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Some Rubiaceae of Southeastern Polynesia[1]

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The results of a critical study of the Rubiaceae collected in southeastern Polynesia by the Mangarevan Expedition of Bernice P. Bishop Museum in 1934 are presented here. The work has been carried on in the herbarium of the Museum, and thanks are due to the Director, Dr. Peter H. Buck, and the Curator of Collections, Mr. Edwin H. Bryan, Jr., for permission to use the extensive collections of Polynesian plants housed there, as well as to the former Director, Dr. H. E. Gregory, and the Trustees of Bishop Museum for including me as a member of the expedition on which the specimens here treated were collected. I also wish to thank Dr. Harold St. John who kindly examined and photographed several types in European herbaria.

This collection has yielded a considerable number of new species, varieties, and forms, and has made possible a far better understanding of a number of previously known ones.

The genera *Psychotria, Ixora,* and *Coprosma* are the best represented genera of the Rubiaceae in southeastern Polynesia. The species of the first two, as well as of most of the other genera represented seem to be more closely related to those of western Polynesia and Melanesia than to those of any other region. The genera *Nertera* and *Coprosma* have an antarctic distribution in general, but it is difficult to speculate on the origin of the southeastern Polynesian species. The species of *Nertera* represented occurs from America across the Pacific to Malaysia, while the southeastern Polynesian *Coprosma,* except *C. Cookei,* form a closely related group with no very obvious

[1] Mangarevan Expedition Publication 19.

affinities. *C. Cookei* is closest to *C. acutifolia* of the Kermadec Islands, north of New Zealand.

Discussion of possible former land connections within the region under consideration is of doubtful value when based on the species of only one family. However, the existence of the same or closely related species of *Coprosma* and *Canthium* in Rapa and Pitcairn, *Ixora* and *Canthium* in Rapa and the Austral Islands, and *Ixora* in Raivavae and the Cook Islands, is at least suggestive. If similar relationships are found in other families of plants, and animals as well, then they may be shown to have some significance.

In this paper, with the exception of two varieties of *Coprosma taitensis* and two of *Canthium barbatum,* plants not collected on the Mangarevan Expedition are discussed only incidentally. Several of the genera concerned, such as *Ixora* and *Psychotria,* need revision as a whole, or at least the entire Pacific representation needs revision.

Two species at least, *Morinda citrifolia* and *Gardenia tahitensis,* and possibly a third, *Guettarda speciosa,* were carried from island to island by Polynesians in ancient times. Six exotic cultivated species and one weed are noted.

HEDYOTIS

In order to determine the generic relationships of certain plants hitherto assigned to the genera *Kadua* and *Gouldia,* some study has been made of the genera of the Hedyotideae to which the plants obviously belong. This study has by no means progressed far enough to attempt a realignment of the genera of the Hedyotideae, but my present feeling is that a broad concept of the genus *Hedyotis,* essentially similar to that proposed by Endlicher (Gen. Pl., 548, 1836-40), seems the most satisfactory.

No two workers who have treated many species of this relationship have agreed as to which species to assign to *Oldenlandia* and which to *Hedyotis* or other related genera. No two treatments agree on which of the various proposed segregates should be maintained. *Kadua* is apparently separated on the single point that the seeds are attached at the edge, rather than peltately. This character was broken down as early as the time of Hillebrand (Fl. Haw. Is., 158, 1888), as he observed that in *K. glomerata* and *K. centranthoides* the attachment is peltate. In all the extra-Hawaiian species of *Kadua* that have been described, the seeds are peltate. Furthermore, the Hawaiian species only appear to have the seeds attached at the edge because they are

so crowded as to become higher than wide, and the attachment is at the bottom, actually in the same position as in the peltate ones of other species. These facts all indicate that a narrow generic concept is difficult to apply in this group.

Schumann (Nat. Pflanzenf., Teil 4, Abt. 4, p. 24, 1891) takes a more or less intermediate position, maintaining *Kadua* and some other segregates, but combining the majority including *Hedyotis*, under *Oldenlandia*. He points out no characters separating *Kadua* except the attachment of the seeds. He gives no reason for using the name *Oldenlandia* instead of *Hedyotis*. The latter is the correct name to be applied if these two are combined, as they were both published at the same time, and Wight and Arnott (Fl. Peninsulae Indiae Orientalis, Prodr., **1**:405, 1834), the first writers to combine them, chose *Hedyotis*.

The characters pointed out by Gray (Am. Acad., Proc., **4**:312-318, 1860) as satisfactorily separating the genera concerned, such as the thickness of the capsule wall and the dehiscence of the capsule, may prove sufficient to separate subgenera, but applied to a large number of species they do not seem sufficiently constant to be the basis of genera.

Of the few southeastern Polynesian species of this group, only three were collected by the Mangarevan Expedition. Of these, one is an old species first described as an *Oldenlandia*; another was one of the original species of *Kadua* and was later made one of the original species of *Gouldia*, with which, however, it has no close relationship; and the third species was recently described as a *Kadua*.

Hedyotis foetida (Forst.) Spreng.: Pug. Prodr., **2**:28, 1815.

Oldenlandia foetida Forst.: no. 55 in Fl. Ins. Austr. Prodr., 10, 1786.

Kadua rurutensis F. Brown: B. P. Bishop Mus., Bull. **130**:286, 1935.

Austral Islands. Rurutu: Mato Tea, alt. 3 m., Aug. 29, 1934, *St. John 16714;* hills northwest of Moerai, alt. 75 m., Aug. 24, 1934, *St. John and Fosberg 16565.*

The type of Brown's *Kadua rurutensis* in the Bishop Museum herbarium matches very well material from Tonga, the type locality of *Hedyotis foetida,* as do the specimens cited above.

Hedyotis romanzoffiensis (Cham. and Schlect.) Fosberg, n. comb. (fig. 1).

Kadua romanzoffiensis Cham. and Schlect.: Linnaea, **4**:162, 1829.

Petesia carnosa Hook. and Arn.: Bot. Beechey's Voy., 64, 1832.

Gouldia romanzoffiensis (Cham. and Schlect.) Gray: Am. Acad., Proc., **4**:310, 1860.

Coprosma oceanica W. R. B. Oliver: B. P. Bishop Mus., Bull. **132**:142, 1935.

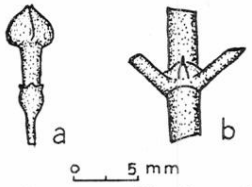

FIGURE 1.—*Hedyotis romanzoffiensis: a,* bud; *b,* node with stipules.

Erect, glabrous herb or small shrub less than 1 m. tall, internodes rather short; leaves obovate with rounded apex and cuneate base, stiff, fleshy, 1.5 mm. thick, rather glossy above, glabrous, veins somewhat pellucid; stipules broadly triangular, obtuse, mucronate, carinate, adnate with petioles into a short sheath, persistent, usually falling with the leaves; inflorescence ordinarily a terminal 3-flowered cyme, with a leaf-like bract subtending each lateral flower, a pair of such bracts part way up on the pedicel of the terminal flower, represented on the lateral pedicels by a pair of tiny pyramidal bractlets less than 1 mm. long, which sometimes replace the bracts on terminal ones, the cymes in fruit often pendent, usually appearing to be in a fork of a branch, as two branches appear at the base of the cyme; buds with the lower portion tubular, the upper part abruptly larger, broadly ovoid, 4-sided, the lobes of the corolla valvate with the outer parts slightly separate, leaving a shallow cleft, the inner part truly valvate; hypanthium broadly turbinate, round to strongly flattened, 3 mm. long, 3 mm. wide, calyx lobes obtuse, less than 1 mm. long, 1 mm. broad; flowers not dimorphic; corolla pale green, fleshy-coriaceous, tube 5 mm. long, 2 mm. wide at base, 2.5 mm. wide at throat, salverform, but without a sharp angle between the lobes and throat, lobes 4-5 mm. long, ovate, 2.5 mm. wide at base, acute, with only a slight prominence in place of an appendage outside of the apex, but with a blunt, backward pointing appendage about 0.5 mm. long on the inside of the apex, corolla readily deciduous; anthers attached in throat, narrowly sagittate, about 1.5 mm. long, with slight sterile appendage at the apex; ovary 2-celled, style 2.5 mm. long, stigma 1.5 mm. long, with 2 thickened, narrowly ovate lobes, appearing revolute around the margins, connivent and difficult to separate, style deciduous with the corolla; fruit soft and fleshy with thick aerogenous tissue, spherical or subspherical with flattened apex, the whole about 2 cm. in diameter, disk depressed and somewhat wrinkled and twisted, calyx only evident as a low, remotely denticulate ring, flesh white, epidermis white to deep purple, usually purplish on one side, endocarp lightly sclerified, cells 3-4 mm. across, fruit persistent on plant, gradually drying and becoming shriveled and obovoid, dehiscing loculicidally across the

disk when almost dry; seeds angular, irregular, peltately attached, black and loose in the ripe fruit.

The above description was made from living plants collected on Tepoto, Tuamotu Archipelago, and may be supplemented with the following, added from other specimens:

Cyme occasionally reduced to one terminal flower, solitary flowers also occasionally borne in the axils of the upper leaves; placenta fleshy, attached to the middle of the septum; loculicidal dehiscence usually followed by a slight septicidal dehiscence, making the disk open up into a small roundish hole; pedicels 1-5 cm. long, usually short in flower, elongate in fruit.

Tuamotu Archipelago: Hao, Boring Bay, alt. 1 m., May 18, 1934, *St. John 14363;* Anaa, Tukuhora, May 13, 1934, *St. John 14249, 14308;* Tepoto, alt. 1 m., May 16, 1934, *St. John 14351;* South Marutea, northwest islet, alt. 1 m., May 22, 1934, *St. John 14436, St. John and Wight 14429.*

Mangareva (Gambier) Islands: Vaiatekeua, alt. 2 m., June 6, 1934, *Fosberg 11162.*

Timoe Island, north islet, alt. 2 m., June 25, 1934, *St. John and Fosberg 15206.*

Oeno Island, June 23, 1934, *St. John and Fosberg 15192, 15198, 15200.*

Austral Islands: Raivavae, Motu Tehau, alt. 1 m., Aug. 11, 1934, *St. John and Wight 16136;* Maria, Middle Islet, alt. 2 m., Sept. 6, 1934, *Fosberg 12094, 12093;* Maria, Northeast Islet, alt. 1 m., Sept. 6, 1934, *St. John 16950.*

Pacific Equatorial Islands: Christmas Island, 4 miles west (?) of Manulu Lagoon, Oct. 21, 1934, *St. John and Fosberg 17491.*

This species has been variously treated by different authors, one of whom has even placed it in *Coprosma.* It certainly does not belong with the *Gouldia* of the Hawaiian islands. I have had some doubts as to whether or not it should constitute a new genus, but most of the characteristics that would make it seem out of place in *Hedyotis, sensu lata,* are just such differences as one would expect in a strand plant. The fleshy mesocarp, large fruit, and peculiar inflorescence would make it constitute at least a new subgenus, but until further study of the other subgenera is completed, this is as well left undone.

Three collections, two from the Danger (Pukapuka) Islands, *E. H. Bryan 13,* and *E. Beaglehole 50,* and one from Maria, *Fosberg 12093,* have longer petioles than usual, and the leaves oblanceolate

obtuse to acute. These characters seem almost sufficiently distinct to merit a name, but since the Maria Island plant was growing in the shade with normal plants in the sun nearby, it is probably only a shade form, so I will not describe it.

A widely distributed strand plant found on the coral islands throughout eastern and central Polynesia as far north as Christmas Island and at least as far west as the Danger Islands.

Native names: *koporoporo* on Hao and Anaa; *koporapora* on Tepoto; and *ti riga* on Mangareva.

Hedyotis rapensis (F. Brown) Fosberg, n. comb.

Kadua rapensis F. Brown: B. P. Bishop Mus., Bull. **130**:283, 1935.

Brown's description may be emended and corrected on the basis of further collections as follows:

The leaves vary from narrowly lanceolate or oblanceolate to narrowly obovate; stipules not connate, but adnate to the upper surface of the base of the petiole, forming the sheath in this way; also they are deciduous somewhat before the leaves; flowers in 3-flowered cymes, both terminal and axillary, the pedicel varying in length from very short to 2 cm. long; capsule sclerified, rather than coriaceous.

Two varieties may be distinguished:

Hedyotis rapensis (F. Brown) Fosberg var. **typica** Fosberg, n. nom.

This is the ordinary form originally described by Brown.

Rapa: Maitua, cliffs of Tautautu, alt. 210 m., July 11, 1934, *Fosberg 11488;* Hiri, alt. 2 m., July 27, 1934, *Fosberg 11631;* Karapo Rahi Islet, alt. 75 m., July 18, 1934, *St. John and Maireau 15598;* east side of peak between Ahurei Bay and Atanui Valley, alt. 110 m., July 3, 1934, *Fosberg 11370, 11371;* Area, alt. 20 m., July 3, 1934, *St. John and Maireau 15342;* Toutore, west of Mount Vaitau, alt. 250 m., July 6, 1934, *St. John and Maireau 15415.*

Hedyotis rapensis (F. Brown) Fosberg var. **taverana** Fosberg, n. var.

Folia cuneati-obovata obtusa, lobi calycorum oblongi-ovati obtusi.

Differs from var. *typica* in the rather fleshy branchlets, obovate-cuneate, obtuse, venulose leaves and oblong-ovate, obtuse calyx lobes.

Rapa: Tavera Valley, alt. 200 m., July 28, 1934, *St. John and Fosberg 15726* (type).

OPHIORRHIZA

Ophiorrhiza sp.

Society Islands: Tahiti, south ridge of Orofena, near top of ridge, alt. 1,700 m., Sept. 22, 1934, *St. John and Fosberg 17011.*

This specimen does not seem to fit any of the known species of *Ophiorrhiza* from Tahiti, but certainly belongs in this genus. It is only in bud and considering the complexity of the genus, I think it inadvisable to describe it without more material.

The somewhat persistent stipules keep it out of *O. subumbellata* and *O. scorpioidea.* It also has a shorter cyme than *O. scorpioidea,* and a more robust cyme and stem than *O. subumbellata.* Glabrous buds, leaves, and inflorescence, and smaller entire stipules distinguish it from *O. Nelsoni.* Much smaller, triangular, non-forked stipules, smaller leaves, and a much shorter cyme distinguish it from *O. tahitensis.* It might be *O. torrentium* Nad., but that has triflorous rather than multiflorous cymes.

The specimen comes from a higher altitude than previously recorded for this genus in Tahiti. It most nearly resembles a specimen collected in the same general locality but at 1,550 m. altitude by L. H. MacDaniels (*no. 1485*) and labeled *O. Nelsoni* by M. L. Grant. The latter specimen is somewhat pubescent and has larger, longer, aristate stipules. It also is only in bud.

PENTAS

Pentas lanceolata (Forsk.) K. Schum.: in Engl. and Prantl, Nat. Pflanzenf., Teil 4, Abt. 4, p. 29, 1891.

Ophiorrhiza lanceolata Forsk.: Fl. Aeg.-Arab., 42, 1775.

Pentas carnea Benth.: Bot. Mag., **70.** pl. 4086, 1844.

Mangareva (Gambier) Islands: Mangareva, Rikitea, alt. 3 m., May 26, 1934, *Fosberg 11021.*

NEONAUCLEA

Neonauclea Forsteri (Seem.) Merrill: Wash. Acad. Sci., Proc., **5**:540, 1915.

Nauclea Forsteri Seem.: Fl. Vit., 121, 1866.

Society Islands: Huahine, Huahine Iti, Haapu Bay, Paore, alt. 300 m., Oct. 2, 1934, *St. John 17188;* Tahaa, Haamene Bay, Oct. 10, 1934, *St. John and D. Anderson 17333;* Tahaa, east side of Mount

Purauti, alt. 175 m., Oct. 10, 1934, *St. John 17347*; Borabora, west ridge of Mount Pahio, alt. 175 m., Oct. 13, 1934, Fosberg *12157*.

Found usually on dry ridges and in rather dry forests at comparatively low altitudes.

Merrill, in the publication cited above, gives adequate reasons for using the name *Neonauclea,* rather than *Nauclea,* for this plant.

TARENNA

Tarenna sambucina (Forst.) Durand: in Drake, Ill. Fl. Ins. Mar. Pac., **6**:190, 1890.

Coffea sambucina Forst.: no. 92 in Fl. Ins. Austr. Prodr., 16, 1786.

Stylocoryne sambucina (Forst.) Gray: Am. Acad., Proc., **4**:309, 1860.

Chomelia sambucina (Forst.) O. Kuntze: Rev. Gen. Pl., **1**:278, 1891.

Tuamotu Archipelago: Anaa, Tukuhora, May 13, 1934, *St. John 14254*.

Austral Islands: Rurutu, first gulch south of Teti, west side of Teape, near head of gulch, alt. 310 m., Aug. 31, 1934, *St. John 16748*.

Society Islands: Tahaa, east side of Mount Purauti, alt. 200 m., Oct. 10, 1934, *St. John 17340;* Huahine, Huahine Nui, north ridge of Mount Matoereere, alt. 400 m., Oct. 1, 1934, *St. John 17177*.

This is the *Stylocoryne racemosa* of Hooker and Arnott (Bot. Beechey's Voy., 64, 1832), not of Cavanilles.

I do not understand Schumann's use of the name *Chomelia* for this genus. Although *Tarenna* was published subsequently to *Chomelia,* the former is invalidated by *Chomelia* Jacq. (1760), the first use of the name after 1753. *Chomelia* L. was published in Genera Plantarum (Ed. I, 1737).

Native name: *mahora* on Anaa.

GARDENIA

Gardenia tahitensis DC.: DC. Prodr., **4**:380, 1830.

Tuamotu Archipelago: Hao, Boring Bay, alt. 1 m., May 19, 1934, *St. John 14396;* Anaa, Oto Pipi, alt. 2 m., May 13, 1934, *St. John 14276*.

Mangareva (Gambier) Islands: Mangareva, Rikitea, alt. 3 m., May 31, 1934, *Fosberg 11070*.

Austral Islands: Raivavae, Mahanatoa, alt. 2 m., Aug. 6, 1934, *Fosberg 11652,* and south side of Pic Rouge, alt. 2 m., Aug. 5, 1934, *St. John and Fosberg 15919;* Tubuai, Mataura, alt. 1 m., Aug. 16, 1934, *Fosberg 11806;* Rurutu, Puputa Valley, west of Moerai, alt. 20 m., Aug. 26, 1934, *Fosberg 11867,* and Moerai, Aug. 29, 1934, *Fosberg 11968;* Rimatara, Anapoto, alt. 3 m., Sept. 4, 1934, *St. John and Fosberg 16788.*

This species is the most popular cultivated ornamental among the inhabitants of the warmer Polynesian islands. It has obviously been carried about from island to island, even in ancient times. It is probably not indigenous to southeastern Polynesia as it is not known in the wild state there. It is usually known by the Tahitian name, *tiare tahiti.*

Gardenia jasminoides Ellis: Phil. Trans., **51**:935, 1761.

Mangareva (Gambier) Islands: Mangareva, Point Teone Kura, alt. 2 m., June 5, 1934, *Fosberg 11121.*

Pitcairn Island, Adamstown, alt. 65 m., June 14, 1934, *Fosberg 11249.*

Rapa, Ahurei, alt. 4 m., July 23, 1934, *St. John and Maireau 15706.*

Austral Islands: Raivavae, lower R. Arepua, alt. 5 m., Aug. 6, 1934, *Fosberg 11644;* Tubuai, Tamatoa, alt. 2 m., Aug. 23, 1934, *Fosberg and A. Anderson 11846;* Rimatara, Amaru, alt. 3 m., Sept. 5, 1934, *St. John 16931.*

This species, the common cultivated gardenia, has become widely cultivated in Polynesia since the advent of the Europeans.

CANTHIUM

Canthium is widespread in Polynesia but is represented by few species, mere outliers apparently, of the large numbers occurring in the continental and large insular areas farther west. In southeastern Polynesia only two species are present, both occurring on almost all the volcanic and raised coral islands. They seem to occur in dry to moist forests from practically sea level up to middle altitudes in the highest islands, and up to the summits of the smaller ones.

Canthium odoratum (Forst.) Seem.: Fl. Vit., 132, 1866.

Coffea odorata Forst.: no. 94 in Fl. Ins. Austr. Prodr., 16, 1786.

Canthium lucidum Hook. and Arn.: Bot. Beechey's Voy., 65, 1832 (not of R. Br. or Schlect.).

Canthium Beecheyi Steud.: Nom. Bot., Ed. II, **1**:275, 1841.

Plectronia odorata (Forst.) Benth. and Hook., in Hillebr., Fl. Haw. Is., 175, 1888.

Plectronia kohenua F. Brown: B. P. Bishop Mus., Bull. **130**:297, 1935.

Mangareva (Gambier) Islands: Mangareva, south side of Mount Mokoto, alt. 340 m., June 7, 1934, *St. John 14902;* same locality, alt. 320 m., June 2, 1934, *St. John 14855;* Aukena, Koiovao, alt. 10 m., May 29, 1934, *St. John 14666.*

Pitcairn Island: Parlver Valley Ridge, alt. 330 m., June 13, 1934, *St. John 14961;* Flatlands, alt. 120 m., June 13, 1934, *Fosberg and Christian 11232;* valley back of Adamstown, alt. 175 m., June 13, 1934, *St. John 14950.*

Henderson Island: north end, alt. 30 m., June 17, 1934, *St. John and Fosberg 15072, 15073, 15075;* north center, alt. 30 m., June 20, 1934, *St. John and Fosberg 15176.*

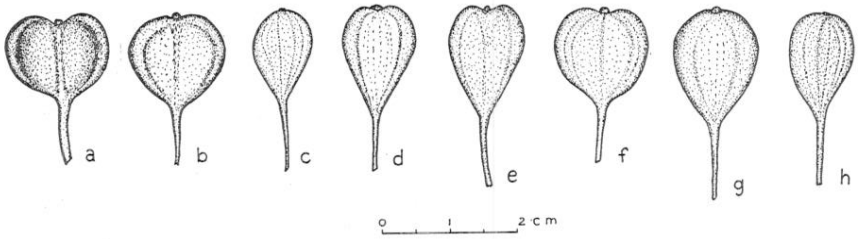

FIGURE 2.—Fruits of varieties of *Canthium barbatum: a,* var. *rapae; b,* var. *gambierense; c,* var. *huahinense; d,* var. *australense* f. *rurutu; e,* var. *australense* f. *tubuai; f,* var. *societense; g,* var. *Christianii* f. *pitcairnense; h,* var. *Christianii* f. *calcicola.*

Rapa: Mount Vaitau, alt. 240 m., July 8, 1934, *St. John and Zimmerman 15424;* Area, alt. 150 m., July 2, 1934, *St. John and Fosberg 15318;* same locality, July 1, 1934, *St. John and Fosberg 15278, 15288;* Anarua Valley, southeast ridge of Mount Perahu, alt. 300 m., July 12, 1934, *Fosberg 11506;* Pupu Point, alt. 3 m., July 15, 1934, *Fosberg 11532, 11534.*

Austral Islands: Rurutu, west slope of Mato Arei, alt. 40 m., *St. John 16708;* Raivavae, northwest slope of Pic Rouge, Aug. 5, 1934, *St. John and Fosberg 15959.*

Society Islands: Tahaa, east ridge of Mount Purauti, alt. 500 m., Oct. 11, 1934, *St. John 17395.*

Plectronia kohenua F. Brown is apparently the exact equivalent of *Canthium odoratum*. Brown compared his specimens with material from Hawaii which varies tremendously in many characters, including those pointed out by him as different. Furthermore, if the Hawaiian plant differs from that of southeastern Polynesia, it is the Hawaiian form that must be considered new, as the type locality of *Coffea odorata* Forst. is Tahiti. There seems to be as much variation in this plant on the same island as between the various islands on which it was collected. Some of the Rapa specimens would, if taken by themselves, seem to form a distinct, small-leafed variety, but other specimens from the same island have larger leaves, some about as large as those from the islands farther north and east.

Practically all the leaf sizes and shapes in the collections from southeastern Polynesia can be duplicated in the Hawaiian collections available. The flowers of the southeastern Polynesian material are a trifle smaller than most of those from Hawaii but not significantly so. In his comparison, Brown states "flowers glabrate in the throat", but in his description, they are "bearded or glabrate." The size and shape of the fruit varies on individual specimens as much as between Brown's varieties and as much as between his specimens and the Hawaiian ones. I do not understand his statement that the inner wall of the seed cavity is arched inward only slightly; in any case the fruits of his type specimens and of Hawaiian specimens are identical in structure.

From the above data I would conclude that either this species is a comparatively recent arrival in Polynesia, or that the variation is largely the result of environment rather than of heredity. The wide distribution of the species counts heavily against the first of these possibilities. If the variation were genetic, long isolation would surely have produced definite local varieties or species as it has with many other plants, including the other species of *Canthium* here to be discussed.

Canthium barbatum (Forst.) Seem.: Fl. Vit., 132, 1866 (figs. 2, 3.)

Chiococca barbata Forst.: no. 96 in Fl. Ins. Austr. Prodr., 16, 1786.

Plectronia barbata (Forst.) K. Schum.: in Engl. and Prantl, Nat. Pflanzenf., Teil 4, Abt. 4, p. 92, 1891.

The variation in this species differs somewhat from that in *C. odoratum*. Either it has been longer in Polynesia, which its distribution

does not bear out, or its variations have had more evolutionary value, as a different form appears on every isolated island or group of islands in at least the eastern part of its range.

Plectronia rapae Riley, when described, was apparently distinct enough, characterized by large, obtuse leaves with pellucid veins, ciliolate corolla lobes and calyx lobes. With the collections now available, however, it would have to include material from the Austral Islands, Mangareva, Pitcairn, and Henderson. With these included, its only distinguishing characters would be the ciliolate calyx and corolla, with the material from Rurutu and Mangareva closely approaching typical *C. barbatum* from Tahiti.

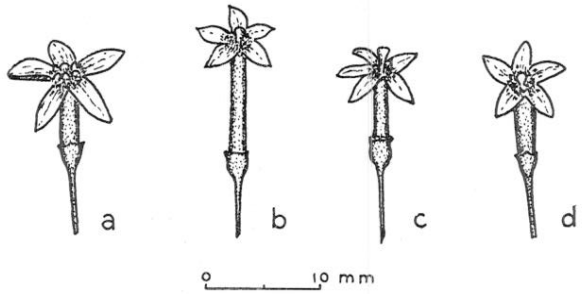

FIGURE 3.—Flowers of varieties of *Canthium barbatum: a,* var. *rapae; b,* var. *raivavaense; c,* var. *australense* f. *tubuai; d,* var. *australense* f. *rurutu.*

The varieties and forms here recognized may, I think, be considered incipient species which have not had time to differentiate sufficiently to justify their ranking as species. No attempt has been made in this paper to dispose of the various forms of the species which occur on islands not visited by the Mangarevan Expedition, extending from the Marquesas at least to Fiji and Tonga. Three original localities were given by Forster with no indication that the plants from each differed in any respect. His plants came from the Marquesas, Tahiti, and Tonga. I consider that a different variety occurs in each of these three places. All three will eventually have to have varietal names, but only one of these will be given here. The first of the following varieties includes all the material which I have seen from Tahiti, and though I have not seen Forster's specimens, undoubtedly forms a part of the original *Chiococca barbata.*

Canthium barbatum (Forst.) Seem. var. **societense** Fosberg, n. var. (fig. 2, *f*).

Chiococca barbata Forst.: no. 96 in Fl. Ins. Austr. Prodr., 16, 1786 (in part).

Folia ovata vel elliptica valde acuminata, nervi non pellucidi, cyma 3-6-florifera, calyx et corolla non ciliolata, drupa pyriformis-obcordata.

Small tree; branchlets glabrous, terete, or when young somewhat 4-sided, internodes ordinarily 4-5 cm. long; leaves 8-13 cm. long (ordinarily 9-10 cm.), 4-6 cm. wide (ordinarily about 4.5 cm.), glabrous, ovate to elliptical, rarely oblong, apex pronouncedly acuminate, base obtuse but attenuate to a petiole less than 1 cm. long, blade chartaceous, veins not pellucid; stipules triangular, somewhat mucronate, early deciduous; cymes small, 3-6-flowered (usually 6, though some flowers often fall early), axillary, peduncles 2-10 mm. long, pedicels, in flower, 5-8 mm. long, in fruit up to 18 mm. long; ovary + calyx 2 mm. long, calyx glabrous, 5-dentate, teeth obtuse to acute, short; corolla tube 4-6 mm. long, 1-1.5 mm. thick, strongly bearded in the throat, lobes 3.5 mm. long, ovate-lanceolate, mucronate, glabrous; fruit 10-12 mm. long, 12-15 mm. wide, broadly pyriform, somewhat flattened and obcordate when both cells are developed, flesh soft, of a deep flesh-red color when ripe, the fleshy-fibrous base attenuating into the pedicel, pyrenes heavily sclerified, rather firmly grown together.

Society Islands. Tahaa: islet in Haamene Bay, alt. 8 m., Oct. 10, 1934, *Fosberg and Cooke 12141* (type); east side of Mount Purauti, alt. 15 m., Oct. 10, 1934, *St. John 17380*; same locality and date, alt. 230 m., *St. John 17363*. Raiatea: Uturoa, alt. 300 m., Sept. 10, 1926, *Moore 58*; without locality, alt. 300 m., Sept. 26, 1926, *Moore 148*. Tahiti: Paea, Nov. 10, 1902, *Seale*; Papenoo Valley, alt. 50 m., Oct. 22, 1928, *Adamson 22*; Papehue, Paea, June 1910, *Tilden 355*; Papieri, alt. 100 ft., March 20, 1925, *Wilder 322*; Papara District, alt. 50 ft., Dec. 4, 1926, *Wilder 532*; without locality, June 21, 1922, *Setchell and Parks 412*; without locality, May 23, 1922, *Setchell and Parks 81*.

Among the Tahitian specimens examined, two vague forms may be distinguished on the basis of the length of the peduncle, but as the collections are few and the differences slight, they probably amount to nothing. The Raiatea and Tahaa specimens differ slightly from most of the Tahitian material in that the peduncles are all less than 5 mm. long and the fruiting pedicels are heavier and straighter, less than 12 mm. long, usually 10 mm. or less.

Canthium barbatum (Forst.) Seem. var. **huahinense** Fosberg, n. var. (fig. 2, *c*).

Ramuli graciles, internodi 1.5-3.5 cm. longi, folia 6-8 cm. longa 3-4 cm. lata elliptica, drupa 7-10 mm. lâta saepe 3-locularis.

A slender shrub, resembling var. *societense* but branchlets noticeably more slender, internodes usually 1.5-3.5 cm. long; leaves mostly smaller, 6-8 cm. long,

3-4 cm. wide, definitely tending toward an elliptical outline; pedicels more slender; fruit much narrower, 7-10 mm. wide, only slightly emarginate at apex, often 3-celled.

Society Islands. Huahine: Huahine Iti, Haapu, north side of bay, alt. 15 m., Oct. 3, 1934, *Fosberg 12131* (type), *12132*; Huahine Iti, Paore, Haapu Bay, alt. 300 m., Oct. 2, 1934, *St. John 17184*.

Though this is close to var. *societense,* it also resembles var. *raiateense* in its short internodes and small elliptical leaves (these characters being more marked in the latter variety, however), but the exact relationship here cannot be determined, as the type of var. *raiateense* lacks fruit, and the available material of var. *huahinense* lacks flowers.

Canthium barbatum (Forst.) Seem. var. **raiateense** (Moore) Fosberg, n. comb.

Plectronia raiateensis J. W. Moore: B. P. Bishop Mus., Bull. **122**: 45, 1933.

This plant is too closely related to var. *societense* and to var. *huahinense* to be maintained as a species. The glands on the pedicel and hypanthium are sometimes present, though not so abundantly, on other varieties. The long flowers, small elliptical leaves and slender habit are only such characters as I have used to distinguish between other varieties in this species.

Canthium barbatum (Forst.) Seem. var. **temehaniense** (Moore) Fosberg, n. comb.

Plectronia temehaniensis J. W. Moore: B. P. Bishop Mus., Bull. **102**: 45, 1933.

This plant is also too close to *C. barbatum* to be considered a species. Apparently nothing separates it from var. *societense* excepting the subcordate, almost sessile leaves, which suggest some of the Marquesan forms. The specimen of the type collection at Bishop Museum is so incomplete that I would hesitate to state definitely to what varieties it is most similar.

Canthium barbatum (Forst.) Seem. var. **australense** Fosberg, n. var.

Nervi foliarum pellucidi, pedunculi breves, calyx et corolla minute ciliolata, tuba corollae 4-5 mm. longa, stigma exserta, fructus 15 mm. longus 11 mm. latus non emarginatus.

Differing from var. *societense* in the square branchlets, short, acuminate to obtuse leaves with pellucid veins; peduncle condensed to a mere corky lump bearing several old pedicel scars as well as pedicels; calyx lobes short, obtuse, ciliolate; corolla tube 4-5 mm. long, corolla lobes ciliolate, not mucronate; stigma exserted 1-2 mm.; fruit 15 mm. long, 11 mm. wide, not emarginate.

The type is *St. John 16362* from Tubuai.

This variety occurs in the Austral Islands on the islands of Rurutu and Tubuai, with a distinct form on each. It is related to var. *rapae,* as shown by the pellucid veins and ciliolate calyx and corolla, but the form on Rurutu shows a decided approach, also, to var. *societense.* It differs from both of these in the long, narrow fruits and more reduced cymes, and from var. *societense* also in the pellucid veins and the ciliolate calyx and corolla.

Canthium barbatum (Forst.) Seem. var. **australense** Fosberg f. **tubuai** Fosberg, n. f. (figs. 2, *e*; 3, *c*).

Folia magna 10-12 cm. longa, 6-7 cm. lata elliptica vel obovata, pedicilus 7-12 mm. longus, loba corollae 4 mm. longa.

Leaves ordinarily 10-12 cm. long, 6-7 cm. wide, broadly elliptical to obovate, obtuse to slightly acuminate, petiole about 1 cm. long; flowering pedicel 7-8 mm. long, fruiting pedicel 11-12 mm. long; corolla lobes 4 mm. long.

Austral Islands: Tubuai, northeast slope of Taitaa, alt. 340 m., Aug. 16, 1934, *St. John 16362* (type).

Canthium barbatum (Forst.) Seem. var. **australense** Fosberg f. **rurutu** Fosberg, n. f. (figs. 2, *d*; 3, *d*).

Folia acuminata, pedicilus 5-7 mm. longus, lobae corollae 3 mm. longae.

Leaves up to 9 cm. long, 4.5 cm. wide, petiole 0.5 cm. long; flowering pedicel 5 mm. long, fruiting pedicel 7 mm. long; corolla lobes 3 mm. long.

Austral Islands: Rurutu, Mato Tea, alt. 100 m., Sept. 1, 1934, *St. John and D. Anderson 16785* (type).

Canthium barbatum (Forst.) Seem. var. **raivavaense** Fosberg, n. var. (fig. 3, *b*).

Nervi foliarum pellucidi; pedicilus floriferis 2-5 mm. longus deinde fructibus maxime 11 mm. longae; tuba corollae 6-7 mm. longa, lobae corollae 3-4 mm. longae.

Like var. *australense* f. *tubuai* but branchlets not markedly 4-sided, internodes variable but tend to be shorter; cymes up to 6 mm. long (without pedicels), branched, bearing up to 10 flowers and numerous scars; flowering pedicels 2-5 mm. long, fruiting pedicels up to 11 cm. long; corolla tube 6-7 mm. long, lobes 3-4 mm. long; ripe fruit not available.

Austral Islands. Raivavae: south side of Pic Rouge, alt. 75 m., Aug. 5, 1934, *St. John and Fosberg 15931* (type); R. Arepua, alt. 20 m., Aug. 5, 1934, *St. John and Cooke 15890*; south side of pass south of Raiurua, alt. 75 m., Aug. 3, 1934, *St. John and Fosberg 15816.*

Canthium barbatum (Forst.) Seem. var. **rapae** (Riley) Fosberg, n. comb. (figs. 2, *a*, 3, *a*).

Plectronia rapae Riley: Kew Bull., 54, 1926.

Plectronia rapae Riley, of F. Brown: B. P. Bishop Mus., Bull. **130**:296, 1935 (in part).

Folia ovata obtusa ad basim attenuata, tuba corollae 4-5 mm. longa, lobae corollae 4-5 mm. longae, fructus 10-12 mm. longus 13-15 mm. latus emarginatus.

Like var. *raivavaense* but leaves conspicuously blunt-obtuse, somewhat smaller, conspicuously attenuate at base, variable in size, tending to be ovate, drying bluish; cymes not so well developed, but more so than in var. *australense*, flowering pedicels 6 mm. long, fruiting pedicels 10-14 mm. long; corolla tube 4-5 mm. long, lobes 4-5 mm. long; fruit 10-12 mm. long, 13-15 mm. wide, noticeably emarginate.

Rapa: Watering Place, near Area, alt. 15 m., June 30, 1934, *St. John and Fosberg 15239*; Anarua Valley, southeast ridge of Mount Perahu, alt. 300 m., July 12, 1934, *Fosberg 11519*; east slope of ridge between Morongota and Vaitau, alt. 150 m., July 20, 1934, *Fosberg 11611*; Oromanga forest, south side of Tangikeu Mountain, alt. 150 m., July 11, 1934, *St. John and Maireau 15483*; Area, alt. 90 m., July 3, 1934, *St. John and Maireau 15350*; Oroi, Angairau Bay, alt. 125 m., July 9, 1934, *St. John and Maireau 15455*.

Canthium barbatum (Forst.) Seem. var. **Christianii** Fosberg, n. var.

Venes foliarum pellucides, fructus 14-16 mm. longus, 10-12 mm. latus exemarginatus.

Like var. *rapae* but leaves tending to be slightly acuminate at apex, somewhat more abruptly contracted at base; cyme slightly more condensed, flowering pedicels 3-5 mm. long; fruits 14-16 mm. long, 10-12 mm. wide, very slightly, if at all, emarginate.

This variety includes two forms which are usually distinguishable and which have separate geographic ranges. It is named for Mr. Burnett Christian, my companion while collecting on Pitcairn Island, who scaled a cliff to obtain the type collection.

It is incorrectly referred to *Plectronia rapae* Riley by F. Brown (B. P. Bishop Mus., Bull. **130**:269, 1935).

Canthium barbatum (Forst.) Seem. var. **Christianii** Fosberg f. **pitcairnense** Fosberg, n. f. (fig. 2, *g*).

Fructus bilocularis.

Fruit always 2-celled.

Pitcairn Island: Flatlands, alt. 100 m., June 13, 1934, *Fosberg and Christian 11235* (type of variety and form).

Canthium barbatum (Forst.) Seem. var. **Christianii** Fosberg f. **calcicola** Fosberg, n. f. (fig. 2, *h*).

Fructus saepe trilocularis.
Fruit tending to be 3-celled.

Henderson Island: north end, alt. 25 m., June 17, 1934, *St. John and Fosberg 15085* (type); same locality and date, alt. 30 m., *St. John and Fosberg 15115*.

Incorrectly referred to *Chiococca odorata* Forst. by Hooker and Arnott (Bot. Beechey's Voy., 65, 1832). The name refers to its habitat, the coral limestone which makes up Henderson Island.

Canthium barbatum (Forst.) Seem. var. **gambierense** Fosberg, n. var. (fig. 2, *b*).

Nerves foliarum pellucides, folia elliptica acuminata, pedunculus 1-2 mm. longus 3-4 floriferus, fructus pauce emarginatus.

Like var. *societense* but leaves elliptical, with apex not so long acuminate but more abruptly so, longer attenuate at base, veins somewhat pellucid; cymes reduced to a peduncle 1-2 mm. long, out of the top of which arise 3 or 4 pedicels, each surrounded by a definite collar at the base, pedicels in fruit 12-18 mm. long; fruit only very slightly emarginate; flowers unknown.

Mangareva (Gambier) Islands: Mangareva, south side of Mount Mokoto, alt. 290 m., June 4, 1934, *St. John 14871* (type); same locality and date, alt. 320 m., *St. John 14878*; same locality, alt. 340 m., June 7, 1934, *St. John 14905*; same locality, alt. 350 m., June 3, 1934, *St. John and D. Anderson 14866*.

This variety forms a connecting link between the group of varieties centering around var. *societense* and that extending from Rurutu to Henderson Island. Its pellucid veins relate it to the latter group, while most of its other known characters resemble the former. When flowering specimens are collected, it will probably be possible to place it exactly by the presence or absence of ciliolation on the corolla lobes.

GUETTARDA

Guettarda speciosa L.: Species Plantarum, 991, 1753.

Tuamotu Archipelago: Tepoto, May 16, 1934, *St. John 14344*; Anaa, Tukuhara, May 13, 1934, *St. John 14290*; Hao, Boring Bay, May 18, 1934, *St. John 14354*; South Marutea, northwest island, May 22, 1934, *St. John 14446*.

Mangareva (Gambier) Islands: Vaiatekeua, June 6, 1934, *Fosberg 11148* (near a shack, possibly planted by former inhabitants).

Timoe Island, north islet, June 25, 1934, *St. John and Fosberg 15226.*

Pitcairn Island, St. Pauls Valley, alt. 220 m., June 14, 1934, *St. John 15009.*

Henderson Island: north end, alt. 15 m., June 17, 1934, *St. John and Fosberg 15081*; north center, June 20, 1934, *St. John and Fosberg 15165.*

Austral Islands: Raivavae, Motu Tehau, Aug. 11, 1934, *St. John and Wight 16135*; Tubuai, Tapapatauai Islet, Aug. 19, 1934, *St. John 16424.*

Native names: Tuamotu Archipelago, on Tepoto, *karauri,* on Anaa and Hao, *kahaia*; on Pitcairn Island, *high white* and, by a curious misapplication, *morinda citrifolia.*

This widely distributed strand tree is, within certain limits, quite variable. The leaves vary in shape from the usual decidedly obovate type to oblong or even ovate, with the base varying from rounded or truncate to subcordate or cordate, and the apex from obtuse to acuminate, sometimes decidedly so. I have seen specimens from other parts of the range of this species exhibiting strange and widely different leaf shapes. The vesture of the leaves varies from almost glabrous to hirsute on the under side of the veins, and on the veinlets from puberulent to so pubescent that the under side of the leaf seems velutinous.

With respect to southeastern Polynesia, only one of these variations has been named, *Guettarda tahitensis* Nad., reduced to a variety by Drake, and here treated as a form.

Guettarda speciosa L. f. **tahitensis** (Nad.) Fosberg, n. comb.

Guettarda tahitensis Nad., no. 352 in Enum. Pl. Tahiti, 52, 1873.

Guettarda speciosa L. var. *tahitensis* (Nad.) Drake: Fl. Polyn. Fran., 92, 1893.

Differs from *G. speciosa* in the much more hirtellous-pubescent under sides of the veins and veinlets in the leaves, making the whole under surface appear sub-velutinous or velutinous.

Mangareva (Gambier) Islands: Tauna Islet, alt. 3 m., May 31, 1934, *St. John 14750.*

Austral Islands, Rurutu: Mato Naa, alt. 60 m., Aug. 24, 1934, *St. John and Fosberg 16914*; Rimatara, Anapoto, alt. 5 m., Sept. 4, 1934, *St. John and Fosberg 16914.* Maria: northeast islet, alt. 2 m., Sept. 6, 1934, *St. John 16958*; southeast islet, alt. 3 m., Sept. 6, 1934, *Fosberg*

12086; middle islet, alt. 2 m., Sept. 6, 1934, *Fosberg 12101;* southwest islet, alt. 3 m., Sept. 6, 1934, *Fosberg 12120.*

Flint Island, alt. 2 m., Oct. 16, 1934, *St. John and Fosberg 17460.*

Fanning Island, English Harbor, alt. 1 m., April 23, 1934, *St. John and Fosberg 14118* (very possibly planted by recent settlers).

This was described as a species by Nadeaud from a specimen collected by him in Tahiti. Drake reduced it to a variety, but did not extend its range, having seen only the type specimen. In the Mangarevan Expedition collections, plants corresponding to this are almost as numerous as those belonging to *G. speciosa* proper, and represent as wide a geographic range. In addition to these, the Bishop Museum herbarium possesses material referable to this form from the Marquesas, Cook Islands, Tuamotus, Society Islands (Scilly), Danger Islands, Phoenix Islands, and even a plant from the Philippines seems to belong here. This distribution indicates a complete lack of geographical unity, making the very hairy plant seem a mere sporadic variation arising independently at different times and places. If it could be demonstrated that either or both forms had been carried by the Polynesians, and were not truly indigenous to Polynesia, this conception might be altered, but no convincing evidence of this has come to my attention.

Dr. St. John examined the type of *G. tahitensis* for me while in Paris, and confirmed my suspicion that it was the same as the plant which we had collected. The actual amount of puberulence varies so much in both forms that some specimens are with difficulty placed in one or the other. These considerations lead me to reduce *G. tahitensis* to a form of *G. speciosa.* Apparently the form has not been collected in Tahiti since the original collection, though the species proper has been found there commonly enough.

TIMONIUS

Timonius polygamus (Forst.) Robinson: Am. Acad., Proc., **45**:394, 1910.

Erithalis polygama Forst.: no. 101 in Fl. Ins. Austr. Prodr., 17, 1786.

Burneya Forsteri Cham. and Schl.: Linnaea, **4**:185, 1829.

Timonius Forsteri (Cham. and Schl.) DC.: DC. Prodr., **4**:461, 1830.

Tuamotu Archipelago: Anaa, Tukuhora, alt. 2 m., May 13, 1934, *St. John 14305;* Anaa, Ote Pipi, alt. 2 m., May 13, 1934, *St. John 14274;* Hao, Boring Bay, alt. 2 m., May 18, 1934, *St. John 14352.*

Henderson Island: north end, alt. 15 m., June 17, 1934, *St. John and Fosberg 15076, 15063, 15120;* same locality and date, alt. 1 and 2 m., *St. John and Fosberg 15094, 15082;* same locality, alt. 33 m., June 18, 1934, *St. John and Fosberg 15122, 15140;* north center, alt. 30 m., June 20, 1934, *St. John and Fosberg 15174.*

Austral Islands: Rimatara, Anapoto, alt. 5 m., Sept. 4, 1934, *St. John and Fosberg 16871, 16911;* Maria, southeast islet, alt. 2 m., Sept. 6, 1934, *Fosberg 12067;* Maria, northeast islet, alt. 2 m., Sept. 6, 1934, *St. John 16957.*

A widely distributed strand plant, growing either on raised coral limestone or sandy flats and beaches. It is most variable, either erect or prostrate, leaves from obovate to orbicular, cuneate to cordate; flower length and size of cyme various, the staminate cymes much longer.

Called *T. Forsteri* by most authors.

Native names: *katokato* on Anaa; *paketa* on Hao.

COFFEA

Coffee is one of the three agricultural crops raised for export in southeastern Polynesia. In Rapa it is the only one and the only source of income for the inhabitants. The quality produced is excellent due, it is claimed, to the fact that the fruits are allowed to ripen on the tree and to fall on the ground. Then they are harvested by gathering the seeds from the ground after the flesh is gone, thus assuring that all the beans are fully ripe when used. The stripping methods used in other countries certainly cause the harvesting of a large percentage of the fruits before they are thoroughly mature.

Coffea arabica L.: Species Plantarum, 172, 1753.

Mangareva (Gambier) Islands: Mangareva, northwest slope of Mount Duff, alt. 100 m., May 24, 1934, *St. John 14486;* Taravai, northeast end, alt. 4 m., June 1, 1934, *St. John 14765;* Akamaru, north side, alt. 3 m., May 29, 1934, *St. John 14709.*

Pitcairn Island: Adamstown, alt. 70 m., June 15, 1934, *St. John 15034.*

Rapa: valley two fifths of a mile east of Ahurei, alt. 30 m., July 1, 1934, *St. John and Fosberg 15268.*

Austral Islands: Raivavae, slope up to pass south of Raiurua, alt. 50 m., Aug. 3, 1934, *St. John and Fosberg 15854;* Tubuai, along road south of Mataura, alt. 20 m., Aug. 15, 1934, *St. John 16222;* Rurutu, Puputa Valley, west of Moerai, alt. 25 m., Aug. 26, 1934, *Fosberg 11865;* Rurutu, road southwest of Moerai, alt. 30 m., Aug. 26, 1934, *St. John 16685;* Rimatara, Anapoto, alt. 3 m., Sept. 4, 1934, *St. John and Fosberg 16893.*

Coffea liberica Hiern (?): Linn. Soc. Lond., Trans., II, **1**:171, 1876.

Mangareva (Gambier) Islands: Mangareva, Rikitea, June 1, 1934, *St. John and Garwood 14840.*

The specimen is sterile so the identity is not certain, though vegetatively it looks like this species. It is said by Mr. Stephen Garwood, a resident of the island, to have grown from seeds received as "Mocha coffee."

IXORA

The native southeastern species of *Ixora* all belong to the section *Phyleilema* Gray (except possibly *I. temehaniensis* Moore), characterized by a much reduced inflorescence enclosed between two foliaceous bracts. Members of this section are found from Henderson Island and the Marquesas as far westward as New Caledonia, Queensland, and Micronesia.

They form the most critical and difficult group of Rubiaceae in southeastern Polynesia. Many different forms are found which closely resemble each other, and most of which might be placed in one species by an extremely conservative botanist. However, when subjected to close examination, a large aggregation of individually minor differences come to light, which, together with the distinct geographic ranges of most of the forms, make it seem best to consider them species pending a more thorough revision of the section. As is true with most of the other groups of endemic plants in southeastern Polynesia, a final treatment is greatly obstructed by lack of sufficient collections of most of the species. Few of them are represented in herbaria by material in enough stages of development for a full understanding.

Ixora triflora (Forst.) Seem.: Fl. Vit., 133, April 2, 1866 (fig. 4, *c*).

Not *I. triflora* R. Br.: in Benth., Fl. Austr., **3**:416, Jan. 5, 1867.

Coffea triflora Forst.: no. 75 in Fl. Ins. Austr. Prodr., 16, 1786.

Shrub or tree up to 7 m. tall, stems terete, internodes rather short but variable; leaves elliptical to slightly obovate, up to 10 cm. long and 5 cm. wide, apex acuminate, base acute, slightly attenuate, petiole somewhat winged, up to

1 cm. long, usually about 5 mm. long; stipules 5-8 mm. long, ovate, connate to 1.5 mm., long acuminate, carinate; cymes terminal or more commonly on short lateral branchlets, peduncles up to 1.5 cm. long, usually less than 1 cm.; bracts ovate, up to 3.5 cm. long, usually 2 cm., up to 2.5 cm. wide, usually 1-2 cm., apex acuminate, base shortly attenuate, petiole winged, 2-5 mm. long; portion of cyme above bracts reduced to 2 or 3 tiny cymules which are each composed of 3 or 4 almost sessile flowers joined at the base, pedicels 1.5-2 mm. long, hypanthium 1 mm. long, free part of calyx 1 mm. long, teeth very short and of unequal length, corolla 4-lobed, tube 9-12 mm. long, less than 1 mm. thick, pinkish, lobes lanceolate, acuminate, 7-9 mm. long, white, sour smelling; fruit unknown.

Society Islands. Huahine: Huahine Iti, north side of Haapu Bay, alt. 50 m., Oct. 3, 1934, *St. John and Cooke 17194;* Huahine Iti, Paore, Haapu Bay, alt. 300 m., Oct. 2, 1934, *St. John 17187.*

The rediscovery of this little known species on Huahine rather than on Tahiti makes one suspect that it was originally collected on the former island, rather than on Tahiti. Both Forster narratives of Cook's voyage mention a short stop at Huahine with some botanizing. The occurrence of this plant, even at present, at as low an altitude as 50 meters makes it quite possible that they found it on the short collecting trips that were made. Certainly nothing has been found in Tahiti since that answers to a description of the type specimen.

Dr. St. John kindly examined the type of this species for me in the British Museum herbarium, and prepared a careful description and several sketches which enabled me to be sure of the determination, though Forster's original description would fit almost equally well any species in the section *Phyleilema.*

Ixora Setchellii Fosberg, n. sp. (figs. 4, *e;* 5).

Arbor vel frutex subscandens, folia sessiles vel raro subsessiles, bracteae sessiles lata ovati-cordatae acuminatae, pars cymi supra bracteas glabrus reductus, 2 vel 3 cymules 3-4 florarum ad basim adnati in pedunculis 1-5 mm. longis, tubus corollae gracilis 1.5-2.5 cm. longus, lobi lanceolati acuminati 5-7 mm. longi, antherae lineares exsertae, stigmata 2 mm. longa bifida, segmentae recurvatae.

Tree or sometimes a somewhat scandent shrub up to 10 m. tall, branchlets terete, or when very young, 4-sided, internodes ordinarily 3-5 cm. long; leaves on older growth oblong to obovate, cordate at base, decidedly acuminate at apex, up to 18 cm. long, usually 10-15 cm., up to 7 cm. wide, usually 4-6 cm., leaves nearer inflorescences gradually smaller, oblong to ovate, cordate, acuminate, all leaves sessile (1 or 2 leaves with slight petiole in Moore 509), the basal 3-8 mm. of the midrib thickened as though the cordate basal lobes had become connate with a former, short, thickened petiole; stipules 5-6 mm. long, ovate, long-acuminate; cymes terminal with peduncles 2-5 cm. long (or occasionally axillary and subsessile); bracts sessile, broadly ovate-cordate, acuminate, 2.5-4.5 cm. long, 2-4.5 cm. wide, thin; portion of cyme above bracts

reduced to a short peduncle 1-5 mm. long, branching into 2 or 3 tiny 3-4-flowered cymules, rarely subtended by tiny bracts if well developed, each cymule with a peduncle about 1 mm. long, with pedicels less than 1 mm. long, the whole glabrous, axillary ones much more reduced; hypanthium 1 mm. long, free part of calyx 0.8-1 mm. long, thin, very shortly 4-dentate, spreading; corolla tube very slender, about 0.5 mm. thick, 1.5-2.5 cm. long, lobes lanceolate acuminate, 5-7 mm. long; anthers linear, 3 mm. long, exserted; pistil exserted 2.5-3 mm., stigma 2 mm. long, bifid, the segments recurved; flower pink; fruit subglobose, red (?), size when mature not known, probably rather small.

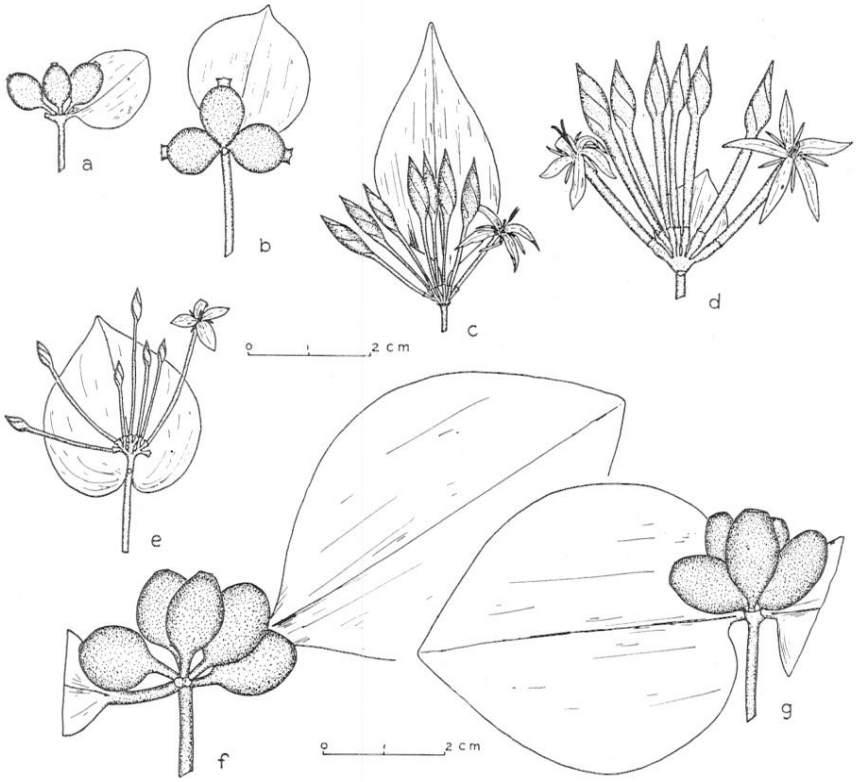

FIGURE 4.—Inflorescences of species of *Ixora* with one bract removed: *a, I. fragrans,* fruit; *b, I. Stokesii,* fruit; *c, I. triflora,* flower; *d, I. brevipedunculata,* flower; *e, I. Setchellii; f, I. St.-Johnii; g, I. raivavaensis.*

The following collections include all material available in the herbaria of Bishop Museum and the University of California.

Society Islands. Tahiti: Orofere Valley, Tarevareva River, alt. 2,000 ft., June 8, 1922, *Setchell and Parks 312;* same locality, June 12, 1922, *Setchell and Parks 339;* same locality, June 13, 1922, *Set-*

chell and Parks 345 (in part). Raiatea: Temihani Plateau, alt. 500 m., Oct. 5, 1934, *St. John 17244* (type); valley east side of Mount Oratorio, alt. 150 m., Oct. 5, 1934, *St. John and Cooke 17239;* Avera, Temehani, alt. 1,300 ft., Jan. 29, 1931, *Grant 5193;* upper part of Avera (?) Valley, alt. 350 m., Jan. 11, 1927, *Moore 509.* Tahaa: east ridge of Mount Purauti, alt. 500 m., Oct. 11, 1934, *St. John 17396*; Ruutia, Mount Ohiri, alt. 1,590 ft., Jan. 15, 1931, *Grant 5177.*

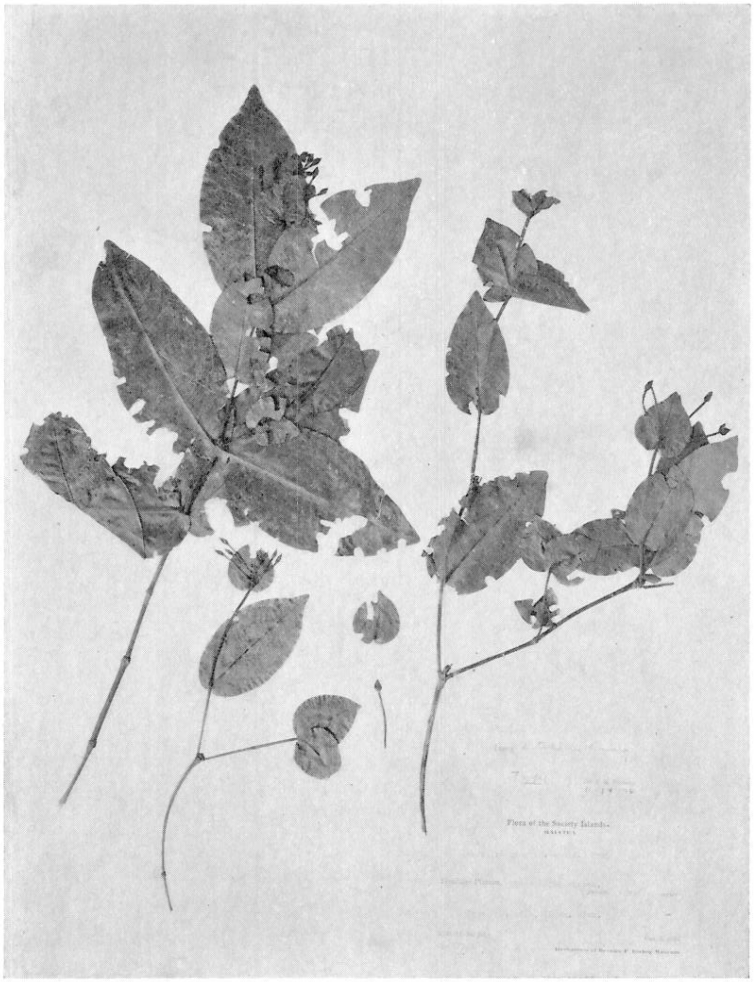

FIGURE 5.—*Ixora Setchellii.*

This species is most closely related to *Ixora moorensis* (Nad.) Fosberg,[2] of Moorea from which it is distinguished by its bifid style, 2-celled ovary, and sessile leaves.

This is the species interpreted as *I. fragrans* by Setchell (Univ. Calif. Pub. Bot., **12**:211, 1926), Moore (in herb.), Grant (in herb.), and probably by both Drake and Nadeaud. However the type locality of *I. fragrans* is Henderson Island, and it is now represented in herbaria by a number of collections. It is as distinct from *I. Setchellii* as almost any two species of the section *Phyleilema* are from each other. The much greater reduction of the cyme, the larger hypanthium and calyx, and the petiolate, obovate, obtuse leaves adequately distinguish *I. fragrans* from the species under consideration.

I am glad to dedicate this species to Dr. William Albert Setchell of the University of California, long one of the most prominent figures in plant taxonomy and distribution in the Pacific area, and whose kind personal interest in my botanical career since its beginning I sincerely appreciate.

Ixora St.-Johnii Fosberg, n. sp. (figs. 4, *f*; 6).

Arbor maxime 6 m., folia elliptica subcoriacea maxime 15 cm. longa 7.5 cm. lata, pedunculus robustus 2.5-5.5 cm. longus, bracteae foliam similes 8 cm. longae 4.5 cm. latae, petioli bractearum robusti 6-10 mm. longi, pars cymi supra bracteas reductus ad 3 ordinem florarum pedicellatarum, fructus lata ellipsoideus 12 mm. longus 10 mm. latus niger.

Tree up to 6 m. tall, branchlets terete, internodes variable; leaves subcoriaceous, glossy green above, pale beneath, elliptical, up to 15 cm. long, 7.5 cm. wide, apex acute to slightly acuminate, with the point blunt, base acute, petiole heavy, slightly winged, 5-15 mm. long; stipules 5-9 mm. long, ovate, connate to 1.5 mm., carinate, long acuminate, the prolonged apices free in the bud; cymes terminal on rather long lateral branches, peduncles heavy, 2.5-5.5 cm. long; bracts similar to the leaves, but only up to 8 cm. long, 4.5 cm. wide, petioles heavy, 6-10 mm. long; part of cyme above bracts reduced to 3 rows of pedicellate flowers on the enlarged node from which the bracts also arise; flowers not available; fruit (probably not quite mature) black, broadly ellipsoidal, 12 mm. long, 10 mm. broad, crowned with the scar and a few remnants of the apparently somewhat persistent calyx, 2 mm. in diameter, pedicellate, pedicels 3-4 mm. long, 1.5-2 mm. thick.

Society Islands: Huahine, Huahine Nui, north ridge of Mount Matoereere, alt. 600 m., Oct. 1, 1934, *St. John 17156* (type).

This is one of the most distinct species in the section *Phyleilema,* its bracts not resembling those of any other known species. Due to the lack of flowers it is, in fact, not altogether certain that it belongs

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[2]**Ixora moorensis** (Nad.) Fosberg, n. comb.
Hitoa moorensis Nad.: Journ. de Bot., **13**:2, 1899.

in this genus, though the resemblance in the fruit and most of the vegetative characters make it most probable that it belongs here. It is not particularly closely related to any of the other species.

This species is named for my teacher, Dr. Harold St. John of Bishop Museum and the University of Hawaii, collector of the only known collection, and to whose energy and enthusiasm, the abundance of the botanical collections brought back by the Mangarevan Expedition is very largely due.

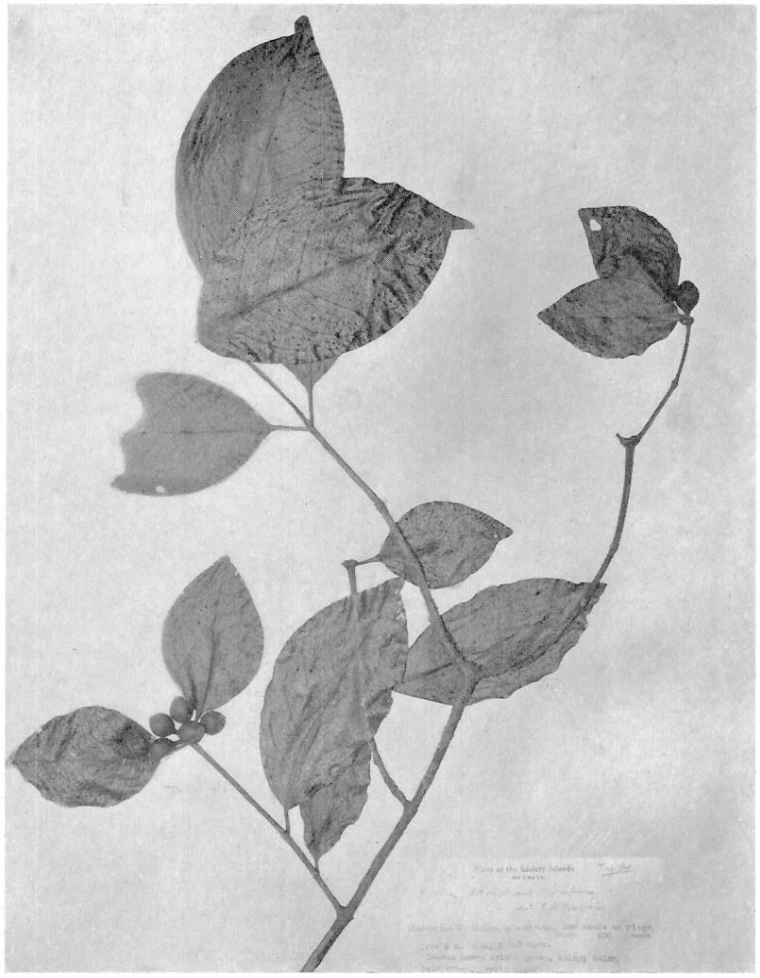

FIGURE 6.—*Ixora St.-Johnii.*

Ixora fragrans (Hook. and Arn.) Gray: Amer. Acad., Proc., **4**:39, 1860 (fig. 4, *a*).

Cephaelis fragrans Hook. and Arn.: Bot. Beechey's Voy., 64, pl. 13, 1832.

Shrub 2-4 m. tall; leaves variable, obovate to elliptical or oval, up to 13 cm. long, usually 6-8 cm., apex obtuse, base acute to cordate, petiole 4-8 mm. long; peduncles 1-2 cm. long, bracts ovate to cordate, obtuse, on petioles 1-2 mm. long, part of inflorescence above bracts reduced to 3 flowers on pedicels about 1 mm. long; free portion of calyx less than 1 mm. long, prominently 4(?) dentate; corolla tube 12-14 mm. long, lobes a little over half that length, lanceolate, 4(?) in number; fruit ellipsoidal to globose or ovoid, black.

Henderson Island: north end, alt. 15 m., June 17, 1934, *St. John and Fosberg 15053;* same locality and date, alt. 30 m., *St. John and Fosberg 15117;* same locality, alt. 33 m., June 18, 1934, *St. John and Fosberg 15140½, 15142, 15144*; north center, alt. 30 m., June 20, 1934, *St. John and Fosberg 15163.*

The above description is only intended to include the important diagnostic characters. Hooker and Arnott's description says that the calyx and corolla are 4-lobed, while their plate shows them to be 5-lobed. The available collections are all in fruit, and while the calyces are in some cases still persistent, it is very difficult to discern whether some are really 5-lobed or are merely damaged, due to enlargement of the fruit. This species is most closely related to *I. bracteata.*

Ixora brevipedunculata Fosberg, n. sp. (figs. 4, *d*; 7).

Folia ovata vel elliptica, apex acuta vel subacuminata, basis rotundus raro acutus vel cordatus, lamina 10 cm. longa 4 cm. lata, petiolus 4 mm. longus, pedunculi 1-7 mm. longi, bracteae sessiles 0.5-2 cm. longi 0.5-1.5 cm. lati, pars cymi supra bracteas reducta, cymulae 1-5 3-floriferae, cymulae hypanthiaque breve hirsuti-pilosa, hypanthia 1.5-2.5 mm. longa, calyx 1.5 mm. longa 4-dentata, tubus corollae 14-18 mm. longus, lobi 9-10 mm. longi, antheres lineares 5 mm. longi, fructus glabratus ellipsoideus 12-13 mm. longus 9 mm. latus.

Shrub up to 6 m. tall, branchlets terete, internodes variable; leaves ovate to elliptical, apex acute to slightly acuminate, base rounded or rarely acute to cordate, blade up to 12 cm. long, usually 10 cm., up to 6 cm. wide, usually 4 cm., petiole 2-6 mm. long, usually 4 mm., slightly winged; stipules 6-10 mm. long, ovate, long acuminate or aristate, strongly carinate, connate up to 1.5 mm.; cymes commonly on lateral branchlets, peduncles 1-7 mm. long; bracts 0.5-2 cm. long, usually about 1 cm., 0.5-1.5 cm. wide, usually about 1 cm., thin, ovate to more commonly elliptical or obovate, apex acuminate, base subcordate, sessile; portion of inflorescence above bracts reduced to 1 to 5 3-flowered cymules, each so reduced as to be nothing but a ridge with 3 pedicellate flowers on it, the cymules next to the bracts often further reduced to 1 flower, the cymules and the hypanthium shortly hirsute-pilose; hypanthium 1.5-2.5 mm. long, calyx 1.5 mm. long, thin, shortly 4-dentate, almost glabrous outside, pilose inside;

corolla tube 1 mm. thick, 14-18 mm. long, rarely as short as 9 mm. or as long as 20 mm., pinkish, lobes lanceolate-acuminate, 9-10 mm. long, cream-white, fragrant; anthers linear, 5 mm. long, exserted and hanging in the sinuses; pistil exserted 5-6 mm., stigma 2-3 mm. long, bifid; fruit 12-13 mm. long, 9 mm. wide, red, glabrate, ellipsoidal, crowned almost until maturity with the persistent calyx.

Austral Islands: Tubuai, south slope of Panee, alt. 350 m., Aug. 23, 1934, *St. John 16528* (type); north ridge of Panee, alt. 300 m.,

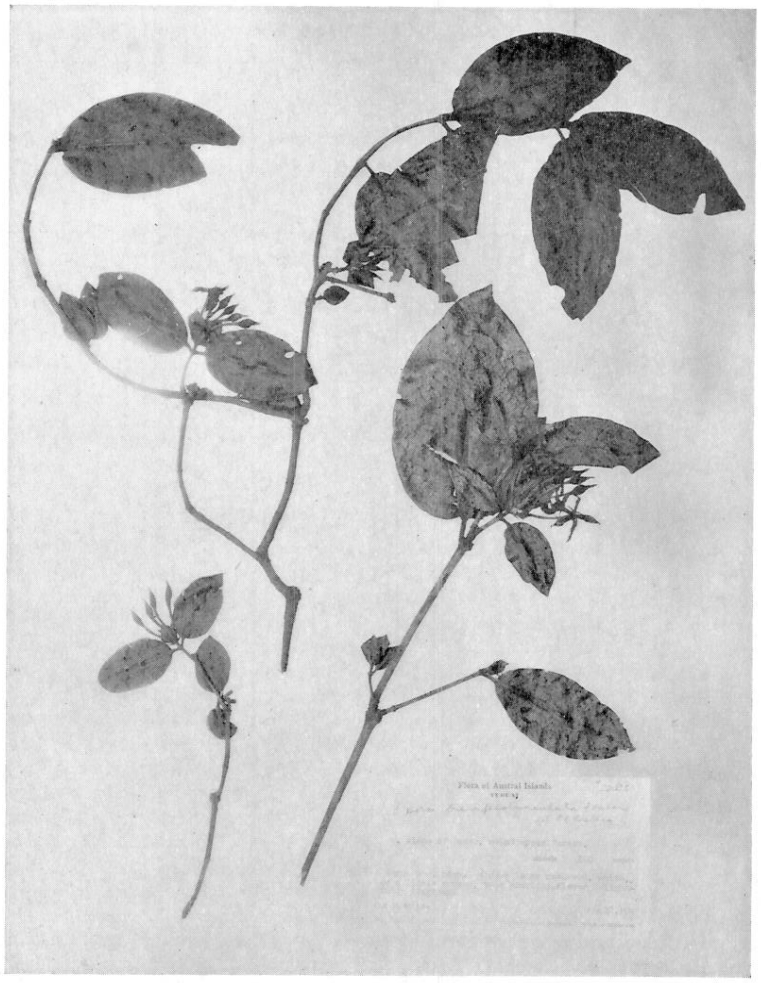

FIGURE 7.—*Ixora brevipedunculata.*

Aug. 23, 1934, *St. John 16526;* southwest ridge of Taitaa, alt. 320 m., Aug. 20, 1934, *St. John 16466.*

Quite distinct, resembling some of the Samoan species in the hirsute-pilose cyme and hypanthium, and the number of flowers, but differing from all species in the section in the very short peduncles.

Ixora raivavaensis Fosberg, n. sp. (fig. 4, *g*).

Folia 10-15 cm. longa elliptica, petioli robusti 10-15 mm. longi, bracteae ovatae maxime 5 cm. longae 4 cm. latae, pars cymi supra bracteas reducta ad 2-3 cymulae, fructus ellipsoideus 13-18 mm. longus 10 mm. latus.

Shrub up to 2.5 m. tall, branchlets terete, internodes long, mostly over 3 or 4 cm.; leaves large, elliptical, mostly 10-15 cm. long; apex more or less blunt-acuminate, base obtuse or more commonly acute, petiole heavy, on larger leaves 10-15 mm. long; stipules 6-10 mm. long, long-ovate, long-acuminate, strongly carinate, connate to 2 mm., peduncles 1-2.5 cm. long; bracts up to 5 cm. long, 4 cm. wide, ovate, apex acute or obtuse, base round or cordate, petiole 1.5-3 mm. long; part of inflorescence above bracts reduced to, usually, 2-3 tiny cymules side by side, these on peduncles from 5 mm. long to almost sessile, pedicels 1 mm. long, tiny sterile or cyme-bearing branchlets sometimes appearing in axils of the bracts; flowers not available; fruit 13-18 mm. long, 10 mm. thick, ellipsoidal, somewhat truncate distally, greenish streaked with magenta pink, the pink becoming more pronounced with age, calyx scar 2.5-3.5 mm. across.

Austral Islands. Raivavae: south slope of Mount Muanui, alt. 200 m., Aug. 8, 1934, *Fosberg 11700*; east slope of Mount Muanui, alt. 190 m., Aug. 8, 1934, *St. John 16042* (type); slope northeast of Vaiuru, alt. 40 m., Aug. 10, 1934, *Fosberg 11726.*

This species is probably closest to *I. Stokesii*, differing chiefly in that the inflorescence is not nearly so much reduced. It is also rather close to *I. marquesensis* of the Marquesas.

Ixora bracteata Cheeseman: Linn. Soc. Lond., Trans., II, **6**:283, 1903.

Austral Islands. Raivavae: slope up to pass south of Raiurua, alt. 80 m., Aug. 3, 1934, *St. John and Fosberg 15803*; south slope of Matotea, alt. 275 ft., April 19, 1922, *A. M. Stokes 76.*

With no flowers available it is with some doubt that I refer the Raivavae material cited above to *I. bracteata* of Rarotonga. Brown called the Stokes specimen *I. fragrans* with the comment that it had somewhat more prominent veins than that from Henderson Island. The only very marked difference between *I. fragrans* and *I. bracteata* is in the much longer corolla of the latter. I have seen no corollas of Raivavae material, so the determination is very uncertain. The pronounced rusty appearance of the leaves and the shorter peduncle

common to Raivavae and Rarotonga plants, and the fact that relationship with Rarotonga seems more logical than with Henderson Island lead me to associate the Raivavae plants with *I. bracteata* for the present. Little is known of the flowers of *I. fragrans*. Perhaps when further collections of flowering material from all three islands are made, the two species may be found to be identical.

Ixora Stokesii F. Brown: B. P. Bishop Mus., Bull. **130**:304, 1935 (fig. 4, *b*).

Rapa: Area, alt. 150 m., July 2, 1934, *St. John and Fosberg 15334*; Kopenena, alt. 125 m., July 12, 1934, *St. John and Maireau 15509*; east side of peak between Ahurei Bay and Atanui Valley, alt. 120 m., July 3, 1934, *Fosberg 11369*; north slope of Mount Lekie, alt. 250 m., July 20, 1934, *St. John and Maireau 15629*; Oromanga forest, south side of Mount Tangikou, alt. 150 m., July 11, 1934, *St. John and Maireau 15480*; same locality and date, alt. 200 m., *St. John and Maireau 15476*.

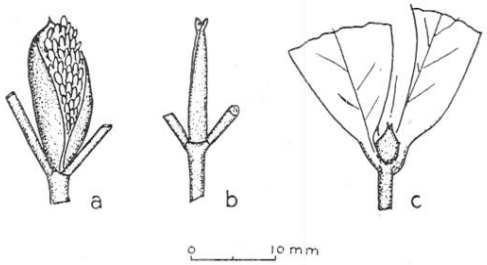

FIGURE 8.—Species of *Psychotria*, nodes with stipules: *a, P. raivavaensis*, showing calyptra opening and inflorescence emerging; *b, P. Grantii; c, P. temehaniensis*.

This species differs from *I. fragrans* to which it is most closely related in that the leaves are more commonly elliptical, apex acute, petiole somewhat longer, stipules much longer, bracts sessile or on petioles less than 1 mm. long, flowers completely sessile, calyx twice as long, less prominently dentate, corolla tube considerably longer, lobes longer and the fruit dark red. The cyme is more completely reduced in this than in any other species of *Ixora*.

Ixora macrothyrsa Teijm. and Binn.: Gard. Chron., **2**:267, 1884.

Mangareva (Gambier) Islands: Mangareva, Point Teone Kura,

alt. 2 m., June 5, 1934, *Fosberg 11125*; Rikitea, alt. 2 m., June 1, 1934, *Fosberg 11088*.

Austral Islands: Rurutu, Moerai, alt. 2 m., Aug. 29, 1934, *Fosberg 11990*.

This common cultivated species is grown as an ornamental in various parts of Polynesia. Its original home is in the East Indies.

Ixora odorata Hook.: Bot. Mag., **71**, pl. 4191, 1845.

Mangareva (Gambier) Islands: Mangareva, Rikitea, alt. 2 m., May 27, 1934, *St. John 14579*.

This cultivated species was also observed in Tahiti. Its original home is in Madagascar.

PSYCHOTRIA

The *Psychotria* of southeastern Polynesia present a large number of distinct, yet in many cases closely related species. Collections are few in number and for some species, sterile or minus either fruit or flowers. A comprehensive revision would be desirable, including an investigation of the relationships of the southeastern Polynesian species to those of the other parts of Polynesia and the western Pacific.

All of the species of southeastern Polynesia seem to be rather closely related, except possibly two in the Society Islands and one or two in the Marquesas. The group to which the great majority belong is characterized by calyptrate stipules, usually with four free lobes at the apex, enclosing the inflorescences, and the terminal bud borne at the node where they are situated. As soon as the above-mentioned organs start to enlarge the stipules are shed. The pyrenes in the fruit are usually tricarinate.

No attempt will be made here to treat species not collected by the Mangarevan Expedition.

Psychotria speciosa Forst.: no. 89 in Fl. Ins. Austr. Prodr., 16, 1786.

Cephaelis speciosa (Forst.) Spreng.: Syst. Veg., ed. 16, **1**:749, 1825.

Uragoga speciosa (Forst.) Drake: Ill. Fl. Ins. Mar. Pac.: 38, pl. 15, 1886.

Society Islands: Tahiti, east side of south ridge of Orofena, alt. 1,220 m., Sept. 20, 1934, *St. John and Fosberg 17039*.

Psychotria tahitensis (Drake) Drake: Ill. Fl. Ins. Mar. Pac., 199, 1890.

Uragoga tahitensis Drake: Ill. Fl. Ins. Mar. Pac.: 42, pl. 17, 1886.

Society Islands: Tahiti, east side of south ridge of Orofena, alt. 1,250 m., Sept. 26, 1934, *St. John and Fosberg 17097*.

This species, rather common in the high rain forests of Tahiti, was the one considered to be *P. asiatica* by Nadeaud.

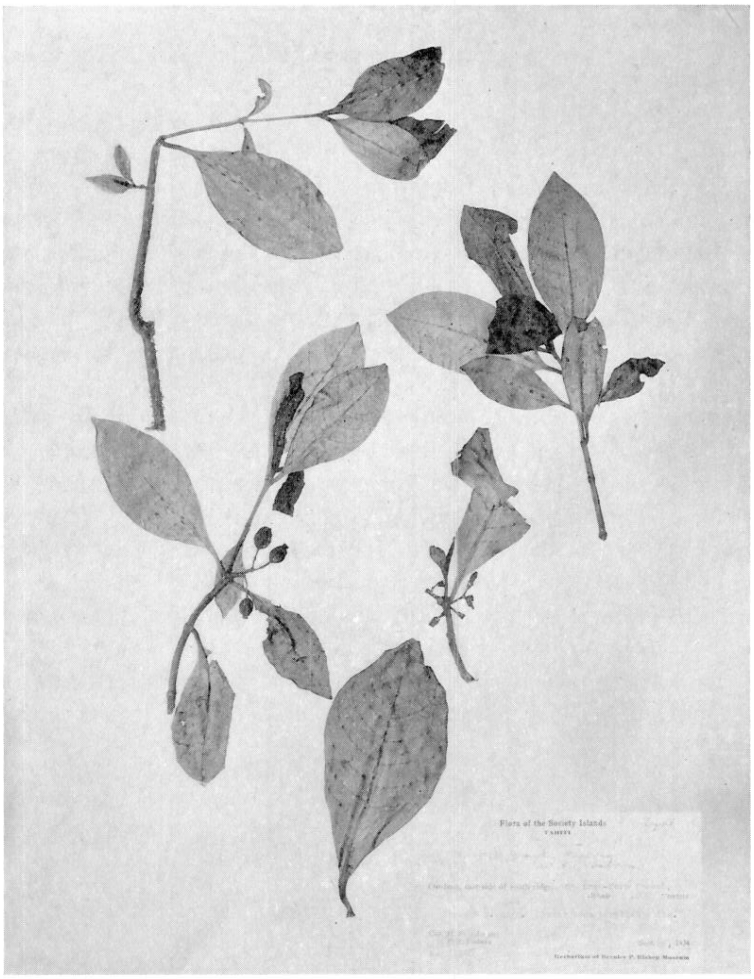

FIGURE 9.—*Psychotria Grantii.*

Psychotria Grantii Fosberg, n. sp. (figs. 8, *b*; 9).

Frutex, folia obovata coriacea, stipulae calyptratae 2 cm. longae, cymi pauciflori terminales robusti trichotomi, calyx integer 2 mm. longus infundibuliformis, corolla pentamera, pyrenae fructi tricarinatae.

Shrub up to 4 m. tall, with heavy cylindrical branchlets, internodes 1-3 cm. long; leaves obovate, rarely elliptical, apex acute or somewhat acuminate, rarely obtuse, base cuneate-attenuate, blade up to 12 cm. long, 5.5 cm. wide, coriaceous, glabrous above, somewhat brown-woolly along the midrib beneath, petiole winged, 1-1.5 cm. long; stipules forming a calyptra up to 2 cm. long, slightly bifid at apex; cymes few flowered, terminal in threes, becoming lateral by a branch arising at the base of the cymes, cymes elongating to 6 cm. in fruit, cyme heavy, once trichotomous, then each branch bearing 3 pedicellate flowers at apex, pedicels 1-3 mm. long, elongating in fruit to 4-5 mm.; ovary and calyx golden appressed hirtellous, becoming glabrate in fruit, ovary 1 mm. long, calyx entire, 2 mm. long, funnelform; corolla pentamerous, glabrous externally, purplish white in bud, not known open, tube at least 5 mm. long, lobes at least 5 mm. long; fruit ellipsoidal, 9-10 mm. long, 7 mm. wide, crowned by the persistent truncate calyx, pyrenes tricarinate.

Society Islands: Tahiti, east side of south ridge of Orofena, alt. 1,200 m., Sept. 26, 1934, *St. John and Fosberg 17100* (type); same locality, alt. 1,500 m., Sept. 25, 1934, *St. John and Fosberg 17121*; south of Orohena (Orofena), alt. 1,550 m., May 16, 1927, *L. H. MacDaniels 1487*.

This species was annotated in the herbarium by Grant as a new variety of *P. temehaniensis*, to which it bears a strong superficial resemblance. The form of the stipules, however, places it in the group centering around *P. tahitensis*. The coriaceous leaves, stiff, few flowered cyme, and the enlarged calyx persisting on the fruit amply separate it from the latter. The pyrenes of the fruit are tricarinate, while those of *P. temehaniensis* are, according to Moore, unicarinate.

Named for Dr. Martin L. Grant, Bishop Museum Fellow 1930-32, whose flora of the Society Islands, now in preparation, will doubtless clear up many of the difficult problems presented by the southeastern Polynesian flora.

Psychotria tubuaiensis Fosberg, n. sp. (fig. 10).

Folia elliptica vel obovata, cymi ternati, pedunculi trichotomi elongati, dentes calicis obtusae, tubus corollae 4-5 mm. longus, lobi 3 mm. longi anguste ovati, stylus 6-7 mm. longus.

Shrub up to 6 m. tall, branchlets almost terete, fistulose, internodes up to 2.5 cm. long, leaves up to 14 cm. long, 6 cm. wide, elliptical or obovate, obtuse to acute, slightly blunt-acuminate at apex, cuneate-attenuate at base, petiole 1.5-2 cm. long, blade with only a slight coppery tinge above when dry, with a conspicuous band of rusty-brown woolly-pilose hair 2 mm. wide extending along

each side of the midrib beneath; stipules 1.5 cm. long, forming a terminal calyptra, but apparently with no free lobes at apex, shed with the opening of the bud; cymes borne usually 3 at a node, the bud which prolongs the branch appearing a little to one side; peduncle elongate, up to 6 cm., once trichotomous, each branch bearing 3 shortly pedicellate flowers; calyx cup-shaped, 1-1.5 mm. long, teeth obtuse; corolla with tube and throat almost indistinguishable, salver-form, tube and throat together 4-5 mm. long, lobes 3 mm. long, narrowly ovate, glabrous except the throat, which is bearded; style 6-7 mm. long; fruit ellipsoidal, pyrenes 10 mm. long, about 5 mm. wide.

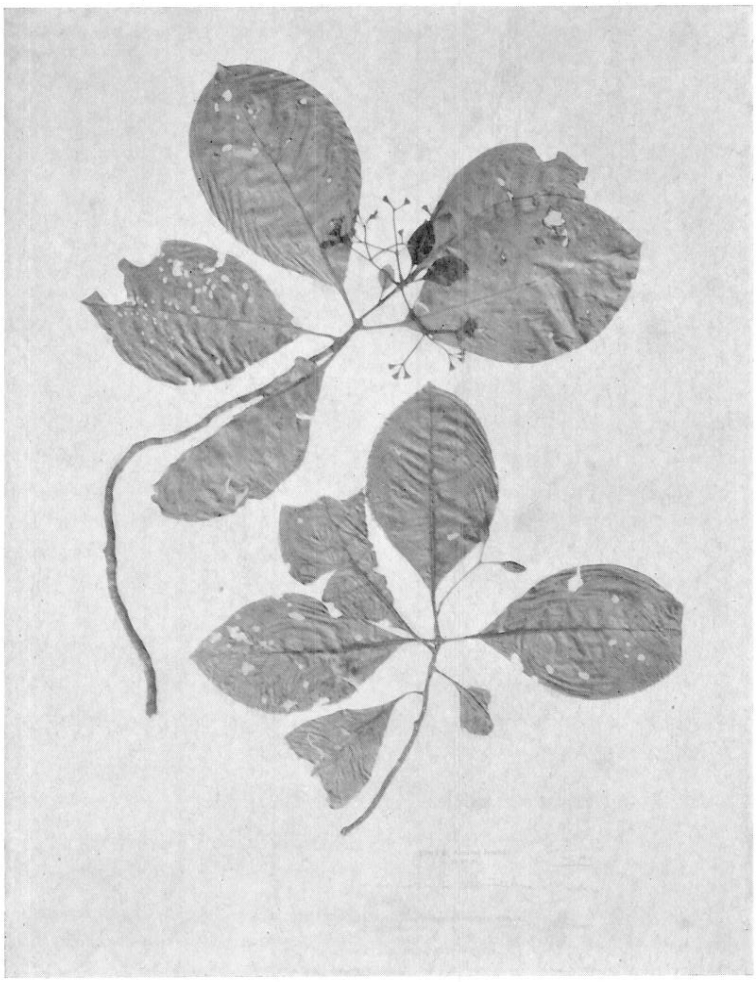

FIGURE 10.—*Psychotria tubuaiensis.*

Austral Islands: Tubuai, west side of Taitaa, alt. 370 m., Aug. 23, 1934, *St. John 16543*; northeast slope of Taitaa, alt. 350 m., Aug. 20, 1934, *St. John 16447* (type).

Related to *P. raivavensis* and to *P. rapensis,* differing from the former in the once trichotomous cyme, shorter flowers and the larger pyrenes, and from the latter in the ternately borne cymes, the longer flowers and slightly narrower pyrenes.

Psychotria raivavaensis Fosberg, n. sp. (figs. 8, *a*; 11).

Cymi ternati, pedunculi trichotomi, ramuli cymorum trichotomi, calyx 2 mm. longa 4 mm. lata, tubus corollae 6-7 mm. longus, lobi 3 mm. longi, pyrenae ovalis 7 mm. longae 6 mm. latae.

Like *P. tubuaiensis* but with broader leaves, up to 7 cm. wide, 14 cm. long, on petioles 3-4 cm. long, apex of leaf obtuse to rounded, leaves on some plants completely glabrous beneath, others with a band of hair; the 3 cymes at one node sometimes on a short common peduncle, more often not, each cyme twice trichotomous, then each ultimate branch bearing 3 flowers on pedicels 0.5-1 cm. long; calyx 2 mm. long, 4 mm. broad; corolla tube plus throat 6-7 mm. long, lobes 3 mm. long, more narrowly ovate, throat somewhat less bearded; fruit with pyrenes 7 mm. long, 6 mm. broad, very broadly oval.

Austral Islands: Raivavae, south slope of Mount Muanui, alt. 200 m., Aug. 8, 1934, *Fosberg 11701* (type); same locality and alt., Aug. 6, 1934, *St. John and Zimmerman 15991*; south slope of Mount Taraia, alt. 230 m., Aug. 6, 1934, *St. John 16005, 16006, 16008.*

The last two collections cited have the leaves entirely glabrous beneath, but this character is variable, and the form does not seem worth naming.

This species is most closely related to *P. tubuaiensis.*

Psychotria rapensis F. Brown: B. P. Bishop Mus., Bull. **130**:309, 1935.

Rapa: Maungaeae, east of Mangaoa Peak, alt. 250 m., July 4, 1934, *St. John and Maireau 15376*; south slope of Mount Tepiahu, alt. 200 m., July 20, 1934, *St. John and Zimmerman 15611*; southeast slope of Morongota, alt. 150 m., July 16, 1934, *St. John and Maireau 15606*; Taratika, east side of Mount Perahu, alt. 450 m., July 15, 1934, *St. John and Maireau 15563.*

Psychotria temehaniensis Moore: B. P. Bishop Mus., Bull. **102**:46, 1933 (fig. 8, c).

Society Islands: Raiatea, Temihani Plateau, alt. 600 m., Oct. 5, 1934, *St. John 17278.*

This species is apparently not closely related to *P. tahitensis* and its allies, as its stipules are only 4.5 mm. long, ovate, bluntly cuspidate, and show no signs of forming a calyptrate bud sheath.

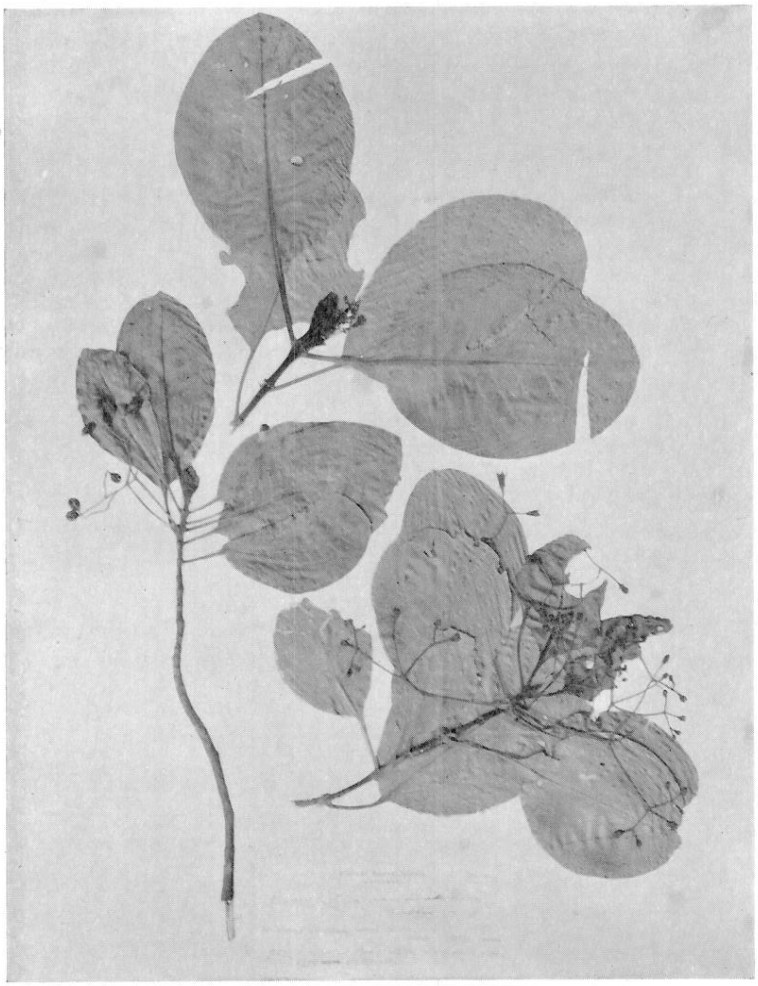

FIGURE 11.—*Psychotria raivavaensis.*

Psychotria sp.

Shrub 5 m. tall, branchlets cylindrical, internodes 1-2.5 cm. long, leaves obovate-cuneate, rather abruptly contracted to a winged petiole at base, apex acuminate, up to 15 cm. long, 5.5 cm. wide, thin-coriaceous, glabrous above, also beneath except for a close line of brown wool along each side of the midrib,

veins almost at right angles to midrib, somewhat purplish when dry, petiole 1 cm. long; stipules broadly ovate, obtuse, slightly mucronate, 7 mm. long, connate, forming a sheath, persistent to the second or third node, brown pilose inside; fruit described as red, but not present on the specimen, apparently lost in drying.

Society Islands: Huahine, Huahine Nui, Matoereere, alt. 400 m., Oct. 1, 1934, *St. John 17175*.

I hesitate to name this plant from sterile material. Its stipules seem to relate it to *P. temehaniensis*, though its general appearance is quite different.

GEOPHILA

Geophila herbacea (Jacq.) O. Kuntze: Rev. Gen. Pl., **1**:300, 1891.

Psychotria herbacea Jacq.: Enum. Pl. Carib., 16, 1760.

Geophila reniformis D. Don: Fl. Nepal. Prodr., 136, 1825.

Uragoga herbacea (Jacq.) O. Kuntze: Rev. Gen. Pl., **1**:300, 1891.

Society Islands: Tahiti, District de Pare, Fautaua Valley, alt. 60 m., May 7, 1934, *St. John and Fosberg 14123*.

Identical with collections examined from the western Pacific and Malaysia.

NERTERA

Nertera granadensis (Mutis) Druce: Bot. Exch. Club of British Isles, Rept. of 1916, 637, 1917.

Gomozia granadensis Mutis: in Linn. f., Suppl. Pl., 129, 1781.

Nertera depressa Banks and Sol.: in Gaertn., de Fruct. et Sem. Pl., **1**:124, 1788.

Society Islands: Tahiti, south ridge of Orofena, alt. 1,550 m., Sept. 22, 1934, *St. John and Fosberg 16985*.

Careful comparison has failed to reveal any significant difference from the wide spread plant which has been called *N. depressa*, though Nadeaud has recorded *N. setulosa* from Tahiti (no. 350 in Enum. Pl. Ile Tahiti, 52, 1873). I have not seen specimens identified by Nadeaud, but it is doubtful if *N. setulosa* occurs outside New Zealand. The specimen cited above is much like certain narrow leafed Hawaiian ones.

The plant is decidedly rare in Tahiti, at least in the part explored by the Mangarevan Expedition. Only one isolated patch was seen, growing on the face of a bare, wet, almost perpendicular cliff just below the crest of the main south ridge of Orofena.

It is with some hesitation that I take up the name of *N. granadensis* in place of the long established *N. depressa* without having had access to the type specimen, but so far no one has presented any evidence favoring the subdivision of the widespread *N. depressa* excepting its wide distribution, and *N. granadensis* is certainly the oldest name for the group taken in a broad sense.

COPROSMA

In his treatment of the southeastern Polynesian group of species of *Coprosma* in his recent monograph of the genus (B. P. Bishop Mus., Bull. **132**, 1935), Oliver obviously had too little material at his disposal for an adequate picture. The mass of collections on which the present notes are based is by far the greatest and most representative that has been brought together, though some items are still to be desired, such as fruit of *C. Cookei* and *C. velutina* var. *Andersonii,* flowers of *C. taitensis* var. *Oliverii,* and fertile material of *C. rapensis* var. *mangarevica.* Intelligent future collecting should easily correct these deficiencies except possibly the last mentioned.

The present study maintains the integrity of the group of species centering around *C. taitensis,* though necessitating drastic realignment of the species within the group. Also it effectually disposes of the false group of *C. oceanica* created by Oliver, and introduces in *C. Cookei* another very definite element of relationship between the flora of Rapa and that of the New Zealand region. The species, as here treated, are clear and easily distinguished from each other.

Coprosma taitensis Gray: Am. Acad., Proc., **4**:49, 1860 (figs. 12, *a;* 13).

Coprosma tahitensis Nad.: no. 340 in Enum. Pl. Ile Tahiti, 50, 1873.

Coprosma Nadeaudiana Drake: Ill. Fl. Ins. Mar. Pac., 201, 1890.

Specimens of this species differ somewhat in degree of hairiness, thickness of branchlets, length of internodes, and in size and shape of leaves. However, these differences seem to be correlated somewhat with the degree of exposure of the habitat, and no sharp lines can be drawn between them. Drake's statement in describing *C. Nadeaudiana,* that the description of *C. taitensis* Gray more nearly fits a Tuamotuan species has been apparently the foundation for considerable confusion since, including the describing of *C. oceanica* Oliver,

based on *Hedyotis romanzoffiensis* (*Kadua romanzoffiensis, Gouldia romanzoffiensis*). Certainly the latter was the plant that Drake had in mind, as there are no *Coprosma* known from the Tuamotus, and the specimen he cites (Savatier, Morurua), of which I have seen a photo, belongs there. *C. Nadeaudiana* is considered both by Oliver and by Grant to be identical with *C. taitensis,* and a photograph of the type bears this out.

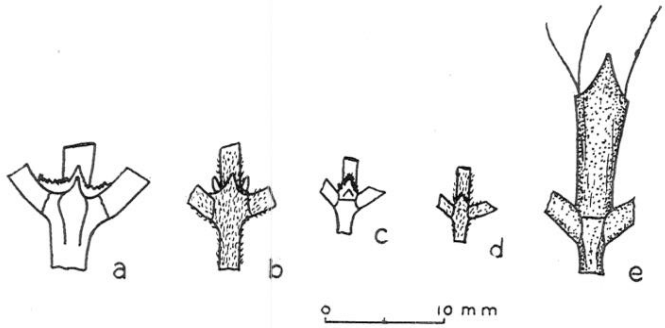

FIGURE 12.—Species of *Coprosma,* nodes with stipules: *a, C. taitensis; b, C. velutina; c, C. rapensis* var. *typica, d, C. rapensis* var. *mangarevica; e, C. Cookei.*

One specimen from Orofena certainly seems to merit varietal recognition because of its glabrous branchlets, lack of domatia, and differently shaped fruits.

Although a careful search was made for it, no *Coprosma* was found on Tubuai. A later examination of the specimen (*Aitken 910*) reported by Brown (B. P. Bishop Mus., Bull. **130**:317, 1935) as *C. tahitensis* Gray showed that the plant was *Psidium Cattleyanum.*

Coprosma taitensis Gray var. **genuina** Fosberg, n. nom. (fig. 13, *a*).

The typical form of the species.

Society Islands: Tahiti, Orofena, east side of south ridge, alt. 1,300 m., Sept. 26, 1934, *St. John and Fosberg 17098*; south ridge of Orofena, Sept. 22, 1934, *St. John and Fosberg 16996;* same locality, alt. 1,600 m., Sept. 24, 1934, *St. John and Fosberg 17074;* same locality, alt. 1,950 m., *St. John and Fosberg 17065.*

Numerous other collections are represented in the Bishop Museum herbarium.

Coprosma taitensis Gray var. **Oliverii** Fosberg, n. var. (fig. 13, *b*).

Ramuli glabri, domatia nulla, fructi ellipsoidei.

Differing from var. *genuina* in the completely glabrous branchlets, lack of domatia in the leaves, and in ellipsoid rather than broadly obovoid fruits.

Society Islands: Tahiti, south ridge of Orofena, alt. 1,600 m., Sept. 22, 1934, *St. John and Fosberg 17006* (type).

Named for Mr. W. R. B. Oliver, of Wellington, New Zealand, monographer of the genus *Coprosma*.

This variety would have to belong to *C. glabrata* Moore if that species were upheld, but as var. *Oliverii* is intermediate between it and *C. taitensis* and the differences between the latter and Moore's two species are slight, the following reductions seem to be necessary.

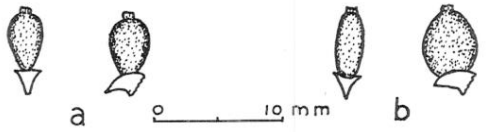

FIGURE 13.—Fruits of varieties of *Coprosma taitensis: a,* var. *genuina; b,* var. *Oliverii.*

Coprosma taitensis Gray var. **glabrata** (Moore) Fosberg, n. comb.
Coprosma glabrata Moore: B. P. Bishop Mus., Bull. **102**:41, 1933.

Coprosma taitensis Gray var. **raiateensis** (Moore) Fosberg, n. comb.
Coprosma raiateensis Moore: B. P. Bishop Mus., Bull. **102**:41, 1933.

These two species were only weakly separated from *C. taitensis* and from each other by differences in pubescence, denticulation of stipules, shape of leaves, and size and shape of fruit. The discovery of *C. taitensis* var. *Oliverii,* which is obviously a variant of *C. taitensis,* but which on technical characters would have to go into *C. glabrata* makes it useless to try to maintain them as separate species. I have examined type material of both.

Coprosma setosa Moore: B. P. Bishop Mus., Bull. **102**:42, 1933.

Society Islands: Raiatea, Temihani Plateau, alt. 750 m., Oct. 5, 1934, *St. John 17280.*

This species seems distinct enough.

Coprosma velutina Fosberg, n. sp. (figs. 12, *b*; 14).

Stipulae latae triangulares valde denticulato-glandulosae valde mucronatae leviter connatae et adnatae ad bases petiolarum, dioica, calyx absens, stamina penta, lobae florae pistillatae tubam longiores, fructus 7 mm. longus 2-3 mm. latus oblongus vel ovoideo-oblongus.

Shrub or small tree up to 5 m. tall; branchlets somewhat fleshy, 4-sided; internodes short, 0.5-2.5 cm. long, nodes prominent; leaves chartaceous, elliptical to ovate, apex obtuse to rounded, base acute to slightly attenuate to a petiole 8-17 mm. long, slightly winged, blade up to 8.5 cm. long, 4.5 cm. wide, usually smaller, upper side of midrib and lower side of blade sparsely puberulent, margin ciliolate, domatia large, triangular, very hairy; stipules broadly triangular, strongly denticulate-glandular, stoutly mucronate, slightly connate, adnate to the bases of the petioles; apparently dioecious; (inflorescences and flowers described under var. *typica*); fruit 7 mm. long, 2-3 mm. thick, orange, glabrous, oblong or ovoid-oblong, crowned by persistent calyx.

Related most closely to *C. taitensis* Gray, but differing in being densely pubescent on many parts, in the shape of the stipules, in the lack of a calyx and in having 5 stamens in staminate flowers, in having the lobes longer than the tube in the smaller pistillate flowers, and most noticeably in the oblong or oblong ovoid, larger fruit.

Two varieties exist, one on Raivavae and one on Rurutu, of the Austral Islands. It is rather surprising not to find a variety on Tubuai, situated between these two. However, the original vegetation of Tubuai is almost completely destroyed. Possibly if a *Coprosma* ever existed there it may not have survived the devastation produced by fires set by natives and the weeds and goats introduced by misguided Europeans.

Coprosma velutina Fosberg var. **typica** Fosberg, n. var.

Ramuli valde velutino-pubescentes, petiolus velutinus, costa et nervi foliae velutinae, stipulae dense pubescentes, pedunculi puberuli, bractae setosae.

Branchlets strongly velutinous-pubescent; petiole and under side of midribs and veins velutinous; stipules densely pubescent; peduncles up to 0.5 mm. long, puberulent, topped by a shallow cup formed by a pair of oblong-lanceolate bracts and their triangular stipules, these setose; in staminate plants this cup contains a small, subcapitate cluster of sessile flowers, these without calyx, the corollas somewhat glabrous outside, apparently (as nearly as can be determined from not fully developed buds) with a rather short tube and 5 blunt oblong lobes and 5 stamens with linear-oblong anthers; on pistillate plants the cup may bear 3 sessile or subsessile flowers, or 1 or more secondary peduncles, each bearing a cup with 3 flowers, the ovaries glabrous, less than 1 mm. long, calyx half to almost the length of the ovary, slightly spreading, pubescent, lobes unequal, one side usually longer than the other, irregular, making the calyx appear erose, ciliate, corolla 1.5-2 mm. long, tube shorter than the lanceolate blunt lobes, glabrous, stigmas glandular-puberulent, linear, 5-8 mm. long, coiling when dry.

Austral Islands: Raivavae, east slope of Mount Muanui, alt. 250 m., Aug. 8, 1934, *St. John 16035* (type); south side of Mount Taraia, alt. 250 m., Aug. 6, 1934, *St. John and Kondo 15995;* south side of saddle between Mount Turivao and Mount Muatapu, alt. 170 m., Aug. 11, 1934, *Fosberg 11780.*

Coprosma velutina Fosberg var. **Andersonii** Fosberg, n. var.

Ramuli petioli et nervi puberulentes, stipuli et cymi bracteaeque glabrati.

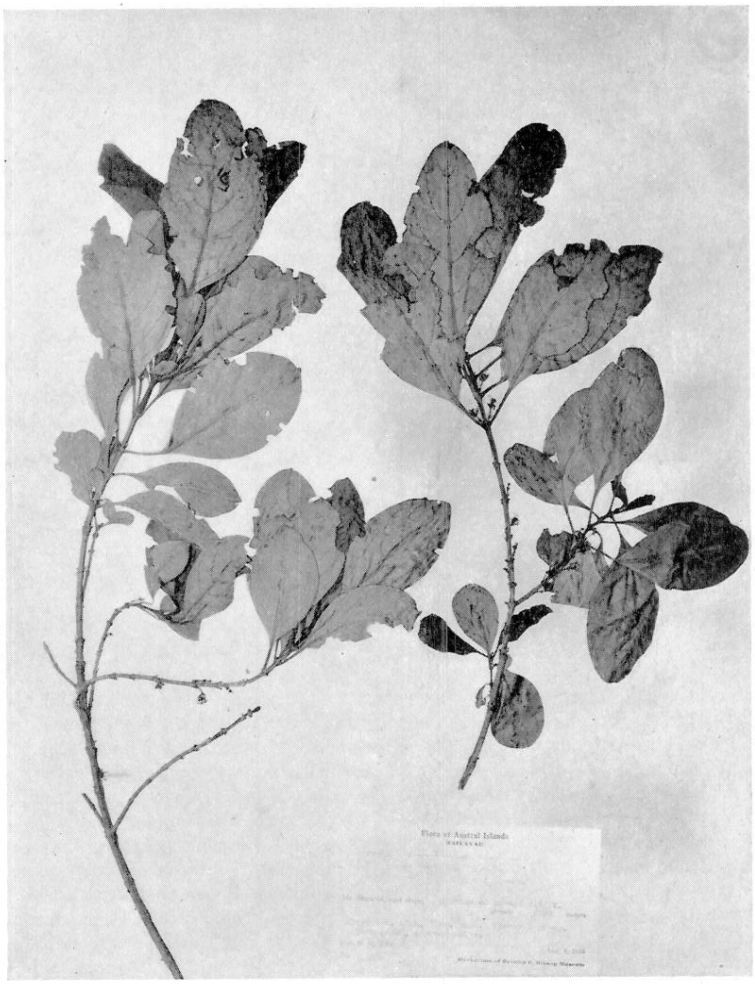

FIGURE 14.—*Coprosma velutina.*

Differing from var. *typica* in having puberulent branchlets, petioles and under sides of leaf veins; stipules glabrate; cymes, bracts, and inflorescence stipules glabrate; flowers unknown.

Austral Islands: Rurutu, 1.5 km. north of Avera, alt. 350 m., Aug. 25, 1934, *St. John and D. Anderson 16625* (type).

Named for Donald Anderson, Bishop Museum, one of the collectors of the type.

Coprosma rapensis F. Brown: B. P. Bishop Mus., Bull. **130**:316, 1935.

This species is, as Brown says, closest to *C. laevigata* Cheeseman of Rarotonga, and his statement of differences is, as far as it goes, correct, but the most important difference is not noted, the noticeably articulate stipules of *C. rapensis*.

Since much more material is now available and since Brown's description and figures are in certain particulars inaccurate, I am including a rather full description under var. *typica,* based on all the Rapa material available, including that used by Brown. Only material collected by the Mangarevan Expedition is cited.

Three varieties are known, from Rapa, Mangareva, and Pitcairn, which distribution is of considerable interest in the study of the geological and botanical history of southeastern Polynesia.

Coprosma rapensis F. Brown var. **typica** Fosberg, n. nom. (fig. 12, *c*).

Shrub or small tree up to 7 m. high, usually 2-3 m.; branchlets slender, somewhat 4-sided, papillose-puberulent, internodes 0.5-1.5 cm., rarely 2.5 cm. long; leaves glabrous, elliptic or elliptic-lanceolate to obovate or oblanceolate, apex acute to somewhat acuminate, base acute to somewhat attenuate, petiole 4-8 mm. long, slightly winged, blade chartaceous to subcoriaceous, up to 6 cm. long and 2 cm. broad, usually about 3 cm. long and 1 cm. broad, very variable in shape and texture, domatia variable, in some specimens large, in others small, in others absent, veins forming a fine network; stipules triangular-acuminate, glabrous, up to 2 mm. long, conspicuously articulate to the node, persistent on several nodes back of the apex of the stem; peduncles papillose puberulent, up to 6 mm. long, bearing at the top a pair of small lanceolate bracts 1-2 mm. long, and their stipules, and either several sessile flowers or one or more branches similar to the peduncle but shorter, bearing several sessile flowers; dioecious; staminate flowers with no calyx, corolla somewhat funnel-shaped, tube about 1 mm. long, lobes ovate-acute, 1 mm. long, filaments papillose-puberulent, 3-4 mm. long, anthers oblong, apiculate, 2 mm. long; pistillate flowers with ovary less than 1 mm. long, calyx about 0.5 mm. long, with sharp triangular-lanceolate teeth, corolla with tube 1 mm. long, lobes lanceolate, 1.5 mm. long, stigmas up to 8 mm. long; fruit orange-red, spherical to slightly flattened perpendicularly to the septum, so that the cross section may be circular or elliptical, 4-5 mm. in diameter.

Rapa: Peatuakaviri, west of Mount Tautautu, alt. 210 m., July 6, 1934, *St. John and Maireau 15407;* Mount Ruatara, alt. 100 m., July 9, 1934, *Fosberg 11465;* Oroi, Angairao Bay, alt. 150 m., July 9, 1934, *St. John and Maireau 15453;* Taratika, east side of Mount Perahu, alt. 400 m., July 15, 1934, *St. John and Maireau 15569;* Anarua Valley, southeast ridge of Mount Perahu, alt. 300 m., July 12, 1934, *Fosberg 11522, 11523;* west ridge of Morongota, alt. 240 m., July 20, 1934, *Fosberg 11600;* east slope of Mount Ruatara, alt. 70 m., July 9, 1934, *Fosberg 11472;* Maitua, cliffs of Mount Tautautu, alt. 210 m., July 11, 1934, *Fosberg 11490.*

Brown's figure (B. P. Bishop Mus., Bull. **130**:317, fig. 55, 1935) does not correctly represent the calyx of the pistillate flowers, not showing the prominent teeth; also the anthers in the staminate flowers are rather too small and the filaments too short.

Brown and Oliver both consider the leaves membranous, which is not correct, though in a few specimens, they might be considered thin-chartaceous. Oliver speaks of *C. laevigata* as agreeing with *C. rapensis* in the absence of domatia, though in his description he says that *C. rapensis* has domatia. Both statements are correct as the domatia vary from conspicuous to none at all.

Coprosma rapensis F. Brown var. **benefica** (Oliver) Fosberg, n. comb.

Coprosma benefica W. R. B. Oliver: B. P. Bishop Mus., Bull. **132**:137, 1935.

Very close to *C. rapensis* var. *typica,* differing in having the branchlets, stipules, under sides of the midribs of the leaves, and the inflorescence hirtellous, in the thinner, sometimes larger leaves with minutely ciliolate margins, in the larger, blunter bracts, and in the more hairy stigmas, all of which characters vary considerably. In fact, one collection (*Fosberg 11267½*) can scarcely be told from var. *typica,* differing only in that the inflorescence is a trifle more hairy.

Pitcairn Island: hills above Adamstown, June 14, 1934, *Fosberg and Christian 11267½;* Middle Hill, alt. 220 m., June 14, 1934, *Fosberg and Clark 11313; 11317;* Parlver Valley ridge, alt. 250 m., June 13, 1934, *St. John 14984;* Outer Valley, alt. 200 m., June 14, 1934, *Fosberg and Clark 11301;* The Rope, alt. 200 m., June 14, 1934, *St. John 15004.*

Coprosma rapensis F. Brown var. **mangarevica** Fosberg, n. var. (fig. 12, *d*).

Ramuli elongati graciles teretes, folia membranacea ciliolata, petioli sparse pilosuli, costae infra sparse pilosulae, stipuli breves.

Differing from var. *typica* in the much more elongate, slender, nearly terete branchlets, longer internodes, leaves truly membranous, much more broadly elliptical, with ciliolate margins and sparsely pilosulous petiole and under side of midrib, and in the very short stipules which are not so markedly articulate.

Mangareva (Gambier) Islands: Mangareva, south side of Mount Mokoto, alt. 320 m., June 4, 1934, *St. John 14875* (type); same locality, alt. 350 m., June 3, 1934, *St. John and D. Anderson 14865;* same locality, alt. 340 m., June 2, 1934, *St. John and D. Anderson 14842.*

Unfortunately the material of this variety is all sterile. With fertile material it may well prove to be a distinct species, though the characters evident in the sterile specimens do not justify separation. The hairiness is somewhat variable.

This variety is almost extinct, persisting only in one tiny patch of woods on a steep cliff.

Coprosma Cookei Fosberg, n. sp. (figs. 12, *e*; 15).

Ramuli glabri, internodi brevi, folia subcoriacea ovato-lanceolata, apex longe acuminata, basis acuto-attenuata, stipuli connati vaginati, imperfecte dioica, cymi subcapitati laterales, florae staminatae sine calycibus, stamini 8-12, antheres ovato-cordati vel ovato-oblongi, calyces florae pistillatae breves, lobae 4-5 linearae inaequalae, stigmatae 2 carnosae pubescentes.

Shrub or small tree up to 4 m. tall; branchlets glabrous, rather slender, square to subterete, internodes short, usually about 1 cm. long, nodes prominent on young branchlets; leaves glabrous, subcoriaceous, ovate-lanceolate, apex long-acuminate, base acute-attenuate into a petiole up to 1.5 cm. long, usually 1 cm. or less, winged above, blade up to 2 cm. wide and 6 cm. long, usually about 1 cm. wide and 4 cm. long, midrib and secondary veins prominent, secondaries subopposite to alternate, network fine and distinct, domatia prominent; stipules connate into a tubular sheath 8-15 mm. long, splitting and caducous as leaves and inflorescences enlarge, free portion acuminate, long-mucronate, 3-8 mm. long; incompletely dioecious; inflorescences, both staminate and pistillate, subcapitulate on slightly flattened axillary peduncles up to 1 cm. long, two at a node, with sometimes a reduced pistillate one extra in staminate plants, each peduncle surmounted by a pair of small oblanceolate bracts, and a stipular sheath so expanded as to form a bowl-shaped involucre, this bearing either 1-3 (or more) shortly pedunculate, 3-flowered cymules of pistillate flowers, or several sessile to shortly pedicellate staminate flowers, each subtended by a reduced pair of bracts and their stipules giving the appearance of a calyx, and suggesting that each flower represents a separate cymule, corresponding to those of the pistillate flowers; staminate flowers without calyx, corolla cup-shaped, tube about 2 mm. long, lobes oblong-lanceolate, blunt-acute, 2 mm. long, 1 mm. or less wide, 6-8 in number, stamens 8-12 or more attached in a mass at base of corolla tube, some poorly developed, others obviously the result of fusion of two, normal filaments up to 8 mm. long, anthers ovate-cordate to

ovate-oblong with cordate base, mucronate at apex, about 2 mm. long, 1 mm. wide, pendent; peduncles of pistillate cymules 2-5 mm. long, central one usually about twice the length of the lateral ones, the three flowers at the top of each subtended by a much reduced ring or involucel of two bractlets and stipules, similar to that subtending each individual staminate flower, flowers sessile or very shortly pedicellate, ovary 1.5 mm. long, 0.7 mm. thick, calyx tube very short, only a ring bearing 4-6 linear strongly unequal lobes 0.5-1.5 mm. long, 0.15-0.2 mm. wide, blunt, corolla funnel-shaped, 3.5-4 mm. long, lobes 4 equaling tube, spreading but not reflexed, linear-oblong, blunt; pistil of two elongate

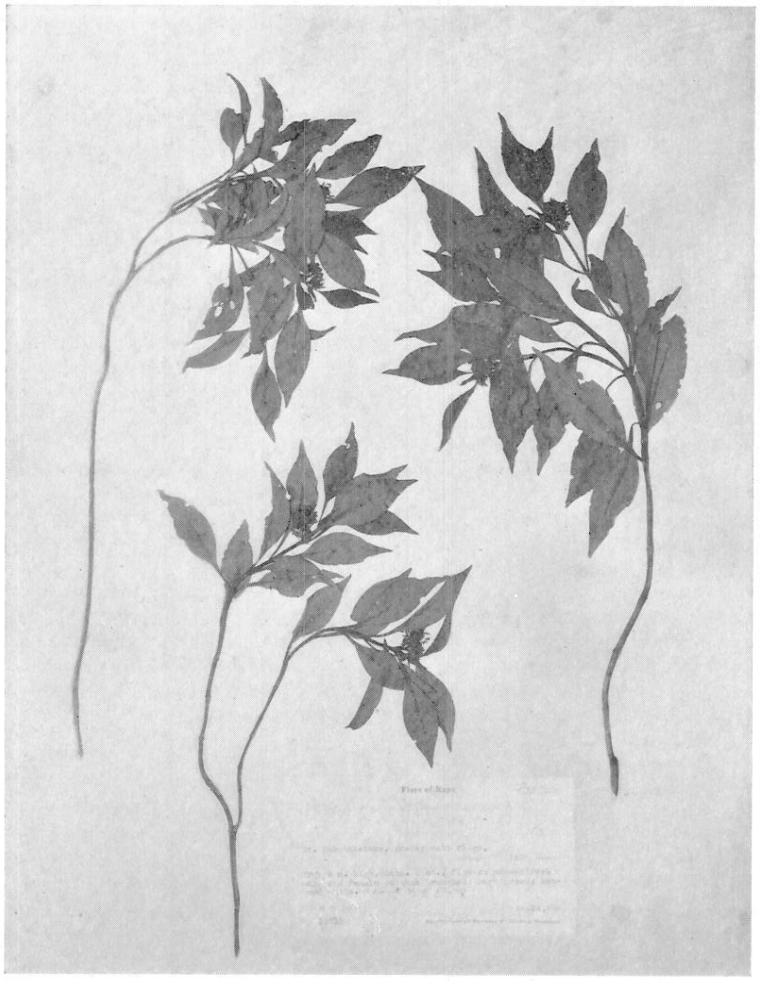

FIGURE 15.—*Coprosma Cookei.*

cylindrical, fleshy, pubescent stigmas, up to 1 cm. long and 0.4 cm. thick, united only at the very base, whitish-translucent; fruit not available.

Rapa: Taratika, east side of Mount Perahu, alt. 350 m., July 21, 1934, *St. John, Fosberg, and Maireau 15674;* Maitua cliffs, base of Mount Tautautu, alt. 220 m., July 11, 1934, *Fosberg 11494, 11495;* cliffs and slopes above Area, alt. 100 m., July 3, 1934, *Fosberg 11373;* Mount Pukutaketake, alt. 340 m., July 24, 1934, *St. John 15712* (type); Area, alt. 90 m., July 3, 1934, *St. John and Maireau 15351;* Hiri Valley, south slope of Morongota, alt. 200 m., July 20, 1934, *Fosberg 11597.*

This species is dedicated to Dr. C. Montague Cooke, Jr., of Bishop Museum, leader of the Mangarevan Expedition, to whose intelligent and friendly direction may be attributed in large measure the remarkable success of the expedition.

Coprosma Cookei seems related to *C. acutifolia* of the Kermadec Islands, though in many ways it suggests the *C. longifolia* group of the Hawaiian islands. This latter resemblance, however, may be a case of parallel development, rather than actual relationship. From *C. acutifolia* it differs only in details of the flower and inflorescence, the vegetative parts being similar except for the somewhat longer petioles and much longer stipular sheath. The staminate flowers differ in the lack of a calyx and in the peculiar multiplicity of flower parts. The pistillate inflorescence is identical, but the flowers differ in the much longer calyx lobes and more funnel-shaped corolla with the lobes not reflexed. *C. Cookei* is apparently not at all related to any other southeastern Polynesian species.

The incompletely dioecious condition and the multiplicity of staminate corolla lobes and of stamens, part of the latter being variously fused and poorly developed, suggest a very peculiar genetic situation in this species.

MORINDA

Morinda Forsteri Seem.: Fl. Vit., 129, 1866.

Morinda umbellata var. . . . . of Gray: Am. Acad., Proc., 4:41, 1860.

Usually a woody vine, but certain specimens are recorded as shrubs; leaves usually subcoriaceous, usually slightly revolute at margin, varying in shape, but usually oblong or oblong-lanceolate, apex round to strongly acuminate; heads axillary on slender peduncles and in a terminal umbel, the heads varying greatly in size and number of flowers; flowers varying in color, outside greenish or

whitish to pink or dull red, inside white or cream to greenish yellow, glabrous or only slightly bearded in throat; fruit reddish purple.

Pitcairn Island: St. Pauls Valley, alt. 220 m., June 14, 1934, *St. John 15013.*

Henderson Island: north end, alt. 33 m., June 17, 1934, *St. John and Fosberg 15074;* north center, alt. 30 m., June 20, 1934, *St. John and Fosberg 15161.*

Austral Islands. Raivavae: northwest side of Pic Rouge, alt. 130 m., Aug. 5, 1934, *St. John and Fosberg 15960.* Rurutu: Mato Naa, alt. 75 m., Aug. 24, 1934, *St. John and Fosberg 16557;* 1.5 km. north of Avera, alt. 320 m., Aug. 25, 1934, *St. John and D. Anderson 16626;* north side of Moerai, alt. 15 m., Aug. 25, 1934, *St. John 16633.*

Society Islands. Raiatea, Temihani Plateau, alt. 600 m., Oct. 5, 1934, *St. John 17251;* Tahaa, east ridge of Mount Purauti, alt. 450 m., Oct. 11, 1934, *St. John 17389;* Huahine, Huahine Nui, north ridge of Mount Matoereere, alt. 400 m., Oct. 1, 1934, *St. John 17173.*

Though this species is close to *M. umbellata* L., it seems to differ sufficiently in the glabrous or almost glabrous corolla throat and in the reddish purple fruit. Its range, both geographical and altitudinal is very wide. It extends from Fiji and Tonga to the Marquesas, Henderson, and Pitcairn, and from practically sea level on coral limestone in Henderson and the Austral Islands to the high open bogs on Temihani plateau, Raiatea, and probably much higher in Fiji and Tahiti.

Morinda citrifolia L.: Species Plantarum, 176, 1753.

Tuamotu Archipelago. Anaa: Tukuhora, alt. 1 m., May 13, 1934, *St. John 14299.* Tepoto: alt. 1 m., May 16, 1934, *St. John 14342.*

Mangareva (Gambier) Islands. Mangareva: Rikitea, alt. 50 m., May 23, 1934, *St. John 14466;* Aukena, Point Mata Kuiti, alt. 10 m., May 28, 1934, *St. John 14628;* north side of Akamaru, alt. 3 m., May 29, 1934, *St. John 14713;* northeast end of Taravai, alt. 6 m., June 1, 1934, *St. John 14820;* west side of Agakauitai, alt. 5 m., June 8, 1934, *St. John 14939.*

Timoe (Crescent) Island: North Islet, June 25, 1934, *St. John and Fosberg 15213.*

Pitcairn Island, hills above Adamstown, alt. 100 m., June 14, 1934, *Fosberg 11266.*

Austral Islands. Raivavae: Vaiuru, alt. 3 m., Aug. 10, 1934, *Fosberg 11741.* Tubuai: Tapapatauai Islet, alt. 1 m., Aug. 19, 1934, *St. John 16412;* Mataura, alt. 5 m., Aug. 15, 1934, *St. John and Fosberg*

16281. Rurutu: hills northwest of Moerai, alt. 15 m., Aug. 24, 1934, *St. John and Fosberg 16589*. Rimatara: Anapoto, alt. 3 m., Sept. 4, 1934, *St. John and Fosberg 16874*. Maria: southwest islet, alt. 3 m., Sept. 6, 1934, *Fosberg 12115;* northeast islet, alt. 2 m., Sept. 6, 1934, *St. John 16962*.

Society Islands. Meetia: Fatia-po to Fareura, alt. 100 m., May 12, 1934, *St. John 14235*. Raiatea: Tetaro Islet, alt. 1 m., Oct. 4, 1934, *St. John and S. G. Wight 17215*.

Flint Island, copra plantation, alt. 2 m., Oct. 16, 1934, *St. John and Fosberg 17450*.

Usually found near present or former human habitations, this widespread plant is generally considered to have been introduced into Polynesia by the Polynesians in prehistoric times, and is still used extensively by them in medical practice.

Native names: *hora* on Anaa and Tepoto; *nonu* on Mangareva and many other islands.

Considerable variation is evident in the size and shape of the leaves, varying from broadly ovate or elliptical to broadly lanceolate. The length of the petiole varies some, also, as does the length of the peduncle, and the size and shape of the mature fruit.

BORRERIA

Borreria laevis (Lam.) Griseb.: Goett. Abh., **7**:231, 1857.

Spermococe laevis Lam.: Tab. Encycl. Meth. Bot., **1**:273, 1791.

Fanning Island: English Harbor, alt. 1 m., April 23, 1934, *St. John and Fosberg 14115*.

This weed species is evidently a comparatively recent arrival. Its recent occurrence in a number of widely separated islands in the western Pacific has been noted by Merrill (Philipp. Jour. Sci., **60**:34, 1936). It is generally considered to be a native of tropical America (fide Standley) but probably arrived in Fanning from some place farther west in the Pacific such as Samoa or Fiji where it is known. Determined by Dr. Paul Standley and Dr. E. D. Merrill.