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Some New Hawaiian Lobelioids

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INTRODUCTION

Thirty-eight years have passed since I described my last new lobelioid of the Hawaiian Islands in "A monographic study of the Hawaiian species of the tribe Lobelioideae, family Campanulaceae" [B. P. Bishop Mus., Mem. 7 (2) : 5-394, 1919]. Since then quite a number of new species have been described, of which some have been relegated to synonymy.

With the opening up of the country, especially during World War II when the army cut jeep roads into the hills, it has been possible to visit areas formerly accessible only with great difficulty; and thus new species have been brought to light. Quite a number of old species have become extinct, owing to the inroads of civilization, and in time the present new species will join those now known solely as dried corpses in the herbaria, till finally only those will have survived which cling to inaccessible precipices where neither man nor beast can reach them.

It was in the areas recently made accessible that I was privileged to botanize, and there found a number of new plants belonging, among others, to the Lobelioideae which are here described for the first time. This group of plants forms one of the most interesting components of the flora of the Hawaiian Islands, now with well over 200 recognized species, varieties, and forms.

While spending part of the winter of 1953-1954 on east Maui, I visited my old haunts on the Waikamoi Ditch trail in company with

Mr. R. P. Bruce who kindly took me to a then recently opened tract situated 1,000 feet below the main ditch trail; and there we found a new species of *Cyanea*, as well as a yellow-flowered species recorded previously only from Hawaii.

During the winter of 1955-1956 I made excursions to Kauai and Hawaii and there, again, I was privileged to find several new species and one variety belonging to my favorite group, the Lobelioideae. I hope that the numerous botanists now in Hawaii will find the time and the inclination to explore these newly opened areas and make known to the world any new plants before it is too late to save them for the botanical morgue, the herbarium, for certain newcomers to Hawaii express themselves as indifferent to our rich flora being supplanted by foreign weeds.

During my present visit to the Islands, 1956-1957, three new species of *Cyanea* were discovered on the uplands of the island of Hawaii in the dense rain forest on the slopes of Mauna Loa.

Furthermore, while determining unidentified Lobelioideae in Bishop Museum, I found four undescribed species, three new varieties, and one new form of the genus *Cyanea* and two new varieties of *Clermontia*.

SYSTEMATICS

***Clermontia loyana*, spec. nov. (fig. 1).**

Arbor 3-4 m. alta, foliorum lamina oblongo lanceolata, apice acuta, basi decurrentia, supra glabra, nitida, nervus medianus et nervi secundarii prominentes, puberuli, subtus purpurascens nitida, margine undulata, irregulariter callose-denticulata; petioli 1-4 cm. longi; pedunculi crassi, in axillis foliorum, 2-3 cm. longi, bracteati; pedicelli in medio vel ad basin bibracteolati; lobi calycis primo connati et corollam includentes, postea lobi calycis quam corolla 2-3 cm. brevior, maturitate cum corolla decedentes; corolla virenti-purpurea; fructus ignotus.

Tree 3-4 m. tall, branching candelabra-like, trunk 10 cm. in diameter; leaves lanceolate oblong, dark green shining above, glabrous with impressed nerves, purplish iridescent, glossy beneath, puberulous along the prominent midrib and nerves, margin undulate, irregularly denticulate with callous teeth, 10-22 cm. long, 2-4 cm. wide, acute at the apex, decurrent at the base; petiole 1-4 cm. long; inflorescence axillary, usually 2-flowered; peduncle thick fleshy, 2-3 cm. long, puberulous, bracteate near the apex with triangular acuminate bracts 2-4 cm. long, pedicel shorter than the peduncle, 1.5-2 cm. long, bibracteolate about the middle or at the base of the calyx; calyx thick, flattened, with a thick prominent dorsal ridge, and 10 distinct, dark-green ridges which merge into the thickened pedicel, 2.5 cm. in diameter, dark purplish red in the upper two-thirds, puberulous throughout; calycine lobes connate, as long as and enclosing the corolla when half mature, but half as long as the corolla at anthesis, 2-3 cm. long, 10-12 mm. broad at the base, dark green, with distinct midrib, bluntly acute



FIGURE 1.—*Clermontia loyana*.

at the apex, the two lower lobes connate to the middle, the upper connate to within one-fifth of the base where they are separated by oblong sinuses, caducous with the corolla; corolla emerald green, purplish red toward the apex, puberulous throughout, slightly curved, 5 cm. long, 2 cm. broad, petals connate from base to apex except one which is completely free; staminal column purple, 6-6.5 cm. long, glossy, glabrous; anthers 1.5 cm. long, the two lower penicillate with long white hair; style pale green, glabrous, the broad stigmatic lobes with a ring of white hair beneath; fruit unknown, probably purplish red and ribbed.

Hawaii: Southern slopes of Mauna Loa, South Kona, between Komakawai and Kaunene on the McCandless Ranch, at an altitude of 6,000 feet, on the grassy uplands with *Acacia koa hawaiiensis*, *Myoporum sandwicense*, *Coprosma*, and others, March 14, 1956, type *Rock 25651* in Bishop Museum. Collected in company with A. Lester Marks, Robert Trent, and K. Isenberg.

This species is named in honor of Mrs. A. Lester (Loy) Marks of Honolulu, Hawaii, an ardent lover and grower of plants, who is especially interested in the preservation of Hawaiian plants.

This is the only *Clermontia* in which the calyx encloses the corolla before anthesis but permits the corolla to push through, leaving calycine lobes half the length of the corolla; both, however, drop off after flowering, as in all *Clermontiae Genuinae*. It does not, therefore, fit into either section of the genus as now constituted.

At 6,200 feet, or 200 feet above this extraordinary species, in the same locality grows *Clermontia rockiana* E. Wimmer, a tree about 15 feet tall. Outwardly *C. loyana* resembles that species, but it differs in the curious corolla.

It would be interesting to make a thorough study of the various *Clermontia* growing in the region from altitudes of 1,500 feet to 6,200 feet. The first to be encountered is the recently described form of *C. caerulea* Hbd. forma *flavescens* E. Wimmer, with pale greenish-yellow flowers and small dentiform calycine teeth; at about 5,000 feet the new variety *parvifolia* of the same species makes its appearance in considerable numbers, nearly all epiphytic on tree ferns; at 6,000 feet the extraordinary *C. loyana* occurs in isolated specimens; whereas at 6,200 feet, near Komakawai, *C. rockiana* E. Wimmer has its home. Next to the now extinct *C. haleakalensis* Rock, which grew at 7,000 feet on Haleakala, this is the highest altitude at which a *Clermontia* has been found. Not a single species of *Cyanea* was observed in the region, but their absence may be due to the ravages of cattle and wild pigs.

Clermontia caerulea Hbd. var. **parvifolia**, var. nov. (fig. 2).

Frutex epiphyticus, ramosus, 1-1.5 m. altus; folia chartacea, oblongo-lanceolata, 6-8 cm. longa, 1.5-2 cm. lata, virescenti-purpurea; pedunculi circa 3 cm. longi; corolla luteo-virens, 3-3.5 cm. longa, 8-10 mm. lata; fructus ignotus.

A small epiphytic shrub, 1-1.5 m. tall, purplish throughout, branches slender, curved candelabra-like; leaves oblong lanceolate, chartaceous, dark green with purplish tinge, 6-8 cm. long, 1.5-2 cm. wide, bluntly acute at the apex, cuneate at the base on purple petioles of 1.5-2 cm., corolla pale yellowish green, 3-3.5 cm. long, 8-10 mm. broad, on peduncles up to 3 cm.; fruit unknown.

Hawaii: South Kona, on the land of Kealia 2, altitude 5,000 feet, March 14, 1956, type *Rock 25650* in Bishop Museum. Collected in company with A. Lester Marks, Robert Trent, and K. Isenberg.

This variety is a miniature of *Clermontia caerulea* Hbd. and is purplish throughout except the corolla, which is like that in forma *flavescens* E. Wimmer. It is quite common in the region but has been observed only as an epiphyte.

Clermontia clermontioides (Gaud.) Heller var. **hirsutiflora**, var. nov.

Arbor 5 m. alta, folia ovato-oblonga, 8-17.5 cm. longa, 3-5.5 cm. lata, apice acuminata, basi acuta, petiolo 3-6 cm. longo; pedunculi 1 cm. longi, hirsuti; pedicelli eadem longitudine, hirsuti; hypanthium hirsutum, obconicum vel oblongum; lobi calycis triangularis; corolla arcuata, hirsuta, 3-3.5 cm. longa, 4-7 mm. lata; bacca ignota.

Shrub or small tree up to 5 m. tall, the leaves ovate-oblong, 8-17.5 cm. long, 3-5.5 cm. broad, shortly acuminate at the apex, acute at the base, glabrous on both sides, dark green, shining above, paler beneath; peduncles and pedicels hirsute as in the hypanthium and corolla, the latter pale purplish.

Kauai: Pole-line trail, altitude 1,200 feet, January 31, 1920, type *Rock 17244* in Bishop Museum.

This variety differs from the species in the hirsute inflorescence and in the smaller hirsute corolla.

Clermontia leptoclada var. **urceolata** Rock, var. nov.

Frutex ramosus, 3-5 m. altus; folia oblongo-lanceolata, margine serrulata, 10-14 cm. longa, 2.5-3 cm. lata; petiolus 4-5 cm. longus, glaber vel plus minus puberulus; pedunculus 2-floriferi, 10-12 mm. longus, medio bibracteatus; pedicelli 1.5 cm. longi, glabrati; supra medio bibracteolati; hypanthium glabrum, urceolatum, lobi calycis extus viridi, intus purpurei, glabri, tam longi quam corolla; corolla purpurea, 2.5-3 cm. longa; stamina glabra, purpurascens; bacca aurantiaca, urceolata.

Shrub 3-5 m. tall, terrestrial, more often epiphytic, branching candelabra-like; leaves oblong lanceolate, bluntly acuminate at the apex, acute at the base, the margins serrulate, dark green, glossy above, without any purplish venation on margins, 10-14 cm. long, 2.5-3 cm. wide, paler beneath, the pale midrib slightly puberulous; petiole 4-5 cm. long, glabrous or minutely puberulous; peduncles 2-



FIGURE 2.—*Clermontia caerulea* var. *parvifolia*.

flowered, 10-12 mm. long, bibracteate at the middle and at the apex with two long, subulate, hirtellous, dark bracts, 5-6 mm. long; pedicels 1.5 cm. long, glabrous, pale green, bibracteolate above the middle, hypanthium glabrous, urceolate, green, 14 mm. high, 12 mm. broad at apex, constricted in the middle; calyx lobes green, purplish inside, glabrous, as long as the corolla, 2.5-3 cm. long; corolla purple, greenish at the base, puberulous with white hairs, the dorsal slit extending to half the length of the corolla; staminal column glabrous, purple, paler in the lower half; anthers dark purple, glabrous; pistil pale green, glabrous; stigmatic lobes very short, broadly conical; fruit urceolate (remining one of the shape of the constricted capsule of *Eucalyptus globulus*), constricted below the rim, glabrous, 16-20 mm. long, 15 mm. broad at the base, the circular upper rim 1 cm. in diameter and 3 mm. deep; seeds dark brown, shining.

Hawaii: Kohala Mountains, Parker Ranch, along Kahena Ditch trail, altitude 3,000 feet, in dense forest, flowering, March 20, 1957, type *Rock 25737* in Bishop Museum. Collected in company with W. K. Sproat, manager of Kohala Ditch.

This variety differs from the species in the glabrous peduncle (not hirsute as in the species), in the urceolate hypanthium, in the glabrous anthers, and in the urceolate fruits crowned by a distinct rim which is 3 mm. high.

***Clermontia waimeae* var. *obovata* Rock, var. nov.**

Folia obovato-oblonga, 5.5-11 cm. longa, 3-4 cm. lata, apice rotundata-subacuta, margine crenulata, utrinque glabrata; petiolus 10-20 mm. longus; pedunculus hirsutus, 10 mm. longus, 2-floriferi; pedicelli 5.7 mm. longi; hypanthium oblongo-turbinatum, puberulum, 10 mm. altum; lobi calycis triangulari, acuminati, sinus intereos rotundati, 7 mm. longi, 3 mm. lati; corolla basi luteo-alba, supra atro-purpurea, 4 cm. longa, 8 mm. lata, hirsuta; bacca ignota.

A tree 8 m. tall, leaves obovate-oblong, 5.5-11 cm. long, 3-4 cm. broad, bluntly acute at the apex, acute at the base, margin crenulate, glabrous on both sides except for a few scattered white hairs along the midrib below; petiole 10-20 mm. long; peduncle hirsute, 10 mm. long, 2-flowered; pedicels 5-7 mm.; calyx oblong to turbinate, 10 mm. high, puberulous, the calycine teeth separated by broad sinuses, triangular, puberulous, 7 mm. long, the base broad, apex long acuminate; corolla yellowish white below, above deep purple, lobes cleft half way to base, 32-40 mm. long, 8 mm. broad, hirtellous, fruit unknown.

Hawaii: Kohala Mountains, Puu Ahia, Kawaihae, in wet forest, 4,800 feet altitude, flowering, January 2, 1932, type *H. St. John and E. Y. Hosaka 11500* in Bishop Museum.

This is one of the many but more distinct forms of *Clermontia waimeae*. It differs from the species in the obovate-oblong leaves, which are similar in shape to those of var. *longispala*, but longer; in the shorter calycine lobes, which are separated by broad, rounded, sinuses, and in the shorter and larger corolla.

***Clermontia waimeae* var. *longisepala* Rock, var. nov.**

Frutex 2-3 m.; folia obovata, 5-9 cm. longa, 3-5.5 cm. lata, chartacea, supra glabra, subtus puberula; margine crenulata-denticulata; pedunculus 10-12 cm. longus, hirsutus, 2-3-4-floriferus; pedicelli hirsuti, 10 mm. longi; hypanthium obconico-turbinatum, 10-12 mm. longum, 9-10 mm. latum; lobi calycis lineares-lanceolati, 18-20 mm. longi, 1-2 mm. lati, hirsuti; corolla 25-30 mm. longa, 6-8 mm. lata, hirsuta, purpurea antherarum tubus glabrus; stamina subglabra; bacca (?).

Shrub 2-3 m. high; leaves obovate, 5-9 cm. long, 3-5.5 cm. broad, chartaceous, glabrous above, puberulous beneath, crenulate-denticulate, apex rounded or bluntly acute, acute at the base, on petioles of 15-20 mm., puberulous; peduncle 10-12 mm. long, hirsute, 2-3-4-flowered; pedicel hirsute, 10 mm. long; hypanthium obconical or turbinate, 10-12 mm. long, 9-10 mm. broad at the apex, hirsute; calycine lobes linear-lanceolate, 18-20 mm. long, 1-2 mm. wide, two-thirds the length of the corolla; corolla 25-30 mm. long, hirsute; staminal column glabrous; anthers with scattered white hairs along the sutures; style glabrous; stigmas deeply divided into two conical, acute, lobes; fruit unknown, probably a turbinate-oblong yellow berry.

Hawaii: Mountains back of Waimea, altitude 2,500 feet, in rain forest, July 1910, type *Rock 25671* in Bishop Museum.

This variety is intermediate between *Clermontia parviflora* and *C. waimeae*. It differs from the latter in the obovate leaves, which are rounded at the top or very bluntly acute, and in the long sepals, which, however, do not at any time enclose the corolla, as is the case of *C. parviflora*; the flowers are twice as large as in *C. parviflora*. It differs from *C. parviflora* var. *calycina* in the 3-4 times longer calycine teeth.

C. parviflora grows at lower altitudes than *C. waimeae*, which appears constant except that the color of the corolla varies. In some, the calyx is green and the corolla purple, or the calyx is purplish on one side and the corolla green. As I have already remarked in my monograph, *C. parviflora* is a variable species and undoubtedly still in evolution. Hybridization must take place, for they do not grow far apart, which accounts for these varieties. For example, *C. parviflora* var. *calycina* is more like the species, except for the short calycine teeth. The same holds true for *C. waimeae* var. *longisepala* which has leaves more like some forms of *C. parviflora*; but the calycine lobes are shorter than the corolla. They are all closely related. In *C. waimeae*, however, the leaves are glabrous, subcoriaceous, elliptical-lanceolate, acute at both ends. It might be better to bring *C. parviflora* var. *calycina* to *C. waimeae* as a variety than to *C. parviflora*, although it has the aspect of the latter.

Clermontia hawaiiensis (Hbd.) Rock var. **grandis** Rock, var. nov.

Arbor vel frutex 5-6 m. altus; folia obovato-oblonga, 22-24 cm. longa, 5-8.5 cm. lata, apice acuta, ad basin angustata in petiolum crassum, 4-6 cm. longum, margine denticulata, supra nitida, glabra, subtus pallida, dense pubescentia; pedunculus crassus, 2.5-3 cm. longus, viride-albido pubescentia; pedicelli crassi, 2 cm. longi, infra apicem bibracteolati; hypanthium luteo-viride, turbinatum, 10-costatum, 20 mm. altum, 20-22 mm. latum, puberulum; lobi calycis longior quam corolla, viridi, 8-8.5 cm. longi, 5-6 mm. lati, puberuli; corolla 7-9.5 cm. longa, pallide-viridis; tubus staminum albus, glaber, 5 cm. longus; antherae albae, glabrae, 2 inferiores penicillatae; fructus ignotus.

Tree or shrub 5-6 m. high; leaves dark green above, glabrous, glossy, pale green beneath, densely pubescent, especially along midrib and veins, with white hairs, 22-24 cm. long, 5-8.5 cm. wide, acute at the apex, acuminate at the base, merging into a thick, fleshy, terete petiole; peduncle green and pubescent, thick, fleshy, 2.5-3 cm. long; pedicels 2 cm. long, bibracteolate below the apex; bracteoles subulate, 8 mm. long; hypanthium turbinate, greenish yellow, with 10 darker green depressions, 2 cm. high, 20-22 mm. broad at the apex, puberulous; calycine lobes longer than the corolla, 8-8.5 cm. long, 5-6 mm. broad, green, puberulous outside, whitish glabrous inside; corolla 7-9.5 cm. long, pale green, puberulous, staminal column white, glabrous, 5 cm. long; anthers white, glabrous, the lower only penicillate, 18 mm. long; fruit unknown.

Hawaii: Northeastern slope of Mauna Kea, above Onomea, in Puakala Paddock 1, Papaikou, in *Metrosideros* forest, altitude 5,400-6,000 feet, March 1957, Thomas Lindsey, *Rock 25768*, in bud only, in Bishop Museum; 2 miles west of Puu Oo Ranch, altitude 6,000 feet, April 5, 1957, Mrs. W. J. Stephens, type in Bishop Museum; Shipman Ranch, Makahanaloa Section, altitude 5,800 feet, April 7, 1957, Mrs. W. J. Stephens, specimen sent to me in Seattle but not preserved.

This variety is much larger in every respect than the species. The leaves show no purplish tints or purplish veins, are perfectly flat and not undulate, are dark green, and are densely pubescent beneath. The flowers are the largest of any *Clermontia* known. The corolla is half again as large as in the species and is pale green with neither whitish nor purplish tint. The staminal column and anthers are dull white and perfectly glabrous. The plant has more the aspect of *Clermontia kakeana*, especially in the inflorescence; but the latter is half the size of the new variety, which has the 10 depressions of the hypanthium in common with *C. hawaiiensis*.

For the material which served for the description, I am indebted to Mrs. W. J. Stephens of Hawaii.

Cyanea mceldowneyi, spec. nov.

Caulis simplex, 2-3 m. alta, armata; folia ovato-oblonga, 17-27 cm. longa, 6-8 cm. lata, irregulariter crenato-dentata, glabra, supra aculeis luteis, subtus

atro-purpureis munita; petiolus aculeatus 15-55 mm. longus; pedunculus 15-25 mm., crassus, armatus; pedicelli 10 mm. longi, hirsuti; hypanthium ovatum; lobi calycis late oblongi, obtusi; flores et baccae ignotae.

Densely armed plant; stem simple 2-3 m. high, armed with yellow spines to near the apex, less so in mature plants. Young plants and leaves densely armed; leaves ovate oblong, 17-27 cm. long, 6-8 cm. broad, armed with yellow spines on the upper, with purple spines on the lower, surface, mature leaves almost unarmed; petioles of young leaves bristling with spines, of mature leaves, unarmed, 15-55 mm. long; peduncle 15-25 mm. long, armed with yellow spines; pedicels hirsute, 10 mm. long; hypanthium ovate, the calycine lobes broadly oblong 1-3-nerved, obtuse subglabrous; flowers and fruits unknown.

East Maui: Northern slopes of Haleakala, west of Waikamoi in rain forest, February 2, 1954, type *Rock 25610* in Bishop Museum (without flower or fruit) Honomanu Gulch, May 1911, *Rock 8796* in Bishop Museum. Named for Mr. George McEldowney of Kula, Maui.

This species is related to *C. rollandioides* Rock, from which it differs in the very short armed peduncle and hirsute pedicels, in the absence of foliaceous bracts, and in the broadly oblong calycine lobes. It belongs to the Section *Cyaneae Genuinae*.

***Cyanea shipmanii*, spec. nov. (figs. 3, 4).**

Truncus robustus, 3-4 m. altus; folia pinnatifida, non nitentia, supra viridia, subtus purpurea, pinnae lobatae; racemi in axillis foliorum, pedunculi 2.5-3 cm. longi, pedicelli 1 cm. longi, calyx turbinatus, lobi oblongi, purpurei, corolla albo-lutea.

A small tree with stout muricate solid stem, 3-4 m. tall, branching from the base, especially when injured, young plants densely muricate throughout with pale straw-colored, conical, sharp spines, otherwise purple; foliate at the apex forming a loose crown; leaves pinnate, dark green above, dull, purple beneath, veins impressed above, purplish with few scattered whitish short hairs, leaf blade obovate in outline, obtuse, broadest at the middle, up to 30 cm. long, 13-14 cm. broad, veins prominent beneath, pubescent with gray hair, pinnae lobed or incised half way to midrib, the lobes rounded, the terminal segment 4-5-lobed or irregularly notched; midrib thick, round, grayish pubescent, petiole 2.5-5.5 cm. long, distantly tuberculate; inflorescence a grayish pubescent raceme up to 15-flowered; peduncle 2.5-3 cm. long, dull reddish brown with short red bracts; pedicels 1 cm. or more long; calyx green, the ovarian portion turbinate with impressed veins extending to below the lobes; sepals oblong, longer than the calyx, purple; corolla 4-4.5 cm. long, slit for 2 cm. only, all petals united at the tip, slightly ribbed and finely muricate, pale greenish white, apex yellow, 3 mm. broad, slightly more so at the base; staminal column white, pubescent; anthers bluish white, densely pubescent with soft long white hair, only the two lower anthers penicillate with long white hair; style completely enclosed in the staminal column, glabrous, pale green except the thickened upper part purple, stigmatic lobes broadly deltoid, pale green, surrounded at the base with a complete ring of white hair; ovary glabrous; immature fruit truncate



FIGURE 3.—*Cyanea shipmanii*.

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at the apex, 8-9 mm. long, 6 mm. wide with a distinct rim which protrudes above the base of the sepals, top depressed, purple, crowned by the base of the style.

Hawaii: Northeastern slopes of Mauna Kea, above Onomea, in Puakala Paddock 1, Papaikou, in *Metrosideros* forest, altitude 5,400 feet, December 1955, type *Rock 25619* in Bishop Museum. Collected in company with Herbert Shipman and Thomas Lindsey who originally discovered the species.

This very distinct species is named in honor of Herbert Shipman of Hilo, Hawaii, a great lover and grower of plants.

Cyanea shipmanii is related to *C. ferox* Hbd. of Molokai, from



FIGURE 4.—*Cyanea shipmanii*.

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which it differs in the distinctly pinnate leaves, in the broadly sessile pinnae which are again deeply lobed, in the small slender whitish pubescent corolla, in the non-muricate non-hispid calyx, and in sepals longer than the calyx. It is remarkable for the crown of dull, deep-green leaves, almost bipinnate, which are purple beneath. Because of its branching habit and muricate stem, it falls in the section *Cyaneae Genuinae*. It represents one of the oldest types of *Cyanea*, and while many species have juvenile pinnate leaves, this species retains them. It grows at a much higher altitude than any other of the cyaneas with pinnate leaves, in a geologically very old region, unlike *C. grimesiana* Gaud. and *C. asplenifolia* (H. Mann) Hbd. which are never found at more than 1,500 feet altitude in valleys and along stream beds.

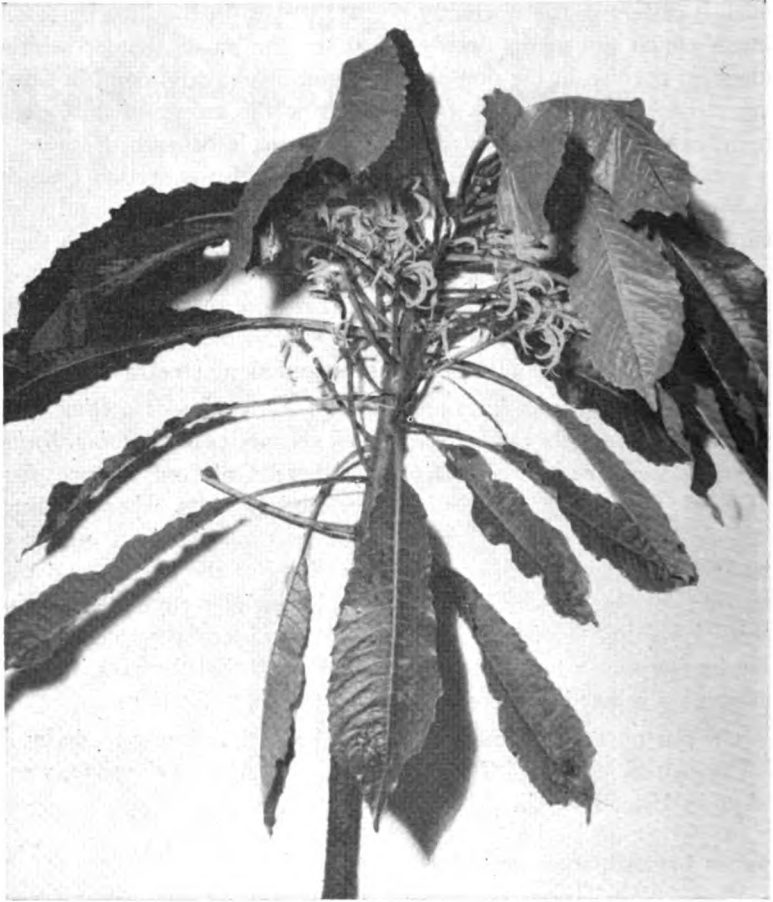
C. shipmanii grows in company with *Metrosideros collina polymorpha*, *Ilex anomala sandwicensis*, various species of *Myrsine*, *Rubus macraei*, *Acacia koa hawaiiensis*, and others. Only one mature plant was seen. Young plants grew from the surface roots, whereas others were seedlings. How long these plants will survive is a matter of speculation, for wild pigs and cattle are fond of the fronds, and pigs and rats eat the bark. The plant found owed its survival to being lodged between two fallen giants of *Metrosideros*, preventing cattle from having access to it. I strongly recommend that the area in which this species grows be fenced in to save it from extinction.

The photograph showing the entire plant (fig. 4) was made by A. H. Dreesen of Mansfield Centre, Connecticut, who, at the time, was a visitor in Hilo, Hawaii.

***Cyanea bryanii*, spec. nov. (figs. 5, 6).**

Plantae 2-3 m. altae; foliis 30-50 cm. longis, 14-16 cm. latis, oblongo-ovatis, supra nitidis, glabratis, marginibus eroso-dentatis, petiolis 18-22 cm. longis; pedunculi 15-20 cm. longi, bracteis foliaceis; corolla alba, 6 cm. longa, 1 cm. lata; fructi turbinati.

Plant single-stemmed, branching only when injured, 2-3 m. tall, stem solid, muricate to near the apex with yellow conical spines; crown loosely open, 1.5 m. in diameter with leaves extending for 50 cm. along the stem, leaves at intervals of 5-6 cm., glabrous, except for a slight murication along the veins, dark green above, shiny on both sides, paler grass green beneath, lanceolate oblong, 30-50 cm. long, 10-16 cm. broad, broadest in the upper third, bluntly acuminate, tapering toward the slightly unequal base, margin unequally eroso-dentate; petioles 18-22 cm. long, thick fleshy, distantly muricate with small purple spines; peduncle 18-22 cm. long, terete, with a foliaceous bract 25 mm. long in the upper third, a larger foliaceous bract 15 cm. long in the lower third, the apex openly bracteate with 5 mm. long filiform bracts; pedicels 15-20 mm. long, naked, pale green, slightly purplish, muricate; calyx obconical, 6-7 mm. long,

FIGURE 5.—*Cyanea bryanii*.

the lobes 4-5 mm. long, narrow lanceolate, acuminate, purplish at the base; corolla pure white, curved, 5 cm. or more long, 10 mm. broad in the middle, slit only in the upper part for 2 cm., the two upper lobes narrow lanceolate, the lower three 10-12 mm. long, 1.5 mm. broad; staminal column free to the base, pale whitish green, anthers green, only the upper penicillate with white hair; pistil 6.5 cm. long, filiform, pale green, stigmatic lobes broadly rounded, 1 mm. in diameter; fruit pale orange, 10 mm. long, 8 mm. broad, seeds very few, minute, light brown.

Hawaii: In Waiakea Forest Reserve back of Hilo, altitude 1,000 feet, in dense rain forest, under tree ferns, December 2, 1955, type *Rock 25500* in Bishop Museum. Collected in company with L. William

Bryan, Associate Forester, Board of Agriculture and Forestry, Hilo Branch.

This species is named in honor of Mr. Bryan for his very keen interest in the preservation of the Hawaiian flora, and in appreciation of many courtesies and his friendship.

The species is related to *Cyanca rollandioides* Rock and differs from it in the much larger stature; in the loosely foliate crown; in the much longer peduncles which bear one small and one large foliaceous bract on the otherwise naked peduncle, which is loosely bracteate



FIGURE 6.—*Cyanca bryanii*, growing in Waiakea Forest Reserve.

at the apex; in the non-bracteolate pedicel; and in the pure-white corolla. Like *C. rollandioides*, the new species is single-stemmed but branches when injured or broken; it belongs to the Section *Cyaneae Genuinae*. Young plants growing from prostrate fallen old plants, rooting along the stem, bear broadly ovate leaves 12 cm. \times 5-6 cm., and are irregularly incised, with pale spines above and purple spines beneath along midrib and veins. The petioles are also covered with purplish curved spines.

The photograph showing a fresh specimen was taken by Larry Kadooka, staff photographer of the Hilo Tribune Herald. The photo

showing the plant growing in the Waiakea Forest Reserve was taken by Norman Carlson of Kealakekua, Hawaii. (See figures 5 and 6.)

Cyanea gayana Rock var. **duvelii**, var. nov. (fig. 7).

Plantae erectae, inermes, 3 m. altae; foliis sessilibus, supra nitidis, subtus pallidis, lanceolatis oblongis, apice acuminatis, 55-80 cm. longis, 10-13 cm. latis, margine denticulatis; pedunculi 6-8 cm. longi, hispidi, bracteati, bractei acuminati, 15-20 mm. longi, lanceolati; pedicelli 18-20 longi, bibracteolati, 15-25-floriferi; hypanthium rubro-purpureum 10 mm. longum, lobi calycis triangulares acuminati; corolla pallide-violacea, purpureo-striata, 2-3.5 cm. \times 6 mm.; fructus turbinatus.

Plant erect or procumbent, branching, unarmed, with a large dense crown, 3 or more m. tall; leaves dark green shiny above, pale green beneath, the blade slightly curved, 55-80 cm. long, 10-13 cm. wide, midrib and veins impressed above, prominent below, densely pubescent with whitish-gray hair; margins denticulate, with callous, triangular teeth protruding on the upper surface; peduncles 15-25-flowered, densely bracteate in the upper two-thirds, naked below, 6-8 cm. long, bracts dull green, densely hispid with purplish gray, coarse hair, narrow lanceolate acuminate, 15-20 mm. long, 2-3 mm. wide; pedicels purple, 18-20 mm. long, bibracteolate near the thickened base, the bracteoles purplish gray, long acuminate; calyx purplish red, dull, somewhat turbinate, gradually merging into the ribbed pedicel, 10 mm. long, 8-10 mm. thick at the middle, calycine lobes thick triangular, acuminate, paler than the calyx, 5 mm. long, 2-3 mm. broad at the base; corolla pale lavender with darker streaks, 2-3.5 cm. long, 6 mm. wide, the dorsal slit extending to the base, pubescent with gray hair, the two upper corolla lobes 6-8 mm. long, the three lower 15 mm. long, 2.5-3 mm. wide, inner side whitish gray with purple streaks to the base, the lower central lobe broader than the other four; staminal column bulging and split at the base, whitish silky in the lower, and purplish in the upper, part; anthers dark purple with whitish margins, only the two lower penicillate; style as long as or longer than the staminal column, glabrous, greenish with exception of the purple apex, stigmas broadly triangular, bluntly acute, with a thick hairy ring at the base, the hair extending downward; fruit broadly turbinate, orange red, 13 mm. high, 15 mm. broad; seeds pale, smooth.

Kauai: Southeastern end of the island, in the forest on the flat adjoining Mount Kahili, altitude 2,500 to 3,000 feet, together with *Straussia*, *Gouldia*, *Syzygium*, *Broussaisia*, *Scaevola*, and others, February 15, 1956, type *Rock 25675* in Bishop Museum. Collected in company with Albert W. Duvel, Associate Forester, Board of Agriculture and Forestry, Lihue, Kauai, in whose honor the variety is named.

Another specimen of this variety in Bishop Museum was collected January 20, 1944, by Noel Krauss (coll. no. 16) at Hanahanapuni, Kauai, 7 miles northeast of Kahili, at an altitude of about 900 feet. This earlier collection, described as a plant 5 feet high with two branches, matches the later one, from Kahili (the type), in general appearance and in all details of leaves, flowers, and fruit.



FIGURE 7.—*Cyanea gayana* var. *duvelii*.

This very handsome plant of the wet forest of southeast Kauai, growing in dense shade, differs from the species in the larger stature (nearly twice as tall); in the more than twice as large dark-green, shiny, sessile leaves; in the peduncles, which are more than six times as long; in the broadly triangular calycine lobes; in the pale lilac corolla, which is magenta red in the species; and in the orange-red berries. It is almost worthy of specific rank. The species grows on the high plateau to the west of Kahili, above Waimea, at 1,000 feet above the variety.

The accompanying photograph (fig. 7) was made by the Kekaha Plantation photographer through the courtesy of Lindsay A. Faye, manager of the plantation, to whom I am indebted for many courtesies and for hospitality.

A much smaller plant, with dull-green leaves, shorter peduncles (1 cm. long), and darker streaked purple corolla, was found a little higher up toward the base of Mount Kahili. This latter plant comes nearer to the species.

Cyanea marksii, spec. nov. (fig. 8).

Planta 1-2 m. alta, basi lignescens, apice subherbacea, purpurea, undique aculeis viride-purpureis vestita; folia obovato-oblonga, 25-30 cm. longa, 8-10 cm. lata, apice acuta, basi subrotunda, utrinque aculeata; petiolus 6-8 cm. longus, aculeatus; pedunculi 5-8-floriferi, 20 mm. longi, muricati; bractei grassi, muricati, acuti; pedicelli pallide virides, pubescenti, basi bracteolati, 20 mm. longi; hypanthium viride, nitidum, puberulum, oblongum, 13-15 mm. longum, apice 8 mm. latum; lobi calycis pallide virides, lanceolati, acuti, 10 mm. longi et basi 4 mm. lati, puberuli; corolla atro-purpurea, hirsuta, pilis albidis vestita. arcuata, 8 cm. longa, 8 mm. lata, apice submuricata; stamina glabra; bacca ignota.

Plant 1-2 m. or more tall, of purple appearance, woody at the base, fleshy in the upper part, milky throughout, sap white, and covered from base to apex with deep greenish-purple spines, excepting the inflorescence; leaves obovate-oblong, dark green purplish, dull above, paler beneath with prominent reticulate veins, aculeate on both sides, with repand-crenate margins, 25-30 cm. long, 8-10 cm. wide in the upper third, bluntly acute at the apex, cuneate to subrotund at the base; petiole deep purple, covered with very sharp deep purple spines, 6-8 cm. long; peduncle 5-8-flowered, 20 mm. long, muricate; basal bracts fleshy green with purplish tinge toward base, muricate with purplish spines, 5-10 mm. long; pedicels pale green, pubescent, each supported by a pale green pubescent bracteole of 5-6 mm.; hypanthium oblong, glossy, puberulous, pale green, 13-15 mm. long, 8 mm. wide at the apex; the calycine lobes lanceolate, acute, pale green, 10 mm. long, 4 mm. broad at the base, puberulous, 1-nerved; corolla purplish-black, arched, 8 cm. long, 8 mm. broad, hirsute with whitish hair, the dorsal slit to nearly half its length; segments of corolla sub-muricate at the apex, linear, acuminate, of nearly equal length, the three lower slightly shorter, purple within, with pale lavender marginal lines; staminal column reddish purple, glabrous; anthers glabrous, dark purple, only the two lower

penicillate; pollen pale yellow, mature before pistil emerges from staminal column; pistil purple, glabrous, darker toward the stigma; stigmatic lobes pale purple, broad, rounded with a double ring of white hair at the broad base, the hair of the upper ring extending upward, that of the lower downward.



FIGURE 8.—*Cyanca marksii*.

Hawaii: South Kona, McCandless Ranch, on slopes of Mauna Loa, altitude 3,600 feet, in mixed rain forest, December 10, 1956, flower buds, type *Rock* 25631 in Bishop Museum. Collected in company with Mrs. A. Lester Marks, who first discovered the species in a

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sterile state some months earlier; plants were brought down by her and planted in the Marks' garden in Nuuanu Valley where they are flourishing.

The description of the mature flowers is drawn from a beautiful fresh specimen from the type locality brought to Honolulu by A. Lester Marks on January 25, 1957, no. 25631a in Bishop Museum, and from which the accompanying photograph was made.

This beautiful species is named in honor of A. Lester Marks, to whom I am indebted for many courtesies and for hospitality.

Cyanea marksii is related to *C. nolimetangere* Rock, from which it differs in the pale-green oblong calyx and the long, lanceolate calyx lobes, but especially in the twice as long blackish purple, hirsute corolla and submuricate petals.

It belongs to the Section *Cyaneae Genuinae*. It grows in clumps from one rootstock on fallen moss-covered trunks of *Cibotium*. The plant has the habit of sending out aerial roots from procumbent stems.

***Cyanea longipedunculata*, spec. nov. (figs. 9, 10).**

Planta 2-4 m. alta, inermis; caulis erectus hirsutus, basi lignescens, vertice foliata; folia 18-30 cm. longa, 10-12 cm. lata, apice acuminata, utrinque dense pilosa, basi acuta, late obovata, margine eroso-dentata; petiolus 2-4 cm. longus; racemi rosei 12-18 cm. longi, dense hirsuti pilis albis; bracteis viridis, linearis; flores 15-30; pedicelli 10 mm. longi, viridi, hirsuti; tubus calycis glabrus, rubro-viridis, 5-6 mm. altus, lobi calycis lanceolati 5 mm. longi; corolla albo-viridis, rubro-purpurea striata, 25 mm. longa, 4 mm. lata; antherarum tubus 4 mm. longus, pilis albis obsitus, 2 inferiores antherae penicillatae; bacca ignota.

Plant erect, 2-4 m. tall, unbranched (branching only when injured) but often several stems rising from one rootstock, unarmed, but densely pilose throughout with white hair, woody, subherbaceous only near the foliose apex, milk sap deep yellow; leaves obovate, dark green above, pale beneath, acuminate at the apex, acute at the base, densely pilose with white hair giving the young leaves a white-silvery sheen, 18-30 cm. long, 10-12 cm. wide, the margins eroso-dentate; petioles densely pilose, 2-4 cm. long; peduncle rose colored toward the apex, densely villous, 12-18 cm. long in flower, bearing 15-30 flowers; sparsely bracteate with linear pale green pilose bracts 5 mm. long; pedicels minutely bibracteolate below the middle, sparsely pilose, 8-10 mm. long; hypanthium glabrous, dark green at the base, purplish pink above, oblong, 6 mm. long, the glabrous pale-green calycine teeth linear, 4 mm. long, acute; corolla whitish green with purple streaks, glabrous, 25 mm. long, 4 mm. wide, slit to half its length, the two outer lobes 7 mm. long, acuminate, the three inner shorter; staminal column whitish, puberulous toward the apex; anthers pale green, hirsute with white hair, especially along the sutures, the two lower penicillate; style deep purple, glabrous, stigmatic lobes broadly triangular with a ring of white hair at the base; fruit unknown.

Hawaii: Hilo Forest Reserve, in *kipuka* off the Mauna Kea Saddle Road, altitude 4,300 feet, in dense rain forest, together with *Cibotium*,

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FIGURE 9.—*Cyanea longipedunculata*.

Metrosideros, *Clermontia montis-loa* Rock, and *Cyanea pilosa* A. Gray var. *densiflora* Rock, December 5, 1956, type *Rock 25630* in Bishop Museum. Collected in company with Mrs. W. J. Stephens, Herbert Shipman of Hilo, and Albert Mackenzie.

The plant is related to *Cyanea pilosa* A. Gray, from which it is at once distinguished by the long villous peduncle which in flower reaches a length of 18 cm. (those of *C. pilosa* measure only 2 cm. in fruit).

The plant when first found had only minute flower buds. The description of the inflorescence is based on fresh material collected by Mrs. Stephens and forwarded to me by air on January 3, 1957. It has since been collected in full flower on February 28, 1957, at the type locality, Rock 25750, and at 29 miles above Hilo in dense forest on March 27, Rock 25751; both numbers are in Bishop Museum. In 25751 the flowers are greenish white instead of pink.

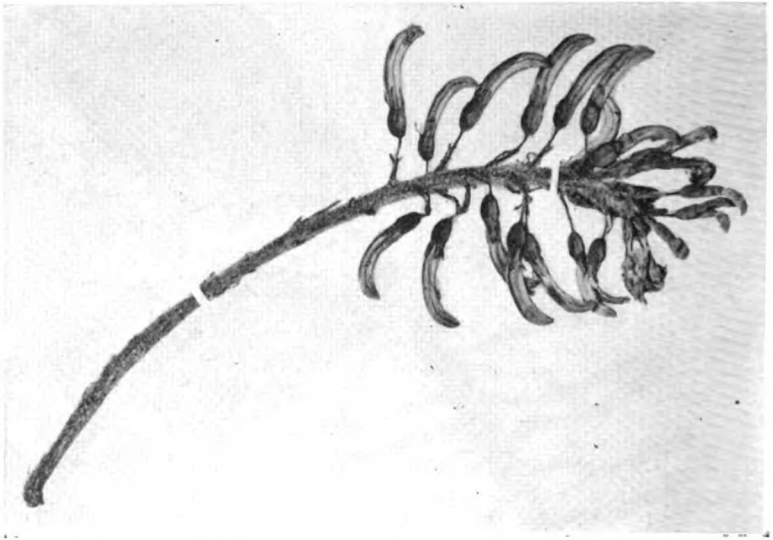


FIGURE 10.—Inflorescence of *Cyanea longipedunculata*.

***Cyanea gayana* Rock var. *wainihaensis*, var. nov. (fig. 11).**

Frutex 2 m. altus; folia late obovata, apice acuta (?), basi attenuata, chartacea, supra glabra, subtus sparsissime puberulus, 32 cm. longa, 13 cm. lata; petiolus 5 cm. longus; pedunculus subhirsutus, 4-6 cm. longus, bracteis paucis, linearis, 4 mm. longis; pedicelli 5-10 mm. longi; hypanthium subglobose, subglabrum, 6-8 mm.; lobi calycis triangulares, acuti, 4 mm. longi; corolla subglabra, caerulea rubra (?), 4 cm. longa, 5 mm. lata; fructus ignotus.

Shrub 2 m. tall; leaves broadly obovate, acute (?) at the apex, the base attenuated, chartaceous, glabrous above, very sparsely puberulous beneath, 32 cm. long, 13 cm. broad on a petiole of 5 cm.; peduncle subhirsute, 4-6 cm. long, distantly bracteate with short linear bracts 4 mm. long; pedicel subhirsute at the base, 5-10 mm. long; calyx subglobose, 6-8 mm., the lobes triangular acute, 4 mm. long; corolla subglabrous, 4 cm. long, 5 mm. broad, purplish red (?); fruit unknown.

Kauai: Wainiha Valley, 200 m. altitude, in rain forest along

stream, February 24, 1927, type *L. H. MacDaniels* 866 in Bishop Museum.

It differs from the species in the broadly obovate leaves, the longer petiole, the subglabrous inflorescence, the distantly bracteate peduncle, and the subglabrous corolla.

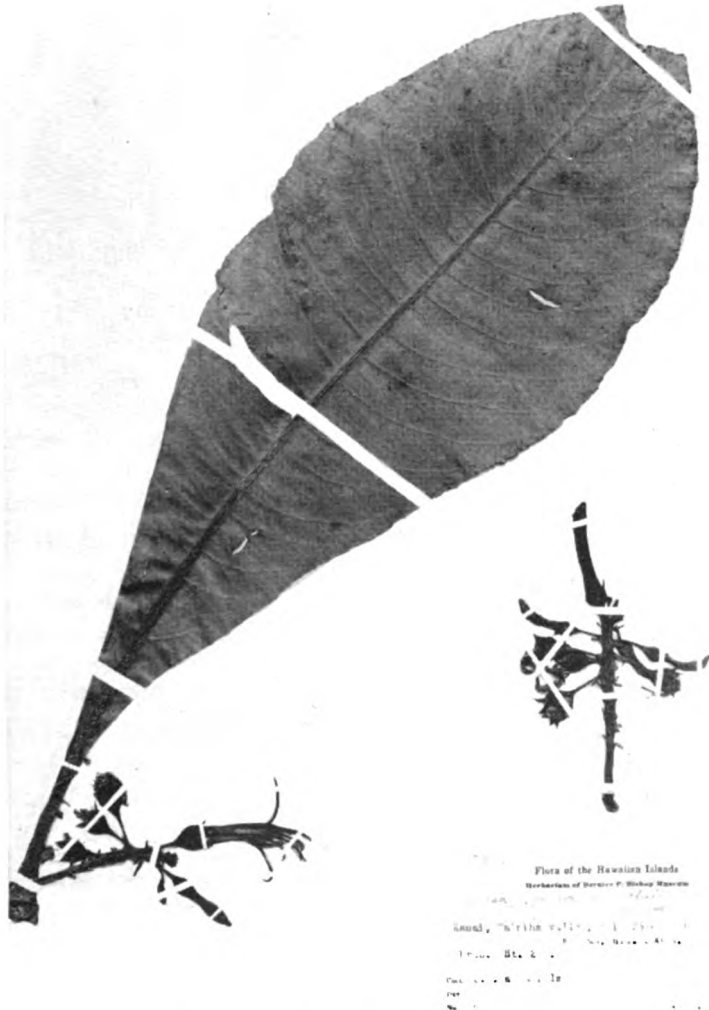


FIGURE 11.—*Cyanea gayana* var. *wainihaensis*.

Cyanea pulchra, spec. nov. (fig. 12).

Suffrutex inermis, alta (?); folia obovato-oblonga, chartacea, supra glabra, subtus puberula, 14-46 cm. longa, 6-13 cm. lata, apice breviter acuta, basi acuta, truncata vel subcordata, margine denticulata; petiolus 4-11 cm. longus; pedunculi 2-7 cm. longi, apice bracteata, bracteis 2-6 mm. longis; pedicelli 15-25 mm. longi, circa in medio minute bibracteolati; calycis tubus oblongo-obconicus, puberulus, 8-10 mm. longus, lobi calycis longe triangulati vel lineares 5-12 mm. longi, acuminati, puberuli, 1-2 mm. lati; corolla 4-6 cm. longa, 5-8 mm. lata, falcata vel recta, puberula, apicea subhirsuta; fructus ignotus.

Plant unarmed; leaves obovate oblong, chartaceous, glabrous above, puberulous beneath especially on the veins, 14-46 cm. long, 6-13 cm. broad, widest in the upper fourth, abruptly or bluntly acute at the apex, bluntly acute to truncate or subherbaceous at the base, the margins minutely denticulate; petioles unarmed, 4-11 cm. long; peduncles 5-10-flowered, 2-7 cm. long, bracteate at the apex, the bracts 2-6 mm. long, occasionally two foliaceous in the lower part; pedicels minutely bibracteolate about the middle; hypanthium obconical to oblong, puberulous, 8-10 mm. long, the calycine lobes long triangulate to linear, acuminate, 5-12 mm. long, 1-2 mm. broad, puberulous; corolla dark magenta, white within, falcate to erect, puberulous, the apex subhirsute; anthers glabrous, pale to purplish red, the lower penicillate; fruit unknown.

Hawaii: Hamakua, Hiilawe Valley, Waipio, flowering, July 1909, type *Rock 4664* in Bishop Museum; Waipio, July 1909, *Rock 4663*; Waipio, Upper Hamakua Ditch trail, altitude 3,000 feet, January 1, 1932, *H. St. John and E. Y. Hosaka 11470* in Bishop Museum.

This beautiful species is related to *C. fernaldii* Rock, to which I doubtfully referred it in my monographic study of the Hawaiian Lobelioideae, [B. P. Bishop Mus., Mem. 7 (2): 237]. It differs from it in the leaves, which are bluntly acute to truncate and subcordate (coll. no. 11470) at the base, in being obovate oblong in outline instead of lanceolate oblong, and in the absence of murication on petioles and leaves; in the much shorter peduncle and longer pedicels; and in the corolla which differs from it in that it is dark magenta in color. F. E. Wimmer in his monograph [Campanulaceae-Lobelioideae, Das Pflanzenreich (IV, 276b) 106 (1), 1943, Nachdruck, 68, 1956] refers my number (*Rock 4663*) to *C. fernaldii* Rock but quotes my remark, "doubtfully referred to this species."

Cyanea chockii, spec. nov.

Frutex (?) inermis; folia parva, 10-12.5 cm. longa, 15-20 mm. lata, supra glabra, subtus sparse pubescentia ad nervos, apice acuminata, mucronulata, ad basin angustata in petiolum 2.5-3.5 cm. longum, margine crenato-denticulata; racemi axillares, pedunculus 8-10 mm., hirsutus pilis luteis; pedicelli filiformes 6-8 mm. longi, hirsuti; hypanthium ovato-globosum 6 × 5 mm., subhirsutum, lobi triangulati, acuti, subhirsuti; corolla purpurascens (?), subhirsuta, subcurvata, dorso usque ad medium vel ad basin (?) fere fissa, 2-5 cm. longa; bacca ovoidea 8-10 mm. alta, 5-6 mm. lata; semina nitida, ovoidea.

Branching (?) unarmed shrub; leaves small 10-12.5 cm. long, 15-20 mm. wide, glabrous above, sparsely pubescent along the nerves, acuminate, mucronulate at the apex, narrowing at the base and merging into petiole 2.5-3.5 cm. long, the margins crenate denticulate; racemes axillary, peduncle hirsute, bracteate at the apex, 8-10 mm. long; the pedicels filiform, hirsute, 6-8 mm. long; hypanthium ovate to globose, subhirsute, 6×5 mm., the calycine lobes triangulate



FIGURE 12.—*Cyanea pulchra*.

acute, subhirsute; corolla purplish (?), the tube subhirsute, the slender linear lanceolate segments hirsute at the apex, the dorsal slit extending almost to the base, 2.5 cm. long; fruit ovoid, 8-10 mm. high, 5-6 mm. broad (not quite mature); seed pale brown, shining, ovoid.

Kauai: Waimea, Na Pali Kona Forest Reserve, Kapukapaia Ridge, Ka Lehua Hakihaki, Waialeale trail, 3,500 feet, August 18, 1953, from Kokee Natural History Museum, type *Alvin K. Chock 972* in Bishop Museum.

This species is a very graceful *Cyanea*, related to *C. spathulata* (Hbd.) Heller, from which it differs in the smaller acuminate leaves, shorter hirsute peduncles and pedicels, and subhirsute corolla.

***Cyanea linearifolia*, spec. nov. (fig. 13).**

Caulis simplex, 2-2.5 m. altus; folia linearis, margine revoluta, apice longe acuminata ad basi in petiolum 4-7 cm. longum decurrens, 28-33 cm. longa, 3-6 mm. lata, glabra; pedunculus gracilis, 6-7 cm. longus; pedicelli filiformi, 12-15 mm. longi; hypanthium globosum, glabrum, lobis triangularibus, minutis; corolla arcuata, 15 mm. longa, 2-3 mm. lata; fructus ignotus.

Stem simple, 2-2.5 m. (6-7 feet) high; crowned by the narrow, linear, glabrous leaves, 28-33 cm. long, 3-6 mm. wide, with revolute margins; racemes glabrous, 6-7 cm. long, with small deciduous bracts in the upper third, 10-12-flowered, the flowers on 12-15 mm. long filiform pedicels; calyx globose to campanulate glabrous, the calycine teeth minute; corolla (color ?) glabrous, 15 mm. long, probably 20 mm. when mature; fruit unknown.

Kauai: Hii Mountains, probably near the Lydgate mountain cabin; collected by J. M. Lydgate, without date. Type in Bishop Museum.

The plant is related to *Cyanea angustifolia* (Cham.) Hbd. but is remarkable for its long linear leaves, the narrowest of any known lobelioid of the Hawaiian Islands. Mr. Lydgate collected it many years ago. Another sheet in Bishop Museum, of more recent collection but without locality, date, or collector's name, belongs here. The leaves of the latter are somewhat shorter.

***Cyanea carlsonii* Rock, spec. nov. (fig. 14).**

Truncus simplex, erectus, 8 m. altus, inermis, 10 cm. in diametro, in vertice foliis coronatus; folia sessilia, supra glabra, subtus puberula, oblongo-lanceolata, 68-70 cm. longa, 10 cm. lata, apice acuta, margine callose denticulata.

Tree 8 m. tall, single-stemmed, with a globose crown of leaves at the apex, stem unarmed, 10 cm. in diameter; leaves 68-70 cm. long, obovate oblong-lanceolate, 10 cm. wide, broader in the upper fourth, acute at the apex, decurrent at the base, sessile, glabrous above, puberulous along the main veins; midrib thick fleshy, prominent below, the lamina dark green above, paler beneath, the veins slightly impressed, transparent, margins finely denticulate with pale thickened teeth; flowers and fruits unknown.

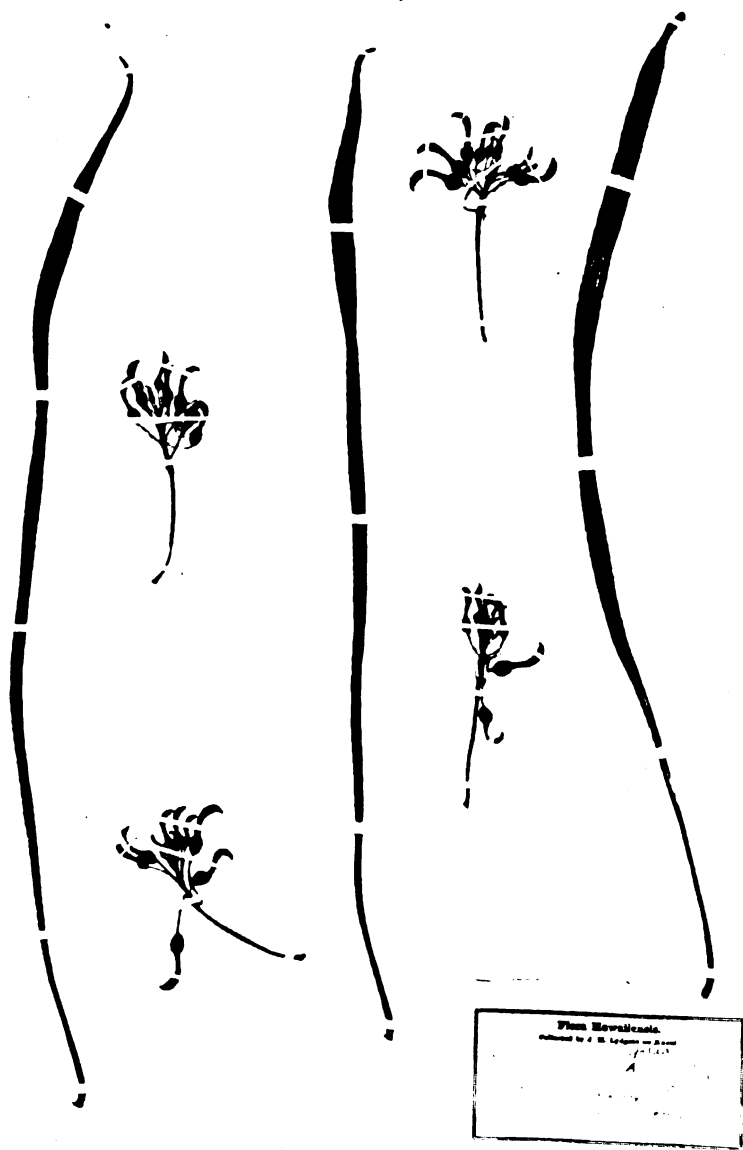


FIGURE 13.—*Cyanea linearifolia*.

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Hawaii: South Kona, Honaunau Forest Reserve, Bishop Estate land, at an altitude of 4,300 feet, March 10, 1957, type *Rock 25711* in Bishop Museum. Collected in company with G. C. Ruhle.

Although no flowers were seen, I am confident that this beautiful and stately palm-like plant is new. No *Cyanea* of this type with sessile leaves has ever been recorded from Hawaii. It is related to *C. hamatiflora* Rock as far as leaves go, but differs from the latter (not pubescent as in *C. hamatiflora*), in the leaves, which are glabrous below, and in the finely (not irregularly) dentate margins.

This species was first seen by Norman Carlson of Hilo, in company



FIGURE 14.—*Cyanea carlsonii*.

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with William A. Bryan, associate forester of the Hawaii branch of the Board of Agriculture and Forestry (Hilo). The accompanying photograph (fig. 14) is by Mr. Carlson, in whose honor the plant is named. The plant will be protected and Mr. Carlson will watch for flowers, which he will send to me.

The only other species with sessile leaves which are not glabrous below is *Cyanea procera* Hbd. from the island of Molokai where it grows at 2,000 feet altitude, less than half the height at which *C. carlsonii* occurs. I presume that the new species will differ as much in the inflorescence and fruit from both cyaneas with sessile leaves as *C. procera*, the Molokai species, differs from *C. hamatiflora* from the northern slopes of Haleakala, Maui.

***Cyanea membranacea* Rock, spec. nov.**

Folia obovato-oblonga, 20-25 cm. longa, 4.5-6 cm. lata, membranacea, utrinque puberula, margine inaequaliter serrata, apice acuta, basi subacuminata; petiolus 4-6 cm., hirsutus; pedunculus 2-4 cm. longus, hirsutus; pedicelli hirsuti 5-10 mm. longi; hypanthium puberulum, lobi calycis denticulati apice hirsuti; corolla 3 cm. longa, hirsuta; antherae pilis albidis vestitae.

Shrub (?), leaves obovate-oblong, 20-25 cm. long, 4-5 cm. wide, membranous, puberulous on both sides, the margin unequally serrate, apex acute, base subacuminate; petiole hirsute, 4-6 cm.; peduncle 2-4 cm. long, hirsute; pedicels hirsute 5-10 mm. long; calyx tube puberulous, the teeth short and blunt, the apices hirsute; corolla 3 cm. long, hirsute, color not known; anthers with white hairs along the sutures.

Oahu: Waianae Mountains, Kaaikukai, *G. W. Russ*, October 1929, without number, in Bishop Museum.

This species is related to *Cyanea knudsenii* Rock, from which it differs in the membranous leaves, which are irregularly serrate, puberulous on both sides; in the hirsute petiole; in the hirsute inflorescence; and in the very short triangular calyx teeth, which are hirsute at the apex.

Unfortunately the collector gave no data as to height, color of corolla, and so forth.

***Cyanea stictophylla* var. *inermis* Rock, var. nov.**

Frutex ramosus, 5-6 m. altus, inermis; folia margine undulata, irregulariter incisa, denticulata, oblonga, apice acuminata, basi angustata, 25-37 cm. longa, 5-8 cm. lata, supra glabra, subtus puberula; petiolus 1.5-3.5 cm. longus, puberulus; pedunculus glaber, 3 cm. longus; pedicelli 13-22 mm. longi, bracteati; bracteae basi orbiculares apice longe subulatae; corolla ignota; calycis tubus ovoidus vel ellipsoidus, lobi acuminati; 3-4 mm. longi, 1-nervii.

Tree 5-6 m. tall, with few erect branches, unarmed throughout; the fleshy part of stem puberulous; leaves undulate, crisp but fleshy, unevenly incised, the

sinuses shallow, margins denticulate with pale teeth, oblong, acuminate at the apex, decurrent at the base, 25-37 cm. long, 5-8 cm. wide, dull green on both sides, darker above, midrib pale whitish, veins impressed above, reticulate, portions of leaf blade raised between veins, giving fresh leaves a crinkly appearance, glabrous above, puberulous beneath; petiole 1.5-3.5 cm. long, terete, flattened above, puberulous; peduncle green, glabrous or minutely puberulous, 3 cm. long, few-flowered at the apex; pedicels 13-22 mm. long, bracteate at the base, the bracts orbicular or rounded with a long subulate point, the bracts united at the base, green; flowers unknown; immature fruit ovoid-ellipsoidal, green, 13 mm. long, 9-10 mm. wide, calycine lobes crowning the immature fruit 1-nerved, 3-4 mm. long.

Hawaii: South Kona, Honaunau Forest Reserve, Bishop Estate land, growing in company with *Cyanea carlsonii* and *Urera glabra*, in dense rain forest, altitude 4,300 feet, March 9, 1957, type *Rock 25703* in Bishop Museum. Collected in company with G. C. Ruhle.

***Cyanea grimesiana* var. *hirsutifolia* Rock, var. nov.**

Planta ? alta; folia pinnatifida, 25-30 cm. longa; pinnae 6-10 cm. longae, sinuato-dentatae, supra subglabrae, subtus hirsutae, petiolus hirsutus, muricatus; pedunculus puberulus; pedicelli hispidulosi; hypanthium turbinatum, hirtellum, lobi calycis lineares, acuminati, 10-12 mm. longi, 2 mm. lati, 1-nervii, subglabri; corolla 4 cm. longa, 4-5 mm. lata, puberula, lobi corollae hirsuti; antherae glabrae.

Height of plant unknown; leaves pinnatifid, 25-30 cm. long, the pinnae 6-10 cm. long, 10 mm. broad, subglabrous above, densely hirsute with yellowish hair, sinuate-dentate; petiole hirsute and muricate; peduncle puberulous, multi-bracteate above the middle, bracts subulate pubescent; pedicels hispidulous; hypanthium turbinate, hirtellous; calyx lobes linear, acuminate, 1-nerved, subglabrous; corolla 4 cm. long, 4-5 mm. broad, puberulous, apparently dark purple?, the lobes hirsute; anthers glabrous.

Oahu: Waianae Mountains, Kaaikukai, *G. H. Russ*, October 1929, three sheets, without number, in Bishop Museum.

This variety differs from the species and all the other varieties in the densely hirsute leaves; in the hirsute petioles, which are also muricate; in the linear lanceolate calycine lobes, which are long acuminate; and in the puberulous corolla and the hirsute corolla lobes.

***Cyanea angustifolia* forma *elliptica* Rock, f. nov.**

Folia ovato-elliptica, 10-12 cm. longa, 4-5 cm. lata, chartacea, supra glabra, subtus puberula apice acuta, basi rotundata, subinaequaliter; petiolus 4-6.5 cm. longus; pedunculus filiformis, 15-18 mm. longus; pedicelli 5-10 mm. longi; corolla parva, 20-25 mm. longa, glabra; anthera glabra.

Shrub (?), leaves ovate-elliptical, 10-12 cm. long, 4-5 cm. wide, chartaceous, glabrous above, puberulous beneath along the midrib, apex bluntly acute, rounded at the base, slightly unequal, margin dentate to almost the base; petiole 4-6.5 cm. long; peduncle filiform, 15-18 mm. long; pedicels 5-10 mm. long; corolla glabrous, 20-25 mm. long; anthers glabrous.

West Maui: Ridge west of Waihee, type *C. N. Forbes*, without number, August 1910, in Bishop Museum.

This form is at once distinguished from the varieties of *C. angustifolia* by the ovate-elliptical leaves, but approaches var. *lanaiensis* Rock, from which it differs in the leaves, which are broad, rounded at the base.

Cyanea coriacea (A. Gray) Rock var. **serratifolia** Rock, var. nov.

Frutex 2 m. altus; folia late lanceolata, 28-30 cm. longa, 7-8 cm. lata, chartacea, supra glabra, obscuro-viridis, subtus puberula, pallida, apice acuta, basi subacuta. Margine serrata; petiolus 7-8 cm. longus; pedunculus 3-5 cm. longus, hirsutus; pedicelli hirsuti, 1.5-2 cm. longi; corolla alba, 3-4 cm. longa, 3 mm. lata; staminum tubus glaber, antherae 8 mm. longae, purpureae, glabrae.

Shrub 2 m. tall; leaves broadly lanceolate, 28-30 cm. long, 7-8 cm. wide, papery, glabrous, dark green above, pale whitish, puberulous on the median nerve below, apex acute, base subacute, the margin sharply serrate; petiole 7-8 cm. long; peduncle hirsute, 3-5 cm. long; pedicels hirsute, 1.5-2 cm. long; hypanthium purple; corolla white as is the staminal column; anthers purple.

Oahu: Waianae Mountains, Puu Kanehoa, on dry wooded ridge, altitude 2,200 feet, flowering, June 13, 1948, type *Grady L. Webster 1636* in Bishop Museum.

The inflorescence does not exceed the petiole. This variety differs from the species in the chartaceous, sharply serrate leaves and in the hirsute inflorescence and the white corolla, which is nearly twice as long as in the species.

ADDITIONS

Cyanea fissa (H. Mann) Hbd.

Kauai: along Pole-line trail, in dense forest, January 31, 1920, *Rock 17245* in Bishop Museum. New locality.

Cyanea solanacea Hbd.

Molokai: South of Pepeopae, near stream bed in rich low woods, April 13, 1928, *Otto Degener 7785* in Bishop Museum; head of Waihanau Stream, May 24, 1928, *Otto Degener 7787a* in Bishop Museum.

Both numbers were seen by Wimmer; 7785 he named *C. quercifolia* Hbd. var. *mitis* E. Wimmer, var. nov.; 7787a he named *C. solanacea* Hbd. var. *mitis* E. Wimmer, var. nov.; both are *nomina nuda*. The plants belong to *C. solanacea* Hbd. The collector does not state whether the young plants were armed or unarmed. The specimens

are unarmed but that does not exclude the younger plants being armed, which is often the case in the lobed-leaved species. A slight murication appears on the petioles of both numbers.

On the label of Degener's 7785 he states: "trunk 11 cm. in diameter, bearing 17 erect branches 16 or more feet high. Entire plant must be 17 feet high; flowers white (with very slight greenish tinge) tip purplish, the color extending down the margin of petal as fine faint lines until it reaches about half way down; staminal column white, stigma greenish, distal half of style purplish."

Wimmer either forgot to describe these plants under one or the other species as var. *mitis*, or he decided that both belonged to *Cyanea solanacea* Hbd. However, he did not cite them under the species.

Clermontia arborescens (H. Mann) Hbd.

Kauai: Pole-line trail, altitude 650 m., February 14, 1927, *L. H. MacDaniels 706* in Bishop Museum. First record from Kauai.

Delissea undulata Gaud.

Cyanea argutidentata E. Wimmer is equal to *Delissea undulata* Gaud. Forbes collected this species in Kona at Kanahaha (no. 264), June 26, 1911, and determined it erroneously as *Delissea fallax* Hbd. My specimens from Puuwaawaa Hill, North Kona, are typical *Delissea undulata* Gaud., and Forbes' flowering specimen of Wimmer's type of *Cyanea argutidentata* also comes from Puuwaawaa, where the species has now become extinct. It matches *Delissea undulata* Gaud. perfectly. What apparently led Wimmer astray is the near absence of the gibbous knobs at the dorsal slit of the corolla and the absence of fruit.

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