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SOME HEPATICAE FROM THE GALAPAGOS, COCOS,
AND OTHER PACIFIC COAST ISLANDS

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This is a report on a collection of Hepaticae sent us for determination by the California Academy of Sciences. They were collected chiefly by John Thomas Howell in 1931 and 1932, as a member of the Templeton Crocker Expedition, and by Alban Stewart in 1905 and 1906. Two packets were gathered by H. Walton Clark in 1932, also a member of the Crocker Expedition. Most of the material is from the Galapagos Islands, or from Cocos, Guadalupe, and Socorro islands. A few of the packets are from San Nicolas and Maria Madre islands, and from Nicaragua. The first set of specimens and the types are deposited in the Academy's herbarium, with duplicates in the University of Washington Herbarium.

The determinations were made in part by A. W. Evans, and in part by the writer who, however, studied all the material. The drawings were made in pencil by Dr. Evans, and inked by T. C. Frye who also prepared the manuscript for publication. Thus any errors may be attributed to the proper person.

Most of the packets contain mixtures. Each packet will probably be put into the herbarium under the name of the species first mentioned on the packet, which is usually the most abundant therein, or occasionally a rare species. To facilitate the finding of a packet containing a minor amount of material of a desired species, we state also the filing species of the packet if different. For example, if one wishes to examine *Cytolajeunea convexi-*

stipa he will find some of it in Howell's no. 227 filed under *Cheilolejeunea decidua*.

Since several of the islands on which collections were made are commonly not given on maps, because they are so far off shore from the continents, it is considered desirable that their location be indicated. For that reason the general regions of the collections are approximately given, except that the islands constituting the Galapagos group are not further located.

LOCALITIES

Cocos Island (Costa Rica). About 350 miles southwest of Costa Rica; Lat. $5^{\circ} 35' N.$, Long. $87^{\circ} 2' W.$

Coseguina Volcano. Just south of the entrance to the Gulf of Fonseca, Nicaragua; Lat. $13^{\circ} 23' N.$, Long. $87^{\circ} 37' W.$

Galapagos Islands (Ecuador). Lat. $0^{\circ} 33' S.$, Long. $90^{\circ} 33' W.$ The islands on which collections were made are Abingdon, Albemarle, Charles, Chatham, Duncan, Indefatigable, and James.

Guadalupe Island (Mexico). Lat. $29^{\circ} 4' N.$, Long. $118^{\circ} 18' W.$; about one-third of the way down Lower California and about 200 miles west of its western shore. It should not be confused with Guadeloupe Island (France), on the eastern rim of the Caribbean Sea.

Gulf of Fonseca. At the northwest corner of Nicaragua.

Maria Madre Island (Mexico). Lat. $22^{\circ} 13' N.$, Long. $106^{\circ} 10' W.$; the north island of the Tres Marias group.

Revillagigedo Islands (Mexico). A group of small, widely separated islands about 430 miles due west of Manzanillo, Mexico.

San Nicolas Island, California. Lat. $33^{\circ} 15' N.$, Long. $119^{\circ} W.$; about 100 miles southwest of Los Angeles.

Socorro Island (Mexico). Lat. $18^{\circ} 45' N.$, Long. $110^{\circ} 54' W.$; one of the Revillagigedo group.

Tres Marias Islands (Mexico). About 65 miles off the coast of the State of Nayarit, Mexico.

ALPHABETICAL LIST OF SPECIES

Those species herein reported from the Galapagos^g, Cocos^c, Revillagigedo^r, or Guadalupe^{*} islands, and not previously known from that particular group or island, are indicated by letters as above.

**Asterella californica* (Hampe) Underw., Bot. Gaz., 20: 60, 1895. (*Fimbriaria californica* Hampe in Underw., Bull. Ill. State Lab. Nat. Hist., 2: 41, 1884.)

Guadalupe Island, above northeast anchorage, on slope, November 14, 1931 (*Howell 129, 134*), and on Pine Ridge, on rocks and trees, November 15, 1931 (*135*), also at 4000 feet, March 17, 1932 (*165*) and at 2000 feet (*167*).

California, San Nicolas Island, March 13, 1932 (*Howell 149*), and in packet of *Targionia hypophylla* (*150*).

Asterella palmeri (Aust.) Underw., Bot. Gaz., 20: 63, 1895. (*Fimbriaria palmeri* Aust., Bull. Torr. Bot. Club, 6: 47, 1875.)

Guadalupe Island, north end, March 16, 1932 (*Howell 162*), and south end of Cypress Forest, under rocks, March 17, 1932 (*169*). Reported from Guadalupe (Sutcliffe, 1932).

♯**Bazzania teretiuscula** (Lindenb. & Gottsche) Trev., Mem. Istit. Lomb., 13: 414, 1877; *not* of Spruce Proc. Bot. Soc. Edinburgh, 15: 375, 1885. (*Mastigobryum teretiusculum* Lindenb. & Gottsche in G. L. & N., Syn. Hep., 720, 1847.)

Galapagos Islands, Indefatigable Island, Camp No. 2, altitude about 2000 feet, on sloping ground, in packet of *Bryopteris filicina*, May 9, 1932 (*Howell 212*).

♯**Brachiolejeunea densifolia** (Raddi) Evans, Bull. Torr. Bot. Club, 35: 158, 1908. (*Frullanioides densifolia* Raddi, Mem. Soc. Ital. Modena, 19: 38, 1823.) Galapagos Islands, Charles Island, April 25, 1932 (*Howell 196*).

♯**Brachiolejeunea grandidentata** Clark, new species.

Plants large, in depressed mats intermingled with other hepaticae, dull brownish green to brown; leafy shoots 2–3 mm. wide. Stems irregularly bipinnate, with subfloral innovations, about 170 μ in diameter; in cross section the cells about the same size throughout, walls thin. Leaves when dry wrapped about the stem. Dorsal lobe closely imbricate, spreading, ovate to oblong, about 1.9 mm. long as measured from insertion and 0.85 mm. wide; apex decurved, rounded-acute to apiculate; dorsal margin hardly or little crossing beyond the stem; base rounded to slightly cordate. Ventral lobe ovate-triangular in outline, about 710 μ long and 426 μ wide, its inflated water sac more than half the length of the lobule; keel straight, its base rounded, line of juncture of keel and lobe straight or curved; free margin rounded to base; margin with 4–6 large teeth; teeth 2–3 cells long, 2 or more cells wide at base, incurved toward dorsal lobe; apical tooth 4–5 cells long from a 2-celled base; hyaline papilla displaced to inner surface of ventral lobe, 2–3 cells from margin. Marginal cells of dorsal lobe subquadrate, 8–17 μ ; median 25–34 μ long, 15–17 wide; basal 15–26 μ long, 8–11 μ wide; trigones present, somewhat bulging near middle of lobe and below; inter-

mediate thickenings present, oval-oblong. Underleaves large, transversely inserted, subrotund, 710–730 μ long from insertion, 781–802 μ wide; apex rounded or truncate to retuse; margins entire; base auriculate; auricles entire. Plants bisexual. Male inflorescence below the female or on innovations; male bracts 6–10, imbricate, slightly smaller than the leaves; ventral lobe large, almost equaling the dorsal; stylar tooth clearly evident. Female inflorescence terminal on stem, forming innovations on both sides. Female bracts larger than the leaves, erect-spreading, 2-lobed; dorsal lobe united with the ventral for two-thirds its length, ovate to oblong, 1.5–1.7 mm. long, 700–850 μ wide, apex rounded and apiculate to obtusely pointed, sinuate; ventral lobe nearly as long as the dorsal, narrower, ovate, 0.81–1.06 mm. long, 319–390 μ wide, apex acute, margins entire; keel winged; the wing long-triangular, attached along its upper part, about 214 μ wide, its margin entire to sinuate or with 2–3 small teeth. Female bracteole oblong to obovate, 0.9–1.4 mm. long, 700–800 μ wide, apex rounded to truncate or retuse; margins entire. Perianth slightly exserted, becoming more so with growth of sporophyte, ovate-oblong, 1.5–1.7 mm. long, about 850 μ wide, pluricarinate; keels 10, extending half the length, rounded, separated by deep grooves; apex more or less truncate; beak short; mouth flaring. Spores yellow-brown; elaters 7 μ in diameter and bispiral at middle.

Plantae maiores fusco-brunneae aut brunneae. Caules 2-pinnati. Folia imbricata, arte circum caulem involuta cum arida, inaequaliter bilobata. Lobus dorsalis folii ovatus aut oblongatus, 1.9 mm. longus, 850 μ latus, apice decurvato, rotundato apiculatoque; margine integerrimo, basi circinata. Lobus ventralis ovato-triangularis, 710 μ longus, 426 μ latus; sacco aquario 355 μ longo; carina directa; margine soluto cum 6 dentibus maximis; dentibus 2–3 cellulas longis, a basi 2–4 cellulas latis, incurvatis ad lobum dorsalem; dente apicali 4–5 cellulas longo. Amphigastria maxima 710–730 μ longa, 781–802 μ lata; apicibus modo integerrimis modo retusis. Plantae monoeciae. Folia floralia magna, bilobata. Lobus dorsalis ovatus aut oblongatus; apice rotundato; margine integerrimo. Lobus ventralis ovatus, apice rotundato; marginibus sinuatis, integerrimis, alatis; alis longo-triangularibus; marginibus modo truncatis modo sinuatis modo cum 2–3 dentibus parvis. Amphigastria floralia oblongata aut obovata; apice truncato aut retuso; margine integerrimo. Perianthium pluricarinatum, apice truncato; rostro brevi; ore tubae simili.

Galapagos Islands, Charles Island, common on trees, October 7, 1905 (*Alban Stewart 769*); Albemarle Island, above Santo Tomas, Villamil Mountain, on trees, April 29, 1932 (*John Thomas Howell 211A*). Since most of the descriptions and drawings were made from *Howell's no. 211A* we suggest that be considered the type (Herb. Calif. Acad. Sci. no. 372,424).

Brachirolejeunca grandidentata is similar to *B. densifolia* (Raddi) Evans

in general habit, in the auriculate underleaves, and in the pluriplicate perianth. The latter is a species ranging from Mexico and the Island of St. Vincent southward into Brazil and Bolivia, and occurs also in the Galapagos Islands. However *B. grandidentata* differs from *B. densifolia* in that the former is bisexual, has the dorsal leaf lobes more rounded, and has more and larger teeth on the ventral leaf lobes. In Howell's no. 211A *B. grandidentata* is intermingled with *Frullania atrata*, *F. arecae*, *Omphalanthus filiformis*, and *Rectolejeunea maxonii*.

Bryopteris filicina (Swartz) Nees in G. L. & N., Syn. Hep., 284, 1845. (*Jungermannia filicina* Swartz, Prodr. Fl. Ind. Occid., 145, 1788.)

Galapagos Islands, Albemarle Island, below Santo Tomas, on branches of trees in humid region, April 29, 1932 (*Howell 206*); Indefatigable Island, Camp No. 2, altitude 2000 feet, common on ground, May 9, 1932 (*Howell 212*). Known from the Galapagos Islands (Robinson, 1902, p. 100).

Bryopteris galapagona Gottsche., Ann. Sci. Nat., ser. 4, 8:341, 1857. (*Jungermannia filicina* var. *tenuis* of Hook. in Trans. Linn. Soc., 20:163-233, 1847.)

Galapagos Islands, Charles Island, common on bushes, in packet of *Frullania aculeata*, October 7, 1905 (*Stewart 765*). Known from the Galapagos Islands (Robinson, 1902, p. 100).

Bryopteris tenuicaulis Tayl. in G. L. & N., Syn. Hep., 285, 1845.

Galapagos Islands, Charles Island, common on rocks, October 9, 1905 (*Stewart 876*), also on trunks and branches of trees, May 15, 1906 (*7041*): Abingdon Island, common on trees, September 19, 1906 (*Stewart 8501*): Indefatigable Island, common on trunks of trees, July 23, 1906 (*Stewart 5102*). Known from the Galapagos Islands (Robinson, 1902, p. 100).

♁**Calypogeia miquelii** Mont. in G. L. & N., Syn. Hep., 200, 1845.

Galapagos Islands, Indefatigable Island, Camp No. 1, altitude 1700 feet, May 10, 1932 (*Howell 254, 258*).

♁**Caudalejeunea lehmanniana** (Gottsche) Evans, Bull. Torr. Bot. Club, 34:554, 1908. (*Lejeunea lehmanniana* Gottsche in G. L. & N., Syn. Hep., 325, 1845.)

Galapagos Islands, Albemarle Island, south end, above Santo Tomas, Villamil Mountain, on branches of trees, in packet of *Frullania atrata*, April 29, 1932 (*Howell 215*).

♁**Ceratolejeunea lobata** Clark, new species.

Plants small, light yellowish brown; leafy shoots up to 1 mm. wide. Stems to 1.5 cm. long, pinnately branched; branches spreading at right angles to stem, up to 1 cm. long. Leaves contiguous to imbricate, spreading.

Dorsal lobe of leaf oblong-ovate, becoming falcate, 426–568 μ long and about 400 μ wide; apex rounded to obtuse or subacute; margin sinuate to entire or rarely with 2–3 more or less coarse teeth at apical region. Ventral lobe large, ovoid, about $14 \times 8 \mu$, strongly inflated, or small and even reduced to a few cells, both types appearing on the same branch; apical tooth of small ventral lobe mostly straight, oval; that on larger ventral lobe long, bluntly pointed, curved; rarely 1–2 utricles present at bases of main branches. Cells of dorsal leaf lobes isodiametric, near apex 11–17 μ , median and basal 20–34 μ ; walls uniformly rather thin; trigones wanting or very small; paracysts (ocelli) basal, in groups of 2–3. Underleaves distant, wider than the stem, about 100 μ long from insertion and 120 μ wide, 2-lobed to one-half their length, the lobes acute; insertion a transverse line. Plants bisexual. Male inflorescence not found. Female bracts slightly larger than the leaves, spreading, unequally 2-lobed. Dorsal lobe ovate, 686–775 μ long, about 450 μ wide; apex variable, obtuse to acute or apiculate; margin sinuate. Ventral lobe shorter than the dorsal but similar. Bracteole free, ovate, 2-lobed to one-third its length; lobes triangular, acute. Otherwise unknown.

Plantae minutae flavo-brunneae, 15 mm. longae. Caules pinnati; ramis 10 mm. longis. Folia propinqua aut imbricata; lobo dorsali oblongo-ovato, 426–568 μ longo, 400 μ lato; apice rotundato aut subacuto; marginibus integerrimis sinuosis aut cum 2–3 dentibus crassis; lobo ventrali magno, ovato, 14 μ longo, 8 μ lato, modo valide inflato modo ad paucas cellulas reducto; dente apicali magni lobi ventralis, obtuso, flexo; dente apicali reducti lobi ventralis erecto; utriculis 1–2, raris; paracystibus a basi 2–3. Amphigastria parva remota, 109 μ longa, 120 μ lata, $\frac{1}{2}$ bifida. Plantae dioeciae. Folia floralia bilobata; lobo dorsali ovato, 686–775 μ longo, 450 μ lato; lobo ventrali simili lobo dorsali. Amphigastrium florale solutum, ovatum, $\frac{1}{3}$ bilobatum.

Cocos Island, Wafer Bay, in packet of *Lopholejeunea cocosensis*, containing also *Plagiochila bursata*, *Radula affinis* and *Lejeunea setiloba*, June 28, 1932 (*H. Walton Clark 221, type*, Herb. Calif. Acad. Sci. no. 372,425).

Without the perianth *Ceratolejeunea lobata* is hard to place definitely. The following may help to distinguish it from *C. maritima* (Spruce) Steph., which is close to it: (*a*) The group of 1–3 paracysts (ocelli) at the base of the dorsal lobe of the former; (*b*) The teeth on the apical margin of the dorsal lobe; (*c*) The ventral lobe, either large and strongly inflated or reduced to a few cells; (*d*) The presence of a pair of utricles at the bases of some of the primary branches; (*e*) The small female bracts with entire to sinuate margins. *C. maritima* is highly variable, and *C. lobata* may well prove to be one of its variants.

⁸⁰*Ceratolejeunea maritima* (Spruce) Steph., Sp. Hep., 5: 423, 1913. (*Lejeunea maritima* Spruce, Trans. Bot. Soc. Edinburgh, 15: 210, 1884.)

Galapagos Islands, Indefatigable Island, Camp No. 1, altitude 1700

feet, May 10, 1932 (*Howell 251, 252, 260*), also in packet of *Taxilejeunea pterogonia* (253A, 253B), of *Calypogeia miquelii* (254), of *Omphalanthus filiformis* (255), of *Leucolejeunea xanthocarpa* (257), of *Euosmolejeunea trifaria* (263), and of *Plagiochila bursata* (264).

Cocos Island, Wafer Bay, in packet of *Cheilolejeunea decidua*, June 28, 1932 (*Howell 227*).

♁**Ceratolejeunea spinosa** (Gottsche) Steph., *Hedwigia*, 34: 238, 1895. (*Lejeunea spinosa* Gottsche in G. L. & N., Syn. Hep., 402, 1845.)

Galapagos Islands, Indefatigable Island, near Camp No. 1, in packet of *Plagiochila bursata*, May 10, 1932 (*Howell 248*).

♁**Cheilolejeunea decidua** (Spruce) Evans, Bull. Torr. Bot. Club, 32: 188, 1905. (*Lejeunea decidua* Spruce, Trans. Bot. Soc. Edinburgh, 15: 257, 1884.)

Galapagos Islands, Indefatigable Island, Camp No. 1, altitude 1700 feet, May 10, 1932 (*Howell 256*), and in packet of *Calypogeia miquelii* (254, 258); also near Fortuna, in packet of *Frullania riojaneirensis*, May 12, 1932 (265B).

Cocos Island, Wafer Bay, June 28, 1932 (*Howell 227*), also in packet of *Frullania cocosensis* (226), and of *Symbiezidium transversale* (H. Walton Clark 230), and at Chatham Bay (*Howell 235*).

Cololejeunea coseguinana Clark, new species.

Plants yellow-green to nearly colorless; leafy shoots up to 1.1 mm. wide. Stems prostrate, about 50 μ in diameter, very slightly geniculate, irregularly branched; in cross section with 5 peripheral cells; rhizoids moderately numerous. Leaves distant to subimbricate, obliquely to widely spreading, unequally 2-lobed, the dorsal lobe much the larger. Dorsal lobe convex, subrotund to broadly ovate, 320–380 μ long, 280–320 μ wide; apex rounded; margins crenulate with projecting cells; ventral margin forming a continuous line with the keel; dorsal margin hardly or not reaching the farther edge of the stem, at base not rounded but straight. Ventral lobe more or less quadrate, 170–204 μ long, 136–204 μ wide, with arched keel, a portion near keel inflated; free margin curved, somewhat involute for $\frac{1}{3}$ – $\frac{1}{2}$ its length, with apical tooth, and with a 2-celled tooth about half way on the straight or concave margin between the apical tooth and the distal end of keel; apical tooth obtuse to rounded; hyaline papilla at base of 1-2-celled tooth. Stylus reduced to a hyaline papilla (*fig. 3 h*). Cells of the dorsal leaf lobe bulging on the dorsal surface of the leaf, the apical ones about 17 μ , the median 23 μ and the basal 18–23 μ ; trigones wanting; walls thin. Underleaves wanting. Gemmae usually on the ventral surface of the male bracts, flat, discoid, 50–60 μ in diameter, of about 24 cells. Plants bisexual. Male

inflorescence on more or less elongate branches, spike-like; bracts 6–10, subequally 2-lobed; dorsal lobe rather larger, very concave, rounded; ventral lobe entire. Female inflorescence terminal on a main shoot; subfloral innovations present. Female bracts very unequally 2-lobed. Dorsal lobe ovate, about $355\ \mu$ long and $213\ \mu$ wide; apex obtuse to rounded; margins crenulate. Ventral lobe reduced, oblong, about $255\ \mu$ long and $64\ \mu$ wide; apex obtuse; margin crenulate by projecting cells. Perianth obovoid to pyriform, rounded or less rapidly contracted toward apex, sharply 5-keeled in upper part; surface rough with bulging cells; beak very short. Sporangia spherical. Seta short, in cross section 4 cells thick.

Plantae flavo-virides aut hyalinae. Caules procumbentes, ramis incompositae diffusis, $50\ \mu$ per medium. Folia remota aut subimbricata, bilobata inaequaliter; lobo dorsali convexo, subrotundato $320\text{--}380\ \mu$ longo, $280\text{--}320\ \mu$ lato; apice rotundato; marginibus crenulatis ob cellas prominentes; lobo ventrali subquadrato, $170\text{--}204\ \mu$ longo, $136\text{--}204\ \mu$ lato; carina arcuata; dente apicali obtuso aut rotundato; margine flexo, involuto, dente 1–2-cellas longo, in medio inter basim carinae et dentem apicalem locato; papillis hyalinis a basi dentis 2-cellas lati; stylo papilla hyalina reducto. Plantae monoeciae. Folia floralia bilobata inaequaliter; lobo dorsali ovato; apice obtuso aut rotundato; marginibus crenulatis. Perianthium obovatum aut pyriforme, parte superiore cum 5 carinis; superficie aspera; rostro brevi. Sporangium sphaericum; setis brevibus, 4-cellas latis per medium. Gemmae in superficie ventrali foliorum masculinorum locatae, orbes 24 cellarum, $50\text{--}60\ \mu$ latae per medium.

Nicaragua, Gulf of Fonseca, east of Volcano Coseguina, July 7, 1932 (*John Thomas Howell 245, type*, Herb. Calif. Acad. Sci. no. 372,426), and in packet of *Lejeunea setiloba* (242, 270).

Cololejeunea cosequinana is closely related to *C. myriocarpa* (Nees & Mont.) Steph. (*pl. 41, fig. 4*) but the former differs in having: (a) Round or obovate dorsal leaf-lobes; (b) A distinct ventral leaf-lobe with definite apical tooth; (c) The hyaline papilla not marginal but at the base of the apical tooth; (d) The ventral lobe of the female bract reduced but still evident; (e) The gemmae composed of 24 cells; and (f) The margins of the gemmae not crenulate. Evans (1911, p. 281) says: "In the various species where gemmae are found they may differ in size and number of cells, but for a given species, the number of cells is fairly constant."

Cololejeunea cosequinana is also close to *C. minutissima* (Smith) Schiffn. (*pl. 41, figs. 1–3*) but differs in that (a) The former is a larger plant; (b) With the basal margin of the dorsal leaf-lobe not rounded but straight; (c) The hyaline papilla is at the base of the apical tooth; (d) The ventral lobe of the female bract is much reduced (*pl. 39, figs. 6 and 7; pl. 41, fig. 3*);

(e) The gemmae have fewer than 24 cells and (f) The margin of the gemma is not crenulate but entire.

**Cololejeunea sicaefolia* Gottsche in Steph., Hedwigia, 27:290, 1888.

Galapagos Islands, Indefatigable Island, Camp No. 1, altitude 1700 feet, in packet of *Leucolejeunea xanthocarpa*, May 10, 1932 (*Howell 257*).

**Cyclolejeunea convexistipa* (Lehm. & Lindenb.) Evans, Bull. Torr. Bot. Club, 31:198, 1904. (*Jungermannia convexistipa* Lehm. & Lindenb. in Lehm., Pugillus, 6:43, 1834.)

Cocos Island, Wafer Bay, in packet of *Cheilolejeunea decidua*, June 28, 1932 (*Howell 227*).

Dendroceros crispus (Swartz) Nees in G. L. & N., Syn. Hep., 581, 1846. (*Anthoceros crispus* Swartz, Prodr. Fl. Ind. Occid., 3:1884, 1806.)

Galapagos Islands, Indefatigable Island, Camp No. 1, altitude 1700 feet, in packet of *Omphalanthus filiformis*, May 10, 1932 (*Howell 255*). Known from the Galapagos Islands (Howe, 1934, p. 207).

Dicranolejeunea axillaris (Mont.) Steph., Sp. Hep., 5:163, 1912. (*Lejeunea axillaris* Mont., Ann. Sci. Nat., ser. 2, 5:59, 1836.)

Galapagos Islands, Albemarle Island, Villamil Mountain, common on branches of trees, August 23, 1906 (*Stewart 6760*). Reported from the Galapagos Islands (Stephani 1898-1925, vol. 5, p. 163).

**Euosmolejeunea duriuscula* (Nees) Evans, Mem. Torr. Bot. Club, 8:135, 1902. (*Lejeunea duriuscula* Nees in G. L. & N., Syn. Hep., 364, 1845.)

Revillagigedo Islands, Socorro Island, March 27, 1932 (*Howell 179*).

**Euosmolejeunea trifaria* (Nees) Schiffn. in Engler & Prantl, Nat. Pfl. Fam., Ed. 1, 1³:124, 1895. (*Lejeunea trifaria* Nees in G. L. & N., Syn. Hep., 361, 1845.)

Galapagos Islands, Abingdon Island, common on trees, in packet of *Omphalanthus filiformis*, September 21, 1906 (*Stewart 8710*); Indefatigable Island, near Camp No. 1, altitude 1700 feet, May 10, 1932 (*Howell 263*).

**Fossombronina hispidissima* Steph., Sp. Hep., 1:389, 1900.

Guadalupe Island, altitude 2500 feet, March 17, 1932 (*Howell 163*).

Frullania aculeata Tayl., London Journ. Bot., 5:407, 1846.

Galapagos Islands, Duncan Island, on trees and bushes, December 2, 1905 (*Stewart 3166*): Charles Island, common on bushes, October 7, 1905 (*Stewart 765*): Chatham Island, common on bushes, February 26, 1906 (*Stewart 2770*): Indefatigable Island, just below Fortuna, in forest belt, hanging in bunches on branches, May 12, 1932 (*Howell 214*). Known from the Galapagos Islands (Robinson, 1902, p. 100).

Frullania arecae (Spreng.) Spruce, Trans. Bot. Soc. Edinburgh, 15: 20, 1884. (*Jungermannia arecae* Spreng., Neue Entdeck., 2: 99, 1821.)

Galapagos Islands, Albemarle Island, above Santo Tomas, Villamil Mountain, on trees, in packet of *Brachiolejeunea grandidentata*, April 29, 1932 (*Howell 211A*), and of *Frullania atrata* (*211B*). Reported from the Galapagos Islands as *Frullania hians* Lehm. & Lindenb. (Stephani, 1898-1925, vol. 4, p. 333).

Frullania atrata Nees in G. L. & N., Syn. Hep., 463, 1845.

Galapagos Islands, Albemarle Island, above Santo Tomas, Villamil Mountain, on trees, April 29, 1932 (*Howell 211B, 215*), and in packet of *Brachiolejeunea grandidentata* (*211A*): Indefatigable Island, near Camp No. 1, altitude 1700 feet, in packet of *Euosmolejeunea trifaria*, May 10, 1932 (*Howell 263*); also near Fortuna, May 12, 1932 (*268*), and in packet of *Frullania riojaneirensis* (*265A, 265B*): Charles Island, on summit of high peak, on ground and rocks, May 18, 1932 (*Howell 216*). Known from the Galapagos Islands (Robinson, 1902, p. 100, and Robinson and Greenman, 1895, p. 149).

Frullania atrosanguinea Tayl. in Spruce, Trans. Bot. Soc. Edinburgh, 15: 39, 1884.

Galapagos Islands, James Island, common on trees, August 8, 1906 (*Stewart 6064*).

Frullania brasiliensis Raddi, Mem. Soc. Sci. Modena, 19: 36, 1823.

Galapagos Islands, Charles Island, common on rocks, October 9, 1905 (*Stewart 872*): Indefatigable Island, common on trees, October 28, 1905 (*Stewart 1734*): Chatham Island, on rocks and dead twigs, in packet of *Marchesinia brachiata*, January 27, 1906 (*Stewart 2598*), and on bushes and trees, in packet of *Omphalanthus filiformis*, February 23, 1906 (*Stewart 2783*): James Island, common on trees, August 8, 1906 (*Stewart 6063*): Abingdon Island, common on trees, in packet of *Omphalanthus filiformis*, September 21, 1906 (*Stewart 8710*).

Frullania californica (Aust.) Evans, Trans. Conn. Acad. Arts Sci., 10: 25, 1897. (*Frullania asagrayana* var. *californica* Aust. in Underw., Bull. Ill. State Lab. Nat. Hist., 2: 67, 1884; emend. Howe, Erythea, 2: 98, 1894.)

Guadalupe Island, on Pine Ridge, on rocks and trees, November 11, 1931 (*Howell 135*). Reported from Guadalupe under the name *Frullania catalinae* Evans (Sutcliffe, 1932).

Frullania cocosensis Steph., Sp. Hep., 4: 492, 1911.

Cocos Island, Wafer Bay, June 28, 1932 (*Howell 226*); male plants only. Known only from Cocos Island (Stephani 1898-1925, vol. 4, p. 492). Apparently Stephani considered Cocos Island one of the Galapagos group.

^{sc}**Frullania cucullata** Lindenb. & Gottsche in G. L. & N., Syn. Hep., 782, 1847.

Galapagos Islands, James Island, on bushes, December 19, 1905 (*Stewart 3394*).

Cocos Island, Wafer Bay, June 28, 1932 (*Howell 229*), and Chatham Bay, in packet of *Taxilejeunea pterogonia*, June 28, 1932 (*228*).

^r**Frullania eboracensis** Gottsche in Lehm., Pugillus, 8:14, 1844.

Revillagigedo Islands, Socorro Island, March 27, 1932 (*Howell 178*), and in packet of *Lejeunea cladogyna* (*170*).

^{sc}**Frullania gymnotis** Nees & Mont. in Mont., Ann. Sci. Nat., ser. 2, 19:257, 1843.

Galapagos Islands, Indefatigable Island, Camp No. 1, altitude 1700 feet, in packet of *Leucolejeunea xanthocarpa*, May 10, 1932 (*Howell 257*), and in packet of *Euosmolejeunea trifaria* (*263*).

Cocos Island, Wafer Bay, in packet of *Lopholejeunea cocosensis*, June 28, 1932 (*Howell 231*).

^{r*}**Frullania inflata** Gottsche in G. L. & N., Syn. Hep., 424, 1845.

Revillagigedo Islands, Socorro Island, March 27, 1932 (*Howell 173*), also above Braithwaite Bay, at lower limit of forest (*171*), and in packet of *Lejeunea setiloba* (*172*).

Guadalupe Island, on Pine Ridge, November 14, 1931 (*Howell 130*), and November 15, 1931 (*131, 141*).

Nicaragua, Gulf of Fonseca, east of Volcano Coseguina, near shore, July 7, 1932 (*Howell 244*).

^c**Frullania riojaneirensis** (Raddi) Spruce, Trans. Bot. Soc. Edinburgh, 15:23, 1884. (*Frullanioides riojaneirensis* Raddi, Mem. Soc. Sci. Ital. Modena, 12:37, 1823.)

Galapagos Islands, Indefatigable Island, near Fortuna, May 12, 1932 (*Howell 208, 265A, 265B*). Reported from the Galapagos Islands as *Frullania arietina* (Robinson and Greenman, 1895, p. 149).

Cocos Island, Wafer Bay, in packet of *Cheilolejeunea decidua*, June 28, 1932 (*Howell 277*).

^r**Frullania riparia** Hampe in Lehm., Pugillus 7:14, 1838.

Revillagigedo Islands, Socorro Island, in packet of *Euosmolejeunea duriuscula*, March 27, 1932 (*Howell 179*).

Nicaragua, Gulf of Fonseca, east base of Volcano Coseguina, near shore, in packet of *Lejeunea setiloba*, July 7, 1932 (*Howell 246*).

^{sc}**Frullania squarrosa** (R., Bl. & Nees) Dum., Rec. d'Obs., 13, 1835.

(*Jungermannia squarrosa* R. Bl. & Nees, Nova Acta Acad. Caes. Leop-Carol., 12: 219, 1824.)

Galapagos Islands, Charles Island, east of highest cone, April 25, 1932 (*Howell 191*), and inland from Postoffice Bay, on rocks, July 17, 1932 (*186*): Indefatigable Island, Academy Bay, on stumps, May 2, 1932 (*Howell 192*) and May 4, 1932 (*207*): Albemarle Island, Iguana Cove, May 21, 1932 (*Howell 200*).

Nicaragua, Gulf of Fonseca, east of Volcano Coseguina, in packet of *Lejeunea setiloba*, July 7, 1932 (*Howell 270*).

Mexico, Tres Marias Islands, Maria Madre Island, July 26, 1932 (*Howell 237*).

^{scr}*Lejeunea cladogyna* Evans, Amer. Journ. Bot., 5: 134, 1918.

Galapagos Islands, James Island, common on trees, August 8, 1906 (*Stewart 6066*): Charles Island, in packet of *Plagiochila asplenioides*, April 25, 1932 (*Howell 189*): Indefatigable Island, near Fortuna, May 10, 1932 (*Howell 266*), and in packet of *Stylolejeunea pililoba*, May 8, 1932 (*267*) and of *Plagiochila bursata* (*284*).

Cocos Island, Chatham Bay, June 28, 1932 (*Howell 233*), and Wafer Bay, in packet of *Lopholejeunea cocosensis* (*231*).

Revillagigedo Islands, Socorro Island, March 27, 1932 (*Howell 170*), and in packet of *Lejeunea setiloba* (*172*).

^{sc}*Lejeunea flava* (Swartz) Nees, Naturg. Eur. Leberm., 3: 277, 1838. (*Jungermannia flava* Swartz, Prodr. Fl. Ind. Occid., 144, 1788.)

Galapagos Islands, Indefatigable Island, Camp No. 1, altitude 1700 feet, in packet of *Ceratolejeunea maritima*, May 10, 1932 (*Howell 251*), and in packet of *Leucolejeunea xanthocarpa* (*257*): Charles Island, summit of high peak, on ground and rocks, in packet of *Frullania atrata*, May 10, 1932 (*Howell 216*).

Cocos Island, Wafer Bay, in packet of *Frullania cucullata*, June 28, 1932 (*Howell 229*).

^{scr}*Lejeunea setiloba* Spruce, Trans. Bot. Soc. Edinburgh, 15: 281, 1884.

Galapagos Islands, Indefatigable Island, near Camp No. 1, in packet of *Plagiochila bursata*, May 10, 1932 (*Howell 248*).

Cocos Island, Wafer Bay, in packet of *Lopholejeunea cocosensis*, June 28, 1932 (*H. Walton Clark 221*).

Revillagigedo Islands, Socorro Island, March 27, 1932 (*Howell 172*).

Nicaragua, Gulf of Fonseca, east of Volcano Coseguina, July 7, 1932 (*Howell 242, 246, 270*).

^{sc}*Leucolejeunea xanthocarpa* (Lehm. & Lindenb.) Evans, Torreya,

7:229, 1907. (*Jungermannia xanthocarpa* Lehm. & Lindenb. in Lehm., Pugillus, 5:8, 1832.)

Galapagos Islands, Indefatigable Island, Camp No. 1, altitude 1700 feet, May 10, 1932 (*Howell 257*), also in packet of *Ceratolejeunea maritima* (251) and of *Euosmolejeunea trifaria* (263).

Lophocolea bidentata (L.) Dum., Rec. d'Obs., 17, 1835. (*Jungermannia bidentata* L., Sp. Pl. 1132, 1753.)

Guadalupe Island, Pine Ridge, on rocks, November 15, 1931 (*Howell 137*). Known from Guadalupe (*Sutcliffe, 1932*).

♂**Lopholejeunea cocosensis** Clark, new species.

Plants large, in closely appressed mats or mixed with other lejeunoid species, dark brown or olive-green to light green, glossy; leafy shoots up to 2.2 mm. wide. Stems prostrate, irregularly 2-3-pinnate, up to 227 μ in diameter and 3 cm. long; in cross section the cortical layer of a single row of cells; cortical cells larger, tangentially about 34 μ and radially about 18 μ , with walls pigmented; interior cells distinctly smaller, roundish-hexagonal, colorless. Leaves imbricate, widely spreading; keel more or less convex. Dorsal leaf lobe plane or very slightly convex, ovate-oblong, slightly falcate, 3.4-4 mm. long from insertion, 0.8-1.4 mm. wide; apex rounded, slightly decurved; margin entire to occasionally sinuate at dorsal base; dorsal margin arching to middle of stem or to stem-width over it; ventral margin forming an obtuse angle with the keel. Ventral lobes of leaf well developed, ovate, about 234 μ long and 180 μ wide, inflated except at apex; inflated portion hemispheric, conspicuous, constituting a swelling at inner half of the ventral lobe; apical tooth triangular, its base 2 cells wide and 2-3 cells (about 42 μ) long; sinus narrow, adnate portion 2-3 cells long; margin of free portion entire; hyaline papilla on incurved margin of ventral lobe. Cells of dorsal leaf lobe slightly bulging on dorsal surface, marginal ones about 17 μ , median 25 μ , basal 51 \times 34 μ ; trigones distinct but not bulging; walls uniformly somewhat thickened, pits small; intermediate thickenings common, oval. Underleaves imbricate, reniform, very large but smaller than the dorsal leaf lobe, 532-770 μ long, 1.3-1.45 mm. wide; base rounded to subcordate; apex broad, rounded; margin entire. Plants bisexual. Male inflorescence an oblong branch; bracts 8-12, unequally 2-lobed, strongly concave; ventral lobe the smaller, more convex dorsally; both lobes with apex rounded and margins entire. Male bracteoles imbricate, orbicular to broader than long. Female inflorescence on a short to long branch. Female bract widely spreading, 2-lobed to below middle. Dorsal lobe falcate, broadly ovate-orbicular to ovate, about 1.56 mm. long and 780 μ wide; apex obtuse to rounded, apiculate; dorsal margin with 6-9 coarse irregular teeth in upper part, basal half entire; ventral margin dentate; its teeth to 4 cells long,

2-4 cells wide at base, blunt or sharp. Ventral lobe large, about 710 μ long and 284 μ wide, more or less concavely folded on dorsal lobe; apex acute to apiculate, margins coarsely dentate, with a large curved tooth at base of sinus (fig. 7). Female bracteole free, large, orbicular to slightly longer than wide, about 1.3 mm. long and 1.1 mm. wide; apex rounded, recurved; margins coarsely dentate; teeth numerous, short to 2-4 cells long, 2-3 cells wide at base. Perianth ovate to obovate, extending slightly beyond the bracts, about 3 mm. long and 805 μ wide at middle, with plane dorsal face; keels 4, 2 lateral, 2 ventral; lateral keels deeply and coarsely laciniate; laciniae more or less curved, crowded, ovate to lanceolate from a narrow base, acute, entire; beak short.

Plantae maximae, subnigrae fuscae, viridi-nigricantes aut pallentes, nitidae. Caules procumbentes inaequali-pinnati. Folia imbricata, bilobata; lobo dorsali plano, oblongo-ovato, 3.4-4 mm. longo, 0.8-1.4 mm. lato; apice rotundato, decurvato; marginibus integerrimis aut sinuatis a basi dorsali; lobo ventrali ovato, 234 μ longo, 180 μ lato, parte inflata hemisphaericali conspicua; dente apicali triangulari a basi 2 cellulas lato, 2-3 cellulas longo; sinu angusto; margine partis solutae integerrimo. Amphigastria maxima imbricata reniformia, apice lato, rotundato, marginibus integris, basi rotundata aut subcordata. Plantae dioeciae. Folia floralia bilobata; lobo dorsali falcato ovato-orbiculato aut ovato 1.56 mm. longo, 780 μ lato; apice obtuso aut rotundato apiculato; parte superiore marginis dorsalis cum 6-9 dentibus crassis, parte a basi integerrima; margine ventrali dentato cum dentibus 4 cellas longis, a basi 2-4 cellas lato; lobo ventrali magno in lobum dorsalem concave plicato; apice acuto aut apiculato; marginibus crasse dentatis et uno magno dente curvato a basi sinus. Amphigastria floralia soluta, maxima, orbiculata aut longiora quam latiora; apice rotundato recurvato; marginibus cum multis dentibus crassis, 2-4 cellas longis, a basi 2-3 cellas latis. Perianthium ovatum aut obovatum, 4 carinis; marginibus carinarum alte et crasse laciniatis; rostro brevi. Androecia a ramo brevi; foliis masculinis 4-6 jugis, inaequaliter bilobatis.

Cocos Island, Wafer Bay, June 28, 1932 (*John Thomas Howell 231, type*, Herb. Calif. Acad. Sci. no. 372, 427), and in packet of *Frullania cucullata* (229), also intermingled with other hepaticae in packet of *Lopholejeunea cocosensis* (*H. Walton Clark 221*).

Lopholejeunea cocosensis is near *L. sagraeana*, the vegetative characters offer no distinct separation. However, in the former: (a) The dorsal lobe of the female bract often is apiculate; (b) The ventral lobe of the female bract is approximately 1 mm. long and wide; (c) The margins of the bracteole are coarsely dentate; (d) The laciniae on the margins of the lateral keels of the perianth are entire. In the latter: (a) The dorsal lobe of the female

bract is obtuse or acute; (*b*) The ventral lobe of the female bract is reduced to a mere tooth; (*c*) The margins of the bracteole are entire or merely vaguely sinuate; (*d*) The laciniae on the margins of the lateral keels of the perianth are irregularly dentate or spinose-dentate.

♂**Lopholejeunea muelleriana** (Gottsche) Schiffn., Bot. Jahrb., 23: 599, 1897. (*Lejeunea muelleriana* Gottsche, Kongl. Danske Vidensk. Selsk. Skrift., ser. 5, 6: 280, 1867.)

Cocos Island, Wafer Bay, June 28, 1932 (*Howell 241*), and in packet of *Frullania cocosensis* (226), and of *Symbiezidium vincentianum* (222); also Chatham Bay, in packet of *Symbiezidium pogonopterum* (225).

♂**Lophozia opacula** (Spruce) Steph., Sp. Hep., 2: 46, 1901. (*Jungermannia opacula* Spruce, Trans. Bot. Soc. Edinburgh, 15: 514, 1885.)

Galapagos Islands, Indefatigable Island, Camp No. 1, altitude 1700 feet, in packet of *Cheilolejeunea decidua*, May 10, 1932 (*Howell 256*).

Marchesinia brachiata (Swartz) Schiffn. in Engler & Prantl, Nat. Pfl. Fam., Ed. 1, 1³: 128, 1895. (*Jungermannia brachiata* Swartz, Prodr. Fl. Ind. Occid., 144, 1788.)

Galapagos Islands, Chatham Island, common on moist rocks and dead twigs, January 27, 1906 (*Stewart 2598, 4042*): Indefatigable Island, Camp No. 1, altitude 1700 feet, May 10, 1932 (*Howell 250*). Known from the Galapagos Islands (Robinson, 1902, p. 101, and Evans, 1907, p. 548).

♂**Mastigolejeunea auriculata** (Wils. & Hook.) Schiffn. in Engler & Prantl, Nat. Pfl. Fam., Ed. 1, 1³: 129, 1895. (*Jungermannia auriculata* Wils. & Hook., Musci Amer. Exsic., 170, 1841.)

Galapagos Islands, Indefatigable Island, near Fortuna, in packet of *Frullania riojaneirensis*, May 12, 1932 (*Howell 265B*), and of *Frullania atrata* (268).

Metzgeria grandiflora Evans, Torreya, 16: 68, 1916.

Galapagos Islands, Indefatigable Island, Camp No. 1, altitude 1700 feet, in packet of *Microlejeunea ulicina*, May 10, 1932 (*Howell 249*) and of *Plagiochila bursata* (264). Known from the Galapagos Islands (Evans, 1916, p. 68).

♂**Microlejeunea bullata** (Tayl.) Evans, Mem. Torr. Bot. Club, 8: 164, 1902. (*Lejeunea bullata* Tayl., London Journ. Bot., 5: 398, 1846.)

Galapagos Islands, Albemarle Island, top of Tagus Cove Mountain, altitude about 4000 feet, May 26, 1932 (*Howell 218*).

Cocos Island, Wafer Bay, in packet of *Cheilolejeunea decidua*, June 28, 1932 (*Howell 227*).

♯**Microlejeunea laetevirens** (Nees & Mont.) Evans, *Bryologist*, 11: 68, 1908. (*Lejeunea laetevirens* Nees & Mont. in Ramon de la Sagra, *Hist. Fis. Pol. y Nat. Cuba*, 9: 281, 1845.)

Galapagos Islands, Indefatigable Island, near Fortuna, in packet of *Plagiochila martiana*, May 12, 1932 (*Howell 269*).

Revillagigedo Islands, Socorro Island, in packet of *Frullania eboracensis*, March 27, 1932 (*Howell 178*).

♯**Microlejeunea ulicina** (Tayl.) Evans, *Mem. Torr. Bot. Club*, 8: 165, 1902. (*Jungermannia ulicina* Tayl., *Trans. Bot. Soc. Edinburgh*, 1: 115 1844.)

Galapagos Islands, Indefatigable Island, Camp No. 1, altitude 1700 feet, May 10, 1932 (*Howell 249*).

Omphalanthus filiformis (Swartz) Nees in G. L. & N., *Syn. Hep.* 304, 1845. (*Jungermannia filiformis* Swartz, *Prodr. Fl. Ind. Occid.*, 144, 1788.)

Galapagos Islands, James Island, on trees, August 8, 1906 (*Stewart 6044*), and on bushes, in packet of *Frullania cucullata*, December 19, 1905 (*3394*): Chatham Island, on bushes and trees, February 23, 1906 (*Stewart 2783*): Abingdon Island, common on trees, September 21, 1906 (*Stewart 8710*): Albemarle Island, above Santo Tomas, Villamil Mountain, on trees, in packet of *Brachilejeunea grandidentata*, April 29, 1932 (*Howell 211A*): Indefatigable Island, Camp No. 1, altitude 1700 feet, May 10, 1932 (*Howell 255*): Charles Island, summit of high peak, on ground and rocks, in packet of *Frullania atrata*, May 18, 1932 (*Howell 216*). Known from the Galapagos Islands (Robinson, 1902, p. 101).

♯**Peltolejeunea jackii** Steph., *Hedwigia*, 31: 18, 1892.

Galapagos Islands, James Island, on bushes, in packet of *Frullania cucullata*, December 19, 1905 (*Stewart 3394*): Abingdon Island, common on trees, in packet of *Omphalanthus filiformis*, September 21, 1906 (*Stewart 8710*).

Plagiochasma rupestre (Forst.) Steph., *Sp. Hep.*, 1: 80, 1898. (*Aytonia rupestris* Forst., *Char. Gen. Plant.*, 147, 1776.)

Galapagos Islands, Albemarle Island, Iguana Cove, May 21, 1932 (*Howell 194*), and Tagus Cove Mountain, west side, altitude 1500 feet, in moist shaded places under rocks (*198*): Charles Island, east of highest cone, April 25, 1932 (*Howell 210*), and at "The Springs," on wet rocks (*217*). Known from the Galapagos Islands (Evans, 1915, p. 280).

Plagiochila anderssonii Angstr., *Kongl. Vetensk.-Akad. Föhr.*, 114, 1873.

Cocos Island, Wafer Bay, June 28, 1932 (*Howell 232*), and in packet of

Lopholejeunea muelleriana (241). Known from the Galapagos Islands (Robinson, 1902, pp. 101 and 241), and from Cocos Island (Evans, 1907, pp. 101 and 261; Stephani, 1898-1925, vol. 2, p. 497; Robinson, 1902, p. 261).

♁*Plagiochila asplenioides* (L.) Dum. Rec. d'Obs., 14, 1835. (*Jungermannia asplenioides* L., Sp. Pl. 1131, 1783.)

Galapagos Islands, Charles Island, in packet of *Lejeunea cladogyna*, April 25, 1932 (*Howell 189*), and summit of high peak, on ground and rocks, in packet of *Frullania atrata*, May 18, 1932 (216).

♁*Plagiochila breuteliana* Lindenb. in Lindenb. & Gottsche, Sp. Hep., 150, yr. ?.

Galapagos Islands, Indefatigable Island, Camp No. 1, altitude 1700 feet, in packet of *Ceratolejeunea maritima*, May 10, 1932 (*Howell 260*).

♁*Plagiochila bursata* (Desv.) Lindenb. in Lindenb. & Gottsche, Sp. Hep., 88, yr. ?. (*Jungermannia bursata* Desv., Jour. de Bot., 4:59, 1824.)

Galapagos Islands, Indefatigable Island, at Fortuna, May 8, 1932 (*Howell 284*); at Camp No. 1, altitude 1700 feet (248, 261, 264), also in packet of *Microlejeunea ulicina* (249), of *Ceratolejeunea maritima* (252), of *Cheilolejeunea decidua* (256), of *Euosmolejeunea trifaria* (263) and of *Taxilejeunea pterogonia* (253B): Charles Island, summit of high peak, on ground and rocks, in packet of *Frullania atrata*, May 18, 1932 (*Howell 216*).

Cocos Island, Wafer Bay, in packet of *Symbiezidium transversale*, June 28, 1932 (*H. Walton Clark 230*), and in packet of *Lopholejeunea cocosensis* (221); Chatham Bay, in packet of *Taxilejeunea pterogonia*, June 28, 1932 (*Howell 228*).

♁*Plagiochila martiana* Nees in Lindenb. & Gottsche, Sp. Hep., 12, 1839. (*Jungermannia martiana* Nees, Linnaea, 6: 617, 1831.)

Galapagos Islands, Indefatigable Island, on trees, November 9, 1905 (*Stewart 386*), and near Fortuna, May 12, 1932 (*Howell 269*): James Island, on trees, January 3, 1906 (*Stewart 3404, 3660*), and in packet of *Lejeunea cladogyna*, August 8, 1906 (6066).

Cocos Island, Chatham Bay, in packet of *Symbiezidium pogonopterum*, June 28, 1932 (*Howell 225*).

Porella navicularis (Lehm. & Lindenb.) Lindb., Acta Soc. Sci. Fennica, 9: 337, 1869. (*Jungermannia navicularis* Lehm. & Lindenb. in Lehm., Pugillus, 6: 37, 1834.)

Guadalupe Island, on trees and rocks in Pine Forest, November 15, 1931 (*Howell 133, 136*). Reported from Guadalupe (Sutcliffe, 1932).

♁*Radula affinis* Lindenb. & Gottsche in G. L. & N., Syn. Hep., 725, 1847.

Cocos Island, Wafer Bay, in packet of *Lopholejeunea cocosensis*, June 28, 1932 (*H. Walton Clark 221*), and of *Symbiezidium transversale* (230); also in packet of *Symbiezidium vincentinum*, June 28, 1932 (*Howell 222*) and of *Frullania cucullata* (229).

♯*Rectolejeunea maxonii* Evans, Bull. Torr. Bot. Club, 39:609, 1912.

Galapagos Islands, Albemarle Island, above Santo Tomas, Villamil Mountain, on trees, in packet of *Brachiolejeunea grandidentata*, April 29, 1932 (*Howell 211A*).

♯*Sphaerocarpus cristatus* Howe, Mem. Torr. Bot. Club, 7:66, 1899.

California, San Nicolas Island, March 13, 1932 (*Howell 148*).

♯*Stictolejeunea squamata* (Willd.) Schiffn. in Engler & Prantl, Nat. Pfl. Fam., Ed. 1, 1³:131, 1895.

Cocos Island, Chatham Bay, June 28, 1932 (*Howell 223*).

♯*Stylolejeunea pililoba* (Spruce) Evans, Bryologist, 43:3, 1940. (*Lejeunea pililoba* Spruce, Journ. Linn. Soc. Bot., 30:346, 1895.)

Galapagos Islands, Indefatigable Island, near Fortuna, May 8, 1932 (*Howell 267*).

♯*Symbiezidium pogonopterum* (Spruce) Steph., Sp. Hep., 5:103, 1912. (*Lejeunea pogonoptera* Spruce, Trans. Bot. Soc. Edinburgh, 15:128, 1884.)

Cocos Island, Chatham Bay, June 28, 1932 (*Howell 225*). Known from Cocos Island (Robinson, 1902, p. 261) as *Platylejeunea pogonoptera*.

♯*Symbiezidium transversale* (Swartz) Trev., Mem. Soc. Istit. Lomb., III. 4:403, 1877. (*Jungermannia transversalis* Swartz, Prodr. Fl. Ind. Occid., 144, 1788.)

Galapagos Islands, Charles Island, east of the highest cone, April 25, 1932 (*Howell 190*).

Cocos Islands, Wafer Bay, June 28, 1932 (*H. Walton Clark 230*), and in packet of *Lopholejeunea cocosensis* (*Howell 231*).

♯*Symbiezidium vincentinum* (Gottsche) Trev., Mem. Istit. Lomb., III. 4:403, 1877. (*Lejeunea vincentina* Gottsche in G. L. & N., Syn. Sep., 313, 1845.)

Cocos Island, Wafer Bay, June 2, 1932 (*Howell 222*).

♯*Syzygiella oppositifolia* Spruce in Gepp., Hep. Domin., Journ. of Bot., :302, 1895. (*Jungermannia oppositifolia* Spruce, Mem. Torr. Bot. Club, 1:138, 1890.)

Galapagos Islands, Chatham Island, on rocks and soil, July 6, 1906 (*Stewart 7330*).

Targionia hypophylla L., Sp. Pl., 1604, 1753.

Guadalupe Island, above northeast anchorage on slopes, November 14, 1931 (*Howell 132, 143*), and in packet of *Asterella californica* (129); also on north end of the island, March 16, 1932 (*Howell 161*). Known from Guadalupe (Sutcliffe, 1932).

California, San Nicolas Island, March 13, 1932 (*Howell 150, 151*).

♂**Taxilejeunea pterogonia** (Lehm. & Lindenb.) Schiffn. in Engler & Prantl Nat. Pfl. Fam., Ed. 1, 1³:125, 1895. (*Jungermannia Pterogonia* Lehm. & Lindenb. in Lehm., Pugillus, 6:44, 1834.)

Galapagos Islands, Indefatigable Island, Camp No. 1, altitude 1700 feet, May 10, 1932 (*Howell 253A, 253B*).

Cocos Island, Wafer Bay, June 28, 1932 (*Howell 224*), and Chatham Bay (228).

♂**Telaranea nematodes** (Aust.) Howe, Bull. Torr. Bot. Club, 29:284, 1902. (*Cephalozia nematodes* Aust., Bull. Torr. Bot. Club, 6:302, 1879.)

Galapagos Islands, Indefatigable Island, Camp No. 1, altitude 1700 feet, in packet of *Calypogeia miquelii*, May 10, 1932 (*Howell 254*) and of *Cheilojeunea decidua* (256).

ADDITIONAL SPECIES REPORTED

Species not in this collection but reported from the Galapagos, Cocos, Revillagigedo, or Guadalupe islands. We have not the literature to make this list complete.

Anthoceros simulans Howe. Galapagos (Howe, 1934, p. 204).

Anthoceros vegetans Howe. Cocos (Howe, 1934, p. 206).

Brachiolejeunea galapagona (Angstr.) Steph. Galapagos (Stephani, 1898–1925, vol. 5 (1912), p. 139).

Frullania decipiens (Beauv.) Steph. Galapagos and Cocos (Stephani, 1898–1925, vol. 6, p. 570 and vol. 4, p. 532).

Frullania galapagona Angstr. Galapagos (Stephani, 1898–1925, vol. 4, p. 636).

Frullania tamarisci (L.) Dum. Galapagos (Robinson, 1902, p. 100).

Frullania vaginata (Swartz) Dum. Galapagos (Robinson, 1902, p. 100).

Hygrolejeunea ocellata Steph. Cocos (Stephani, 1898–1925, vol. 5, p. 566).

Lopholejeunea anderssonii Steph. Galapagos (Robinson, 1902, p. 100; Stephani, 1896, p. 108; Stephani, 1898–1925, vol. 5, p. 76).

Macrolejeunea subsimplex (Mont.) Schiffn. Cocos (Robinson, 1902, p. 261).



Marchantia chenopoda L. Galapagos (Evans, 1917, p. 295).

Marchesinia galapagona (Angstr.) Steph. Galapagos (Stephani, 1898–1925, vol. 5, p. 146).

Marchesinia nigrescens (Angstr.) Steph. Galapagos (Stephani, 1898–1925, vol. 5, p. 146).

Notothylas galapagensis Howe. Galapagos (Howe, 1934, p. 304).

Peltolejeunea galapagona Steph. Galapagos (Robinson, 1902, p. 101; Stephani, 1898–1925, vol. 4, p. 700).

Plagiochila ovata Lindenb. & Gottsche. Galapagos (Stephani, 1898–1925, vol. 2, p. 578).

Plagiochila spinifera Angstr. Galapagos (Robinson, 1902, p. 101; Stephani, 1898–1925, vol. 2, p. 593).

Plagiochila subsimplex Steph. Galapagos (Stephani, 1898–1925, vol. 2, p. 233).

Plagiochila trifida Steph. Galapagos (Stephani, 1898–1925, vol. 6, p. 232).

Radula galapagona Steph. Galapagos (Stephani, 1898–1925, vol. 4, p. 176).

Radula retroflexa Tayl. Galapagos (Robinson, 1902, p. 101; Stephani, 1898–1925, vol. 4, p. 229).

Riccia howellii Howe. Galapagos (Howe, 1934, p. 202).

Riccia iodocheila Howe. Galapagos (Howe, 1934, p. 200).

Riccia mauryana Steph. Guadalupe (Sutcliffe, 1932).

Riccia nigrella DC. Guadalupe (Howe, 1934, p. 200).

Riccia sorocarpa Bisch. Guadalupe (Howe, 1934, p. 199; Sutcliffe, 1932).

Riccia trichocarpa Howe. Guadalupe (Howe, 1934, p. 200; Sutcliffe, 1932).

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PLATE 37

Brachiolejeunea grandidentata

Fig. 1. Base of leaf lobe, x 300.

Fig. 2. Female inflorescence, ventral view, (*b*) bracts, (*o*) bracteole, (*w*) wing, x 23.

Fig. 3. Cells half way between margin and middle of leaf lobe, x 400.

Figs. 4-6. Teeth of 3 lobules, x 67. ..

Fig. 7. Part of plant, ventral view, x 23.

Fig. 8. Two teeth of a leaf lobule, the distal one at the right, (*h*) hyaline papilla, x 300.

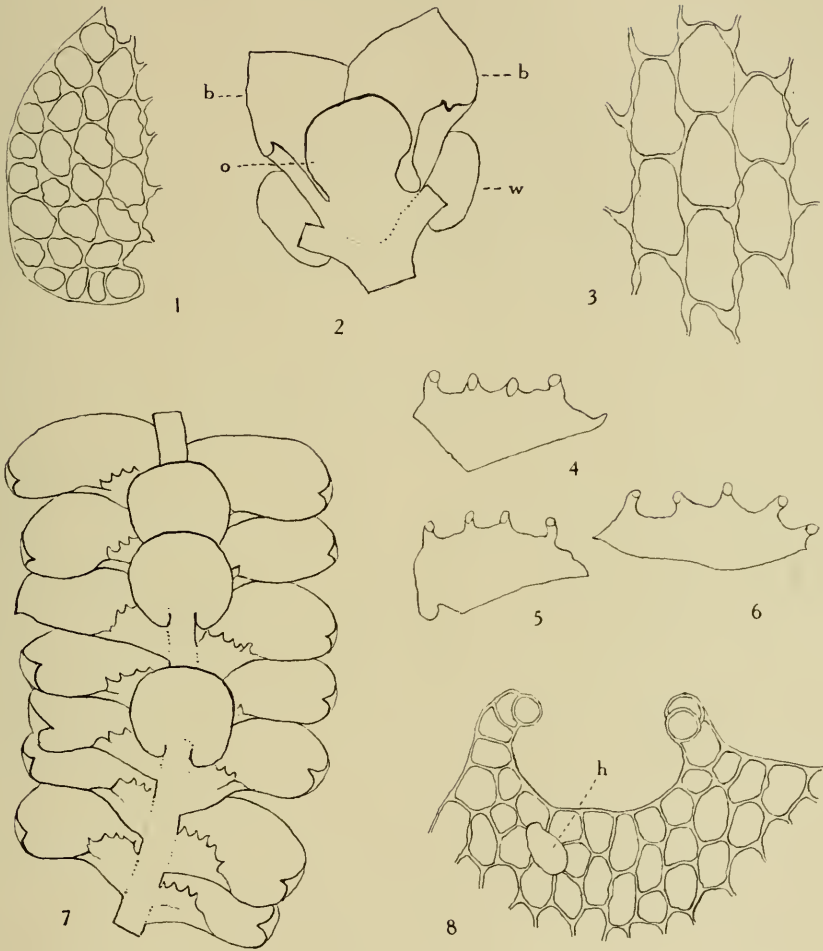


PLATE 38

Ceratolejeunea lobata

Figs. 1-3. Bracts, x 67.

Fig. 4. Bracteole, x 67.

Figs. 5-7. Apices of leaf lobes, x 300.

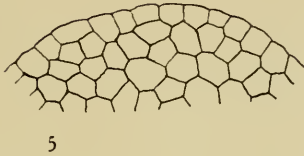
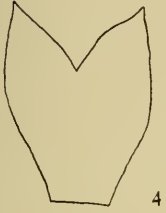
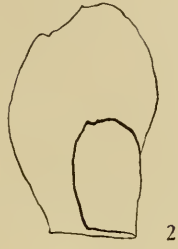
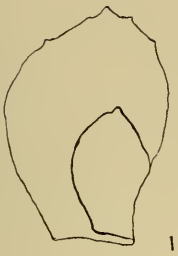
Fig. 8. Apex of lobule, (*h*) hyaline papilla, x 300.

Fig. 9. Underleaf, x 300.

Fig. 10. Part of plant, ventral view, x 52.

Fig. 11. Cells from base of leaf lobe, paracysts shaded, x 300.

Fig. 12. Underleaf, region of rhizoids shaded, x 300.



7

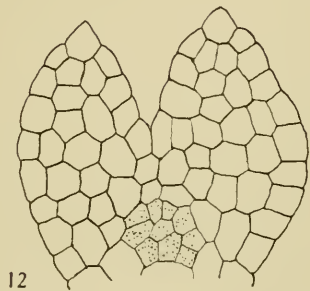
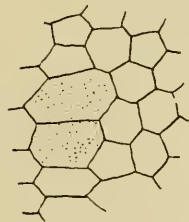
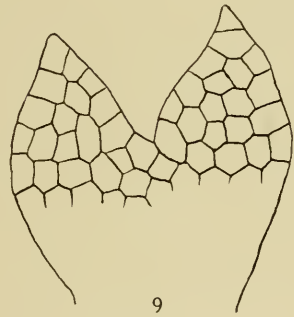
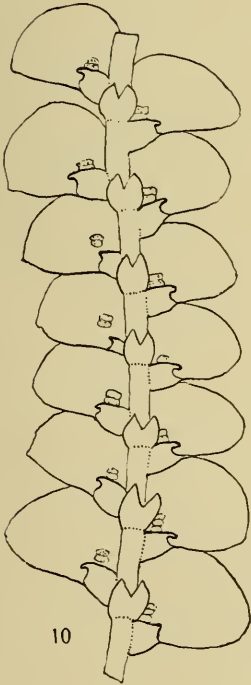
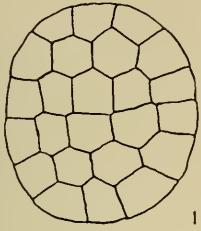


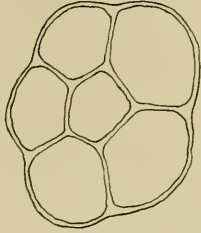
PLATE 39

Cololejeunea coseguinana

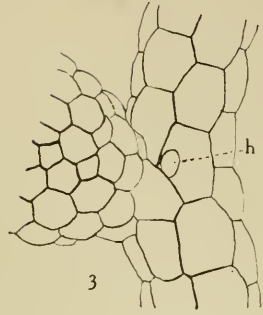
- Fig. 1. Gemma, x 400.
Fig. 2. Cross section of stem, x 400.
Fig. 3. Base of lobule, (*h*) hyaline papilla, x 300.
Fig. 4. Cross section of seta, x 300.
Fig. 5. Apex of leaf lobe, x 300.
Figs. 6-7. Bracts, (*u*) tip of lobule, x 67.
Fig. 8. Apex of lobule of leaf lobe, (*h*) hyaline papilla, x 300.
Fig. 9. Part of plant, ventral view, x 67.
Fig. 10. Apex of lobule of bract, (*h*) hyaline papilla, x 300.
All drawings made from the type.



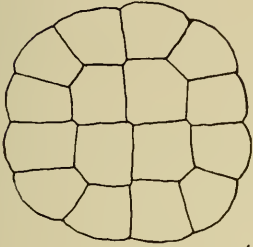
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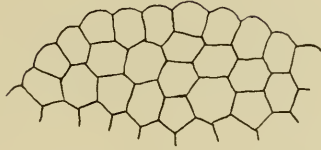
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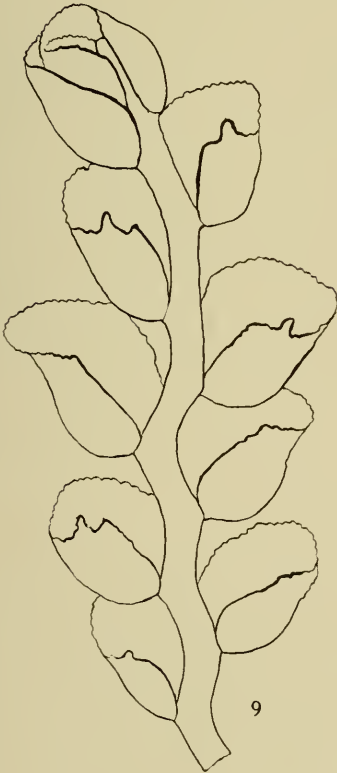


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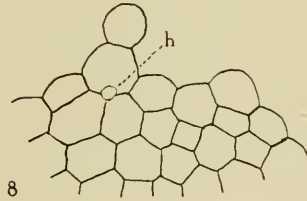


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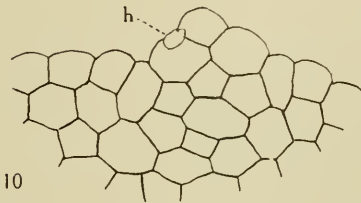
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PLATE 40

Lopholejeunea cocosensis

- Fig. 1. Male inflorescence, ventral view, x 23.
Fig. 2. Bracteole, x 23.
Fig. 3. Teeth from side of bracteole, x 300.
Fig. 4. Cross section of seta, x 400.
Fig. 5. Bract, x 23.
Fig. 6. Cells from base of leaf lobe, x 400.
Fig. 7. Female inflorescence, ventral view, (*c*) curved tooth of sinus, x 23.
Fig. 8. Bract, x 23.
Fig. 9. Leaves, dorsal view, x 23.
Fig. 10. Part of plant, ventral view, x 23.
Fig. 11. Cross section of stem, x 300.
Fig. 12. Apical region of lobule, (*h*) hyaline papilla, x 300.

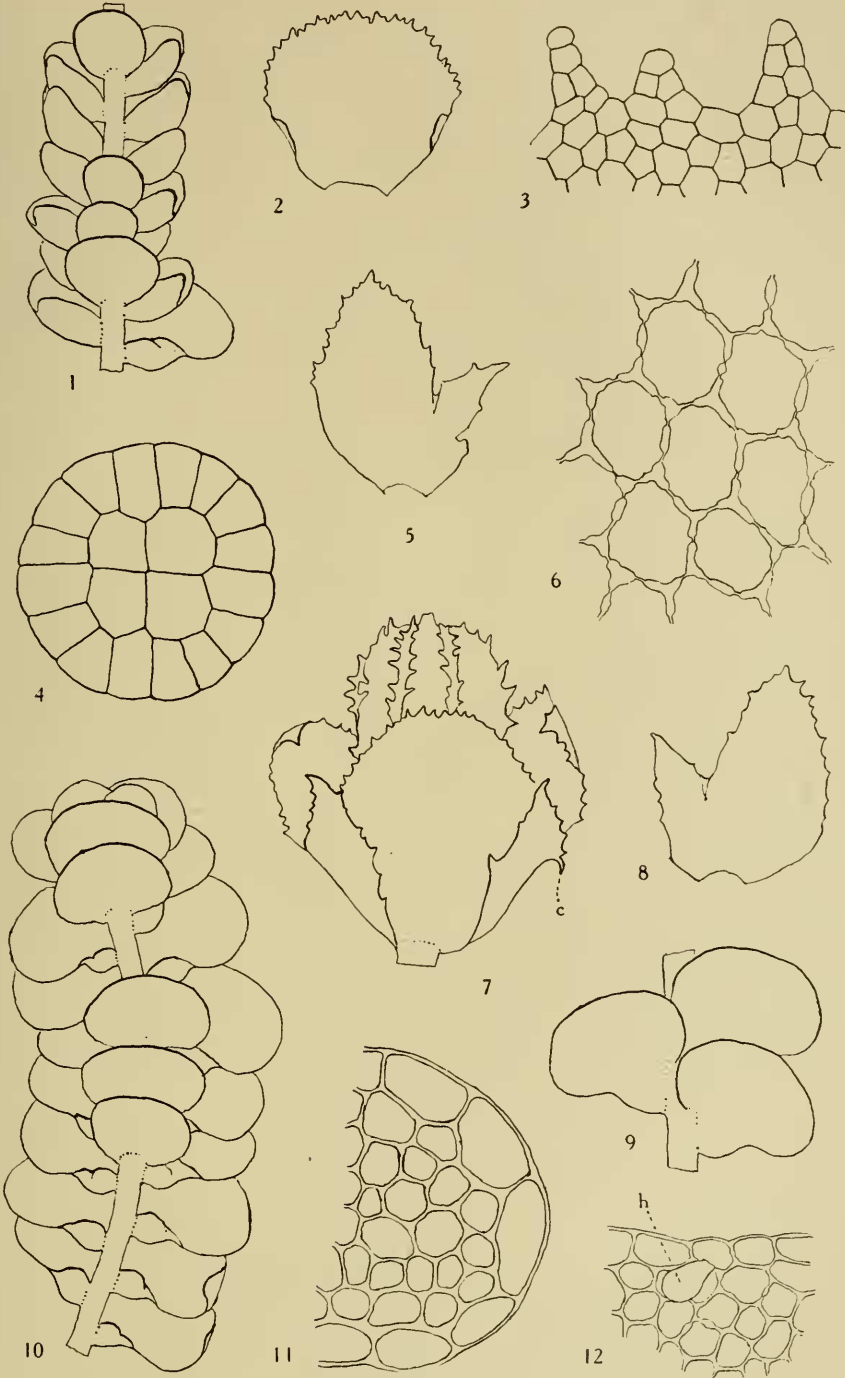


PLATE 41

Cololejeunea minutissima, from Italy and identified by Spruce

Fig. 1. Apex of leaf lobe, x 300.

Fig. 2. Apex of ventral lobe of leaf, x 300.

Fig. 3. Upper portion of ventral lobe of female bract, (*h*) hyaline papilla, x 300.

Cololejeunea myriocarpa (Nees & Mont.) Steph.

Fig. 4. Apex of leaf lobe, x 300.

Lopholejeunea cocosensis

Fig. 13. Apex of ventral leaf lobe, x 300.

Figs. 14-15. Underleaves near female bracteole, x 23.

Fig. 16. Apical region of ventral leaf lobe, (*h*) hyaline papilla, x 300.

