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REVISION OF
THE GENUS CHEIRODENDRON NUTT.
EX SEEM.

FOR THE HAWAIIAN ISLANDS

EARL EDWARD SHERFF

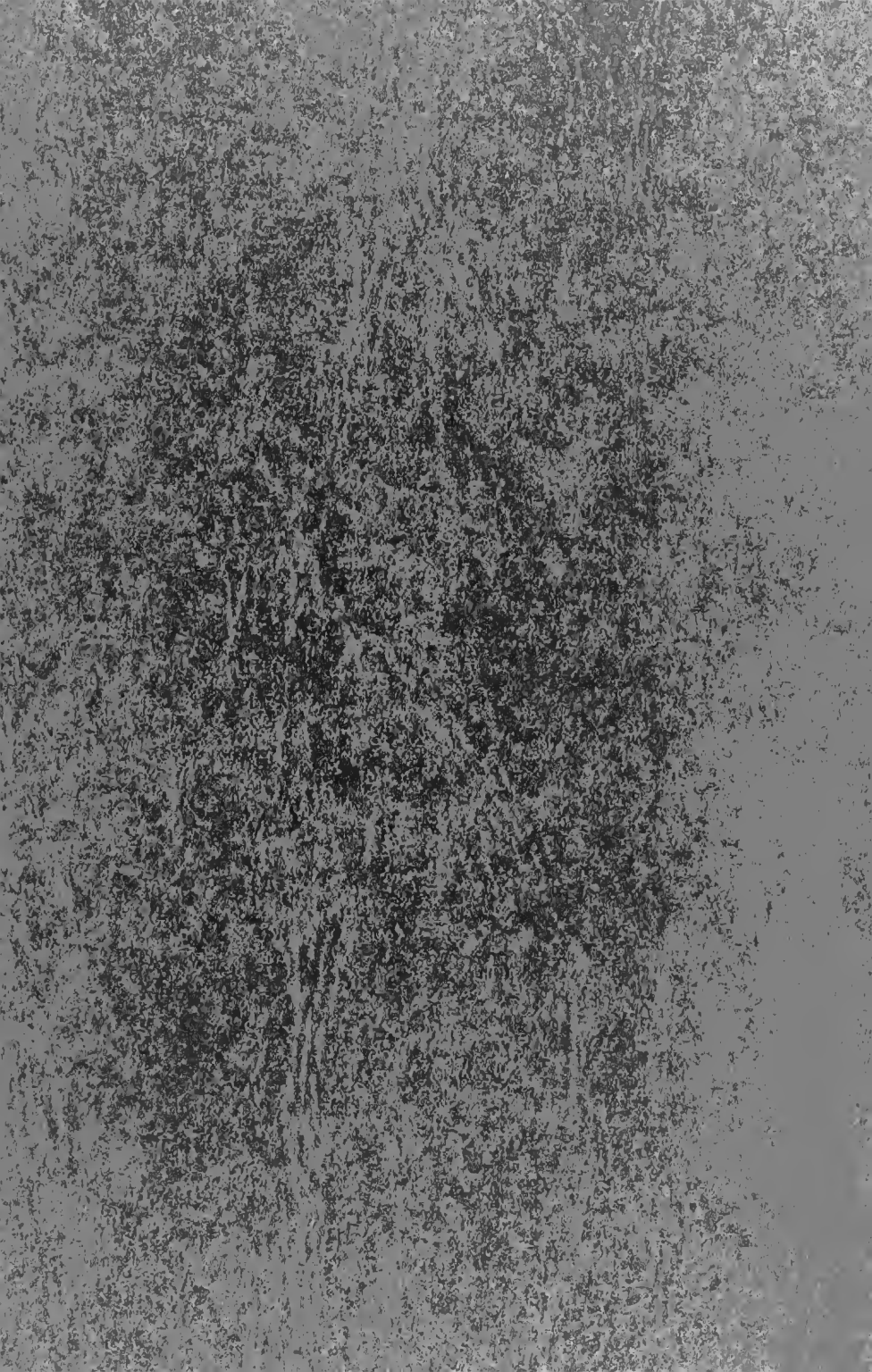
FIELDIANA: BOTANY

VOLUME 29, NUMBER 1

Published by

CHICAGO NATURAL HISTORY MUSEUM

NOVEMBER 11, 1954



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EARL EDWARD SHERFF
Research Associate, Systematic Botany

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CHICAGO NATURAL HISTORY MUSEUM
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PRINTED IN THE UNITED STATES OF AMERICA
BY CHICAGO NATURAL HISTORY MUSEUM PRESS

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Revision of the Genus *Cheirodendron* for the Hawaiian Islands

INTRODUCTION AND HISTORICAL NOTES

The history of *Cheirodendron* as a genus may be said to begin with the name *Aralia trigyna* Gaud. in Freycin. Voy. tab. 98, a plate published in 1826 and sufficient under the International Rules (art. 44) to validate the epithet *trigyna*. Gaudichaud's binomial *Aralia trigyna* was reinforced with a Latin description (*op. cit.* 474) early in, and not later than March, 1830. In September of the same year¹ De Candolle (Prodr. 4: 253) published the new name "*Panax? Gaudichaudi*" for Gaudichaud's plant, the type plate of which he cited but the description of which, published only a few months earlier, had escaped his notice (*cf.* his words, "descr. adhuc ined."). The "*Panax? Gaudichaudi*" of De Candolle was adopted shortly afterwards by Hooker & Arnott, Bot. Beechey's Voy. 84. 1832. They even proposed two additional species, both likewise referred and in a similarly interrogative way to the genus *Panax*: *Panax? ovatum* and *Panax? platyphyllum*. The first of these was founded upon a single specimen with "neither flower nor fruit." This had been found on the Island of Oneeheow, today called Niihau. It seems never to have been re-collected there. We shall return to it below. The second was founded upon specimens from the Island of Oahu.

In 1854, Asa Gray (Bot. U. S. Explor. Exped. 719) transferred De Candolle's epithet to *Hedera*, making the new combination *Hedera Gaudichaudi* (DC.) A. Gray. For material from "Oahu, and the western part of Maui" he erected a var. β , describing it as having leaflets more often 3, subovate, scarcely denticulate or even very entire. He considered it as "undoubtedly the *Panax? ovatum* of Hooker & Arnott," but made no attempt to use the epithet *ovatum* with a varietal status. For "*Panax? platyphyllum*" of Hooker & Arnott, Gray used the binomial *Hedera platyphylla*.

¹ See page 20, footnote.

M. SMITH
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In making his two transfers of Hawaiian species, along with two more of New Zealand species, to *Hedera*, Gray was influenced obviously by their possession of "more or less united styles," leading to his conclusion that such species "surely are not real congeners of the original, North American *Araliae*."

In 1867, Berthold Seemann took up the name *Cheirodendron* from Nuttall's manuscripts (Herb. Brit. Mus.) and published it (Jour. Bot. 5: 236) for a new genus in his Revision of the Natural Order Hederaceae. He included, in the following order, (1) *Ch. Gaudichaudii* (DC.) Seem. and (2) *Ch. platyphyllum* (H. & A.) Seem. of the Hawaiian Islands; (3) *Ch. laetivirens* (Gay) Seem. and (4) *Ch. valdiviense* (Gay) Seem. of Chile; and (5) *Ch. samoense* (A. Gray) Seem. of the Samoan Islands. The genus was described as closely allied to *Pseudopanax* C. Koch, from which it differed "by its denticulate calyculus and stigmas seated on a stylopodium."

Since Seemann's day, the Chilean and Samoan species included by him have been excluded by other workers, leaving only the first two species, *Ch. Gaudichaudii* and *Ch. platyphyllum* in *Cheirodendron*.

In 1888, Hillebrand (Fl. Haw. Isl. 147-149) presented a revised treatment of *Cheirodendron*, retaining Seemann's two Hawaiian species, but giving for *Ch. Gaudichaudii* five "forms," distinguished as α , β , γ , δ , and ϵ . By his form α he meant of course the species proper. To his form δ , based principally upon his own material from Mt. Kaala, Isl. Oahu, he referred as a synonym the above mentioned *Panax? ovatum* H. & A.

His treatment was followed soon afterwards by that of Drake del Castillo (Illustr. Fl. Ins. Mar. Pacif. 181 and 182. 1890). Drake kept *Cheirodendron* as a part of *Panax* L. For Hillebrand's forms β - ϵ he employed a varietal status without, however, designating them except by letter. He added an enigmatic additional "var. ζ " based upon *Remy* 497 from Oahu, "foliis ovatis subcordatis," a plant not as yet seen by me.

In 1897, Heller (Minnesota Bot. Studies 1: 870) made the new combination, *Cheirodendron trigynum* (Gaud.) Heller, a name that takes clear precedence over *Ch. Gaudichaudii*. In 1912, L veill  (Fedde, Repert. Spec. Nov. Regn. Veg. 10: 154) employed Heller's new name, though incorrectly attributing it solely to Gaudichaud's authorship, and described three varieties, *hawaiense*, *kauaiense*, and *mauiense*, based respectively upon *Faurie*, 262, 266, and 265. A year later, Rock (Indig. Trees Haw. Isl. 359-365, pls. 146-148) unfortunately took up again the ill-advised name *Cheirodendron Gaudi-*

chaudii. As with Drake del Castillo at an earlier day, Hillebrand's several "forms" ranked with Rock as varieties.

In 1925, Hochreutiner (Candollea 2: 487), apparently unaware of Lévillé's earlier paper, published a new species, *Ch. Fauriei*, based upon the same type (*Faurie* 266) as was Lévillé's *Ch. trigynum* var. *kauaiense*.

In 1931, Krajina (Preslia 10: 98), apparently having seen neither Lévillé's nor Hochreutiner's paper, described a *Cheirodendron wahiawense* which reduces at once to *Ch. Fauriei* Hochr. Krajina had collected personally in the Hawaiian Islands and assembled many data. He presented two additional species that were really new, *Ch. Dominii* and *Ch. kauaiense*, also several new varieties. His illustrations were distinctive and valuable.

In 1935, Brown (Bishop Mus. Bull. no. 130: 207, fig. 30, f-n) described and illustrated a new species from the Marquesas Islands, *Ch. marquesense*. This species, outside the scope of this paper, but apparently most closely related to *Ch. kauaiense* (through the latter's var. *keakuense*), is noteworthy as being the only member of the genus growing outside the Hawaiian Islands.

More recently, a most important contribution has been made by Skottsberg (Meddel. Göteb. Bot. Trädg. 15: 416-419. 1944). For *Ch. trigynum* he described the two new varieties, *multiflorum* (since placed by me under *Ch. Helleri*) and *acuminatum*. His paper contained certain critical notes, these of special value because of the author's ripe scholarship and very keen knowledge of the Hawaiian flora.

The monographic study summarized in the following pages was undertaken upon the suggestion of Dr. Otto Degener, the widely known author of works dealing with Hawaiian plants. Small portions of the text have appeared in substantially similar form elsewhere (Sherff, Bot. Leaflet no. 5: 2-14. 1951; *ibid.* no. 6: 6. 1952). As in former monographic studies, I have made photographs of most of the types and other exceptionally important specimens. These are cited by number in their proper place in the text. A complete set is deposited with Chicago Natural History Museum and a duplicate set is in my own possession.

The present research was made possible largely through the generous cooperation of many botanical institutions in the United States and Europe. To their respective authorities, and particularly to those of Chicago Natural History Museum, where much of the work has been done, it is a pleasure to express here my indebtedness and thanks.

Genus **CHEIRODENDRON** Nutt. ex Seem.: Description

Nutt. ex Seemann, Journ. Bot. 5: 236. 1867.

Glabrous, unarmed trees. Leaves opposite, estipulate, petiolate, digitate; leaflets petiolulate, toothed or entire, emitting a strong caroty or oily odor. Flowers mostly in umbellets on the ultimate divisions of a terminal or lateral panicle, this with opposite, horizontal or subreflexed, nodally and subcalycally articulate branches. Bracts minute, opposite, subconnate into a continuous involucl subtending the umbellet and a few-toothed pseudocalyx (calyculus or pseudocalyculus of most authors) at the base of the calyx, the latter's teeth presently deciduous (in rare cases dilated and leaf-like). Calyx gamosepalous, with 5 short teeth. Petals 5 or rarely 6, triangular to oblong, valvate, minute (*circ.* 2-3 mm. long). Stamens normally 5, their filaments subulate, anthers ovoid and included or but slightly exerted. Ovary inferior, 2-5-carpellate and -loculate. Styles united into a short or obsolete conical column, this expanded into a disk or stylopodium below and bearing 2-5 persistent stigmas at top. Fruit a drupe, globose to compressed-globose, subtruncate at top, the exocarp somewhat fleshy, the surface coarsely 2-5-angulate and finely costate when dry; pyrenae laterally compressed, coriaceous, in number matching the stigmas.

CONSPECTUS OF SPECIES, VARIETIES, AND FORMS

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KEY

- a. Stigmas and pyrenae normally 5, nervation of leaflets brochidromous.
- b. Leaflets very entire, flowers small (± 4 mm. long above calyculus), body of drupe about 3.7–4.4 mm. long and 3.7–4.2 mm. wide; native of Kauai 2. *Ch. kauaiense* and vars.
- b. Leaflets commonly somewhat shallow- or obsolete-denticulate, flowers larger (± 6 mm. long above calyculus), body of drupe about 5.3–7.3 mm. long and 4.7–6 mm. wide; native of Oahu.
1. *Ch. platyphyllum*.
- a. Stigmas and pyrenae mostly 2–4.
- b. Stigmas and pyrenae normally 4.
- c. Leaflets widely ovate to subrotund-ovate, at base truncate or subtruncate, umbellets up to 3–5-flowered, thickish pedicels 2–3.5 mm. long; native of northeastern Oahu.
4. *Ch. trigynum* var. γ . *Fosbergii*.
- c. Leaflets oblong to broadly oval-oblong, at base truncate to broadly cuneate, umbellets more often 9–14-flowered, pedicels slender and 3–8 mm. long; native of East Maui.
4. *Ch. trigynum* var. ϵ . *oblongum* f. 1. *latius*.
- c. Leaflets mostly lanceolate to broadly lance-oblong or narrowly oblong-ovate or -obovate, basally cuneate or rarely rounded, umbellets 6–10(–15)-flowered, slender pedicels 3–6.5 mm. long; native of East Maui.
4. *Ch. trigynum* var. δ . *mauiense*.
- b. Stigmas and pyrenae normally 2.

- c. Leaflets broadly orbicular-deltoid to transversely oblong, principal ones 9–12.5 cm. wide, their base very wide and truncate to subcordate; native of northeastern Kauai.
5. *Ch. Fauriei* var. β . *Macdanielsii*.
- c. Leaflets otherwise.
- d. Leaflets oval-oblong, the small, regular teeth commonly 8–10 to an edge, umbellets mostly 7–15-flowered.
6. *Ch. Helleri* var. γ . *multiflorum*.
- d. Leaflets broader.
- e. Leaflets widely ovate to orbicular or even transversely oblong, the marginal teeth mostly slender, antrorse, and more or less uncinulate, stigmas under 0.5 mm. long in fruit. 5. *Ch. Fauriei* sensu stricto.
- e. Leaflets somewhat narrower, from ovate to broadly ovate- or subrhomboid-oval, stigmas 1–1.5 mm. long in fruit.
- f. Leaflets 5–8(–9) cm. long (as to blade) and 3–7 cm. wide, foliar teeth not uncinulate, umbellets up to 11- or rarely to 13-flowered, drupes about 8 mm. tall including stigmas; native of central Kauai.
6. *Ch. Helleri* sensu stricto.
- f. Leaflets slightly smaller, many foliar teeth uncinulate, umbellets up to 7-flowered, drupes 5–6 mm. long including stigmas; native of northwestern Kauai.
6. *Ch. Helleri* var. β . *microcarpum*.
- e. Leaflets more or less obovate-rotundate to very broadly obovate-oblong, entire. . . 6. *Ch. Helleri* var. δ . *sodalium*.
- b. Stigmas and pyrenae commonly (but not consistently) 3.
- c. Blade of leaflets commonly broader than long, transversely reniform-oval, at base subtruncate to rarely truncate-contracted, at apex subtruncate to subrotundate (but mucronate to abruptly or sharply apiculate), nervation craspedodromous; native of central and northwestern Kauai.
3. *Ch. Dominii* sensu stricto.
- c. Blade of leaflets commonly otherwise.
- d. Blade of leaflets subentire or but remotely and obsoletely denticulate, usually thickish and subglossy; native of Oahu. 4. *Ch. trigynum* var. ι . *Hillebrandii*.
- d. Blade of leaflets commonly denticulate.

- e. Blade of leaflets (at least for larger leaves) more or less cordate at base, up to 17.5 cm. long and to 10 cm. wide, panicle up to ± 2.5 dm. long (including peduncle) and to 1.6 dm. wide, umbellets often 10–15-flowered; native of northwestern Hawaii.

4. *Ch. trigynum* var. β . *subcordatum*.

- e. Blade of leaflets truncate to cuneate at base and smaller, panicle smaller.

- f. Leaflets mostly wide-ovate to orbicular, at apex abruptly acuminate to caudate (in addition to the varieties listed below, anomalous forms of *Ch. trigynum* var. γ . *Fosbergii* from northeastern Oahu to be looked for here).

- g. Panicles mostly many-flowered and congested, under 12 cm. long including peduncle; native of Maui.

4. *Ch. trigynum* var. κ . *confertiflorum*.

- g. Panicles fewer-flowered, open, a little larger; natives of Hawaii.

- h. Blade of leaflets 4–8 cm. long and 3–6.5 cm. wide, fruiting pedicels up to 8 mm. long; native of northwesternmost Hawaii.

4. *Ch. trigynum* var. ξ . *acuminatum*.

- h. Blade of leaflets 7–10 cm. long and 4–8(–10) cm. wide, fruiting pedicels commonly 5 rarely to 6 mm. long; natives of northwestern and southeastern Hawaii. 4. *Ch. trigynum* var. \omicron .

Degereri and f. 1. *pauciflorum*.

- f. Leaflets mostly otherwise.

- g. Leaflets mostly oblong and obtuse at apex.

- h. Umbellets 2–5-flowered.

- i. Leaflets with many slender-uncinulate teeth, drupes large, 6–7.2 mm. long including the coarse stigmas; native of northwestern Hawaii.

4. *Ch. trigynum* var. ν . *Ilicoides*.

- i. Leaflets mostly with coarser teeth; drupes small, under 5 mm. long including stigmas; native of Lanai and West Maui.

4. *Ch. trigynum* var. μ . *Skottsbergii*.

- h. Umbellets mostly 6–14-flowered.

- i. Panicles usually numerous and small, 3.5–7 (rarely to 9.5) cm. long including peduncle, drupes under 4 mm. thick.
- j. Leaflets elongate- or elliptic-oblong, seldom uncinulate-serrate; native of southern East Maui. . . . 4. *Ch. trigynum* var. *ε. oblongum*.
- j. Leaflets oval-oblong, mostly uncinulate-serrate; native of eastern Molokai.
 - 4. *Ch. trigynum* var. *ζ. molokaiense*.
- i. Panicles few and large, often 12–23 cm. long including peduncle, drupes 5–6 mm. thick; native of Hawaii.
 - 4. *Ch. trigynum* sensu stricto.
- g. Leaflets otherwise.
 - h. Leaflets thinnish, dull, mostly broad-oval to -ovate, obtuse to emarginate at apex, drupes 3.5–5 mm. thick; native of Oahu, Molokai, and Lanai. . . . 4. *Ch. trigynum* var. *θ. halawanum*.
 - h. Leaflets mostly narrower, at apex acute to acuminate.
 - i. Leaflets ovate-lanceolate, at apex acute.
 - j. Panicle solitary, 12–15 cm. long including peduncle, stigmas of fruits spreading and tapering, 1.5–3 times as long as thick, mostly darkish; native of Lanai.
 - 4. *Ch. trigynum* var. *λ. Rockii*.
 - j. Panicles usually several to a spray, under 9.5 cm. long including peduncle; natives of eastern Molokai and West Maui.
 - k. Leaflets under 6.5 cm. long and 3.5 cm. wide; fruiting stigmas subglobose or depressed-globose, more or less bony-indurated and stramineous.
 - 4. *Ch. trigynum* var. *η. osteostigma*.
 - k. Leaflets larger, fruiting stigmas oblong to linear-oblong, not or scarcely bony in appearance. . . . 4. *Ch. trigynum* var. *ζ. molokaiense* f. 1. *angustius*.
 - i. Leaflets narrower or broader but at apex acuminate; natives of Maui.

j. Leaflets oblong, broadly ovate or even obovate, umbellets about 4- or 5-flowered, drupes 3.5–4 mm. thick.

4. *Ch. trigynum* var. *κ. confertiflorum*.

j. Leaflets mostly lanceolate to lance-oblong, umbellets 6–15-flowered, drupes 4–4.5 mm. thick. . . . 4. *Ch. trigynum* var. *δ. mauianse*.

ABBREVIATIONS USED FOR HERBARIA CITED

Arn.	Herb. Arnold Arboretum, Jamaica Plain, Massachusetts.
Bish.	Herb. Bernice P. Bishop Museum, Honolulu.
Calif. Acad.	Herb. California Academy of Sciences, San Francisco.
Chi.	Herb. Chicago Natural History Museum, Chicago.
Corn.	Herb. Cornell University, Ithaca.
Del.	Herb. Delessert, Geneva.
Goth.	Herb. Botanical Garden of Gothenburg.
Gray	Herb. Gray, Harvard University, Cambridge, Massachusetts.
Kew	Herb. Royal Botanic Gardens, Kew.
Minn.	Herb. University of Minnesota, Minneapolis.
Mo.	Herb. Missouri Botanical Garden, St. Louis.
N.Y.	Herb. New York Botanical Garden, New York City.
Par.	Herb. Museum of Natural History, Paris.
Phila.	Herb. Academy of Natural Sciences, Philadelphia.
Prague	Herb. Charles University, Prague.
Stockh.	Herb. Botanical Museum of Stockholm.
Univ. Calif.	Herb. University of California, Berkeley.
U. S.	Herb. United States National Museum, Washington, D.C.
Yunck.	Herb. Dr. T. G. Yuncker, Greencastle, Indiana.

1. ***Cheirodendron platyphyllum*** (Hook. & Arn.) Seem. Journ. Bot. 5: 236. 1867; *Panax? platyphyllum* Hook. & Arn. Bot. Capt. Beechey's Voy. 84. 1832; *Hedera platyphylla* (Hook. & Arn.) A. Gray, Bot. U. S. Explor. Exped. 720, pl. 91. 1854.

Small tree, about 2.5–6 mm. tall. Flowering branchlets (when dry) sulcate, 4–6 mm. thick. Leaves ternate, petiole commonly

6–12 cm. long; leaflets petiolulate, blade commonly broader than long, widely and transversely reniform-oval to rotund-deltoid, usually 4–7 cm. long and up to a half wider, widest near the truncate or subtruncate rarely cuneate and sometimes suboblique base, at the emarginate to truncate or broadly rounded apex apiculate and more or less uncinulate, at margins thickened and very entire or more often remotely and minutely serrulate, coriaceous (or when dry chartaceous, and then dull to somewhat glossy, yellowish-green to brown); nervation pinnate, lateral nerves brochidodromous; petioles usually 3–5 cm. long. Panicles large, open, single or in three's, 8–16 cm. long peduncle included and 7–12 cm. wide, 50–80-flowered, branches finally spreading to diffuse; umbellets up to 6- or more rarely to 8-flowered; calyx 5–6-toothed, the teeth 0.3–0.5 mm. long; corolla valvate, on outside obscurely greenish-brown, on inside pale; petals 5 or 6, thickish, opaque, ovate, 3.2–3.5 mm. long, all separate at base in anthesis, at apex cucullate and apiculate, early deciduous; stamens 5 or 6, filament ± 1.6 mm. long, anther circ. 1.7–2.1 mm. long; style persisting on drupe and projecting 1.5–1.8 mm. above it, resting on a stylopodium; stigmas commonly 5 (rarely 4, very rarely 3), scarcely protruding; drupe brownish-black, fleshy, with as many pyrenae as stigmas, subglobose, 5.3–7.3 mm. long and 4.6–6 mm. thick, usually 5-angled but scarcely rugose when dry; pedicels 3–6 mm. long.

Type: Collected by *G. T. Lay & A. Collie* (on *Captain Beechey's Voyage*) on Island of Oahu (presumably at Kew).

Distribution: In the Koolau and Waianae ranges of Oahu.

Specimens examined (all from Oahu or presumably so): *Annie M. Alexander & Louise Kellogg* 5,194, leaves fragrant when bruised, on swamp flat . . . summit of Kaala, alt. 5,030 ft., Feb. 13, 1947 (Univ. Calif.); *R. W. Baxter*, Poamoho Trail, Paalaa, right-hand ridge, alt. 2,000 ft., November, 1938 (Mo.); *Captain Beechey*, Oahu, May 19–30, 1826 (*ex herb. Brownii in Chi.*, type collection, my photograph no. 4,126); *H. F. Bergman*, wet slope, alt. 4,000 ft., summit of Kaala, Feb. 11, 1928 (Bish.); *E. Bryan*, Mt. Kaala, January, 1920 (Bish.); *Bush & Topping* 3,762, shrubby hillside, Maakua Gulch, July 15, 1934 (Calif. Acad.); *Otto Degener* 9,584, at summit, Mt. Kaala, Feb. 11, 1928 (Mo.; N.Y.); *Degener & Eichi Masunaga* 2,050, open, exposed region, near summit of Konahuanui, Apr. 2, 1926 (Phila.); *Degener, Park, & Kwon* 9,573, summit of Pig-God Trail, Punaluu, Jan. 17, 1932 (N.Y.); *Degener, Park, Potter, Bush, & Topping* 9,993, Poamoho Trail, wind-swept summit,

Laie, Aug. 18, 1935 (Chi.; Corn.; Del.; Mo.; N.Y.; U.S.); *idem* 11,317, rain-forest, summit of Pig-God Trail, July 4, 1935 (N.Y., my photograph no. 4,128; Phila.); *Degener, Henry Wiebke, & Eichi Masunaga* 2,050, near summit of Konahuanui, Apr. 2, 1926 (Goth.); *Charles N. Forbes*, Koolauloa Mts., between Punaluu and Kaipapau, May 8-13, 1909 (Bish.); *Forbes & C. M. Cooke*, same place, May 3-8, 1909 (Chi.); *D. Wesley Garber* 80, peak of Mt. Konahuanui, Nov. 23, 1919 (Bish.); *Gaudichaud*, Hawaiian Isls., September and October, 1836 (Gray; Par.); *J. Arthur Harris* C242,128, tree, summit of Puu Kaala, alt. 4,000 ft., Aug. 24, 1924 (Goth.); *Harris* C242,174, shrub on windward side of ridge between Kahana and Wahiawa valleys, Koolau Range, alt. about 2,200 ft., Aug. 31, 1924 (Goth.); *Harris* C242,224, ridge of Koolau Range, between same two valleys, alt. about 2,400 ft., Sept. 7, 1924 (Bish.; Goth.); *William H. Hatheway, H. A. Miller, & N. Morton* 337, tree 25 ft. tall with trunk 10 in. in diameter at breast height, dominant with *Metrosideros* in cloud-zone mossy forest, north slope of Mt. Kaala, alt. 3,800 feet., Sept. 9, 1950 (Chi.; Goth.; Phila.); *Amos A. Heller* 2,244 *pro parte*, on and near summit of Konahuanui, May 2, 1895 (Arn.; Chi.; Gray; Mo.; N.Y.; Univ. Calif.; U.S.; regarding further use of this no. 2,244 by Heller, see under *Ch. kauaiense*, especially the first footnote); *William Hillebrand*, Mt. Kaala, August, 1869 (*ex herb. berol. in* Bish.); *Hillebrand* 259, alt. 3,000-4,000 ft., Mt. Konahuanui and Mt. Kaala (Kew); *Hillebrand & Rev. John M. Lydgate*, Konahuanui (Bish.); *Edward Y. Hosaka* 130, alt. 4,000 ft., in rain-forest, Waianaueka, Mt. Kaala, Feb. 2, 1930 (Bish.; Calif. Acad.); *Mark Kerr* (*Degener's distrib. no.*) 21,686, Aiea trail near summit of Koolau Range, Feb. 23, 1947 (Chi.; N.Y.); *N. H. Krauss*, alt. 3,800-4,000 ft., Mt. Kaala, Jan. 8, 1933 (Bish.); *Lay & Collie, Capt. Beechey's Voyage*, see *Beechey*; *L. H. MacDaniels* 23, rain-forest, alt. 800 m., Waipio-Waiawa Ridge, Oct. 6, 1926 (Bish.); *MacDaniels* 94, moist situation, alt. 650 m., Konahuanui, Nov. 1, 1926 (Bish.); *Horace Mann & William T. Brigham* 605 *p. p.*, high on Konahuanui etc. (Chi.; Gray); *Harold Morley*, rain-forest, alt. 2,600 ft., ridge south of Kipapa Gulch, Dec. 10, 1933 (Bish.); *K. Nitta* 26, alt. 4,000 ft., Mt. Kaala, Oct. 13, 1929 (N.Y.); *Joseph F. Rock*, main ridge above Palolo Crater, Lanipo, Aug. 16, 1908 (Arn.; Bish.); *G. W. Russ*, top of main range, Waiawa, March, 1930 (Bish.); *Russ*, Nuuanu, *p. p.* top of Lanihuli, July 19, 1933 (Bish.); *Olof H. Selling* 3,596, Kaala, Sept. 25, 1938 (Bish.; Goth.); *Carl Skottsberg* 1,844, ridge above Kahana Bay, alt. 750 m., Sept. 17, 1926 (Bish.; Goth.); *D. LeRoy Topping* 2,965, Mt. Konahuanui, Dec. 28, 1924 (Arn.;

Univ. Calif.; N.Y.); *U.S.S. Pacif. Explor. Exped. under Capt. Wilkes*, Hawaiian Islands, 1838-42 (N.Y.); *T. G. Yuncker* 3,629, native name *Wapalapa*, alt. 3,000 ft., Waikane-Schofield Trail, at summit, Oct. 16, 1932 (Chi.; Yunck.).

The leaflets are occasionally very cuneate in their lower half (e.g., *Degener et al.* 11,317 and some of *Heller* 2,244) and would seem to belong to a distinct *forma*, but apparently this variation is too fickle to warrant segregation even as a *forma*.

Native name: *Lapalapa*. The leaves are swayed by the slightest breeze ("Le nom indigène est une onomatopée imitant le bruit particulier des feuilles agitées."—Hochreutiner, *Candollea* 2: 487. 1925).

2. ***Cheirodendron kauaiense*** Krajina, *Preslia* 10: 96, *tab.* 3, *fig. a-m*, *tab.* 5, *fig.* 1. 1931; *Cheirodendron kauaiense* var. *typicum* Krajina, *op. cit.* 98.

Blades of leaflets all or nearly all definitely wider than long.

Ch. kauaiense sensu stricto.

Blades of leaflets all or nearly all longer than wide.

Blades of leaflets widely oval to ovate var. β . *keakuense*.

Blades of leaflets all or at least many of them oblong or narrowly oblong-obovate var. γ . *Forbesii*.

Tree 6-12 m. tall; flowering branchlets when dry 3.5-6 mm. thick, rugose and sulcate. Leaves ternate, petiole 5-12 cm. long; leaflets petiolulate, their blade dull to somewhat glossy, widely ovate to transversely reniform-oval or -ovate and a little broader than long, 4.5-8(-9) cm. long but up to 11.5 cm. wide, broadest in basal third or half, at base rarely subcordate commonly subtruncate to very broadly cuneate-contracted, at the commonly obtuse or rounded apex somewhat apiculate, very entire, coriaceous or when dry chartaceous, at margin slightly crisped and thickened; nervation pinnate, lateral nerves brochidromous; petiolule 2.5-4.5 cm. long. Panicle at times large, 8-14.5 cm. long including peduncle and 8-13 cm. wide, open or dense, at times 200-350-flowered, branches more or less divaricate; umbellets up to 5-7-flowered; calyx 5-toothed, teeth 0.2-0.3 mm. long. Corolla valvate, dark outside, greenish within; petals hardly transparent, outwardly sulcate, elliptic-ovate, all separate to their base at anthesis, at apex apiculate and somewhat cucullate. Stamens 5, filament 1.9-2.2 mm. long, anther 1.8-2 mm.

long. Stylopodium at anthesis only 0.5 mm. tall, scarcely or not at all projecting above calyx-teeth. Style very short or obscure, persistent. Stigmas 5 or rarely but 3 or 4, in fruit becoming slender-corniculate and 1-1.5 mm. long. Drupe black or brownish-black, fleshy, globose, 4-5 mm. long (including stigmas) and 3.7-4.2 mm. thick, commonly 5- rarely 3- or 4-angled, rugulose, pyrenae (3-4)-5, exocarp very thin.

Type: Collected by *Vladimir Krajina*, in western part of swamp forest, alt. about 1,200 m., Alakai Swamp, near Kilohana, north-western Kauai, Jan. 14, 1930 (Prague).

Distribution: Kauai, especially the northwestern part.

Specimens examined (all from Kauai): *Lucy M. Cranwell*, *Olof H. Selling*, & *Carl Skottsberg* 2,906, forest near Lehuamakanoi bog, Waimea, Aug. 13, 1938 (Bish.; Goth.); *Otto Degener* 9,586, Waineke Swamp, June 28, 1926 (Chi.); *Degener* 21,471, in windy, open forest, east rim of Kalalau Valley, Dec. 27, 1951 (Chi.; Gray; Kew); *Degener & Miss Amy Greenwell*, Mohihi Road, Kokee region, Jan. 13, 1952 (Chi.); *Degener & Henry Wiebke* 2,078, Waineke Swamp, Kokee, June 28, 1926 (N.Y.); *Abbé Urbain Faurie* 261, alt. 1,000 m., Waimea, March, 1910 (Arn.; Bish.); *Charles N. Forbes* 367a-K, large tree 20-30 ft. tall, Kaholuamanu, behind Waimea, September, 1909 (Bish.; Chi.); *Forbes* 1,039-K, Kalalau pali, July 3-Aug. 18, 1917 (Bish.); *Amos A. Heller* 2,244 *pro parte*, on Kaholuamanu, above Waimea, Sept. 10-16, 1895 (Bish.);¹ *Albert S. Hitchcock* 15,336, alt. 3,600 ft., Kaholuamanu, Oct. 20, 1916 (U.S.); *L. H. MacDaniels* 806, tree 6 m. tall, on slope of valley of small stream, alt. 1,300 m., Alakai Swamp, Feb. 17, 1927 (Bish.); *Joseph F. Rock*, Central Plateau, alt. 4,300 ft., September, 1909 (N.Y.); *Rock* 1,525, Halemanu, Feb. 14-26, 1909 (Bish.); *Rock* 5,646, high plateau, trail to Waialeale, Sept. 4, 1909 (Gray); *Rock* 5,702, in wet forest near Waikealoha, Kaholuamanu, Sept. 4, 1909 (Arn.); *Rock* 5,707, Waikealoha, Sept. 4, 1909 (Bish.; U.S.); *Rock* 5,963, high plateau, Sept. 10, 1909 (Arn.); *Rock* 5,965, road to Waikealoha, Sept. 10, 1909 (Gray).

Krajina (*loc. cit.*) cited three specimens collected by him on Kauai, all of them fruiting. His delineations were in part (*fig. a-c, f-k*) from flowers, which may have been taken from typical, flowering

¹ More specimens of *Heller* 2,244 from Kauai were distributed (Corn.; Par.; Phila., my photograph no. 4,127, etc.) but were erroneously labeled as a part of his similar number 2,244 from Konahuanui on Oahu, which was *Ch. platyphyllum*, a species not known from Kauai.

material collected by someone else on Kauai (e.g., *Heller* or *Rock*, each cited by him) or from his own flowering specimen which he cited as the type of his var. *keakuense* (*vide infra*).

***Cheirodendron kauaiense* var. β . *keakuense* Krajina, *op. cit.* 98.**

Different in its leaflets, these with blades longer than wide and somewhat greener.

Type: Collected by *Vladimir Krajina*, in the eastern part of the swamp forest of Alakai Swamp, alt. about 1,350 m., near Keaku Cave, Isl. Kauai, Jan. 26, 1930 (Prague).

Distribution: Known only from type locality in central Kauai.

Specimens examined: None.

It is assumed here that *Krajina*, whose work on *Cheirodendron* gives evidence of careful and thorough study, found his type, collected as he stated in flowering condition, to have each floret with 5 stigmas as a rule. If so, he was doubtless right in associating his plant, with its proportionately longer leaflets, with *Ch. kauaiense*. A different pistil, with but two stigmas, would at once suggest, however, either *Ch. Helleri* from just west of the Hanapepe River, or its var. *microcarpum* from northwestern Kauai.

***Cheirodendron kauaiense* var. γ . *Forbesii* Sherff, Bot. Leaflet no. 5: 12. 1951.**

Leaves 3- or at least for the juvenile branchlets up to 5-foliolate, petiole 3-7.5 (for juvenile leaves up to 10) cm. long, leaflets entire, membranaceous, glossy or dull above, ovate to oblong or narrowly oblong-obovate, at base widely to moderately cuneate, at tip rounded-obtuse to acuminate, blade 6-13 cm. long and 2.5-6 cm. wide. Panicle under 1 dm. long including peduncle and under 8 cm. wide, densely flowered, umbellets more often about 7- or 8-flowered; drupes 5-pyrenate, black, under 5 mm. long including stigmas and 4 mm. thick; stigmas 5, spreading; pedicel slender, finally 4-5.5 mm. long.

Type: Collected by *L. H. MacDaniels*, no. 708A, Power Line Trail, near summit, Isl. Kauai, Feb. 14, 1927 (type, Bish.).

Distribution: Eastern Kauai.

Specimens examined: *Charles N. Forbes* 257-K, vicinity of Wahiawa Swamp, August, 1909 (Bish.; U.S.); *Forbes* 266-K, same place and date (Bish., my photograph no. 4,117; Chi.; Minn.); *Forbes*

270-K, same place and date (Bish., my photograph no. 4,118, juvenile branchlet showing variation from 3 to 5 leaflets, these thinner, broader, and faintly rhombic, and apically more acuminate); *MacDaniels* 708A (type, Bish., my photograph no. 4,116).

The 5-angled drupes combine with the peculiarly shaped leaflets and their utter lack of marginal serratures to stamp this variety as very distinct from all varieties of *Ch. trigynum*, but allied with *Ch. kauaiense*. It may have formed part of Hillebrand's form ϵ (Fl. Haw. Isls. 148, *sub Ch. Gaudichaudii*. 1888), but the leaflets are not merely "subentire" as described by him, nor are the "styles 2-5." On the few drupes left on *Forbes* 266-K and the large number on the type, the styles or stigmas seem consistently 5.¹

The leaflets of the type are especially glossy on their upper surface, but on the *Forbes* specimens they are practically lusterless.

3. *Cheirodendron Dominii* Krajina, *Preslia* 10: 94, *tab.* II, *fig.* a-m and *tab.* IV, *fig.* 2. 1931.

Small tree 3-7 m., more rarely a shrub up to only 1.5 m. tall. Leaves ternate, as wide as long or wider, petiole 6.5-8.5 cm. long, delicate; leaflets slenderly petiolulate, of a vigorous green, (2.5-) 3.5-5 or more rarely up to 6 cm. long, 4.5-6.5 or even to 7.5 cm. wide, transversely reniform-oval, at base subtruncate to rarely truncate-contracted, at apex subtruncate to subrotundate but mucronate to abruptly and very sharply apiculate, on each edge subremotely dentate with 4-8 slender uncinuate teeth, thinly coriaceous, when dry more or less chartaceous, at margins slightly thickened; nervation pinnate, lateral nerves craspedodromous; petiolule 2-3.5 (-4.2) cm. long. Panicle small, as wide as or wider than long (4.7-9.5 cm. long and 6.3-10 cm. wide), more often open, 40-70-flowered, the branches diffuse to more or less spreading, umbellets (3-)4-6(-8)-flowered, the pedicels in fruit 3-6 mm. long. Florets 6-6.7 mm. long, calyx 5-toothed, short, the teeth about 0.5 mm. long. Corolla valvate, outwardly dark-purple, inwardly greenish; petals apparently 3 actually 5 (coalescence having occurred in the bud), opaque, broadly ovate or elliptic, 3-3.1 mm. long, at apex cucullate and apiculate. Stamens 2.5-2.7 mm. long, filament 1.2-1.5 mm. long and 0.3-0.6 mm. thick, anther 2.2-2.4 mm. long and 1.2-1.5 mm. wide. Ovary 2.8-3.4 mm. long, at base 1.5 near top 2.8-3.3 mm. broad, 3(-5)-ovuled. Stylopodium minute (± 0.8 mm.

¹ In determinations in some herbaria, J. F. Rock applied the designation " ϵ " to very different Kauai material, this identical with specimens later made *Ch. trigynum* var. *multiflorum* Skottsb. (*Ch. Helleri* var. *multiflorum* of this text).

tall) at anthesis, scarcely protruding above the calyx-teeth. Style persistent, rather short, 0.9–1.2 mm. tall above the drupe, stigmas 3(–4–5), commonly inconspicuous. Drupe dark-purple, fleshy, subglobose, 6–6.3 mm. long including stigmas and 4.6–4.8 mm. wide, when dry 3(–4–5)-ribbed and coarsely rugose on surface, calyx teeth extremely short and more or less appressed, pyrenae 3(–4–5), exocarp thick.

Type: Collected by *Vladimir Krajina*, in western part of swamp-forest, Alakai Swamp near Kilohana, alt. about 1,210 m., Isl. Kauai, Feb. 14, 1930 (Prague *vide cl. Krajinae coram* Sept. 11, 1951).

Distribution: From top of Mt. Waialeale, central Kauai, north-westward to near Kilohana, in far northwestern Kauai.

Specimens examined (all from Kauai): *Cranwell, Selling, & Skottsberg* 3,053, alt. about 1,550 m., pali just below summit, Waialeale, Aug. 23, 1938 (Bish.; Goth., my photograph no. 4,146); *Albert S. Hitchcock* 15,463, alt. 3,600–5,080 ft., Waialeale, Oct. 22–24, 1916 (U.S., my photograph no. 4,083).

4. **Cheirodendron trigynum** (Gaud.) Heller, Minnesota Bot. Studs. 1: 870. 1897; *Aralia trigyna* Gaud. in Bot. Freycin. Voy. tab. 98. 1826 (text, p. 474, January–March, 1830); *Panax? Gaudichaudii* DC. Prodr. 4: 253. September, 1830; *Hedera Gaudichaudii* (DC.) A. Gray, Bot. United States Explor. Exped. 719 (*ex synonym. Gaudichaudii* DC.), pl. 90 (excluding flowering spray). 1854; *Cheirodendron Gaudichaudii* (DC.) Seem. Journ. Bot. 5: 236. 1867; J. F. Rock, Indig. Trees Haw. Isls. 361, pl. 146. 1913; *Cheirodendron Gaudichaudii* form *a* Hillebr. Fl. Haw. Isls. 148. 1888 (*ex tab. Gaud.*); *Cheirodendron Gaudichaudii* var. *a* Rock, *op. cit.* 363 (*exclud. E. Maui*).

For a key to the many varieties and forms of this species, see the general key (pp. 7–11).

A tree 6–15 m. tall. Leaflets 3–5 rarely 6 or 7 (the outer ones smaller), their blade ovate-oblong or at times somewhat obovate, at base broadly cuneate to rounded or rarely subtruncate, at apex rounded to obtuse often abruptly short-acuminate or uncinately apiculate, the somewhat thickened margin more or less crenate to appressedly serrate (with the notch of each serrature enclosing a gland), for the larger leaflets commonly 8–15 (rarely, perhaps on sterile shoots, –20) cm. long and 3–6 (rarely –10) cm. wide, chartaceous to coriaceous, glabrous, on upper surface dull to glossy, nervation pinnate, lateral nerves more often imperfectly or scarcely

brochidodromous; petiolule 1-3 (rarely -6) cm. long; petiole 5-14 (rarely -30) cm. long. Panicle small and compact to large (12-23 cm. long including peduncle, this ± 5.5 cm. long) and open, umbellets mostly 6-12-flowered. Flowers greenish, calyx about 3 mm. long, corolla about 2.2 mm. long; petals thick, ovate, spreading, caducous, stamens nearly as long. Drupe ovoid to globose, 2-5- commonly 3-angled and reddish- or brownish-black when dry, 5-6 mm. wide and 6-7.5 mm. long including stigmas, these short, thinnish, recurved, and resting directly upon a stylopodium. Pyrenae 2-5 commonly 3. Pedicels slender and 3-9 mm. long at anthesis.

Type: Collected by *Charles Gaudichaud*, *Voyage of the Uranie*, Hawaiian Isls., 1819 (Par.).

Distribution: Widespread on the Island of Hawaii.

Specimens examined (all from Isl. Hawaii or presumably so): *Lucy M. Cranwell*, *Olof H. Selling*, & *Carl Skottsberg* 3,243, Kipuka Puaulu, Kilauea, Sept. 13, 1938 (Goth.); *Otto Degener*, *Amy Greenwell*, & *Toshio Murashige* 20,348, in forest, numerous trees and all uniformly heavily fruiting, near pit where David Douglas was murdered, Mauna Kea, Aug. 23, 1949 (U.S., leaflets more acutely toothed); *Alice Eastwood*, Bird Forest near volcano, Aug. 1-16, 1924 (Calif. Acad., 2 sheets); *G. O. Fagerlund* & *A. L. Mitchell* 775, tree 30 ft. tall, 2 trunks each 1 ft. diameter, alt. 4,000 ft., Kipuka Puaulu, Aug. 16, 1943 (Bish.); *Abbé Urbain Faurie* 262, alt. 1,500 m., Maunakea, July, 1909 (Bish., isotype of *Ch. trigynum* var. *hawaiiense* Lévl.); *Charles N. Forbes* 30-H, Puuwaawaa, June 8-14, 1911 (Bish.; Chi.); *Forbes* 426-H, above Pahala, Kau District, Aug. 9-11, 1911 (Bish.); *Albert S. Hitchcock* 14,513, tree on lava, woods, alt. 4,000 ft., Mt. Hualalai, Sept. 1, 1916 (U.S.); *L. H. MacDaniels* 217a, tree 12 m. tall, in fern forest, small forest reserve, alt. 1,250 m., along Volcano Road, near Volcano Kilauea, Nov. 10, 1926 (Bish.); *Alfred Meebold*, alt. 4,000 ft., Kipuka Puaulu, Kilauea, May, 1932 (Bish.); *Marie Neal* & *Constance Hartt* 808, in koa-lehua forest, alt. 6,000-6,500 ft., Laumaia, Aug. 17, 1935 (Bish.); *G. E. Olson*, tree ± 15 ft. tall, bark light-colored, leaves mostly 5- some 4-6-foliate, Bird Park, near Kilauea, Nov. 8, 1940 (Bish.); Olson, same place, June 6, 1941 (Bish.); *G. W. Russ*, Kapapala, Kau District, August, 1927 (Bish., one leaf with 7 leaflets); *W. A. Setchell*, Kipuka Puaulu, near Volcano Kilauea, July 31, 1924 (Univ. Calif.; U.S.); *U.S.S. Pacif. Explor. Exped. under Capt. Wilkes*, Hawaii, 1838-1842 (Gray, 2 sheets; N.Y.).

Gaudichaud's epithet *trigynum* is the one that must be used for this species. It was published in 1826, accompanying Gaudichaud's ample plate 98, which, according to Art. 44, of the International Rules, was sufficient to validate publication (as well stated by Skottsberg, Meddel. Göteborgs Bot. Trädg. 15: 416. 1844). Some authors have persisted in using De Candolle's epithet *Gaudichaudii*, since Gaudichaud's description was not published until 1830. It may be remarked, however, that the description for the epithet *trigynum* was published in January or February or, at the latest, early in March of 1830, whereas De Candolle's epithet *Gaudichaudii* and its description did not appear until September of that year.¹

Native name: *Olapa* throughout Hawaiian Islands; *Mahu* on Molokai (*vide Hillebrandii*); *Kauila Mahu* on Kauai (*vide Rockii*).

Cheirodendron trigynum var. *β. subcordatum* Sherff, Bot. Leaflet no. 5: 9. 1951.

Leaves 5-foliolate, petiole 7–9 cm. long; blade of leaflets ovate or ovate-oblong, scarcely coriaceous, glossy above, basally (at least for the larger leaves) truncate to cordate, at apex emarginate or rounded to obtuse and abruptly uncinately-apiculate, at margins coarsely crenate-serrate (serratures short or moderately extended and inflexed-uncinulate, about 6–12 to each side), up to 17.5 cm. long and to 10 cm. wide; petiolule 0.5–3 cm. long; panicle very large, up to ±2.5 dm. long including peduncle (this ±9.5 cm. long) and to 1.6 dm. wide, open, umbellets often 10–15-flowered, pedicel at anthesis slender and 5–6 mm. long; calyx 3–3.2 mm. long; corolla scarcely 2.5 mm. long; drupes unknown.

Type: Collected by *Joseph F. Rock*, no. 3,861, in forest of Waihou, alt. 4,000 ft., north of Puuwaawaa, northwestern Hawaii, June 18, 1909 (Gray).

Distribution: Known only from type locality on north slope of Mt. Hualalai, northwestern Hawaii.

Specimens examined (all from Hawaii): *Joseph F. Rock* 3,860, in dense forest, alt. 4,000 ft., Waihou, north of Puuwaawaa, slope

¹ I am indebted to Dr. H. W. Rickett, Bibliographer of the New York Botanical Garden, for confirmation of these lines. Under date of Nov. 19, 1951, he wrote: "Your information on *Aralia trigyna* seems to be correct. Page 474 of Gaudichaud's *Voyage* is included in a part noticed in the *Bibliographie de France* for 6 March 1830. It must therefore have appeared before this time, probably in January or February of that year. Volume IV of the *Prodromus* . . . appeared in September 1830, according to Stearn. Apparently the atlas of plates appeared all at once in 1826." For Stearn's paper dealing with publication dates for the *Prodromus* of De Candolle, see *Candollea* 8: 3. 1939.

of Hualalai, June 18, 1909 (Bish., topotype, my photograph no. 4,129); *Rock* 3,861 (type, Gray, my photograph no. 4,130); *Rock* 3,941, Hualalai, June 18, 1909 (topotype, Arn., my photograph no. 4,131).

A variety readily mistaken for the species proper, from which it differs in the more or less cordate bases of its leaflets and the even larger panicle, that on the type measuring slightly over 2.5 dm. long including its peduncle, this (or what was kept when the panicle was separately mounted) fully 9.5 cm. long.

Cheirodendron trigynum var. γ . **Fosbergii** Sherff, Bot. Leaflet no. 5: 7. 1951.

Tree \pm 5 m. tall, leaves 3-foliolate, petiole 4–10 cm. long; blade of leaflets pale, widely ovate or subrotundate-ovate, at base truncate or subtruncate, at apex shortly and abruptly acuminate or rotundate-obtuse or rarely emarginate, at margins obsoletely and sharply denticulate with few small teeth, up to 8 cm. long and to 7 cm. wide; petiolule 2–5 cm. long. Inflorescence dark-brown, a terminal panicle up to 13 cm. long including peduncle, its branches divaricate, umbellets 3–5-flowered, pedicels thickish and 2–3.5 mm. long, ovary 3 mm. long, corolla 2 mm. long, petals ovate. Drupes black, commonly 4- rarely 3- or 5-pyrenate, under 5.5(–7) mm. long (including the usually 4 but rarely 3 or 5 stigmas) and 4.5(–5.5) mm. thick.

Type: Collected by *Francis Raymond Fosberg*, no. 14,223 (*Plantae Exsiccatae Grayanae* num. 855), a tree 5 m. tall, herbage with strong oily odor when broken, inflorescence dark-brown, fruits black, on wet wind-swept wooded ridge, main divide, alt. 825 m., crest of Koolau Mountains above Kaipapau Gulch, Isl. Oahu, July 24, 1937 (Phila.).

Distribution: Koolau Mountains, northeastern Oahu.

Specimens examined (all from Oahu): *Charles N. Forbes*, Koolauloa Mountains, between Punaluu and Kaipapau, Nov. 14–21, 1908 (Bish.; Chi.); *Fosberg* 14,223 (type, Phila., my photograph no. 4,106: isotypes, Calif. Acad.; Chi.; Corn.; Del.; Gray; Mo.; N.Y.; Univ. Calif.; U.S.); *Joseph F. Rock* 313 (184), Koolau Range, Punaluu, Nov. 14–21, 1908 (Bish.; Chi.); *Rock* 561, Koolau Mountains, above Punaluu Valley, Nov. 14–21, 1908 (Arn.).

A variety of narrowly restricted range geographically, with usually smaller and more regularly shaped leaflets than in var. *halawanum* and fruits mostly 4-pyrenate, not mostly 3-pyrenate.

Cheirodendron trigynum var. δ . **mauiense** Lév. *in* Fedde Repert. Spec. Nov. Regni Veg. 10: 154. 1912.

Leaves 3-5-foliolate, highly variable in size, petiole at times 12 cm. long; leaflets somewhat glossy above, mostly lanceolate to broadly lance-oblong or narrowly oblong-ovate or -obovate, at base more or less cuneate or rarely rounded, at apex acute to acuminate, at margins subobsoletely to sharply serrulate (about 8-12 teeth to each side), blade now 4-7 cm. long and 2-3 cm. wide now up to 14 cm. long and to 5 cm. wide; petiolule 0.5-3 cm. long. Panicle terminal, open, up to 8 cm. long including peduncle, branches divaricate, umbellets numerous flowered (florets usually 6-10, sometimes to 15!), the slender pedicels 3-6.5 mm. long, ovary about 3 mm. long, petals ovate-oblong and about 2.5 mm. long. Drupes black or partly blackish-brown on drying, mostly 5-5.5 mm. long and nearly as thick, pyrenae 3 or 4, stigmas 3 or 4 and very short.

Type: Collected by *Abbé Urbain Faurie*, no. 265, Olinda, East Maui, August, 1909 (herb. not mentioned).

Distribution: East Maui.

Specimens examined (all from East Maui): *Brigham, Anderson, & Hosmer*, Haleakala, 1909 (Bish.); *Hugh McCollum Curran* 67, Maui, April, 1911 (U.S.); *Otto Degener* 2,244, in rain-forest, along pipe-line trail, Olinda, June 14, 1927 (topotypes, Chi.; Corn.; N.Y.; U.S.); *Degener & Henry Wiebke* 2,243, mesophytic woods north of Olinda, June 16, 1927 (topotypes, Calif. Acad.; N.Y.; Univ. Calif.; U.S.); *Degener & David LeRoy Topping* 9,578, in forest, along pipe-line trail, Olinda, July 29, 1927 (topotypes, Mo.; N.Y.); *Faurie* 265 (isotypes, Arn., my photograph no. 4,087; Bish.); *Charles N. Forbes* 220-*M*, woods near Ukulele, above Olinda, July, 1910 (Bish.; Chi.); *Forbes* 1,247-*M*, Kaupo Gap, Aug. 25, 1919 (Bish.; Chi.); *William Hillebrand & Rev. John M. Lydgate*, Makawao (Bish.); *Albert S. Hitchcock* 14,929, tree in wet forest along pipe-line, east of Olinda, alt. 4,000 ft., Oct. 1, 1916 (topotype, U.S.); *George C. Munro* 388, Auwahi, Ulupalakua, Feb. 12, 1915 (Bish.).

Occasionally the leaflets are broad enough to suggest a partial transition toward var. *confertiflorum*. Indeed, *Forbes* 1,247-*M*, referred here to var. *mauiense*, might by some workers be construed as equally well referred to var. *confertiflorum*.

Cheirodendron trigynum var. ϵ . **oblongum** Sherff, Bot. Leaf. no. 5: 9. 1951.

- Blade of leaflets up to 10 or 11 cm. long and to 4-6 cm. wide, stigmas commonly 3.....var. *ε. oblongum* sensu stricto.
 Blade of leaflets moderately broader and shorter, stigmas commonly 4.....var. *ε. oblongum* f. 1. *latius*.

Leaflets 3-5 more rarely 6; blade oblong, up to 10 or 11 cm. long and to 4-6 cm. wide, at apex commonly rotundate-obtuse at times emarginate or subacute, at margins obsoletely up to very sharply serrulate with 10-22 serratures to each side; panicles more often numerous and small, commonly only 3.5-7 (rarely -9.5) cm. long; umbellets more often 9-14-flowered; drupes trigonous, black or black-purple, about 5 mm. long and a little less in width, stigmas 3 or very rarely 4.

Type: Collected by *Gerrit P. Wilder*, Ulupalakua, southwestern East Maui, 1913 (Bish.).

Distribution: Southern East Maui.

Specimens examined (all from East Maui): *Otto Degener* 9,580, just below rain-forest, north *mauka* of Ulupalakua, July 4, 1927 (topotypes, N.Y.; Phila.; U.S.); *Degener* 17,482, in foggy, open forest, Paliku, within Haleakala, Aug. 17, 1939 (Mo.; N.Y.; Phila.; U.S., 2 sheets); *Charles N. Forbes* 1,041-*M*, Keanae Gap, Crater of Haleakala, Aug. 3, 1919 (Bish.); *Forbes* 1,874-*M*, Nu'u, south slope of Haleakala, Mar. 6, 1920 (Bish.; Chi.); *Forbes* 2,041-*M*, Auwahi, south slope of Haleakala, Mar. 20, 1920 (Bish.; Chi.); *Forbes* 2,050-*M*, same place and date (Bish.; Chi.); *William Hillebrand*, Ulupalakua (topotype, Bish.); *Hillebrand* 200, alt. 3,000-4,000 ft., "Haleakala South" (Kew); *Wilder*, Ulupalakua, 1913 (type, Bish., my photograph no. 4,119).

Cheirodendron trigynum* var. *ε. oblongum* f. 1. *latius
 Sherff, *op. cit.* 10.

Leaflets 3 or 4, moderately wider and shorter, more coriaceous, often glossy on upper surface, stigmas of the commonly tetragonous very rarely trigonous drupes commonly 4 very rarely 3.

Type: Collected by *Charles N. Forbes*, no. 900-*M*, east of Ukulele, East Maui, August, 1919 (Bish.).

Distribution: East Maui.

Specimens examined (all from East Maui): *Otto Degener* 2,245, on fog-swept, eroded *aa* lava slope, Koolau Gap, Aug. 11, 1927 (U.S.); *Degener* 9,579, in cold, fog-swept region, Koolau Gap, Aug. 17, 1927 (Chi.; N.Y., my photograph no. 4,121); *Charles N. Forbes*

703-M, Ukulele, July 11, 1919 (topotypes, Bish.; Chi.); *Forbes* 900-M (type, Bish., my photograph no. 4,120).

Cheirodendron trigynum var. ζ . **molokaiense** Sherff, Bot. Leaflet no. 5: 10. 1951.

Leaves 3-5-foliolate, petiole 3-8 more rarely up to 11 cm. long; blade of leaflets broadly oblong-oval to somewhat elliptic-oblong, somewhat shiny above, at base rotundate or widely triangulate sometimes oblique, at apex more or less acuminate, at margins more often conspicuously uncinulate-denticulate (teeth 3-11 rarely -21 to each side, slender, antrorse), commonly 4-8 cm. long and 2-6 cm. wide; petiolule 1-3 cm. long. Panicle more often 6-7 at times up to 9 cm. long including peduncle, finally lax, umbellets up to 4-10-flowered, pedicels 1-3(-4) mm. long, ovary under 2 mm. long, corolla under 1.5 mm. long, petals ovate or oblong; drupes reddish-black when dry, rather small, 4-5.3 mm. long including stigmas and 3-4 mm. thick, commonly 3- more rarely 4-pyrenate and with a corresponding number of stigmas.

Type: Collected by *Joseph F. Rock*, no. 6,165, very common, on edge of gulch above Kamoko (Kamoku), eastern Molokai, Mar. 23, 1910 (Arn.).

Distribution: Eastern Molokai and West Maui.

Specimens examined, eastern Molokai: *Otto Degener & Charles Tousley* 22,169, topping windswept, shrubby rain-forest, head of Waikolu Valley, Mar. 15, 1952 (Berl.; Bish.; Chi.; Gray; N.Y.; Par.; Phila.; U.S.); *Abbé Urbain Faurie* 264, alt. 1,000 m., Kamolo (Kamalo), June, 1910 (Arn.); *Faurie* 267 *pro parte*, Pukoo, May, 1910 (Arn.; Bish.; my photograph no. 4,123A); *Joseph F. Rock* 6,165 (type, Arn., my photograph no. 4,100: isotypes, Bish.; Gray, my photograph no. 4,101; U.S.); *H. St. John et alii* 12,368, moist woods, alt. 3,700 ft., head of Waikolu Valley, Dec. 21, 1932 (Yunck.).

West Maui: *Marie C. Neal*, alt. 3,000-4,500 ft., in rain-forest, on ridge, Puu Kukui, Aug. 16, 1933 (Bish.; Chi.); *Harold St. John* 10,191, tree 30 ft. tall, alt. 3,300 ft., ridge, Haelaau, Feb. 5, 1930 (Bish.; Chi.).

The small, reddish-black (when dry) frequently 4-pyrenate drupes, the more or less numerous flowered umbellets, and the usually conspicuous uncinulae of the leaf-margins distinguish this variety rather easily. Hillebrand (Fl. Haw. Isls. 148. 1888) included his Molokai material together with West Maui and Kohala Range (Isl. Hawaii) material in his unnamed var. β . His West Maui

specimens undoubtedly were var. *κ. confertiflorum* and his Kohala Range specimens var. *ξ. acuminatum*. These two varieties were doubtless the basis of his "umbellets 4-5-flowered. Stigmas 3 or 2," while his "remotely but sharply dentate or serrate with long incurved teeth" may well have come from the Molokai material, var. *ζ. molokaiense*. It may be noted, however, that on Molokai the umbellets are rather inconstant in the maximum number of florets borne. On the *type*, for example, the largest umbellets have 4 or 5 florets, while on the *isotype* at Gray Herbarium they have 7-10.

Cheirodendron trigynum var. *ζ. molokaiense* f. 1. **angustius** Sherff, *op. cit.* 11.

Blade of leaflets narrower, more often elliptic-oblong or oblong-lanceolate, up to 12.5 cm. long.¹

Type: Collected by *Abbé Urbain Faurie*, no. 267 *pro parte*, Pukoo, eastern Molokai, May, 1910 (Bish.).

Distribution: Eastern Molokai and West Maui.

Specimens examined, eastern Molokai: *Lucy M. Cranwell* 3,398, very abundant, forest-forming, top of Wailau trail, Sept. 20, 1938 (Bish.); *Otto Degener* 9,581, in rain-forest, near Puu o Wahaula, Apr. 17, 1928 (N.Y., sterile sprays); *Degener* 9,582, south of Pepeopae, Apr. 13, 1928 (N.Y., two sterile specimens, one juvenile *with leaflets sparsely setose on one face*); *Degener* 9,585, in rain-forest, gully west of head of Waikolu Valley, Apr. 21, 1928 (Chi.; Mo.; N.Y., 2 sheets; U.S.); *Faurie* 267 *pro parte* (type, Bish., my photograph no. 4,123B).

West Maui: *F. Fagerlind & Carl Skottsberg* 6,695a, Palm Valley near Haelaau, Mar. 28, 1948 (Stockh.).

In West Maui the forma *angustius* and the var. *molokaiense* proper are somewhat closer to each other in leaflet form than on Molokai.

Cheirodendron trigynum var. *η. osteostigma* Sherff, Bot. Leaflet no. 5: 12. 1951.

¹ For his no. 6,695a from Palm Valley, West Maui (Stockh.) Skottsberg notes "lower leaves with 5-7 leaflets;" and his 6,695b (omitted from my list of specimens examined) from the same locality consists (Stockh.) of one huge, presumably lower leaf with a petiole 2.5 dm. long, petiolules up to 4.6 cm. long, and seven leaflets, the largest with narrowly oblong-ovate, obtusely tipped but mucronulate, pallid blade up to 1.9 dm. long and to 7.6 cm. wide, the 9-15 teeth on each side small, antrorse, minutely uncinulate, much inflexed, the lateral nerves (as also on his 6,695a) brochidodromous. The two smallest leaflets are 7.5-8.5 cm. long, 4-4.5 cm. wide and with but 3-5 teeth to each side.

Leaves small, 3- or 4-foliolate; petiole under 9.5 cm. long; blade of leaflets more often ovate-lanceolate, at base rounded to widely cuneate, at apex more or less acuminate and uncinately mucronate, at margins subentire to antrorsely and uncinately few-toothed, 3-6 cm. long and 1.6-3.5 cm. wide. Panicles several, under 9 cm. long, umbellets 3-5-flowered, pedicels 2-5 mm. long, calyx 3 mm. long, petals oblong. Drupes reddish-black when dry, 5.5 mm. long including stigmas and barely 4 mm. thick, commonly 3- rarely 4-pyrenate; stigmas 3 (rarely 4), in fruit short, subglobose or depressed-globose, calloused-indurate and straw-colored.

Type: Collected by *R. L. Usinger*, no. 2, alt. 2,500 ft., Mapulehu-Punaula Ridge, southeastern Molokai, August, 1936 (Bish.).

Distribution: Known only from type locality.

Specimens examined: *Usinger* 2 (type, Bish., my photograph no. 4,148).

Cheirodendron trigynum var. *θ. halawanum* Sherff, Bot. Leaflet no. 5: 3. 1951; *Hedera Gaudichaudii* (DC.) A. Gray, Bot. U. S. Explor. Exped. *pl.* 90. 1854 (as to flowering spray); *Cheirodendron Gaudichaudii* form *δ* Hillebr. Fl. Haw. Isls. 148. 1888; *Panax Gaudichaudii* var. *δ* Drake del Cast. Illustr. Fl. Ins. Mar. Pacif. 181. 1890; *Cheirodendron Gaudichaudii* var. *δ* Rock, Indig. Trees Haw. Isls. 363. 1913.

Leaves 3-5-foliolate, petiole 4-10 cm. long; blade of leaflets thinnish, in the dry state now pallid now brownish and faintly glossy, variously oval ovate subrhomboid-ovate or subrotundate-ovate, at base truncate or broadly triangular to rotundate and often oblique, at apex now rotundate-obtuse (at times uncinately mucronulate) now subacute now emarginate, on each edge obsolete to sharply 1-9-denticulate the small teeth thickish, glandular, antrorse or inflexed, 4-9 cm. long and 3-6.5 cm. wide; petiolule commonly 1.5-4 cm. long. Panicle terminal, 5-12 cm. long including peduncle, branches spreading or divaricate, umbellets commonly up to 3-5-more rarely to 8-flowered; pedicel slender, 1.5-4 mm. long; ovary 2 mm. long; corolla 3 mm. long, petals oblong. Drupes commonly 3- rarely 2-pyrenate, dark-brown or rarely black, 4.5-6 mm. long including stigmas and about 3.5-5 mm. thick; stigmas commonly 3 rarely 2 (very rarely 4 or 5 even in the same inflorescence), now very small now slenderish and 1-1.5 mm. long, spreading to recurved-spreading.

Type: Collected by *United States South Pacific Exploring Expedition under Captain Wilkes*, locality not stated, 1838-1842 (U.S., herb. sheet no. 65,774).

Distribution: Widely distributed in the Koolau and Waianae ranges of Oahu; known from Kaiholena in central Lanai; rare in eastern Molokai, where apparently passing into or represented by var. *ζ. molokaiense*; perhaps on Niihau (*vide* footnote below, p. 28, on "*Panax? ovatum* Hook. & Arn.").

Specimens examined, Isl. Oahu: *H. F. Bergman*, Mt. Kaala, Feb. 11, 1928 (Bish.); *Richard S. Cowan* 692, ridge trail to Palikea, Honouliuli, August, 1947 (Bish.); *Otto Degener et al.* 9,574, in open rain-forest, north slope of South Halawa Gulch, Apr. 17, 1932 (N.Y.; U.S.); *Abbé Urbain Faurie* 263 *pro parte*, alt. 600 m., Kalihi, October, 1909 (Arn., my photograph no. 4,109);¹ *Charles N. Forbes*, ridge west of Kalihi Valley, Aug. 18, 1908 (Bish.; Chi.); *Forbes*, same locality, Dec. 24, 1908 (Bish.; Chi., my photograph no. 4,108); *Forbes*, Lanihuli Trail, Sept. 17, 1908 (Bish.; Chi.); *Forbes*, Makaha Valley, Feb. 12-19, 1909 (Bish.; Chi.); *D. Wesley Garber* 223, Pauoa-Konahuanui Trail, Feb. 15, 1920 (Bish.); *Gaudichaud*, *Voyage of the Bonite*, Oahu, 1836 (Gray); *Amos A. Heller* 2,313, on lower slopes of Konahuanui, above Manoa, May 13, 1895 (Chi.; Corn., my photograph no. 4,107; Mo.; N.Y.; Phila., my photograph no. 4,099; Univ. Calif.; U.S.); *Heller* (similarly) 2,313, same locality, May 28, 1895 (Gray); *William Hillebrand*, Oahu (Gray); *Hillebrand* 99, Nuuanu (Kew); *Hillebrand* 257, Nuuanu and Pauoa (Kew); *Hillebrand & Rev. John M. Lydgate*, Oahu (Bish.); *Mrs. G. Earle Kelly*, Koolau Mts., July, 1916 (Calif. Acad.); *Frank Kitamura*, wooded moist ridge, alt. 1,675 ft., Kaipapau Forest Reserve, Hauula, Oct. 15, 1933 (Bish.); *Horace Mann & William Brigham* 379 *pro parte*, Oahu (Bish.; Chi.; U.S., 2 sheets; confused in some herbaria with var. *confertiflorum* of Maui); *Mann & Brigham* 605 *p. p.*, Konahuanui (Bish.); *Alfred Meebold*, alt. 3,500 ft., Makaleha Ridge, June, 1932 (Bish.); *Amy Suehiro*, on ridge, Kaipapau, Oct. 15, 1933; *U. S. S. Pacif. Explor. Exped. under Capt. Wilkes*, locality not stated, 1838-1842 (type, U.S., herb. sheet no. 65,774, my photograph no. 4,091b: isotype fragment, a leaf with two leaflets remaining,

¹ *Faurie* 263 at the Arnold Arboretum is accompanied with a second spray, having larger fruits, these 8-10 in the larger umbellets, many with 2 pyrenae and 2 stigmas, the rest with 3, the elongate stigmas slender, recurved, and 1-1.5 mm. long, the drupes (stigmas, as throughout my text, included) up to 6.5 mm. long and to 5.5 mm. wide. Judgment as to the true status of this somewhat anomalous second spray seems best suspended for the present.

Gray); *R. L. Wilbur* 442, tree 15 ft. by 3 in., Manoa Cliff Trail to Pauoa Flats, Feb. 23, 1948 (U.S.).

Isl. Molokai: *Lucy M. Cranwell, Olof H. Selling, & Carl Skottsberg* 2,502, forest at head of Waikolu on trail to Pepeopae, July 9, 1938 (Bish.); *Hillebrand & Lydgate*, Molokai (Bish.).

Isl. Lanai: *G. C. Munro* 21, Kaiholena (Bish., 2 sheets).

Hawaiian Isls.: *Jules Remy* 495, *annis* 1851–1855 (Par.).

The type and isotype sheets both bear specimens of var. *Hillebrandii* along with those of the sharply different var. *halawanum*. Each sheet has a label with the inscription, in Asa Gray's own hand, "*Hedera Gaudichaudii* var. β ," whence it is evident that Gray's unnamed var. β (Bot. U. S. Explor. Exped. 719. 1854) was based by him on at least two sets of varietally different material. The labels do not carry the habitat, but in Gray's text his var. β was said to come from "Oahu and the western part of Maui." Unquestionably his western Maui material was of still a third variety.

If we exclude Gray's Maui material and his material now named var. *Hillebrandii*, it is seen that the remainder was the variety here named *halawanum* and which had been regarded, though surely with little justification, as the "*Panax? ovatum*" of Hook. & Arn. (Bot. Beechey's Voy. 84. 1832), by Gray, by Hillebrand, and by others.¹

Gray's plate (Bot. U. S. Explor. Exped. *pl.* 90. 1854) of the species proper (his *Hedera Gaudichaudii* or our presently accepted *Cheirodendron trigynum*) is seen to have been drawn, as to its flowering spray, from a herbarium sheet no. 65,773 (U.S.). This sheet bears a single large flowering spray with leaves and umbellets (these 4- or 5-flowered) fairly typical of var. *halawanum* but with the tips of some of the leaflets shortly and subabruptly acuminate. The label says "Hawaii," but there seems a likelihood that the specimen came from Oahu. The attached packet bears many fruits, *these with three stigmas, although Gray's plate shows five.*

¹ *Panax? ovatum* Hook. & Arn. was collected by Lay & Collie on the Island of Niihau ("Oneeheow" of the old spelling). It consisted of a single specimen, *without flowers or fruits*. Its 3 leaflets were ovate, very entire, coriaceous, not acuminate but slightly obtuse, their upper surface glossy. I have seen no *Cheirodendron* material from Niihau and cannot say what kind of flowers or fruits the "*ovatum*" material on Niihau really has. In any case, however, the name "*ovatum*" has never been used, so far as I can learn, for varietal status under *Ch. trigynum*. Hillebrand (Fl. Haw. Isls. 148. 1888) included the "*ovatum*" concept under his unnamed form δ .

Cheirodendron trigynum var. *ι*. **Hillebrandii** Sherff, Bot. Leaflet no. 5: 5. 1951; *Cheirodendron Gaudichaudii* form γ Hillebr. Fl. Haw. Isls. 148. 1888; *Panax Gaudichaudii* var. γ Drake del Cast. Illustr. Fl. Ins. Mar. Pacif. 181. 1890; *Cheirodendron Gaudichaudii* var. γ Rock, Indig. Trees Haw. Isls. 363. 1913.

Leaflets 3 to rarely 5 (*vide Hillebrandii*), variously obovate wide-ovate or subrotund, pale, at apex subacuminate or rarely emarginate, at base broadly cuneate, at margins subentire or remotely and obsoletely denticulate, blade up to ± 6.5 cm. long and to 4–5 cm. wide; petiolule 1.5–3 cm. long; petiole up to ± 7.5 cm. long. Panicle finally ± 11 cm. long including peduncle, umbellets 6–8-flowered; drupes 6–7 mm. long including stigmas (these 2–5 but commonly 5, short, thick) and under 5 mm. thick, pyrenae mostly 3.

Type: Collected by the *United States South Pacific Exploring Expedition under Captain Wilkes*, Hawaiian Islands, 1838–1842 (U.S.).

Distribution: Island of Oahu.

Specimens examined (all from Oahu): *E. H. Bryan, Jr.*, summit of Lanihuli, July 18, 1920 (Bish.); *W. A. Bryan*, alt. 2,000 ft., Konahuanui, Jan. 10, 1904 (Bish.); *Otto Degener*, near summit divide, Wilhelmina Rise, Nov. 11, 1931 (N.Y.); *Degener, O.*, *Miss Amy Greenwell*, & *Toshio Murashige* 19,685, in open rain-forest near summit, Wiliwilinui Ridge, June 27, 1949 (U.S.; 2 sheets); *Degener, Park, Potter, Bush, & Topping* 9,992, in rain-forest at summit, west of Poamoho Trail, Laie, Aug. 25, 1935 (Calif. Acad.; Chi.; Corn.; Del.; Mo.; N.Y.; U.S.); *Charles N. Forbes (with J. F. G. Stokes)*, Waiolani Ridge, June 28, 1908 (Bish.); *Forbes*, same place, Sept. 17, 1908 (Bish.); *J. Arthur Harris* C242,165, alt. about 2,400 ft., ridge of Koolau Range between Kahana and Wahiawa valleys, Aug. 31, 1924 (Bish.; Goth.; N.Y.); *William Hillebrand*, alt. 3,000–4,000 ft., Konahuanui and Mt. Kaala (Gray); *Hillebrand*, Mt. Kaala (Bish.); *Hillebrand* 258, Mt. Kaala (Kew); *Hillebrand* 262, Mt. Kaala (Kew); *Edward Y. Hosaka* 329, alt. 1,500 ft., South Opaepala Gulch, Paalaa, Nov. 9, 1930 (Bish.); *L. H. MacDaniels* 93, alt. 700 m., rain-forest, Konahuanui, Nov. 1, 1926 (Bish.); *MacDaniels* 292, alt. 1,000 m., Upper Hamakua Ditch Trail, near Waipio Valley, slope of Mt. Kaala, Nov. 19, 1926 (Bish.); *MacDaniels* 351, Lanihuli Ridge Trail, Jan. 23, 1927 (Bish.); *MacDaniels* 486, Palolo-Waialae Ridge, Jan. 27, 1927 (Bish.); *Joseph F. Rock* 647, Punaluu, Dec. 24–29, 1908 (Bish.); *Rock* 744, Koolau Mts., Punaluu, Dec. 3–14, 1908 (Gray); *Rock* 758, Punaluu, Dec. 3–14, 1908 (Bish.); *G. W. Russ*,

Nuuanu *p. p.*, top of Lanihuli, July 19, 1933 (Bish.); *D. LeRoy Topping* 2,831, Bowman Trail, Aug. 31, 1924 (N.Y.; Univ. Calif.); *Topping* 2,966, Konahuanui, Dec. 28, 1924 (Arn.; N.Y.; Univ. Calif.); *U. S. S. Pacif. Explor. Exped. under Capt. Wilkes*, Hawaiian Is., 1838–1842 (type, U.S., my photograph no. 4,091a: isotype, Gray).

The sheet (U.S. herb. no. 65,774) bearing the type of var. *Hillebrandii* bears also, beneath, a large flowering specimen of the var. *halawanum* (my photograph no. 4,091b). Both were included in the basis of Asa Gray's *Hedera Gaudichaudii* var. β (Bot. U. S. Explor. Exped. 719. 1854). For the range of his var. β he gave (*loc. cit.*) "Oahu and the western part of Maui." Neither var. *Hillebrandii* nor var. *halawanum* is known to me from West Maui and it is likely that any West Maui material Gray might have seen was of the variety now named *confertiflorum*.

Several of the fruiting umbellets of the var. *Hillebrandii* type still possess seven or eight drupes each. There can be no doubt that Hillebrand (Fl. Haw. Isls. 148. 1888) had this variety in mind when he described his *Ch. Gaudichaudii* form γ (listed as var. γ by Rock, Indig. Trees. Haw. Isls. 363. 1913).

Cheirodendron trigynum var. κ . *confertiflorum* Sherff, Bot. Leaflet no. 5: 2. 1951.

Leaves 3–5-foliolate; petiole 6–13 cm. long; blade of leaflets thinnish, moderately glossy above or at times dull, oblong to broadly ovate or sometimes obovate, at base rounded to broadly triangular, at apex shortly and abruptly caudate-acuminate, at margins irregularly subrepand or subrenate and subentire to remotely denticulate with delicate and often inflexed teeth, 3.5–10.5 cm. long and 2–6.5 cm. wide (the minimum dimensions pertaining to the lateral leaflets, especially the outermost ones of 5-foliolate leaves); petiolule 1–3 cm. long. Panicle up to 12 cm. long including peduncle, abundantly flowered, umbellets commonly 4- or 5-flowered; pedicels slender, about 3–3.5 mm. long; florets about 4–4.5 mm. long, ovary about 2–2.2 mm. long. Drupes drying dark-brown, 4–5 mm. long including the usually 3 stigmas and 3.5–4 mm. thick; pyrenae usually 3; stigmas very short, thick, and blunt.

Type: Collected by *Horace Mann & William T. Brigham*, no. 379 *pro parte*, West Maui (Corn.).

Distribution: Common in West and rare in East Maui.

Specimens examined, West Maui: *Edwin H. Bryan, Jr.*, 635, alt. 5,200 ft., upper edge of rain-forest, on edge of open bogs, Puu

Kukui, Dec. 18, 1928 (Bish.); *Lucy M. Cranwell, Olof H. Selling, & Carl Skottsberg* 2,695, alt. about 1,750 m., summit forest on Puu Kukui, July 25, 1938 (Bish.; Goth.); *Otto Degener* 9,577, in forest north of Mt. Eke, Aug. 28, 1927 (Mo.; N.Y.; Phila.); *G. R. Ewart, III*, no. 80, alt. 4,000 ft., Haelaau-Puu Kukui Trail, Dec. 18, 1928 (Bish.; N.Y.); *G. R. Ewart, III*, no. 86, alt. 5,000 ft., rain-forest, near edge of open bog, Puu Kukui, same date (Bish.); *Charles N. Forbes* 419-M, Eke Trail to Halfway House, Sept. 25–Oct. 17, 1917 (Bish.; Chi.); *Forbes & C. M. Cooke, Jr.*, 20-M, Maunahooma, May, 1910 (Bish.; Chi.); *William Hillebrand*, West Maui (Bish., *ex herb. Hillebrandii* in *Herb. Berolinense sub inscript. Cheiroidendron Gaudichaudii* var. β . Hillebr.); *Horace Mann & William T. Brigham* 379 *pro parte* (type, Corn., my photograph no. 4,094: isotypes, Chi.; Gray; U.S.).

East Maui: *Forbes* 1,667-M, on top of ridge, right side of Kipahulu, Nov. 17, 1919 (Bish.; Chi.; approaching, in its more open inflorescence, var. *acuminatum* of northwestern Hawaii); *Forbes* 2,629-M, west ridge of Haipuaena, north slope of Haleakala, June 28–30, 1920 (Bish.; U.S.); *Rock*, Nahiku, Jan. 11, 1909 (Bish.; Chi.).

A variety suggestive of var. *acuminatum* of northwestern Hawaii, immediately to the southeast across the Alenuihaha Channel from East Maui, but having leaflets usually much larger and an inflorescence more compact. *Forbes* 1,667-M from East Maui, with its leaflets characteristic of var. *confertiflorum* but with more open inflorescence, would seem to be a transitional form between the two varieties.

Mann & Brigham issued two collections under their no. 379, one from Maui (W. Maui is given on one label, U.S.) and the other from Oahu. The latter is referred to var. *halawanum* (*qu. vide*).¹

Special mention may be made of the above cited *Hillebrand* specimen from West Maui, since the inscription on its label shows that by his var. β (published as form β in his *Flora of the Hawaiian Islands*, p. 148. 1888) *Hillebrand* meant, as to his *West Maui* material, our var. *confertiflorum*.

¹ One sheet of *Mann & Brigham* 379 at Washington (U.S.) has the label saying "Maui & Oahu." It bears a flowering spray at the top, of the (mostly West) Maui var. *confertiflorum*. At the bottom is a fruiting specimen of the Oahu var. *halawanum*. A second sheet (U.S.) says merely "W. Maui" but this is clearly an error (except in so far as it shows that their Maui material came from West Maui), since the one fruiting spray borne thereon is likewise the Oahu var. *halawanum*.

Cheirodendron trigynum var. λ . **Rockii** Sherff, Bot. Leafl. no. 5: 8. 1951.

Leaves 3-5-foliolate, petiole 6-12 cm. long; blade of leaflets somewhat shiny above, ovate-lanceolate, at base broadly cuneate or subrotundate, at apex acute, on each edge obsoletely or moderately \pm 6-dentate (the largest teeth inflexed, about 0.5-1 mm. long on side toward leaf's apex, and subtending a gland), more often 7-9 (sometimes -11.5) cm. long and 2-4.5 (sometimes -6) cm. wide; petiolule 1-2.5 cm. long. Panicle terminal, open or somewhat dense, about 12-15 cm. long including peduncle, branches broadly spreading, umbellets 4-6-flowered, pedicels 2-3 mm. long in fruit. Drupes drying black, small, about 4-4.5 mm. long including the normally 3 stigmas (these very short—about 0.3 mm. long—and diverging) and 3-4 mm. thick.

Type: Collected by *Joseph F. Rock*, Mahana ridge, Isl. Lanai, July, 1910 (Bish.).

Distribution: Of unknown extent on Lanai.

Specimens examined (all from Lanai): *Joseph F. Rock*, near summit, 1910 (Bish.; Chi.); *Rock*, Mahana ridge, July, 1910 (type, Bish., my photograph no. 4,111: isotype, Arn., my photograph no. 4,102).

Cheirodendron trigynum var. μ . **Skottsbergii** Sherff, Bot. Leafl. no. 5: 7. 1951.

Tree, leaves 3-5-foliolate, petiole 3.5-9 cm. long, petiolules 1-3.5 cm. long; blade of leaflets pallid, elliptic-oblong to oval-oblong rarely a few obovate or ovate, at base broadly cuneate to rounded, at apex obtuse or at times barely acuminate even mucronulate, at margins not truly crenate but obsoletely or sometimes very conspicuously and more or less remotely inflexed-denticulate, up to 10.5 cm. long and to 6.5 cm. wide. Panicle terminal or lateral, lax, up to 14 cm. long including peduncle, branches divaricate or sub-reflexed, umbellets commonly 3-5-flowered, pedicels slender and 3-5 mm. long, ovary about 2.5 mm. long, corolla barely 2 mm. long, petals ovate. Drupes black or reddish-black at least when dry, 3-pyrenate, 4-5 mm. long including the 3 stigmas (these thick, diverging, very short) and 3.5-4.5 mm. wide.

Type: Collected by *Albert S. Hitchcock*, no. 14,765, tree in upper forest, alt. 4,000-5,000 ft., Puu Kukui, West Maui, Sept. 24-26, 1916 (U.S.).

Distribution: Mountains of West Maui and Lanai.

Specimens examined, West Maui: *Degener, Tam, Tousley, & Barber* 22,026, rain-forest, *mauka* of McGregor, Mar. 9, 1952 (Arn.; Calif. Acad.; Chi.; Del.; Gray; Kew; Mo.; N.Y.; Par.); *Albert S. Hitchcock* 14,765 (type, U.S., my photograph no. 4,110); *Hitchcock* 14,851, tree in upper forest, alt. 3,000–5,000 ft., same place and date (topotype, U.S.).

Isl. Lanai: *Charles N. Forbes* 218-L, mountains at east end of Lanai, June, 1913 (Bish.; Chi.; U.S.); *Forbes* 383-L, Lanai, September, 1917 (Bish., my photograph no. 4,122); *Hitchcock* 14,681, tree on upper part of mountain, Sept. 21, 1916 (U.S., my photograph no. 4,103); *F. Fagerlind & C. Skottsberg* 6,428, summit ridge, Feb. 25, 1948 (Stockh.).

The Lanai specimens, at first regarded by me as distinct, have leaflets slightly more thickish, also a tendency to become brown and slightly glossy on drying. Otherwise they seem inseparable from West Maui material. The latter has leaflets close to those of the var. *multiflorum* of *Ch. Helleri*, of Kauai, but differs in its smaller drupes (these with 3, seldom only 2 pyrenae) and their diminutive, scarcely visible stigmata.

Skottsberg and his associates collected in the type locality some specimens with broadly oblong-ovate, truncate-based, and round-tipped leaflets (*Cranwell, Selling, & Skottsberg* 2,695, alt. *circ.* 1,750 m., summit forest on Puu Kukui, July 25, 1938), which Skottsberg (Meddel. Göteborg. Bot. Trädg. 15: 418. 1944) doubtfully regarded as representing a form of his new var. *acuminatum*. A flowering specimen before me (Bish.) belongs neither to var. ξ . *acuminatum* nor to var. μ . *Skottsbergii*, but to var. κ . *confertiflorum* (*qu. vide*).

The only other variety of *Ch. trigynum* known from Lanai is var. λ . *Rockii*, which has leaflets ovate-lanceolate, basally broad-cuneate, and apically acute.

Cheirodendron trigynum var. ν . **Ilicoides** Sherff, Bot. Leaflet no. 5: 10. 1951.

Similar to the species proper but with leaflets not crenate, each side more often 5–15-dentate (teeth elongate, antrorse, irregularly uncinulate); umbellets only 3–5-flowered.

Type: Collected by *L. H. MacDaniels*, no. 320, spreading tree 10 m. tall, on rough lava, alt. 1,000 m., Puuwaawaa, Isl. Hawaii, Dec. 1, 1926 (Bish.).

Distribution: Northwestern Hawaii.

Specimens examined (all from northwestern Hawaii): *MacDaniels* 320 (type, Bish., my photograph no. 4,114); *Alfred Meebold* 20,889, alt. 5,000 ft., Hualalai, November, 1935 (N.Y.); *Joseph F. Rock* 12,977, "Waihou forest," Puuwaawaa, August, 1917 (Bish., my photograph no. 4,115).

The type has leaflets very similar in shape and marginal teeth to those of typical var. *molokaiense* of Molokai, but the drupes have a volume twice as great as in that variety and the umbellets are fewer- (up to 4- or 5- not to 10-) flowered. From the species proper, so common on Hawaii, var. *Ilicoides* can be told by the sharp, elongate, antrorse marginal teeth on its leaflets (these not crenate) and its few-flowered umbellets. The varietal name alludes more particularly to *Ilex opaca* Ait., to the leaves of which the leaflets display a fanciful resemblance.

Cheirodendron trigynum var. ξ . **acuminatum** Skottsbo. Meddel. Göteborg. Bot. Trädg. 15: 417. 1944 (only as to material from Kohala Mts., Isl. Hawaii); *Cheirodendron Gaudichaudii* form β Hillebr. Fl. Haw. Isls. 148. 1888 (only as to material from Kohala Range); *Panax Gaudichaudii* var. β Drake del Cast. Illustr. Fl. Ins. Mar. Pacif. 181. 1890 (only as to material from Isl. Hawaii); *Cheirodendron Gaudichaudii* var. β Rock, Indig. Trees Haw. Isls. 363. 1913 (only as to material from Isl. Hawaii).

Small tree. Leaves 3-5-foliolate; petiole 5-11 cm. long; petioles 2.5-4 cm. long; blade of leaflets broadly ovate to orbicular, at base truncate or broadly rounded to subcuneate, at apex abruptly acuminate to caudate, at margins subentire to remotely serrate with obsolete or short-uncinate teeth, light-green and somewhat glossy above (more or less brownish when dried), paler beneath, commonly 4-8 cm. long and 3-6.5 cm. wide. Panicle terminal, ample, open, 11-13 cm. long including peduncle, branches mostly divaricate, umbellets 3- or 4- or rarely to 6-flowered; pedicels 5-8 mm. long; florets mostly 5- sometimes 6-merous, 5-7 mm. long, ovary about 3-3.5 mm. long and 2-2.5 mm. thick; calyx-teeth very minute; petals oblong-ovate, 2-3.2 mm. long and 1-1.5 mm. wide; stamens included. Drupes drying black, delicate, 5-5.5 mm. long including stigmas (these 3 or sometimes 2, very minute, thickish, and scarcely diverging) and about 4 mm. thick; pyrenae normally 3, sometimes only 2.

Type: Collected by *William Hillebrand* in Kohala Range, Isl. Hawaii (type lost with the recent destruction, by war, of the Berlin

Herbarium). While Skottsberg rested his name upon Hillebrand's form β (excluding plants from West Maui and Molokai) as a synonym, thus making a Hillebrand plant technically his type, he actually used the *Cranwell et al.* 3,139 material as an important basis for his description of var. *acuminatum*.

Distribution: Known only from the mountains of North Kohala, northwesternmost Hawaii.

Specimens examined (all assumedly from northwesternmost Hawaii): *William T. Brigham*, Hawaii, 1899 (Bish.); *Lucy M. Cranwell, Olof H. Selling, & Carl Skottsberg* 3,139, Upper Hamakua Valley ditch trail at head of Koiawe Valley near first ditchman's house, Kohala Mts., flowering, Sept. 7, 1938 (Goth.); *Otto Degener & Henry Wiebke* 2,076, open woods, 17 miles from Kohala toward Waimea, Aug. 14, 1926 (Goth.; N.Y.; Univ. Calif.; U.S., my photograph no. 4,085); *F. Fagerlind & Carl Skottsberg* 6,163, Hamakua Trail above Waipio, Kohala Mts., Jan. 31, 1948 (Stockh.); *Albert S. Hitchcock* 14,338, tree in upper pasture, alt. about 4,000 ft., Waimea, Aug. 25, 1916 (U.S.); *Joseph F. Rock* 8,372, woods of Kohala, west of Honokane Nui Gulch, June, 1910 (Arn.; Bish.; Gray); *Carl Skottsberg* 6,827, alt. 1,666 m., in forest on summit of Kohala Mts., Apr. 6, 1948 (Stockh.).

Skottsberg (*loc. cit.*) included *Degener & Wiebke* 2,094 under var. *acuminatum*, but that plant is referred by me to var. *Degeneri* f. *pauciflorum*. The West Maui collection (*Bog Survey* no. 2,695), treated doubtfully by Skottsberg as a form of var. *acuminatum*, is to be referred to var. *confertiflorum*. The Molokai collection (*Cranwell* 3,398), likewise treated doubtfully by him as a form of var. *acuminatum*, is referred by me to var. *molokaiense* f. *angustius* (*qu. vide*). *Cheirodendron Gaudichaudii* form β Hillebr. (Fl. Haw. Isls. 148. 1888), later raised to varietal status under the binomial *Panax Gaudichaudii* by Drake del Castillo (Illustr. Fl. Ins. Mar. Pacif. 181. 1890), was at least in part (and particularly as to Kohala Range specimens) the var. *acuminatum*.

Cheirodendron trigynum var. *o. Degeneri* Sherff, Bot. Leaflet no. 5: 4. 1951.

Umbellets mostly 6-8-flowered. var. *o. Degeneri* sensu stricto.

Umbellets 2-5-flowered. var. *o. Degeneri* f. 1. *pauciflorum*.

Leaves 3-5-foliolate, petiole 5-13 cm. long; blade of leaflets rounded-ovate to widely oval-oblong, at base truncate or rounded

to very broadly triangulate, at apex obtuse or more often sub-abruptly acuminate, at margins remotely and shortly serrulate (serratures now straight now inflexed), 7–10 cm. long and 4–8 cm. wide, greenish-brown when dry but not glossy; petiolules 1–4.5 cm. long. Panicle lax and open, up to 1.5 dm. long including peduncle, branches divaricate or slightly reflexed, umbellets commonly 6–8-flowered, pedicels 3–5 (rarely –6) mm. long, ovary scarcely 2 mm. long; corolla about 2.5 mm. long, petals oblong-ovate; stamens included. Drupes intensely black when dry, 3-pyrenate, 4.5–6 mm. long including the 3 stigmas (these small and squarrose) and under 5 mm. thick.

Type: Collected by *Otto Degener*, no. 9,576, in dark, wet jungle, between Glenwood and 29 Miles, Isl. Hawaii, June 23, 1929 (U.S.).

Distribution: Known only from southeastern Hawaii.

Specimens examined (all from southeastern Hawaii): *Otto Degener* 1,600, in tree-fern forest, Kilauea, Dec. 18, 1923 (N.Y.); *Degener* 9,575, in wet jungle, between Glenwood and 29 Miles, June 28, 1929 (N.Y.); *Degener* 9,576 (type, U.S., my photograph no. 4,092: isotypes, Chi., my photograph no. 4,093; Corn.; Mo.; N.Y.; Univ. Calif.; U.S.); *Degener* 21,802, tree 10–30 ft. tall, epiphytic and terrestrial in rich forest, near Kulani Prison Road, Feb. 3, 1952 (Bish.; Chi.; Del.; Gray; Kew; N.Y.); *Charles N. Forbes* 654-H, Olaa Flume, June 2, 1915 (Bish.; Chi.); *L. H. MacDaniels* 217, tree 12 m. tall, alt. 1,250 m., in fern forest, small forest reserve along Volcano Road, near Volcano Kilauea, Nov. 10, 1926 (Bish.); *G. W. Russ*, Punaluu Gulch, alt. 5,000 ft., September, 1927 (Bish.); *W. A. & C. B. Setchell*, Volcano Road, June 26, 1924 (Univ. Calif.).

This variety, including the following forma, suggests var. ξ *acuminatum*, but the leaflets are mostly much larger than in that variety. Var. *Degeneri* proper differs further in having its umbellets mostly 6–8 (not 3–5) -flowered. The black (dried) drupes appear quite different from the usually brownish (dried) ones of var. *halawanum*, nor are the leaflets commonly obtuse as in that variety.

Cheirodendron trigynum* var. *o. Degeneri* f. 1. *pauciflorum
Sherff, Bot. Leaflet no. 5: 5. 1951.

Umbellets mostly only 2–5-flowered, leaflets at times widely and subdeltoidly rounded-ovate with a blade 6–10 cm. wide.

Type: Collected by *Otto Degener & Henry Wiebke*, no. 2,094, in jungle between Glenwood and Kilauea, Isl. Hawaii, July 27, 1926 (U.S.).

Distribution: Southeastern and northwestern Hawaii.

Specimens examined (all from Hawaii): *Degener & Wiebke* 2,094 (type, U.S., my photograph no. 4,105: isotypes, Goth., 2 sheets; N.Y.; Univ. Calif.); *Jules Remy* 494, Hawaii, 1851-1855 (Par.); *Carl Skottsberg* 560, fern forest, alt. about 1,200 m., Kilauea, Sept. 17, 1922 (Goth., 2 sheets); *Harold St. John & Edward Y. Hosaka* 11,447, moist woods, alt. 2,900 ft., Upper Hamakua Ditch Trail, Waipio, Kohala Mts., Jan. 1, 1932 (Bish., my photograph no. 4,113; Chi.).

5. **Cheirodendron Fauriei** Hochr. *Candollea* 2: 487. 1925; *Cheirodendron trigynum* var. *kauaiense* Lév. in Fedde Repert. 10: 154. 1911; *Cheirodendron wahiawense* Krajina, *Preslia* 10: 98, tab. II, fig. N; tab. III, fig. N and O; tab. V, fig. 2. 1931.

Leaflets often ovate to orbicular, mostly under 8.5 cm. long and wide, at base very broadly cuneate to cuneate-contracted.

Ch. Fauriei sensu stricto.

Leaflets broadly orbicular-deltoid to transversely oblong, the larger ones 9-12.5 cm. wide, at base very broad and truncate to subcordate.....*Ch. Fauriei* var. β . *Macdanielsii*.

Tree up to 12 m. tall. Leaves trifoliate, petiole up to 10.5 cm. long; blade of leaflets widely ovate to orbicular or even transversely oblong, up to 7-8.5 cm. long and to about as wide, in dry state dull or sometimes slightly lustrous, at base very broadly cuneate to cuneate-contracted, at the rounded to subtruncate apex abruptly apiculate or short-acuminate, on each side somewhat in-crassate-margined and 3-9-dentate (the slender teeth more or less antrorse and uncinulate); nervation pinnate, the lateral nerves brochidodromous; petiolules 2-4 cm. long. Panicle 7-8 (or sometimes -11) cm. long including peduncle, in fruit up to 9 cm. wide, now few- now many-(± 75 -) flowered, umbellets variously up to about 10-flowered. Flowers (a single one seen) about 6 mm. long, calyx urceolate and about 2.5 mm. tall. Drupes very fleshy, brownish and rugose in dry state, much compressed, up to 7.3 mm. long (stigmas included) up to 8.5 mm. wide and to 4 mm. thick; pyrenae 2, thick, very hard; exocarp thick; style short (0.5 mm.), the 2 stigmas very small (barely 0.5 mm. long) and diverging.

Type: Collected by *Abbé Urbain Faurie*, no. 266, Eleele, Isl. Kauai, December, 1909 (herbarium not stated; Skottsberg—Meddel. Göteborg. Bot. Trädg. 15: 418. 1944—cites a specimen seen by him at Paris).

Distribution: Southeastern quarter or third of Kauai.

Specimens examined (all from Kauai): *Otto Degener* 17,179, in rain-forest, alt. about 1,800 ft., Kaluaea, Koloa, Dec. 31, 1939 (N.Y.; Phila., my photograph no. 4,090; U.S., my photograph no. 4,084); *F. Fagerlind & Carl Skottsberg* 6,488, alt. 600 m., edge of Wahiawa Swamp, Mar. 5, 1948 (Stockh.); *Charles N. Forbes* 3-K, low tree 9 ft. tall, Lihue District, July 8, 1909 (Bish.; Chi.); *Forbes* 194-K, tree 10-30 ft. tall, Wahiawa Mts., August, 1909 (Bish.; Chi.); *L. H. MacDaniels* 634, tree 6 m. tall, wet forest, alt. 700 m., above Wahiawa, Feb. 8, 1927 (Bish.); *MacDaniels* 698, tree 9 m. tall, along Electric Power Line, alt. 700 m., Feb. 14, 1927 (Bish.; Chi.); *MacDaniels* 892, tree 4 m. tall, alt. 760 m., summit of Haupu, Feb. 26, 1927 (Bish.); *Joseph F. Rock* 8,869, Waialeale, Oct. 20, 1911 (Arn., my photograph no. 4,082; Bish.).

Regarding *Ch. wahiawense* var. *populneum* Krajina, a form as yet inadequately known but apparently belonging with *Ch. Fauriei*, see under "Incertae sedis."

Cheirodendron Fauriei var. β . **Macdanielsii** Sherff, Bot. Leafl. no. 5: 13. 1951.

Leaflets broadly orbicular-deltoid to transversely oblong, principal ones 9-12.5 cm. wide, at base very broad and truncate to subcordate.

Type: Collected by *L. H. MacDaniels*, no. 668, tree 6 m. tall, in rain-forest, ridge above Kilauea, alt. 800 m., Kekoiki, northeastern Kauai, Feb. 13, 1927 (Bish.).

Distribution: Known only from type locality in northeastern Kauai.

Specimens examined: *MacDaniels* 668 (type, Bish., my photograph no. 4,124; isotype, Chi., my photograph no. 4,125).

6. **Cheirodendron Helleri** Sherff, Bot. Leafl. no. 5: 13. 1951.

a. Blade of leaflets oval-oblong; common trees in northwestern Kauai..... var. γ . *multiflorum*.

a. Blade of leaflets broader.

b. Blade of leaflets obovate-rotundate to very widely obovate-oblong; trees of south-central Kauai..... var. δ . *sodalium*.

b. Blade of leaflets more or less ovate.

- c. Mature drupes only 5-6 mm. long (including stigmas); trees of northwestern Kauai. var. *β. microcarpum*.
- c. Mature drupes much longer; trees of south-central Kauai.
Ch. Helleri sensu stricto.

Tree about 6-7.5 m. tall, branchlets (when dry) brown with a slightly reddish tinge. Leaves trifoliolate, petiole commonly 5-9 cm. long; blade of leaflets pallid, membranaceous, ovate to widely ovate- or subrhomboid-oval, at base very broadly cuneate, at apex rarely emarginate commonly more or less obtuse but rather often mucronate, at margins subentire to few-toothed, the teeth narrowish, antrorse, incurved or straight, 5-9 cm. long and 3-7 cm. wide; petiolules up to 4 cm. long; nervation pinnate, lateral nerves now brochidodromous now more or less craspedodromous. Panicle commonly 6-8 rarely up to 9.5 cm. long including peduncle (this 2-3 cm. long) and a little broader, umbellets commonly up to 11- rarely to 13-flowered; tube of calyx slenderly obconic to urceolate, about 2.5 mm. long; petals ovate or ovate-oblong, a little shorter. Drupes (only immature ones known thus far) dark-brown when dry, 2-pyrenate, strongly compressed, about 8 mm. tall including stigmas (these consistently 2, slender, spreading, 1-1.5 mm. long) and up to 7.5 mm. wide, their pedicel slender and 3-6 mm. long.

Type: Collected by *Amos Arthur Heller*, no. 2,496, alt. about 3,000 ft. [*vide Helleri* Minn. Bot. Studs. 1: 870. 1897; hence about two thirds the distance from Hanapepe Bay to summit of Mt. Waialeale], on the ridge west of Hanapepe River, Isl. Kauai, Aug. 22, 1895 (U.S.).

Distribution: Known only from type locality, Isl. Kauai.

Specimens examined (all from Kauai): *Amos Arthur Heller* 2,496, tree about 25 ft. tall, on the ridge west of Hanapepe River, alt. about 3,000 ft., July 4, 1895 (topotypes, N.Y.; Par.; Univ. Calif.); *Heller* (similarly) 2,496, same place, July 11, 1895 (topotypes, Bish.; Corn., my photograph no. 4,089; U.S.); *Heller* (similarly) 2,496 (type, U.S., my photograph no. 4,088: isotype, Mo.).

In *foliage*, this species is more closely characteristic of the *C. trigynum* complex and much resembles *Ch. trigynum* var. *halawanum*. In its *large, consistently 2-pyrenate fruits*, however, it resembles *Ch. Fauriei*, a species related through leaf-type more closely to *Ch. platyphyllum* than to *Ch. trigynum*. The panicles are noteworthy as being short, proportionately broad, compactly fruited, and with as many as 11 or sometimes even 13 drupes to a single umbellet.

Cheirodendron Helleri var. β . **microcarpum** Sherff, Bot. Leaf. no. 5: 14. 1951.

Leaflets scarcely smaller, a little thicker, their nervation more definitely brochidodromous and the teeth or some of them antrorse-uncinulate; umbellets up to only 7-flowered; mature drupes only 5–6 mm. long (including stigmas, these about 1 mm. long) and equally broad.

Type: Collected by *Annie M. Alexander & Louise Kellogg*, no. 5,197, several trees about 20 ft. tall, trail from Kalalau Lookout (*i.e.*, Kilohana Lookout), alt. 4,000 ft., Isl. Kauai, Mar. 7, 1947 (Univ. Calif.).

Distribution: Known only from type locality in northwestern Kauai.

Specimens examined: *Alexander & Kellogg* 5,197 (type, Univ. Calif., my photograph no. 4,097); *Otto Degener* 21,472, windy, open forest, east rim of Kalalau Valley, Kauai, Dec. 27, 1951 (Chi.; N.Y.).

Cheirodendron Helleri var. γ . **multiflorum** (Skotts.) comb. nov.; *Cheirodendron trigynum* var. *multiflorum* Skotts. Meddel. Göteb. Bot. Trädg. 15: 416. 1944.

Small tree. Leaves 3-foliolate; petiole up to ± 8.5 cm. long; blade of leaflets oval-oblong, at base broadly triangular, at apex rounded but commonly mucronulate, at margins not crenate but regularly denticulate with short, strongly incurved teeth (these subtending a large gland), dull to somewhat glossy above, 5–11 cm. long and 3–6 cm. wide; nervation brochidodromous; petiolule 1–2.5 cm. long. Panicle terminal or at times lateral, 6–10 cm. long including peduncle, its branches spreading to divaricate-reflexed, umbellets mostly 7–15-flowered. Pedicels 3–6 mm. long; florets 6–6.5 mm. long, ovary about 3 mm. long and 2.8 mm. wide; petals ovate, 3.2–3.5 mm. long. Drupes orbicular, drying dark-brown, 7–8 mm. wide; pyrenae 2 or very rarely 3, in outline semilunar, 5–6 mm. long; stigmas 2 or very rarely 3, finally recurved and about 1 mm. long.

Type: Collected by *Lucy M. Cranwell, Olof H. Selling, & Carl Skottsberg*, no. 2,966, in forest, alt. about 1,200 m., near Lehuamakanoi bog, Alakai, Isl. Kauai, in flower and fruit, Aug. 16, 1938 (Goth.).

Distribution: Northwestern Kauai.

Specimens examined (all from Kauai): *R. W. Baxter*, a 25-foot tree, alt. 3,600 ft., Kokee-Alakai Road, February, 1939 (Mo., 2

sheets); *Cranwell, Selling, & Skottsberg* 2,966 (type, Goth.); *Cranwell, Selling, & Skottsberg* 3,881, alt. about 1,200 m., Kawaia trail, Kohua ridge, Waimea, Aug. 19, 1938 (Bish., my photograph no. 4,132; Goth.); *Otto Degener* 9,588, in rain-forest, Kokee, 1926 (Chi.); *Degener & Amy Greenwell* 21,552, forest, Kumuweia Ridge east of Waianeke Swamp, Kokee, Jan. 8, 1952 (Chi.); *Degener & Greenwell* 21,581, forest along Kopiwai Trail, Kokee region, Jan. 11, 1952 (Chi.); *Degener & Greenwell* 21,741, open forest, Kaluapuhi-Kaunohua Trail, Kokee region, Jan. 12, 1952 (Berl.; Brit.; Chi.; Del.; Gray; Kew; N.Y.; Par.; Phila.); *Degener & Henry Wiebke* 2,077, in woods near Halemanu, Kokee, June 27, 1926 (Goth., 2 sheets; N.Y., 2 sheets; Univ. Calif.; U.S.); *Gertrude E. Douglas* 419, alt. 3,000–3,400 ft., humus, rainy district, beside trail, Kokee forest, June 29, 1928 (Corn.); *Charles N. Forbes* 375-K, mountains in vicinity of Kaholuamanu, September, 1909 (Bish.; Chi.); *Forbes* 901-K, Waimea Drainage Basin, west side, July 3–Aug. 18, 1917 (Bish.; Chi.); *Amos A. Heller* 2,795, on Kaholuamanu above Waimea, Sept. 2–9, 1895 (Arn.; Bish.; Chi.; Corn.; Gray; Mo.; N.Y.; Par.; Phila.; Univ. Calif., my photograph no. 4,133; U.S.); *Albert S. Hitchcock* 15,323, alt. 3,600 ft., Kaholuamanu, Oct. 20, 1916 (U.S.); *L. H. MacDaniels* 804, tree 10 m. tall, common on slopes and ridges, alt. 1,300 m., Alakai Swamp, Feb. 17, 1927 (Bish.; Chi.); *Joseph F. Rock* 2,182, Halemanu, Feb. 14–26, 1909 (Gray); *Rock* 2,183, same place and date (U.S.); *Rock* 2,195, same place and date (Bish.); *Rock* 2,196, same place and date (Arn.); *Rock* 5,924, Kaholuamanu, Waiakealoha, Sept. 10, 1909 (Arn.); *Rock* 5,964, road to Waiakealoha, same date (Gray).

This variety has leaflets similar to those of *Ch. trigynum* vars. *Skottsbergii* and *oblongum*, and so at first might seem to belong in the *Ch. trigynum* complex. Its fruits, however, indicate a stronger affinity with *Ch. Helleri*.

Cheirodendron Helleri var. δ . *sodalium* Sherff, Bot. Leaflet no. 6: 6. 1952.

Blade of leaflets more or less obovate-rotundate to very widely obovate-oblong, at base very widely cuneate, at apex truncate to emarginate and at times very abruptly short-mucronate, at margins very entire, a blade of a median leaflet 7.5–9 cm. long and 7–8 cm. wide, that of the lateral ones a little smaller. Umbellets 2–5-flowered. Drupes 6 mm. tall including the two stigmas (these under 0.7 mm. long, diverging) and up to 5.6 mm. wide, compressed, 2-pyrenate.

Type: Collected by *F. Fagerlind & Carl Skottsberg*, no. 6,489, alt. about 600 m., in forest, near margin, Wahiawa Swamp, southern Kauai, Mar. 5, 1948 (Stockh.).

Distribution: Known only from type locality in south-central Kauai.

Specimens examined: *Fagerlind & Skottsberg* 6,489 (type, Stockh., my photograph no. 4,150).

Dr. Skottsberg had determined the type as "*Cheirodendron Fauriei* Hochr. var." His separate annotation on a supplementary slip of paper states: "This seems to come near Krajina's *Ch. wahiawense* var. *populneum*, but differs from this in shape of base and total lack of teeth." *Ch. Helleri*, published since Skottsberg's note was written, is seen to be the logical species with which to associate this variety (although it is true that in its small stigmas var. *sodalium* might seem allied to *Ch. Fauriei* or, to use the synonym used by Krajina, *Ch. wahiawense*). The varietal epithet alludes to the two collectors of the type. As associates in the field, they collected many specimens of Hawaiian plants, many of which have proved to be new.

Incertae sedis

Cheirodendron Gaudichaudii forma ϵ Hillebr. Fl. Haw. Isls. 148. 1888; *Panax Gaudichaudii* var. ϵ Drake del Cast. Illustr. Fl. Ins. Mar. Pacif. 181. 1890; *Cheirodendron Gaudichaudii* var. ϵ Rock, Indig. Trees Haw. Isls. 363. 1913. Described with "leaflets subentire, smaller, membranous, the common petiole 2-2½ inches. Styles 2-5. Kauai!" This is possibly but by no means certainly *Ch. kauaiense* var. *Forbesii*. In herbarium determinations, Rock applied his ϵ to specimens that are now to be called *Ch. Helleri* var. *multiflorum*.

Panax Gaudichaudii (i.e., *Cheirodendron Gaudichaudii*) var. ζ Drake del Cast. Illustr. Fl. Ins. Mar. Pacif. 181. 1890. Described with "foliis [sic!] ovatis subcordatis" from the Island of Oahu, based on *Remy* 497 (not seen by me).

Cheirodendron wahiawense var. *populneum* Krajina, Preslia 10: 99. 1931. Apparently a form of *Ch. Fauriei* (to which *Ch. wahiawense* Krajina reduces). The type was a sterile spray, collected by Krajina on the same day and almost at the same spot with his *Ch. wahiawense* proper. From his short description—"Foliola valde integriora, dimidio inferiore solum quatuor usque six [sic!] dentibus instructo. Flores et fructus mihi ignoti."—it seems doubtful if a varietal status is merited.

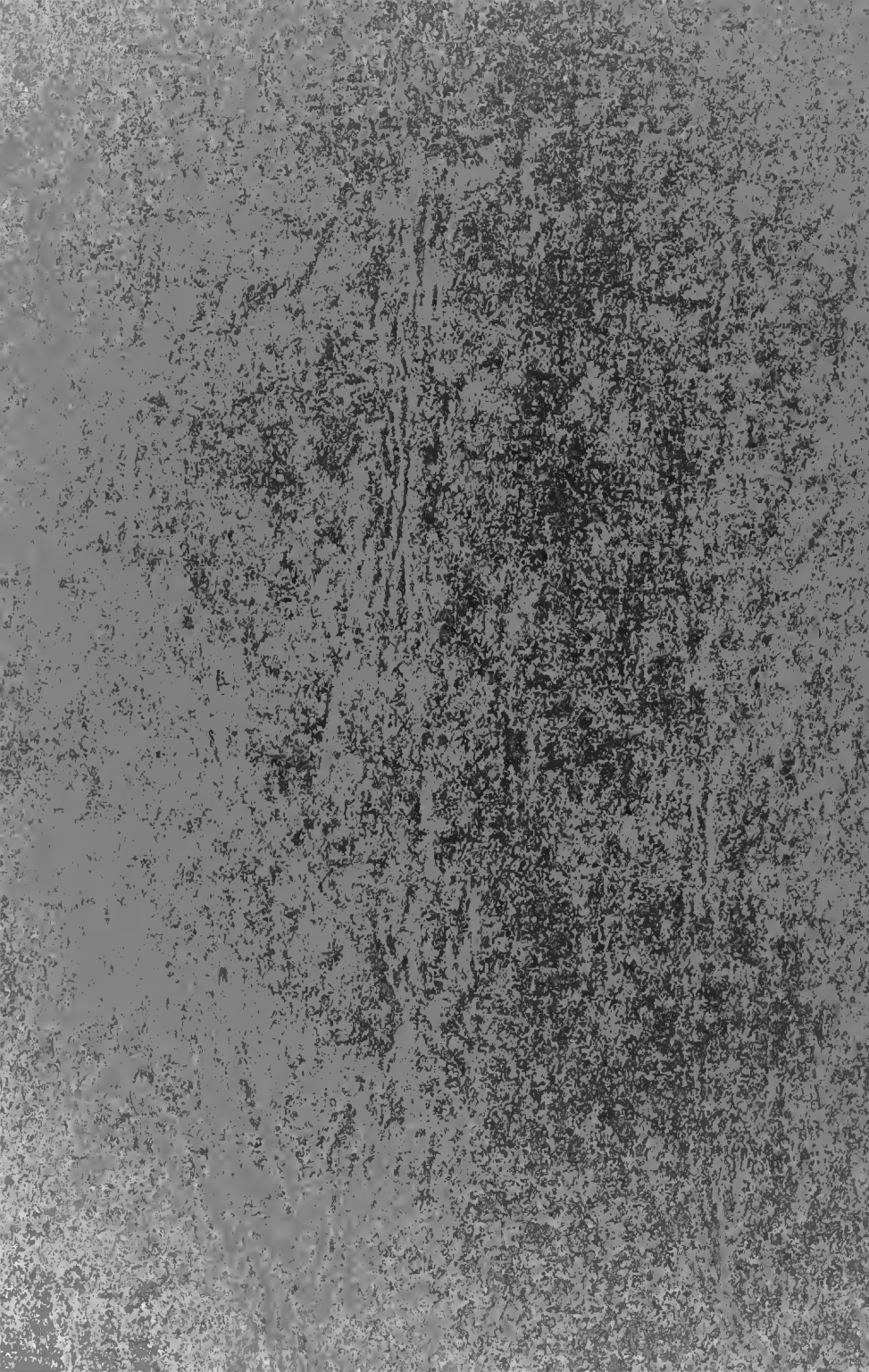
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