OCCASIONAL PAPERS
OF
BERNICE P. BISHOP MUSEUM
HONOLULU, HAWAII

Volume XXIII August 17, 1962 Number 5

Hawaiian Lobelioids

By J. F. ROCK
HONORARY ASSOCIATE IN BOTANY, B. P. BISHOP MUSEUM

INTRODUCTION

It is becoming more and more difficult to find new species of Hawaiian plants, even in so polymorphic a group as the Lobeliaceae. Of all the genera of this family in the Hawaiian Islands the genus *Cyanea* has the greatest number of species. Second is the genus *Clermontia*. *Delissea* is a decadent genus in which few of the species described have been rediscovered and to which no new ones have been added.

Most of the several doubtful species described in *Cyanea* and *Clermontia* have been relegated to varieties and forms, whereas varieties of older species have been raised to specific rank. I refer to the varieties of *Cyanea pilosa* A. Gray, a species not well known, since only poor material is extant. There is, however, no doubt that *Cyanea longipedunculata* Rock, *C. floribunda* E. Wimmer (identical with my old *C. pilosa* var. *glabrifolia*), and *C. densiflora* Rock are related to *C. pilosa* and are probably derived from it. *C. megacarpa* Rock and *C. bondiana* Rock, both occurring on or restricted to the Kohala Mountains on Hawaii, are not related to *C. pilosa* A. Gray. Closest to each other are *C. floribunda* E. Wimmer and *C. densiflora* Rock, which differs from *C. floribunda* in the densely villous leaves that, when fresh, have a thick velvety texture, whereas the leaves of *C. floribunda* are flaccid, whitish beneath. The flowers of *C. densiflora* are hirsute. *C. floribunda* is not uncommon in the dense rain forest around Kilauea Volcano and in kipukas along the Saddle Road, whereas *C. densiflora* is restricted to the dense forests of Naalehu on the southern slopes of Mauna Loa.

FIGURE 1.—*Cyanea longipedunculata.*

When I described *C. carlsonii* on the strength of the leaves, I was convinced that it represented a new species and that it was related closely to *C. hamatiflora* Rock from the windward slopes of Haleakala, Maui. Since the species was published (1957) flowers have been collected and have confirmed this surmise. Therefore, the description of the species has been amended here and the type figured. A typical specimen of *Cyanea longipedunculata* Rock is also reproduced in this paper (fig. 1).

The *Clermontia* that Thomas Lindsey discovered on the slopes of Mauna Kea, a very old region where *Clermontia pyrularia* Hbd. and *Cyanea shipmanii* Rock occur, I had assigned to *Clermontia hawaiiensis* (Hbd.) Rock as variety *grandis,* but when better material became available it was clearly recognized as a distinct species. Its relationship is with *Clermontia hawaiiensis* and *Clermontia kakeana* Meyen. These three species have all-green flowers; in *Clermontia lindseyana,* however, the inner side of the petals is white.

A close search in such recently opened areas as the Napali coast of windward Kauai, the deep valleys of Molokai, and the windward slopes of Haleakala will no doubt reveal more new species of both *Cyanea* and *Clermontia.*

Cyanea **longipedunculata** Rock.

In my paper "On some new Hawaiian lobelioids" [B. P. Bishop Mus., Occ. Papers **22** (5), figs. 9, 10] figure 9 shows a specimen of this species with undeveloped, flowerless peduncles only; in figure 10, a single flowering peduncle is reproduced. In order to better illustrate this species a complete flowering specimen from the type locality (*Bishop Mus., no. 25750*) is figured here. (See figure 1.)

Clermontia lindseyana Rock, sp. nov. (fig. 2).

Clermontia hawaiiensis var. *grandis* Rock, B. P. Bishop Mus., Occ. Papers **22** (5) : 43, 1957.

Frutex vel arbor 5-6 m. alta, truncus saepe exedit 20 cm. in diam.; ramuli hirsuti; folia obovato-oblonga, 22-24 cm. longa, 5-8.5 cm. lata, subcoriacea, apice acuta, apiculata, ad basin angustata in petiolum crassum, 4-6 cm. longum, margine denticulata, supra fusco-viridis, nitida, glabra, subtus pallida, dense pubescentia cum pilis albidis; petiolus crassus, 4-6 cm. longus, hirsutus; pedunculus crassus, hirsutus, 2.5-3 cm. longus, 2-flori; pedicelli 1.5-2 cm. longi, infra apicem bi-bracteolati, scabri; hypanthium luteo viride turbinatum, 10-sulcatum, 20 mm. altum, 20-22 mm. latum, puberulum; lobi calycis longior quam corollam, viridi, 8-8.5 cm. longi, 5-6 mm. lati, puberuli; corolla 7-9.5 cm. longa, pallide viridis vel alba, cum pilis albidis exteriore pubescentia; staminum tubus albus, glaber, 5 cm.

longus; antherae albidae, 2 inferiore forte penicillatae; fructus globosus aurantiacus, 5-5.5 cm. in diam.

Tree or shrub 5-6 m. high; leaves dark green above, subcoriaceous, obovate-oblong, 22-24 cm. long, 5-8.5 cm. wide, acute at apex, apiculate, narrowing at base into a thick hirsute petiole 4-6 cm. long, leaf margin denticulate, glabrous above, pale beneath, densely pubescent with white hair; peduncle fleshy, hirsute, two-flowered, 2.5-3 cm. long; pedicels 1.5-2 cm. long, bibracteolate below apex, scabrous; hypanthium yellowish green, turbinate, 10-sulcate, 20 mm. high, 20-22 mm. broad, puberulous; calycine lobes longer than corolla, green, 8-9.5 cm. long,

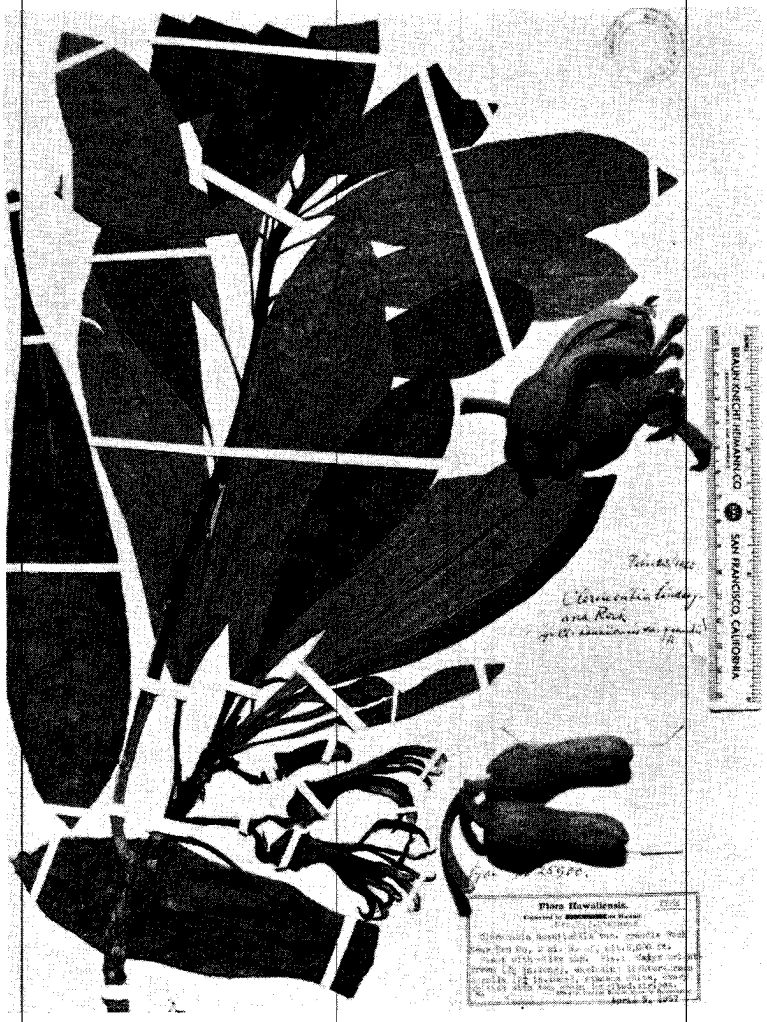

FIGURE 2.—*Clermontia lindseyana.*

5-6 mm. broad, puberulous; corolla 7-9.5 cm. long, pale green, inside of petals white, covered on outside with whitish hair; staminal tube white, glabrous, 5 cm. long; anthers white, the two lower strongly penicillate; berry globose, orange yellow, 5-5.5 cm. in diameter, deeply furrowed when immature, smooth when ripe.

Hawaii: Northeastern slopes of Mauna Kea in mixed forest above Onomea, in Puakala Paddock 1, Papaikou, 4,500-6,000 feet altitude, March 1957, Thomas Lindsey, *Rock 25768,* in bud only; 2 miles west of Puu Oo, 6,000 feet altitude, Thomas Lindsey and W. J. Stephens, *type 25900* in Bishop Museum; eastern slopes of Mauna Kea, Puu Akala, 6,000 feet, January 1958, *Rock 26030,* in Bishop Museum; eastern slopes of Mauna Kea, growing on fallen log of *Acacia koa hawaiiensis,* 5,500 feet altitude, Thomas Lindsey, March 25, 1962.

This species of *Clermontia* has the largest flowers and fruits of any *Clermontia* known. It is intermediate between *C. hawaiiensis* and *C. kakeana,* from which it differs mainly in the much larger flowers, in the hypanthium which is sulcate instead of ribbed, and in the large fruits which are globose and smooth when mature. It differs also in the leaves, which are densely pubescent beneath. The corolla lobes are white, star-shaped, and not green as in the other two species. Named in honor of Thomas Lindsey, who first discovered the species and who, with his wife, is keenly interested in Hawaiian Lobelioideae and continues to explore the mountains of Hawaii for species of this interesting group of plants. When I made this species a variety of *C. hawaiiensis,* I was not in possession of complete material; nor did I have the time to study the specimens at my disposal, as I was on the point of departure for Europe.

Clermontia lindseyana var. **livida** Rock, var. nov.

Arbor 3-4 m. alta; folia obovata-oblonga, apice acuta, 15-18 cm. longa, supra fusco-viridis, subtus lividus, prope marginem fusco purpurea; corolla minor, 6 cm. longa; bacca ignota.

Tree 3-4 m. tall; leaves obovate-oblong, acute at the apex, 15-18 cm. long, dark green above, deep livid purplish green, shining, the margins deep dark purple; corolla smaller than in the species, 6 cm. long, otherwise as in the species.

Hawaii: eastern slopes of Mauna Kea, Puu Akala, in open *Metrosideros* forest, altitude 6,000 feet. Collected first by Thomas Lindsey, January 1958, *type 26029* in Bishop Museum. I collected it in 1960 near the type locality in company with Mr. Lindsey and Paul Weissich.

The variety grows in more open country and is, in general, smaller than the species. The striking feature is the livid purple undersurface of the leaves.

Cyanea carlsonii Rock, B. P. Bishop Mus., Occ. Papers 22 (5): 60-63, 1957 (fig. 3).

Corolla and calyx deep purplish red, ovarian portion oblong-turbinate, 2-3 cm. long, 1.5 cm. wide at the top, uneven at the base with 10 impressed nerves; calycine lobes glabrous, nearly as long as the corolla but of unequal length, 4-4.5 cm. long, 5-7 mm. wide, pale purple toward the round mucronate apex, with a thick broad median nerve and lateral veins; corolla 4.5 cm. long, 4 mm. wide, reddish purple, the dorsal slit 2 cm. long; stamens glabrous, the lower two penicillate; pedicels purple, 8-10 mm. long, bibracteolate at the base, bracteoles narrow subulate, 10-12 mm. long, 1 mm. wide; immature fruit purple, unripe seeds dark purplish red, glossy, shining.

As anticipated, this species is closely related to *C. hamatiflora* of Maui, from which it differs in the glabrous, finely denticulate leaves, the calycine lobes that are nearly as long as the corolla, which is deep purplish, not hamate and not magenta red. Both species have calycine lobes of unequal length. *C. carlsonii, C. hamatiflora, C. procera,* and *C. leptostegia*—the first from Hawaii, the second from Maui, the third from Molokai, and the last from Kauai—undoubtedly represent the oldest types of *Cyanea.* All have sessile leaves and very short peduncles. The rarest of all is *C. carlsonii,* of which only a single plant is known.

When I collected this species in company with Norman Carlson and L. W. Bryan no flowers or fruits were found. I described the plant on the strength of its leaves and the isolated region in which it grew, recognizing at once its relationship to *C. hamatiflora,* a species found only in the forests of Waikamoi on the northern slopes of Haleakala, east Maui. Later, Mr. Carlson sent me several inflorescences, but they were past flowering; only one flower was in sufficiently good condition to allow the preceding description.

Cyanea truncata Rock var. **juddii** (Forbes) St. John.

Oahu: right side of Kaaawa Valley, windward side of Koolau Range, altitude 1,500 feet, November 14, 1959, James Y. H. Pang.

The plant collected by Mr. Pang had a single stemmed submuricate trunk 1-2 meters tall; the densely bracteate peduncles were 13-15 cm. long. The species and variety are confined to the windward side of the Koolau Range, where they grow in dense rain forest.

Cyanea regina (Hbd.) Rock.

Oahu: Niu Valley, extreme left branch, above three waterfalls, near streambed with *Touchardia latifolia,* February 7, 1960, James Y. H. Pang, Nellie K. H. Pang, and Adrian Brash.

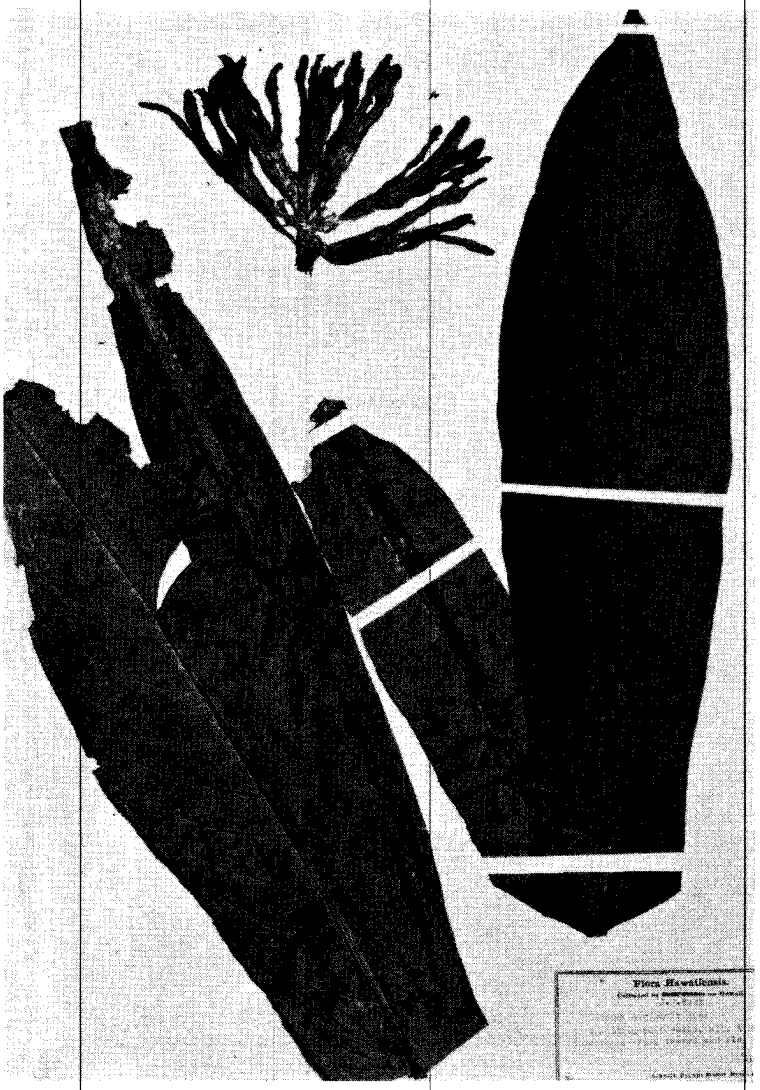

FIGURE 3.—*Cyanea carlsonii.*

This is the first time that this rare species, long believed to have become extinct, has been re-collected in the type locality since the days of Hillebrand (1870). The site is nearly inaccessible, necessitating climbing ropes over the waterfalls. The approach to the region is through forest of the introduced *Spondias dulce,* trees of huge size, the seeds of which are spread by birds. One of the living plants of *Cyanea regina* collected by Mr. Pang has survived and is growing in the greenhouse at 3860 Old Pali Road, Honolulu. It has flowered once but has set no fruit.

Cyanea densiflora Rock (fig. 4).

Cyanea pilosa densiflora Rock, Indigenous Trees of Hawaiian Islands, 508, 1913; Monog. Hawaiian Lobelioideae, B. P. Bishop Mus., Mem. **7** (2) : 273, pl. 154 (misprinted *Cyanea pilosa densifolia*), 1919.

Folia obovato-oblonga usque oblonga, subcarnosa, subtus alba vel argentea, supra viridia; pedunculus 15 mm. longus, 10-16 florus; corolla alba vel purpurascenti-tincta; tubus filamentorum albus glaber; antherae albae, albohirsuta; bacca aurantiaca, sparse hirsuta, 10-costata.

Hawaii: in dense swampy forest of Naalehu, southern slopes of Mauna Loa, alt. 1,300 m., Jan. 9, 1912, *Rock 10001,* in Bishop Museum.

According to Wimmer this plant was collected by Macrae on the "Island of Owhyhee on Mount Kaah" [Hawaii, Mauna Kea]. I have not seen Macrae's plant, and Wimmer does not state in what herbarium it is preserved.

A. Gray's *Cyanea pilosa* is based on a fragmentary specimen, as can be seen by the photograph of the type in the Gray Herbarium [Rock, B. P. Bishop Mus., Mem. **7** (2) : pl. 153]. The various varieties I had established of that species are actually good species, and I herewith raise them to specific rank.

Cyanea bondiana Rock.

Cyanea pilosa bondiana Rock, Indigenous Trees of Hawaiian Islands, 508, 1913; Monog. Hawaiian Lobelioideae, B. P. Bishop Mus., Mem. **7** (2) : 275, 1919.

Folia obovato-oblonga, utrinque acuminata, 10-14 cm. longa et 3.5-5.5 cm. lata, coriacea, supra glabra, subtus molliter dilute fusco-tomentosa, breviter petiolata; pedunculus 3 mm. longus, pauciflorus; corolla purpurea, sparse hirsuta; bacca globosa, lutea, glabra.

Hawaii: Kohala Mountains, in dense swampy forest, 7 miles above Awini, near summit, altitude 5,000 feet, flower buds and fruit, June 1910, *Rock 8727,* in Bishop Museum.

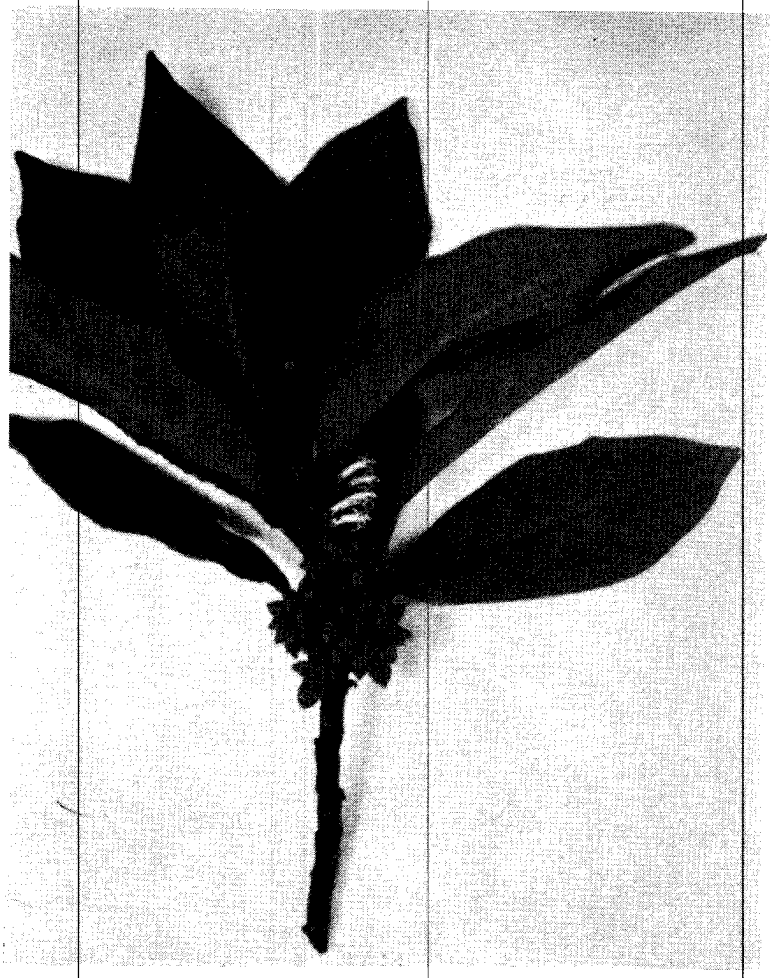

FIGURE 4.—*Cyanea densiflora.*

Cyanea megacarpa Rock (fig. 5).

Cyanea pilosa megacarpa Rock, Indigenous Trees of Hawaiian Islands, 508, 1913; Monog. Hawaiian Lobelioideae, B. P. Bishop Mus., Mem. **7** (2) : 275, 1919.

Folia obovato-oblonga 20-22 cm. longa et 10 cm. lata, apice obtusa, ad basin abrupte attenuata in petiolum carnosum 5 cm. longum, supra parce, subtus sparse hirsuta; bacca globosa, 22 mm. in diam., coronata lobis late triangularibus 8 mm. longis; flores ignoti.

FIGURE 5.—*Cyanea megacarpa.*

Hawaii: Mountains of Kohala in swampy forest back of Waimea along the Alakahi gorge, altitude 4,200 feet, fruiting, June 1910, *Rock 8728*, in Bishop Museum.

Cyanea floribunda E. Wimmer, Das Pflanzenreich, Camp.-Lobel. Suppl., 761, 1953.—Degener, New Illustrated Flora, family 339, 1956.

Cyanea pilosa glabrifolia Rock, Indigenous Trees of Hawaiian Islands, 508, 1913; Monog. Hawaiian Lobelioideae, B. P. Bishop Mus., Mem. **7** (2) : 273, pls. 40, 41, 1919.

Cyanea pilosa var. *glabrifolia* Rock, E. Wimmer, Das Planzenreich, Camp.-Lobel. Suppl., 77, 1956.

This plant, according to Wimmer, was first collected by Remy (no. 303) on the island of Hawaii. I did not see his specimen, but it is doubtful if it belongs here. First, Wimmer upheld my variety of *C. pilosa* Gray, but later he published *C. floribunda* in the same work without stating that it is identical with *C. pilosa* var. *glabrifolia*. A few years ago, when looking over the Lobelioideae in the Vienna Herbarium, I saw Wimmer's type of *C. floribunda* and recognized at once that it is identical with my *C. pilosa glabrifolia*. As previously explained, the varieties of *C. pilosa* Gray that I established are, like this one, different species. In Vienna, in January of 1961, I saw Wimmer and told him that his *C. floribunda* was identical with the above variety. If he mentioned it in his supplement, which he finished shortly before his death in May of that year, I am not aware of it. The plant is not as hirsute in live specimens as it is figured by Degener; but in comparison to *C. pilosa* Gray, the leaves appear glabrous.