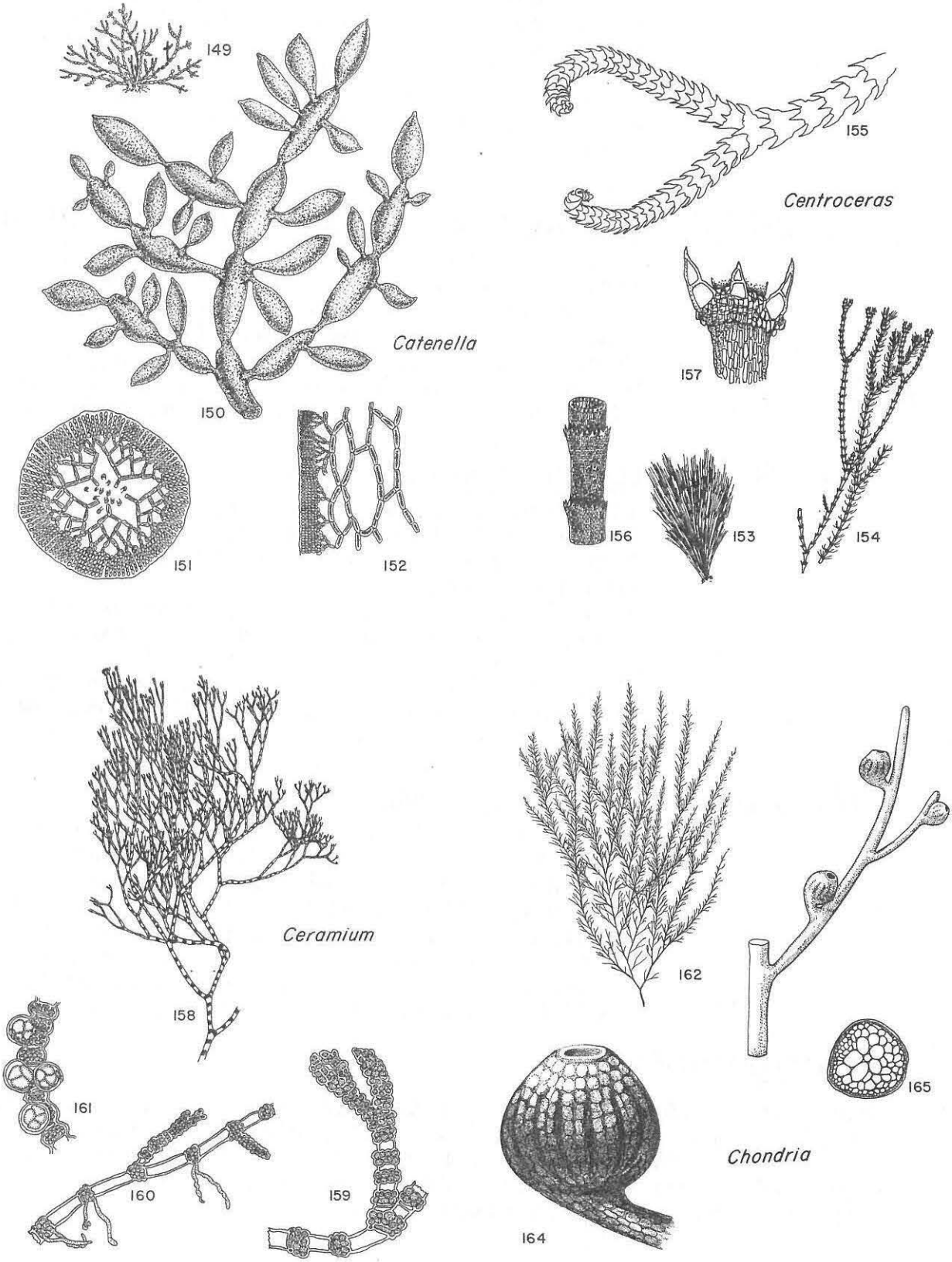
FIGS. 162-165. CHONDRIA LITTORALIS HARVEY

(After Harvey 1853 [162-164] and Boergesen 1915-1920 [165]). Habit (162); branch bearing cystocarps (163) and a single cystocarp (164); branch cross section (165) showing central axis and 5 pericentral cells.

Plants of Chondria usually grow to 10-30 cm tall and usually occur in the lithos of somewhat sheltered localities. They are common in shallow water.

MAGNIFICATION FACTORS:

Fig. 149: 0.5×; Fig. 150: 2.5×; Fig. 151: 15×; Fig. 152: 15×; Fig. 153: 6.5×; Fig. 154: 10×; Fig. 155: 60×; Fig. 156: 60×; Fig. 157: 100×; Fig. 158: 2×; Fig. 159: 50×; Fig. 160: 50×; Fig. 161: 100×; Fig. 162: 0.25×; Fig. 163: 8×; Fig. 164: 40×; Fig. 165: 25×.


149
Catenella
150
151
152
155
Centroceras
157
156
153
154
Ceramium
158
161
160
159
162
165
164
Chondria

FIGS. 166-168. CHRYSYMENIA HALYMENIOIDES HARVEY

(After Harvey 1853). Habit (166); cross section showing cystocarps (167); cross section of tetrasporangial plant (168).
Plants grow to 10-30 cm and occur in the lithos of deeper waters. Specimens occasionally wash ashore.

FIGS. 169-177. COTTONIELLA

(After Boergesen 1915-1920). A series of drawings of C. arcuata from the Virgin Islands showing salient features of the genus needed for identification.
Plants generally attain lengths of 4-16 cm and occur in the aufwuchs of shallow and deeper waters.

FIGS. 178-180. COELOTHRIX IRREGULARIS (HARVEY) BOERGESEN

(After Boergesen 1915-1920). Branch of plant (178); cross section (179) and longitudinal section (180) both showing gland cells.
Plants usually grow to 3 cm and occur in the intertidal and sublittoral lithos in shaded areas.

FIGS. 181-183. CORALLINA CUBENSIS (MONTAGNE) KÜTZING

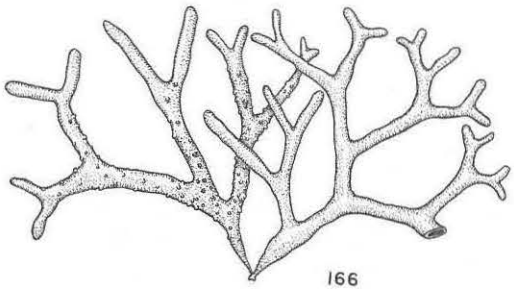
(After Boergesen 1915-1920). Segment of plant showing branching (181); conceptacle (182); and longitudinal section through a node (183).
Corallina occurs in the lithos and aufwuchs in tide pools and in sublittoral situations; plants usually do not exceed 2 cm in height.

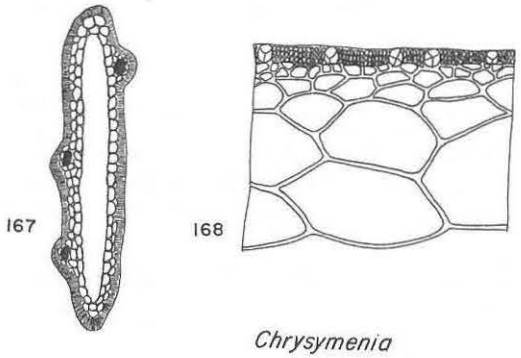
FIGS. 184-187. CORYNOMORPHA CLAVATA (HARVEY) J. AGARDH

(Original). Habit of plants.
Corynomorpha occurs in lithos from the lower intertidal downwards and usually is less than 5 cm tall.

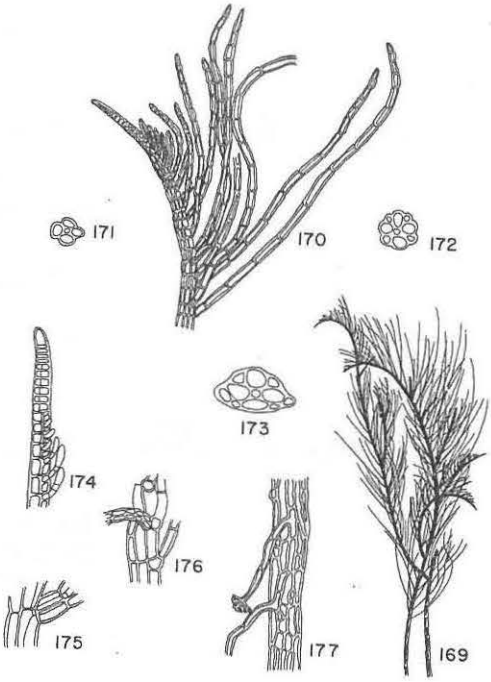
MAGNIFICATION FACTORS:

Fig. 166: 0.3×; Fig. 167: 5×; Fig. 168: 40×; Fig. 169: 18×; Fig. 170: 90×; Fig. 171: 100×; Fig. 172: 100×; Fig. 173: 100×; Fig. 174: 180×; Fig. 175: 135×; Fig. 176: 135×; Fig. 177: 30×; Fig. 178: 1.3×; Fig. 179: 140×; Fig. 180: 100×; Fig. 181: 6.5×; Fig. 182: 35×; Fig. 183: 80×; Figs. 184-7: 1.0×;

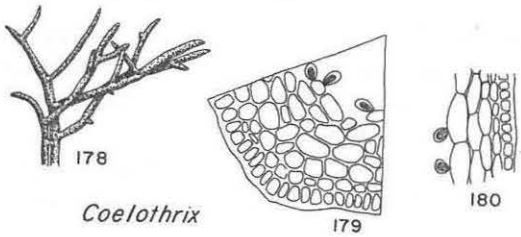




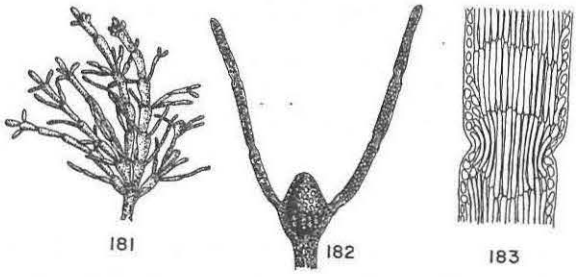
Chrysymenia



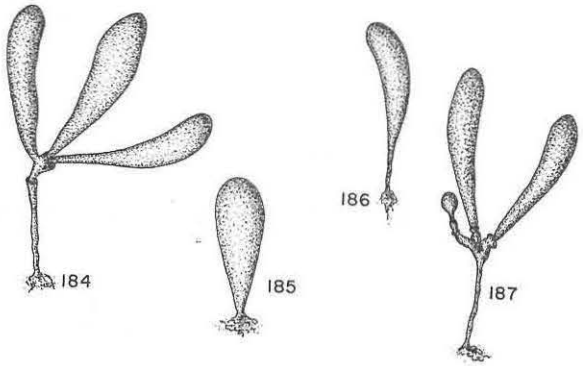
Cottoniella



Coelothrix



Corallina



Corynomorpha

FIGS. 188-192. CRYPTARACHNE AGARDHII (HARVEY) KYLIN

(After Boergesen 1915-1920 [191-192] and Harvey 1853 [188-190], both as Chrysymenia agardhii). Habit (188); longitudinal and cross sections (189-190); gland cells (191-192).
Plants grow to 20 cm and apparently are confined to the lithos of deeper waters.

FIG. 193. CRYPTONEMIA CRENULATA J. AGARDH

(Original). Habit of plant.
Plants reach 15 cm long and occur in sublittoral lithos, mostly from deeper waters.

FIGS. 194-196. CROUANIA ATTENUATA (BONNEMAISON) J. AGARDH

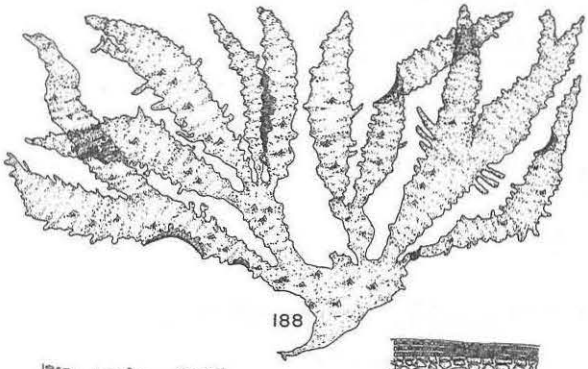
(After Boergesen 1915-1920 [195-196] and Harvey 1853 [194]). Branch (194); main axis with lateral branches.
Crouania occurs both in the aufwuchs and lithos in both shallow and deeper water; plants grow to 5 cm.

FIG. 197. DASYA BAILLOUVIANA (GMELIN) MONTAGNE

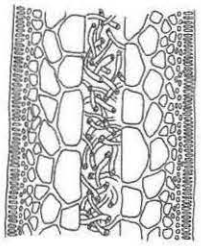
(Original). This taxon includes as a synonym the name D. pedicellata.
Species of Dasya vary from less than 2 cm to over 75 cm tall and occur in both the lithos and aufwuchs in shallow water. Many species have a feathery appearance due to the occurrence of numerous monosiphonous branchlets.

MAGNIFICATION FACTORS:

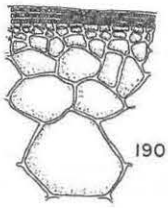
Fig. 188: 0.25×; Fig. 189: 50×; Fig. 190: 50×; Fig. 191: 30×; Fig. 192: 145×; Fig. 193: 0.4×; Fig. 194: 0.8×; Fig. 195: 120×; Fig. 196: 45×; Fig. 197: 0.2×.



188

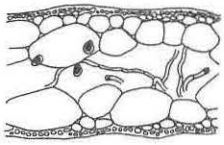


189



190

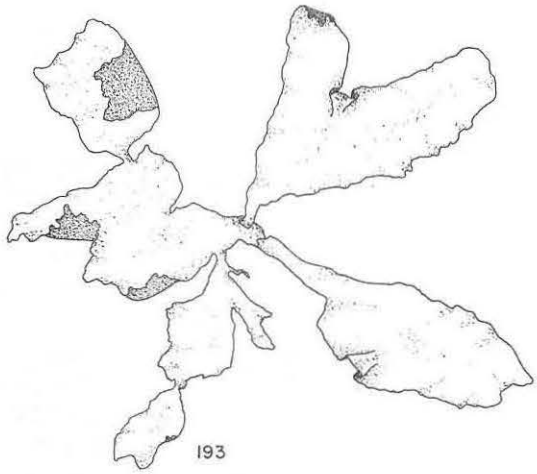
Cryptarachne



191

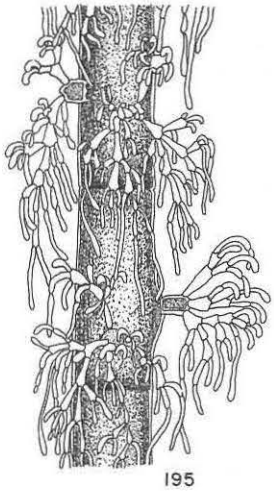


192

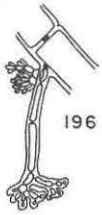


193

Cryptonemia



195



196



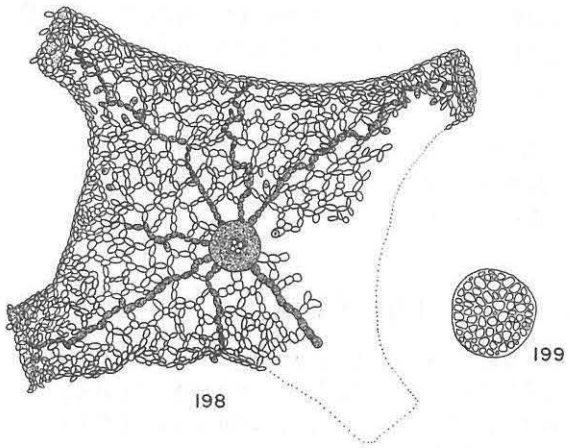
194

Crouania

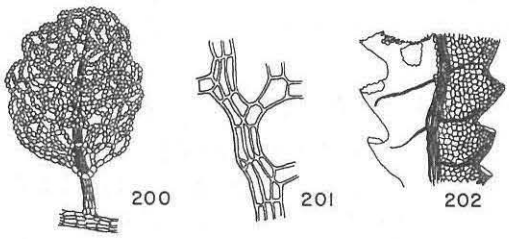


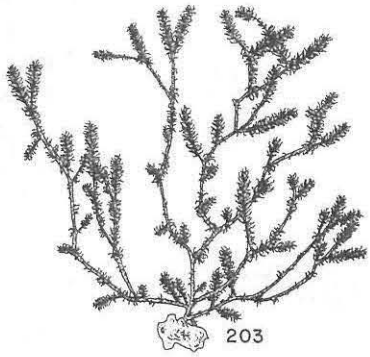
197

Dasya

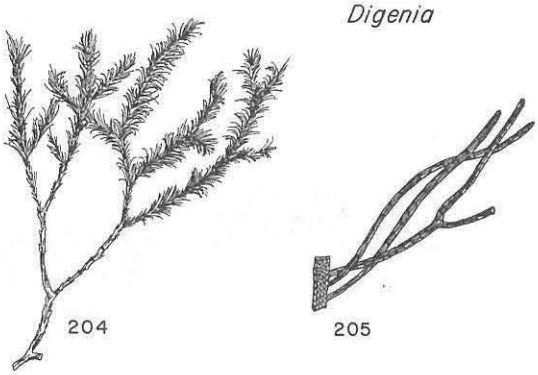


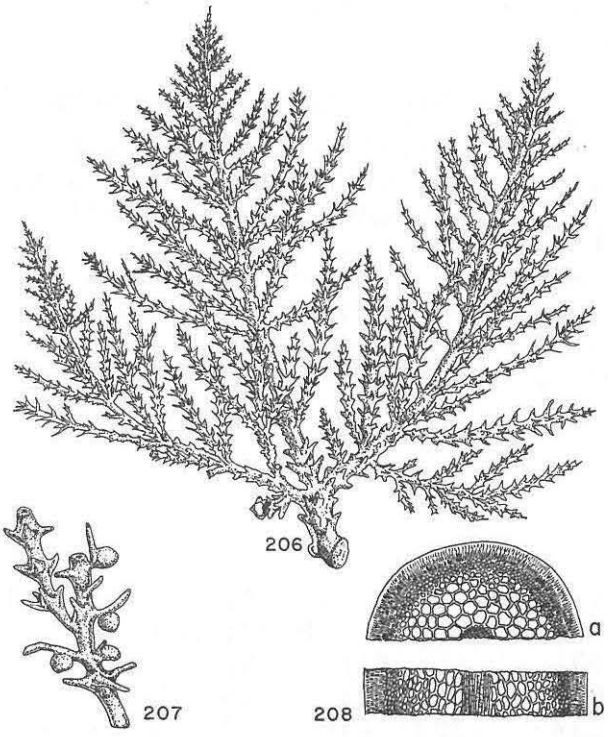
Dictyurus



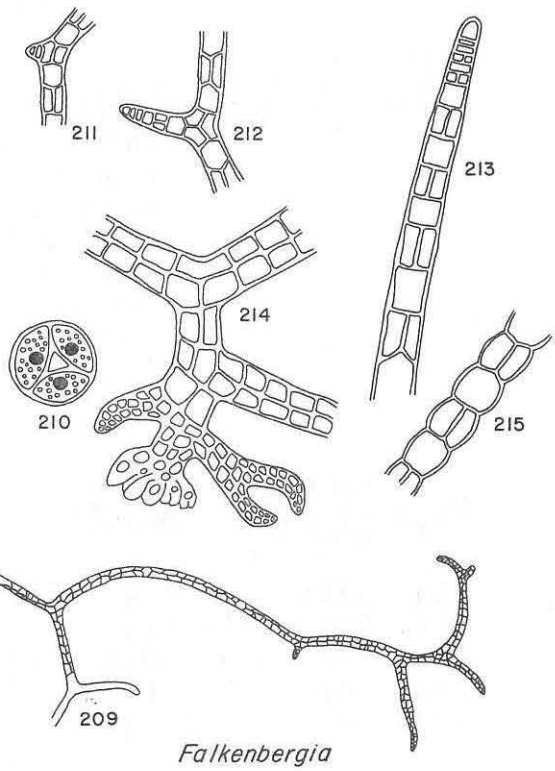


Digenia





Eucheuma



Falkenbergia

FIGS. 198-202. DICTYURUS OCCIDENTALIS J. AGARDH

(After Boergesen 1915-1920). Cross sections of entire thallus (198) and main stem (199); portions of erect shoots in face view (200, 202); and face view of polysiphonous main axis (201).
Plants grow to 4-12 cm tall and generally occur in shallow water lithos communities. The meshwork appearance is distinctive of the genus.

FIGS. 203-205. DIGENIA SIMPLEX (WULFEN) C. AGARDH

(Original [203] and after Harvey 1853 [204, 205]). Habit (203); branch system (204); very young branchlets still showing polysiphonous nature (205).
Digenia grows to 3-25 cm and is a common plant of rocky intertidal zones in exposed localities. It often has a wiry aspect and is heavily epiphytized.

FIGS. 206-208. EUCHEUMA ISIFORME (C. AGARDH) J. AGARDH

(After Harvey 1853). Habit (206), branch with spherical cystocarps (207); cross (208a) and longitudinal (208b) sections of stem.
Species of Eucheuma reach maximum heights of 5-75 cm and occur in shallow waters and deeper waters on rocks and other debris. Plants occur in both sheltered and exposed situations.

FIGS. 209-215. FALKENBERGIA HILLEBRANDII (BORNET) FALKENBERG

(After Boergesen 1915-1920). Habit of portion of a plant (209); cross section (210); haptera (214); and branches showing cell arrangement (211, 212, 213, 215).
Plants rarely exceed 2 cm in height and occur in the shallow water aufwuchs. This is the tetrasporophyte stage; sexual stages have been referred to Asparagopsis (Figs. 125-127) in the past.

MAGNIFICATION FACTORS:

Fig. 198: 9×; Fig. 199: 25×; Fig. 200: 7×; Fig. 201: 40×; Fig. 202: 3×; Fig. 203: 0.2×; Fig. 204: 0.3×; Fig. 205: 10×; Fig. 206: 0.4×; Fig. 207: 0.6×; Fig. 208: 6×; Fig. 209: 17×; Fig. 210: 165×; Fig. 211: 135×; Fig. 212: 135×; Fig. 213: 135×; Fig. 214: 130×; Fig. 215: 135×.

FIGS. 198-202. DICTYURUS OCCIDENTALIS J. AGARDH

(After Boergesen 1915-1920). Cross sections of entire thallus (198) and main stem (199); portions of erect shoots in face view (200, 202); and face view of polysiphonous main axis (201).
Plants grow to 4-12 cm tall and generally occur in shallow water lithos communities. The meshwork appearance is distinctive of the genus.

FIGS. 203-205. DIGENIA SIMPLEX (WULFEN) C. AGARDH

(Original [203] and after Harvey 1853 [204, 205]). Habit (203); branch system (204); very young branchlets still showing polysiphonous nature (205).
Digenia grows to 3-25 cm and is a common plant of rocky intertidal zones in exposed localities. It often has a wiry aspect and is heavily epiphytized.

FIGS. 206-208. EUCHEUMA ISIFORME (C. AGARDH) J. AGARDH

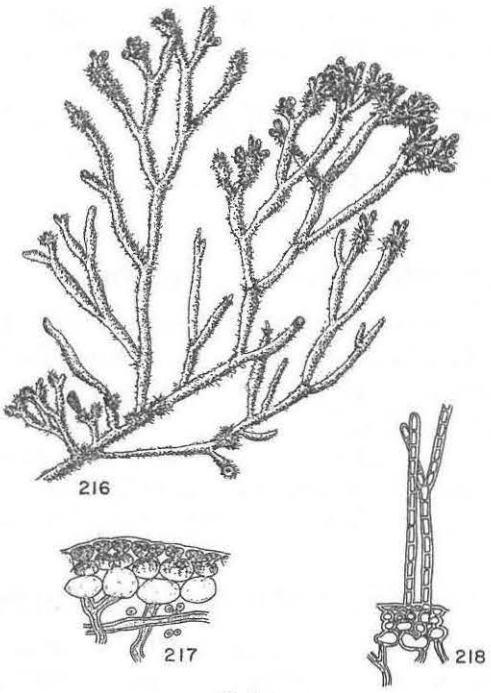
(After Harvey 1853). Habit (206), branch with spherical cystocarps (207); cross (208a) and longitudinal (208b) sections of stem.
Species of Eucheuma reach maximum heights of 5-75 cm and occur in shallow waters and deeper waters on rocks and other debris. Plants occur in both sheltered and exposed situations.

FIGS. 209-215. FALKENBERGIA HILLEBRANDII (BORNET) FALKENBERG

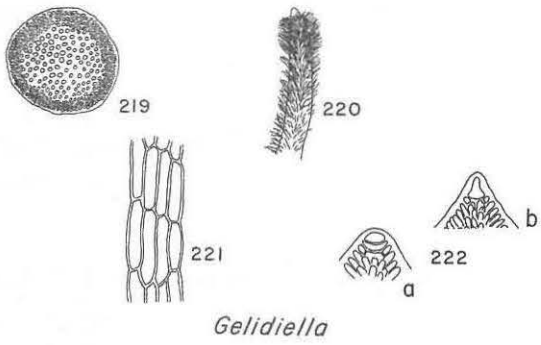
(After Boergesen 1915-1920). Habit of portion of a plant (209); cross section (210); haptera (214); and branches showing cell arrangement (211, 212, 213, 215).
Plants rarely exceed 2 cm in height and occur in the shallow water aufwuchs. This is the tetrasporophyte stage; sexual stages have been referred to Asparagopsis (Figs. 125-127) in the past.

MAGNIFICATION FACTORS:

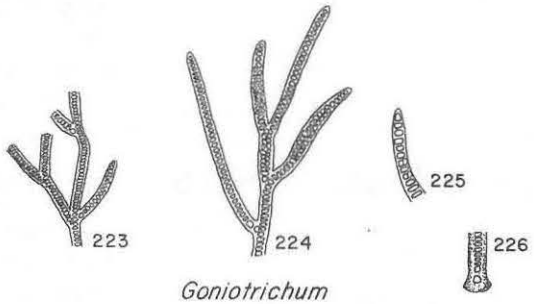
Fig. 198: 9×; Fig. 199: 25×; Fig. 200: 7×; Fig. 201: 40×; Fig. 202: 3×; Fig. 203: 0.2×; Fig. 204: 0.3×; Fig. 205: 10×; Fig. 206: 0.4×; Fig. 207: 0.6×; Fig. 208: 6×; Fig. 209: 17×; Fig. 210: 165×; Fig. 211: 135×; Fig. 212: 135×; Fig. 213: 135×; Fig. 214: 130×; Fig. 215: 135×.



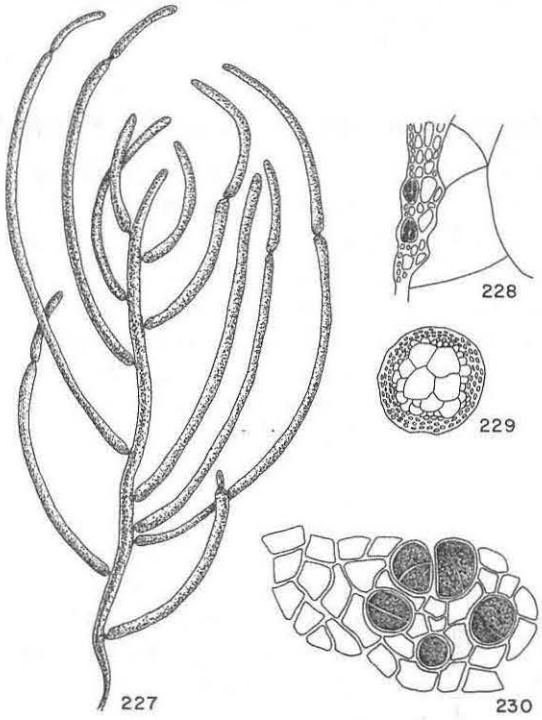
Galaxaura



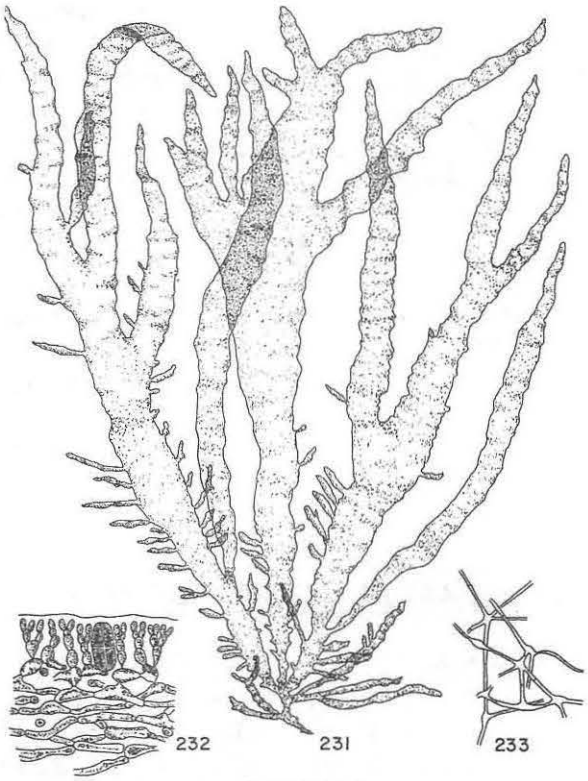
Gelidiella



Goniotrichum



Gracilaria



Grateloupia

FIGS. 234-236. GRIFFITHSIA GLOBULIFERA HARVEY

(After Harvey 1853 as G. corallina). Habit (234); branches near apex (235); cystocarp near branch apex (236).
Plants normally grow to 2-7 cm and occur in the sublittoral lithos and aufwuchs of open coasts.

FIG. 237. GRINNELLIA AMERICANA (C. AGARDH) HARVEY

(After Harvey 1853). Habit of plant (237).
Grinnellia plants often grow to over 50 cm in length and normally develop in the upper sublittoral as a component of the lithos.

FIGS. 238-240. HALYMENIA BERMUDENSIS COLLINS AND HOWE

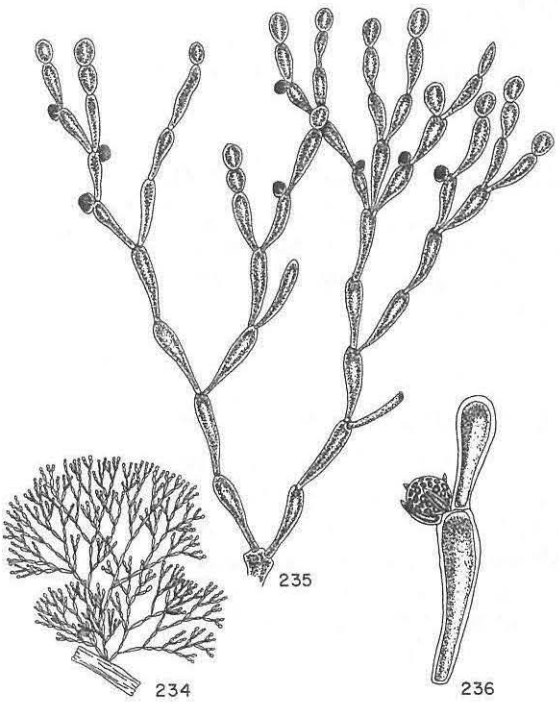
(Original [239], and after Collins and Hervey [238, 240]). Habit of young plant (238) and older plant (239); cross section of thallus (240) showing medulla and cortex.
Blades of Halymenia range from 5-70 cm in length and are known from the aufwuchs and lithos of both sheltered and exposed localities.

FIGS. 241-244. HERPOSIPHONIA TENELLA (C. AGARDH) AMBRONN

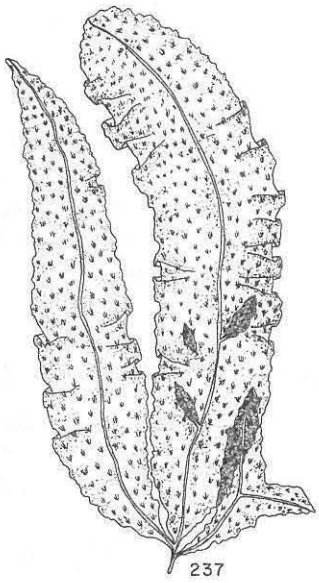
(After Boergesen 1915-1920). Habit (241); cross section (243); tetrasporangia (242); spermatangia on erect branches (244). Note the hair-like trichoblasts at the tips of the branches (241).
Species of Herposiphonia grow on a variety of objects in both the lithos and aufwuchs and often form extensive patches from the stolon-like runners. Erect filaments rarely exceed 5 mm in height.

MAGNIFICATION FACTORS:

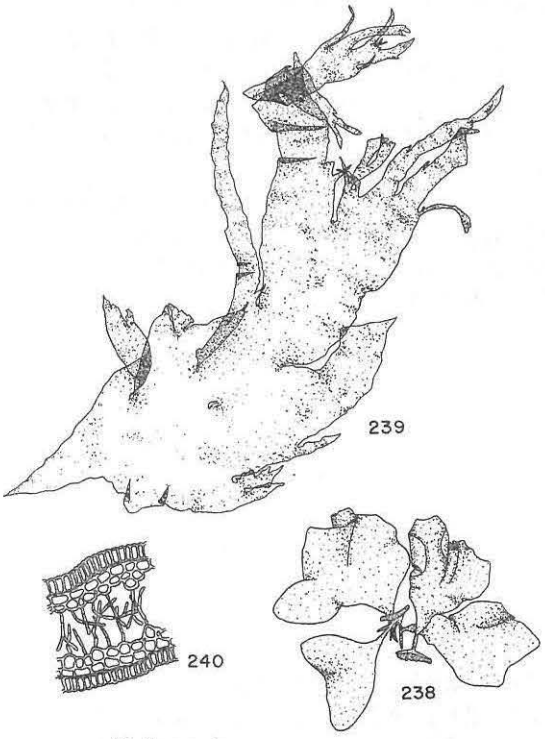
Fig. 234: 0.4×; Fig. 235: 3×; Fig. 236: 8×; Fig. 237: 0.2×; Fig. 238: 0.2×; Fig. 239: 0.2×; Fig. 240: 120×; Fig. 241: 20×; Fig. 242: 50×; Fig. 243: 60×; Fig. 244: 35×.



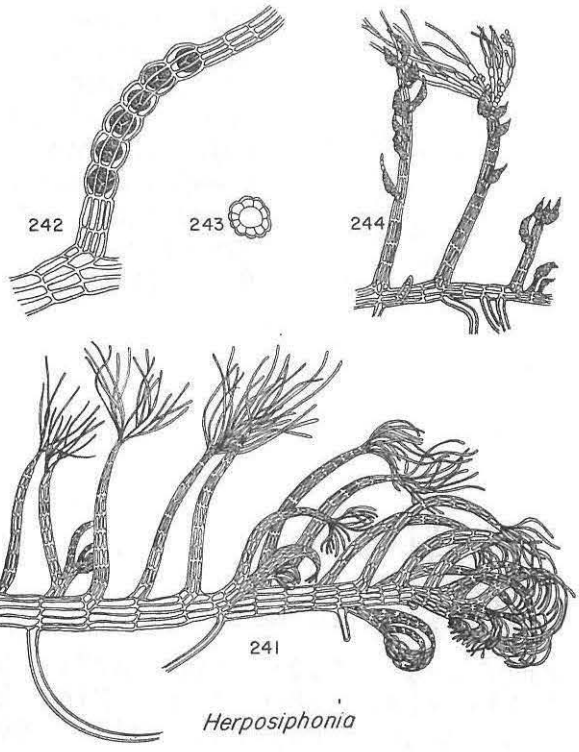
Griffithsia



Grinnellia



Halymenia



Herposiphonia

FIGS. 245-251. HETEROSIPHONIA GIBBESII (HARVEY) FALKENBERG

(After Harvey 1853, as Dasya gibbesii). Habit (245); monosiphonous branch tip (246); branch bearing tetrasporangial stichidia (247); one stichidium (248) and one tetrasporangium (249); longitudinal (250) and cross (251) sections of thallus branch.

Plants of Heterosiphonia range from 1-25 cm tall and grow both in the lithos and aufwuchs in shallow water in regions of slight to moderate wave action.

FIGS. 252-253. HYPNEA CORNUTA (LAMOUROUX) J. AGARDH

(After Boergesen 1915-1920). Habit of part of plant (252); cross section (253) of a branch.

Hypnea species vary from 2-50 cm or more in height and most commonly occur in the lithos of exposed localities. Plants also occur in sheltered areas and form tangled masses. In one species the tips of certain branches form distinctive enlarged hooks.

FIGS. 254-256. HYPOGLOSSUM INVOLVENS (HARVEY) J. AGARDH

(After Harvey 1853, as Delesseria involvens). Habit of plant (254); tetrasporangial branch (255), tetrasporangia in surface view (256).

Hypoglossum plants grow to 1-10 cm tall and are known chiefly from specimens cast ashore from deeper waters.

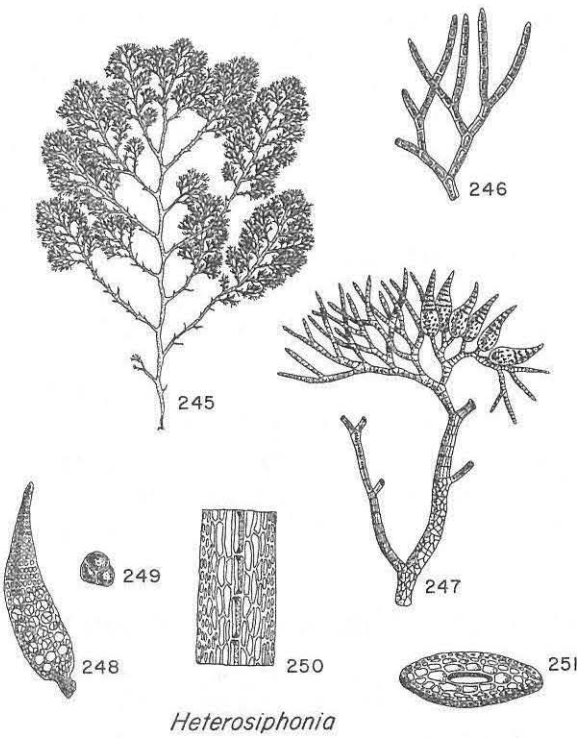
FIGS. 257-259. JANIA ADHAERENS LAMOUROUX

(After Boergesen 1915-1920). Portions of plants showing branching (257, 258); branch bearing conceptacles (259).

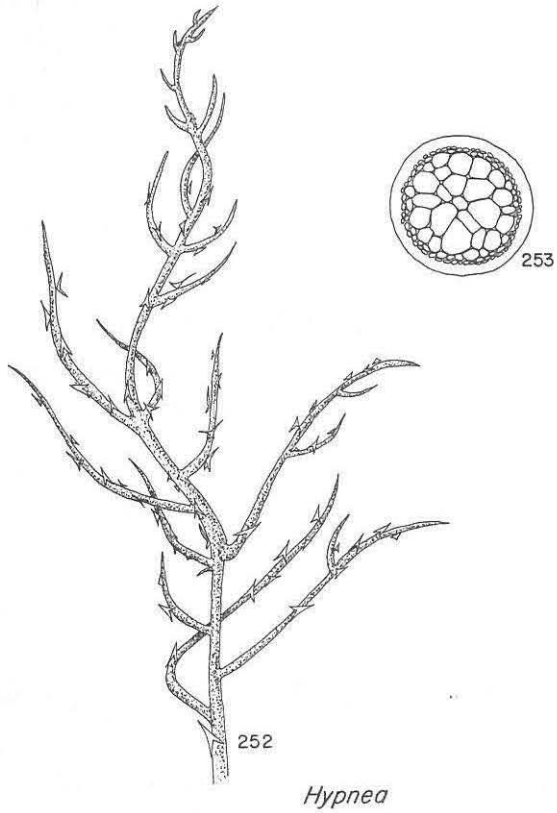
Certain species rarely exceed 8 mm in height; others grow to 1-6 cm regularly. Plants are most common in the aufwuchs in sheltered localities, but they can also occur in the lithos in shallow water.

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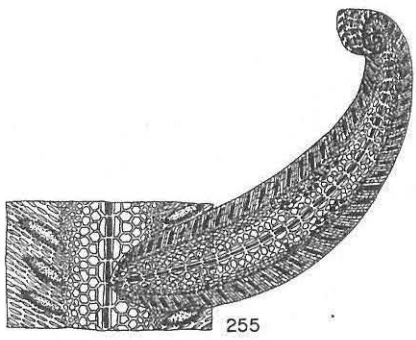
Fig. 245: 0.25×; Fig. 246: 30×; Fig. 247: 20×; Fig. 248: 60×; Fig. 249: 200×; Fig. 250: 12×; Fig. 251: 20×; Fig. 252: 3×; Fig. 253: 50×; Fig. 254: 1×; Fig. 255: 17×; Fig. 256: 65×; Fig. 257: 2×; Fig. 258: 10×; Fig. 259: 10×.

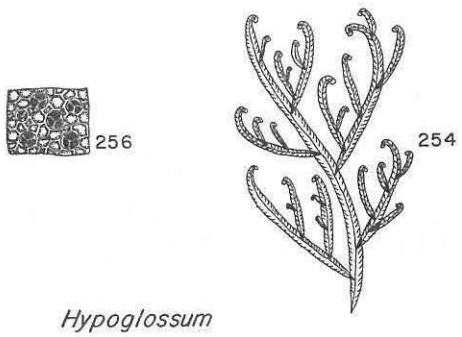


Heterosiphonia

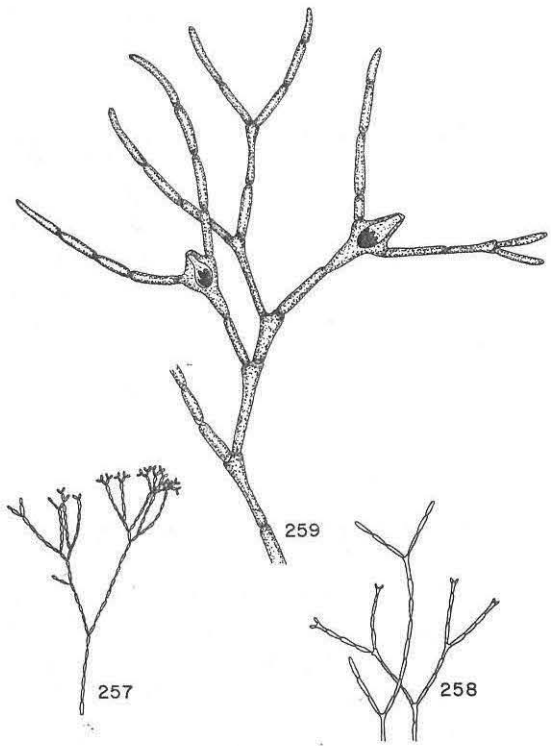


Hypnea





Hypoglossum



Jania

FIGS. 260-262. KALLYMENIA

Habit (260) of K. reniformis (Turner) J. Agardh from England (after Harvey 1846-1851). Cross section (261) and medulla (262) of K. perforata J. Agardh (after Boergesen 1915-1920).

Plants range from 2 cm to over 20 cm tall and can occur in deep waters on near the low tide mark on deeply shaded rocks and in crevices.

FIGS. 263-264. LAURENCIA INTRICATA LAMOUROUX

(After Boergesen 1915-1920, as L. implicata). Portion of a plant (263); cross section (264).

Species of Laurencia range from 1-25 cm tall. Plants are common and often abundant in the intertidal zone, but are also frequently encountered in sublittoral collections. Specimens occur both in the lithos and in the aufwuchs and most species have short ultimate branchlets with conspicuous apical depressions.

FIGS. 265-269. LIAGORA VALIDA HARVEY

(After Harvey 1853). Habit (265); axis segment (266); longitudinal section showing cortex and medulla (267); cortical filaments (268-269).

Plants range from 2-35 cm or more tall and occur both in the lithos and aufwuchs in areas of little or moderate wave action. The degree of calcification varies from species to species.

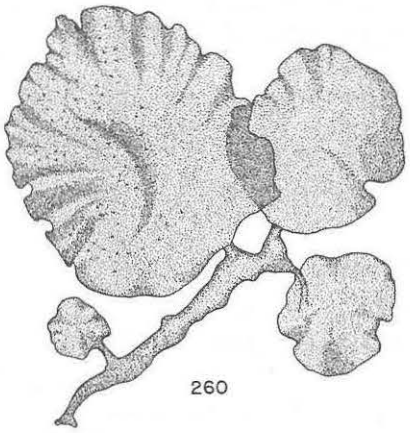
FIGS. 270-274. LOMENTARIA BAILEYANA (HARVEY) FARLOW

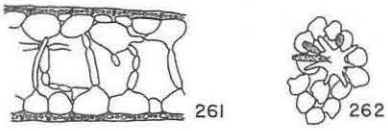
(After Harvey 1853, as Chylocladia baileyana). Habit (270, 271); tetrasporangial branch (272); cross sections of thallus (273, 274).

Lomentaria plants range from 0.5-20 cm tall and are known both in the aufwuchs and lithos of shallow waters.

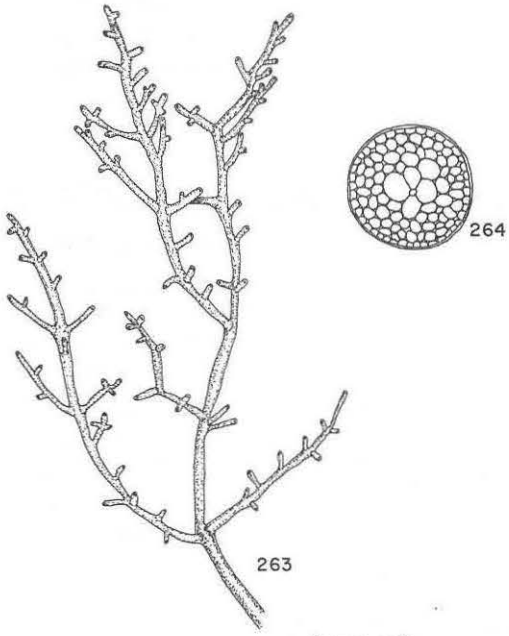
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Fig. 260:0.8×; Fig. 261: 63×; Fig. 262: 50×; Fig. 263: 1.5×; Fig. 264: 23×; Fig. 265: 0.9×; Fig. 266: 15×, Fig. 267: 30×; Fig. 268: 200×; Fig. 269: 100×; Fig. 270: 0.4×; Fig. 271: 1×; Fig. 272: 1.2×; Fig. 273: 18×; Fig. 274: 60×.

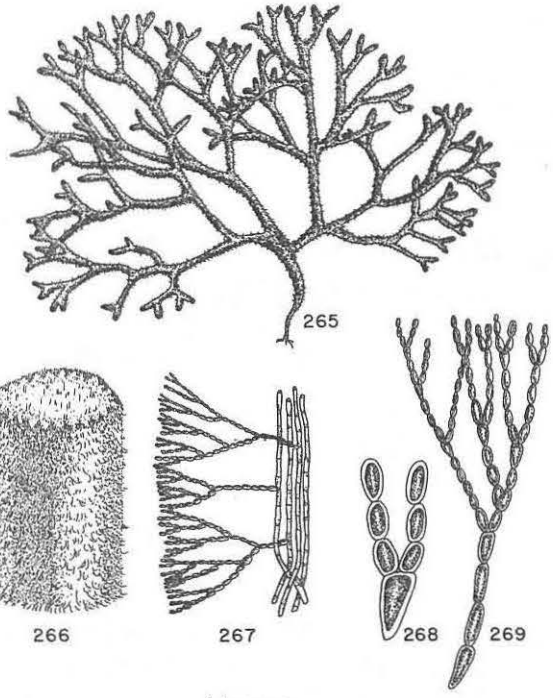




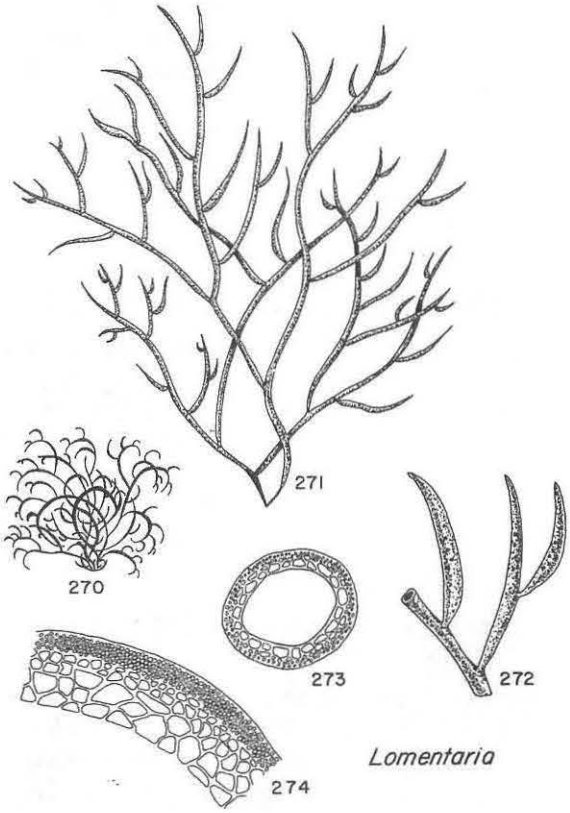
Kallymenia



Laurencia



Liagora



Lomentaria

FIGS. 275-279. LOPHOCLADIA TRICHOCLADOS (MERTENS IN C. AGARDH) SCHMITZ. (After Boergesen 1915-1920). Branch with trichoblasts (275); male (276), female (277), and tetrasporangial (278) branches; basal part of plant showing haptera (279). *Plants reach 7-10 cm in height and are usually cast ashore from deeper water.*

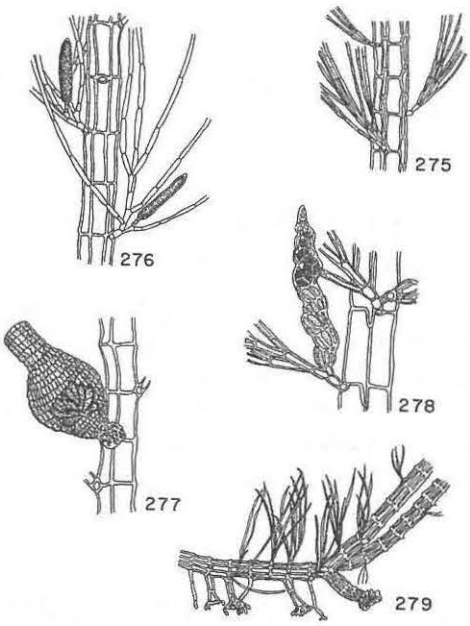
FIGS. 280-283. LOPHOSIPHONIA. L. saccorhiza Collins and Hervey from Bermuda showing saccate rhizoids (280). After Collins and Hervey 1917). L. cristata Falkenberg. (After Boergesen 1915-1920). Habit (281); branch tip (282); cross section (283). *Specimens can become several mm tall and occur in both the aufwuchs and lithos, usually in shallow water.*

FIGS. 284-285. MARTENSIA PAVONIA (J. AGARDH) J. AGARDH (After Boergesen 1915-1920). Habit of portion of thallus (284); segment of plant bearing tetrasporangia (285).

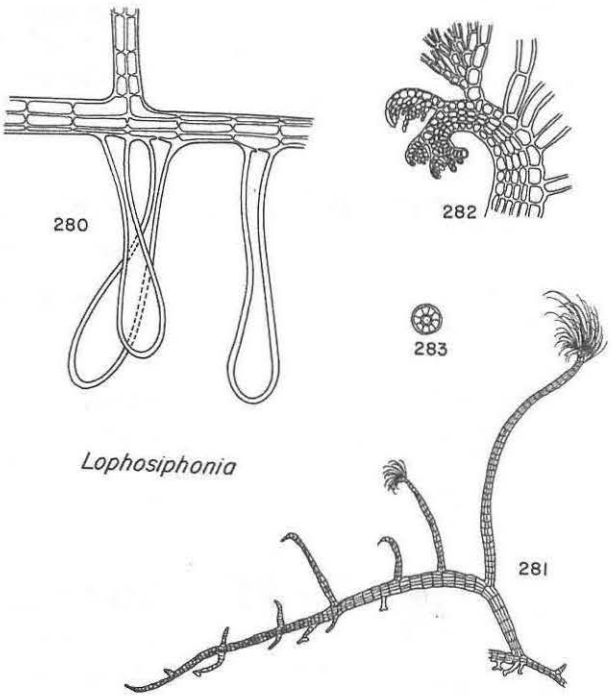
FIGS. 286-288. MERISTOTHECA FLORIDANA KYLIN (Original [286] and after Kylin [287-288]). Habit (286); cross section of cystocarp (287); longitudinal section showing tetrasporangia (288). *Plants attain heights of up to 35 cm and are known primarily from specimens washed ashore from deeper waters.*

MAGNIFICATION FACTORS:

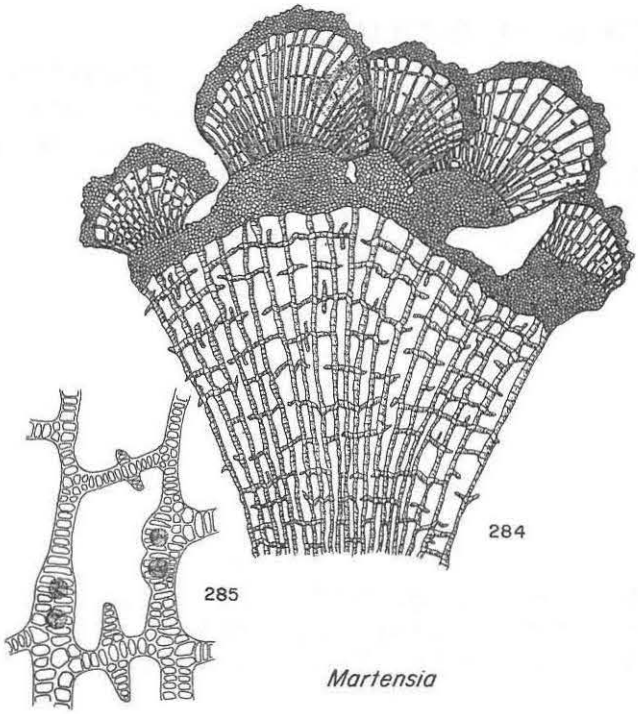
Fig. 275: 19×; Fig. 276: 30×; Fig. 277: 25×; Fig. 278; 30×; Fig. 279: 30×; Fig. 280: 85×; Fig. 281: 15×; Fig. 282: 65×; Fig. 283: 60×; Fig. 284: 8×; Fig. 285: 40×; Fig. 286:



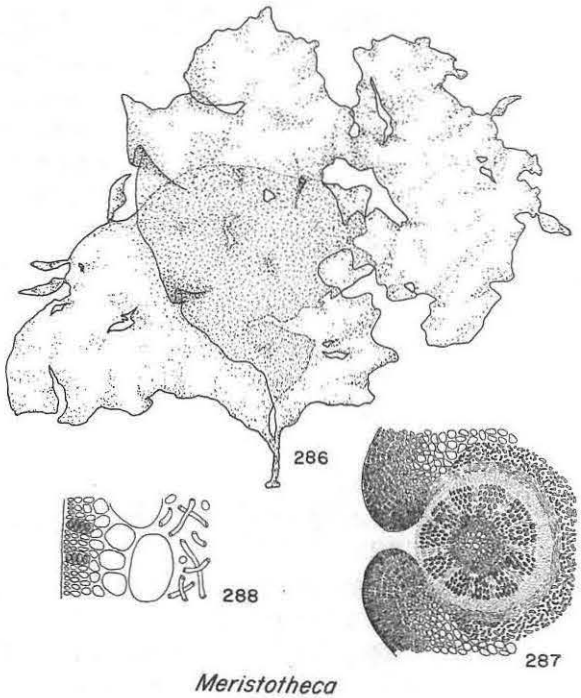
Lophocladia



Lophosiphonia



Martensia



Meristotheca

FIGS. 289-293. MURRAYELLA PERICLADOS (C. AGARDH) SCHMITZ

(After Boergesen 1915-1920 and Harvey 1853, as Bostrychia tuomeyi). Habit of parts of plants (289, 290); polysiphonous segment (292); creeping portion showing descending rhizoids (293); tetrasporangia (291).

Murrayella plants reach heights of 2-5 cm and are most common in mangrove thickets and on rock in sheltered waters.

FIGS. 294-298. NEOAGARDHIELLA RAMOSISSIMA (HARVEY) WYNNE AND TAYLOR. (Original and after Harvey 1853 as Chrysymenia ramosissima). Habit (294-296); cross section (297); longitudinal section (298).

Plants grow to 30 cm and occur primarily in deeper water lithos.

FIG. 299. NITOPHYLLUM PUNCTATUM (STACKHOUSE) GREVILLE

(Original). Habit of plant.

Plants rarely exceed 20 cm in height and usually grow only 3-8 cm tall.

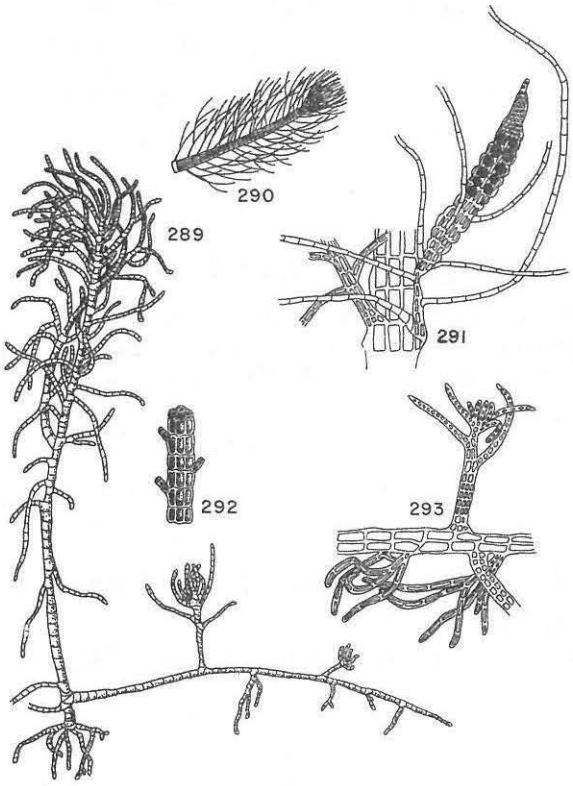
FIGS. 300-302. POLYSIPHONIA HAVANENSIS MONTAGNE

(After Boergesen 1915-1920). Parts of plants with trichoblasts (300); branch tip with trichoblasts and scar cells (301); basal part of axis with a hapteron and an adventitious branch (302).

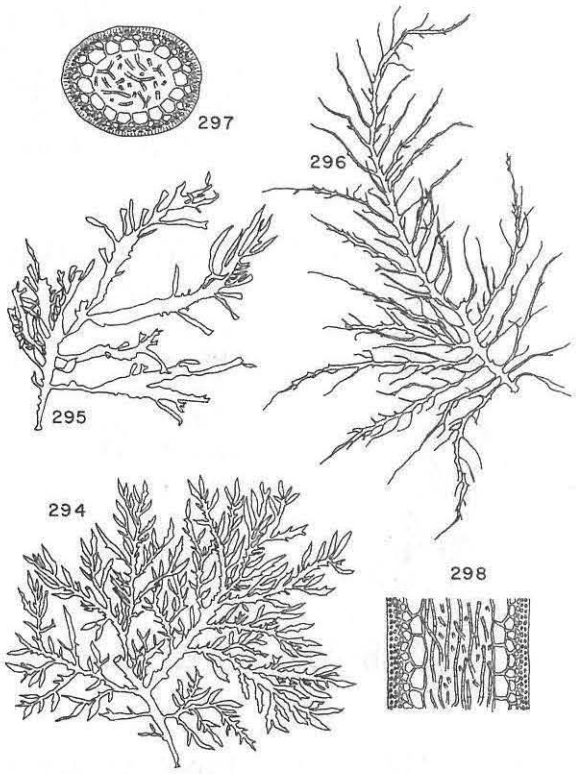
Plants of Polysiphonia occur in almost all habitats as lithos and aufwuchs. Plants range from 5 mm to 40 cm tall. Species concepts are poorly defined and critical studies of Florida members of this group are badly needed.

MAGNIFICATION FACTORS:

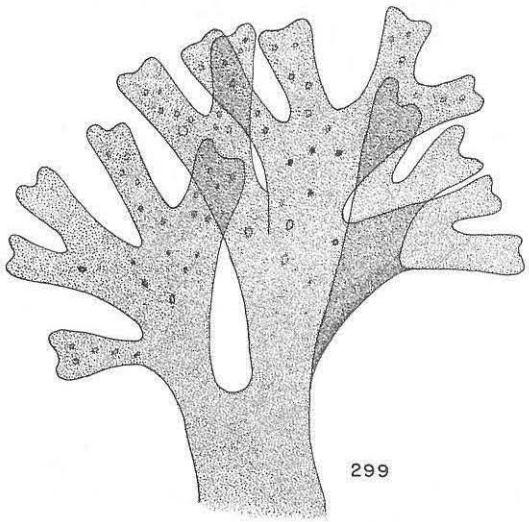
Fig. 289: 6×; Fig. 290: 6×; Fig. 291: 30×; Fig. 292: 25×; Fig. 293: 26×; Fig. 294: 0.2×; Fig. 295: 0.2×; Fig. 296: 0.2×; Fig. 297: 7×; Fig. 298: 7×; Fig. 299: 1.5 × Fig. 300: 8×; Fig. 301: 195×; Fig. 302: 20×.



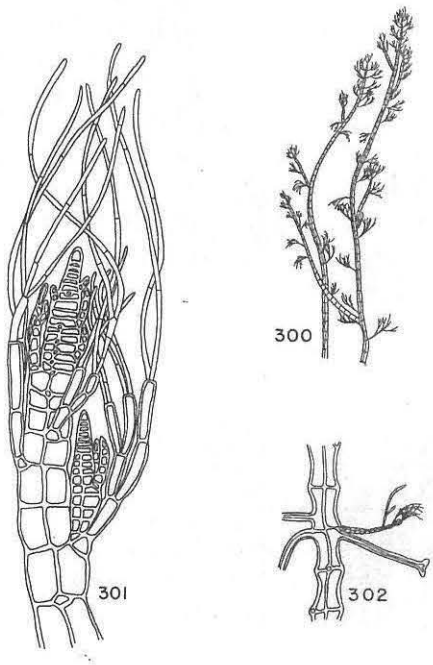
Murrayella



Neoagardhiella



Nitophyllum



Polysiphonia

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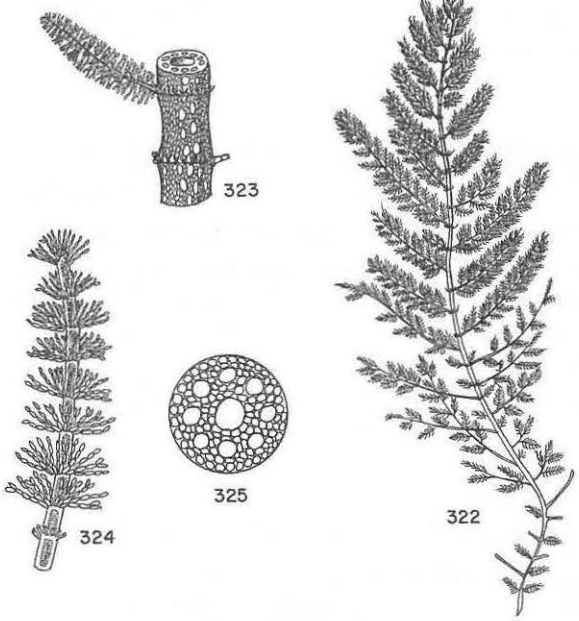
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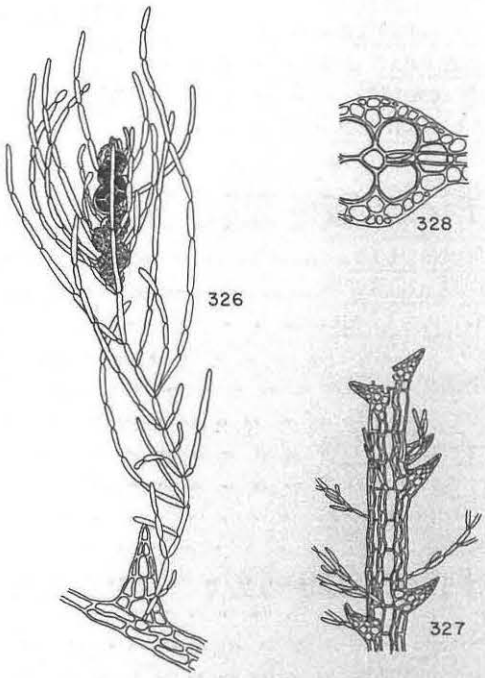
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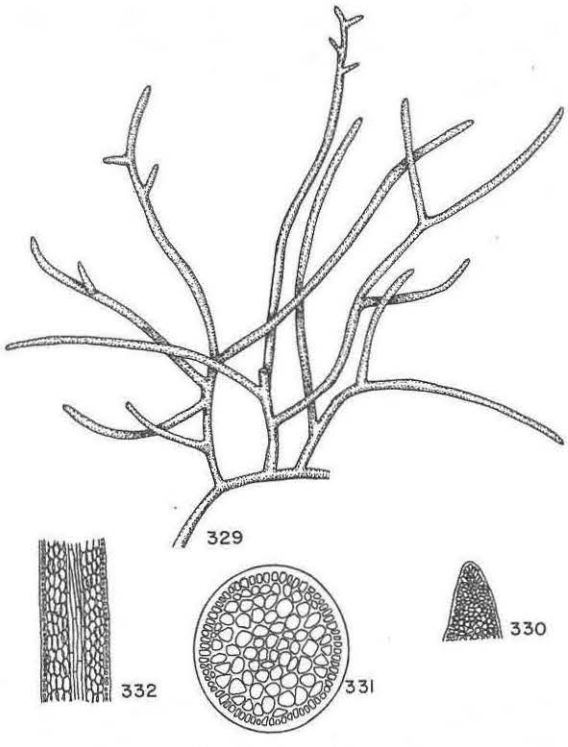
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Wrangelia



Wrightiella



Wurdemannia

FIGS. 322-325. WRANGELIA PENICILLATA C. AGARDH

(After Harvey 1853). Branches of plant (322-324); cross section (325) of branch.
Species of Wrangelia range from 1.0-18 cm tall and they occur on rocks and in the aufwuchs both in shallow and deeper water.

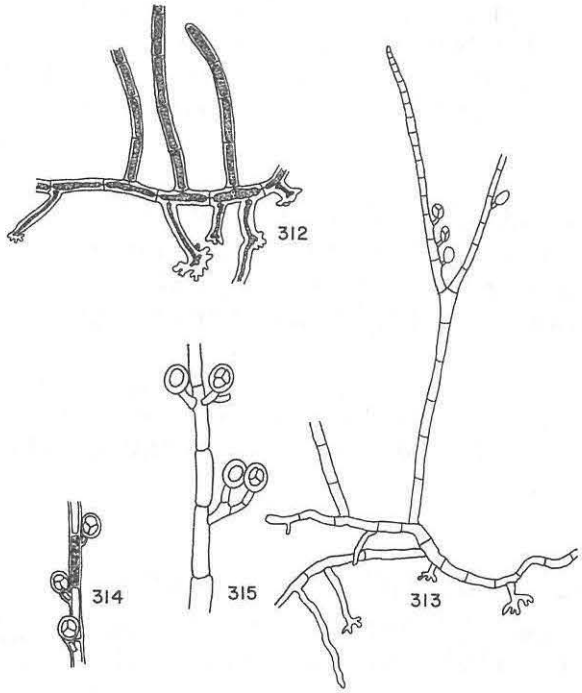
FIGS. 326-328. WRIGHTIELLA TUMANOWICZI (GATTY) SCHMITZ

(After Boergesen 1915-1920). Part of main axis showing trichoblast and stichidium (326); portion of partially corticated main axis with spine-like branchlets and trichoblasts (327); cross section at spot where branch emerges (328).
Plants grow to 75 cm or more tall and usually occur in deeper waters in the lithos.

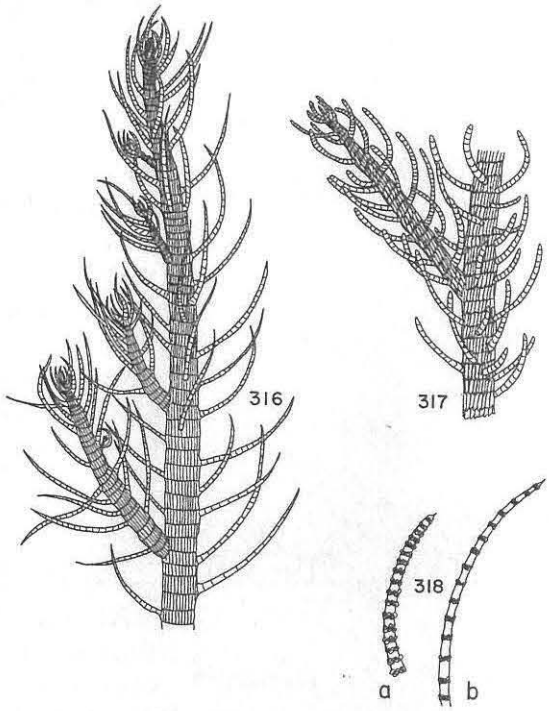
FIGS. 329-332. WURDEMANNIA MINIATA (DRAPARNAUD) FELDMANN AND HAMEL. (After Boergesen 1915-1920, as W. setacea). Part of plant (329); branch tip (330); cross section (331); longitudinal section (332).
Wurdemannia plants usually form extensive turf-like expanses on intertidal rocks in exposed localities, but also occur in more sheltered situations. Erect branches rarely exceed 3 cm in height.

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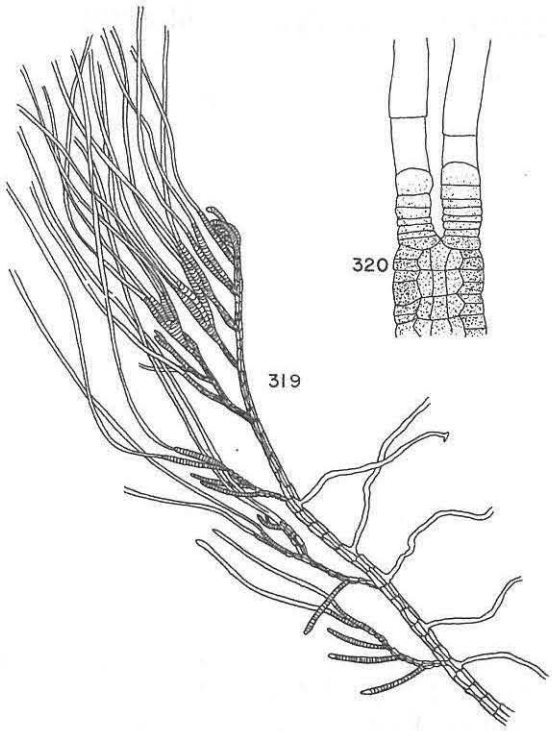
Fig. 322: 1×; Fig. 323: 14×; Fig. 324: 4×; Fig. 325: 30×; Fig. 326: 40×; Fig. 327: 23×; Fig. 328: 40×, Fig. 329: 2.5×; Fig. 330: 30×; Fig. 331: 100×; Fig. 332: 60×.



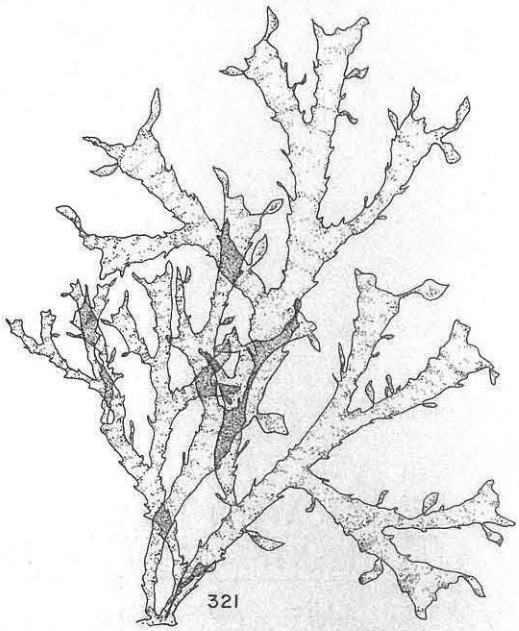
Spermothamnion



Spyridia



Taenioma



Vidalia

FIGS. 312-315. SPERMOTHAMNION INVESTIENS (CROUAN) VICKERS

(After Boergesen 1915-1920). Plants from neighboring Virgin Is. showing habit (312-313) and tetrasporangia (314-315).

Plants of Spermothamnion grow from 2 mm - 5 cm tall and usually occur as aufwuchs in shallow waters.

FIGS. 316-318. SPYRIDIA FILAMENTOSA (WULFEN) HARVEY

(After Boergesen 1915-1920). Habit of parts of plants (316-317); ultimate branchlets showing ring-like cortication (318).

Plants range from 5-30 cm tall. Various species prefer warm quiet waters or more exposed sites and they can occur in the lithos or aufwuchs or in small floating masses.

FIGS. 319-320. TAENIOMA NANUM (KÜTZING) PAPENFUSS

(After Boergesen 1915-1920, as T. perpusillum). Part of plant (319); branch tip with hairs (320).

Plants normally are 2-3 mm tall and grow in the lithos near low tide mark in exposed localities.

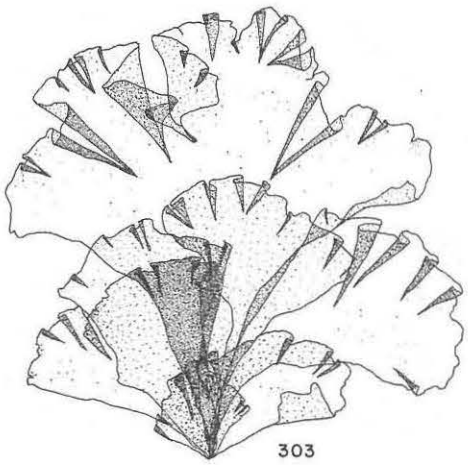
FIG. 321. VIDALIA OBTUSILOBA (MERTENS) J. AGARDH

(Original). Habit.

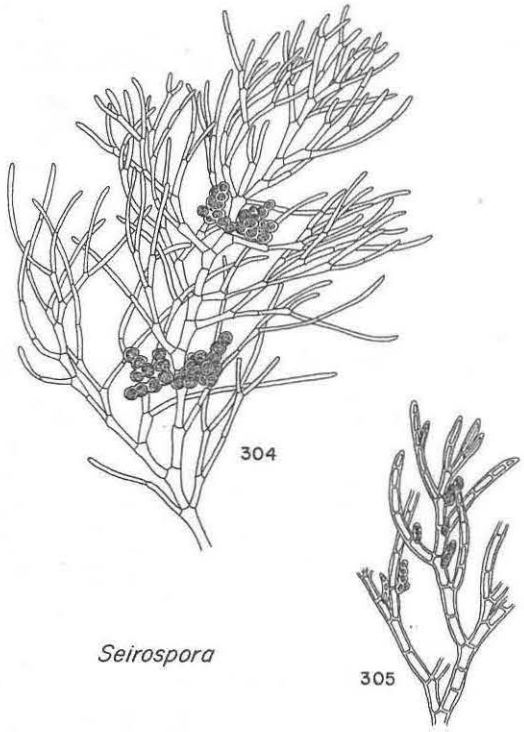
Plants reach heights of 10-25 cm and usually occur in deeper waters in the lithos.

MAGNIFICATION FACTORS:

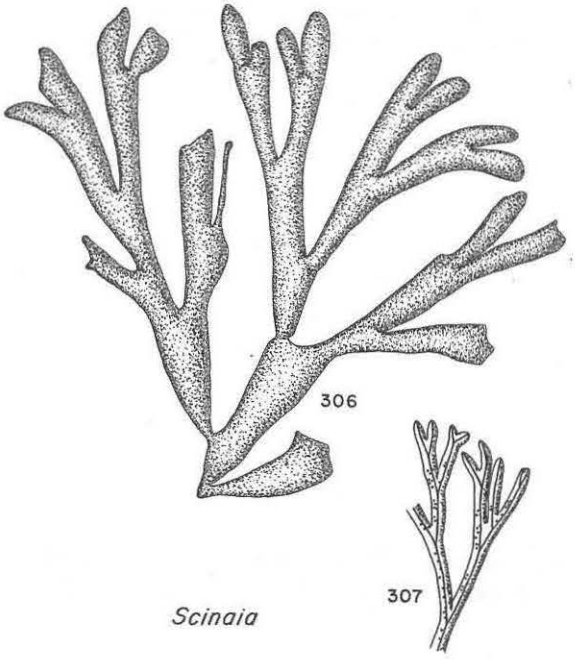
Fig. 312: 85×; Fig. 313: 32×; Fig. 314: 26×; Fig. 315: 80×; Fig. 316: 13×; Fig. 317: 13×; Fig. 318: 70×; Fig. 319: 20×; Fig. 320: 180×; Fig. 321: 0.4×.



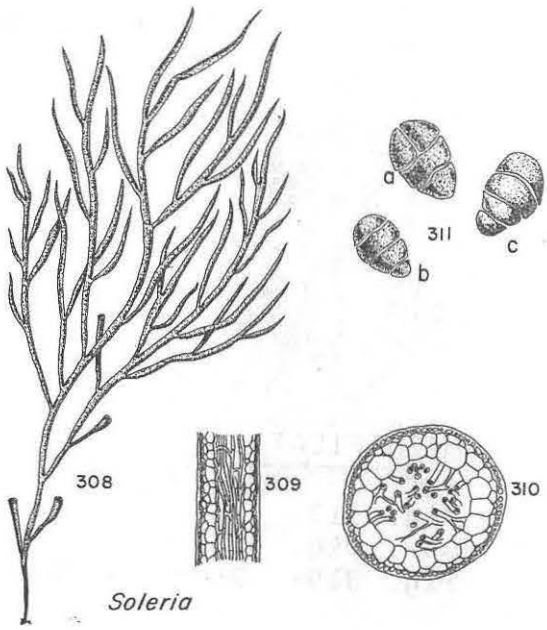
Porphyra



Seirospora



Scinaia



Soleria

FIG. 303. PORPHYRA UMBILICALIS (LINNEAUS) J. AGARDH (Original). Habit of plant.
Plants range from 10-80 cm in length and occur almost exclusively on intertidal rocks.

FIGS. 304-305. SEIROSPORA OCCIDENTALIS BOERGESEN (After Boergesen 1915-1920). Portion of female plant (304); part of plant with seirospores (305).
Seiospora grows to 2.5 cm tall and occurs in the lithos under very shaded conditions, especially on walls and in crevices.

FIGS. 306-307. SCINAIA COMPLANATA (COLLINS) COTTON (Original and after Boergesen 1915-1920). Habit (306) and branch tip showing position of central axis (307).
Scinaia plants attain heights of 5-8 cm and usually occur in deeper waters on rocks and old shells and coral fragments.

FIGS. 308-311. SOLERIA TENERA (J. AGARDH) WYNNE AND TAYLOR (After Harvey 1853, as Soleria chordalis and Boergesen 1915-1920, as Agardhiella tenera). Habit (308); longitudinal section (309); cross section (310); tetrasporangia (311).
Plants of Soleria commonly occur on sublittoral rocks in both sheltered and exposed situations.

MAGNIFICATION FACTORS:

Fig. 303: 0.3×; Fig. 304: 35×; Fig. 305: 60×; Fig. 306: 4×; Fig. 307: 1×; Fig. 308: 0.3×; Fig. 309: 20×; Fig. 310: 30×; Fig. 311: 175×.