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OCCASIONAL PAPERS

OF

BERNICE P. BISHOP MUSEUM

HONOLULU, HAWAII

Volume XV

May 29, 1940

Number 27 ✓

Mosses of Southeastern Polynesia¹

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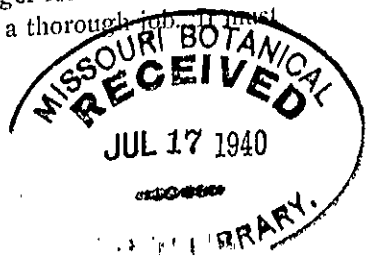
This paper is based upon the collections of Dr. Harold St. John and Dr. F. R. Fosberg made during the Mangarevan Expedition from Bernice P. Bishop Museum in 1934.

This important collection gives for the first time a fairly comprehensive, though probably by no means complete, outline of the moss flora of the numerous islands between latitude 18°S. and 28°S. and longitude 124°W. and 151°W., the extreme southeastern corner of the Polynesian area. This region is bisected laterally by the Tropic of Capricorn and includes the Tuamotu Archipelago, the Austral Islands, the Mangareva (Gambier) Islands, and Pitcairn and Henderson Islands. The mosses show a close and very natural relationship with the flora of Tahiti. It is interesting to find here, together with several supposedly endemic Hawaiian species, other typical Polynesian mosses of quite local distribution, such as *Macromitrium tongense* and *Himantocladium inflexum*. A significant group of species comprising *Dicranoloma plicatum*, *Leptostomum macrocarpum*, *Macromitrium suberosulum*, *M. rapaense*, and *M. incurvifolium*, all from the Austral Islands, indicates clearly an intimate connection with the New Zealand flora which is apparently confined to these southernmost islands.

In order to make the paper as complete as possible, I have included previous records from the Austral Islands and the Tuamotus [Bartram, B. P. Bishop Mus., Occ. Papers 10(10), 1933].

The total of 62 species seems rather meager for such an extensive area, but I believe the collectors have done a thorough job.

¹ Mangarevan Expedition publication 34.



be remembered that the islands are relatively small and the highest elevation scarcely exceeds 2,000 feet, or 600 meters (Rapa, Mt. Perahu 2,077 feet; Mangareva, Mt. Duff, 1,427 feet; Pitcairn about 1,000 feet), so that the moss flora is confined almost exclusively to low altitudes. The luxuriant rain-forest flora of the tropical mountains is nearly or quite absent.

Types of new species described below are in my herbarium and in the herbarium of Bishop Museum.

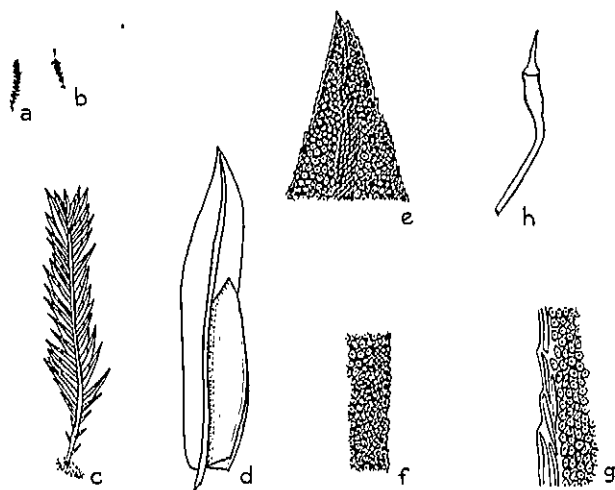


FIGURE 1.—*Fissidens Clarkii*: a, sterile stem $\times 1$; b, fertile plant $\times 1$; c, sterile stem $\times 6$; d, leaf $\times 40$; e, apex of leaf $\times 250$; f, median cells and margin of dorsal blade $\times 250$; g, cells and margin of duplicate blade $\times 250$; h, capsule $\times 15$.

FAMILY FISSIDENTACEAE

Fissidens (*Semilimbidium*) *Clarkii*, new species (fig. 1).

Dioicus? Laxe caespitosus. Caulis ad 5 mm. altus, simplex. Folia plurijuga, infima minuta, superiora multo majora, conferta, sicca parce decurvata, anguste lanceolata, late acuminata, ad 1.2 mm. longa, lamina dorsalis ad basin rotundata, elimbata, lamina vera limbata; margines ubique crenulati; costa infra apicem folii evanida; cellulae omnes parvae, hexoganae, 6-8 μ , papillosae. Seta (juniora) 1.5 mm. alta, laevissima; theca minuta, inclinata.

Dioicus? Laxly tufted plants, pale green. Stems to 5 mm. high, simple. Leaves numerous, 12 to 15 or more pairs, crowded, slightly flexuose with deflexed points when dry, up to 1.2 mm. long, narrowly lanceolate, broadly acuminate, dorsal blade not bordered, ending in a rounded lobe at the insertion, apical blade not bordered, duplicate blades distinctly bordered with 2-3 rows of linear, incrassate cells; margins crenulate all around; costa ending below the apex;

cells small, hexagonal, minutely papillose, 6-8 μ , not incrassate. Sporophyte immature; seta 1.5 mm. high, smooth; capsule minute, inclined.

Pitcairn Island: *Roy P. Clark 1*, 1936.

From the description, *F. philonotulus* Bescherelle of Tahiti, differs in the short apical leaf blade and entire leaf margins, while in *F. scabrisetus* Mitten, from Samoa, the frond is wider and the seta scabrous.

In *F. Clarkii* even the lower stem leaves are constantly bordered on the duplicate blades. The stem with leaves is only 1-1.5 mm. wide.

Fissidens mangarevensis Montagne.

Austral Islands: Raivavae, south of Raiurua, south side of pass, on rocks in forest, alt. 70 m., *St. John and Fosberg 15827*.

Rapa: valley east of Ahurei, crevices of shaded boulder, alt. 30 m., *St. John and Fosberg 15267*; Titikaveka, east side of Mt. Vaitau, on trunk of *Aleurites moluccana* tree, alt. 100 m., *St. John and Jean Maireau 15387*.

Distribution: Mangareva, Fiji, Solomon Islands.

FAMILY DICRANACEAE

Trematodon latinervis C. Müller.

Austral Islands: Rimatara, road southwest of Anapoto, cut bank of earth beside road, alt. 5 m., *Fosberg 12058*; Moeraï, hills northwest, on cut dirt bank by trail, alt. 50 m., *St. John and Fosberg 16568*.

Pitcairn Island: Adamstown, stone wall, 65 m., *Fosberg 11332*.

Distribution: Hawaii.

Trematodon rapaensis, new species (fig. 2).

Autoicus. Caespites densi. Caulis 6-8 mm. altus. Folia ad 3 mm. longa, conferta, erecto-patentia vel flexuosa, e basi crecta, latissime oblongo-ovata vel subquadrata, abrupte lineari-subulata, obtusa; marginibus erectis, superne crenulatis; costa valida, infra apicem folii evanida; cellulæ basilares anguste rectangulares, laxae, superiores subquadratae. Seta pallida, valde flexuosa, circa 8 mm. longa; theca cum collo 2.5 mm. longa, leniter curvata, vix strumosa; peristomii dentes laevissimi? (fructus immaturus).

Autoicus. Slender, densely tufted, dull yellowish-green plants. Stems 6-8 mm. high, erect. Leaves to 3 mm. long, crowded, flexuose and spreading when dry, more erect-spreading when moist, abruptly linear-subulate from an erect oblong-ovate or subquadrate base, apex obtuse; costa strong, ending below the apex; margins erect, crenulate above; basal cells lax, narrowly rectangular, upper cells subquadrate, smooth. Seta pale, flexuose, about 8 mm. long; capsule including the neck 2.5 mm. long, slightly curved, clearly strumose, urn about 1 mm. long; peristome teeth (as seen) smooth. Fruit immature.

Rapa: Tubuai, moist clay bank, alt. 75 m., July 9, 1934, *St. John and Maireau 15460*.

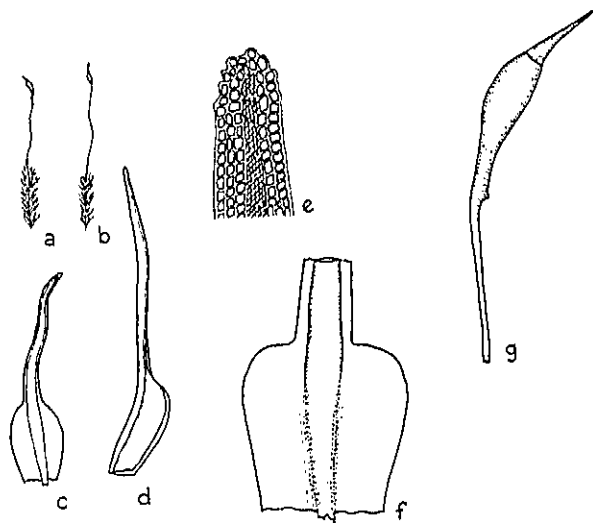


FIGURE 2.—*Trematodon rapaensis*: *a, b*, plants $\times 1$; *c, d*, leaves $\times 15$; *e*, apex of leaf $\times 250$; *f*, leaf base $\times 40$; *g*, capsule $\times 8$.

This species differs appreciably from *T. latinervis* C. Müller, of Hawaii, in the longer stems and the short, broad clasping leaf base abruptly contracted to the flexuose spreading subula. Unfortunately the fruit is very immature, but some fairly well-developed capsules show a relatively short neck which is strongly strumose. Apparently the peristome teeth are short, hyaline and smooth, but these significant characters remain to be demonstrated.

***Dicranella Hillebrandi* (C. Müller) Brotherus.**

Rapa: Tuko, damp, boglike open slope, with *Gleichenia*, alt. 30 m., *Fosberg 11477*.

Distribution: Hawaii.

***Campylopodium euphorocladum* (C. Müller) Beschereille.**

Austral Islands: Rurutu, Moeraï, hill northwest, cut dirt bank by road, alt. 60 m., *St. John and Fosberg 16567*.

Distribution: east Africa, Malaysia, Pacific islands.

Campylopus sulphureus Bescherele.

Rapa: top of Mt. Perahu, on ground, open spot at summit, alt. 640 m., *St. John and Fosberg 15729*.

Distribution: Society Islands.

Campylopus introflexus (Hedwig) Bridel.

Rapa: Tapui Islet, on rocks, alt. 2 m., *Fosberg 11440*; Taratika, east side of Mt. Perahu, moist rock, alt. 500 m., *St. John and Maireau 15558, 15568*; north ridge of Mt. Perahu, open spot on steep ridge, alt. 600 m., *St. John and Fosberg 15725*.

Austral Islands: Tubuai, Taitaa, northeast slope, basalt rocks in open, alt. 300 m., *St. John and C. M. Cooke, Jr., 16318*; Raivavae, Vaiuru, slope northeast, talus of basalt rocks, alt. 100 m., *Fosberg 11732*.

Distribution: cosmopolitan.

Campylopus umbellatus (Walker-Arnott) Bartram.

Rapa: Area, crevice of basalt on waterfall, alt. 50 m., *St. John and Fosberg 15292*.

Austral Islands: Raivavae, Pic Rouge, south slope, steep earth slope, alt. 120 m., *St. John and Fosberg 15972*; west ridge, alt. 140 m., *St. John and Fosberg 15941*; Mt. Taraia, crevice leading to summit of cliffs, moist, shaded precipice, alt. 280 m., *St. John 16015*; Vaiuru, slope northeast, talus of basalt blocks, open, alt. 100 m., *Fosberg 11731*.

Mangareva Islands: Mangareva Island, Mt. Duff, near summit, dry rock crevices, alt. 440 m., *Fosberg 11363*; east side, on moist basalt ledges, alt. 75 m., *St. John 14578*; Mt. Duff, on basalt, in steep gully, alt. 483 m., *St. John 14858*; south side, Mt. Duff, wet places, alt. 375 m., *Fosberg 11364*.

Distribution: Indo-Malayan regions and the Philippines to Hawaii.

Dicranoloma plicatum Bartram.

Rapa: Taratika, east side of Mt. Perahu, on trees in rain forest, alt. 550-620 m., *St. John, Fosberg, Maireau 15556, 15648*.

Distribution: endemic.

As these collections are well fruited the description may be completed by the following brief summary of the sporophyte characters:

Perichaetium large, 8-10 mm. high, slightly exceeding the stem leaves; inner perichaetial leaves erect, closely sheathing the base of the seta, oblong-ovate, abruptly aristate; margins lightly crenulate above; costa very faint,

ending in or well below the acumen; cells linear, incrassate. Seta solitary, stramineous, 10-14 mm. long; capsule ovoid, erect; lid long rostrate; peristome teeth cleft about half way down, orange red below, pale above, coarsely papillose and lightly vertically striolate on the outer plates, articulations strong and coarsely papillose-cristate on the inner face.

FAMILY LEUCOBRYACEAE

Leucobryum scalare C. Müller.

Rapa: Kaimaru, south ridge of Mt. Perahu, tree trunk in moist woods, alt. 475 m., *St. John and Maireau 15523*; Taratika, east side of Mt. Perahu, on dead branch, rain forest, alt. 620 m., *St. John, Fosberg, Maireau 15661*; top of Mt. Perahu, open spaces on summit, alt. 640 m., *St. John and Fosberg 15727, 15728*.

Austral Islands: Raivavae, Vaiuru, slope northeast, talus of basalt blocks, alt. 100 m., *Fosberg 11733*; Pic Rouge, southwest ridge, tree trunk, *St. John and Fosberg 15939*; Mt. Hiro, on moist rocks near summit, alt. 430 m., *St. John 16178*.

Tuamotu Archipelago: Makatea.

Distribution: Indo-Malaya, Philippines, Tahiti.

These collections vary considerably but the differences seem to be slight and of little importance. The leaves are all short, very rough on the back, and show three to five layers of leucocysts in the thickest part of the leaf.

Leucophanes nukahivense Bescherelle.

Tuamotu Archipelago: Makatea.

Austral Islands: Raivavae, Pic Rouge, northwest side, basalt ledges near top, alt. 160 m., *St. John and Fosberg 15965*. Rurutu, Unau, on trunk of coconut tree, alt. 20 m., *St. John 16731*.

Mangareva Islands: Mangareva Island, Rikitea, moist basalt ledges, alt. 4 m., *St. John 14553*.

Pitcairn Island: *Clark 4*.

Henderson Island: alt. 30 m., *St. John and Fosberg 15130, 15169*.

Distribution: Marquesas Islands.

FAMILY CALYMPERACEAE

Syrhophodon Banksii C. Müller.

Tuamotu Archipelago: Makatea.

Rapa: Anatauri Valley, on tree branch in woods, alt. 230 m., *St. John 15715*.

Austral Islands: 'Tubu'ai, 'Taitaa, on exposed tree root, alt. 399 m., *St. John and S. G. Wight 16314*; Haramaea, on trunk of coconut tree, forming hemispherical cushions 0.3 m. in diameter, alt. 15 m., *St. John and Cooke 16501*. Rurutu, Auti, spherical clump on coconut tree, alt. 5 m., *St. John and Wight 16622*. Rimatara, Anapoto, on coconut tree, alt. 5 m., *St. John and Fosberg 16835*.

Distribution: Solomon Islands, Fiji, Cook Islands, Society Islands.

Thyridium obtusifolium (Lindberg) Fleischer.

Austral Islands: Raivavae, Vaiuru, slope northeast, perpendicular rocks, dry forest, alt. 120 m., *Fosberg 11728*; south side of Mt. 'Turivao, rock cliff, basalt, alt. 200 m., *Fosberg 11787*; Mt. Hiro, south side of pass, on tree trunk in moist woods, alt. 250 m., *St. John 16191*. Rurutu, Vitaria, on trunks of coconut trees, alt. 5 m., *Fosberg 12013*; Moerai, hills northwest, on trunk of coconut tree, alt. 25 m., *St. John and Cooke 16623*; northwest slope of 'Teape, Teti woods on tree branch, alt. 360 m., *St. John 16675*. 'Tubu'ai, 'Taitaa, northeast slope, on basalt rock in dense upper woods, alt. 350 m., *St. John and Cooke 16320, 16321*.

Mangareva Islands: Mangareva Island, summit Mt. Duff, rock cliffs on south side, alt. 450 m., *Fosberg 11361*.

Pitcairn Island: Outer Valley, on bark of tree, alt. 220 m., *Fosberg and Clark 11329*; Parlver Valley Ridge, mossy tree branch, alt. 320 m., *St. John 14964*; *Clark 3*.

Henderson Island: *E. H. Quayle*.

Distribution: Society Islands, Marquesas Islands.

Calymperes tuamotuense Bartram.

Tuamotu Archipelago: Anaa, 'Tukuhora, on tree trunk, alt. 2 m., *St. John and Cooke 14309*; Ahii (Aahi); Makatea, Manihi; Faite.

Pitcairn Island: *Clark 2*; the Rope, crevice of basalt precipice above, alt. 200 m., *St. John 15008*.

Henderson Island: north end, trunk of *Pisonia*, alt. 5 m., *St. John and Fosberg 15099*.

Austral Islands: Raivavae, Mt. 'Taraia, crevice leading to summit of cliffs, moist, shaded precipice, alt. 280 m., *St. John 16014*; south side of pass, south of Rairua, on rocks in forest, alt. 70 m., *St. John and Fosberg 15825*.

Mangareva Islands: Mangareva Island, Mt. Duff, northwest slope, on rocks in woods, alt. 100 m., *St. John 14493*.

Distribution: Tuamotu Archipelago, Pitcairn Island, Henderson Island, Austral Islands, Mangareva Islands.

***Calymperes Quaylei* Bartram.**

Austral Islands: Raivavae, Motu Tehau, on dead log, alt. 1 m., *St. John and Wight 16157*. Tubuai, Tapapatauai Islet, on fallen log in woods, alt. 1 m., *St. John 16429*.

Distribution: Society Islands.

***Calymperes tenerum* C. Müller.**

Austral Islands: Tubuai, Rautaro Islet, on bark of dead fallen log of *Casuarina*, alt. 1 m., *St. John 16397, 16398*.

Tuamotu Archipelago: Iiao, Tekotika, tree trunk, alt. 1-2 m., *St. John 14377, 14380*.

Pitcairn Island: point between Rope and Tahautumah (Tahuutoumah?), dry rock, alt. 150 m., *Fosberg and Clark 11330*.

Distribution: Indo-Malaya to Hawaii.

***Calymperes pseudopodianum* Bartram.**

Tuamotu Archipelago: Makatea.

Distribution: endemic.

FAMILY POTTIACEAE

***Weisia controversa* Hedwig.**

Rapa: southeast ridge of Mt. Pukunia, earth between rocks on bare ridge, alt. 210 m., *Fosberg 11436*.

Austral Islands: Raivavae, south side of Mt. Turivao, moist place at base of cliff, alt. 200 m., *Fosberg 11786*.

Mangareva Islands: Mangareva Island, east side, moist basalt ledges, alt. 75 m., *St. John 14577*.

Distribution: cosmopolitan.

***Trichostomum oblongifolium* Bartram.**

Rapa: Mt. Pukutaketake, crevices of basalt, near summit, alt. 390 m., *St. John and Maireau 15442*.

Distribution: Hawaii.

FAMILY BRYACEAE

***Brachymerium melanothecium* (C. Müller) Jaeger.**

Austral Islands: Raivavae, Motu Tehau, on ground, alt. 1 m.,

St. John and Wight 16156; Anatonu, alt. 1 m., *Fosberg and Wight 11722*; Vaiuru, pile of lime from burned coral rock, *Fosberg 11763*. Tubuai, Taitaa, northeast slope, on ground, alt. 150 m., *St. John and Cooke 16317*.

Mangareva Islands: Mangareva Island, Rikitea, base of stone wall of church, alt. 3 m., *Fosberg 11004*; on bits of earth accumulated on rock ridge, alt. 80 m., *Fosberg 11100*; decomposing coral on walls of pit, alt. 1 m., *Fosberg 11086*; moist rocks by village street, alt. 2 m., *St. John 14449*. Taravai Island, northeast end, on coral stone wall, alt. 5 m., *St. John 14763*; Tarauroroa (Taraururoa), open coral sand, alt. 1 m., *St. John 14585*.

Tuamotu Archipelago: Hao, moist coral sand, especially abundant near town, alt. 1 m., *St. John 14371*; south Marutea, northwest islet, on sandy flats under coconuts, alt. 1 m., *St. John 14435*.

Temoe Island: north islet, shady hollows under coconut trees, alt. 2 m., *St. John and Fosberg 15222*.

Pitcairn Island: *Clark 6, 7*.

Distribution: Society Islands, Tonga Islands.

Bryum argenteum Hedwig variety *lanatum* (Palisot de Beauvois) Bryol. Eur., fasc. 6-9, p. 79, 1839.

Rapa: Tapui Islet, grooves of lapies in rock, alt. 7 m., *Fosberg 11442*.

Austral Islands: Raiyavae, Mt. Hiro, east ridge, on dry soil, alt. 400 m., *St. John 16179*; Mt. Taraia, summit, on basalt ledges, alt. 304 m., *St. John 16016*.

Pitcairn Island: *Clark 5*.

Distribution: cosmopolitan.

Bryum rapaense, new species (fig. 3).

Dioicum? Humile, caespites densi, rubro-virides. Caulis vix mm. altus. Folia conferta, erecto-patentia, clinibata, saepe rubra, oblongo-lanceolata, breviter cuspidata, ad 2 mm. longa; marginibus recurvis, apicem versus denticulatis; costa valida, in cuspidem brevem excurrente; cellulae rhomboideo-hexagonae, sat incrassatae. Seta 2.5-3 cm. longa, rubella; theca pendula, oblongo, collo brevi; operculum mamillatum; cilia appendiculata.

Dioicum? Low plants in dense tufts, tinged with red. Stems 4 mm. high. Leaves crowded, erect-spreading, nearly straight when dry, not bordered, often reddish, oblong-lanceolate, short cuspidate, to 2 mm. long; margins recurved, denticulate toward the apex; costa strong, excurrent in a short cuspidate point; cells rhomboidal-hexagonal, moderately incrassate. Seta slender, red, 2.5-3 cm. long; capsule pendulous, pale brown, oblong with a short neck; lid mamillate; cilia of the inner peristome appendiculate.

Rapa: Vaitau, flat, grassy top of ridge, alt. 300 m., July 27, 1934, Fosberg 11636.

Not unlike a small *B. binum* Schreber, but noticeably different in the unbordered leaves, slightly or not at all contorted when dry.

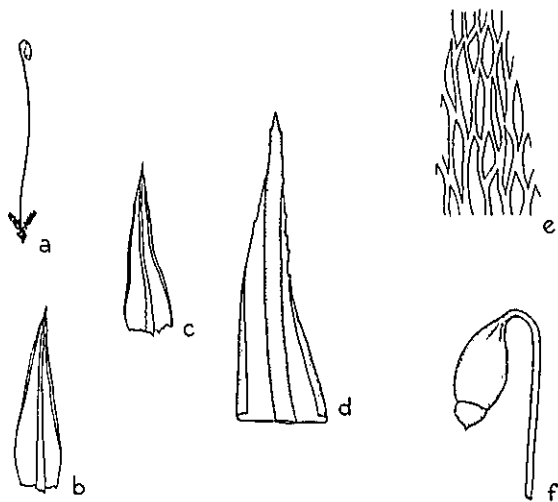


FIGURE 3.—*Bryum rapense*: a, plant $\times 1$; b,c, leaves $\times 15$; d, apex of leaf $\times 80$; e, upper leaf cells $\times 250$; f, capsule $\times 7$.

***Bryum megalothecium* Sullivant.**

Rapa: Area, bare, damp rocks, alt. 100 m., *St. John and Fosberg 15322*.

Distribution: Hawaii.

***Bryum truncorum* Bridel.**

Rapa: Area, crevices of basalt on waterfall, alt. 50 m., *St. John and Fosberg 15291*.

Austral Islands: Raivavae, Mt. Muanui, east slope, wet cliffs, alt. 220 m., *St. John 16033*.

Distribution: Africa, Australia, New Zealand, Society Islands.

FAMILY LEPTOSTOMACEAE

***Leptostomum macrocarpum* (Hedwig) R. Brown.**

Rapa: Kaimaru, south ridge of Mt. Perahu, on trunk of tree fern in moist woods, alt. 400 m., *St. John and Maireau 15532*.

Distribution: New Zealand.

The occurrence of this striking moss in Rapa brings up some interesting queries. Hedwig (Sp. Muscorum, 178, 1801) gives the locality for *Bryum macrocarpon* as "Insulae australes" and C. Müller (Syn. Musc., 186, 1849) amplifies this somewhat, as follows: "Patria. In insulis Australibus praesertim in Otaheite, ubi primus legit Banks." Dixon (Bryol. N. Z., 218, 1926) inferentially treats this species as endemic or at least mentions no further distribution, and Brotherus (Engler and Prantl, Natürlich. Pflanzenf. 10:406, 1924) limits the species to New Zealand and the Norfolk Islands. Thus, the original source of the plant seems to have been overlooked or ignored.

According to the facts outlined to me by Dr. St. John, Joseph Banks made only one trip to the South Pacific, with Captain Cook's first voyage. Although they sailed southward from Tahiti on their way to New Zealand they neither sighted nor landed on Rapa or any of the Austral Islands. Captain Vancouver sighted Rapa in 1797 and sailed around it, talked and traded with the natives who came off in canoes, recorded the name of Oparo for the island, but allowed no one from the ship to land. Menzies must have looked at the island with longing eyes. As Vancouver was the discoverer of the island, there is no possibility of any collections having been made before 1791.

If the plant was first collected by Banks, as Müller indicates, it probably came from Tahiti, although it has never been rediscovered there, so far as I know.

FAMILY CALOMNIACEAE

Calomnium Nadeaudii Bescherele.

Austral Islands: Rurutu, first gulch south of Teti, west side of Teape, open, moist headwall, alt. 330 m., *St. John 16760, 16755.*

FAMILY RHIZOGONIACEAE

Rhizogonium spiniforme (Hedwig) Bruch.

Austral Islands: Rurutu, first gulch south of Teti, west side of Teape, open, moist headwall, alt. 330 m., *St. John 16761.*

Distribution: cosmopolitan in tropical regions.

FAMILY BARTRAMIACEAE

Philonotis Vescoana (Bescherelle) Brotherus.

Rapa: Mt. Ruatara, east slope, wet, densely shaded rocks, alt. 100 m., *Fosberg 11457*.

Austral Islands: Raivavae, west cliffs of Mt. Muatapu, dry rocks, base of cliff, alt. 180 m., *Fosberg 11764*; north slope of Mt. Hiro, face of dripping basalt cliffs, alt. 150 m., *St. John 16086*. Rurutu, first gulch south of Teti, west side of Teape, moist shaded rocks by waterfall, alt. 320 m., *St. John 16758*.

Distribution: Tahiti.

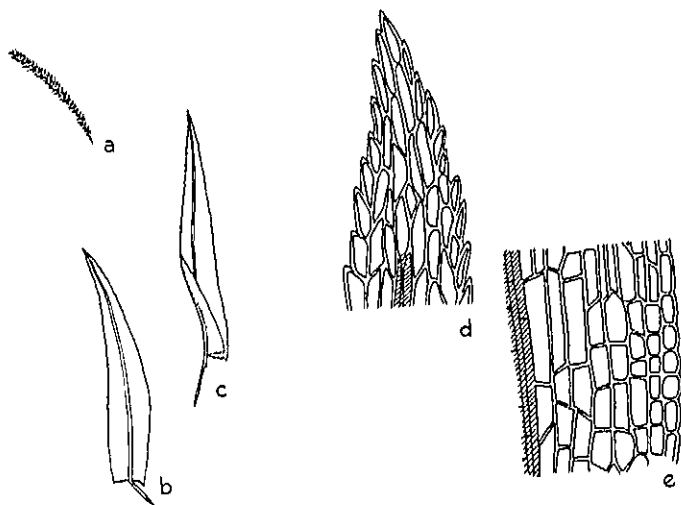


FIGURE 4.—*Philonotis St.-Johni*: a, sterile stem $\times 1$; b, c, leaves $\times 30$; d, apex of leaf $\times 250$; e, basal angle of leaf $\times 250$.

Philonotis St.-Johni, new species (fig. 4).

Dioica. Tenella, pallide viridis, dense caespitosa. Caulis (sterilis) simplex, parce radiculosus, 1-2 cm. longus. Folia conferta, anguste lanceolata, sensim acuminata, 1.2-1.5 mm. longa; marginibus planis, fere ad basin serratis; costa infra apicem folii evanida, dorso scabra; cellulae laxissimae, ubique laevissimae, superiores oblongo-hexagonae, 10-12 μ latae, haud incrassatae, inferiores rectangulares, margines versus rotundato-quadratae. Caetera ignota.

Dioicous. Slender, delicate, pale green plants, without luster, in rather dense tufts or mats. Sterile stems simple, slightly radiculose, 1-2 cm. long. Leaves widely spreading, narrowly lanceolate, gradually acuminate, 1.2-1.5 mm. long; margins plane, serrate to the base; costa ending below the apex, toothed on the back about half way down; cells very lax, smooth and pellucid, with

thin walls in the upper part of the leaf oblong-hexagonal, to 10-12 μ wide, sometimes faintly protuberant at the apical end, lower cells rectangular, 2-3 rows at the basal angles rounded-quadrate. Sporophyte unknown.

Mangareva Islands: Aukena Island, Koiovao (Koivao), moist basalt cliff, alt. 15 m., May 29, 1934, *St. John 14667* (type).

Austral Islands: Marotiri, southeast islet, moist soil in cave under overhanging cliffs, alt. 75 m., *St. John 15685*.

Pitcairn Island: *Clark 8*.

A slender, delicate species quite noticeably different from *P. lavisima* (C. Müller) Bryol. Jav. in the narrower, sharply acuminate leaves. The plants from Pitcairn Island are open to question. The tufts are very compact and show the zones of growth clearly. The leaf characters agree substantially with the type collection from Aukena Island, and I am, therefore, provisionally including the Pitcairn plant here until more information is available.

FAMILY SPIRIDENTACEAE

Spidens Balfourianus Greville.

Rapa: Mitiperu, horizontal on erect tree trunks, dense, damp forest, alt. 350 m., *Fosberg 11572*; Maungaea, east of Mangaoa Peak, on bark of trees (*Chrysogonum coriaceum*) in moist woods, alt. 325 m., *St. John and Maireau 15352*; Kaimaru, south ridge of Mt. Perahu, growing out at right angles to tree trunk, moist woods on ridge, alt. 475 m., *St. John and Maireau 15520*.

Distribution: Society Islands and Fiji.

FAMILY ORTHOTRICHACEAE

Macromitrium (Goniostoma) rapaense, new species (fig. 5).

Dense caespitosum, caespitibus fuscescenti-viridibus. Caulis elongatus, ramis 3-4 mm. longis. Folia ramea sicca crispatula, 1.5-1.8 mm. longa et 4 mm. lata, ligulata, obtusa; marginibus erectis, superne minute crenulatis; costa infra apicem folii evanida; cellulae superiores rotundatae, tumidae, haud incrassatae, 8-12 μ , basilares rhomboideae, laevissimae, margine versus uno latere lineares. Seta 4-5 mm. longa, sat crassa; theca elliptica, ore contracto, angulato; peristomium simplex, dentibus brevibus, dense papillois; calyptra nuda.

Growing in thin but dense brownish-green mats. Primary stems elongate, creeping, branches numerous, erect, 3-4 mm. high. Branch leaves crispate when dry, 1.5-1.8 mm. long and 0.4 mm. wide, ligulate, obtuse; margins erect, minutely crenulate above; costa ending below the apex; upper cells rounded, not incrassate, 8-12 μ , convex or tumid on the free surfaces, basal cells rhomboidal, smooth,

linear at the margin on one side of the leaf base. Seta 4-5 mm. high, rather thick; capsule elliptic, contracted and plicate at the mouth; peristome single, teeth short and densely papillose; calyptra naked.

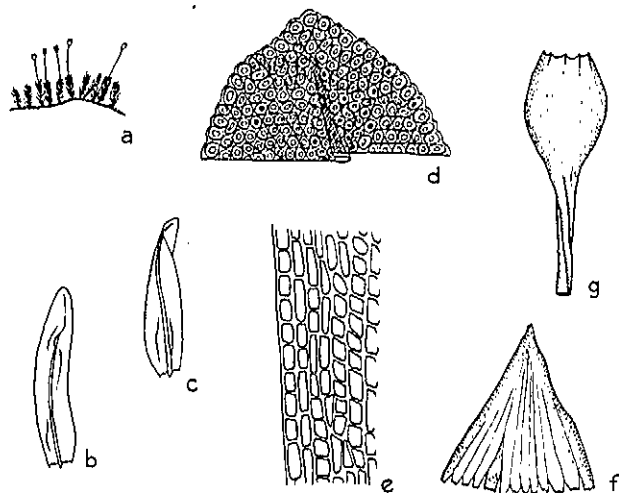


FIGURE 5.—*Macromitrium rapaense*: a, part of plant $\times 1$; b, c, leaves $\times 15$; d, apex of leaf $\times 250$; e, basal angle of leaf $\times 250$; f, calyptra $\times 15$; g, dry capsule $\times 15$.

Rapa: Tapui Islet, surface of rocks, alt. 4 m., July 9, 1934, *Fosberg 11441*.

Near *M. ligulare* Mitten, of New Zealand, but obviously distinct in the slightly convex or tumid leaf cells (not strongly papillose as in *M. ligulare*) and the minutely crenulate leaf margins.

Macromitrium tongense Sullivant.

Macromitrium elizabethae Dixon, Ann. Bryol. 7: 158, 1934.

Henderson Island: north end, on tree trunk, alt. 30 m., *St. John and Fosberg 15112, 15124, 15134*; north center, tree trunk (*Pisonia*), alt. 30 m., *St. John and Fosberg 15177*.

Distribution: Tonga Islands, Fiji.

It is possible that a critical study of the Polynesian species of this large and difficult genus will considerably expand the synonymy and range of *M. tongense*.

Macromitrium (Goniostoma) suberosulum, new species (fig. 6).

Sat robustum. Caulis repens, ramis ad 15 mm. longis. Folia ramea sicca erecto-fleuosa, apice circinato-incurva, lanceolata, acuta, 3-3.5 mm. longa;

marginibus erectis, superne minute crenulatis; costa infra apicem folii evanida; cellulae rotundatae, haud incrassatae, mamillosae, circa $10\ \mu$, basiales alte tuberculosae, infimae oblongo-rhomboidae, laevissimae. Seta 4 mm. longa; theca anguste ovalis, rubella, microstoma, ore plicata; peristomium?; calyptra densiuscule pilosa.

Rather robust plants, yellowish green at the tips, brown below. Branches to 15 mm. high. Branch leaves erect and flexuose with circinate points when dry, 3-3.5 mm. long, lanceolate, acute; margins erect, minutely crenulate above; costa ending below the apex; upper cells rounded, not incrassate, about $10\ \mu$, mamillose, basal cells strongly tuberculate, oblong-rhomboidal and smooth near the insertion. Seta 4 mm. high; capsule narrowly ovoid, reddish, contracted and puckered at the mouth; peristome not seen; calyptra densely long pilose.

Austral Islands: Tubuai, south slope of Panee, on tree branches in moist upper forest, alt. 350 m., Aug. 23, 1934, *St. John 16530a*.

Probably nearest *M. erosulum* Mitten, of New Zealand, from which it seems to be amply distinct in the thin walled and more weakly mamillose upper leaf cells, the lightly crenulate leaf margins and the basal cells elongate only near the insertion, quickly becoming shorter and strongly tuberculate upward.

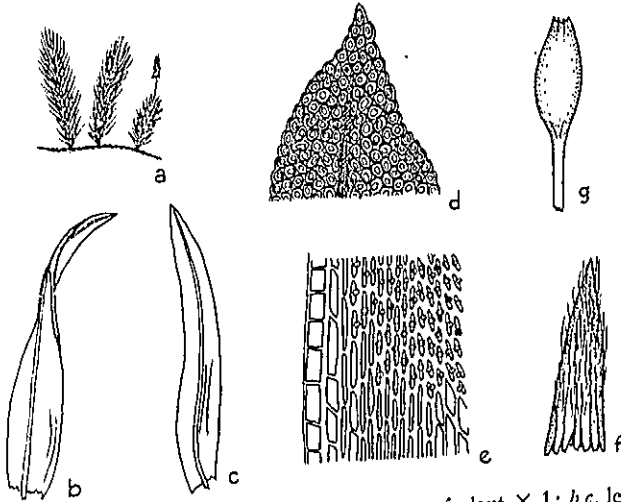


FIGURE 6.—*Macromitrium suberosulum*: a, part of plant $\times 1$; b, c, leaves $\times 15$; d, apex of leaf $\times 250$; e, basal angle of leaf $\times 250$; f, immature calyptra $\times 8$; g, dry capsule $\times 8$.

***Macromitrium (Leiostoma) St.-Johni*, new species (fig. 7).**

Dense caespitosum, caespitibus humilibus, fuscescenti-viridibus, haud nitidis. Caulis dense ramosus, ramis circa 5 mm. altis. Folia ramea conferta, sicca subspiraliter contorta, ligulata, obtusa vel minute mucronata, 2.5 mm. longa et

0.5 mm. lata; marginibus erectis, superne minutissime crenulatis; costa percurrente; cellulae superiores rotundatae, 6-8 μ , valde incrassatae, basilares laevissimae, ellipticae, magis incrassatae, margines versus sensim lineares. Seta 4 mm. longa, laevissima; theca ovalis, laevis; peristomium nullum; calyptra nuda vel parcissime pilosa; spori papilloso, ad 30 μ .

In low, dense mats or tufts, dull yellowish green above, brown below. Stems densely branched, branches about 5 mm. high. Branch leaves crowded, more or less spirally contorted and twisted around the stem when dry, ligulate, obtuse or minutely mucronate, 2.5 mm. long and 0.5 mm. wide; margins erect, minutely crenulate above; costa percurrent; upper cells rounded, incrassate, papillose, 6-8 μ , basal cells smooth, strongly incrassate, with small elliptical lumens and thick, pellucid walls, linear in 6-10 rows at the basal margins. Seta 4 mm. long, smooth capsule ovoid, smooth; peristome none; calyptra naked or very sparsely pilose; spores papillose, to 30 μ .

Rapa: Kopenena, on tree trunk, steep wooded gulch, alt. 125 m., *St. John and Maireau 15512* (type); Area, on tree trunk in woods, alt. 120 m., *St. John and Fosberg 15299*.

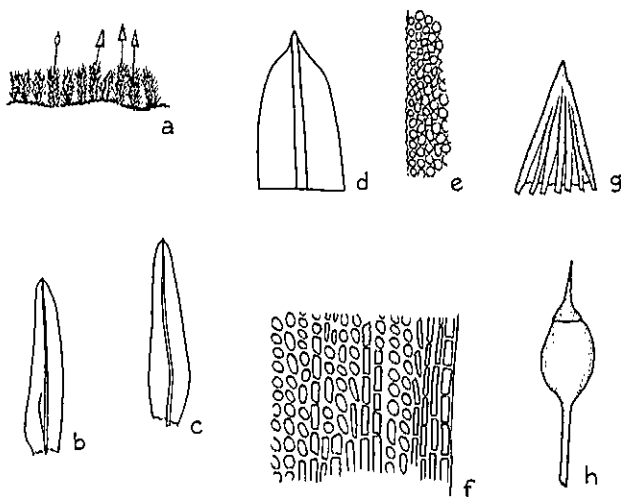


FIGURE 7.—*Macromitrium St-Johni*: a, part of plant $\times 1$; b, c, leaves $\times 10$; d, apex of leaf $\times 80$; e, upper leaf cells and margin $\times 250$; f, basal leaf cells $\times 250$; g, calyptra $\times 8$; h, capsule $\times 8$.

The affinities of this species are not clear. It bears some resemblance to *M. mucronifolium* (Hooker and Greville) Schwagrighen, of tropical America, but the leaf base is indistinctly bordered with elongated cells and the marginal cells are not hyaline and rectangular. The obtuse leaves, short setae, smooth capsules, and nearly or quite naked calyptrae separate it clearly from any of the local Poly-

nesian species. I take great pleasure in associating with this species the name of my old friend Dr. Harold St. John, of the University of Hawaii and Bishop Museum, to whom I am indebted for many courtesies during my visit to Hawaii and whose bryological interest is primarily responsible for this valuable series of Polynesian mosses.

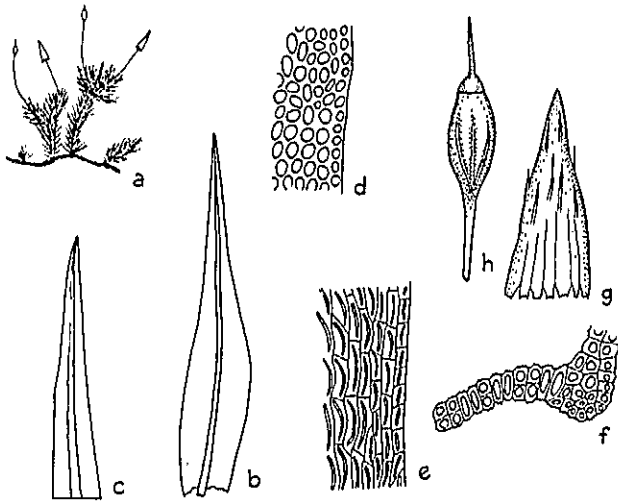


FIGURE 8.—*Macromitrium bistratosum*: a, part of plant $\times 1$; b, leaf $\times 15$; c, apex of leaf $\times 40$; d, upper leaf cells $\times 250$; e, basal leaf cells $\times 250$; f, part of cross section of leaf $\times 250$; g, calyptra $\times 8$; h, capsule $\times 8$.

***Macromitrium (Leiostoma) bistratosum*, new species (fig. 8).**

Robustum, lutescenti-fuscescens, nitidiusculum. Caulis elongatus, repens, dense ramosus, ramis erectis, ad 2 cm. altis, dense foliosis, simplicibus vel apice divis. Folia ramea sicca erecta, apice valde flexuosa, ovato-lanceolata, acuminata, circa 3 mm. longa; marginibus integerrimis; costa percurrente; cellululae superiores subrotundatae, incrassatae, saepe bistratosae, basilares elongatae, incrassatae, lumine semilunari. Seta 7 mm. longa, erecta vel curvata, laevissima; theca ovalis, laevis; peristomium simplex, exostomii, dentes pallidi, dense papilloso; calyptra parce ramentosa.

Robust, glossy plants in deep mats, yellowish above, deep rich brown below. Branches erect, to 2 cm. high, densely leaved, simple or forked above. Branch leaves erect with curved or slightly flexuose points when dry, about 3 mm. long, ovate-lanceolate, acuminate, carinate-concave, entire; costa percurrent; upper cells rounded, incrassate, frequently in two layers, basal cells elongate, smooth, incrassate, with narrow curved lumens. Seta 7 mm. long, erect or slightly curved; capsule ovoid, indistinctly ridged when young, becoming smooth with age, not plicate at the mouth; peristome simple, teeth of the outer peristome pale, densely papillose; calyptra sparingly ramentose.

Rapa: Mangaoa, on tree trunks, moist open woods, alt. 400 m., July 18, 1934, *Fosberg 11586* (type); Taratika, east side of Mt. Perahu, tree trunk, alt. 450 m., *St. John and Maireau 15574*; east side of Mt. Perahu, tree trunk, alt. 615 m., *St. John and Maireau 15662*.

An exceedingly fine plant, richly colored, and unique—so far as my experience goes—in the bistratose upper leaf cells.

Macromitrium incurvifolium (Hooker and Greville) Schwaegrichen.

Austral Islands: Tubuai, south slope of Panee, on tree branches in moist upper forest, alt. 350 m., *St. John 16530*.

Distribution: Java, Ternate, Amboina, Tahiti, Pitcairn.

Macromitrium subtile Schwaegrichen.

Austral Islands: Raiavac, south side of pass, south of Raiurua, on dead sticks of *Hibiscus tiliaceus*, alt. 60 m., *St. John and Fosberg 15824*; Pic Rouge, south side, basalt cliff, alt. 125 m., *St. John and Fosberg 15933*. Rurutu, Naa, on tree trunk, alt. 50 m., *Fosberg 11999*. Tubuai, Puturani, on branches of *Hibiscus tiliaceus*, alt. 75 m., *St. John and Cooke 16325*.

Distribution: New Hebrides, Tuamotu Archipelago, Society Islands.

FAMILY RHACOPILACEAE

Rhacopilum cuspidigerum (Schwaegrichen) Mitten.

Mangareva Islands: Mangareva Island, Mt. Duff, northwest slope, on rocks in woods, alt. 100 m., *St. John 14492*.

Henderson Island: north center, on trunk of *Pisonia*, in woods on elevated, dissected coral, alt. 30 m., *St. John and Fosberg 15164*.

Distribution: Java to Hawaii.

Rhacopilum convolutaceum C. Müller.

Austral Islands: Raiavac, Mt. Hiro, woods on south side on rock in moist woods, alt. 400 m., *St. John 16173*. Rurutu, Naa, coral rock, shade, alt. 25 m., *Fosberg 11998*.

Rapa: Area, cliffs and slopes above, shady moist rock, alt. 50 m., *St. John and Maireau 15560*.

Distribution: Australia, Norfolk Island, Kermadec Islands, Fiji.

FAMILY PTYCHOMNIACEAE

Ptychomnium aciculare (Bridel) Mitten.

Rapa: Taratika, east side of Mt. Perahu, tree trunk in rain forest, alt. 550 m., *St. John and Maireau 15560*; top of Mt. Perahu, tree branches in rain forest, alt. 640 m., *St. John and Fosberg 15734*.

Distribution: Australia, New Zealand, Fiji, Society Islands.

FAMILY PTEROBRYACEAE

Garovaglia tahitense Beschereille.

Austral Islands: Tubuai, Taitaa, alt. 370-399 m., *St. John and Wight 16314-5(a)*.

Distribution: Society Islands.

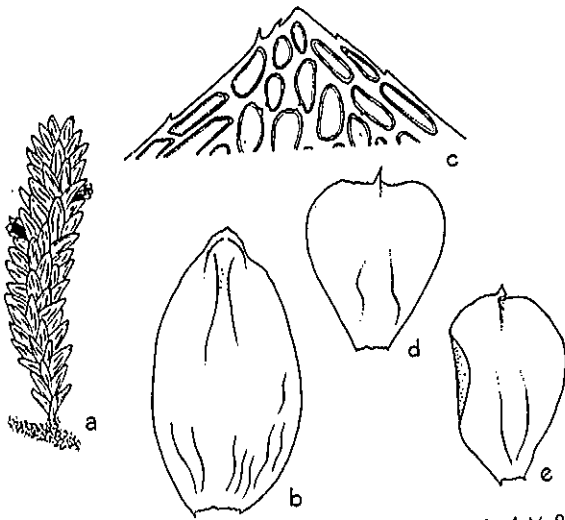


FIGURE 9.—*Garovaglia obtusata*: a, plant $\times 1$; b, stem leaf $\times 8$; c, apex of stem leaf $\times 250$; d, e, perichaetial leaves $\times 15$.

Garovaglia obtusata, new species (fig. 9).

Species cum *G. tahitensi* Beschereille comparanda sed statura minore, foliorum forma, nec non folia perichaetialia truncata vel emarginata, abrupte cuspidata diversa.

Robust, glossy, pale yellowish-green plants. Second stems simple, up to 4 cm. (rarely 5 cm.) high, slightly flattened, about 8 mm. wide with leaves, radiculose at the extreme base. Leaves densely crowded, erect-spreading, ovate, obtuse or very minutely apiculate, longitudinally plicate, 5 mm. long and 2.5 mm.

wide; margins erect, remotely denticulate toward the apex; costa none; upper cells oval-rhomboidal, incrassate and porous, to 17 μ wide, gradually longer and narrower toward the base, lax and irregularly rounded in a small group at the basal angles. Inner perichaetial leaves obovate, truncate or emarginate and shortly cuspidate.

Rapa: Taratika, east side of Mt. Perahu, on mossy rock in rain forest, alt. 525 m., July 15, 1934, *St. John and Maireau 15557*.

While evidently in the alliance of *G. tahitense* Bescherelle this species seems to be entirely distinct in the shorter stems and stockier habit, the obtusely pointed leaves and the truncate or emarginate perichaetial leaves which are abruptly cuspidate. The apical cells of the stem leaves are also appreciably broader and shorter.

FAMILY METEORACEAE

Papillaria Aongstroemiana C. Müller.

Rapa: southeast valley of Mt. Oranga (Ororangi), on rock in woods, alt. 550-700 ft., *Cooke*; Oromanga, forest, south side of Mt. Tangikeu, on tree trunk, woods on steep south side, alt. 250 m., *St. John and Maireau 15481*; Kaimaru, south ridge of Mt. Perahu, mossy tree trunk, alt. 400 m., *St. John and Maireau 15535*.

Austral Islands: Raiavavae, Mt. Muanui, south slope, from dead limb, moist forest, alt. 190 m., *Fosberg 11707*; Vaiuru, slope north-east, talus of basalt blocks, alt. 100 m., *Fosberg 11734*; south side of pass, south of Raiturua, on rocks in forest, alt. 70 m., *St. John and Fosberg 15826*; Mt. Taraia, crevice leading to summit of cliffs, moist, shaded ledges, alt. 280 m., *St. John 16012*; Mt. Hiro, south side of pass, hanging from tree trunk, alt. 250 m., *St. John 16189*. Tubuai, Taitaa, on trees, alt. 370 m., *St. John and Wight 16315*; northeast slope, on shaded rock in upper woods, alt. 350 m., *St. John and Cooke 16319*; northeast slope, on rocks in dense upper woods, alt. 350 m., *St. John and Cooke 16322(a)*.

Mangareva Islands: Mangareva Island, summit of Mt. Duff, cliffs on south side, alt. 450 m., *Fosberg 11362*; on basalt, steep gully, alt. 483 m., *St. John 14857*; Gatavake Valley, base of Mt. Duff, carpeting rocks, alt. 100 m., *Fosberg 11365*.

Distribution: Society Islands.

FAMILY PHYLLOGONIACEAE

Orthorrhynchium cylindricum (Lindberg) Brotherus.

Austral Islands: Raivavae, Mt. Taraia, north side, on tree trunk in woods, alt. 230 m., *St. John 16021*.

Distribution: Fiji, Samoa, Society Islands, Mangareva Islands.

FAMILY NECKERACEAE

Calypothecium Urvilleanum (C. Müller) Brotherus.

Rapa: Toutore, west end of Mt. Vaitau, pendent from tree trunk in moist woods, alt. 230 m., *St. John and Maireau 15419, 15416*.

Austral Islands: Tubuai, pass north of Tunarutu, woods, on rocks, alt. 150 m., *St. John 16516*.

Distribution: India, Malaysia to the Philippines, Fiji, Samoa, Caroline Islands, Society Islands.

Neckeropsis Lepineana (Montagne) Fleischer.

Rapa: southeast valley of Mt. Ororangi, on rocks in woods, alt. 550-700 ft., *Cooke*.

Austral Islands: Raivavae, Mt. Taraia, south slope, moist rocks in woods, alt. 220 m., *St. John and Cooke 15997*; Mt. Muanui, south slope, around tree trunk, moist forest, alt. 100 m., *Fosberg 11708*. Tubuai, Taitaa, northeast slope, on basalt rock in dense upper forest, alt. 350 m., *St. John and Cooke 16323*.

Mangareva Islands: Mangareva Island, Mt. Duff, southeast slope, deep basalt cliff, alt. 190 m., *St. John 14516*.

Distribution: east Africa, Malaysia, and Pacific islands to Hawaii.

Himantocladium implanum (Mitten) Fleischer.

Rapa: Toutore, west end of Mt. Vaitau, on moist rock in woods, alt. 230 m., *St. John and Maireau 15420*.

Distribution: Fiji, Samoa.

FAMILY HOOKERIAACEAE

Callicostella papillata (Montagne) Jaeger.

Rapa: south slope of Mt. Tepiahu, fern-covered ravine, on rocks, alt. 150 m., *Fosberg 11546*.

Distribution: India, Sumatra, Java, Borneo, Philippines, and Pacific islands.

Callicostella vesiculata C. Müller.

Rapa: T'outore, west of Mt. Vaitau, on mossy rock in woods, alt. 240 m., *St. John and Maireau 15414*; Area, wet basalt rocks, in stream in dense shade, alt. 130 m., *St. John and Fosberg 15315a*.

Pitcairn Island: *Clark 9*.

Distribution: Samoa.

FAMILY HYPOPTERYGIACEAE

Hypopterygium tahitense Aongström.

Rapa: southeast valley of Mt. Ororangi, on rock in woods, alt. 550-700 ft., *Cooke*.

Austral Islands: Raivavae, Mt. Muanui, south slope, rocks in shaded ravine, alt. 160 m., *Fosberg 11712*.

Mangareva Islands: Mangareva Island, Mt. Duff, southeast slope, moist basalt ledge, alt. 180 m., *St. John 14515*.

Distribution: Tahiti.

FAMILY BRACHYTHECIACEAE

Rhynchostegium vitianum Bartram and Dixon.

Austral Islands: Raivavae, Mt. Hiro, south side of pass, on rock in moist upper woods, alt. 250 m., *St. John 16190*; Mt. Muanui, south slope, rocks in shaded ravine, alt. 160 m., *Fosberg 11711*.

Distribution: Fiji, Cook Islands.

FAMILY ENTODONTACEAE

Entodon Solanderi (Aongström) Jaeger.

Rapa: Mt. Taga, above watering place, shaded rock, alt. 30 m., *Fosberg 11396*; Mangaoa, shaded rocky ground, alt. 400 m., *Fosberg 11581*; valley two-fifths mile east of Ahurei, mossy boulder, alt. 30 m., *St. John and Fosberg 15272*; Area, on moist shaded basalt rock, alt. 90 m., *St. John and Maireau 15339*; Karapo Rahi Islet, wet, dripping, basalt cliffs, alt. 5 m., *St. John and Maireau 15609*.

Austral Islands: Raivavae, Mt. Muanui, south slope, rocks in shaded ravine, alt. 160 m., *Fosberg 11710*.

Distribution: Hawaii, Society Islands.

FAMILY SEMATOPHYLLACEAE

Sematophyllum hawaiiense (Brotherus) Brotherus.

Rapa: south slope of Mt. Tepiahu, grassy, rocky slope, alt. 150 m., Fosberg 11543.

Distribution: Hawaii.

Rhaphidostichum brevisetum, new species (fig. 10).

Dioicum? Sat robustum, caespitosum, caespitibus densis, depressis, lutescenti-viridibus, nitidus. Caulis repens, parce radiculosus, irregulariter pinnatus ramosus, ramis circa 1 cm. longis, parce ramulosis, cuspidatis. Folia patentia, enervia, ovato-oblonga, in acumen elongatum circa 0.5 mm. longam sensim contracta. Lamina 1-1.4 mm. longa; marginibus erectis, integerrimis; cellulae valde incrassatae, laevissimae, lumine lineari, alares 3-4, oblongo-vesiculosae, hyalinae. Perichaetii bracteae erectae, acumine minute denticulato; seta 15 mm. alta, superne humiliter mamillata; theca oblongo-cylindrica, horizontalis, collo mamilloso.

Dioicous? Rather robust, glossy plants in depressed tufts or mats, yellowish green tinged with brown. Stems creeping, slightly radiculose, irregularly pinnate, branches about 1 cm. long, often with a few branchlets, cuspidate at the tips. Leaves spreading, ecostate, oblong-ovate, gradually contracted to a flat hairlike point about 0.5 mm. long, leaf blade concave, 1-1.4 mm. long; margins erect, entire, broadly inflexed above; cells smooth, incrassate, with narrow lumens, 3-4 cells at the basal angles large, oblong, vesiculose and hyaline. Perichaetial leaves erect, acumine minutely denticulate; seta 15 mm. high scabrous about half way down; capsule cylindrical, horizontal, neck short and mamillose.

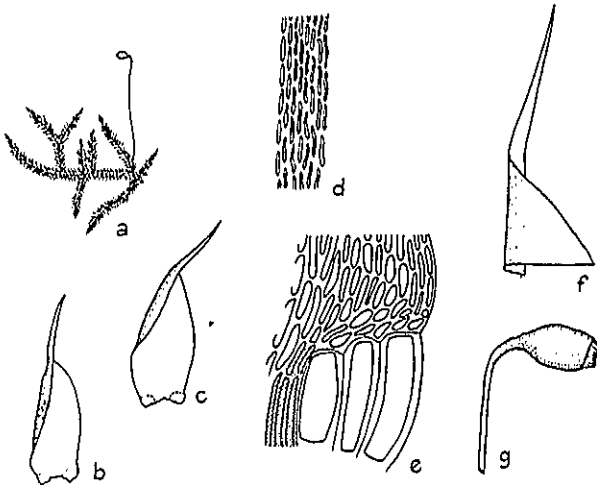


FIGURE 10.—*Rhaphidostichum brevisetum*: a, part of plant $\times 1$; b, c, leaves $\times 15$; d, median leaf cells $\times 250$; e, basal angle of leaf $\times 250$; f, apex of leaf $\times 40$; g, capsule $\times 8$.

Rapa: Taratika, east side of Mt. Perahu, on tree trunk in rain forest, alt. 550 m., July 15, 1934, *St. John and Maireau 15559*.

This species is noticeably smaller than *R. luzonense* (Brotherus) Brotherus, of the Philippines. The leaves are less than 2 mm. long including the acumen and more gradually narrowed to the acumen. The most obvious distinction, however, is in the leaf cells which in *R. brevisetum* are strongly incrassate with narrowly fusiform, slightly vermicular lumens, rounded at both ends.

Trichosteleum pygmaeum Bartram.

Tuamotu Archipelago: Makatea.

Distribution: endemic.

Taxithelium falcifolium Bartram.

Henderson Island: north end, moist shady soil, alt. 30 m., *St. John and Fosberg 15129*.

Oeno Island: on fallen log, alt. 2 m., *St. John and Fosberg 15182*.

Distribution: Marquesas Islands.

Taxithelium Vernieri (Duby) Bescherelle.

Tuamotu Archipelago: Makatea.

Distribution: Society Islands.

FAMILY HYPNACEAE

Ectropothecium sandwichense (Hooker and Walker-Arnott) Mitten.

Rapa: Kopenena, mossy rock, alt. 100 m., *St. John and Maireau 15511*.

Austral Islands: Raivavae, Mt. Taraia, south slope, on log in moist woods, alt. 225 m., *St. John 16002*. Rurutu, Vitaria, on trunk of old coconut tree, alt. 3 m., *St. John 16723*; Maria Island, north-east islet, decayed log in woods, alt. 2 m., *St. John 16970*.

Mangareva Islands: Mangareva Island, Mt. Duff, southeast slope, on tree trunk, alt. 180 m., *St. John 14517*.

Distribution: Australia, New Zealand, Pacific islands to Hawaii.

Ectropothecium (Ectropothecidium) Fosbergii, new species (fig. 11).

Autoicum. Viride, late extensum. Caulis repens, pinnatim ramosus, ramis 5 mm. longis. Folia enervia, lateralia complanato-patula, leniter falcata, late ovato-lanceolata, breviter acuminata, circa 0.8 mm. longa, fere ad basin denticu-

lata; cellulae lineari-rhomboidae, chlorophyllosae, apice valde papillosae, alares nullae. Seta 15 mm. longa; theca minuta, turgide elliptica, horizontalis; operculum convexum, alte apiculatum.

Autoicum. Glossy, green plants in extensive, thin mats. Stems creeping, pinnately branched, branches 5 mm. long, widely spreading, slightly hooked at the tips. Branch leaves complanate, ecostate, the lateral rows spreading and lightly falcate with decurved, flexuose points when dry, broadly ovate-lanceolate, short acuminate, about 0.8 mm. long; margins denticulate nearly to the base; cells linear-rhomboidal, chlorophyllose, papillose at the apical angles above midleaf, not differentiated at the basal angles. Seta 15 mm. high; capsule horizontal, ovoid, contracted below the mouth when dry, urn 1 mm. long; lid convex, sharply apiculate.

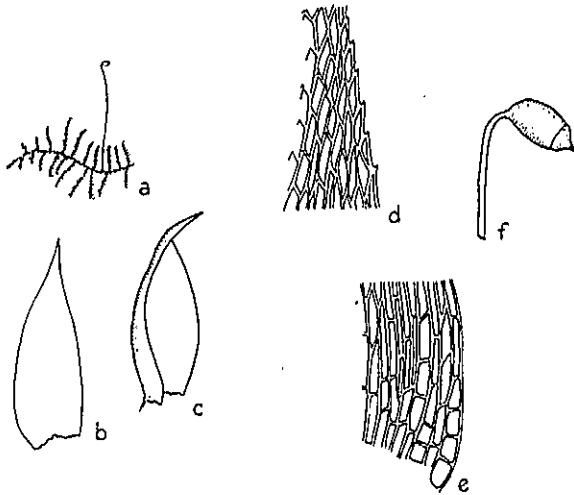


FIGURE 11.—*Ectropothecium Fosbergii*: a, plant $\times 1$; b, c, leaves $\times 30$; d, upper leaf cells and margin $\times 250$; e, basal angle of leaf $\times 250$; f, capsule $\times 8$.

Austral Islands: Raivavae, Vaiannaua [Vaianaua] Peninsula, west side, rotting log, alt. 20 m., Aug. 5, 1934, *Fosberg 11676*.

In comparison with *E. venustulum* Beschereille, of Tahiti, this species shows the leaf margins denticulate at least half way down and often nearly to the base, the leaf cells wider and rhomboidal and the setae longer.

Isopterygium perpallidum, new species (fig. 12).

Autoicum: *I. albescentis* (Schwaegrichen) Jaeger affine sed robustius. Caulis elongatus, subpinnatim ramosus, ramis ad 1 cm. longis, complanatis. Folia ecostata, patentia, 1-1.4 mm. longa, ovato-lanceolata, acuminata; marginibus e basi fere minute denticulatis; cellulae anguste lineares, hyalinae, infimae laxiores, alares paucae, subquadratae. Bractee perichaetii erectae, pilliforme-

acuminatae, subulae minutissime denticulatae; seta 20-23 mm. alta; theca inclinata, curvata, 1 mm. longa; operculum conico-apiculatum.

Similar to *I. albescens* (Schwaegrichen) Jaeger but more robust. Stems elongate, subpinnately branched, branches complanate, about 1 cm. long. Leaves spreading, complanate, ecostate, 1-1.4 mm. long, ovate-lanceolate, acuminate; margins erect, minutely denticulate nearly to the base; cells narrowly linear, hyaline, more lax toward the base, subquadrate alar cells few. Perichaetial leaves erect, filiform-acuminate, very minutely denticulate toward the apex; seta 20-23 mm. high, reddish below, paler above; capsule nodding, slightly curved, urn 1 mm. long; lid conical, apiculate.

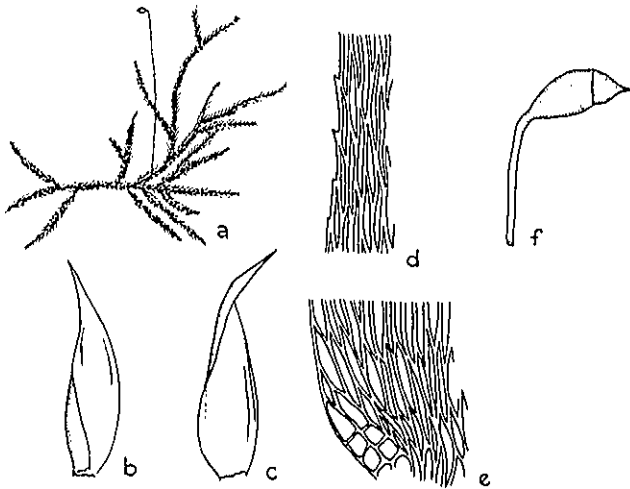


FIGURE 12.—*Isopterygium perpallidum*: a, plant $\times 1$; b, c, leaves $\times 25$; d, upper leaf cells and margin $\times 250$; e, basal angle of leaf $\times 250$; f, capsule $\times 8$.

Austral Islands: Raivavae, Mt. Hiro, woods on south side, on rock in moist upper woods, alt. 400 m., *St. John 16172*. Tubuai, Taitaa, west side on steep rocks in moist upper woods, alt. 370 m., Aug. 23, 1934, *St. John 16542* (type). Rurutu, first gulch south of T'eti, west side of Teape, on steep, shaded, moist rock wall by stream bed, alt. 310 m., *St. John 16757*.

With the habit and coloring of *I. albescens* but noticeably larger, leaf margins minutely and remotely denticulate nearly to the base and setae longer. All of these collections are from moist rock faces, while *I. albescens* usually grows on fallen logs.

***Vesicularia tahitensis* (Aongström) Brotherus.**

Rapa: Mt. Ruatara, east slope, wet, densely shaded rocks, alt. 100 m., *Porsberg 11456, 11458*; south slope of Mt. T'epiahu, fern-

covered ravine, on rocks, alt. 150 m., *Fosberg 11546*; Area, on moist ground, alt. 120 m., *St. John and Fosberg 15323*; Ahurei, mossy rocks, alt. 100 m., *St. John and Maireau 15396*; Akao Bay, wet ledges, on basalt cliff, alt. 4 m., *St. John and Maireau 15579*.

Pitcairn Island: *Clark 10*.

Distribution: Society Islands.

Vesicularia inflectens (Bridel) C. Müller.

Rapa: wet basalt rocks, in stream in dense shade, alt. 130 m., *St. John and Fosberg 15315*.

Austral Islands: Rurutu, Tea, damp coral rock, alt. 3 m., *Fosberg 12019*.

Distribution: Hongkong, Borneo to the Society Islands.