VEGETATION OF TUTUILLA ISLAND
Marine and Terrestrial Algae

(note: page 187 is missing)

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1924

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mm. undersurface 0.09 mm. by 0.02 mm., 0.09 mm. by 0.07 mm.; bract, 1.6 by 0.23 mm. by 0.13 mm., 1.6 by 0.22 mm. by 0.11 mm.; petal 0.5 mm. by 0.3 mm.; ovule 0.25 mm. by 0.15 mm.; stamen 0.2 mm. by 0.15 mm., 0.35 mm. by 0.15 mm.


Catulueaeutes tatuliana sp. Pearson. Fig. 27.

Stems. Minute; very pale green to hyaline in water, growing on living leaves. Seen very delicate. 2 cells wide, irregularly branched, branches curved. Leaves horizontal (90°) to pendant (90°), alternate, oblong-elliptic to oblong-obovate or narrowly irregularly elliptic, entire, upper margin on the lower two-thirds decurrent, incurved; upper portion recurved, upper oblong-elliptic, lower linear, more than half the length of the leaf incurved; cells medium size to rather large, oblong-elliptic, walls thin, with irregular ridges; trigones long. Underside bipinnate, segments spreading horizontally or slightly ascending, 3 to 5 cells long. 1 and 2 cells wide, disk 2 cells high by 3 cells broad, broadly lanceolate.

Fig. 27.—Catulueaeutes (catulium) Pearson sp. low. (Pearson det.)
1. Plant, x 47.
2. Stem, x 16.8.
3-6. Leaves, x 50.

Dimensions: Stems 0.25 inch long; diameter 0.075 mm.; with leaves 0.2 mm. wide; leaves 1.1 mm. by 0.45 mm., 1 mm. by 0.3 mm., 0.7 mm. by 0.25 mm.; cells 0.09 mm. by 0.03 mm., 0.39 mm. by 0.03 mm.; unicells, disk 0.15 mm. high by 0.1 mm. wide, segments 0.2 mm. by 0.25 mm. long.


Observations: There is no Catulueaeutes listed from Aka or Oanaka or Stephanie in which this can be referred.

Class 4. PHYCOPHYTA.

The phycophytes, or algae, are aquatic and, so far as Tutuila is concerned, are confined largely to the marine species. Some grow on marine rocks, dropping guano, and such like habitats, and a few may be found in such scanty fresh water as may occur on Tutuila. As has been stated previously, the calcareous algae, particularly of the green and red groups, are of greater or less significance in reef and bench formation. The general Suman name is Lima or Leu-leu.

There are 22 species recorded to date, of which 106 occur on Tutuila.
Subclass 1. IHODOPHYCEAE.

The red algae are few on the reef and not even well developed, except in the case of the Melobesia of the family Corallinaeae. They are better developed on the few basaltic shores I was able to investigate. On the reef practically all of the algae, as has been mentioned, werecompose of their algaete, with the exception of the calcareaeae species, and those were mostly the Melobesia. When algae were found on the reef surface it was in such places as to avoid the full direct illumination, and I have earlier in this paper attributed this to the effect of intense illumination, both from above by direct sunlight and from below by reflection from the intensely white substratum of the reef. The attempt to avoid being subject to both kinds of illumination at the same time leads to the red algae, for the greater part, to "wriggle" into hollows, etc., etc., to become phyllophores.

Family 101. Corallinaeae.

The members of this family are all calcified and those of the tropics, especially the unpointed species of Melobesia, may be important reef formers, as I have stated in the general discussion of the work of calcareaeae algae on the reef.

Tribe 1. Corallinaeae.

This tribe includes all the Corallinaeae with jointed fronds. They arise, at least some of them, from a horizontal crustaceous base of greater or less diameter and thickness.


No. 1074, on hydroids on buoys in Pago Pago Harbor (June 11, 1920, leg. F. A. Parish); No. 1120, on staghorn coral (Acropora pharensis), Ana Reef (June 14, 1920).

I am placing the Tutuila species of this genus, as far as I collected them, under the Jania achaeraensis Lamarck, as a collective species. The two numbers of my collection quoted are considerably different from each other and vary probably each may be considered as representing an undescribed species in the narrower sense. Until, however, a large series of specimens of the group composed of the very slender diversely branched species of the genus, may be studied in connection with the type of the species already described, there will be no certainty in the application of names. No. 1074 is represented only by a single small clump of sterile fronds. Its joints are short, 2 (or even up to 3) times as long as broad, and about 65 μ in greatest diameter. No. 1220 is common over the reef depressions on corals and calcareaeae. It is very slender (not over 32 μ in diameter), its nodes indistinct, and usually only as a point of branching. Its joints are elongated, even up to 13 or 20 times as long as the diameter. Such a plant as this must be many times less in diameter than Lamarck's original Jania achaeraensis, which is given by M. A. Howe (in Betten and Millspaugh, The Bahamas Flexa, p. 899, 1920) as mostly 60 to 100 μ in diameter and joints 2 to 4 times as long as broad. No. 1074 comes nearer to Howe's conception of J. achaeraensis, while No. 1120 comes closer to his conception of J. capillarense Howe. Neither coincides exactly with descriptions of proportions and diameters.

Cheilosporum spectabile Harvey, Friendly Island Alga, No. 31 (nom. nudum); Weber-von Bosse, Siboga Exp., Monogr. 61, p. 106, 1904.

No. 1220, on basaltic rocks, in runways, at the eastern point of the entrance to Pagoa Bay (July 20, 1920); No. 1900, in pools in the shall of Breaker Point, on runway between these rocks and the edge of Ana Reef (July 17, 1920).
I am referring to this species of Harvey two sets of specimens occurring on bank, and for the most part in stone cavities. They do not occur much Harvey's distributed specimens, nor do they occur with Kitting's figures of Amblypus multiloculio (Edw. Flora, vol. 8, plate 50, 1:515), but most more or less intermediate. They agree more readily with Kitting's figure of Amblypus prae-
loculus (loc. cit., plate 57, pl. 1 which, in turn, does not agree with the type Lamouroux (H. Polypl. Corul. Flora, plate 10, fig. 5, 1510) given for his Corallina problematica.


No. 1129, entire, with Amblypus excelso on staghorn coral, real-patch, Ada (June 14, 1920); No. 1301, in expanded polyclad mass on boulders rocks, Breaker Point (July 17, 1920). On the real-patch the growth is scantly and photophilous; on boulders the growth is luxuriant and in heavily expanded patches. The type is from Tahiti, and Weber van Baron (Silago Exp., Monogr. 61, p. 167, 1904) describes it from the south coast of Java.


No. 1232, in tufts on boulder rocks, Breaker Point, July 17, 1920.

I found this species only on the darker colored, boulder rocks and never detected it on the reefs.

The type is probably from Sainte, but Weber van Baron (Silago Exp., Monogr. 61, p. 99, plate 18, figs. 1, 2, and 5, 1904) finds it frequent among the East Indian Islands and the Bula Archipelago.

Amblypus solarea Lamouroux, in Freycinet's Voy. aut. du Monde, Zoöl., p. 623, plate 93, figs. 2-31, 1824.

No. 1093, in clusters and more or less extended patches in boulders among coral fragments on surface of real-patch, Ada (June 3, 1920); No. 1140, infrequent, Ada East toward Breaker Point (June 19, 1920); No. 1246, "magnifying" and "surfour" patches, Uteci Reef (July 16, 1920).

This is a frequent species in small depressions in the reef, a typical photophilous, as it spouts into the smaller boulders, becomes circular, and receives light light only from above. Weber van Baron (Silago Exp., Monogr. 61, p. 96, plate 14, figs. 1-11, 1904) has fully described and discussed the species, which seems to be abundant in the East Indian and Bula Archipelagoes.


No. 1125, a single clump on staghorn coral, real-patch, Ada (June 14, 1920).

This was met with only once and seems to have the character of A. excelso as given by Weber van Baron (Silago Exp., Monogr. 61, p. 93, 1904), who finds it in the East Indies.


No. 2370, an entire boulder rock, in a runway, Breaker Point (July 17, 1920). A thick and long-pointed, deep-red species found only once, in rapidly and con-
tinuously moving water, as a dark-colored (banded) skeleton.

This probably includes the Pacific and Indian Ocean references under A. tribulus (Edw. & Bol, Lam.) Lam's and A. prae-loculus Citrinow.

The Melobesiaec, as the name has been applied, include the names of the Corallinacae whose vegetative bodies are devoid of joints or articulations. The species of this tribe are largely reddish-villous and red-formers, a few of them being of prime importance in the work of building up the reefs, as has been shown in detail earlier in this paper.


No. 1015, on under side of coral and incrusting rosette coral *Acanthocorys lepto-


No. 1222, on Anza Reef, towards Breaker Point (June 14, 1920, legit Dr. Alfred G. Mayo); No. 1150, same locality (June 18, 1920); No. 1155, Fagafua Reef (July 15, 1920). Determined by Marshall A. Howe.

This species is a frequently incrusting species and abundantly of common occurrence on the reefs. It was first described from the Laccadives.


No. 1202, on Fagafua Reef, occasional (July 11, 1920). Determined by Marshall A. Howe.

A rosette form, frequent on the reef at Fagafua. This is distributed widely through the tropical Pacific and Indo-West Pacific.


No. 1013 and 1018 (especially) on upper side of wave-worn rosette corals (Acanthocorys lepto-


No. 1222, on Anza Reef, towards Breaker Point (June 14, 1920, legit Dr. Alfred G. Mayo); No. 1150, same locality (June 18, 1920); No. 1155, Fagafua Reef (July 15, 1920). Determined by Marshall A. Howe.

This species is one of the most important of red-formers. This specimen was taken 1.5 to 2 meters in from the exact outer edge of the reef, but the growth of the thick crust extends from 10 to 12 meters at least, until finally it dies, breaks up, and becomes more or less disintegrated. It protects the reef from erosion and is found only on the reefs exposed to full force of the waves. This species was observed also on Fagafua Reef, Nuuuli Reef, and Anza Reef, but not at Uteleo or other reefs within Pago Pago Harbor and quiet water. *Porolithon onkodes* is widely distributed among the Pacific Ocean coral reefs.


No. 1130, in cushions a clear, shallow water, well out on reef at Nuuuli (June 15, 1920). Determined by Marshall A. Howe.

This is a very brittle species, frequent on certain portions of the reef and one which has an extensive distribution in the tropical Pacific.

*Goniolithon lascadivicum* (Foslie) Foslie, Siboga Exp. Monogr. 61, p. 51, pl. 8, figs. 10-13, 1904. Plate 18, fig. d.

No. 1881, on Anza Reef (June 12, 1920); No. 1151, on Anza Reef (June 18, 1920); No. 1207, on Anza Reef (July 17, 1920); the last two determined by Marshall A. Howe.
A fireweed species occurring sparingly on cliffs, particularly on a small Pointe.

**Family 102. Squamariaceae.**

The Squamariaceae are widely distributed, but particularly affect the warmer waters of the tropical and subtropical zones. We owe most of our exact knowledge of the systematic and distributional aspects of the species of this family to Dr. Anna Whitman Nourse, whose publications (cf. Trans. Linn. Soc., 26 ser. 2, vol. 16, pt. 3, pp. 322-338, 1914; *Liitshira* Nat. Hist. Archiv., vol. 3, No. 19, pp. 126-146, 1916; *Siboga* Exp. Monogr. 58, pp. 203-208, 1921) on the tropical species of the Atlantic and Indian Oceans must serve as a basis for the study of the Turkish species. One difficulty presents itself, most particularly, and that is the identity of so many of the species collected. The vegetative characters, however, are
not understood sufficiently to furnish a reasonable basis for locating specimens fairly closely. Some of the Euphorbiaceae are slightly stupid, others peculiarly, while a few are seemingly as completely recognized with little on top of the Corallinae. Corallina discus (Hydnum) W. et G. occurs infesting the rocks and may be found to be a good indicator of certain reef outcrops, and if found in the core of boring may be determined with some certainty, although the same specie, not being calcified, will have disappeared. The study in the Euphorbiaceae is fastened and expanded. In a few species it is more or less dichotomous, but in the majority of species it is simply expanded, with at most, shallowly forked lobes at the margins. In some cases the blade is attached only at one point, or is free from the substratum, except here and there, where it is attached by bunches of filaments, but in some species it is closely adherent to the substratum with the margins partly free, and in some species even the margins are entirely adherent. Some few species are sun-loving (helianthophytes), but most of the species are shade-loving (xenophytes), growing on the under sides of projections in the lateral belt or fairly deep down in the sublittoral belt. I have only casually studied my Forth material and offer the following tentative references of some of the more obvious specimens.


No. 1861, on cement disks in sublittoral zone, Ava Reef (June 13, 1926, leg. Dr. Alfred G. Mayer, with *Euphorbiaceae*); No. 1177, on hydrates, dredged in 17 to 18 fathoms off Ava Reef (July 19, 1926, leg. Dr. Alfred G. Mayer, series); No. 1184, on Hydractinia, dredged (July 1926, Dr. Alfred G. Mayer).

Following Weber-van Boute, I refer these specimens to *Peyssonelina rubra*, assuming that the specimens of the Indian and Pacific Oceans are identical with the plants of the Mediterranean and the Atlantic. Mine. Weber has been able to compare her East Indian specimens with Greville's type and finds that they are identical as to structure.

**Peyssonelina delicata** sp. nov. Fig. 28.

Thallo superficie inferior plius satures arrode adhaerente sed marginibus intumida liberis aut assimilatis, effuso extenso, frangili, marginibus late lobos rotundos ostendens, delicatis sois concentricis et numerosis notata, siccati sature rubri,

![Peyssonelina delicata sp. nov.: vertical section through a ramostichum](attachment:image.png)

**Fig. 28—Peyssonelina delicata sp. nov.: vertical section through a ramostichum** (No. 1176. X 270. Photographed.)

hypothallial cells in filis reticulatis mit magister radiantibus 20-24 μ, longis, 13-14 μ latis, 8-12 μ altae, rhizids composite, sub axis, cellulae augmentantis, quadruplatae in sections verticalis, 12 μ in quaque diam., filiformis simplicissimis; perithallii, in portionibus axialibus strato uniplano, rare bivallatae, in portionibus lateribus (extragastropogonia), vulgo bivallatae composito; sorta parametrica, 40 μ estra, tetragastropogonia 24X34 μ, trifurcatae, paraphysisbus 3-4 cellulae compositae.

No. 1728, on flat coral fragments, dredged in 17 to 18 fathoms off Ava Reef towards Breaker Point (July 3, 1926, leg. Dr. Alfred G. Mayer) with *Euphorbiaceae*.136
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This thin and delicate species seems clearly different from any described. The sterile thallus is seldom over 2 cells thick, measures 15 to 22 μ in thickness, and the hypothallus and perithallus cells are of about the same dimensions. The sterile portions (tetraptangia) are 40 to 55 μ high, the perithallus cells immediately under the sterile are smaller, and the thallus itself is low with short pseudopores. It is associated with a sterile species of much more complex structure, seemingly an undescribed Crucidiella coming new to C. nitida, but needing further study.

Crucidiella maritii Weber-van Bosse, Siboga Exp., Monogr. 590, p. 288, 1921?

No. 1246, on upper side of encrusted rosette coral (Acropora hyacinthus), Cievel Reef (July 16, 2020), sterile.

I refer to this species, as either belonging here or very nearly related, a sterile plant which has occurred to me as yet only once. It is strongly calcified, slightly rose to light yellowish, and has the microscopic structure of Crucidiella maritii as described and figured by Mme. Weber. The size of the cells of the different layers are fairly in correspondence with the measurements, but in some cells approach the smaller sizes and those of the very distinct cortical layer are smaller. The hypothallus and perithallus of our specimens are invaded by masses of lime as are the similar layers in Crucidiella maritii.


No. 1023, on staghorn coral (Acropora pharos), reef-patch at Aua (June 3, 1920, with scarce tetraptangia).

I refer to the present species, with some confidence, a slightly adhering, very slightly calcified, deep-red species which seems in every way to agree with the description and figures of Mme. Weber. Her specimens were sterile, but mine have some tetraptangial cells. The cell are neither broad nor high and occur on the small supersposed fronds, which are numerous in my specimens. Mine are not thoroughly mature, but nearly so, and measure 43 to 56 μ in thickness, with paraphyses 4 to 6 cells high, the cells being about 4 μ broad and 4 to 6 μ high. The tetraptangia (?) are not well developed and are unindividuated. This plant is certainly very close to those of Crucidiella foveolata, but the measurements do not exactly coincide. The hypothallus cells seem more flattened possibly than in C. foveolata and more distinctly set off from those of the perithallus.

Crucidiella dura (Heyerdich) Weber-van Bosse, Siboga Exp., Monogr. 590, p. 293, 1920. Plate 18, fig. e.

No. 1260, Aua Reef (June 9, 1920, with tetraptangia); No. 1130, reef at T nil (June 18, 1920, with tetraptangia); No. 1110, reef at Nuill (June 15, 1920); No. 1228, reef at Fagana (July 15, 1920, with tetraptangia); No. 1246, reef at Ueldi (July 16, 1920, with tetraptangia).

This species is very common in the reef-moss or small tide-pools on the reef-slim. It is of a peculiar shade of light orange-red and the nemathecium are darker. It fades to a dull yellowish clay-color marked with dark, bluish-black spots where the nemathecium are situated. This species grows in layers, one shallower growing over another in regular succession, and seems to prefer cylindrical or very nearly cylindrical free objects for its substratum. As many as 20 or even more layers may be found about one matrix. It ought to be a characteristic plant in the zone of borings through the reef. It is a characteristic macrophyte bivalvophyte lepypedophyte, characteristic of open pools in the reef-moss and reef-slim.

There are several numbers of my collection as yet unplaced.
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Family 103. Gratoeoliaceae.

Two members of this family are known from Samoa, and I add a third hesitatingly. I regret not having been able to detect any of the forms of Helisoma on the shores of Tutuila, where we might naturally expect them to occur, since one, at least, has been found on Upolu and on Vava'u.

Cryptonemia decumbens Weber-van Bosse, Siboga Exp., Monogr. 59b, p. 245, 1920?

No. 1248; dredged in 25 to 35 fathoms, off the Poyer School, Pago Pago Harbor (June 15, 1920, sterile); No. 1249, dredged in Pago Pago Harbor (July 22, 1920, sterile).

These small plants answer to the description of Nemo. Weber as to habitat and gross dimensions, but they have thinner membranes, from 63 to 200 µ in thickness. They are young and sterile. They are attached to plate-like corals found in deep water along the north side of Pago Harbor.


No. 1200, on basaltic rocks in runway, eastern end of Fagatua Reef (July 11, 1920, with young cystocarps); No. 1258, on basaltic rocks, Breaker Point (July 17, 1920, sterile).

These forms seem to belong to Sonder's species and, as yet, we have nothing to suggest as to the correct genus for it. Gruzov has noticed this as an edible species (cf. Gruzov, Alg. Fideschi, etc., p. 31, 1974).

Family 104. Ceramiaceae.

There are only scanty evidences of this family in Samoa, but sufficient to indicate that in proper situations several genera and species may be represented.

Ceramium punctiforme sp. nov. Fig. 29.

P offered microsporose, repentus, in superficielis basibus Corallinae velarum crus-cenii rum inciduntibus; flamentis primariis, usque ad 1 mm. et ulter latibus, repenterus, substratum per radiibus composita penetraliibis, cylindriis, dorsaliis ramos in serosis dubius leviter div-agregatos positis emittendentis, cellula apiatii longitudinaliis crescentibus, cellula magni unialatere posti compositis, ad disseminatae corticatis; cellulae corticatibus in zona ad disseminata ordinatis, quamvis aut minorem partem introdutorum tegentibus, parvis; radiibus flamentis rhizoideis paralleliis angustissimis substratum plus minus penetrabilibus compositis; ramis simplicissimis, erecta, 4-8 pedicellis; tetraesporangii ad nodos verticillatiis, immersis, tripartitiis; antheridii cystocarps ignoti.

No. 1223, on outer portion of Poraden hill, Fagatua Reef (July 15, 1920), with tetrasporangia.

This minute Ceramium may barely be detected without the aid of a lens, from the small spots it makes on the Poradon pavement of the reef. It is so dwarf and so repent as to be unlike any other member of the genus described. It may be referable to Ceramium pertamii Richards, but I have seen neither cystocarps nor the so-called polyozones in my specimens. My species may be the same as Ceramium verticillatum var. subverticillatum Gruzov (Alg. Fideschi, etc., p. 31, 1974), but the description of that variety under Gonococcus subtilis Klotz, seems to preclude the possibility of their being identical. The simple repent main axis, the erect branches in two dorsal files, the shortness and specialization of these erect branches all point to specific differences even to generic distinction.

Ceramium byssoides Harvey, N. E. B. Amer., 2, p. 218, 1857?

No. 1174, "Oceanic Buoy," Pago Pago Harbor (July 20, 1920, legit. F. A. Potts). This slender, under-watered Ceramium may possibly be the same species that
Grunow (Alg. Fidechi, p. 30, 1874) has referred to C. hymenoides Harvey, a Florida species. I have seen bits of it here and there, but never any well-developed plants. I can not refer it to either of the species of Ceramium already accredited to Samoa.

Fig. 29.—Ceramium pseudiformes sp. nov. (No. 1223).

1. Portion of sterile filament, showing main axis, erect branches, and descending rhizoids, at the tips of which are cells of the base, showing penetration. x 1525.

2. Portion of tetrasporic plant. (Lower.)

—Centrocera clavulatum (Ag.) Mont., Fl. Alg., p. 140, 1838?

An occasional filament is all that I have seen of this commonly distributed species of tropical and subtropical oceans. There can be no mistake, however, in its identity. I have seen it particularly in No. 1132, from Nuual, intermixed with Bootsia. 


No. 1573, on buoy C, Pago Pago Harbor (June 12, 1923, legt F. A. Potter). A scanty and sterile specimen is all I have to represent this species on Tutuila and, for that matter, in Samoa as well. The identification seems certain.

Griffithia furcigera (Turv.) Gruhl. Alg. Fidechi, etc., p. 30, 1874.

No. 1590, with Lyngbia, tufted, on tip of staghorn coral (Acropora phaceloides), Ava Reef (June 12, 1923, sterile).
There is only a very meagre list of the graphic to place this species among the plants of Tutuila Island. I refer it with great doubt.

Family 105. Rhododendraceae.

The Rhododendrons are a large family and well represented in the tropics. The collected specimens are few, but the Rhododendrons are a fairly number of species. Amongst there are 15 species recorded for Samoa.

Buxiflora viiellardi R. et P. Fl. Fiji., vol. 15, p. 45, pl. 36, figs. 6-8, 1868.

No. 1139, forming cord-like masses, well up on basal rocks; portion transplanted to Rusten Bay (July 11, 1920, sterile).

I have used the name of Rusten rather than B. viellardi (Vahl) J. Ag., because my plant seems to agree with his plant better than with the description, plates, and specimens from the West Indies. It seems to be much less richly provided with long monopodial branches than the West Indian plant. Comparison of full series of specimens may show that mine to be included under B. viellardi.


No. 1112, August Island (June 13, 1920, sterile, leg. A. A. Treadwell); No. 1216 Nu'u (or Goat) Island, Pago Pago Harbor, forming masses high up on basalt rock (July 14, 1920, sterile).

The plants referred have been seen to agree with the description and figures of Rusten's Buxiflora viellardi & B. stenophylla but are not as complex as distributed plants of Ampelosia species (Buxiflora) M. A. Reine. My specimens are more nearly in agreement with specimens of Ampelosia species distributed by Reine, in fact are of closely identical form which I am indebted to refer them to Reine's species.  

Polyorchis glomerata (C. Ag.) Schmaltz, in Engler u. Prantl, Die nördl. Fl. Sam., vol. 1, 2, p. 448, 1867.

No. 1074, on buoy A, B, or C, Pago Pago Harbor (June 11, 1920, sterile, leg. F. A. Potts).

A low, deep-red, tailed plant, in small quantity but agreeing with Gmelin's specimens from Tonga.

Lophosiphonia obtusa (Ag.) Flett, Monogr. Rhod., p. 900, 1901.

No. 1217, forming small masses on basalt rock, Nu'U (or Goat) Island, Pago Pago Harbor (July 14, 1920, with tetrapolar), No. 1220, similar association at same locality and date.

These seem to be definite reasons for placing the two collections cited above under Lophosiphonia obtusa, as least in some limited, rather than under I. nobilis (Harv.) De Toni, which seems different from my plant and from plants referred from the tropical Pacific to it. The Polyorchis nobilis Harvey as illustrated by him (Flora Aust., p. 183, 1842) seems to be a different species of more dense and regular growth and with the erect branches destitute of branches of their own.


No. 10334, on staghorn coral (Acropora pharensis, reef at Usul, June 3, 1920).

I refer here, with grave doubt, a 4-tailed plant forming a loose covering on staghorn coral. It has few tips, and those not characteristic, and it is sterile. It
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is probably a Lophophorina. It agrees fairly well with Kuetzing’s figure (Tab. Phyc., vol. 14, plate 37, figs. n-c, 1864).


No. 1073, on buoy C, in Pago Pago Harbor (June 10, 1920, sterile, leg. F. A. Potts). The specimens from “buoy C” are well developed though sterile, and agree well with Kuetzing’s description and figures and also with specimens distributed under this name at No. 14 of Harvey’s Friendly Island Algae.


No. 1073, on buoy, Pago Pago Harbor (June 11, 1920, leg. F. A. Potts); No. 1083, Aua Reef (June 12, 1920); No. 1107, on stones and on reef patch, Aua (June 14, 1920); No. 1108, reef at Nuulii (June 18, 1920); No. 1124, on reef at Asmuu (July 12, 1920, leg. Dr. Alfred Q. Mayor).

This attractive, low and slender but more or less rigid species forms sparingly low pyramidal patches from an intricate base. The color is pinkish white, in general effect. It is second to Halimeda quinqueloculata in frequency, an erect form, and stands intense illumination fairly well, but shows at times a tendency to nestle in hollows.

Laurencia ceylanica J. Ag. forma?

No. 1089, on Actinodiscus rigidus, Aua Reef (June 12, 1920).

A few small plants of this strongly compressive pinnae plant were found. The callois-like pinnae point to this species, of which it may be a form or an undeveloped plantlet.

A few other seemingly undeveloped species of Laurencia were found, but not sufficient to hazard an attempt at determination.

Family 106. Delossieraceae.

No member of this family has been recorded from Samoa, although a species of Niphophora and one of Caloglossa have been described from Tonga. One, at least, of these occurs also in Savoa.

Caloglossa viellardi (Kuetz.). Comb. nov.

Hydrophysum ciliolati Kuetzing, Tab. Phyc., vol. 16, p. 4, pl. 10, figs. n-c, 1856;

Caloglossa viellardi Harvey, Friendly Island Algæ, No. 33 (renamed violacea), 2. G.


No. 1039, creeping, lower side of encrusted polyzooid coral, on Nuulii Reef (June 5, 1920, sterile).

It may very well happen that this species is nothing but a variation of C. leprieuri, but it seems best to keep it separate for the present and to restore to it the exact specific name. It has been seen at many places and usually is scant, creeping over the lithothamnia.

Family 107. Sphaerococccaceae.

Several members of this family are recorded from Samoa and may be expected on the shores of Tutuala. I have only one species but that is a very interesting one.

Hypnea nudula sp. nov. Fig. 30.

Fondibus lace intricate, eospinosa, in Acroporis phaeoedra tadcutans, 5-6 mm. altis, decomposito ramosis, leviter compressis aterrubescuntibus; axi primario plus
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This very distinct species has been distributed by Harvey (Friendly Island Algms. No. 44) as Hypnea parenes J. Ag., which is certainly is not. It is one of the most interesting of the photosynthetic of the reef mont. It usually nests, or snags, down under a compact mass of'strands of staghorn coral, such as the natives assemble and stack in low windows in the reef mont for fish traps. Well down in the pit, the Hypnea nidulans nests in bunches in such fashion as to seemingly avoid the extreme illumination. It is frequent on the sun reef and probably also on the other exposed reefs.
Family 108. Gelidiaceae.

The Gelidiaceae are frequent on stonelike rocks as surface patches in the reef areas and reef rocks as very tangled masses, and on the Feniolithium undersea association as slender and microphyceae herbopaths. i.e., very minute creeping Gelidiaceae. (Gelidiaceae) (Fig. 1) Fig. 1.


Gelidiella racemosa, in its various forms, is a tall-tipped, cylindrical, dark-tinted species, conspicuously conspicuous in small pools on the reef face.


No. 1361, forming turfs on Aua Reef off Lahona (June 12, 1920), No. 1362, Lolu'i Reef (very minute herbopaths).

The flattened branches and tufted habit, together with methods of branching and dimorphism, indicate that any place is the same as that of Reinb.ildel. description. The internal tissues are regularly distributed through all the intertial layer of cells.

No. 1039 and many others of the undivided stamnitzella show stonelike forms whose morphology is very close to that of G. sarcomacee. They are minute and seemingly simple in structure, and show both tetraneuropsis and cylindricp. They constitute a considerable portion of the common microphyceae, beliphyceae, herbobaths flora of the reef area. Further study may show species independent, but may be designated as G. minor (green species, minor, minimum collection, red spot sea, herbophyceae).

Gelidiella reniformis (Ag.) Kütz. Spec. Alg., p. 757, 1890. Fig. 21.

No. 1126, on the reef patch off Aua (June 14, 1920), with tetraneuropsis; No. 1145, in expanded patches on Aua Reef, opposite Lahona (June 12, 1920, sterile).

This slender (0.1 to 0.2 mm. diameter), cylindrical, very much intercrossed and branched species seems to be frequent on the reefs. It is to be distinguished by its habit, diameter, and the external cells, which are large and longer than broad, measuring 8 to 15 μ long by 4 to 6 μ broad. The inner cells are parenchymatous and there are no slender, longitudinal, thick-walled fibers. There are several to many species of the genus Gelidiella related to Gelidium reniformis, which need careful study. The tetraneuropsis are as far as seen in No. 1126 borne on short stipeless-celled branches, single or clumped.

Gelidium cristatum (Ag.) Kütz. Foss. alg. vol. 11, part 1, p. S52, 1875.

No. 1203, with Chlediarum elucidation, on basaltic rock, Papahau Bay (July 11, 1920, sterile); No. 1202, same locality, same view, (N.y. 1467) X 300.

I have examined the two sets of specimens on which Gelidium cristatum is found and fail to see any essential difference between them. No. 94 of the Cyton algae and No. 40 of the Friendly Island algae were examined in Barb. Harvey at Trinity College, Dublin, and the latter was also examined in Herb.
The vegetation of Tutuila Island.


Galaxia maria Kjell., Kjell. & Veteneh. Akad. Handl., vol. 37, no. 1, p. 45, plate 2, figs. 1-9, plate 20, fig. 11, 1900.

No. 1028, on staghorn coral (Acropora placentum) on reef-patch off Aua (June 3, 1920, sterile fragment). No. 1206, forming closely compacted, dark-red mass on exposed boulders rocks on Breaker Point (July 17, 1920, sterile). I have compared my plants with Kjellman's description and figure and also with No. 31 of Harvey's Friendly Island Algae (sub Microtheca lobopetaloa). They all seem to agree.


No. 1038, in dumps among corals, etc., on Aua Reef (June 12, 1920); No. 1106, in dumps at bottom of stones, etc., reef-patch of Aua (June 16, 1920, antheridia and tetraspores.)

Mss. Weber-Van Beee saw the tetrasporangia cystocarps and antheridia of this plant for the first time and has stated the results of her observations (Sylloge Exp., Monogr. 575, pp. 206, 207, 1921) and has reasons for keeping the genus Actinostichia still distinct from Galaxia. I have seen, thus far, only tetrasporangia and antheridia, which correspond to the descriptions of Mss. Weber. Actinostichia rigid is very common in usual bowens or depressions on the reef flat and is there a typical macrophyte physophyte.

Family 110. Nemalionaceae.

I did not find any of this family, but the naturalists of the U. S. Exploring Expedition collected one very interesting species on Tutuila.


This species seems to have escaped notice and is not to be found in the works of J. G. Agardh nor in the Sylloge Algaeorum De Toni. I found a portion of the type material in the Herbarium of J. W. Bailey at Brown University. It was labeled as having been collected as "Tutuila in the Samoan Group." The specimen reached a height of 16 cm. are red, slightly calcified, closely beeted with numerous short, stout, lateral branches, mostly simple but occasionally with one or two longer
VEGETATION OF TUTUILLA ISLAND.

Family 111. Bangiaceae.

There are few members of this family in Tutuilla. I found only the Goniocaulon (Bass. & R.) W. F. H. Goniocaulon albidum (Radd.) M. A. Howe, Metz. Torrey Bot. Club., vol. 15, p. 76, 1914.

No. 1292, on Pericymenia, on leaves, Pago Pago Harbor (June 14, 1920, leg. F. A. Porta).

I have seen a diatom or two of this in a number of preparations and think that it is not infrequent in my collections. It is widespread in warmer seas and is placed, usually, under G. elegans Dan.

Subclass 2. MELAPHYCEA.

It seems best to use the name of Melaphyaceae (Stearn) for Dr. Ludwig Rahn's Aglaonychinae, etc., 1966, p. 30, since it was proposed much earlier than Periphyceae (Kjellman, in Engler and Prantl. Naturl. Pfl.-Aun. 60 (Lud.), p. 176, 1891). The members of this class found about Tutuilla are few. Ratcliffe in Rendle's account (1966, pp. 209-211) enumerates 11 species, and in Reckinger's (1909, p. 293) 13, all of which are additional, making 15. I found 10 species in good condition for determination, 7 of which are not included in either of Rendle's lists. This makes 23 species of Melaphyceae recorded from Samoa and 10, only, from Tutuilla.

Family 112. Sargassaceae.

The sargassum, or gulf-weeds, are usually abundant in tropical seas and Tutuilla might be supposed to have a considerable number. I found 2 species, either growing in pools on basaltic rocks or nesting deep in partially shaded hollows of the rock.

Sargassum anaspense Setchell et Gardner, sp. nov. Fig. 32.

Frondes 2-3 dm. alta, per reliquias angustis parenchymatisa albitis monocarpie; albitis caulis, teretibus, ramos quaque ensibus unitemittibus; ramos caulis secundarios numerosis, comparatis curvis, altissatis (curvatis inflexibus; flavillosus parum tumidusque, tumidumque numerosiusque paulo queus terreis, levibus, plus minusve gatyllato; receptaculis a foliis basiul foliis circuminitis, ovatis, cuneis densis formatis, plus minusve verticillatis; filis fructiferis, lanulatis, utarque,tereis, albis alternatis, 2-3 cm. longis, magnumis leviter densatis, latere utarque, borucatis, coeli medio subtus persistens, tenebrosi, trichomes comparati ombri, inconspicui, plerumque in latere utarque sectae erumpentes in linum singulari; veliculae ignaves.

Samoa name: Linu Tala (improper Linu Kala).

No. 1207, in small tide-pools, in basaltic rocks, littoral belt, Agape (or Apose) Bay (July 11, 1920).

We have compared our plants with the descriptions of all the species coming within the limits of the general characters, and while our plants are all destitute of anthodes and therefore perhaps not fully characterized, they seem to be new, certainly not related to any of the species previously recorded from this region of the Pacific. No. 1207 evidently belongs to the "Cymenae" and seems to
some nearest to *Sargassum cyanarum* (Ag.) J. Ag., but differs sufficiently in the character of leaf and inflorescence as not to allow of its being placed under that species.

*Sargassum fanningense* Setchell et Gardner, sp. nov. Fig. 33, 1, 2.

Frandibus 1.5–2.5 dm. altis, per radices solidas, parenchymatosis, discoidens affinis; mononis; stipitisbus 0.5–1.0 cm. longis, teretibus, levibus, ramosque quieperi-
sum excententibus; ramis ramosis secundariis numerosis, curvis, subchasticis, fruticif-
eria indusiis; rhachidibus ramorum principaliorum leviter complanatis, in ramulis
secundariis teretibus; foliis angustis ellipticis, coriaceis, 1.5–3.5 cm. longis, costis
medialibus inconspicuis, apice fere evanescentibus, marginibus sericeis rigidis
dentium triangularium duibus ad laminas perpendiculares postis ornatis, cryptostomatibus prominentibus dispersis, emarginatis; veinsulae ignatas; receptaculis e
axillis rhachidibus proximis postis, in basilibus foliorum recurvatorum affinis, profuse
ramosis, plus minusve tuberculatis et dentibus curvis obtusiusque dense ornatis,
capitis densa spharica formantibus.

![Diagram](image)

**Fig. 32.—** *Sargassum fanningense* Setchell et Gardner, sp. nov. (No. 1207). Prowell del.

Samoaan name: *Limu Tala* (improperly *Limu Kale*).

No. 1200, in small pools, piled by spray and well above high-water mark, "iron-
bound coast" at Fanoano, beyond Tahina (July 21, 1920).

This species, with the double row of teeth on the margin, seems close to several
species with similar leaves, but in details it is quite different. Siuta says that it
is eaten.

No. 1290 belongs to the Fruticulosea and seems to belong nearest to *S. tel-
ophilum* (Turn.) J. Ag. and to *S. demipolium* Zan., but differs from both in leaf
and inflorescence.


Samoaan name: *Limu Tala*.

No. 1104, in large depression, under overhanging rock, reef-patch off Asa (June
14, 1920); No. 1205, in pool in basaltic rocks, Anape Bay (July 11, 1920). My
plants are very characteristic of this species.
Family 113. Dictyotaceae.

The Dictyotaceae are usually represented by a number of species in tropical seas and many are to be expected in Samoa. Only 3 are recorded from Samoa and I found 1 on Tutuila.

**Fig. 33.—** *Surugawam fornamense* Setchell et Gardner sp. nov. (No. 1200). Powell del.


2. Ralfsia paxooanum, sp. nov. Vertical section through frond, showing two sporangia (No. 1021). X 166.66 X 2.

*Dictyota lata* = D. *paxooanum* Setchell 1926.

No. 1076, on buoys, Pago Pago Harbor (June 11, 1920, sterile, leg. F. A. Potter).

I have only a single young specimen, but the broad lobes, short distance between the dichotomies, obtuse spines, and general agreement with a specimen from the Tonga Islands, collected by Graef and named by Grunow, led me to place it here provisionally.

Family 114. Ralfsiaceae.

The Ralfsiaceae had been little known in the tropics until the publication by Mme. Weber-van Bosse of the results of the Siboga Expedition, where 4 species are listed and described.

*Graefea* paxooanum sp. nov. Fig. 33, 3.

*Ralfsia paxooanum* sp. nov. (1-7 cm. diam., segregatis aut concrecentibus, atrobrunneis usque ad atis, arenicolls, tenusissimis, articinis adhaerentibus; parte
VEGETATION OF TUTULIA ISLAND.

basal 2-3-celled-stemata, filaments erecta, simplicia, dense stipula gerane fil-
manis erecta, fere cylindrica 200 µ altus, usque ad 8 µ diam., 15–20 cellulis
cylindraceis compactis, cellulis apicalibus constrictibus sunt lateris incrassatis; sporun-
gia paucifolia 3–5-celledata subulata, ellipsoides usque ad breviter chovariata, 100–120 µ
longa, 30–100 µ lata.

No. 106, on basaltic cobbles near Stellock's Wharf, Pago Pago Harbor (June 1,
1920, with sporangia); No. 1116, on rounded basaltic rocks, front of chef's
house at Aua (June 14, 1920, with sporangia).

My plant is near to, if they are not identical with, Mesospora schmidii
Weber-van Bosse, since in structural details they agree very closely, but the erect
filaments are scarcely at all slavate and the sporangia are not lateral but terminal,
each on its own filament or stalk. Most Weber gives no figure, but as I interpret
her description, the sporangia in Mesospora schmidii are intercal at the base of
an erect filament and, in absence of contrary statement, sessile as in Ralfsia ovata
and A verrucosa. Since Ralfsia ovata approaches E. verrucosa on the one hand
and Mesospora schmidii on the other, at least so far as complexity of base is
concerned, it seems to me unsuitable to split up the genus Ralfsia and, consequently,
I have retained it.

This species seemed frequent about Pago Pago Harbor, and the large circular, or
irregular, thin black, tightly adherent crusts were conspicuous on the light yellowish-
brown cobbles.

Family 115. Encollaceae.

Two members of this family are already listed as Samoan and 1 is added from
Tutulua.


No. 1253, in pools, etc., exposed to surf, on basaltic rock, Breaker Point (July
17, 1920, with gametangia).

There seems to be little question as to the identity of our plant and that of J. G.
Agardh. It may be doubted as to how many species are really represented under
the several names. My plants do not correspond to either Ch. pacifica J. Ag. or Ch.
chnospora (Harv.) Sonder; as for Ch. fastigata J. Ag., it is a larger than Ch.
pacifica and intended to include it.


There are probably a number of species of this family in Samoan, but this far
note has been reported. Two very slender species occur sparingly and sterile in
my collections, making identification doubtful.

Sphaecelaria ceylanica Sauvageau, Journ. de Bot., vol. 15, p. 224, fig. 25, 1901
(p. 112, Remarkes sur les Sphaecelariacees).

No. 1233, among other dwarf algae on staghorn coral (Acropora pharaonis), reef
at Lautii (June 3, 1920, sterile).

Only an occasional filament mixed with Lopholithon, Cedilla, etc., occurs, but
the slender fronds (about 15 µ diam.), the absence of hairs, and the single vertical
dissection, seem to relate my plant to the species, rather than to S. bowerbanki
Kuetz. There are no organs of reproduction, but even propagula, and it has been
impossible to determine the character of the base.

Sphaecelaria cornuta Sauvageau, Journ. de Bot., vol. 15, p. 243, fig. 31, 1901.
(p. 132 separapi, Remarkes sur les Sphaecelariacees).

No. 1115, in small patches on Pumice coral off Aua (June 14, 1920, with prop-
agula), scanty specimens, but seeming clearly of this species.
Family 117. Ectocarpaceae.

The delicate members of the Ectocarpus family are generally numerous and taxonomically disturbing. A single widespread Indo-Pacific species is credited to Samoa. I am indebted to F. A. Potts, of Cambridge, England, for a tuft of Ectocarpus from the "Oceanic S. S. Co.'s Buoy" in Pago Pago Harbor. This was found to be a most interesting mixture and I am indebted to my colleague, Professor N. L. Gardner, for great assistance towards unraveling its complexity.

Fig. 34.—Ectocarpus indicus Sonder (No. 1173a).
1. Diagram of branching, about x 1.4.
2. Branch with branchlets, gametangia, and (7) sporangia. x 87.5.
3. Cells, showing chromatophores. x 250.

Ectocarpus indicus Sonder, in Zollinger, Flora Archipelagi Indici, in A. Moritz, Syst. Verzeichn. der von H. Zollinger in den Jahren 1842–1849 auf Java versammelten Pflanzen, etc., p. 44, 1855. Fig. 34.

No. 1173a, in tufts, on dark (black) submerged portion of the "Oceanic Buoy," Pago Pago Harbor (July 1920, with gametangia, legit F. A. Potts).
I have reported as distinct and, as nearly as anything yet referred, as typical, Eucalyptus leucoxylon, an E. tenuiramullosa plant, with the same branches alternately second in three and four. The gummangnia are sensorial, subdeltoidal, obtuse, 0.6 to 1.2 mm. high and 24-35, or 25-35 mm. broad. I base this opinion, which differs from that of Weber et al. (loc. Boga Exp. Monogr. 29, pp. 222, 130, fig. 24, 1010), principally on the fact that this plant agrees fairly well with the description of Sonder, 1907, and as described and figured by Mrs. Weber does not, although her original was obtained from the type material. As I have stated above and will make plain below, I find no less than a perfectly distinct species growing intertwined in the same cult of the "Oceanic Box." It does not seem extraordinary, therefore, to assume that the type material also have been a mixture, and that Mrs. Weber obtained one of a plant different from that which Sonder had in mind. Sonder says, "bipollinaris vel uluta," but Mrs. Weber's plant is judged from the figure, not much over 0.6 cm. of an inch (about 0.5 cm.) high. In the second place, Sonder's description reads: "Filis decompsonato-ramosissimis, ramis ramulosis alethio subscuse." Mrs. Weber's plant cannot be called "decompsonato-ramosissimis." I have a record of a plant in the mixture under No. 1173, similar to Mrs. Weber's plants, and refer it below under No. 1173b.

Auchenios (Alme, in Pflanzenforsch. S. A. S. 307, Bezet, p. 19, plate 5, figs. 2, 10, 1968) described a plant from Moreton Bay, Australia, under Fraxinus distans Sonder, and distinguishes two forms, viz., No. 1, smaller, with cylindrical gummangnia, and No. 2, more slender, with gummangnia conical above, but blunt. I suspect that Auchenios' No. 1 is the plant I refer to as the type and that his No. 2 is what I refer to below, under No. 1172c.

M. E. Vickers (Phys. Parta 1, plate 23, 1068) has figured the Eucalyptus pseudococoon Cootam. The agreement of my specimens of No. 1173a with M. E. Vickers' conception of Cootamus' species is extremely close.

Eucalyptus durhamianogigantea Grunow, Alge, in Reise der (Est. Freg. Novara, Botan. Th., vol. 1, p. 49, plate 4, fig. 1, 1879, Fig. 23.

No. 1172b, in tufts, on dark (black) submerged portion of the "Oceanic Box," Pago Pago Harbor (July 1920) with gummangnia, leg. F. A. Potts.

The plant I refer here have variable height and usually very short, about 4 to 5 mm. high. The branching is less abundant than in E. tenuiramullosa and shorter. My specimens agree extremely well with the description and figures of Boragenn (Proc. Alg. Inst. J., part 2, p. 109-102, 127, 128, 1914) except as to height. In this, my specimens and those of Mrs. Weber agree better with the descriptions of Auchenios than do those of Boragenn. Mrs. Weber's figure of E. radians (loc. cit., fig. 34) agrees well with Boragenn's figure 129 and belongs under E. durhamianogigantea also.

Eucalyptus van Bouwae Stichell et Gardner sp. nov., Fig. 20.

Frondes erectae 10-15 cm. altae, spinulis leviter attenuatis, interdum in pilis curtis densitibus, per filamenta numerose, repente aequales; ramulis ulnae sparsis, 35-45 mm. diam., 2-3-pinnullosus; chronophorics brevissimae aut discoidales; gummangnia (filiformes) eliptico-ovales, 45-50 μ longae, 22-35 μ latae, in plantis inodori cum gumangnia inaequantibus, gumangnia sparsae, interdum, aequales aut in pedunculis semiellipsoidales subulatis, eliptico-ovales aut elongate conicos, 60-75 μ longae, 20-40 μ latae.

No. 1173b, in tufts, on dark (black) submerged portion of the "Oceanic Box," Pago Pago Harbor (July 1920, with gummangnia, leg. F. A. Potts). The dwarf plants, 10 to 15 mm. high, referred here are very slightly brachyderm and with scales or pedicellae (1 cell) ovate conical gummangnia. They are similar
to Ectocarpus simplex var. elatum Adans., but the zoids are only about half the size of those of that species. They may be var. No. 3 of Adare's Ectocarpus flexuus, mentioned above. They are very close to, if not identical with, the plant described by Miss. Weber-von Degen (loc. cit., p. 131, fig. 65) as "Ecto-
carpus spec. Ectocarpus simplex plant." I take pleasure in designating this species
as Miss. Dr. Anna Weber-von Bone.

**Fig. 38.** Ectocarpus denticulatus Grev. (No. 130). (Miss. Dr. Anna Weber-von Bone, fig. 38.)

1. Four figures to show base and upper branches. Base and branches with gametangia and (?) with gemellae and gametangia. × 87.5.
2. Cells, showing chromatophores. × 175.

This species appears to have both sporangia and gametangia on the same plant, but it is so confused as to whether the second sporangia are not abnormal, possibly gametangia.

**Ectocarpus breviventerus** J. G. Agardh, Cif. Kongl. Sv. Vetensk.-
Akad. Förh., 1847, p. 7. Fig. 27.

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There can be no question as to the distinctness of this species from any of the other three species associated with it. It is difficult to determine its exact height, but it is certainly several centimeters tall. The entangled ultimate branches, with short cells and the globular to oblong-ovoid gametangia, mark it for a very distinct species. It agrees well with Enterocystus hemiscus (Crown, as represented by Volkers [Phyc. Paci., pt. ii, p. 41, plate 23, 1905]), and which is stated by Evergreen to correspond with a authentic specimen of J. G. Agardh's Enterocystus brevirostriculatus of the Algae Liebrechtum (cf. Evergreen, Mar. Alg. Bau, West Ind., part 2, p. 373, fig. 120, 1914). The type locality is St. Augustin, on the west coast of tropical Mexico.


The green algae are usually unicellular in tropical waters, both fresh and salt. The absence of any considerable amount of fresh water on Tutuila eliminates one source. On the reef, the species are represented chiefly as filamentous and trichophytes, although in the reef-crest there are some metaphytes. A few of the green algae are calcareous, but probably add no considerable contribution to reef formation.

Family 118. Caulerpaceae.

The Caulerpaceae are represented by 6 species in Samoa, 2 of which occur on Tutuila, 5 on Upolu, and 1 on Rose Atoll.

Caulerpa cladoidea (Turn.) Ag.; Spec. Alg., vol. 1, part 2, p. 357, 1922.

Samoan name: Amaumoa.'u.

No. 1070, on buoys, Pago Pago Harbor (June 11, 1920, leg. F. A. Potois); No. 1092, in batters among branching coral, in compact turf, reef-patch off Ava (June 12, 1920); No. 1212, reef at Atua, clinging around stones (July 17, 1920, leg. Dr. Alfred G. Meyer).
All the forms of this species found are small, and are phaladophytes when growing on the reef. Silupa says that it is eaten by the Samoans. It is a common species.


No. 1103, snuggling into hollows and entwined with *Halimedæ opuntia*, making a dense mass. reef-patch off Aua (June 12, 1920); No. 1111, on reef at Aumus Island (June 13, 1920, legt. A. L. Treadwell); No. 1296, snuggling in among the projections on rosette corals, Faga’uvi Reef (July 15, 1920).

This species of *Caulerpa* is nearly as common as the preceding. On the reefs it is small, slender, and distinctly a phalado-phyte.

Family 119. Codiaeae.

I have found 3 genera and 6 species of this family on Tutuila, and only 1 other species, a doubtful one, has been recorded for Samoa. This is a poor showing for tropical coral seas.

*Codium bilobatum* sp. nov. Fig. 38.

Froündibis repenibus, plus minusve complanatig, angustia (1–3 mm. latit), pausim radicanibus, sucitate viridibus, sparse et irregulâter dichotomiaaut sub-dichotomia- mons, ramos frequenter curits et dascacerniformibus; utriculis magnis, 120–190 μ diam., regulâter late aut anguste obovoidis, membrosis non incrassatis, sed ubique temuibus; plus utriculiurum curis, moderate crassis, obtuse subuliformibus, hats bulbosum-tumidis; gametangia ignotis.

No. 1035, fragment in deep hollow in *Porolithus exodera* thallus, reef-patch off Aua (June 3, 1920, sterile); No. 1032, creeping and "rooting" at intervals, among slagborn corals, reef in front of Laului (June 9, 1920, sterile).

This small creeping species has very characteristic utricles and hairs; otherwise I would not have ventured to give it a name.

In habit it resembles rather closely *Codium regens* Crouch, as illustrated by Mr. Vickers (Phys. Barb., p. 1, pl. 29, 1928), but the utricles as figured are very different from those of our plant.


No. 1000, thrown ashore in great quantity all along the south and west shores of Ta'ufau Harbor (June 1, 1920); No. 1003, on stones at 1.5 meters depth, on A reef front of Pagatau (June 8, 1920); No. 1003, on stones, front of Aua (June 12, 1920); No. 1138, on rocks in sandy mud, entrance to lagoon at Nu’uuli (June 15, 1920).

This is one of the most common species on the reef (if we except *Porolithus* exodera on exposed reefs) and grows in quiet water as well. It is the only seaweed I found that ashore in any noticeable quantity during my stay (June and July 1920) on Tutuila.
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No. 1228, entrance to lagoon at Nito (or Tahaia) in mud (June 15, 1920, legit. A. L. Trendall); No. 1128, in mud, entrance to lagoon at Nuto (June 13, 1920). This broad-joined species grows, in company with the other two species of this genus, in dark calcareous mud at the entrance to the lagoon between Nito and Tahaia, and in considerable quantity. No. 1228 was determined by Marshall A. Howe.

Halimeda friderici (Bill. et Soland.) Lamour., Hist. Polyp., p. 208, 1846.
No. 1199, is sand, front of Ana valley (June 14, 1920); No. 1129, in mud, entrance to lagoon at Nito (June 15, 1920, determined by Marshall A. Howe). My specimens all seem to belong to the var. rotundata Czep. et Czep. (Slooga Rep., Micron., 59, p. 26, pl. 4, fig. 44, 1901, nul. 'A. Humboldt'.

No. 1200, attached to corals and lithothamnium, moving in current or wave, red patch off Ana (June 14, 1920); No. 1211, on the reef at Akoa Island (July 12, 1920, legit. Dr. Alfred G. Meyer); No. 1283, an coral, Ana Reef, opposite Utune (July 17, 1920).

Chlorodesmis corallina was found to be a frequent plant on all the reefs. It was observed many times to determine its presence, but without success. The base is simply a sheet and the whole appearance of the plant would have led me to place it in Dictyosiphon, or sea Fan, rather than with the Colinnium. Ural separative organs are found, it will be better to leave it among the Dictyosiphon, where it is a most anomalous member.

Family 120. Phyllophilinaceae.

There are only 2 genera and few species in this family. The non-marine members are endemic in Avacese and Utrineese in the tropics. The marine species are transplanted in shells and corals.

Osteophyllum mediterraneifolium Boerg. & Pav. in Pav., Ostereich. botan. Jahrh., vol. 33, p. 269, 1884. Fig. 66.

No. 1288 and 1289, in corals or various forms, reef at Lula (June 5, 1920) as well as frequent on other reefs.

Osteophyllum is often met with and is not infrequent as a transplanted on the reef.

Family 121. Bryopsidaceae.

The species of the genus Bryopsis of this family are difficult to determine with accuracy. Reinholtz (in Reineckes list) credits two species and I have two, which seem to belong under other names than those given by Reinholtz. One of these is a very frequent species on the reefs.

Bryopsis haemastis (C. Agardh, Till. Alg., Syst., 5, p. 22, 1886.

No. 1034, in lagoons on staghorn corals is lateral current in red-moss, Lula (June 2, 1920); No. 1025, on staghorn corals, red-moss, Ava Reef (June 13, 1920); No. 1200, on corals and coral reefs, red-moss at Nito (June 15, 1920).

I have thought it best to keep this species same for my Tuvalu specimen. The plants are all of the same type and have the stalk all turned to one side, as is characteristic of this species when kept distinct. As to insertion of the ramuli, they may be in series on both sides of the axis of the plant, or in only one, i. e., separately spaced. Each series, however, is made up of two vertical ranks, with a small angle between them. The ramuli, then, are, strictly speaking, dichotous
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As mentioned on the title, with the general appearance of being distinguished or not, but in either case, with all the usual of a parasite, turned in the same direction, giving such parasites the greatest appearance of being recorded. The tips are always incised. It is a common member of the phylum in the red algae. Distinguishing back and forth in the currents. It has been distributed from Pago Pago (Friendly Islands) by Harvey.

Stygoepia pooti, sp. nov. Plate 20, fig. 2.

Frontalis tener, visibilis simplicity, sunt ovus quadrata et irregulariter marces.

(?) rhizoides 1-5 cm. alba, 326 μ et alba marces, immae nodo, immae (50) 1-6 cm. albae hominis unguis ad apicem parallelom rhizoidi, 25 μ (intrae circa 12 μ albi, immae, nesun et quiescentum venas.


I feel very different about proposing a new species in the genus Bryopsis, but I am anxious, Delicate species, seemingly simple at very nearly so, with the axis surrounded on all sides by thin broad medlar surfaces, seem so different from anything described that I am compelled to propose it as new.

Family 322. Valoniaceae.

The Valoniaceae are plants entirely peculiar. They are not frequent on the reef.


No. 1701, en under side of coral blocks in reef, on or near pool. Ava Reef, Friendly Islands (June 15, 1920).

My plans are such, above the size of a grape, unbranched and sessile. They seem to belong later.

**Valoniad bicornis** Haeckel, in J. C. Agardh, Till. Alg. Syst., pl. 5, p. 101, 1889. Fig. 28.

No. 1701, on under side of coral blocks among fragments of coral, forming inexact masses of small, dichotomously cuneate, attached by rhizoids arising in circles; frequent in small pools on reef-patch, Ava Reef (June 14, 1920).

This species is frequent on the Ava Reef and reef-patch. The habit, branching, size, and occasional structure of rhizoids distinguish the species, one of whose original (type?) came from Pago (Friendly Islands).
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_Synonym name: Pucea._

No. 1049, on coral reef at Laulii (June 5, 1920); No. 1079, snuggling into interstices among corals, Ana Reef (June 12, 1920).

There is a _Dictyosphaeria_ commonly occurring on the reef in single or few specimens of various sizes. It is solid and, in general, comes close to _D. verluyxii_, where I think best to place it. The segments are commonly 1 mm. and over in diameter. I have seen few of inwardly projecting spines, but those I have seen did not reach a length of more than 55 μ. Some of my specimens have irregular cavities, but they always (?) run in from the surface and are probably accidental. I have seen no specimen referable to _B. furvus._

[Fig. 40. — *Cladophoropsis limicola* sp. nov. Powell del. Filament to show branching and position of scopae. × 105.]

[Fig. 41. — *Cladophoropsis inostata* sp. nov. (No. 1144). Powell del. 1. Filament. × 40. 2. Holdfast. × 175.]

_Boodlea van bossei_ Reinbold, _La Nuova Notarisiis_, vol. 16, p. 144 (sub _B. van bossei_).

No. 1132, in tufts on reef near Nuuhi, scantly (June 15, 1920); No. 1147, frequent on staghorn coral (Acropora pharensis) in pools and reef-mont, Ana Reef, opposite Utuote (June 15, 1920).

The large size of the filaments (250 to 350 μ, main filament, 100 to 120 μ ultimate branchlets) leads me to place my plate here.

_Cladophoropsis limicola_ sp. nov. Fig. 40.

_Filumina intrinsea erecta, caespites extenso, inagine coletens formatibus, 1-2 cm. altus, sparse plus minus secundae aut fasciato-ranseae; segmentis 120-160 in diam. 6-10-plo longioribus, apicalibus obtusis; dissepimentis intercalatis et scopis basam ramorum positis._

No. 1167, forming a turf on the mud in mangrove swamp back of Ana village, exposed at low water (June 24, 1920).
The specimen referred here seems to be a Chladophoropsis, and in its simplicity of its structure, without rhizoids or holdfast, its sparse branching, and its diminutive size, seems distinct. It forms a distinct and considerable association, appearing from a short distance much like the extended patches made by a coarse Vaucheria.

Chladophoropsis infestans sp. nov. Fig. 41.

Filaments intricately, palmily, interlaminated, frustules infestans et indutum lageno formato, frustules minutissimae, testa abscissum internum frustulam per ramulis radioseminatum sparsa ramis, ramis secundarum, plurumque simplicibus, desintegnata; racemum ad usum ramosum plurumque intercalarios frustulorum internorum ramorumque; fl. prim. 55-56 μ, erecta, ramis 55-57 μ.

No. 1134, forming a low, fuzzy growth among the branches of Conidioblastus frusticem, reef at Nuuhi (June 16, 1920).

Seemingly a distinct, low, little-branched species, occurring occasionally in similar habitats. It has something the appearance of Chladophora incana, but seems to differ in dimensions and habitat.

Family 213. Cladophoraceae.

The members of Cladophoraceae inhabit both fresh and salt water and are well distributed throughout the various zones of temperature.


No. 1112, intermingled with Ascophyllum and other alga, Aumua Island (June 13, 1920, legt. A. L. Treadwell).

A rather coarse form of what seems to be this species was cut with several times a small quantity. It is about 45 μ in diameter and without rhizoids.


No. 1117, forming a deep, green layer on the steep slope of a fresh-water rivulet along the road near Vasaesena (July 8, 1920).

The plants mentioned above seen near the war, underlaid Alloch, of Rhizocodium hieroglyphicum. The segments are about 30 μ in diameter and 10 μ long. No rhizoids were seen.

Rhizocodium sameense sp. nov. Fig. 42.

Filaments longa, intricata, strata tennia, isosa fragmentibus; segmenti filamentorum 45-50 μ, rhizoidibus, 2-5-pla longitudo, ad disipationem non constans, rami picta, rami intercalarios internarios elongato, ramis rhamnoides terminalibus, curvato aut longioribus, non septatis, ramis oblongo ovali, alicubi (?) similes internarios teretiformes ramiferae.

No. 1005, on shaded rocks and trunk of Borinquenia pectinata, high up, men by spray, Hu arrived Point (June 1, 1920); No. 1110, forming a dense on shaded rocks, above high-water mark, wet by the spray, near Ana (June 14, 1920); No. 1113, "in erect (Info) on reef at Aumua Island (June 13, 1920, legt. A. L. Treadwell).

This rather common species seems to be distinct, although related to R. sikeri Kuetz., R. horizon Zell., and R. africanus Kuetz.


No. 1120, small dwarfed clumps in reef-pools, Aden Reef (June 20, 1920); No. 1285, in small pools in basaltic rock, kept dried by the spray, Fantano (July 21, 1920).

This seems to be the plant which is widely distributed in the Pacific and Indian Oceans.
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The plant referred doubtfully above seems to be a Chlamydomorpha, 120 to 150 μ in diameter, with segments 0.5 to 1.5 times as long as broad and very slightly constricted at the dichotomies. It was found under ice in masses of some size, intertwined with Enteromorpha fasciculata. It is closely related to C. Flavus (Müll.) Kureta, but is more slender and with shorter segments.

Cladophora pinniger sp. nov. Plate 59, fig. 1 and fig. 12.

Found once 8 mm. alt., and primary diameter, 0.02 mm.; main axis dichotomous at dichotomies minutelycephalicae et dictyototomo minima, secundae aut laterale similium. In unprimario diametro pe[ctma, primario similium; segmentali ac primum 10 μ lat, usque ad 20 plm

Fig. 42.—Rhodochorton sanguineum sp. nov.: Stroma, thallus, and velamen (No. 1115). v. 88.36×. Rood del.

No. 1771, in brooks, Pago Pago Harbor (June 11, 1853, leg. E. A. Peralta).
The form to be a very distinct species. The hold is well shown on plate 13, figure 1, and the details of two plants in figure 27. It closely resembles a plant collected on Upolu by Beadles and named by Greville, C. testudinosta var. Martinez, var. (cf. Rabenlo, 1856, p. 201).

Cladophora gigantea (L.) Kureta, Phyct., Germ., p. 212, 1843.

No. 1204, in large patches, on waterfall, Anaape Bay (July 11, 1853).
The overgrown masses of Cladophora found on the lower portions of the waterfall at Anaape Bay seem to belong to a variety or form of the widespread species.

Family 124. Dasycladiaceae.
The Dasycladiaceae are almost entirely tropical and are more or less intergraded with them. I found one species on Tutuila. Several have been collected on Tonga, but none in Samoa.
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No. 1838, only 3 specimens found on the under side of loose stones in rear-most Aug Reef (June 12, 1920).

The specimens show a very few sporangia, fused together, as is characteristic of N. annulata.

Family 125. Treadepholiaceae.

The members of this family are subaerial, being inhabitants of tree-trunks and rocks. They are various shades of color, from light yellow to deep orange-red or even crimson. The color fades on drying.


Samoan name: Liniuleni "Ufo.

No. 1308, on trunk of bread-fruit tree ("Ufo) among plantations back of Pago Pago village (June 1, 1920).

Forming an orange-colored felt and seemingly familiar to the Samoan, the filaments are 18 to 22 μ in diameter with elongated cells and sporangia terminal on short branches.

Family 126. Ulvaceae.

The members of the "sea-feeture" family are found in shallow waters in all temperature zones. The majority are marine or brackish-water species, but a few inhabit purely fresh waters. No species of Ulos or of Alonematrum seem to have been detected as yet in Samoa.
Entomorpha intestinalis (L.) Link, Epistaria, p. 6, 1829.
No. 1029, in mixture, floating in tide-waters in Pago Pago Harbor (June 5, 1920), slender plants, but distinctly of this species.

No. 1029, intermingled with the last; No. 1220, on "B Busy," Pago Pago Harbor (July 28, 1920, legit F. A. Poppe).

![Diagram of Entomorpha species](image)

Family 127. Autosporaceae.
The members of the Autosporaceae are almost entirely free-floating, colonial forms of fresh waters. I find one attached form in marine waters which seems to belong here.

Elakothrix (?) sp. sp. nov. Fig. 14.
*Trechodus microsporoides, Helias, 250-300 µ longus at 0-75 µ lata, formanthe; cellula singula, oblonga, in reticulo semel parvissimis 6-8 µ longae.
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4-5 μ latiss. Chroococcus is cellula quam angula pariter angulis; cellulis divisionibus et autopores ascendens vel acute.

No. 192, along with Peyssonellos ruuiro, on under side of rocke coral, Lusiti Reef (June 6, 1920).

I have not been able to determine the direction of cell division, but the arrangement of the cells in the gelatinous matrix points towards this genus.

Subclass 4. MYXOPHYCEAE.

The lime-green algae are primarily plants of warmer latitudes rather than cold, although a few grow truly Arctic. They are the only organisms which really thrive in waters over 27° C. They are to be expected in stagnant water in tropical countries but are usually not thoroughly colored. My own collections have not as yet been thoroughly examined for the smaller species.

Family 126. Stigonemataceae.

The members of this family are much more largely inhabitants of the fresh waters and sediments than marine. I have found one form here on the reefs of Tutuila.


No. 179, in an old shell, on beach, near chief's house at Ana (July 4, 1920).

This species seems to be bound closely by this species.

Family 129. Scytosomenataceae.

The Scytosomenataceae are largely subaereal in habitat, but some are fresh-water species and a few are marine.


No. 1179, forming greyish-brown patches on shell, beach near chief's house at Ana (July 4, 1920).

This specimen seems very typical of the species. The type is from Fiji.

*Scytozoon suppositum* (Kütz.) Bornet, Nöetl Alg., p. 146, 1880.

No. 129, lying near shell, upper edge of strand, near Ana (June 6, 1920).

No. 1288, on mud cliff near Pago Pago (July 6, 1920).

This common tropical species seems not infrequent about Pago Pago Harbor. No. 1029 is well developed and typical.

*Scytozoon eggratum var. samoense* Hieronymus, in Reitsche, Fl. Samoa Enslin, p. 255, 1897.

No. 1020, numerous of shaded rocks, under side of governor's residence, Pago Pago (June 1, 1920).

This may be the var. samoense, but is slightly more slender and I can not detect any granulation of the sheath.


No. 1005, forming a low, epilithicum black expanse on boards of bridge, well above Pago Pago village on Pagoa Trail (June 9, 1920).

Typical specimen of this widespread tropical alg is included in the above number.
Family 130. Nostocaceae.

The Nostocaceae are also largely subaerial or fresh-water, but a very few members inhabit salt or brackish water.

*Nostoc muscorum* Ag., Disp. Alg. Suec., p. 44, 1812.

No. 1231, small, firm, rounded thalli, on vesicular lava, near Blane's Point (July 15, 1920).

My material has good spores and seems definitely characteristic of this species.

Family 131. Oscillatoriaceae.

The non-heterocysted, filamentous Myxophyceae all fall into this family, which is abundantly represented in non-marine localities but which also has a fair representation among the marine algae.

![Diagram](image)


No. 1092, forming fluctuating gelatinous masses over corals, of a bluish-black color, Aus. Reef (June 12, 1920); No. 1094, in dark black tufts, Aus. Reef (June 12, 1920); No. 1160, in reddish-purple tufts on corals, reef patch off Aus. (June 14, 1920).

This species is frequent on corals in the reef-crest or in small pools on the reef-rim. It is a typical metachrophia.

*Symploca muscorum* Gemont, Journ. de Bot., vol. 4, p. 354, 1890.

No. 1130, on roots, etc., on beach black, front of chief's house, Aus (July 4, 1920).

The only locality is well above high-water mark, but well within reach of spray at intervals of storm or rough seas.
Lyngbya majuscula (Dillw.) Harvey, in Hooker, Engl. Flora, vol. 5, pt. 1, p. 370, 1853

No. 1047, reddish-purple tuft on staghorn coral, reef-most in front of Luili (June 5, 1920); No. 101, forming matted layer, dark grayish blue, Aus Reef (June 13, 1920); No. 1127, forming tufts on rocks on reef, and floating, Nuutili (June 15, 1920); No. 1142, forming a fleece under side of coral blocks, Aus Reef, veiil ext toward Breaker Point (June 18, 1920); No. 1201, forming a reddish-purple fleece on under side of coral blocks, reef-most at Fagasa (July 11, 1920). Lyngbya majuscula is of frequent occurrence on the reefs and occurs in two distinct forms, one with filaments larger (30 μ diameter) and the other with smaller filaments (24 μ diameter).

Ex. 46.—Arthrospira laxissima sp. nov. (No. 1042). Powell coll.
1. Common type of filament rolled on itself. X 175.
2. Enlarged terminal portion of filament. X 350.

Lyngbya (Leiblinia) pygmaea sp. nov. Fig. 45.
Filaments fasciculatus, microscopialis, ad lamina affinis, medio decussatus, utrinque erectis, 12-14 μ diam., teretiuscis; vagina tenuibus, hyalina insignis; cellulæ 12-15 μ diam., 3-4-plo brevioribus, granulis crasis facitis, terminalibus rotundatis, non calyptratis.

A species near to if not coming within the form-cycle of L. curvata (Zan.) Guettard, but microscopic still rather below the diameter of that variable species.
No. 1026, on Turbinaria ornata, Apaie (or Apa) Bay (July 11, 1920).

Arthrospira laxissima sp. nov. Fig. 46.
Trichoblastibus laxissimis spiralibus, contortis, teretii, plurumque complexis, cellulæ 12 μ diam., 3-3-plo brevioribus, cytoplasmate homogeneo, terminalibus rotundatis.
No. 1042, on Peyssonnelia rubra, on rosette corals, reef at Luili (June 5, 1920).

Family 132. Chamaesiphonaceae.
When all the material collected on Tutuila is thoroughly examined for epiphytes and trancomytes, we may expect to find a number of species of this family. Some plants of Dermocarpa have been noticed but not studied.

No. 1179, in old shell, beach near chief's house, Aus (July 4, 1920).

This species or one closely related to it occurs more or less sparingly or abundantly as a trancomyte in shells, corals, etc. I have not been able as yet to fully study the material in which this species may be expected.
Family 133. Chroococcaceae.

The Chroococcaceae are largely sub-aerial or fresh-water, but there are also many marine species.


No. 1278, forming large, thick, lumpy, expanded mass, soft and olive-green, on shaded tree-trunks, roadside beyond Aua. (July 4, 1920).

The habit of my specimen was far from globular when I collected it, but it seemed possible that earlier it may have been rounded, at least. My plant seems to fit this species as well as any.

Class 5. MYCOPHYTA.
Subclass 1. EUYCETES.

Series 1. FUNGI.

The collection of fungi made in Tutuila is practically negligible and I shall list the few species doubtfully. The Reineke collections totaled 111, those of Rechinger 106, and the report of Lauterbach adds 7. Deducing for the same species reported twice, the fungi credited to the Samoan Islands number 212. C. G. Loyd (Myco. Notes, No. 6, May 1901) lists 9 new species from Upolu, with descriptions by G. Breход and R. Papenfuss. I have added perhaps 2 from my few specimens, making about 220.

Auricularia acicula-judaes L.

Samoan name: Tapa 'imu (rat's ear).

No. 1185, on dead wood back of Aua, June 24, 1920; Utulei, July 18, 1920.

Coriolus murinus (Lev.) Pat.

No. 1289, on dead wood, Fagam Trail, July 10, 1920, det. W. A. Murrell.

Favolas tenula (Hock.) Murrill.

No. 1186, on dead wood, near Aua, June 24, 1920, det. W. A. Murrell.

Favolas Ehrenhausen Lev.

No. 1274, on dead wood, back of Fagam (July 18, 1920, det. W. A. Murrell).

Polyporus luteus Kers.

No. 1208, on dead wood, trail above Vai'a (July 11, 1920, det. W. A. Murrell).


No. 1183, high on Papatea Trail (July 4, 1920, legit Dr. Alfred G. Mayor). This seems to be the same as the plant of Rechinger (1908, p. 215, pl. 1, figs. 1-3) assigned as above.

Schizophyllum affine (L.) Schroet.

No. 1271, on dead stems of Crocodileus eulosa Andrews, roadside Fagatogo. (early June 1920).
Lentinus sp.
Samoan name: Alofa
No. 1240, near L. kirasi perhaps, but much smaller and more distinctly related to a white form of L. crisipes, to which it seems nearer in use: No. 1240, near L. kirasi, yellowish.
These are mentioned because of the fact that they are very similar species, shine reddish in the dark and are used by the youth of Samoa for sticking to the face in arms.

Series 2. LIChENES.
Lichens were not made a specialty in my collecting on Tutuila, but a few attracted attention, especially certain lichen-inhabiting species. Edw. A. Vario has identified my scanty collection and has supplied the following notes. The species of Reitveke were identified by J. Miller-Ang and they of Rechinger by A. Zahlbruckner. They account to 177 species, with some varieties additional. There are 2 new species, 2 new varieties, and 3 other species new to Samoa in my collection, making approximately 184 species of lichens now known from Samoa.

Physcia aegialitica (Ach.) NyL
In reperie East-Laulii Tutulii. No. 1190c.

Pyxine retrigrlosa Vain., n. sp.
Thallus lacinios 1 (-0.5) mm. latiss. vulgo planis, superne albido-glaucoscensibus, leviter retrixo-cudundos, jugis ruparum albis, soraliis adnato-clavulosis, eustis fulgigineos, prassinis brevibus instructos, medullis albos, superne et intus KIO lustros vel deindeque fulvoscescens. Apotheca disco nigro, micro, margine primum partim tenuissime subhialloide obscuris, cerumen nigro. Perithecium intus sericeum pallidum. Hypothecium fusco-fuscum. Hypothecae superius fuscato-maculatas. Sporae oblongae, fuscoscens, long. 0.017-0.020, crass. 0.007-0.009 mm., membranas inequaliter laciniosis. Habitatis subulatis est P. retrigrlosa NyL.
In reperie East-Laulii Tutulii. No. 1170e.

Ad corticee Coos, Pago Pago Tutulii. No. 1099.

Thallus nec KIO nec Ca Cl O, regens, sed his solutionibus unitis intus levisimis subhiallo-clavulosis. In corticee arboris ad viam Aus-Auscoa Tutulii. No. 1155.

Sporopodium glaucinum Vain. (Lieh. Insul. Philippii. III, 1921, p. 92 var. tutulensis Vain)
Thallus verrucosus minutissimis insperso et apothecis pubescentibus, 0.7-0.3 mm. latiss. a var. polistri Vain. (cf. descrpits) different. Hic species in epithecio gonidia hymenii coarctate (conf. Conococcus Vain. in Flord. Lieh. Brit. t. 1890, p. 26) vittata, ex justasymetrica, subglobosa, diam. 0.003 mm. in thallio gonidia diam. 0.005-0.008 mm, globosa. Hypotheicum olivaceo-fuscum. Sporae olateae, decolorae, olivaceae, murut-divinis, cellulis numerosisimis, long. 0.05-0.075, crass. 0.012-0.016 mm. Apothecia margin integra, pallide, haud polios, disco glauco-olivaceo, teniatur pruinoso. Thallus albido-glaucoscens, KIO nec regens. In sp. perilespice (NyL) et sp. subulatine Vain. (Addnt. Lieh. Antill. in Annal. Acad. Scient. Fenniae, 1914, p. 129) thallus est hervagatus et


Gyalecta radians Vain. n. sp.

Thallassia tenerissima, glaucorecens, maculas radians. 10-3 mm. latas formae, Indice circ. 0.2-0.3 mm. lata, subdichotomia aut simplexibus, sublinearibus aut diffusibus, diereticis, apicibus usum acutis, eordum medio late coninuus, laevi-
gatus aut valgo pyridius numerosus, verruculose limbiniformis formantibus, medio inuspeus. Hypothallus indistinctus. Apathecia lat. 0.4-0.5 mm., tenue, adpersa, tenue constrixta, disco plano aut leviter concavo, fulvoeentente aut subhialide, nude, marginne albide, testi, integro, leviter prominentem, persistente. Peristomium dier-

echymatice, leptodermatice, gonoide destituitum, carinae cellularum 0.000-

0.000 mm. latit. Hypothecium cibodoreoideum, interdum superno pallidum, eterno albidum. Hymenium circ. 0.45 mm. eramus, jodo luteoscenti. Axi cylindrice. Sporae

8 mm., mononoechae aut rarissimae, decoloribus, fusiformibus, apicibus obtusis, aut rarissimae ovoidae, 1.0 septatae, long. 0.008-0.010, crass. 0.003-0.004 mm. Pyridium subhialide. Macroconidia (clypylorae) fusiformia, recta, apicibus obtusi, simplicia aut 1-2 (-3), septata, long. 0.015, crass. 0.022 mm. anaphyllosedosum, simplicia, usum faceo longis, parvis immirta. Gonidia ad Hystrichostomum (Harit.) pertinentia, cretere ramose, ramis connexis, cellulis suboctavaria et parce diffusibus, long. 0.008-0.010, crass. 0.003-0.004 mm. Protoconia est G. lacerata Vain. (Lich. Inul. Philipp. II, 1921, p. 151), quae thallus minus profunde lacerato, sporis teaeformibus et gonidiis ad aliam speciem Hystrichostomum reeribus ad ea differt. Supra folia Angiopetididae (n. 21 p. p.) paga Pago Pago Tutuila.

Colonia, formae Leucotrich Fae (Vain. Lich. Inul. Philipp. II, 1921, p. 165) aut spedicis nova ex proxima, sterilis, una cum Sprotopacias glaucus supra folia Inocerami australi lecta est. Thallassia tenerissima, glaucus albide, pilis 1-0.7 mm. longis, albis, terminalibus numerosis ornatus. Pago Pago Tutuila (N. 20 p. p.).

Pertinua (nae sporis indeterminabilis) ad rupea in East-Laulii collecta (1776a).

ACKNOWLEDGMENTS.

In attempting to carry out a piece of work dealing with so many and so varied items, it is necessary to acknowledge my indebtedness to the following and to extend to them my sincerest gratitude for their ready and most valuable aid: to Dr. Alfred Goldsborough Mayor, not only for affording me the opportunity of working in Tutuila and of putting into shape the accounts of the results of my study, but also for his constant sympathy and helpfulness at every point; to Director Elmer D. Merritt for giving me much of his valuable time in going over my collections and for making the tentative (usually final) determinations of the Spermatophytes, without which assistance my task would
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SOURCES.

While I have consulted and used many original papers and accounts for determining the identity and distribution of the species enumerated, I have quoted only as seemed desirable. Especially I have quoted, for distributional or critical data, the later available summaries, both for Samoa and the rest of the Pacific Islands, or, as I have designated them, Oceania. These I have referred to by date and page only and, consequently, I append a list.

Samoa.


— 1908. Ibid., vol. 84, pp. 345-362, pl. 1-4.


— 1914. Ibid., vol. 91, pp. 139-168.


HENLEY, RENTHORPE. 1865-73. Flora Fijiensis.


Hawaiian.


Society, Marquesas, Paumotu, Gambier, and Wallis Islands.

DRAKE DEL CASTILLO, E. 1886. Flora de la Polinesia Francesa.

Cook Islands.


German Polynesia, Samoan Archipelago, Solomon Islands, Admiralty Islands, Marshall Islands, Caroline Islands, and Micronesia Islands.

BOITMANN, KARL, und KARL LUTTERBACH. 1901. Die Flora der deutschen Schutzgebiete in der Südsee.

A. View from above showing small sheet of Mucilago discoides above peat-forming layer with chalky granules. Inset below is a close-up view of the same section showing the peat-forming layer with small sheets of Mucilago discoides.

B. Side view of the same specimen showing the peat-forming layer with small sheets of Mucilago discoides. The peat is composed of Mucilago discoides and other plant remains.
A. *Bryopelta potanii* sp. nov. No. 1292, habit of cluster of fronds. ×1.5.
B. *Cradeophora piniger* sp. terr. No. 1073, habit of cluster of fronds. ×1.5.
Photographed by W. C. Matthews.
2. Side view of a similar piece. x 6.37.
3. *Puritalia brevis* elongated 7 feet above high-tide level. x 0.57.
4. *Puritalia brevis* with humans 8 feet above high-tide level, from Pismo grove on Rose Islet. x 0.57.
5. Piece of *sedal lenticularis* limestone made up entirely of *Puritalia*, from a "magnetically" on the still rim. Central portion of lower edge of piece photographed shows a lot of exposed surface speckled with clusters of nonspiny *Phyllocidales*. x 0.57.
6. Piece of beach rock of Rose Islet. x 0.57.

Photographs by W. C. Matthews.
Fossilites elongatum *l. major* M. A. Howe.

Enlarged section through tip of a branch, ×300.

Enlarged section of a branch, ×250.

Photograph by W. C. Matthews.