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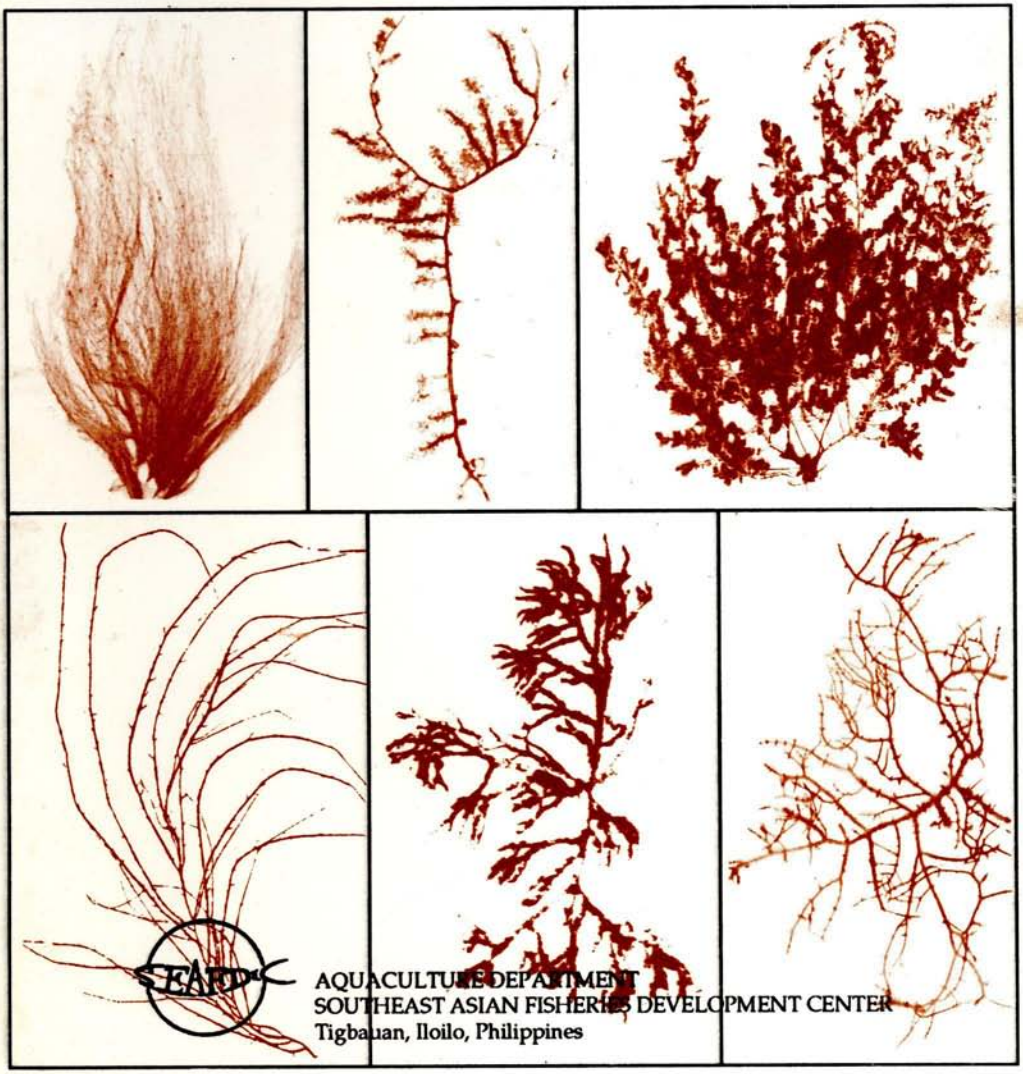

AQUACULTURE DEPARTMENT
SOUTHEAST ASIAN FISHERIES DEVELOPMENT CENTER
Tigbauan, Iloilo, Philippines

ISBN 971-8511-23-7

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ISBN 971-8511-23-7

Published and Printed by
Aquaculture Department
Southeast Asian Fisheries
Development Center (SEAFDEC)
Tigbauan, Iloilo, Philippines

On the cover

Some economically important seaweeds found in Panay (clockwise from the top): *Enteromorpha clathrata* (Roth) Greville, *Caulerpa lentillifera* J. Agardh, *Sargassum polycystum* C. Agardh, *Eucheuma denticulatum* (N.L. Burman) Collins et Hervey, *Kappaphycus alvarezii* (Weber-van Bosse) Doty, and *Gracilariopsis heteroclada* (Zhang et Xia) Zhang et Xia.

Preface

Seaweeds are among the fishery resources abundant in shallow coastal waters. However, maintenance of its maximum sustainable yield appears to be difficult to achieve at present because the coastal zone has been heavily damaged by man - overfishing and overharvesting of marine life, habitat destruction brought by illegal fishing, pollution, siltation, and excessive deforestation which stem from increasing population and greed for money.

The emergence of Western Visayas as a potential site of *Kappaphycus* and *Eucheuma* farming can contribute to the country's seaweed production and provide additional livelihood to marginal fishermen especially since coastal production has been declining in recent years. Indeed, several reports have attested to the profitability of seaweed farming. Thereby, farming other economically important seaweed species in areas where cultivation is possible must be encouraged. Towards this end, the taxonomy, ecology, and distribution of seaweeds must be known.

The seaweed resource of Panay is rich but very little information is available on its taxonomy, distribution, ecology, and economic importance. This practical book on the seaweeds of Panay acquaints and provides information to members of the academe and research institutions, policy makers, fishermen, and businessmen regarding these aspects. The book consists of four major parts: (1) Introduction - reviews the literature, habitat, distribution, morphological structure, and reproduction; (2) Classification - describes the classes to which seaweeds generally belong; (3) Collection and Preservation - explains the procedure used in treatment of specimens; and (4) Taxonomic List. A glossary is included to enlighten the reader of technical terms used. A list of references is also added to widen the user's literature. All species listed and described in this book are macrobenthic and were collected in Panay and Guimaras Islands.

A.Q. Hurtado-Ponce
Ma. R. J. Luhan
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April 1992

Contents

Introduction

Western Visayas abounds in various finfish, crustacean, mollusc, and seaweed species. However, there are only few reports on seaweeds found in the region. To date, there are 179 identified species in Panay (Howe 1932; Kraft 1970; Aligaen 1977; Cordero 1979, 1987; Modelo & Umezaki 1987) which include 60 green, 38 brown, and 81 red seaweeds. A total of 41 species reported in this book are new records to Panay.

Seaweeds are macroscopic marine algae generally belonging to Classes Chlorophyceae, Phaeophyceae, and Rhodophyceae. Their habitat, distribution, morphological structure, and reproduction are discussed below.

Habitat

Habitat refers to the place where seaweed is likely to thrive. It includes the substrates to which seaweeds are attached and the places where seaweeds are exposed to - sheltered from large waves and sprays. Exposed areas permit the development of sturdy and frondose seaweeds like *Sargassum, Turbinaria,* and *Halymenia* while sheltered bays or lagoons permit the development of free-floating seaweeds like *Gracilaria, Enteromorpha,* and *Ulva.* Seaweeds attach to two major types of substrates.

Stable substrates. A typical stable substrate is exemplified by a rocky reef or headland such as those found in Nogas Is. and Pandan, Antique where seaweeds abound. Beaches with large boulders or rocks (rock is the most stable substrate) as seen in Boracay Is., Aklan have moderately extensive seaweed communities. Rock or concrete breakwaters, concrete ramps, pilings, and seawalls also support substantial growths of marine algae. In addition, wooden pilings, anchored objects like docks, barge bottoms (good for filamentous green algae), and similar structures as well as surfaces of marine plants like *Zostera* and of floating net cages at Igang, Nueva Valencia, Guimaras are good stable substrates for *Ulva, Enteromorpha, Gracilaria, Acanthophora, Hypnea, Padina,* and *Dictyota.*

Unstable substrates. Examples are cobbles, shingle beaches, fine sand, mud, and clay. Waves or currents wash away attached seaweeds resulting in decreased population. In quiet or still waters, however, such substrates support moderate to large populations of *Gracilaria, Caulerpa,* and *Udotea.*

Distribution

Many factors influence the distribution of seaweeds. Hence, it is important to classify distribution patterns.

Tidal distribution.

Intertidal distribution. A rocky shore, as found in Nogas Is. and Pandan, Antique, rather than a sandy or muddy beach is a better indicator of seaweed growth. Arrangement or zonation of flora refers to position, type,

and number of seaweeds occupying an area. On the Pacific coast, the time or amount of exposure or immersion (time when tide is out and plants are exposed to air) is the most important factor controlling zonation. Most of the green seaweeds (*Acetabularia, Boergesenia, Caulerpa, Chaetomorpha, Dictyosphaeria, Enteromorpha, Halimeda, Udotea,* and *Ulva*) are found in this area.

Subtidal distribution. Seaweeds in this area are never exposed to air for any length of time. Amount and color of light are the two most important factors controlling vertical distribution. Both factors vary with increasing depth and appear to have a significant effect on the depth at which different seaweeds thrive. Varying sizes of red seaweeds like *Portieria, Halymenia,* and *Titanophora* which can actively photosynthesize in dim and "greener" light in contrast to green or brown (*Sargassum*) seaweeds are typically found in shallower portions of the subtidal zone. In deeper portions, coralline algae like *Amphiroa, Cheilosporum,* and *Jania* appear as pink crusts on the surface of rocks.

Geographic distribution. Many authors consider temperature as the most important factor dictating geographical distribution of seaweeds. Species composition differs when there is significant difference in seawater temperature between locations. Hutchins (1947) pointed out four critical temperatures: (1) minimum for survival which sets winter poleward boundary of species; (2) minimum for reproduction which controls summer poleward boundary; (3) maximum for reproduction which controls winter equatorward boundary; and (4) maximum for survival which determines summer equatorward boundary.

Seasonal distribution. The Philippines has two pronounced seasons: wet (June-October) and dry (November-May). Several genera like *Gracilaria, Codium,* and *Hydroclathrus* are seasonal, i.e., occurrence is limited to dry season; occurrence is affected by monsoon, water movement, salinity, and temperature.

Morphological Structure

Holdfast. This structure anchors the seaweed to the substrate. Holdfasts are of different forms, shapes, and sizes. Examples: hapters - multicellular outgrowths forming part of the holdfast (*Gracilaria eucheumoides);* disc-shaped - resembling a suction cup (*Gracilaria "verrucosa");* root-like filaments - deeply penetrate and surround/attach to sediment particles to form an anchor within the loose substrate (*Avrainvillea, Halimeda*).

Stipe. This is the stalk which supports and orients the blades; provides for flexibility and resilience in meeting the varying forces of water movement.

Thallus. This may consist of a simple filament, a branched filament, a hollow tube or bladder, a bushy tuft of cylindrical or flattened branches, or a simple or compressed blade (lamina); serves as the photosynthetic organ and supporting structure for the reproductive organs.

Vesicle. This hollow gas-filled chamber structure is commonly present in *Sargassum*. The vesicle keeps the blade buoyant and orients plant for sufficient light absorption required for photosynthesis.

Reproduction

There are three types of reproduction known among seaweeds.

Vegetative reproduction. Portions of the thallus regenerate from cut surfaces. This is common in all algae especially in the cultivation of *Kappaphycus*. *Gracilaria* maintains its population in estuaries, rivers, creeks, canals, and fishponds through vegetative reproduction. Thalli of chlorophytans may be fragmented into two or more portions when some intervening portions die off or through accidental or natural separation of its parts. Erect branches arise from the basal holdfast, form stolons which grow out of it, or form special propagules which drop off and give rise to new individuals as in Sphacelariales.

Asexual reproduction. Motile or non-motile spores are produced in structures called sporangia. Spores may be in the form of exospores, endospores, monospores (Bangiales), biospores (Corallinales), paraspores (*Ceramium*), and zoospores or aplanospores (Chlorophyceae and Phaeophyceae).

Sexual reproduction. This involves production and fusion of gametes produced in the gametangia which may be differentiated or undifferentiated from the ordinary vegetative cell. The female gamete is produced in an oogonium or carpogonium while the male gamete is produced in the antheridium or spermatangium. Some red and brown seaweeds may form distinct reproductive structures, e.g., sori which form a fertile area on the thallus' surface (*Padina*), nemathecium which form a cushion-like structure on the thallus' surface, conceptacles found inside cavities (receptacles) (*Amphiroa, Cheilosporum,* and *Mastophora*), stichidium (converted fertile structure from the branch) (*Gelidiella* and *Hypnea*), or cystocarp of the female gametophyte in which carpospores are produced (*Kappaphycus* and *Gracilaria*). Sexual reproduction may be isogamy (gametes are of the same size), anisogamy (motile gametes are of two sizes), oogamy (male gamete is very small, flagellated, and active; female gamete very large, non-flagellated, and completely motionless), or an alternation of isomorphic generations.

Classification

Green Algae (Chlorophyceae)

Presence of chlorophylls *a* and *b* makes the members of this class similar to terrestrial plants. Starch (amylose and amylopectin) is the principal food reserve. Cell wall is made of cellulose, except in siphonous members which have mannan or xylan.

Reproduction is either asexual (fragmentation; formation of zoospores, aplanospores, or autospores) or sexual (isogamy, anisogamy, or oogamy). Gametes with equal or unequal flagella, typically two in number and inserted apically, are distinctive of this class.

Brown Algae (Phaeophyceae)

Species belonging to this class are almost exclusively benthic. Its brown color is due mainly to the principal carotenoid fucoxanthin which combines with various tannins, chlorophyll *a*, and chlorophyll *c1-c2*. Storage products are laminarin and mannitol. Cell wall is two-layered with an inner layer of cellulose and an outer layer of alginic acid and fucoidin.

Asexual reproduction is principally by means of motile zoospores although a variety of vegetative structures are involved in some species. Sexual reproduction can be isogamy, anisogamy, or oogamy.

Red Algae (Rhodophyceae)

Principal pigments are chlorophyll *a*, chlorophyll *(d)*, r-phycocyanin, allophycocyanin, c-phycoerythrin, and α– and β-carotene. These pigments are responsible for the overall red, violet, brown, black, or blue color of the algae. Storage product is floridean starch which lies freely in the cytoplasm. Cell wall is made of cellulose, xylans and galactans in certain species, or the commercially important agar and carrageenan.

Sexual reproduction is oogamy and involves many specialized features. *In situ* post-fertilization development usually occurs, resulting in the production of a unique diploid carposporophyte generation attached to the female gametophyte. Sexes are normally separate and life history usually involves a sequence of haploid gametophyte and diploid carposporophyte and tetrasporophyte generations. Both the gametophyte and tetrasporophyte generations are usually isomorphic, though many heteromorphic samples are known.

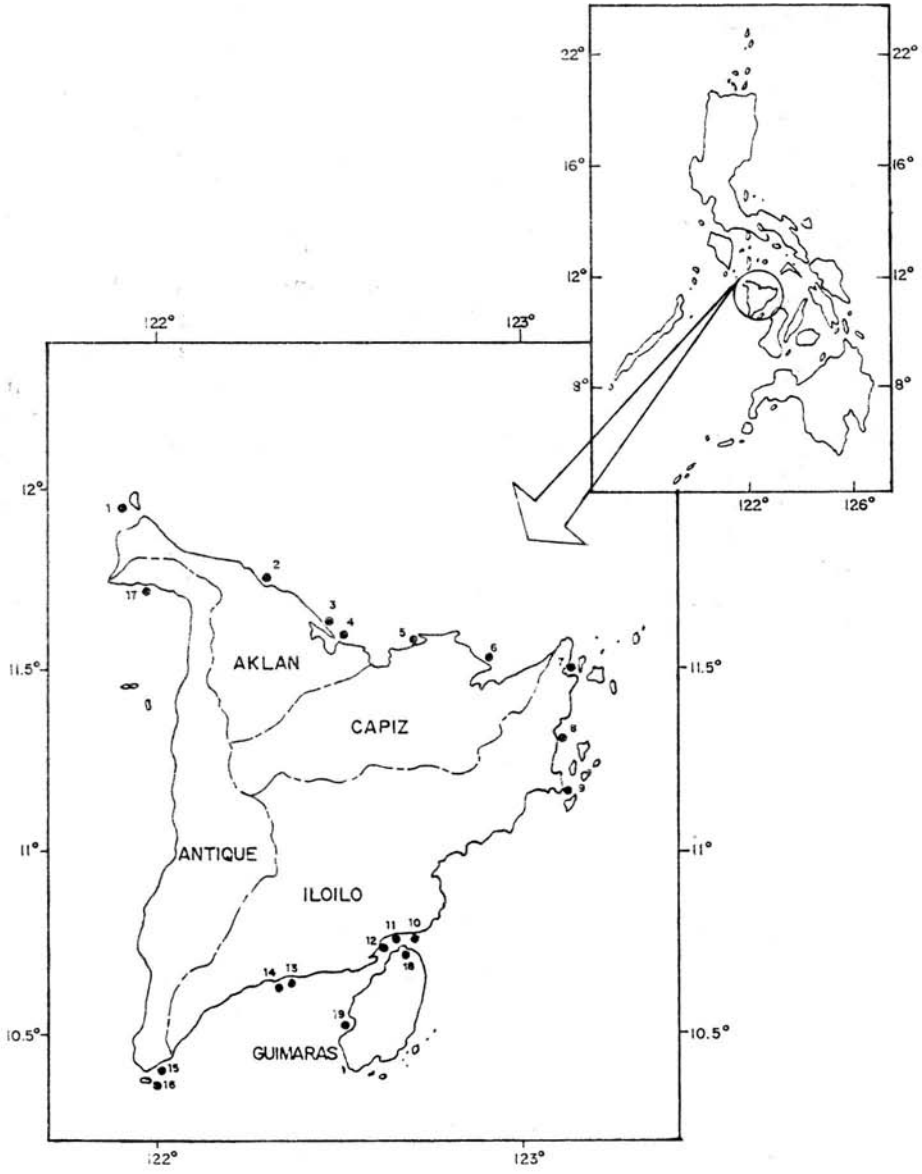
Collection and Preservation

Specimens were collected during low tides from tidal flats to 2-3 m-deep waters. In deeper areas, these were done by skin or SCUBA diving. Whole thalli were collected by hand or with the aid of a knife. Epiphytic and crustose materials were either scraped or collected with the substrate or host plant. Specimens were from different coastal towns of Panay and Guimaras Islands (see map on p. 6) surveyed in April 1988 to February 1989.

Collected specimens were placed in a labelled screen bag. The screen bags were then placed in a sealed container with 10% formalin. Smaller specimens were placed in labelled sample bottles also containing 10% formalin.

Specimens were immediately pressed in the laboratory and washed with running tap water for 10-20 min to remove excess formalin, adhering organisms, and other debris. Calcareous and fragile species were soaked in formalin with 10-40% glycerin, air dried, and kept in small boxes. Herbarium specimens were prepared as described by Ganzon-Fortes (1987).

Pressed samples were sorted by species. Identification was made by inspecting external appearances under a stereo microscope. To ascertain and confirm the identity of each species, cross sections were made and inspected under a compound microscope. Whole plant photographs were also prepared to help in identification. The taxonomic scheme of Silva et al. (1987) was followed.



Seaweeds compiled in this book were collected in April 1988-February 1989 from different coastal towns of Panay and Guimaras Islands [Boracay Island (1), Tangalan (2), New Washington (3), and Batan (4) in Aklan; Ivisan (5) and Pan-ay (6) in Capiz; Estancia (7), Concepcion (8), Ajuy (9), Zarraga (10), Leganes (11), Jaro (12), Tigbauan (13), and Guimbal (14) in Iloilo; Casay (15), Nogas Island (16), and Pandan (17) in Antique; Buenavista (18) and Igang (19) in Guimaras].

Taxonomic List[1]

CLASS CHLOROPHYCEAE

Order Ulvales

Family Ulvaceae

Enteromorpha clathrata (Roth) Greville

Common name: Lumot (Iloku).

Description: Plant is up to 23-cm tall, in clusters, and bright to dark green. Base of main blade is cylindrical, becoming gradually compressed above. Several branches, similar to main blade, arise from the gradually contracted stalk-like base.

Habitat: Shallow portion of intertidal zone; attached to pebbles or boulders.

Economic importance: Human and fish food; fish bait.

Collection site: Tigbauan, Iloilo.

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[1]*Scientific names preceded by asterisks are new records in Panay and Guimaras Islands.*

Enteromorpha intestinalis (Linn.) Nees

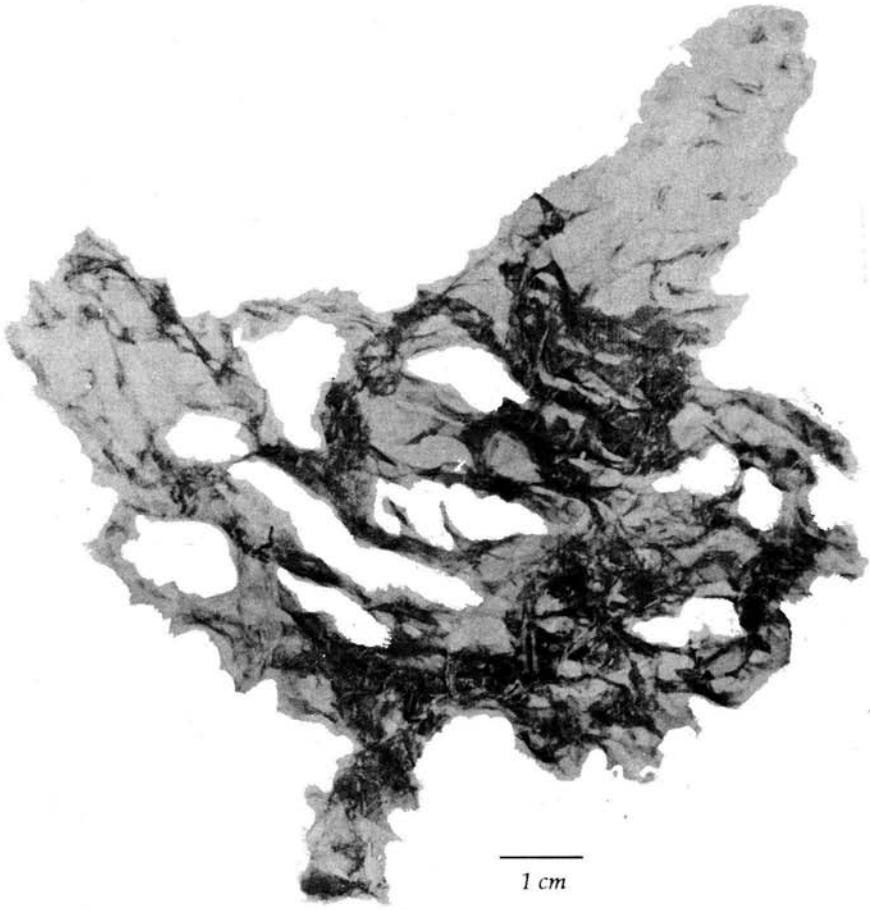
Common name: Bitukang manok (Tagalog).

Description: Plant is greenish to yellowish, tubular, long (80-340 mm), narrow (7-25-mm broad), and tapering to the base.

Habitat: Sandy bottom in lower intertidal zone.

Economic importance: Human and fish food; fertilizer; with vitamin E, protein, and tocopherols.

Collection site: Tigbauan and Concepcion, Iloilo; Tangalan, Aklan; Casay and Nogas Is., Antique; Nueva Valencia, Guimaras.



**Ulva fasciata* Delile

Common name: Gam-gamet, lab-labig (Iloku).

Description: Plant is greenish to yellowish, often twisted and crumpled in appearance, and with irregular perforations. Young thalli are foliaceous (5-12 cm dia.) and divided into linear lobes at the apices when mature.

Habitat: Sandy-rocky substrates; attached to upper layer of floating net cages.

Economic importance: Human and fish food; with vitamin E; vermifuge.

Collection site: Concepcion, Iloilo; Boracay Is., Aklan; Nogas Is., Antique; Nueva Valencia, Guimaras.

1 cm

***Ulva lactuca* Linnaeus**

Common name: Gam-gamet (Iloku).

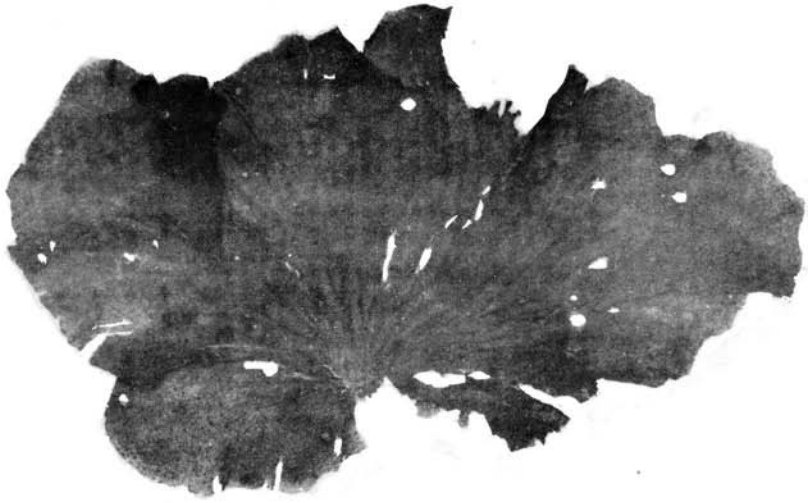
Description: Plant is light green with foliaceous blade (22.5-24.5-cm broad) and papery thin with undulating margin.

Habitat: Sandy bottom; attached to upper portion of floating net cages.

Economic importance: Human and fish food.

Collection site: Nogas Is. and Pandan, Antique; Nueva Valencia, Guimaras.

Order Cladophorales
Family Anadyomenaceae



1 cm

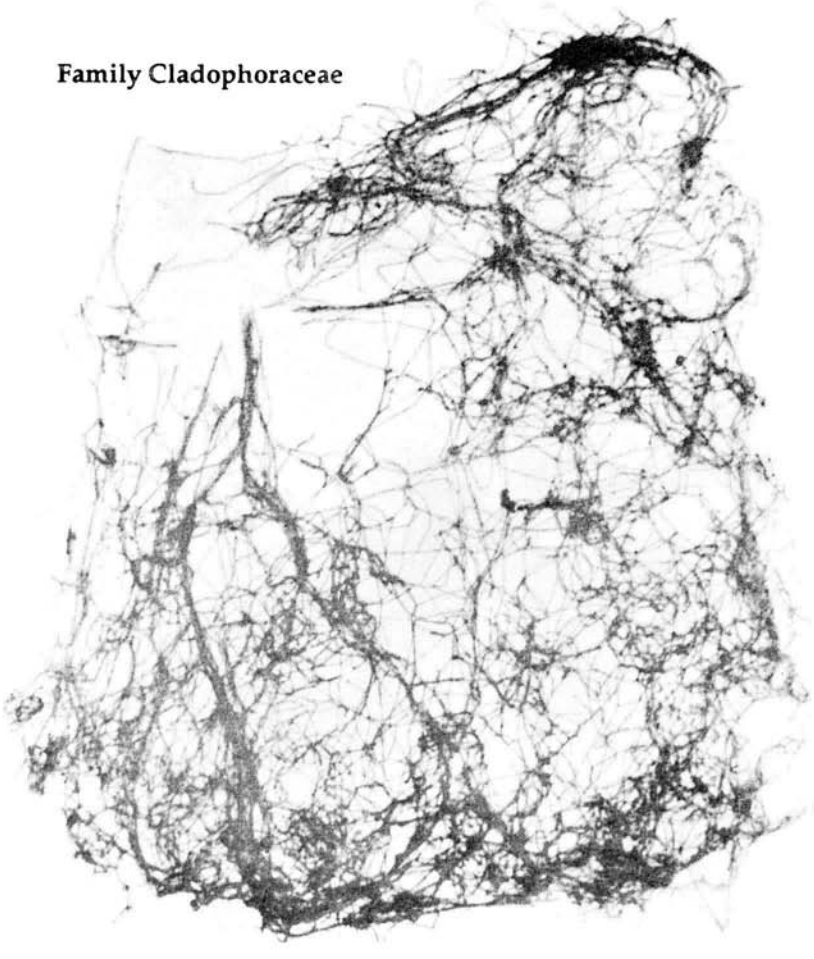
******Anadyomene wrightii* Harvey ex J.E. Gray

Description: Thallus is fan-shaped, forms clumps consisting of dark green blades (1-6-cm broad), and attached by means of a short stalk with rhizoids. Plant is microscopically composed of contiguous cells in a branching filamentous system; larger cells give a rib-like appearance.

Habitat: Rocky substrates exposed to moderate to strong waves.

Collection site: Concepcion and Estancia, Iloilo; Ivisan, Capiz; Tangalan, Aklan; Pandan and Nogas Is., Antique.

Family Cladophoraceae



1 cm

Chaetomorpha crassa (C. Agardh) Kutzing

Common name: Rip-ripies, lumot (Iloku).

Description: Filaments are uniseriate, coarse, and unbranched. Cells measure 400-800-µm long and up to 350 mm dia.

Habitat: Sandy bottom often entangled with other seaweeds (*Gracilaria coronopifolia* and *Sargassum*) or seagrasses; sometimes part of debris drifted to shore.

Economic importance: Fish food.

Collection site: Nogas Is. and Pandan, Antique; Batan, Aklan; Buenavista, Guimaras.

**Cladophora delicatula* (Montagne)

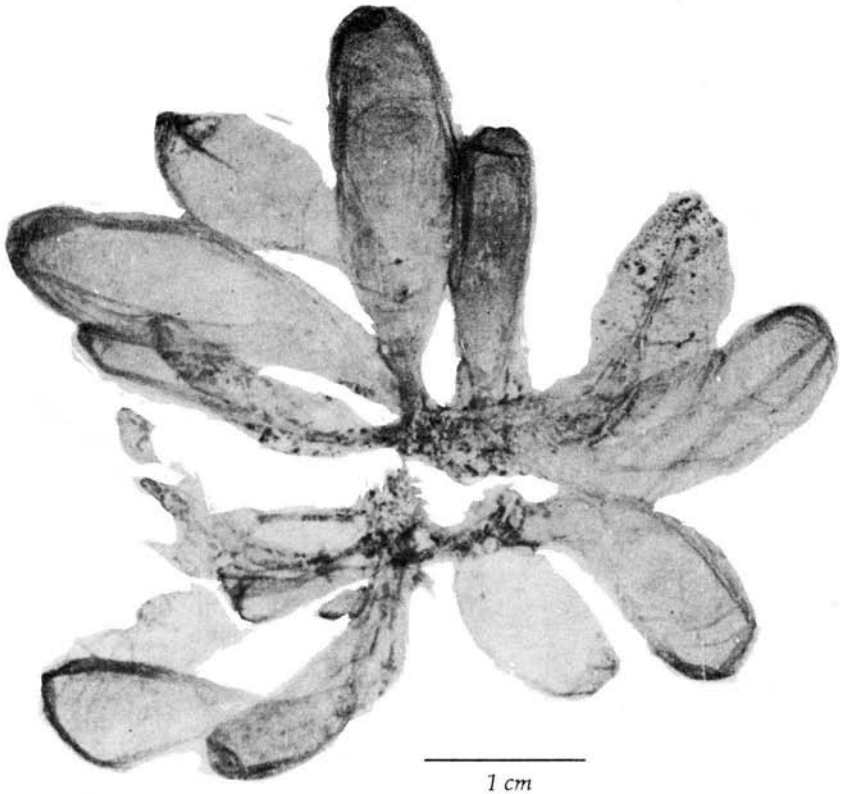
Description: Plant is up to 12-cm tall, dull green, loosely tuft, and soft. Attached to substrate by branching rhizoids. Branching is dichotomous to trichotomous and branchlets are often in one-sided series.

Habitat: Shallow portion of lower intertidal zone.

Economic importance: Good source of protein.

Collection site: Tigbauan, Iloilo

Order Siphonocladales
Family Siphonocladaceae

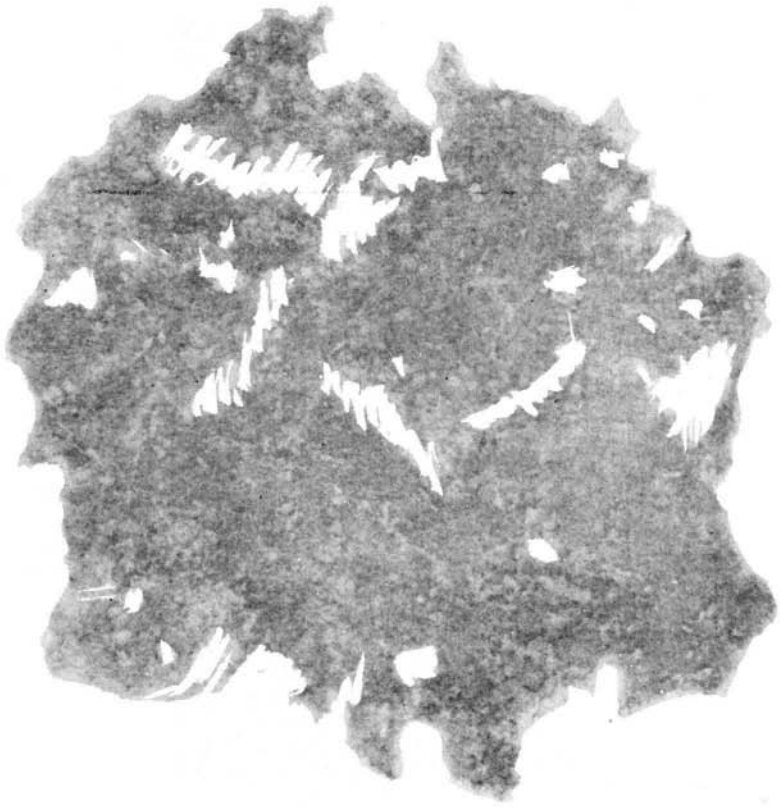


***Boergesenia forbesii (Harvey) J. Feldmann**

Description: Plant is bright green and solitary or in clumps. Thalli are club-shaped (8-40 x 2-14 mm in size), smooth, and held together at the base by adjoining small rhizoid-like holdfasts.

Habitat: Sandy-rocky bottom forming clumps; epiphytic on larger seaweeds like *Sargassum* and *Turbinaria*.

Collection site: Nogas Is., Antique; Boracay Is., Aklan; Nueva Valencia, Guimaras.



1 cm

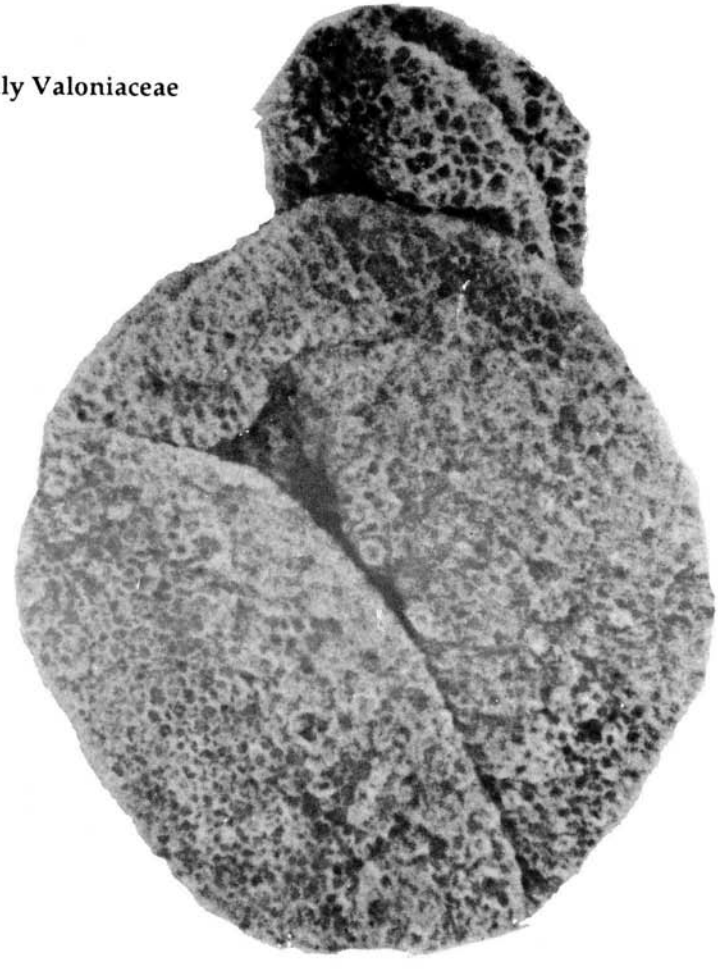
**Boodlea composita* (Harvey) Brand

Description: Plant is bright green and forms amorphous and spongiose clumps of net-like filaments. Branches are pinnately-alternately or irregularly arranged.

Habitat: Sandy portion of lower intertidal zone.

Collection site: Boracay Is., Aklan; Nogas Is. and Pandan, Antique; Nueva Valencia, Guimaras.

Family Valoniaceae



1 cm

Dictyosphaeria cavernosa (Forsskal) Borgesen

Description: Plant is bright green and attached to substrate by rhizoids. Thallus is composed of endogenously developed segments contained within the parental vesicle which press against each other forming a pseudoparenchyma. Young plant forms hollow spheres which rupture when plant matures.

Habitat: Rocky substrates exposed to strong water movement.

Collection site: Ajuy, Iloilo; Tangalan, Aklan; Nogas Is., Antique; Nueva Valencia, Guimaras.

1 cm

**Valonia ventricosa* J. Agardh

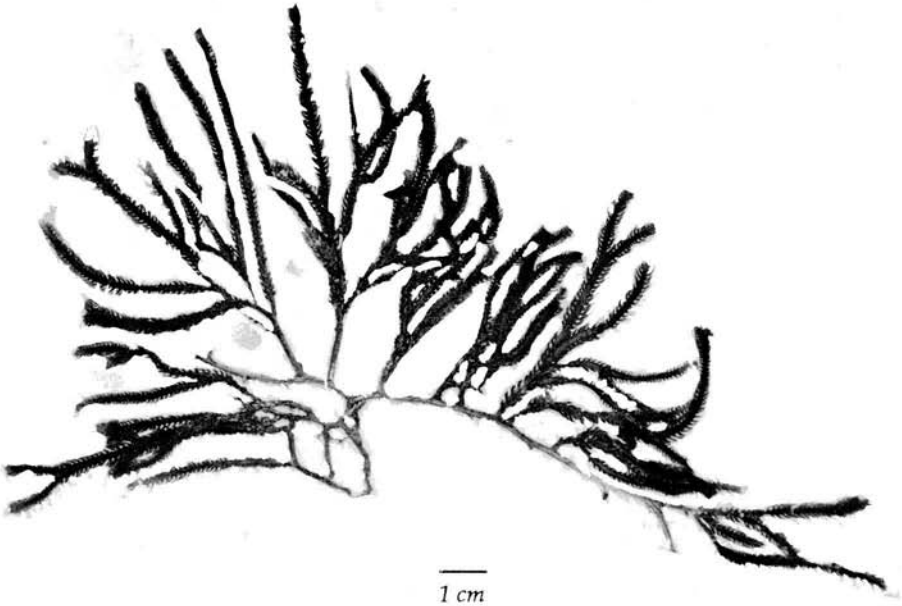
Description: Plant is dark green, single, 10 x 20 mm in size, oval to spherical, and hollow. Small lenticular cells at the lower surface of the alga serve as holdfast.

Habitat: Rocky substrates in intertidal zone.

Collection site: Tangalan, Aklan.

Order Caulerpales
Family Caulerpaceae

The genus *Caulerpa* possesses a horizontal rhizome-like thallus which is anchored to substrate by rhizoidal outgrowths. Species are distinguished by their foliar portions.



***Caulerpa cupressoides** (Vahl) C. Agardh

Description: Plant is erect and up to 9-cm tall. Branches are feather-like with a broad axis bearing cylindrical and upcurved pinnules. Plant is attached to substrate by a stolon with fine rhizoids.

Habitat: Sandy substrates in calm water.

Economic importance: Human food; medicine (antifungus, lowers blood pressure).

Collection site: Concepcion, Iloilo; Tangalan, Aklan.

1 cm

Caulerpa lentillifera J. Agardh

Common name: Ar-arusip (Iloku); lato-bilong (Akeanon).

Description: Spherical ramuli are attached along the erect branch. A distinct constriction between tip of stalk and base of ramuli typifies this species.

Habitat: Sandy-muddy substrates; cultured in brackishwater ponds.

Economic importance: Human food; source of minerals (Ca, K, Mg, Na, Cu, Fe, Zn); medicine (antifungus, lowers blood pressure).

Collection site: Ivisan, Capiz; Nogas Is., Antique.

Caulerpa peltata Lamouroux

Common name: Lato-buklad (Akeanon).

Description: Ramuli end into a disc. Two forms of this species were observed: specimens with narrow disc up to 7.4-mm wide (Nogas and Boracay Is.) and specimens with broad disc up to 16.3-mm wide (Estancia). Young undeveloped discs of the latter were also observed.

Habitat: Sandy-muddy to muddy substrates.

Economic importance: Human food; source of caulerpin (anaesthetic-like); medicine (antifungus, lowers blood pressure).

Collection site: Estancia, Iloilo; Boracay Is., Aklan; Nogas Is., Antique.

1 cm

Caulerpa racemosa (Forsskal) J. Agardh

Common name: Lato (Hiligaynon, Cebuano); lato-bilong (Akeanon); ar-arusip (Iloku).

Description: Plant grows up to 8.5-cm tall. Erect branches have grape-like ramuli which assume other forms depending on prevailing environmental conditions. Ramuli are arranged alternately or radially along the axis.

Habitat: Sandy-rocky substrates in calm waters; attached to soft or hard objects in floating net cages.

Economic importance: Human food; source of caulerpin; medicine (anti-fungus, lowers blood pressure).

Collection site: Estancia, Iloilo; Negas Is., Antique; Nueva Valencia, Guimaras.

1 cm

Caulerpa serrulata (Forsskal) J. Agardh

Description: Spirally flat twisted blade with serrated margins is peculiar to this species.

Habitat: Sandy-coral substrates in shallow and calm waters.

Economic importance: Human food; medicine (antifungus, lowers blood pressure).

Collection site: Guimbal and Estancia, Iloilo; Ivisan, Capiz; Nogas Is., Antique.

1 cm

Caulerpa sertularioides (S.G. Gmelin) Howe

Description: Plant is erect with feather-like blades, grows up to 3-cm tall, and arises from a branched stolon attached to substratum by fine rhizoids. Blade pinnules are cylindrical and pinnately arranged.

Habitat: Sandy-rocky substrates in close association with seagrasses in shallow, exposed, or protected areas.

Economic importance: Human food; medicine (antifungus, lowers blood pressure).

Collection site: Estancia, Iloilo.

1 cm

******Caulerpa taxifolia* (Vahl) C. Agardh

Description: Species resembles C. *sertularioides* but pinnules (up to 1.05 mm dia.) are flattened and upcurved. Plant is attached by a stolon with rhizoids.

Habitat: Sandy-coralline substrates in calm waters or tide pools.

Economic importance: Human food; medicine (antifungus, lowers blood pressure).

Collection site: Concepcion and Estancia, Iloilo.

Family Codiaceae

1 cm

**Codium arabicum* Kutzing

Description: Plant is dark green and forms a spongy convoluted mass on hard substrates. Utricles have truncated apices (7-17-mm broad, 40-55-mm high).

Habitat: Coral substrates in areas with strong waves.

Economic importance: Human food; medicine (antibacteria, antitumor).

Collection site: Concepcion and Ajuy, Iloilo; Tangalan, Aklan; Nueva Valencia, Guimaras.

1 cm

**Codium edule* P.C. Silva

Common name: Pok-poklo (Iloku).

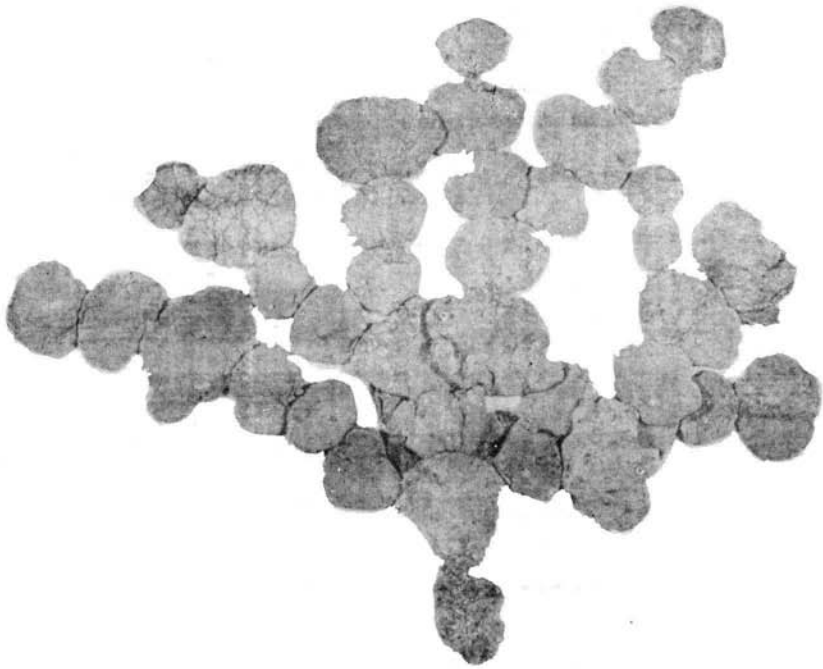
Description: Plant is dark green, clumpy, and spongy. Branches are cylindrical (1-3 mm dia.). Branching is equally dichotomous and utricles have truncated to rounded apices (20-25-µm wide, 60-µm long).

Habitat: Rocky substratum in subtidal zone.

Economic importance: Human food; medicine (antibacteria, antitumor).

Collection site: Ajuy, Iloilo; Tangalan, Aklan; Nogas Is., Antique; Nueva Valencia, Guimaras.

Family Halimedaceae



1 cm

Halimeda macroloba Decaisne

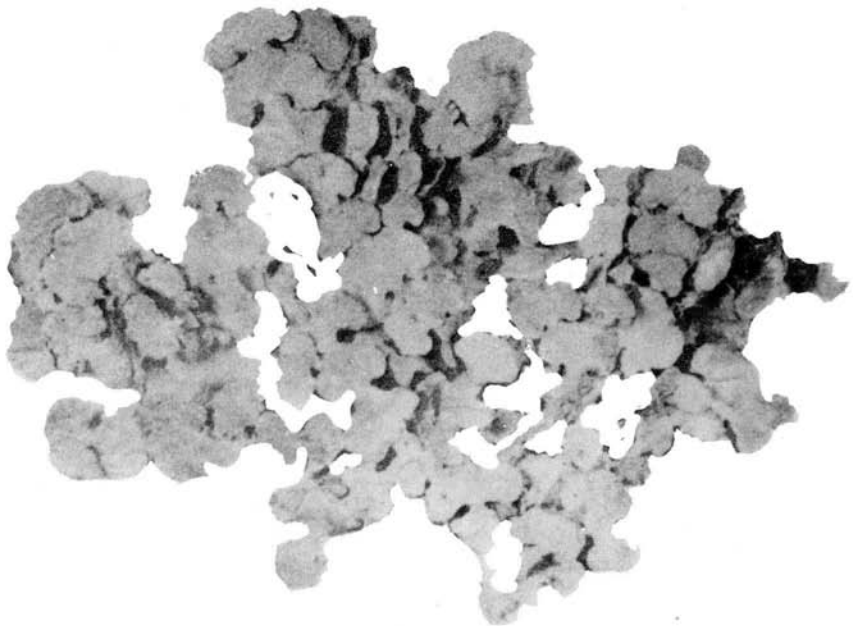
Common name: Sal-salumague (Iloku).

Description: Plant grows up to 11-cm high with bulbous holdfast. Thalli are composed of large segments (7-20-mm high, 6-24-mm broad) with distinctly lobed distal margin.

Habitat: Sandy-muddy substrates in lower intertidal zone and in close association with seagrasses.

Economic importance: Medicine (antibacteria); with growth regulators (auxin, gibberellin, cytokinin).

Collection site: Concepcion, Iloilo; Tangalan, Aklan.



1 cm

Halimeda opuntia (Linn.) Lamouroux

Description: Plant forms amorphous clumps and is attached to substrate by rhizoids arising from segments at the lower portion of clumps. Segments (6-8-mm wide, 3.5-5-mm high) are heavily calcified.

Habitat: Sand flats in lower intertidal zone in close association with other seaweeds and seagrasses.

Economic importance: Medicine (antibacteria).

Collection site: Pandan, Antique.

1 cm

Halimeda tuna (Ellis & Solander) Lamouroux

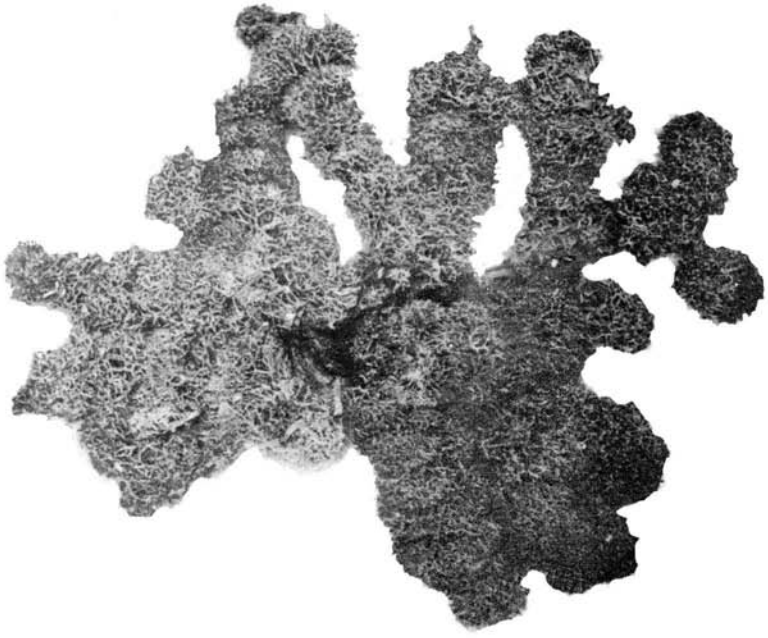
Common name: Sal-salumague (Iloku).

Description: Plant is up to 9-cm high, bright green, and attached to substrate by a sponge-like holdfast. Segments (6-13-mm high, 22-mm wide) are moderately calcified with upper margins thickened and sinuated.

Habitat: Rocky substrates in higher intertidal edge or in crevices in subtidal areas.

Economic importance: Medicine (antibacteria); fodder.

Collection site: Ajuy and Estancia, Iloilo; Tangalan, Aklan; Nogas Is., Antique.



1 cm

**Tydemania expeditiones* Weber-van Bosse

Description: Plant is lightly calcified, green, and forms successive glomeruliferous whorls at 7-10 mm intervals along main axis.

Habitat: Crevices of rocks in subtidal zone (15-20 ft).

Collection site: Nogas Is., Antique.

Family Udoteaceae

***_Avrainvillea erecta_** (Berkeley) A. Gepp & E. S. Gepp

Description: Plant is 7-cm tall, solitary, very dark green when fresh, and attached to substrate by a short and bulbous holdfast (1.8 x 1.2 cm dia.). Blade is flat, flabellate, and finely fibrous. Blade filament is cylindrical, dichotomous, and constricted at the point of dichotomy.

Habitat: Shallow and protected sandy bottom.

Collection site: Buenavista, Guimaras.

1 cm

**Udotea occidentalis* A. Gepp & E.S. Gepp

Description: Plant is up to 5-cm high and 9-cm wide, light green, stipitate, and moderately calcified. Plant can be found singly or in colony. Blade filaments have stalk bell-like capitula (14-µm high, 4-7-µm wide) with short finger-like projections at apices.

Habitat: Sandy substrates in lower intertidal zone.

Collection site: Tangalan, Aklan.

1 *cm*

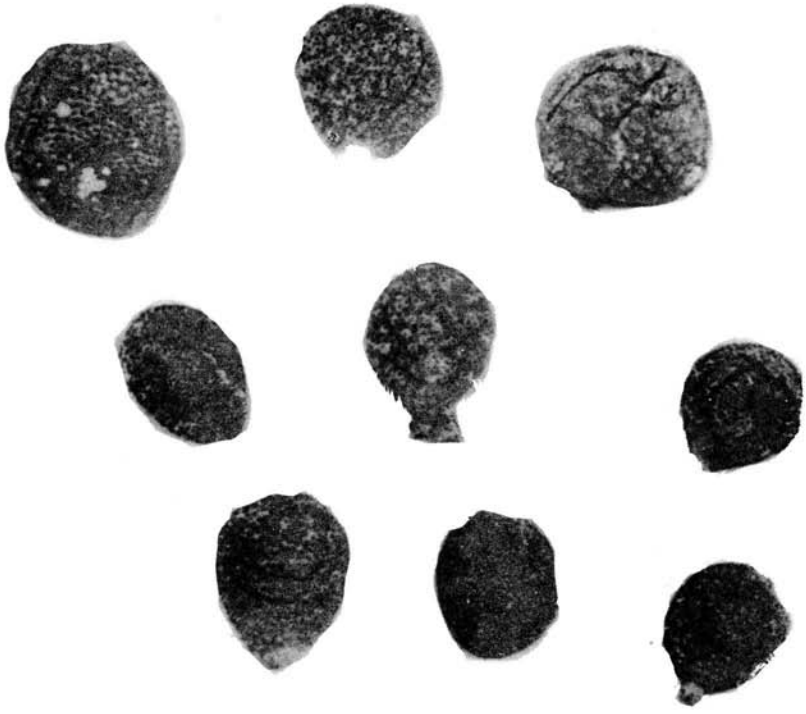
Udotea orientalis A. Gepp & E.S. Gepp

Description: Fan-shaped blade (16-37-mm high, 17-43-mm broad) is bright green. Blade filaments are 20-µm wide and simple.

Habitat: Sandy shallow area; sand-covered rocks.

Collection site: Tangalan, Aklan; Pandan, Antique.

Order Dasycladales
Family Dasycladaceae



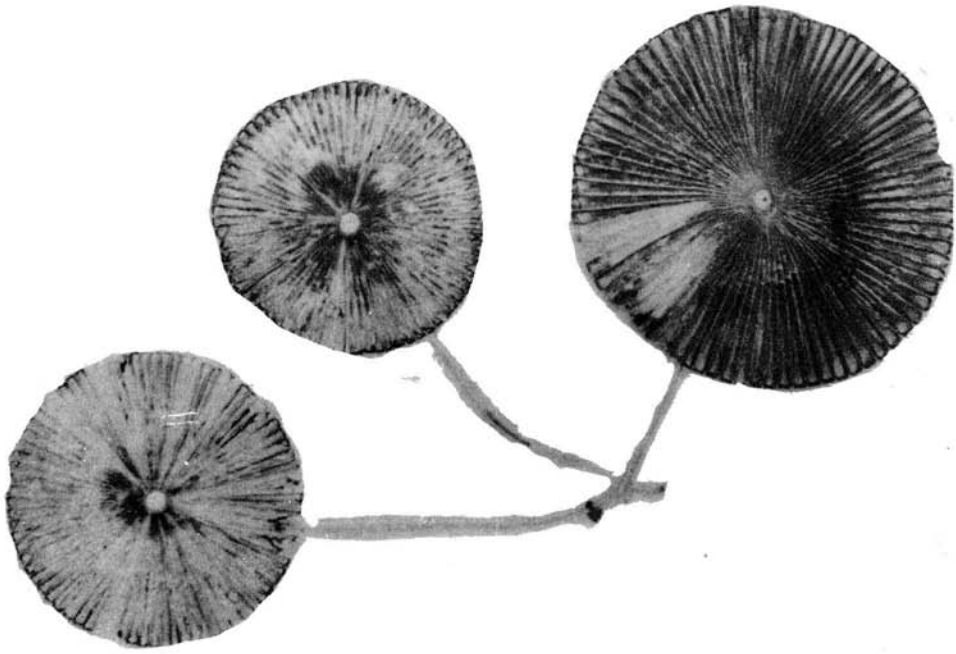
1 cm

Bornetella sphaerica (Zanardini) Solms-Laubach

Description: Plant is spherical (4-5 mm dia.), green, and in colony. Attached by rhizoids from base of thallus.

Habitat: Rocky substrates.

Collection site: Concepcion and Estancia, Iloilo; Tangalan, Aklan; Pandan, Antique.



1 cm

**Acetabularia major* Martens

Common name: Payong-payong (Iloku).

Description: Plant has stipe (5-21-cm long) which ends up into a disc (4-12 mm dia. bearing 75-99 sporangial rays).

Habitat: Rocky-coral substrate in lower intertidal zone.

Economic importance: Medicine for renal disorder.

Collection site: Tigbauan, Iloilo.

1 cm

**Halicoryne wrightii* Harvey

Description: Plant grows up to 50-mm tall and 4-5-mm wide, pale green, moderately calcified, and usually in colony. There are 65-75 whorls along the main axis.

Habitat: Rocky-sandy substrates.

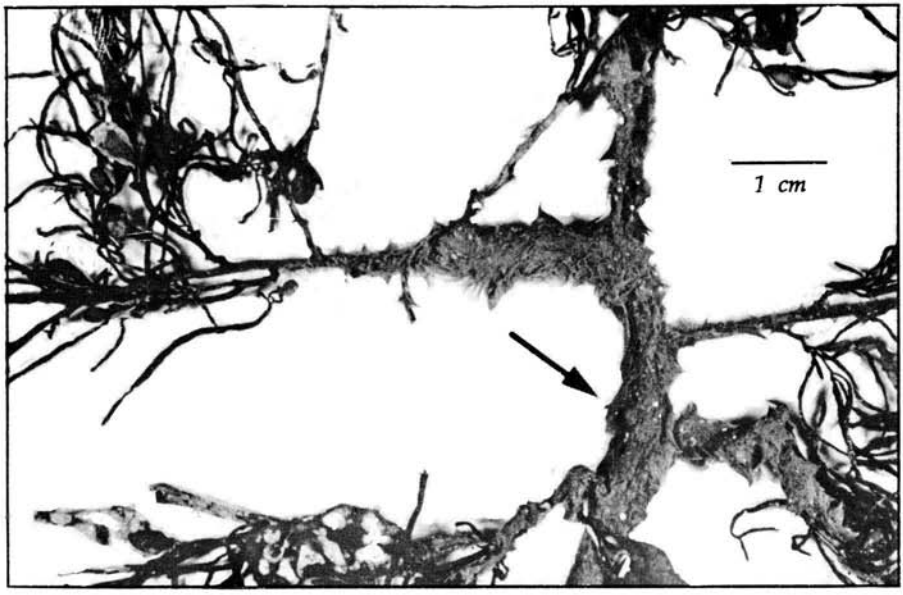
Collection site: Guimbal, Iloilo.

CLASS PHAEOPHYCEAE

Order Sphacelariales

Family Sphacelariaceae

S. tribuloides (arrow) collected from Tangalan, Aklan is epiphytic on Sargassum.



Sphacelaria tribuloides Meneghini

Description: Plant is epiphytic on large species like *Sargassum*. Filaments are polysiphonous and irregularly branched or sometimes unbranched. Terminal hairs are present. Ovoid unilocular sporangia (7.0 x 5.0 µm dia.) are present.

Habitat: Large plants in upper intertidal to subtidal zones.

Collection site: Tangalan, Aklan.

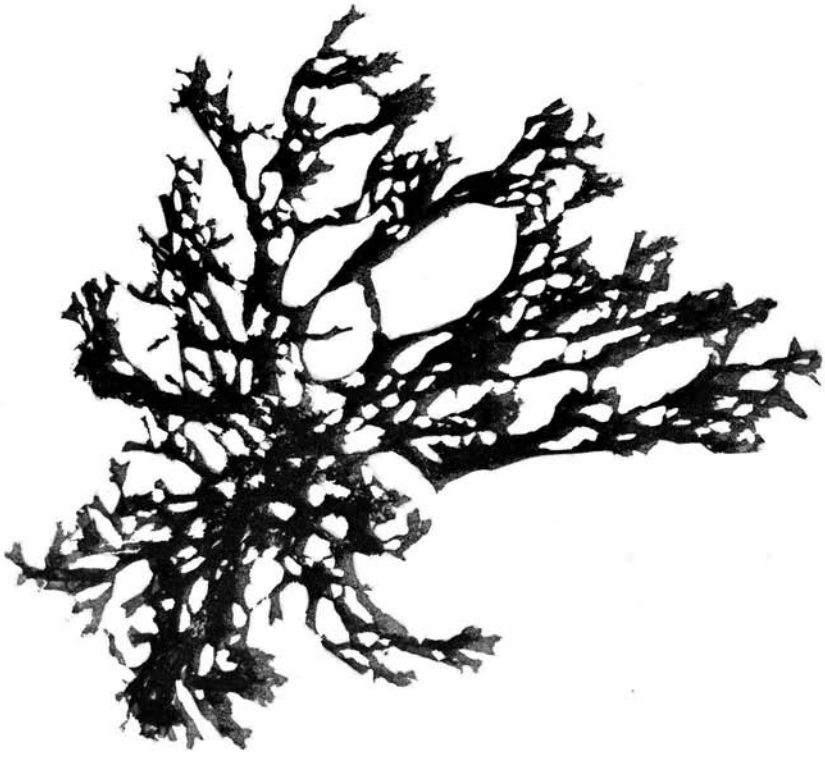
Order Dictyotales
Family Dictyotaceae

**Dictyopteris jamaicencis* W.R. Taylor

Description: Plant is 9-cm tall, with naked and stalk-like lower axis, and attached to substrate by a discoid holdfast. Blades are strap-shaped and 6-12-mm wide at the point of dichotomy. Frond branches subdichotomously to alternately ending in blunt apex. Margin is entire. Midrib is prominent from base but vanishing towards apex. Hairs and tetrasporangia are arranged in two rows parallel to midrib.

Habitat: Hard substrate in shallow waters.

Collection site: Buenavista, Guimaras.



1 cm

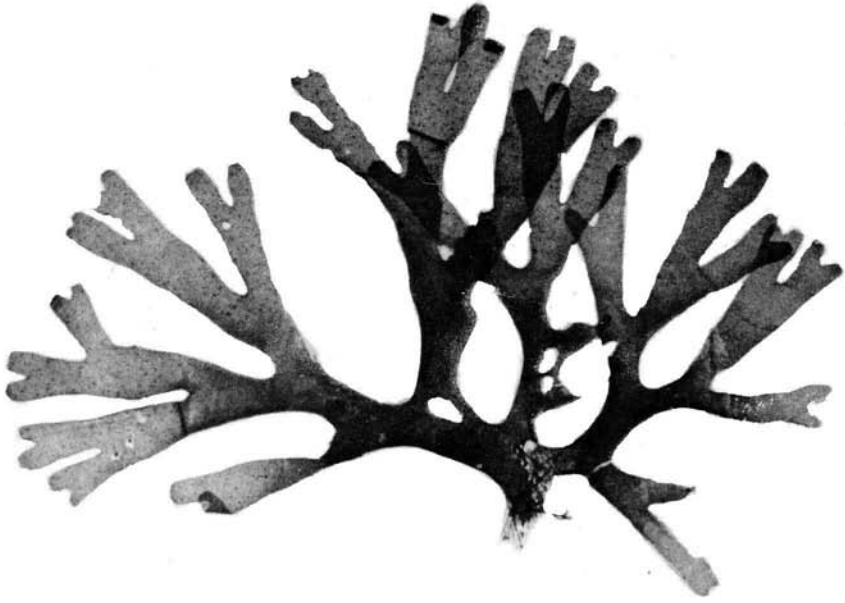
**Dictyota dentata* Lamouroux

Description: Plant is erect, 10-15-cm tall, and brown. Blade is flat; strap-shape branching is repeated in an alternate-dichotomous manner. Blade margin is entire.

Habitat: Tidepools and other shallow subtidal habitats.

Economic importance: Source of algin.

Collection site: Estancia, Iloilo; Boracay Is., Aklan; Nogas Is., Antique.



1 cm

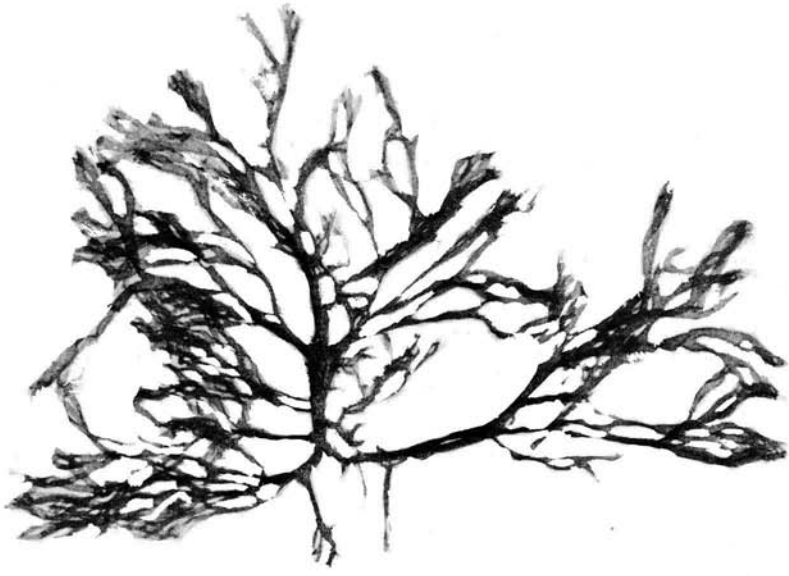
Dictyota dichotoma (Hudson) Lamouroux

Description: Plant is 10-12-cm tall, erect, bushy, and light to dark brown. Branching is regularly dichotomous. Branches are flat (4-15-mm wide) with rounded and entire tips.

Habitat: Attached to rocky substrates in shallow areas exposed to moderate currents.

Economic importance: Source of algin.

Collection site: Estancia, Iloilo; Tangalan, Aklan.



1 cm

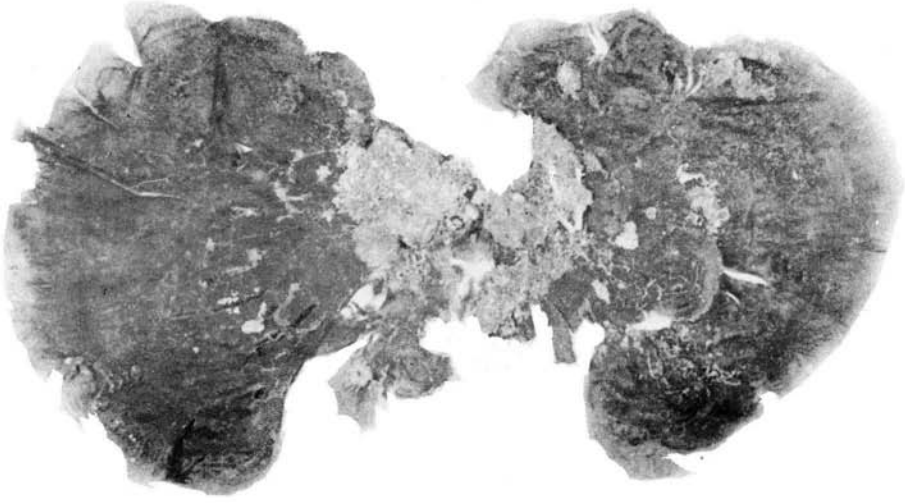
Dictyota divaricata Lamouroux

Description: Plant is erect, 50-60-cm tall, flat, and yellow brown to dark brown. Blade consists of flat, narrow, and broad segments. Branches are spreading in a regular dichotomous manner. Mature specimens have fine rhizoids.

Habitat: Rocky substrates in shallow reef flats.

Economic importance: Source of algin.

Collection site: Ajuy, Concepcion, and Guimbal, Iloilo; Tangalan, Aklan; Pandan, Antique.



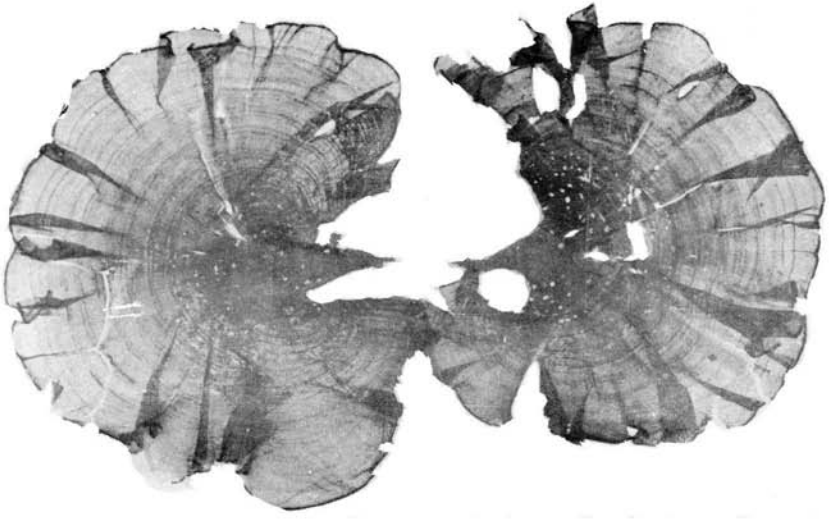
1 cm

Lobophora variegata (Lamouroux) Womersley

Description: Blade is thin, flattened, 1.5-4.5 cm x 1.0-7.0 cm, and orange to dark brown. Blade has a medulla composed of a layer of large cuboidal cells and 4-10 layers of sub-cortical and cortical cells.

Habitat: Attached to rocks or dead corals in lower intertidal habitats or reef flats.

Collection site: Ivisan, Capiz; Nogas Is., Antique.



1 cm

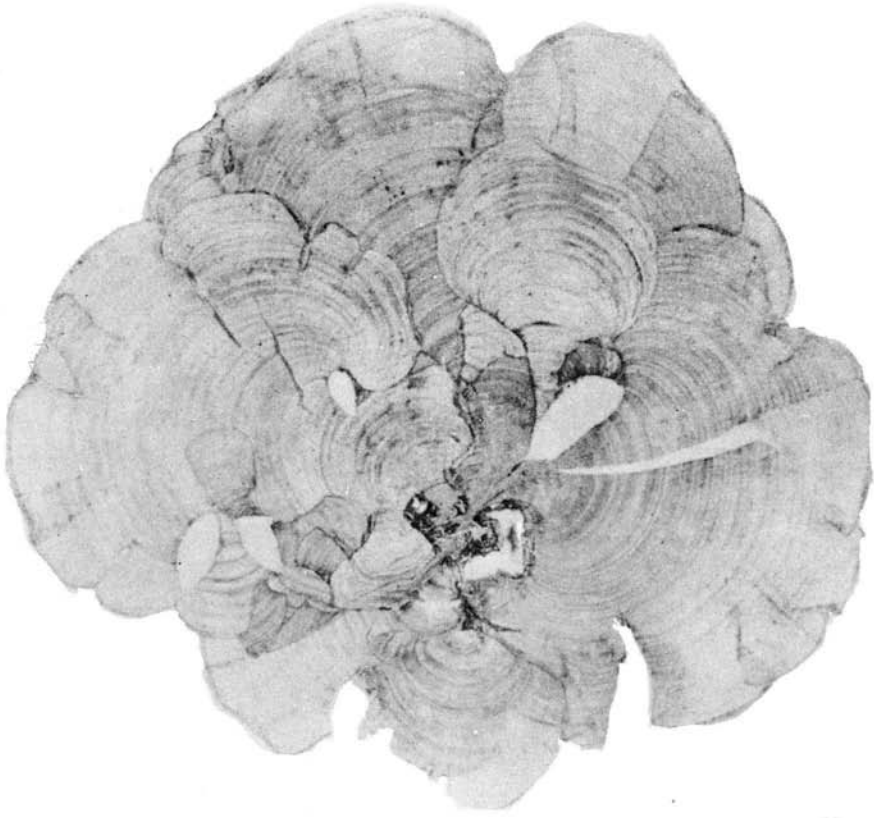
Padina australis Hauck

Common name: Lap-lapayag (Iloku).

Description: Plant is up to 12-cm tall, large, light brown, slightly calcified and with flattened blade. Flat blade is alternately divided by distinct hairlines into wide and narrow glabrous zones; the latter in the lower portion of blade bear the non-indusiate sori.

Habitat: Deep tidepools and reef flats.

Collection site: Ajuy and Concepcion, Iloilo; Boracay Is. and Tangalan, Aklan; Nogas Is. and Pandan, Antique.



1 *cm*

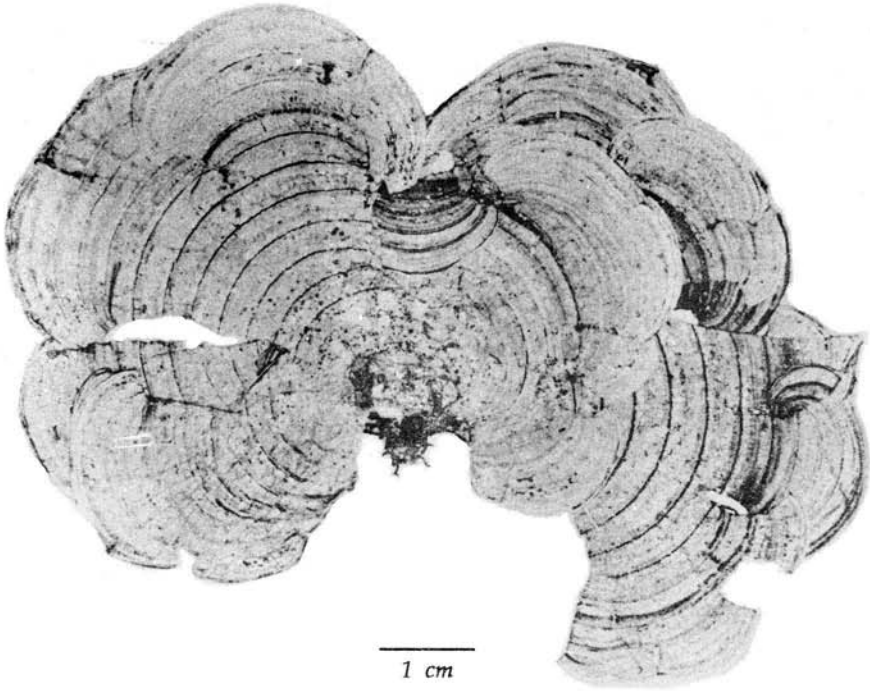
Padina japonica Yamada

Common name: Lap-lapayag (Iloku).

Description: Blade is small, thin, yellowish brown, and heavily calcified on the upper portion. Stipe is slender (up to 2.1 x 3.3 mm) and short. Concentric hairlines are distinct which divide blade into wide and narrow glabrous zones.

Habitat: Shallow tidepools and reef flats.

Collection site: Guimbal, Iloilo; Tangalan, Aklan; Nogas Is., Antique.



Padina minor Yamada

Common name: Lap-lapayag (Iloku).

Description: Plant is 5-8-cm tall and yellowish brown or light brown. Concentric hairlines on upper portion of blade are not well developed while lower portion of blade consists of concentric zones equidistant from each other.

Habitat: Rocky substrate in inner reef flats.

Economic importance: Good source of algin; fertilizer; fodder.

Collection site: Ajuy, Concepcion, Estancia, and Guimbal, Iloilo; Tangalan, Aklan; Nogas Is. and Pandan, Antique.

Order Scytosiphonales
Family Scytosiphonaceae

1 cm

Colpomenia sinuosa (Mertens ex Roth) Derbes & Solier

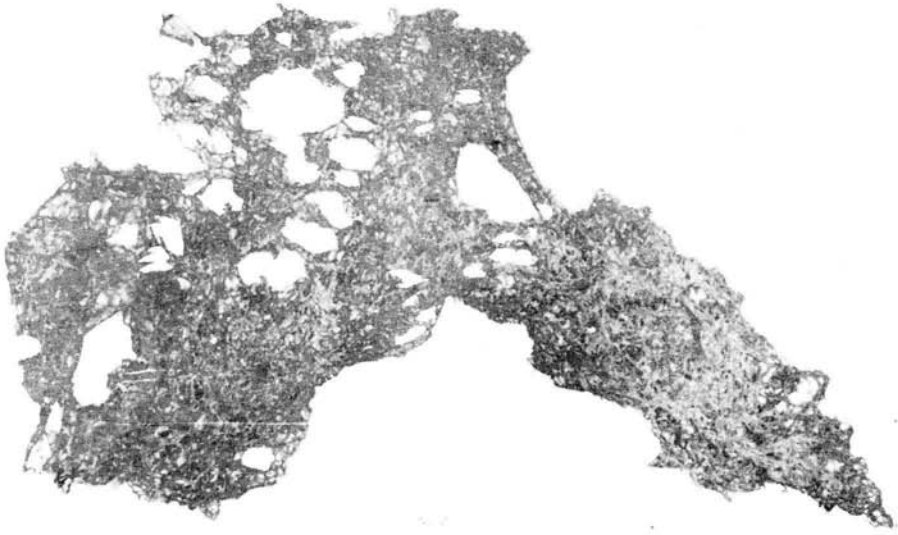
Common name: Lap-lapayag (Iloku).

Description: Plant appears like a sac, has a smooth surface, usually solitary, golden brown, and attached by rhizoidal holdfast.

Habitat: Shallow areas, tidepools, and reef flats.

Economic importance: Source of algin.

Collection site: Concepcion, Iloilo; Ivisan, Capiz; Boracay Is. and Tangalan, Aklan.



1 cm

Hydroclathrus clathratus (C. Agardh) Howe

Common name: Bal-balulang (Iloku).

Description: Plant is reticulate forming thick clumps, light brown, with distinct network of coarse perforations, and 1.0-4.5 mm dia. Uniseriate hairs are abundant and arise from ill-defined depression in outer surface. Thallus consists of cortical cells (3.0-µm thick) and medulla of large parenchymatous cells. Plant occurs only during dry season.

Habitat: Shallow reef flats.

Collection site: Concepcion, Iloilo; Tangalan, Aklan; Nogas Is.,and Pandan, Antique.

1 cm

Hydroclathrus tenuis Tseng & Lu

Common name: Sap-sapuyot (Iloku).

Description: Plant is convoluted, golden brown, and very fine. Perforations range 0.5 -2.5 mm dia. Margin is in-rolled. Thallus shows a layer of cortical cells (10-20-mm thick) and large parenchymatous medulla. Plant occurs only during dry season.

Habitat: Rocky substratum in semi-protected areas.

Economic importance: Human food.

Collection site: Pandan, Antique.

Order Fucales

Family Cystoseiraceae

Hormophysa cuneiformis (J. F. Gmelin) P. C. Silva

Description: Plant is up to 19.2-cm tall and attached to substrate by discoid holdfast. Branches are composed of leaf-like, flat, or triquetrus segments with serrate or dentate outer margin. Branches generally have an oblong to elliptical vesicles at the center.

Habitat: Rocky substratum exposed to strong water movement.

Collection site: Concepcion, Iloilo; Tangalan, Aklan.

Family Sargassaceae

1 *cm*

**Sargassum crassifolium* J. Agardh

Common name: Aragan (Iloku); kulapu (Hiligaynon).

Description: Plant is up to 31.5-cm tall and attached to substrate by a discoid holdfast. Short primary stipe gives rise to branches in an irregular alternate arrangement. Blades are elliptical with coarsely dentated margin; prominent midrib vanishes towards apex. Scattered cryptostomata are present in leaves and spherical vesicles.

Habitat: Upper intertidal zone exposed to strong water movement.

Economic importance: Source of algin; fertilizer; fodder.

Collection site: Nogas Is., Antique; Tangalan, Aklan.

Sargassum cristaefolium C. Agardh

Common name: Aragan (Iloku); kulapu (Hiligaynon).

Description: Plant appearance varies as it matures. Young plant has longer and broader oblong blades; blade is slightly tapered below with finely serrated margin. Mature plant has fewer and smaller blades (8-17-mm long, 1.7-4.1-mm wide); blade is lanceolate or oblong with tapered bases but with rounded, obtuse, or acute apices provided with coarsely serrated to dentated outer margins. Midrib is distinct only up to a short distance from the tip. Cryptostomata are scattered on surface. Ovate or spherical vesicles (1.5-3-mm wide) which have short stalks may grow singly or in clusters to be primary or secondary branches. Mature plants have denser and smaller vesicles.

Habitat: Strongly attached to rocky substrates in semi-exposed portion of reef.

Economic importance: Source of algin; fodder; fertilizer.

Collection site: Boracay Is. and Tangalan, Aklan; Buenavista, Guimaras.

Sargassum oligocystum Montagne

Common name: Aragan (Iloku); kulapu (Hiligaynon).

Description: Plant is up to 60-cm tall, with short stipe giving rise to four flattened primary branches (up to 2.6 mm dia.). Lanceolate and bigger leaves with toothed margin are found in basal portion while smaller leaves are in the upper part. Midrib is prominent and vanishing towards apex with cryptostomata arranged along midrib. Vesicle with cryptostomata which has a flat stalk petiole (1.3 mm dia.) is ellipsoidal to spherical, solitary, or in clusters.

Habitat: Rocky substratum exposed to strong water movement.

Economic importance: Source of algin; fertilizer; fodder.

Collection site: Estancia, Iloilo; Tangalan, Aklan; Nogas Is., Antique; Buenavista, Guimaras.

1 cm

Sargassum polycystum C. Agardh

Common name: Aragan (Iloku); kulapu (Hiligaynon).

Description: Branching holdfasts of this plant with a short erect stipe give rise to 8 primary branches. Basal portion of branches is naked while upper portion of main and secondary branches has numerous Y-shaped proliferations. Leaves are oblanceolate with dentated margin; prominent midrib is vanishing towards apex. Cryptostomata are scattered. Vesicles are found in secondary or tertiary branches, solitary or in clusters, and elliptical to spherical with few cryptostomata.

Habitat: Inner reef area with coarse sandy-coralline and rocky substrates not exposed to strong water movement.

Economic importance: Human food; source of algin and auxin-like substance; fodder; controls heavy metal pollution (Pb, Cd); fertilizer; source of methane.

Collection site: Nogas Is., Antique.

Sargassum siliquosum J. Agardh

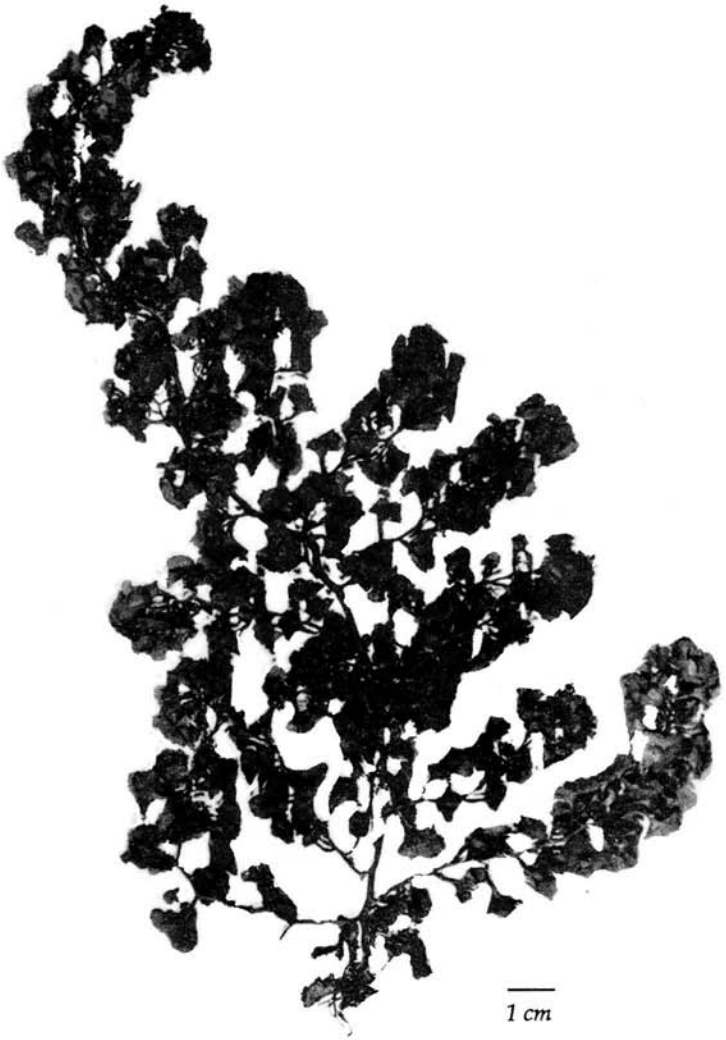
Common name: Aragan (Iloku); kulapu (Hiligaynon).

Description: Fertile plant is up to 45-cm tall. Cylindrical male receptacles (up to 12.4 x 1.3 mm) arise from the short stalk of spherical vesicle and are sometimes forked or branched at apices. Unlike *S. polycystum*, this species has discoid holdfast. Branching is irregularly alternate with terete branches.

Habitat: Protected reef; strongly attached to rocky substrates.

Economic importance: Human food; fertilizer.

Collection site: Concepcion and Estancia, Iloilo; Nogas Is., Antique; Buenavista, Guimaras.



**Turbinaria conoides* (J. Agardh) Kutzing

Description: Plant is erect, 15-26-cm tall, dark brown, and attached by coarse branched holdfast to coral rock. Branching is irregular. Leaves, 5-11-mm long and triangular, are turbinate and outlined by coarse marginal teeth.

Habitat: Subtidal areas where water movement is not strong.

Economic importance: Human food; source of algin and minerals (Ca, K, Mg, Na, Cu, Fe, Zn); fertilizer.

Collection site: Ajuy, Concepcion, and Estancia, Iloilo; Tangalan, Aklan; Pandan, Antique; Buenavista, Guimaras.

1 cm

Turbinaria ornata (Turner) J. Agardh

Description: Plant is 3.5-3.9-cm tall, erect, tough, dark brown, and firmly attached to rocks by a well developed branching holdfast. Leaves are coarse, turbinate, fleshy, and crowd along erect axis. Center top of blade is concave and partially or fully surrounded by a crown of teeth. A single vesicle may be found at depressed center usually among leaves at upper portion of thallus.

Habitat: Rocky intertidal coastlines, tidepools, reef flats, and crests.

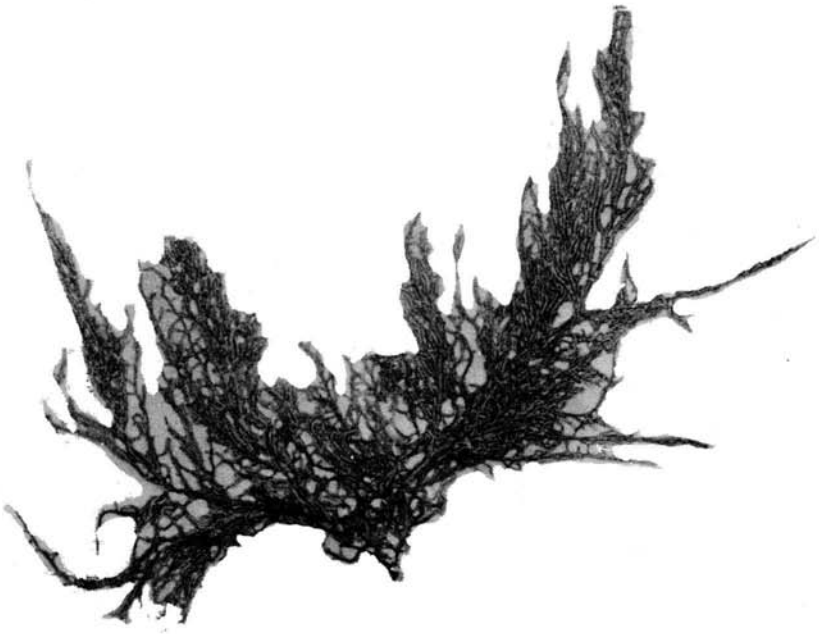
Economic importance: Human food; source of algin.

Collection site: Nogas Is., Antique; Buenavista, Guimaras.

CLASS RHODOPHYCEAE

Order Nemaliales

Family Nemaliaceae



1 cm

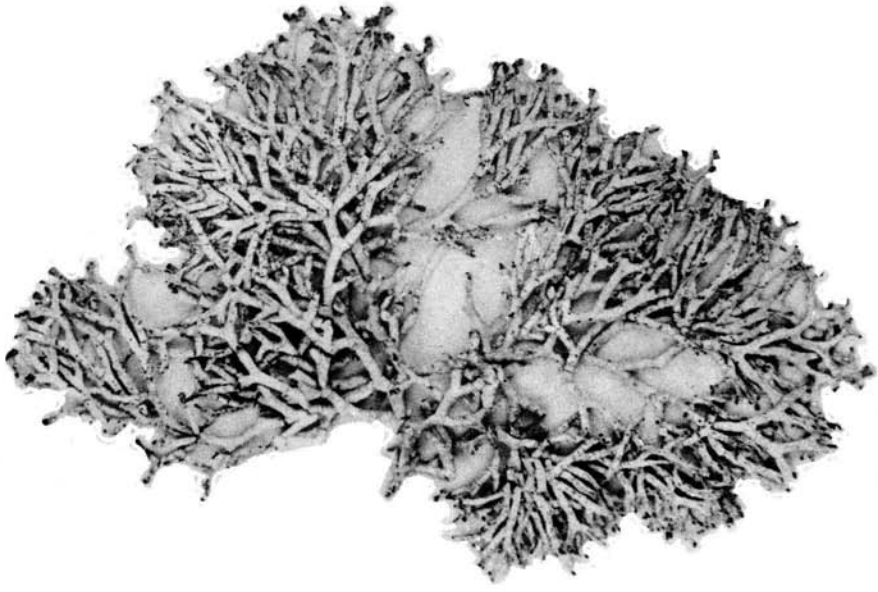
***Trichogloea requienii** (Montagne) Kuetzing

Description: Plant is 10.5-cm tall, dull red, gelatinous, soft, lightly calcified, and attached to a hard substrate by a small discoid holdfast. Short stem (3-mm long) gives rise to several branches; simple, filiform, or cylindrical branchlets end bluntly.

Habitat: Rocky substrates or tide pools in intertidal zone.

Collection site: Buenavista, Guimaras.

Family Dermonemataceae



1 cm

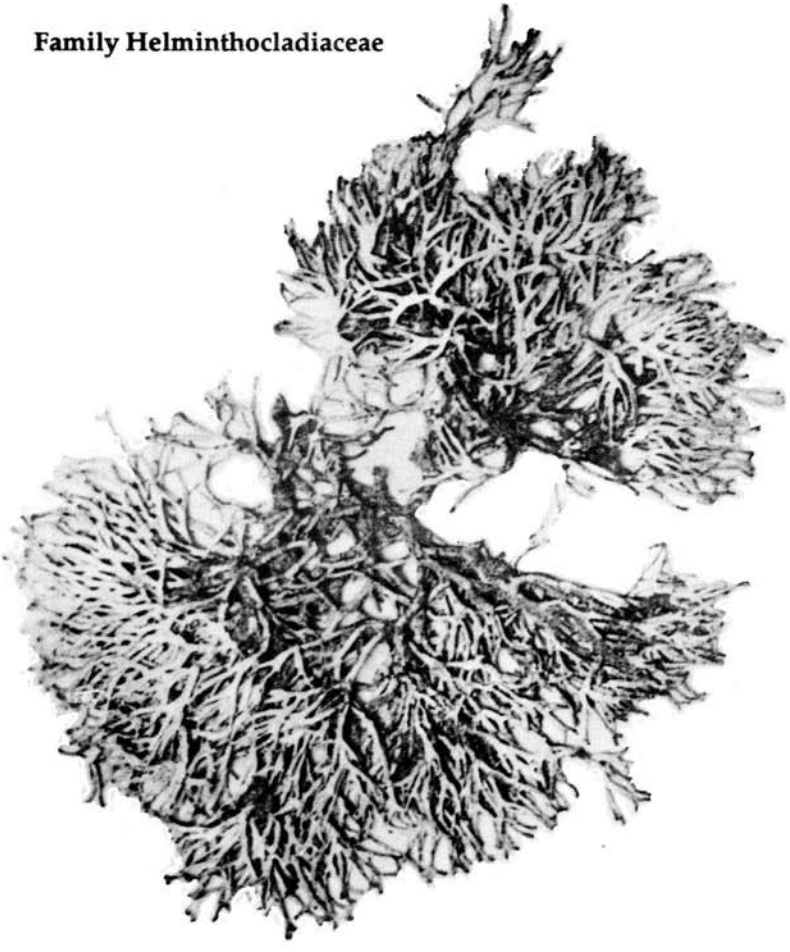
**Yamadaella caenomyce* (Decaisne) Abbott

Description: Plant is up to 9-cm tall, slightly calcified, and arise from a short stipe. Branching is dichotomous. Branches are cylindrical, ending in rounded bifurcate tips. Assimilatory filaments consist of slightly moniliform cells with segmented, simple, or forked apices.

Habitat: Rocky substrate in the intertidal zone.

Collection site: Nogas Is., Antique.

Family Helminthocladiaceae



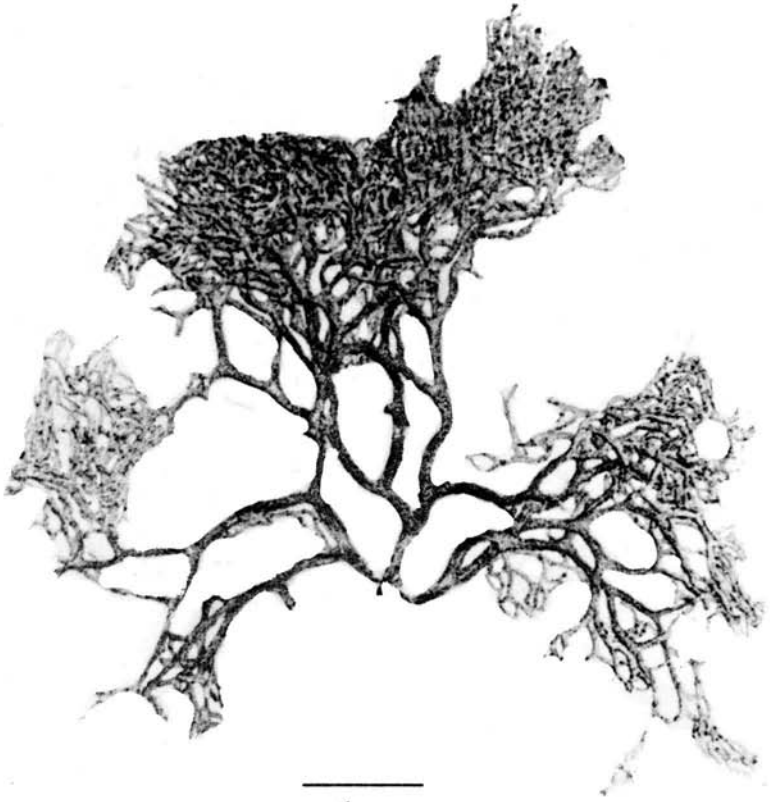
1 cm

Liagora ceranoides Lamouroux

Description: Plant is up to 7-cm tall, clumpy, and slimy but moderately calcified when dried. Medullary filaments are cylindrical and colorless. Basal cells of assimilatory filaments are subcylindrical and pigmented while distal cells are subglobular to ovate. Uppermost assimilatory cells bear cylindrical filaments.

Habitat: Rocky to coral substrates in intertidal zone.

Collection site: Pandan, Antique.



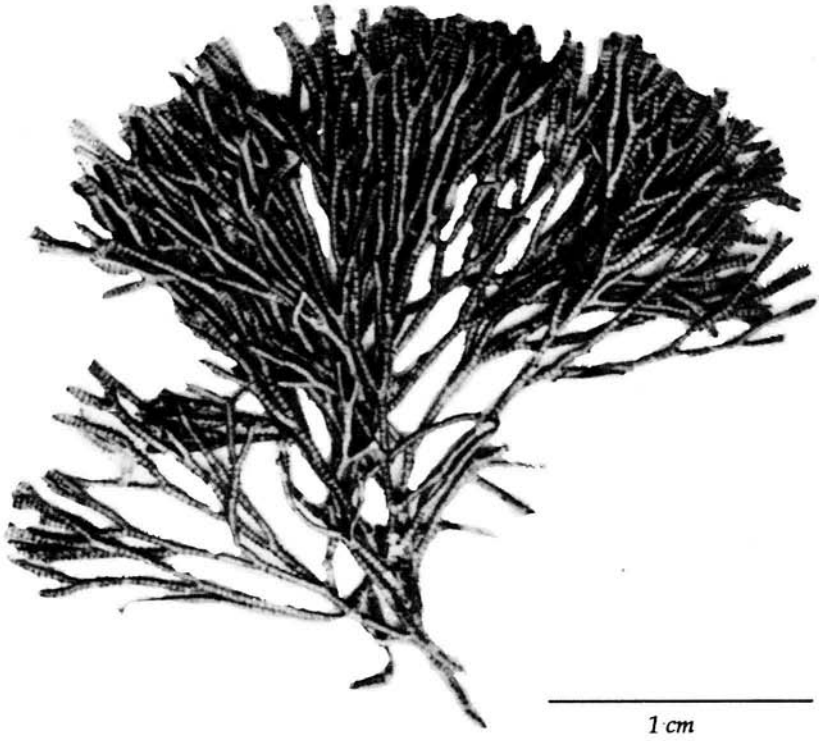
Liagora divaricata Tseng

Description: Plant is up to 4-cm tall, pinkish, and slightly calcified. Branching is 3-4-chotomously. Cells of assimilatory filaments in base are subcylindrical while in distal portion, ovate. Pigmented assimilatory filaments are present.

Habitat: Rocky substratum in tide pools.

Collection site: Pandan, Antique.

Order Bonnemaisoniales
Family Galaxauraceae

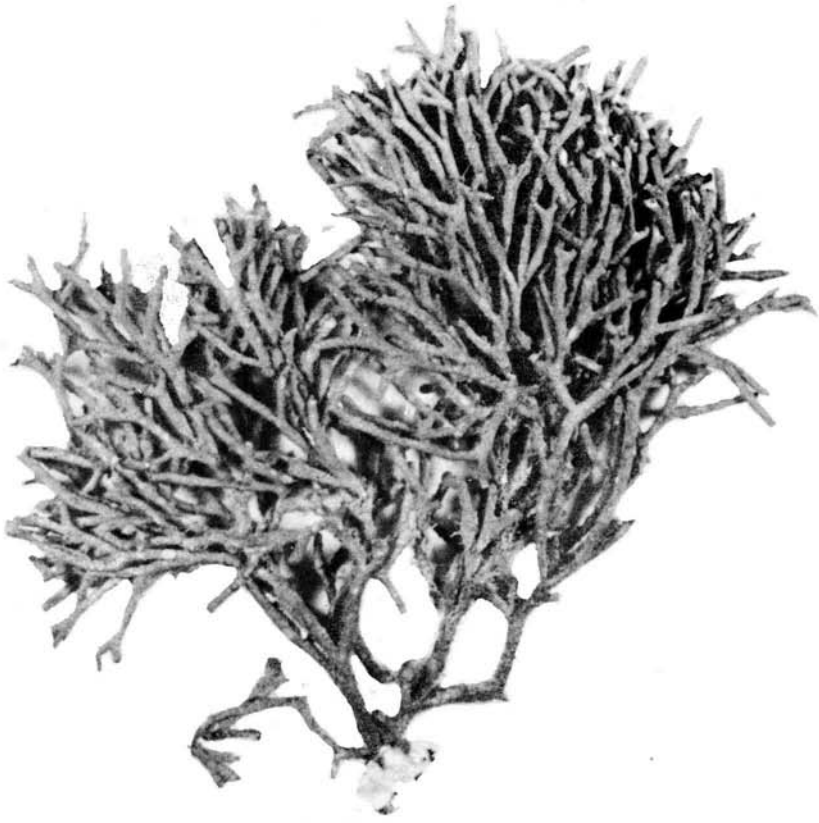


Actinotrichia fragilis (Forsskal) Borgesen

Description: Plant is up to 3-cm tall and red to orange. Branching is regular and repeatedly dichotomous. Branches are cylindrical with terminal branched-segments ending truncately or bluntly. Branches bear whorled assimilatory filaments.

Habitat: Rocky-sandy substratum exposed to moderate water movement.

Collection site: Pandan, Antique; Ajuy, Iloilo.



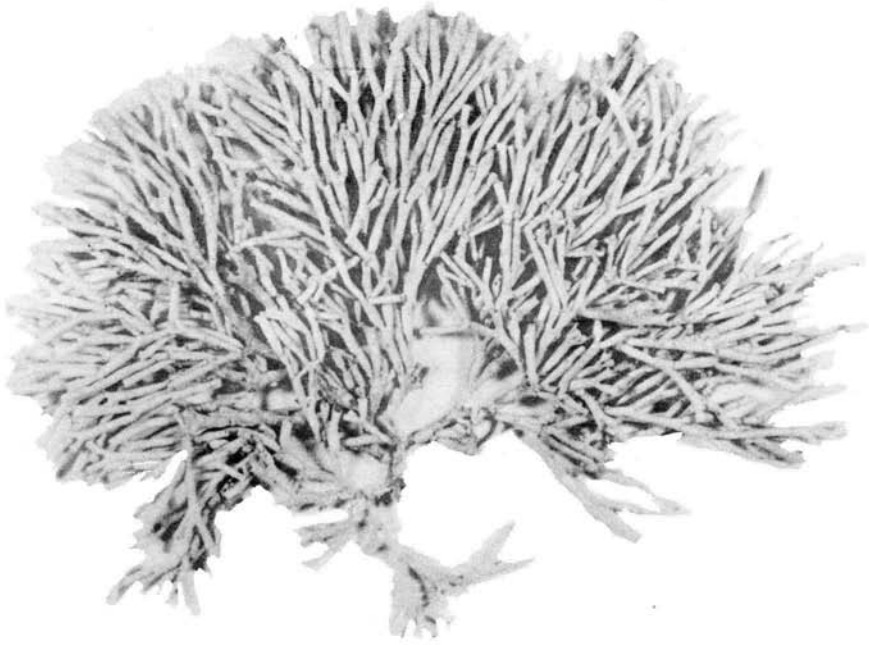
1 cm

Galaxaura fasciculata Kjellman

Description: Plant is up to 11.5-cm tall and attached to substrate by a discoid holdfast. Branching is dichotomous. Branches possess numerous soft and long hairs or extended assimilatory filaments.

Habitat: Rocky substrate on tide pools.

Collection site: Tangalan and Boracay Is., Aklan; Nogas Is., Antique; Ajuy, Iloilo.



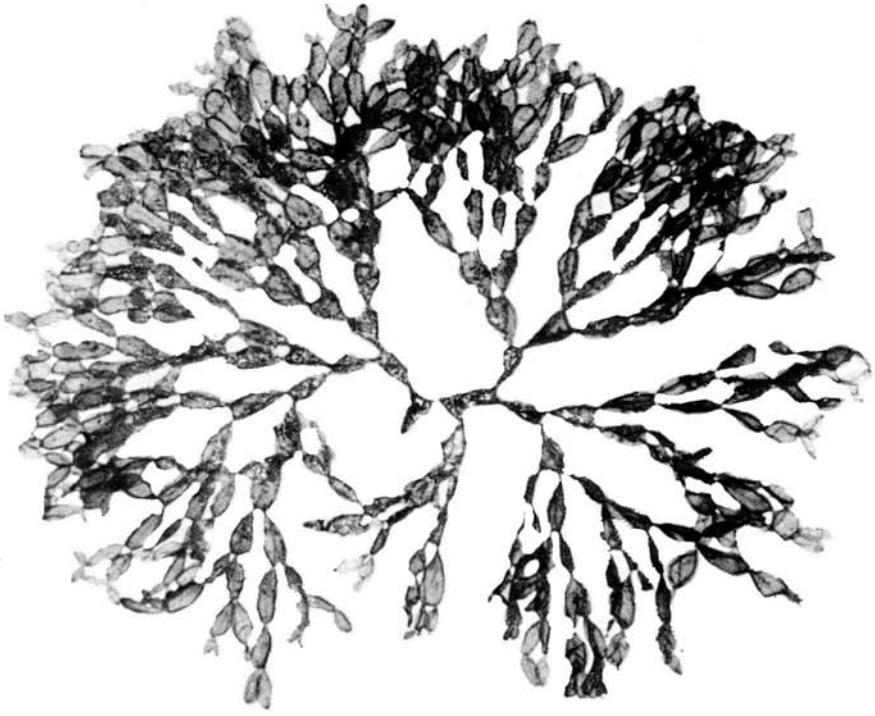
1 cm

Galaxaura oblongata (Ellis & Solander) Lamouroux

Description: Plant is up to 10-cm tall, pinkish, and arises from a short stipe. Branching is regularly dichotomous giving rise to a corymbose shape. Branches are cylindrical and slightly rugose. Interdichotomal segments are cylindrical and slightly constricted at both ends.

Habitat: Rocky substrate in tide pools, crevices, and reef margins exposed to strong waves.

Collection site: Tangalan and Boracay Is., Aklan; Nogas Is. and Pandan, Antique.



1 cm

**Scinaia moniliformis* J. Agardh

Common name: Gar-garnatis (Iloku).

Description: Plant is up to 6.5-cm tall, pink to dark red, and attached by small discoid holdfast. Branches are moniliform consisting of obovate segments usually ending in bifurcate tips. Segments contain slimy fluid.

Habitat: Sandy rock substratum in habitats of moderate wave action.

Economic importance: Human food.

Collection site: Boracay Is., Aklan.

Order Gelidiales
Family Gelidiaceae

Gelidiella acerosa (Forsskal) Feldmann & Hamel

Common name: Gulaman bato (Hiligaynon); kulot (Iloku).

Description: Plant is brownish to greenish. Creeping stolons form mats on hard substrates. Usually associated with other algae like *Gracilaria coronopifolia, Mastophora rosea, Sargassum,* and *Laurencia.* Branches are pinnately arranged, erect, and decumbent with terete to compressed central axis. Branchlets are upcurved and generally decreasing in length towards apex.

Habitat: Rocky substrates exposed to moderate to strong waves.

Economic importance: Human food; agar source.

Collection site: Tangalan, Aklan; Ajuy, Concepcion, and Estancia, Iloilo; Ivisan, Capiz; Nogas, Antique; Buenavista, Guimaras.

Order Cryptonemiales

Family Cryptonemiaceae

1 cm

**Carpopeltis crispata* Okamura

Common name: Lap-lapayag (Iloku).

Description: Plant is small (up to 1.5-cm tall) and attached to rocky substratum by a small hapter. Fronds are flabellate. Branches are flat, semi-cartilaginous, and dichotomous which end in a blunt apex.

Habitat: Rocky substrate.

Economic importance: Human food.

Collection site: Boracay Is., Aklan.

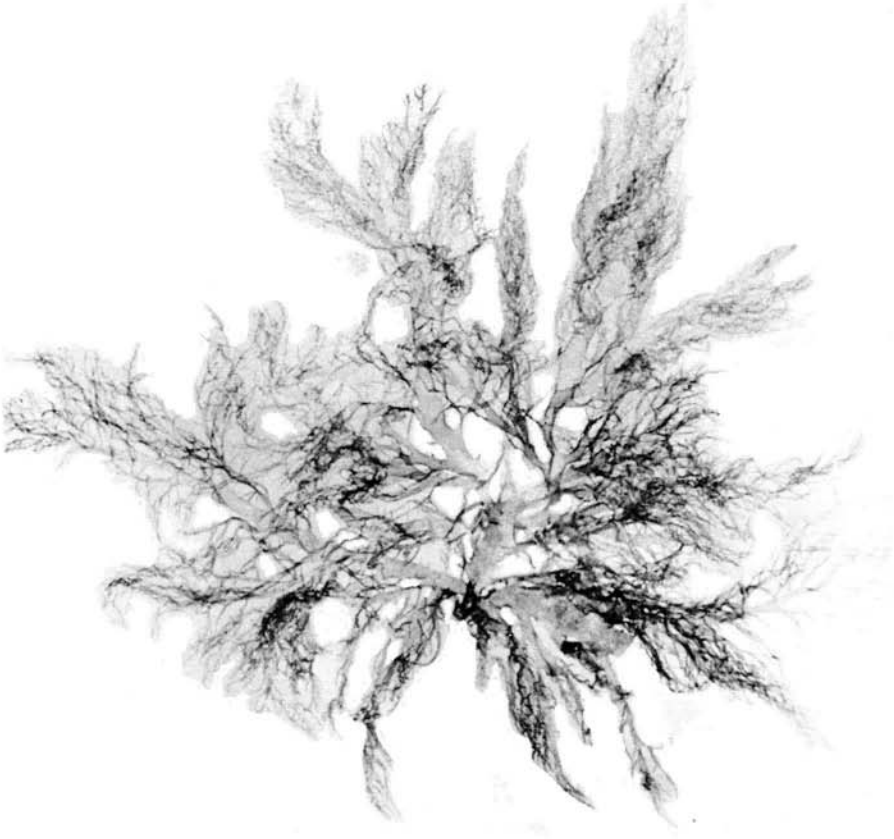
1 cm

Halymenia dilatata Zanardini

Description: Plant is up to 13 cm, yellowish to purplish, gelatino-membranous, arise from a very short stipe, and attached to substrate by a discoid holdfast. Blade is suborbicular to broadly oblong, undulato-curled, and with simple or lobed margin.

Habitat: Subtidal areas exposed to moderate to strong waves.

Collection site: Estancia, Iloilo; Tangalan and Boracay Is., Aklan.



1 cm

Halymenia durvillaei Bory de Saint-Vincent

Common name: Gayong-gayong (Iloku).

Description: Plant is purplish, soft-cartilaginous, slimy when fresh, shortly stipitate, and attached to substrate by a discoid holdfast. Branches are flattened, compressed, and alternately-pinnately arranged with simple or branched proliferous outgrowths on surface of frond.

Habitat: Deeper subtidal area.

Economic importance: Human food.

Collection site: Concepcion and Estancia, Iloilo; Ivisan, Capiz; Tangalan and Boracay Is., Aklan.

Order Corallinales
Family Corallinaceae

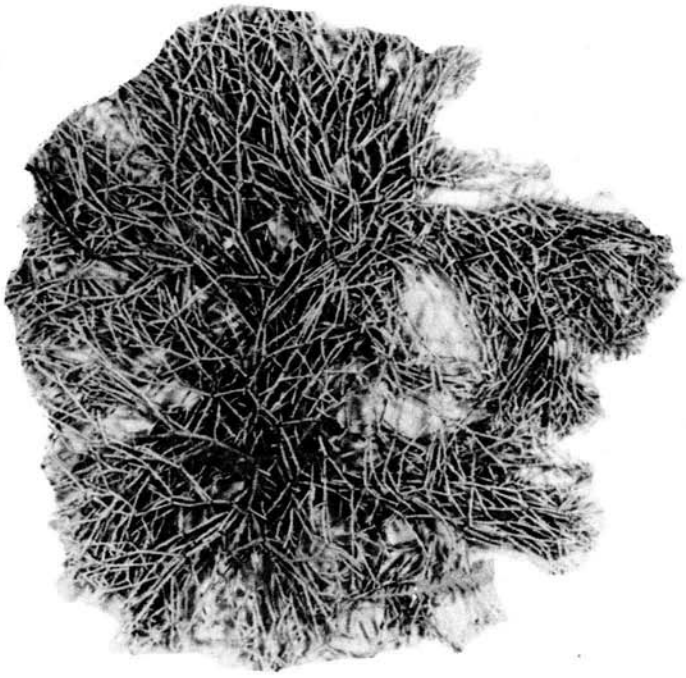
1 cm

**Amphiroa dimorpha* Lemoine

Description: Plant is up to 4.5-cm tall, pinkish, and highly calcified. Branching is dichotomous. Branches consist of slightly compressed and cuneate segments. Genicula are found above dichotomies. Presence of conspicuous elevated conceptacles characterizes this species. Plants are associated with *Actinotrichia fragilis, Gelidiella acerosa, Mastophora rosea, Galaxaura oblongata,* and other *Amphiroa* species.

Habitat: Rocky substratum or dead corals in subtidal areas.

Collection site: Boracay Is. and Tangalan, Aklan; Ajuy and Estancia, Iloilo.



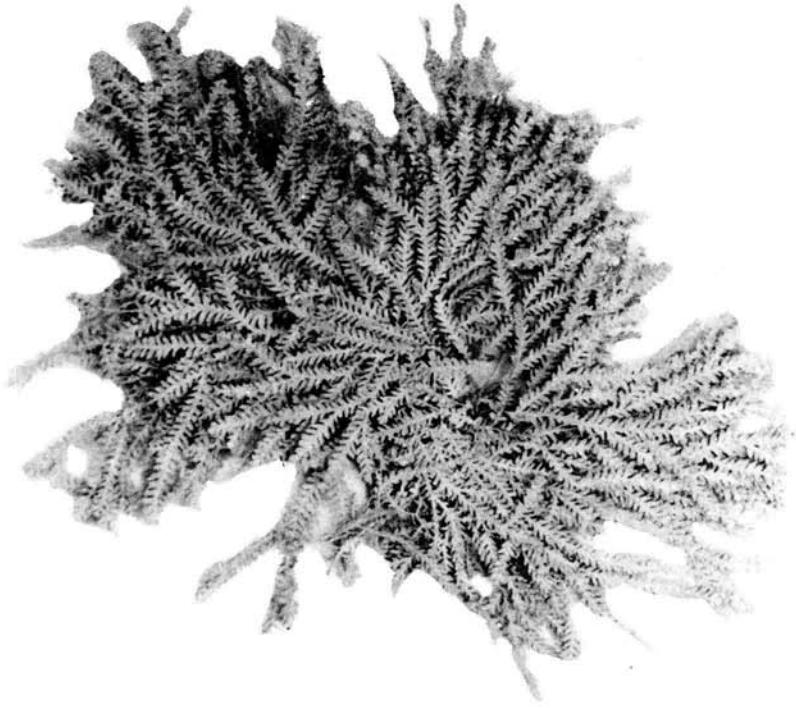
1 cm

Amphiroa fragilissima (Linnaeus) Lamouroux

Description: Plant is up to 8-cm tall, cream to purplish, and consists of heavily calcified branches. Branching is dichotomous to trichotomous with cylindrical segments (0.4 mm dia.). Intergenicula are found at dichotomies. Laterally disposed dome-shaped conceptacles with an ostiole are present. This species is the most widely distributed among *Amphiroa*.

Habitat: Shallow protected tidepools.

Collection site: Ajuy, Concepcion, and Estancia, Iloilo; Ivisan, Capiz; Tangalan and Boracay Is., Aklan; Nogas Is. and Pandan, Antique.



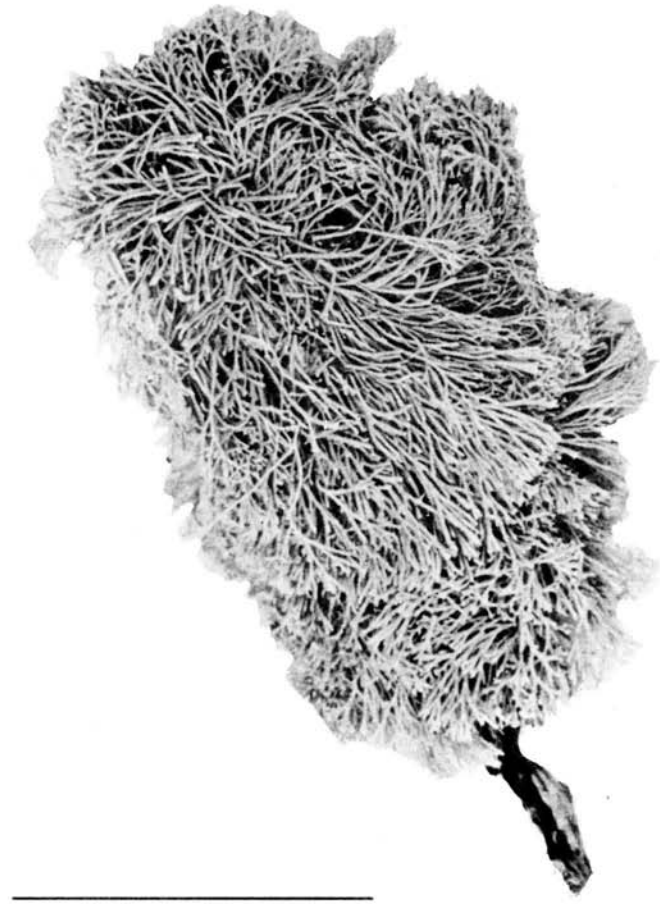
1 cm

Cheilosporum cultratum (Harvey) J. E. Areshcoug

Description: Plant forms decumbent branches di-trichotomously. Branches are heavily calcified and compressed to flattened with a prominent midrib. A striking characteristic of this species is the pointed lateral wings of segments which, when fertile, bear 1-2 slightly elevated and obovoid to ovoid conceptacles on upper-distal portion.

Habitat: Rocky subtidal areas exposed to strong waves.

Collection site: Tangalan, Aklan.



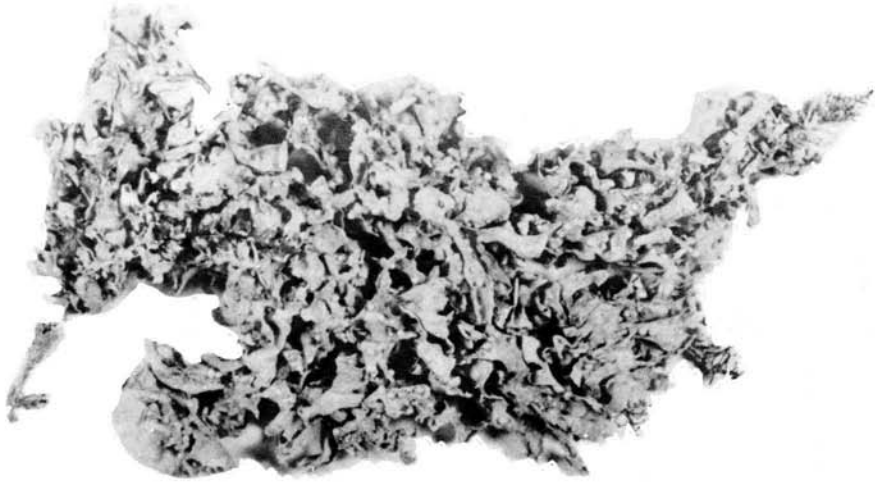
1 cm

**Jania decussato-dichotoma* (Yendo) Yendo

Description: Plant is small (up to 1.5-cm tall), pinkish to whitish, and usually epiphytic on larger algae like *Sargassum, Galaxaura* and *Laurencia*. Branching is irregularly divaricate-dichotomous-decussate. Branches are cylindrical to compressed. Terminal segments are short, bifurcate, and tapering.

Habitat: Epiphytic on larger algae.

Collection site: Concepcion, Iloilo; Tangalan, Aklan; Ivisan, Capiz.



1 cm

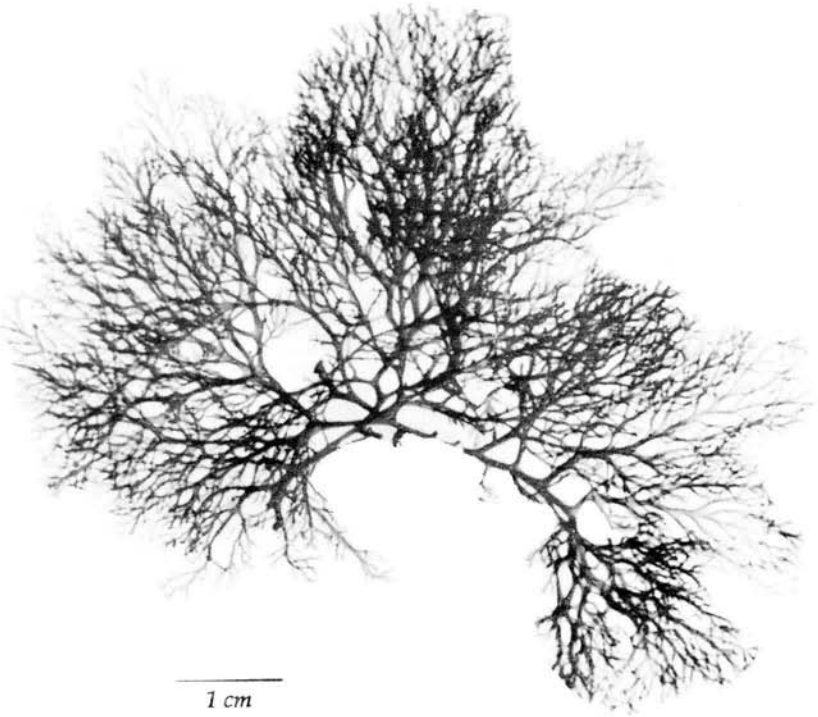
Mastophora rosea (C. Agardh) Setchell

Description: Plant is purplish, creeping or prostrate, and attached to substrate by rhizoids. Branching is irregularly dichotomous. Branches are thin, flattened, and slightly calcified under the surface. Distal branches have rounded apices with semi-circular or in-rolled margins. If fertile, dome-shaped conceptacles with an ostiole are present.

Habitat: Rocky substratum; associated with other algae like *Gracilaria coronopifolia, G. eucheumoides, Amphiroa,* and *Sargassum* in habitats exposed to strong waves.

Collection site: Tangalan, Aklan; Nogas Is., Antique; Buenavista, Guimaras.

Order Gigartinales
Family Rhizophyllidaceae



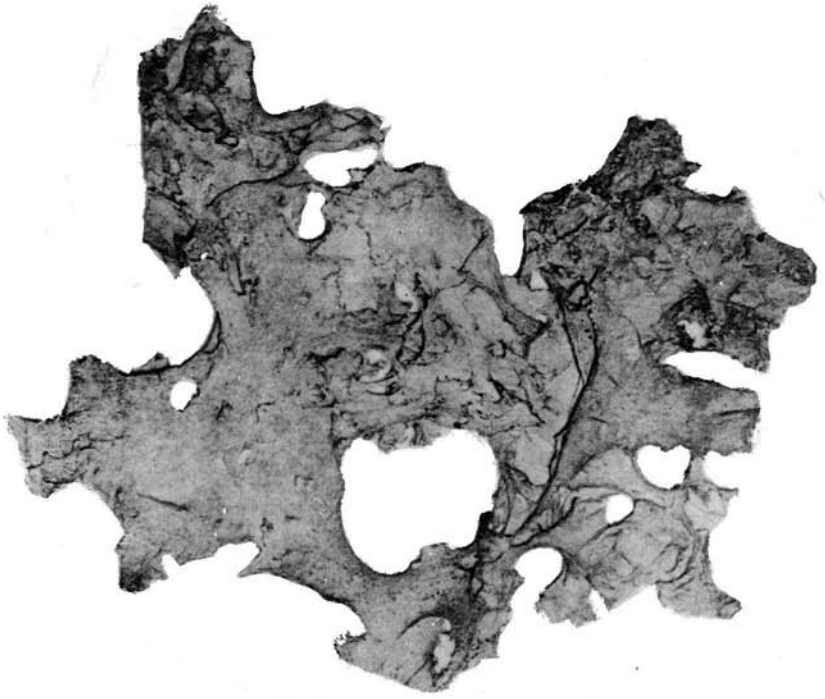
Portieria hornemannii (Lyngbye) P. C. Silva

Description: Plant is up to 10-cm tall, erect, and bright orange to red. Overlapping flattened branches arise from a small discoid holdfast. Branching is irregularly pinnate-alternate. Plant is slightly gelatinous when fresh and adheres to paper when dried. In-rolled tips of ultimate branches are distinctive of this species.

Habitat: Rocky substrates, crevices, and dead corals in subtidal areas exposed to strong waves.

Collection site: Nogas Is., Antique; Ivisan, Capiz; Tangalan, Aklan; Buenavista, Guimaras.

Family Nemastomataceae



1 cm

Titanophora weberae Borgesen

Description: Plant is up to 17-cm tall, dull red to pink, slightly calcified, and mucilaginous when fresh. Broad lobed flabellate frond with dentate margin arising from a small disc-shaped holdfast characterizes this species.

Habitat: Rocky substrate in subtidal areas exposed to strong waves.

Collection site: Boracay Is., Aklan; Pandan, Antique.

Family Sebdeniaceae

1 cm

**Sebdenia yamadae* Okamura & Segawa

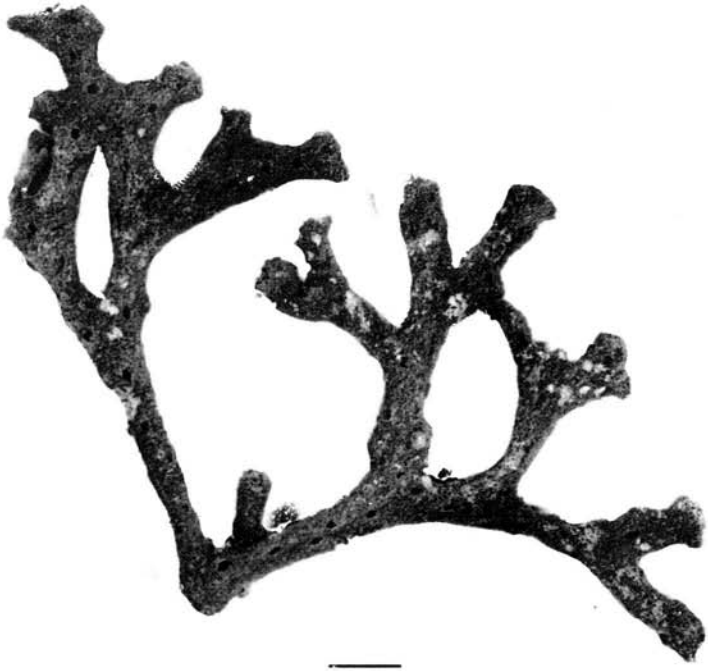
Description: Thin, flat, and flabellate thallus is attached to rocky substratum by a discoid holdfast with short stipe. Frond is uniform or irregular with undulated and lobed margin.

Habitat: Rocky substrates.

Economic importance: Human food.

Collection site: Boracay Is., Aklan.

Family Gracilariaceae



1 cm

Ceratodictyon spongiosum Zanardini

Description: Sponge-like plant is dark green to dark red, hard, and tough. Branching is very irregular and anastomizes at some point. When examined under the microscope (low magnification), sponge-like thallus consists of finely branched "gracilarioid" which are closely intertwined and fused at certain portions. Presence of spicules indicates that algae is a symbiont of sponge.

Habitat: Dead corals.

Collection site: Ajuy and Concepcion, Iloilo; Tangalan, Aklan; Pandan, Antique; Buenavista, Guimaras.

1 cm

Gelidiopsis intricata (C. Agardh) Vickers

Description: Plant is up to 3.7-cm tall, consists of slender filaments, and forms turfs on rocky substratum by rhizoids. Branching is very sparse, forking near the tips. Filaments are terete, tapering apically.

Habitat: Well-protected reefs.

Collection site: Concepcion and Estancia, Iloilo; Boracay Is., Aklan; Buenavista, Guimaras.

1 cm

Gracilaria arcuata Zanardini

Common name: Gulaman (Hiligaynon).

Description: Plant is small, up to 3.5-cm tall, and reddish to purplish. Branching is irregularly pinnate. Fronds are cylindrical and fleshy. Main branches are arcuated with terminal branches in sharp apices.

Habitat: Sandy-coral substrates exposed to moderate water movement.

Economic importance: Human food; source of agar; animal feed; used in water purification; contains growth regulator hormones (auxin, gibberellin, cytokinin).

Collection site: Nogas Is. and Pandan, Antique; Nueva Valencia, Guimaras.

1 cm

Gracilaria blodgettii Harvey

Common name: Gulaman (Hiligaynon).

Description: Terete and tapering branches strongly constricted at the base distinguish this species from other *Gracilaria*. Branching is loose in an irregularly secund to alternate manner.

Habitat: Associated with green algae (*Acetabularia, Halicoryne, Cymopolia, Enteromorpha,* and *Cladophora*) on a sandy-rocky substratum in habitats exposed to moderate water movement.

Economic importance: Human food; agar source; medicine (for stomach disorders, laxative).

Collection site: Guimbal, San Dionisio, and Estancia, Iloilo.

1 cm

Gracilaria coronopifolia J. Agardh

Common name: Kao-kaoayan (Iloku).

Description: Plant is erect, cartilaginous, and greenish brown to dark red or purplish. Divaricate and dichotomous terete branches terminating in bifurcate apices are distinctive of this species.

Habitat: Intertidal zone in close association with *Sargassum, Padina,* and *Acanthophora* in habitats exposed to strong waves.

Economic importance: Human food; agar source; source of fat, protein, vitamin C, and minerals (Ca, K, Mg, Na, Cu, Fe, Zn).

Collection site: Concepcion, San Dionisio, and Estancia, Iloilo; Buenavista and Nueva Valencia, Guimaras.

1 cm

Gracilaria eucheumoides Harvey

Common name: Kanot-kanot (Iloku).

Description: Plant is greenish to purplish, prostrate, and attached to hard substrate by hapters. Branching is irregular with cartilaginous, flattened, and fused branches at certain points. Coarse sharp teeth along margin of branch are distinctive of this species.

Habitat: Closely associated with *Sargassum* in habitats exposed to moderate or strong waves.

Economic importance: Human food; agar source.

Collection site: Ajuy and Estancia, Iloilo; Ivisan, Capiz; Nogas Is., Antique; Buenavista, Guimaras.

1 cm

Gracilaria salicornia (C. Agardh) Dawson

Common name: Susueldot-baybay (Iloku).

Description: Plant is small (up to 3-cm tall) and bright orange (shallower areas) to green (deeper areas). Branching is dichotomous to trichotomous in a divaricate manner. Branches are distinctly divided constrictions (terete and sub-clavate to clavate segments swollen at distal ends).

Habitat: Sandy-coral substrate in association with seagrasses; rocky substrate with other strongly attached algae.

Economic importance: Human food; agar source.

Collection site: Concepcion and Estancia, Iloilo; Tangalan, Aklan; Pandan and Nogas Is., Antique; Buenavista and Nueva Valencia, Guimaras.

***Gracilaria "verrucosa"* (Hudson) Papenfuss**

Common name: Gulaman dagat (Tagalog); gulaman (Hiligaynon, Cebuano, Akeanon).

Description: Plant is tall (grows to 50-70 cm), reddish, erect, loosely branched, and attached to substrate by a small discoid holdfast. Branching is secund to subsecund. Branches are terete (1-2 mm dia.) and tapers gradually towards apex. Basal constriction of branches is a distinctive feature of this species.

Habitat: Sandy-muddy substrate in protected bays (6-7-m deep).

Economic importance: Human food; agar source.

Collection site: Concepcion and Ajuy, Iloilo.

Gracilariopsis heteroclada (Zhang et Xia) Zhang et Xia

Common name: Gulaman (Hiligaynon, Cebuano, Akeanon).

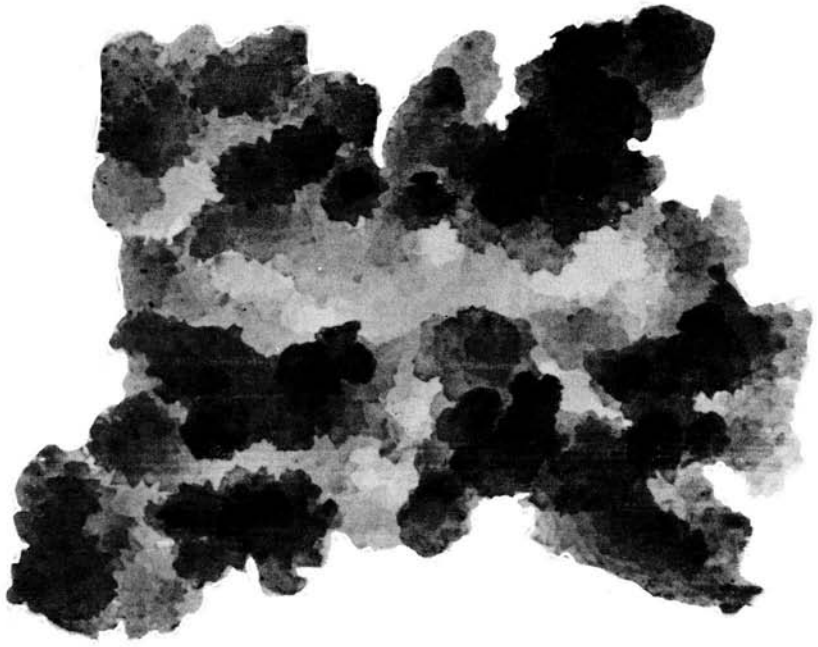
Description: Plant is purple red to dark green (sometimes yellowish during dry season), erect, and solitary or caespitose (arise from a small disc). Branching is irregularly alternate with the 2nd order long and the 3rd order short. Branches are sometimes spinose, unconstricted at the base, tapering gradually towards apex, and are brittle, succulent, and cylindrical. Main axis consists of 2-4 orders of branches. Branch and branchlets are distinguishable. Ovoid to oblong tetrasporangia are scattered on the surface. Cystocarps are prominently protruding, unconstricted at the base, and nonrostrate to slightly rostrate. Cortical layers consist of 2-3 layers of pigmented and roundish to cuboidal cells. Medullary layer consists of several layers of large parenchymatous cells.

Habitat: Protected bays, estuarines, rivers, and creeks with sandy-muddy substrate; sometimes brackishwater ponds.

Economic importance: Human and fish food; agar source.

Collection site: Jaro, Leganes, Zarraga, and Estancia, Iloilo; Ivisan and Pan-ay, Capiz; Batan and New Washington, Aklan.

Family Solieriaceae



1 cm

**Eucheuma arnoldii* Weber-van Bosse

Description: Plant is small (up to 4-cm tall) and appears like the hard coral *Acropora*. Plant has irregularly dichotomous branching. Branches are clavate with slightly acute apices covered with simple or compound spinose tubercles in distinct nodes and internodes.

Habitat: Hard and soft corals in subtidal zone.

Economic importance: Human food; carrageenan source.

Collection site: Boracay Is., Aklan.

1 cm

Eucheuma denticulatum (N. L. Burman) Collins et Hervey

Common name: Guso (Cebuano).

Description: Plant is up to 5.5-cm tall, cartilaginous, and succulent. Branches are cylindrical, provided with whorled spinose determinate branchlets, and forms distinct nodes and internodes especially at the terminal portion of branch.

Habitat: Coral to rocky substrates (2-3-m deep during lowest tide).

Economic importance: Human food; carrageenan source.

Collection site: Estancia, Iloilo.

Kappaphycus alvarezii (Weber-van Bosse) Doty

Common name: Tambalang (Hiligaynon, Cebuano).

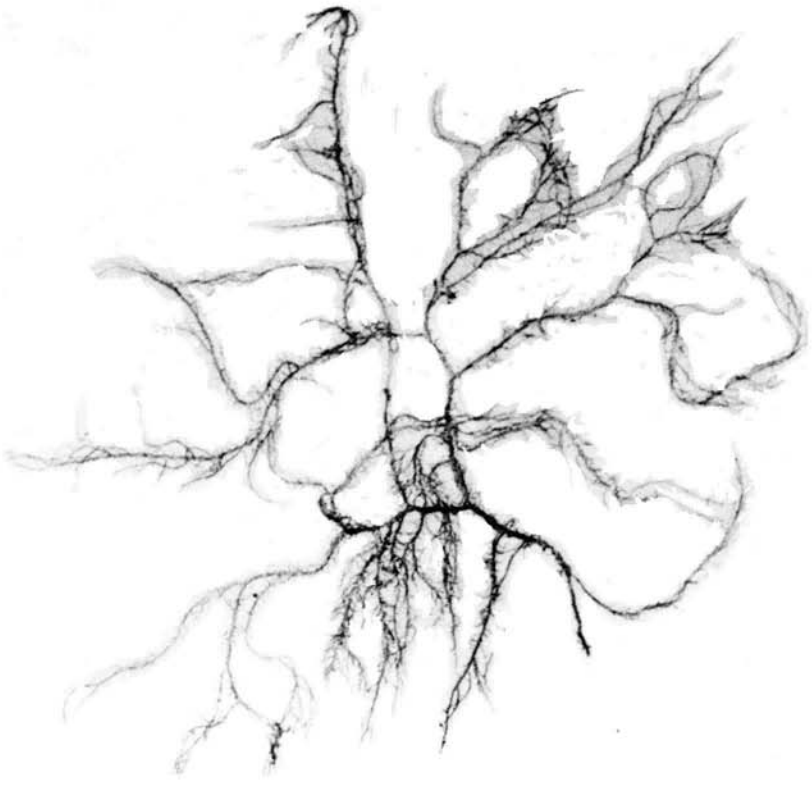
Description: Plant is erect, 15-20-cm tall, and attached to rocky substrates by discoid holdfast. Plant surface consists of numerous short and blunt spines which appears warty.

Habitat: Rocky habitats exposed to strong waves.

Economic importance: Human food; carrageenan source.

Collection site: Ajuy, Concepcion, and Estancia, Iloilo.

Family Hypneacea



1 cm

Hypnea cervicornis J. Agardh

Common name: Kulot ti pusa (Iloku).

Description: Plant is up to 6-cm tall, greenish with a tinge of red, and attached to pebbles, shells, or small stones by discoid holdfast. Branching is irregularly dichotomous and divaricate. Branches are terete and dense. Typical thallus shows main axis producing numerous short cervicorn branchlets.

Habitat: Sandy-coral substrate in tide pools.

Economic importance: Human food; carrageenan source; medicine (antitumor); with protein and minerals (Ca, K, Mg, Na, Cu, Zn, Fe).

Collection site: Tangalan and Boracay Is., Aklan.

Hypnea esperi Bory

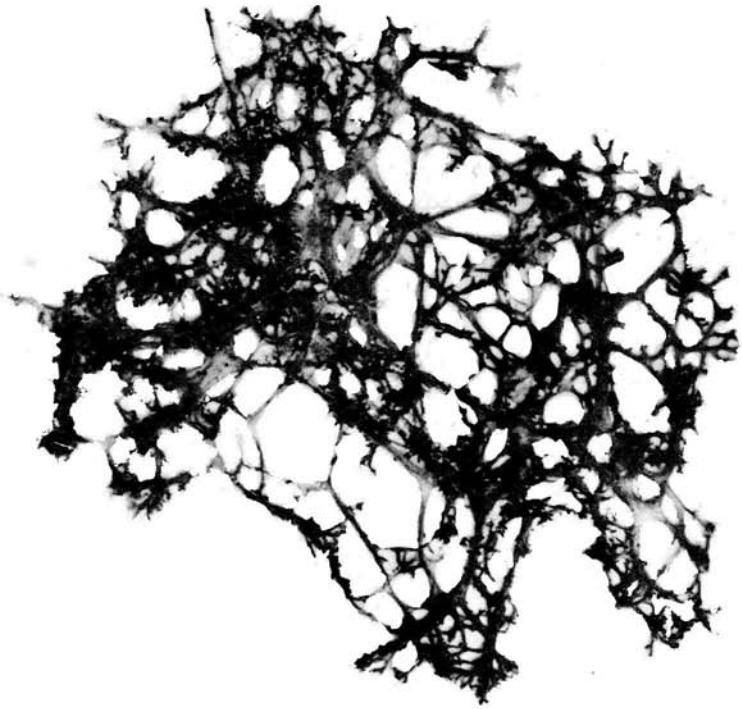
Common name: Kulot (Iloku).

Description: Plant is short (up to 4-cm tall), greenish to purplish, and loosely caespitose. Branches are irregular-alternate and bear fine slender spinose ultimate branchlets.

Habitat: Sandy substratum in close association with green algae and seagrasses.

Economic importance: Human food; carrageenan and protein source; animal feed; fertilizer; medicine (antitumor).

Collection site: Ajuy, Iloilo; Tangalan and Boracay Is., Aklan; Pandan and Nogas Is., Antique.



1 cm

Hypnea pannosa J. Agardh

Description: Plant is purplish, caespitose, creeping, and forms mats on rocky substrates especially between crevices of hard corals. Branching is irregularly alternate ending in many short and stubby spines. Branches are terete to slightly compressed and fused at certain points to form loose but firm clumps. Plant appears luminous underwater during bright sunny days.

Habitat: Between crevices of hard corals in subtidal zone exposed to moderate waves.

Economic importance: Human food; carrageenan source; fertilizer; animal feed; medicine (antitumor).

Collection site: Ajuy, Iloilo; Boracay Is., Aklan; Nogas Is., Antique.

1 cm

Hypnea valentiae (Turner) Montagne

Common name: Kulot (Iloku).

Description: Plant is erect, tall (up to14.5 cm), and greenish to brownish. Branching is irregular; main branches are percurrent with numerous long and tapering determinate branchlets. Stichidia (swollen bands) are borne either near the base or tip of branchlets.

Habitat: Sandy-coralline substrate.

Economic importance: Human food; carrageenan source.

Collection site: Concepcion, Iloilo; Boracay Is., Aklan.

Order Rhodymeniales
Family Rhodymeniaceae

1 cm

Rhodymenia intricata (Okamura) Okamura

Description: Plant is 7.5-cm tall, reddish, flat, thin, membranaceous, and subdichotomously branched with roundish or bifid apices.

Habitat: Rocky substrate in subtidal zone exposed to moderate waves.

Collection site: Tangalan, Aklan.

Family Champiacea

1 cm

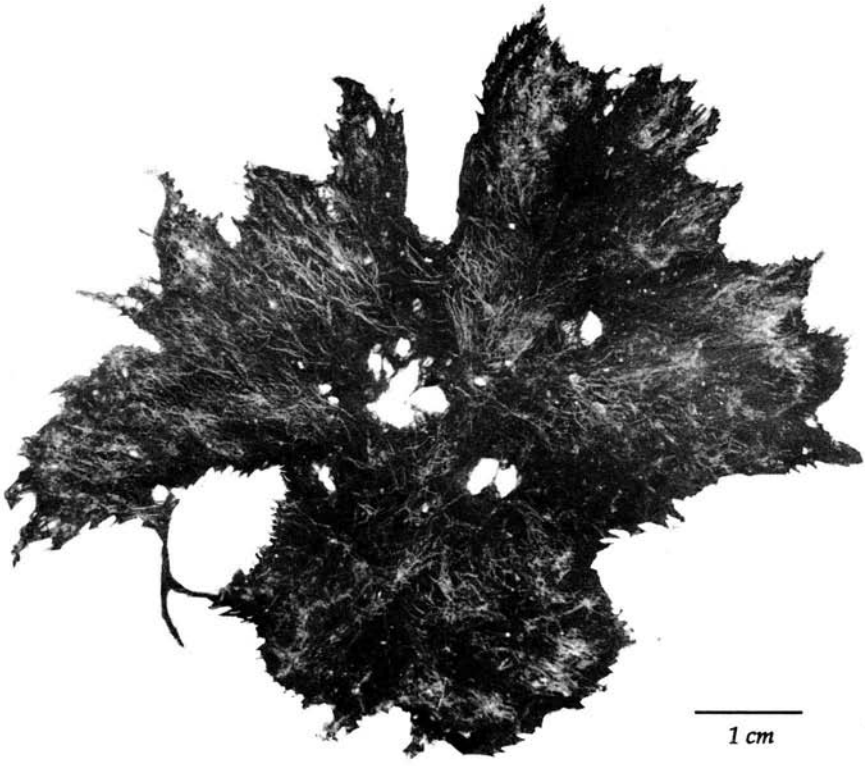
Champia japonica Okamura

Description: Plant forms loose and whitish clump on rocky substrates due to calcareous deposits. It is attached to substrate by disc-like expansion and loosely intricated below (adheres to each other). Branching is alternate to pinnate; terminal branches have blunt tips. Ultimate branches are slightly constricted at the base, unequally broad, and end in blunt apex. Branches are tereti-compressed, segmented, and hollow.

Habitat: Rocky substrates exposed to strong water movement.

Collection site: Nogas Is. and Pandan, Antique.

Order Ceramiales
Family Ceramiaceae



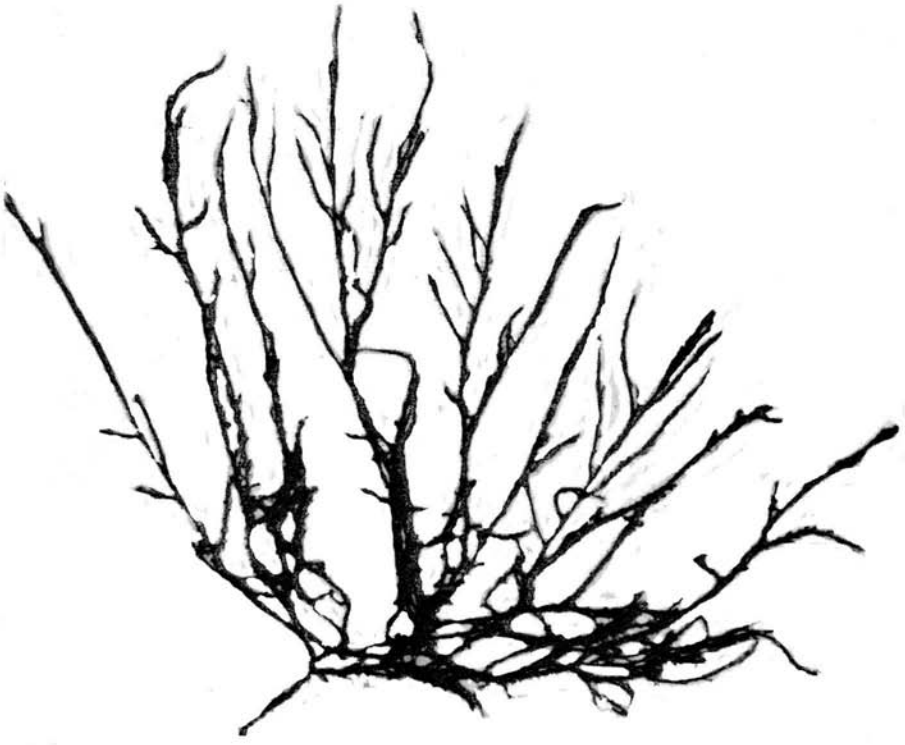
**Centroceras clavulatum* (C. Agardh) Montagne

Description: Plant is reddish, clumpy, and attached to substrate by rhizoids. Branching is dichotomous. Inwardly pointing ultimate branches are incurved like a pair of pincers. Branches are segmented with sharply pointed 2-cell spines at internodes. Internodes are composed of regular longitudinal rows of cells.

Habitat: Rocky substrates in intertidal areas.

Economic importance: Medicine (watery extract relieves constipation and gastro-intestinal disturbance).

Collection site: Pandan, Antique.



1 cm

**Sypridia filamentosa* (Wulfen) Harvey

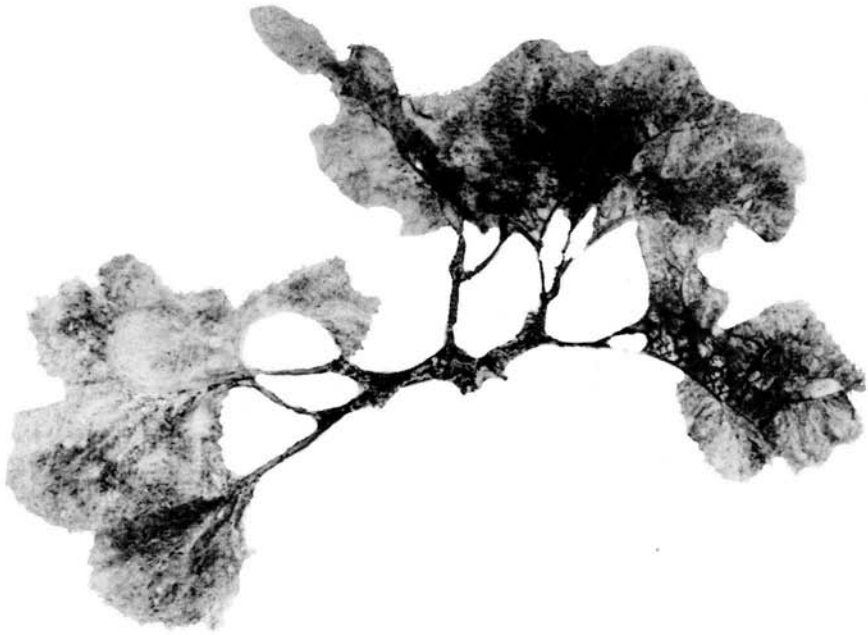
Description: Plant is 10-cm tall, dull brown, tufted, and attached to substrate by a rhizoidal disc holdfast. Branching is alternate or irregular. Main axes are corticated while determinate branchlets are corticated only at the nodes.

Habitat: Rocky-corally substrate in lower intertidal zone.

Economic importance: Agar source.

Collection site: Buenavista, Guimaras.

Family Delesseriaceae



1 cm

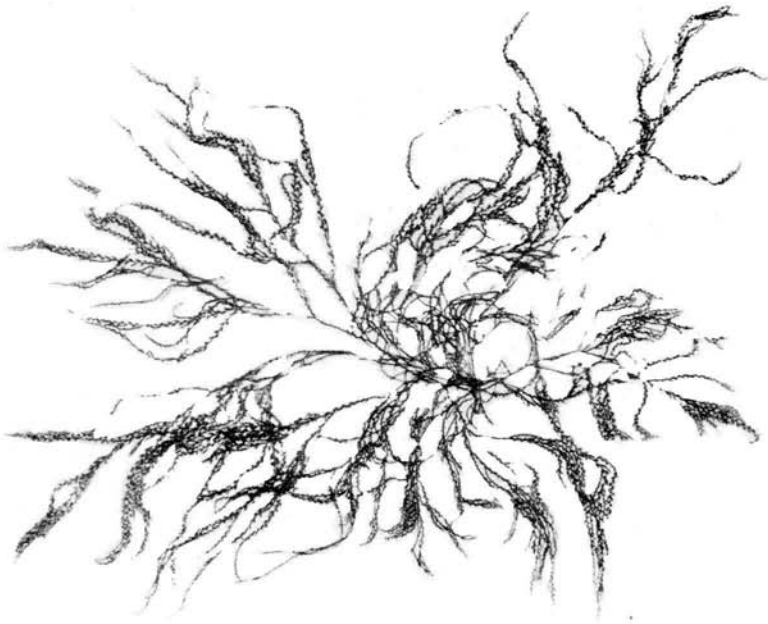
Claudea batanensis Tanaka

Description: Plant is almost 5-cm tall, tufted, very soft and membranaceous, purplish, and anchored to substrate by discoid holdfast. Branches are recurved and unilaterally arranged (one-sided) on main axes.

Habitat: Rocky substrate in intertidal and subtidal areas.

Collection site: Nogas Is., Antique.

Family Rhodomelaceae



1 cm

Acanthophora spicifera (Vahl) Boergesen

Common name: Kulot (Iloku).

Description: Plant grows up to 11-cm tall and is erect, greenish to brownish, and anchored by a small discoid holdfast. Branches are terete with spinose projections on spirally arranged determinate branchlets.

Habitat: Dead corals or rocky substrates in habitats exposed to moderate waves.

Economic importance: Human food; source of agar; medicine (antibiotic, growth regulators).

Collection site: Ajuy and Concepcion, Iloilo; Boracay Is., Aklan; Pandan, Antique; Buenavista and Nueva Valencia, Guimaras.

1 cm

**Acrocystis nana* Zanardini

Description: Plant forms colonies, are obovate (5.29 x 2.56 mm), and with stipitate arising from stolon attached to substrate by branched hapters.

Habitat: Rocky substrates (shaded portions) in spray zone (frequently sprayed by waves).

Collection site: Boracay Is., Aklan.

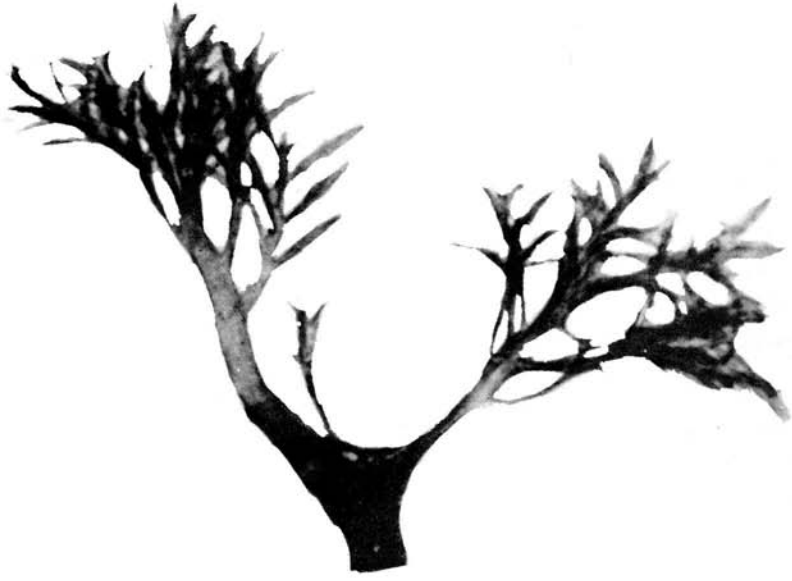
1 cm

**Amansia glomerata* C. Agardh

Description: Plant is small (up to 1.5 cm), greenish to reddish, and attached to solid substrates by hapters thus forming clusters. Branches are flat and linear-lanceolate. Distal portion of branches is finely serrated.

Habitat: Rocky substrates exposed to strong waves.

Collection site: Boracay Is., Aklan.



1 cm

**Chondria armata* (Kutzing) Okamura

Description: Plant is small (up to 2.7-cm tall) and attached by thick root-like holdfast. Branches are naked below but densely covered with ramuli on all sides of upper portion. Branchlets are filiform.

Habitat: Rocky substrates exposed to strong waves.

Economic importance: Medicine (anthelminthic).

Collection site: Nogas Is., Antique.

1 cm

Laurencia cartilaginea Yamada

Description: Plant is erect, up to 12-cm tall, reddish to purple, cartilaginous, and attached by discoid holdfast. Branching is alternate with terete branches and ultimate paniculate branchlets.

Habitat: Rocky substrates exposed to moderate waves.

Economic importance: Human food; agar source; medicine (antifungus, antibacteria).

Collection site: Ajuy and Concepcion, Iloilo; Tangalan and Boracay Is., Aklan.

1 cm

**Laurencia flexilis* Setchell

Description: Plant is cartilaginous, erect, purplish, and attached to rocky substrate by discoid holdfast. Plant is naked at the base but proliferously branched at the upper half. Pinnate-oppositely arranged branches appear pyramidal in shape. Branches are terete to slightly compressed at terminal portions with cylindrical ultimate branchlets having distinct apical pits.

Habitat: Rocky substrate exposed to strong waves.

Economic importance: Human food; agar source; medicine (antifungus, antibacteria).

Collection site: Tangalan, Aklan; Pandan, Antique.

1 cm

Laurencia obtusa (Hudson) Lamouroux

Description: Plant is erect, up to 4.5-cm tall, soft and fleshy in texture, and deep purple or reddish green with rose pink tips. Branching is irregularly alternate to subverticillate. Ultimate branches are simple, distinctly clavate, constricted at the base, and with apical pit.

Habitat: Rocky substrates in intertidal area exposed to strong waves.

Economic importance: Human food; agar source; medicine (antifungus, antibacteria).

Collection site: Nogas Is., Antique.

Laurencia papillosa (C. Agardh) Greville

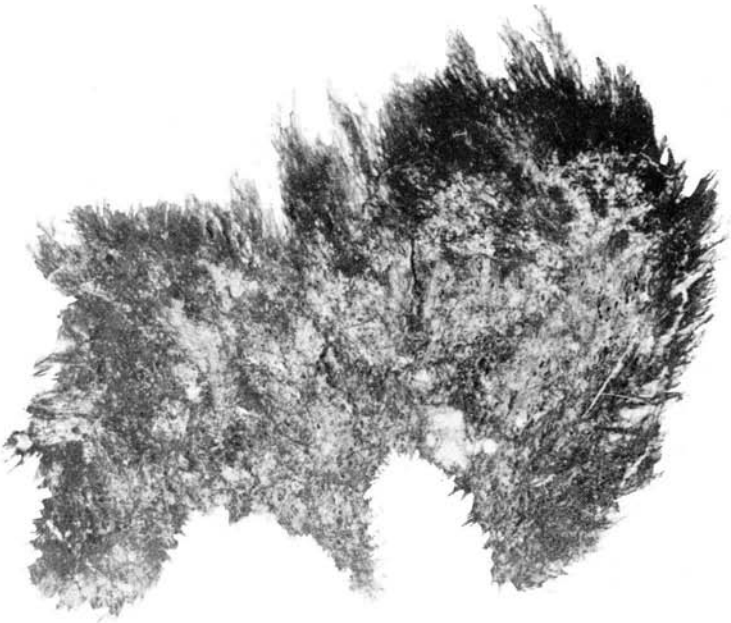
Common name: Kulot (Iloku).

Description: Plant is up to 5-cm tall, clumpy, erect, greenish to brown, and arises from a discoid holdfast. Branching is irregular. Main branches are terete, decurrent, and densely covered with short, simple, and cylindrical ultimate branchlets.

Habitat: Sandy substratum in close association with green algae and seagrasses; intertidal zone on rocky substrate together with other species of *Laurencia*.

Economic importance: Human food; agar source; fish bait; medicine (antibacteria).

Collection site: Ajuy, Concepcion, and Estancia, Iloilo; Boracay Is., Aklan; Pandan and Nogas Is., Antique.



1 cm

Polysiphonia fragilis Suringar

Description: Plant is small (5-cm tall), soft, reddish brown, and forms tufts on rocky substrate by rhizoidal holdfast.

Habitat: Shallow waters on hard (rocky) substrates.

Collection site: Tigbauan, Iloilo.

Glossary

agar - a phycocolloid characteristic of the red algae; a sulfated polysaccharide (galactan) component of cell walls and intercellular spaces, extracted primarily from *Gelidium, Gracilaria,* and *Gelidiella*
algin - soluble sodium salt of alginic acid
amorphous - having no specific shape or form
asexual reproduction - increase in number of individuals not involving gametic union
assimilatory filaments - pigmented or photosynthetic filaments
anastomose - to join together forming a network
apiculate - with a short and sharp point
attenuate - tapering gradually to a narrow extremity
auxin - organic substance which promotes elongation of plant shoots and controls other growth effects
blade - broad, membranous distal portion of foliaceous algae
bifid - divided into two equal parts by a median cleft
bifurcate - to divide or fork into two branches
bulbous - bulging
caespitose - tufted
calcified - hardened by the deposition of calcium salts
capitulum (capitula) - cell in the antheridium from which antheridial filaments arise
carrageenan - a phycocolloid characteristic of some classes of the red algae like Gigartinaceae, Solieraceae, Phyllophoraceae, and Hypneaceae
cartilaginous - firm and gristly
cervicorn - resembling a deer's horn
clavate - club-shaped
compressed - flattened
concentric - having a common center, as in circles or spheres
conceptacles - an organ or cavity enclosing reproductive bodies as in Fucales and Corallinaceae
constriction - state of being contracted
convolute - twisting
corymbose - resembling a flower cluster that has a flat-topped or convex structure
crustose - forming a crust
cuboidal - square-like
cuneate - wedge-shaped
cytokinin - plant growth regulator
cystocarp - the carposporophyte and surrounding envelope (pericarp) provided by the gametophyte
decumbent - reclining on the substrate
decussate - in pairs alternating at right angles
dentate - toothed

determinate branchlet - branchlet that has limited growth
dichotomous - forked into two similar parts
discoid - having the form of a disc
divaricate - branching at wide angles
elliptical - having the form of an ellipse
encrusting - impregnating
entire - having the margin continuous and not broken by division, teeth or serrations
epiphyte - plant that grows/attaches on other plants
fasciculate - arranged in small bundles
filiform - thread-like
flabellate - fan-shaped; broad and round at the top, narrowed below like a fan
foliaceous - leaf-like
forcipate - incurved like a pair of pincers
forked - split into two
gelatino-membranous - papery and muscilaginous in nature
genicula - uncalcified joints between segments in a coralline alga
gibberellin - plant growth regulator
glabrous zone - smooth zone; surface devoid of hairs
glomeriliferous - resembling a head-like cluster of flowers
hapteron (haptera) - basal multicellular outgrowths forming part of a holdfast
holdfast - basal attachment organ of an alga
indusium - a protective covering of sporangia
interdichotomy - portion of a branch or segment in between the dichotomies
internode - portion of an axis between two nodes
intertidal zone - portion of the shore frequently covered and exposed during tidal changes
lanceolate - narrow and tapering towards the apex or to both ends
lateral - pertaining to the side
linear - narrow and several times longer than width with parallel sides
moniliform - like a string of beads
monosporangium - sporangium that produces a single spore
mucilaginous - gelatinous-like substance containing protein and polysaccharide
node - site on axis from which leaves and/or branches arise
oblanceolate - broadest above the middle and tapering downward
obovate - inversely ovate, with the broad end upward and narrow end at the base
ostiole - small opening
ovate - egg-shaped
paniculate - arranged in a loosely branching flower cluster

parenchyma - tissue composed of living thin-walled cells, most often functioning in photosynthesis or storage
percurrent - extending throughout the entire length
perforation - presence of small holes
pericarp - sterile covering of carposporophyte
pinnate - with filaments or branches arising on opposite sides of axis; feather-like
pinnule - one of the pinnately disposed division of a pinnate structure
prostrate - lying flat on the ground
racemose - having the form of a raceme; the organs (receptacles, leaves, etc.) are stalked and attached to a common axis
radial - radiating from an axis or center
ramuli - determinate branches
receptacle - specialized fertilized portion of branches in Fucales containing conceptacles
reniform - kidney-shaped; broader than long with a sinus at the base
reticulate - net-like
rhizoid - unicellular or filamentous attachment organ
rostrate - protruding portion
rugose - wrinkled or ridged
secund - arranged on one side of axis
serrate - having small sharp teeth projected forward
sessile - borne directly on thallus, without a stalk
sexual reproduction - increase in the number of individuals usually involving union of gametes (plasmogamy) and nuclei (karyogamy), association of chromosomes, and meiosis
sinuate - with a deep wavy margin
solitary - singly
spicule - thread-like filaments
spinose - spine-like
spongiose - without firmness, readily compressible
stichidium (stichida) - specialized branch producing tetrasporangia as in *Hypnea* and *Gelidiella*, usually enlarged over vegetative axes
stipe - stem-like, usually basal part of thallus above holdfast
stipilate - provided with stipe
stolon - slender branch or shoot growing out from base of a parent plant and capable of producing another shoot
substrate - base or material on which an organism lives
subtidal zone - area below the lowest tide level
subverticillate - arranged in the same point on the axis
symbiont - living together
terete - with a circular transverse section

thallus - simple vegetative plant body undifferentiated into true leaves, stems, and roots
triquetrous - three-sided
truncate - blunt-ended; abruptly cut-off
tuft - in cluster
turbinate - inversely conical; bell-shaped
undulate - to have a wavy form or surface
unilocular sporangium - sporangium in which all zoospores are produced in a single cavity
uniseriate - in a single series
utricle - dilated or swollen terminal portion of a filament or tube, as in *Codium*
vesicle - bladder-like cell
whorl - circular arrangement of like parts, i.e., leaves, branches, around a point on an axis

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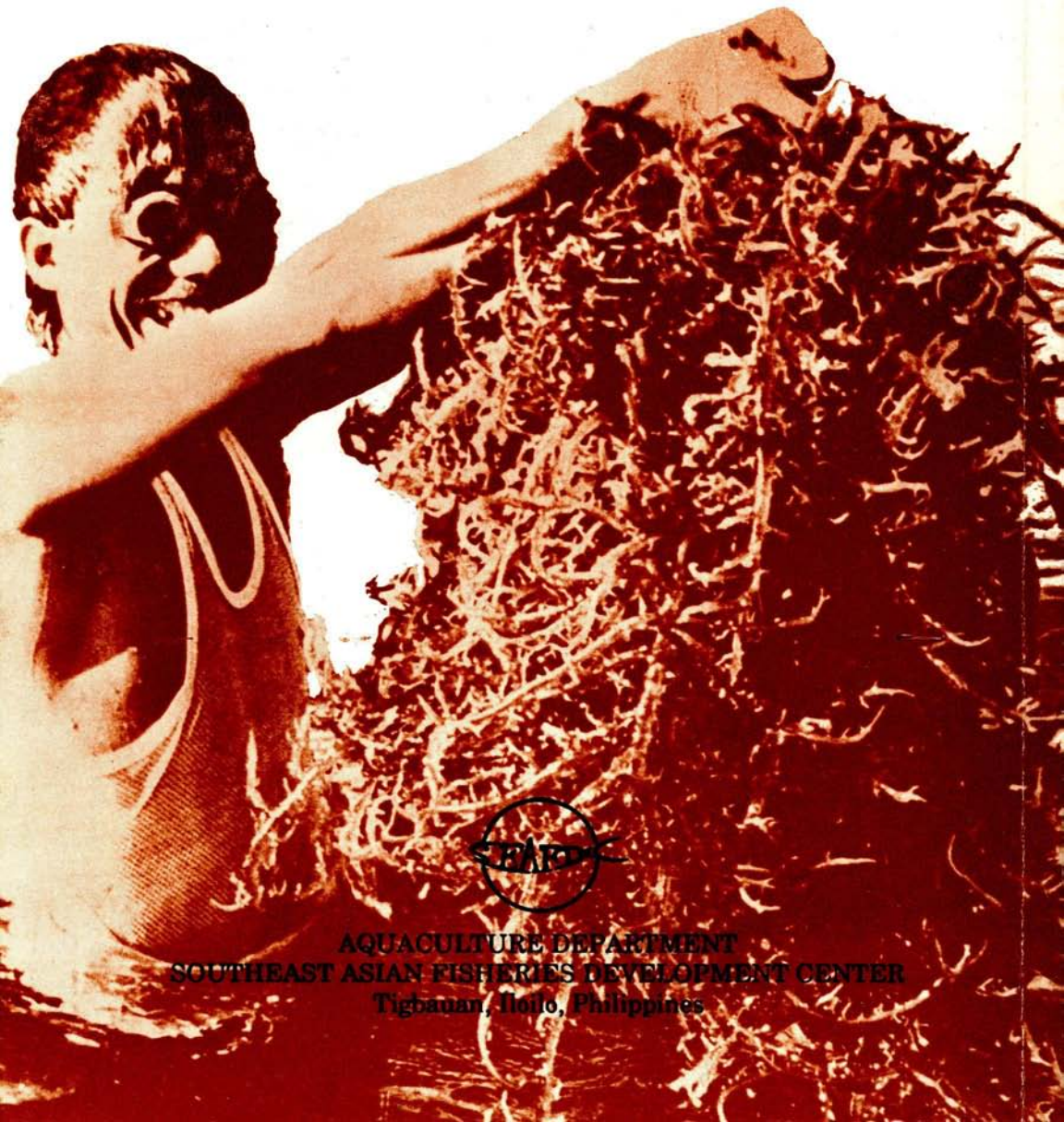
Acknowledgment

The encouragement of Dr. Irineo J. Dogma, Jr. during the early stage of manuscript writing and the critical review made by Dr. Gavino C. Trono, Jr., are deeply appreciated. The editing assistance of Ms. Milagros T. Castaños, the recommendations of the Publications Review Committee, and the production efforts of the Audiovisual-Print Section are gratefully acknowledged.

SEAWEEDS OF PANAY

April 1992



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