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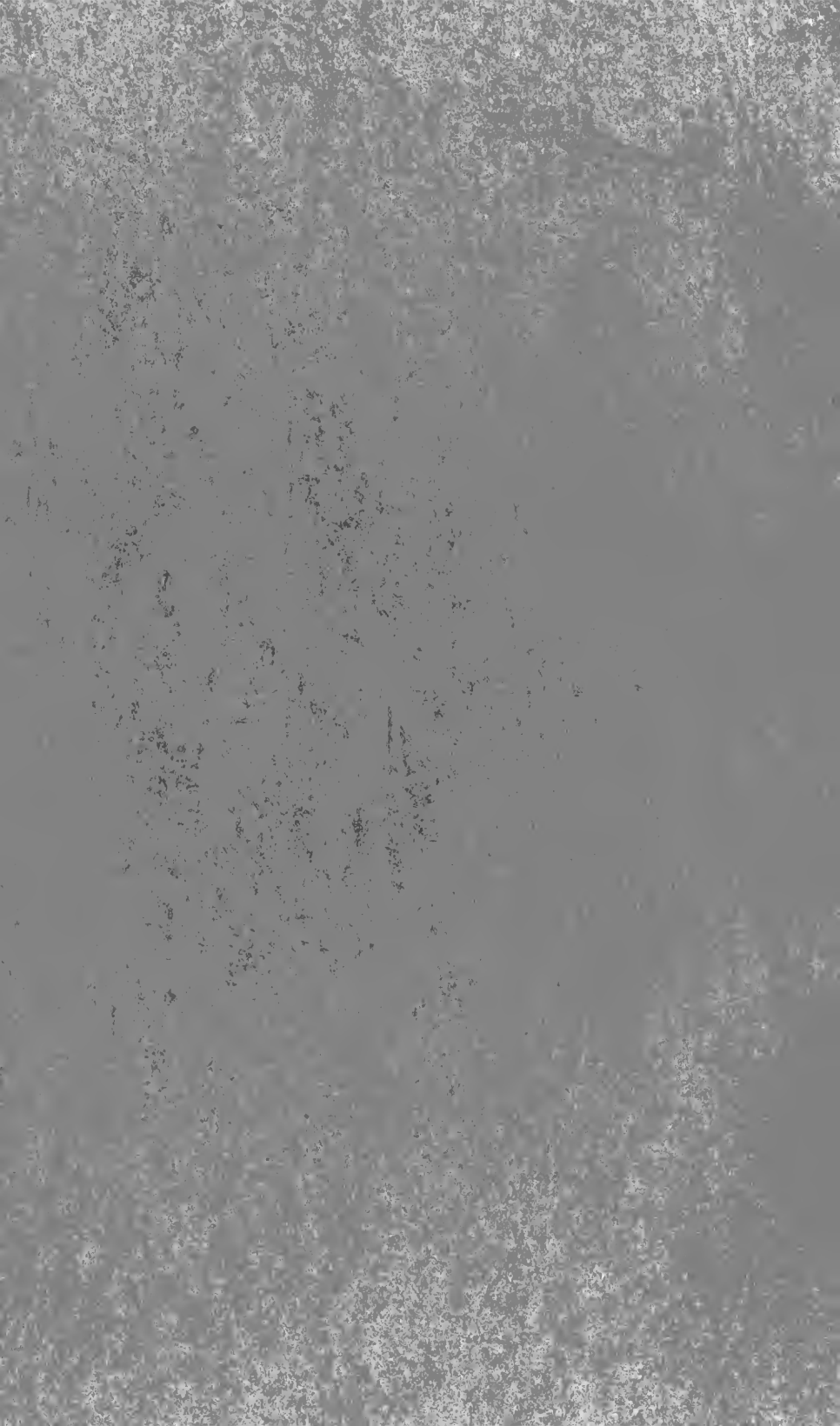
REVISION OF
THE HAWAIIAN MEMBERS
OF THE GENUS
TETRAPLASANDRA A. GRAY

EARL EDWARD SHERFF

FIELDIANA: BOTANY
VOLUME 29, NUMBER 2

Published by
CHICAGO NATURAL HISTORY MUSEUM
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EARL EDWARD SHERFF

Research Associate, Systematic Botany

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Revision of the Hawaiian Members of the Genus *Tetraplasandra* A. Gray

INTRODUCTION AND HISTORICAL NOTES

The history of the genus *Tetraplasandra* begins with the original description of the genus by Asa Gray (Bot. U. S. Explor. Exped. 727, tab. 94. 1854). A single species was described at that time, *T. hawaiiensis*.¹ This, the type basis of the genus, had leaves densely tomentose beneath and a paniculate inflorescence with umbellate, racemose, and umbellate-racemose subordinate branches. In 1873, Wawra (Flora 56: 158) described a second species, *T. waimeae*, from the Island of Kauai, a species with glabrous leaves and twice-compound umbels. As time went on, three additional species were described from elsewhere than the Hawaiian Islands: *T. paucidens* Miq. Ann. Mus. Bot. Lugd. Bat. 1: 4. 1863. East Indies; *T. Koordersii* Harms, Ann. Jard. Buitenz. 19: 12. 1904. Celebes; and *T. philippinensis* Merr. Philipp. Jour. Sci. 1, suppl. 219. 1906. Philippine Islands. As these do not come within the scope of this treatment, they need not concern us here.

In the same volume that contained the original description of *T. hawaiiensis*, Gray described interrogatively (p. 726) a *Gastonia oahuensis* from the mountains behind Honolulu, alt. 2,000 feet. Seemann (Jour. Bot. 6: 139. 1868) renamed this *Triplasandra oahuensis*, a name that was altered to *Tetraplasandra oahuensis* in 1898, when Harms (*in* Engl. & Prantl, Pflanzenfam. 3: 8: 30) merged the genus *Triplasandra* Seem. with *Tetraplasandra* A. Gray. Prior to Harms' work, however, Hillebrand (Fl. Haw. Isls. 151-155. 1888) had given treatments for *Triplasandra* and *Tetraplasandra*. In the latter, he had included only the two species, *Tetraplasandra hawaiiensis* and *T. waimeae*. In the former, he had retained *Triplasandra oahuensis* as it had been renamed by Seemann and had appended to it a var. β . He had added three new species of his

¹ Spelled *hawaiiensis* by Gray but given by certain subsequent authors the more conventional spelling *hawaiensis*.

own: *T. meiandra*, with six varieties, *a* (earlier named by Wawra *op. cit.* 159 with the untenable *Heptapleurum waimeae*), *β*, *γ*, *δ*, *ε*, and *ζ*,¹ *T. Lydgatei*, and *T. kaalae*. These three additional species of Hillebrand's were transferred likewise by Harms (*loc. cit.*) to *Tetraplasandra*, making a total at that time of six species of *Tetraplasandra* for the Hawaiian Islands.

In 1913, Rock (Indig. Trees Haw. Isls. 337-349, *pls.* 135-139) presented an expanded treatment of the genus for the Hawaiian Islands, listing a total of eight species, two of which, namely, *T. waialealae* and *T. lanaiensis*, he had recently described elsewhere (College Haw. Publ. Bull. 1: 10, *pl.* 1, and 12, *pl.* 2. 1911). Rock had made numerous field observations on the various islands and assembled a vast quantity of specimens, many of them of superior quality. His success in discovering numerous new localities unknown to Hillebrand for many of the varieties of *T. meiandra*, he explained by saying that "the forests have merely been opened up nowadays by ditch trails, while in Hillebrand's time the rain forests were almost inaccessible." Rock (p. 347) voiced his intention of producing a monograph later on, but he seems never to have done so.

Almost contemporaneous with the collections by Rock were those by Mr. Charles Noyes Forbes, whose activities were halted by his premature death a third of a century ago. Like many of Rock's specimens, many by Forbes have since proved new to science and will be found cited in considerable numbers in the present text. Forbes lived to publish only one new species in the genus, his *T. racemosa*, a species which, however, is best set apart in a separate genus (see "Excluded Species" below).

Following Forbes, Skottsberg made various collections on the islands and published several new species and varieties. These are listed under *T. pupukeensis* Skottsbg., *T. meiandra* (Hillebr.) Harms, and *T. kohalae* Skottsbg. and bring the number of Hawaiian species to ten.

The most extensive of all collections of *Tetraplasandra*, however, are those of Dr. Otto Degener and his associates. Dr. Degener has spent some three decades in residence in the islands and collected far more numerously than any other collector of Hawaiian plants. He described one new species, *T. waianensis* (Fl. Haw. fam. 281), in

¹ Hillebrand did not specify *varietal* status for these subordinate categories. In the immediate context (pp. 152, 153) he used the word "forms," but on an earlier page (151) he had already referred to *a* as a *variety*. I have followed Drake del Castillo, Rock, Skottsberg, and others in citing Hillebrand's Greek letters (somewhat arbitrarily to be sure) as applying to *varieties*.

1938, but his other new *taxa* have since been described as varieties or formae with myself in joint authorship.

In 1952 appeared two papers by myself on Hawaiian *Tetraplasandra* (Bot. Leaflet nos. 6: 19 and 7: 7) and in 1953 still a third paper (*ibid.* no. 8: 2). These contained numerous notes, descriptions of new varieties and formae, and descriptions of three new species so similar to orthodox *Tetraplasandra* as currently accepted that they need merely be mentioned here: *T. lihuensis*, *T. Munroi*, and *T. bisattenuata*. In the last-cited paper, the above fourteen species were apportioned to three sections of the genus. To Eutetraplasandra Harms (*sensu magnopere restricto*) was assigned the lone species *T. hawaiiensis*. To the new section Neotetraplasandra were assigned all of the other thirteen species except *T. meiandra*, which was placed by itself in the third section, Nothotetraplasandra Harms. Besides these three sections, as will be seen later (p. 54), the genus contains a fourth, namely, Pterotropia. This section contains the remaining five species known for Hawaiian *Tetraplasandra* at the present time, and a brief statement of its inception and subsequent history may be of value here.

In 1867, Horace Mann, Jr., the son of the great educator, described two new Hawaiian species that he himself and William T. Brigham had collected between May 4, 1864, and May 18, 1865. One, *Mann & Brigham* 606, had come from Kauai and was named *Heptapleurum kawaiense* (the *v* changed by several subsequent authors, as also from here on in the present text, to *u*). The other, *Mann & Brigham* 349, had come from Lanai and was named *H. dipyrenum*. Mann considered the two species as constituting a new section for *Heptapleurum* Gaertn. He created, therefore, the section name *Pterotropia*, presenting an adequate description. The following year, Seemann (*Jour. Bot.* 6: 103. 1868) renamed Mann's first species *Agalma kawaiense*. He created the new genus *Dipanax* for *H. dipyrenum* and renamed the one contained species *Dipanax Mannii*. In 1888 Hillebrand (*Fl. Haw. Isls.* 149) went back to Mann's section name *Pterotropia* but raised it to generic rank—a course not permitted by the rules of today, since the earlier *Dipanax* of Seemann had been validly published and would take precedence over *Pterotropia* on the generic level. Hillebrand gave valuable notes upon *Pterotropia* as a genus, also upon related araliads. With him the genus *Pterotropia* consisted of the two species originally described by Mann, also a new var. (called *Tetraplasandra micrantha* in the present text) of *P. kawaiensis* and a third species, *P. gymnocarpa*, so named because of its anomalous, completely superior ovaries,

the other *taxa* in *Pterotropia* having the ovaries inferior or only partially superior.

Shortly after Hillebrand's treatment, there appeared the *Illustrationes Florae Insularum Maris Pacifici* by Drake del Castillo. Drake accepted *Dipanax Mannii* Seem. and *Heptapleurum kauaiense* Mann (misspelling the trivial epithet as *kauaiense*, however) and renamed Hillebrand's new species *Heptapleurum gymnocarpum*. In 1897, Heller (*Minnesota Bot. Studs.* 1: 870) went back to the name *Dipanax* Seem. for the three species known to him but rejected Seemann's *D. Mannii* in favor of the new combination *Dipanax dipyrena*. He rejected *Agalma kauaiense* (H. Mann) Seem. in favor of the new combination *Dipanax kauaiense*. For *Pterotropia gymnocarpa* Hillebr. he made the new combination *Dipanax gymnocarpa*.

Rock, already mentioned above, preferred *Pterotropia* to *Dipanax* on grounds of priority (although as a *generic* name *Dipanax* preceded *Pterotropia* by twenty years).

Recently (*Bot. Leafl.* no. 7: 10. 1952), I have stated that a monographic study of *Tetraplasandra* "reveals so much interlocking and overlapping of characters between *Tetraplasandra*" and the species assigned to *Pterotropia* "as to remove all warrant for their segregation." Accordingly, *Pterotropia* was restored to its original rank of section but transferred as a section to a place within the genus *Tetraplasandra* where, as already stated, it constitutes the fourth (and last) section. To it belong *T. kauaiensis* (type of the section) with several additional varieties (six recently described, one the early *Heptapleurum dipyrenum* H. Mann reduced to varietal rank); the *T. micrantha* and *T. gymnocarpa* already mentioned, the latter with three additional varieties; and, finally, the two recently described species, *T. turbans* of northwestern Oahu and *T. kahanana* of northeastern Oahu.

As in my previous revisional studies, numerous photographs of the more important herbarium specimens have been taken. As formerly, a complete set has been retained in my own private albums and a duplicate set deposited in the Herbarium of Chicago Natural History Museum. To the authorities of that institution, (and especially to Dr. Theodor Just, Chief Curator, Department of Botany) who have afforded opportunities for conducting the research summarized in the following pages, and also to the authorities of all other co-operating institutions, it is a pleasure to express here my appreciation and thanks.

Genus **TETRAPLASANDRA** A. Gray: Description

A. Gray, Bot. U. S. Explor. Exped. 727, tab. 94. 1854; *Dipanax* Seem. Jour. Bot. 6: 130. 1868; *Triplasandra* Seem. Jour. Bot. 6: 139. 1868; *Pterotropia* (H. Mann) Hillebr. Fl. Haw. Isls. 149. 1888.

Unarmed glutinous trees or shrubs. Leaves alternate, imparipinnate with 5–21 entire leaflets, petioles basally clasping and estipulate or with but rudimentary stipules; terminal petiolule usually articulate. Inflorescence terminal or lateral, the florets umbellate-racemose on the umbellate-racemose branches of a usually stalked panicle, or in simple or compound umbels or at times subracemiform umbels; bracts minute, caducous. Pedicels not articulate with calyx, the latter in most species adnate in fruit to ovary halfway up or more, its limb narrow, spreading, often crenulate, often conspicuous. Florets hermaphrodite. Petals 5–9, epigynous, valvate in the bud, thick or thickish, cohering or finally all or most of them separating and spreading, often involute and even uncinulate at tip. Stamens as many as and alternating with petals or 2–8 times as many, arranged in 1–4 circles around an annular disk, filaments short and thickish, anthers introrse and ovate or oblong to lanceolate. Ovary 2–13 (rarely –16)-celled, with a pendulous, anatropous ovule (rarely 2 ovules) in each cell, in fruit half to almost entirely inferior or by exception (*T. gymnocarpa* and vars., *T. turbans*) completely superior, its top depressed or truncate or more often convex to conical and serving at center as an often ill-defined stylopodium, this sometimes contracted into a short, discrete style; stigmas 2–13 (rarely –16), capitate (or if numerous then slender and radiating). Fruit a drupe, not or but slightly succulent, globose to ovoid or cylindrical, rounded to angular or compressed; pyrenae chartaceous, crustaceous, or coriaceous, ovoid to compressed, with 1 or 2 ridges on either side. Seeds often ribbed or furrowed. A genus of about twenty-two known species, all but three (namely, *T. Koordersii* Harms of Celebes, *T. paucidens* Miq. of the East Indies, and *T. philippinensis* Merr. of the Philippine Islands) belonging to the Hawaiian Islands.

¹ Name from τετραπλασιος, fourfold, and ανδρα, stamens, four times as many stamens as petals having been found in the flowers or florets of the type species. The International Code of Botanical Nomenclature adopted at Stockholm in 1950 recommends (Rec. 83A) but does not require the masculine gender for *Tetraplasandra*, the *andra* of which comes from a masculine Greek word. In the present work, however, the feminine gender has been maintained throughout in accordance with general practice for generic names so derived when they end in *a*, as shown, for example, in the binomials *Calliandra amazonica* Benth., *Comandra Richardsoniana* Fern., *Cyrtandra platyphylla* A. Gray, *Pellandra virginica* (L.) Schott & Endl., *Tetraplasandra racemosa* Forbes, etc.

Type species: *Tetraplasandra hawaiiensis* A. Gray, Bot. U.S. Explor. Exped. 728, tab. 94. 1854.

EXCLUDED SPECIES

T. racemosa Forbes, Occ. Paps. Bishop Mus. 6: 4: 51, figs. 9 and 10. 1917=*Munroidendron racemosum* (Forbes) Sherff, Bot. Leaflet no. 7: 22. 1952.

SECTIONS OF TETRAPLASANDRA

Four sections may be recognized. These are:

Sect. I. **Eutetraplasandra** Harms in Engler & Prantl, Nat. Pflanzenfam. 3: 8: 29. 1898 (as to *T. hawaiiensis* only). Stamens four times as many as petals or fewer; inflorescence paniculate; leaves tomentose beneath. No. 1.

Sect. II. **Neotetraplasandra** Sherff, Bot. Leaflet no. 8: 12. 1953 (sect. Eutetraplasandra Harms, *loc. cit.*, exclud. *T. hawaiiensis*). Stamens two to eight times as many as petals; inflorescence umbellate or compound-umbellate or sometimes varying somewhat to racemose-paniculate; leaves commonly glabrous beneath. Nos. 2-13.

Sect. III. **Nothotetraplasandra** Harms, *op. cit.* 30. 1898. Stamens about as many as petals; inflorescence etc. as in sect. II. No. 14.

Sect. IV. **Pterotropia** (H. Mann) Sherff, Bot. Leaflet no. 7: 10. 1952; *Heptapleurum* Gaertn. sect. *Pterotropia* H. Mann, Proc. Amer. Acad. 7: 168. 1867; *Pterotropia* (H. Mann) Hillebr. Fl. Haw. Isls. 149. 1888 (for a genus). Stamens as many as petals; inflorescence coarsely paniculate, the florets umbellate-racemose on the umbellate-racemosely disposed branches. Nos. 15-19.

CONSPECTUS OF SPECIES, VARIETIES, AND FORMS

1. <i>Tetraplasandra hawaiiensis</i>	65
var. β . <i>awiniensis</i>	66
var. γ . <i>gracilis</i>	67
var. δ . <i>microcarpa</i>	68
2. <i>Tetraplasandra waimeae</i>	69
var. β . <i>angustior</i>	71
3. <i>Tetraplasandra waialealae</i>	72
var. β . <i>urceolata</i>	74
var. γ . <i>acrior</i>	74

var. δ . <i>wahiawensis</i>	75
var. ϵ . <i>subsessilis</i>	76
4. <i>Tetraplasandra pupukeensis</i>	77
var. β . <i>venosa</i>	78
var. γ . <i>megalopoda</i>	79
f. <i>trigona</i>	79
var. δ . <i>nitida</i>	80
var. ϵ . <i>decipiens</i>	81
5. <i>Tetraplasandra lihuensis</i>	81
var. β . <i>gracilipes</i>	82
6. <i>Tetraplasandra kohalae</i>	83
7. <i>Tetraplasandra lanaiensis</i>	84
8. <i>Tetraplasandra Munroi</i>	85
9. <i>Tetraplasandra Lydgatei</i>	86
var. β . <i>brachypoda</i>	87
var. γ . <i>Forbesii</i>	88
var. δ . <i>leptorhachis</i>	89
var. ϵ . <i>coriacea</i>	89
10. <i>Tetraplasandra oahuensis</i>	90
var. β . <i>longipes</i>	93
var. γ . <i>eradiata</i>	93
var. δ . <i>pseudolongipes</i>	94
var. ϵ . <i>Fauriei</i>	95
var. ζ . <i>pseudorhachis</i>	96
var. η . <i>venulosior</i>	96
var. θ . <i>hailiensis</i>	97
11. <i>Tetraplasandra waianensis</i>	97
var. β . <i>palehuana</i>	99
12. <i>Tetraplasandra kaalae</i>	99
var. β . <i>multiplex</i>	101
13. <i>Tetraplasandra bisattenuata</i>	102
14. <i>Tetraplasandra meiantra</i>	103
var. β . <i>bisobtusa</i>	105
var. γ . <i>Bryanii</i>	105
var. δ . <i>Degereri</i>	106
var. ϵ . <i>Hillebrandii</i>	106
var. ζ . <i>hiloensis</i>	107
var. η . <i>leptomera</i>	108
var. θ . <i>longipedunculata</i>	108
var. ι . <i>makalehana</i>	111

var. κ. <i>mauiensis</i>	111
var. λ. <i>molokaiensis</i>	112
var. μ. <i>occidentalis</i>	113
var. ν. <i>olowaluana</i>	113
var. ξ. <i>ovalis</i>	114
var. ο. <i>polyantha</i>	115
var. π. <i>polystigmata</i>	116
var. ρ. <i>prolifera</i>	116
var. σ. <i>prolificoides</i>	117
var. τ. <i>ramosior</i>	117
var. υ. <i>rhynchocarpa</i>	118
var. υ'. <i>rhynchocarpoides</i>	119
var. φ. <i>Rockii</i>	119
var. χ. <i>simulans</i>	120
var. ψ. <i>Skottsbergii</i>	121
var. ω. <i>tenuistylis</i>	122
var. ω'. <i>tenuistyloides</i>	123
15. <i>Tetraplasandra kauaiensis</i>	123
var. β. <i>dipyrena</i>	125
var. γ. <i>grandis</i>	126
var. δ. <i>intercedens</i>	126
var. ε. <i>nahikuensis</i>	127
var. ζ. <i>robustior</i>	128
var. η. <i>koloana</i>	129
var. θ. <i>occidua</i>	129
16. <i>Tetraplasandra turbans</i>	130
17. <i>Tetraplasandra micrantha</i>	131
18. <i>Tetraplasandra gymnocarpa</i>	133
var. β. <i>leptocarpa</i>	134
var. γ. <i>megalocarpa</i>	135
var. δ. <i>pupukeensis</i>	136
19. <i>Tetraplasandra kahanana</i>	137

DISTRIBUTION BY ISLANDS

Island of Kauai

- | | |
|--------------------------|---------------------------|
| 1. <i>T. waimeae</i> | 2. <i>T. waialealae</i> |
| var. α. <i>waimeae</i> | var. α. <i>waialealae</i> |
| var. β. <i>angustior</i> | var. β. <i>urceolata</i> |

- var. γ . *acrior*
 var. δ . *wahiawensis*
 var. ϵ . *subsessilis*
3. *T. lihuensis*
 var. α . *lihuensis*
 var. β . *gracilipes*
4. *T. bisattenuata*
5. *T. meiandra*
 var. δ . *Degereri*
6. *T. kauaiensis*
 var. α . *kauaiensis*
 var. ζ . *robustior*
 var. η . *koloana*

Island of Oahu

1. *T. pupukeensis*
 var. α . *pupukeensis*
 var. β . *venosa*
 var. γ . *megalopoda*
 f. *trigona*
 var. δ . *nitida*
 var. ϵ . *decipiens*
2. *T. Lydgatei*
 var. α . *Lydgatei*
 var. β . *brachypoda*
 var. γ . *Forbesii*
 var. δ . *leptorhachis*
 var. ϵ . *coriacea*
3. *T. oahuensis*
 var. α . *oahuensis*
 var. β . *longipes*
 var. γ . *eradiata*
 var. δ . *pseudolongipes*
 var. ϵ . *Fauriei*
 var. ζ . *pseudorhachis*
 var. η . *venulosior*
 var. θ . *hailiensis*
4. *T. waianensis*
 var. α . *waianensis*
 var. β . *palehuana*
5. *T. kaalae*
 var. α . *kaalae*
 var. β . *multiplex*
6. *T. meiandra*
 var. α . *meiandra*
 var. γ . *Bryanii*
 var. θ . *longipedunculata*
 var. ι . *makalehana*
 var. λ . *molokaiensis*
7. *T. turbans*
8. *T. micrantha*
9. *T. gymnocarpa*
 var. α . *gymnocarpa*
 var. β . *leptocarpa*
 var. γ . *megalocarpa*
 var. δ . *pupukeensis*
10. *T. kahanana*

Island of Molokai

1. *T. hawaiiensis*
 var. δ . *microcarpa*
2. *T. meiandra*
 var. \omicron . *polyantha*
 var. ψ . *Skottsbergii*

Island of Lanai

- | | |
|---|--|
| 1. <i>T. hawaiiensis</i>
var. <i>a. hawaiiensis</i>
var. <i>δ. microcarpa</i> | 4. <i>T. meiandra</i>
var. <i>ε. Hillebrandii</i> |
| 2. <i>T. lanaiensis</i> | 5. <i>T. kauaiensis</i>
var. <i>β. dipyrena</i> |
| 3. <i>T. Munroi</i> | |

Island of Maui

- | | |
|--|---|
| 1. <i>T. hawaiiensis</i>
var. <i>γ. gracilis</i>
var. <i>δ. microcarpa</i> | 3. <i>T. kauaiensis</i>
var. <i>β. dipyrena</i>
(<i>fide</i> Hillebr.)
var. <i>δ. intercedens</i>
var. <i>ε. nahikuensis</i>
var. <i>θ. occidua</i> |
| 2. <i>T. meiandra</i>
var. <i>η. leptomera</i>
var. <i>κ. mauiensis</i>
var. <i>μ. occidentalis</i>
var. <i>ν. olowaluana</i>
var. <i>ξ. ovalis</i>
var. <i>π. polystigmata</i>
var. <i>τ. ramosior</i> | |

Island of Hawaii

- | | |
|--|---|
| 1. <i>T. hawaiiensis</i>
var. <i>a. hawaiiensis</i>
var. <i>β. awiniensis</i>
var. <i>δ. microcarpa</i> | 4. <i>T. kauaiensis</i>
var. <i>β. dipyrena</i>
(<i>fide</i> Hillebr.)
var. <i>γ. grandis</i> |
| 2. <i>T. kohalae</i> | |
| 3. <i>T. meiandra</i>
var. <i>β. bisobtusa</i>
var. <i>ζ. hiloensis</i>
var. <i>ρ. prolifica</i>
var. <i>σ. prolificoides</i>
var. <i>υ. rhynchocarpa</i>
var. <i>υ'. rhynchocarpoides</i>
var. <i>φ. Rockii</i>
var. <i>χ. simulans</i>
var. <i>ω. tenuistylis</i>
var. <i>ω'. tenuistyloides</i> | |

KEY

- a. Stamens 2-8 times as many as petals.
- b. Leaves (except for seedlings and watersprouts) normally tomentose underneath; inflorescence paniculate; stamens 3 or 4 times as many as petals. 1. *T. hawaiiensis* and vars.
- b. Leaves glabrous underneath; inflorescence 1-4-umbellate.
- c. Stamens 6-8 times as many as petals; drupes urceolate-globose, 1.5-3 cm. thick, strongly ribbed when dry; natives of Isl. Kauai. 2. *T. waimeae* and var. β . *angustior*.
- c. Stamens mostly fewer; drupes smaller or at least more slender.
- d. Petals 8-10 mm. long or, if shorter, then drupes ovoid-cylindric, 2.2 cm. long and up to 1 cm. thick.
- e. Inflorescence once- or imperfectly twice-umbellate, umbels 23-28-flowered; native of northwestern Hawaii.
6. *T. kohalae*.
- e. Inflorescence twice-umbellate or, if with solitary peduncle, not from Isl. Hawaii; natives of Isl. Oahu.
4. *T. pupukeensis* and vars.
- e. Inflorescence thrice-umbellate; natives of Isl. Kauai.
- f. Flowers large, their calyx 8-15 mm. tall; peduncles and rays without nodes. . . 3. *T. waialealae* and vars.
- f. Flowers smaller, their calyx about 5-6 mm. tall.
- g. Leaflets mostly truncate at base, coriaceous; peduncles without nodes. 5. *T. lihuensis*.
- g. Leaflets contracted to rounded at base, submembranaceous; peduncles with one node.
5. *T. lihuensis* var. β . *gracilipes*.
- d. Petals mostly 7 mm. or less in length.
- e. Drupes 5- or 6-(rarely 4-)angled; natives of southeastern Oahu. 10. *T. oahuensis* and vars.
- e. Drupes 3-4-angled.
- f. Inflorescence drooping, thrice-umbellate; secondary umbels of 17-21 drooping, several-nodate rays 8-10 cm. long; native of Isl. Lanai. 7. *T. lanaiensis*.
- f. Inflorescence erect, or, if drooping, then with no nodes on rays.
- g. Peduncles bearing rays that bear pedicels.

- h.* Leaflets fusiform in outline; native of south-eastern Kauai 13. *T. bisattenuata*.
h. Leaflets broader at one or both ends.
 i. Rays of inflorescence ± 20 , about 5–6.5 cm. long; umbellets about 6–8-flowered; native of Isl. Lanai 8. *T. Munroi*.
 i. Rays of inflorescence mostly fewer and shorter; umbellets directly at tips of rays and about 10–12-flowered or at tips of subrays and 3–5-flowered; natives of northwestern Oahu.
 12. *T. kaalae* and var. β . *multiplex*.
g. Peduncles bearing pedicels directly, rays absent.
 h. Petals 5, stamens 12; natives of Koolau Range from southeastern Oahu northwestward as far as Wahiawa 9. *T. Lydgatei* and vars.
 h. Petals about 8, stamens about 28; known only from Middle Palawai Ridge and vicinity, Waianae Range, Isl. Oahu.
 11. *T. waianensis* and var. β . *palehuana*.
a. Stamens as many as petals.
 b. Ovary superior, even in fruit.
 c. Umbellets dense, 10–16-flowered, at anthesis only 7–9 mm. in diameter with pedicels under 1 mm. long . . . 16. *T. turbans*.
 c. Umbellets and pedicels larger . . . 18. *T. gymnocarpa* and vars.
 b. Ovary more or less inferior.
 c. Inflorescences mostly either simple or compound umbels.¹
 d. Stigmas 2 or at times 3.
 e. Drupes ovoid to urceolate-ovoid; natives of Kilauea-Kulani region, southeastern Kauai.
 f. Drupes more or less truncate at top, stylopodium usually contracted below stigmas into an evident style 14. *T. meiandra* var. ω . *tenuistylis*.
 f. Drupes conical above calyx-limb as a stylopodium and without an evident style.
 14. *T. meiandra* var. ω' . *tenuistyloides*.

¹ In addition to the varieties of *T. meiandra* listed under this *c* are the ill-named and but scantily known var. λ . *molokaiensis* of Wailupe (on Oahu!) and the var. δ . *Degeneri* of northwestern Kauai, a variety unknown as to drupes but with thrice-compound inflorescences, numerous rays (even 18 or 21), and small pentamerous corollas.

- e. Drupes mostly more elongate, style seldom evident.
- f. Inflorescence thrice-umbellate (rays present).
 - g. Umbellets compactly flowered, pedicels 4–6 mm. long; native of northwestern Hawaii.
 - 14. *T. meiandra* var. *s. prolificoides*.
 - g. Umbellets more open, pedicels longer.
 - h. Peduncles under 7 cm. long; native of northwestern Hawaii. 14. *T. meiandra* var. *ρ. prolifica*.
 - h. Peduncles longer.
 - i. Leaflets large, blade 12–17 cm. long and 5–7.5 cm. wide; drupe more or less ovoid, its vertex from slightly raised to moderately conical; local in northwestern Oahu.
 - 14. *T. meiandra* var. *ι. makalehana*.
 - i. Leaflets smaller.
 - j. Leaflets ovate to oblong, at apex somewhat acute, at base more or less contracted; rays mostly under 5 cm. long, umbellets 8–12-flowered; drupe slender-elongate, its vertex manifestly conical and exserted; of wide distribution on Oahu.
 - 14. *T. meiandra* sensu stricto.
 - j. Leaflets oblong, obtuse at both ends; rays 5–7.5 cm. long, umbellets 15–25-flowered; apparently confined to northwestern Hawaii. 14. *T. meiandra* var. *β. bisobtusa*.
- f. Inflorescence twice-umbellate (rays absent).
 - g. Pedicels very numerous (up to ±30), slender, in fruit 0.5–1 mm. thick; leaflets not or but weakly reticulate-venulose above; lateral petiolules 6–16 mm. long; stigmas 2; native of northwesternmost Hawaii (rarer 2-stigmatate forms of the stouter-pedicelled var. *longipedunculata* of Oahu may likewise be looked for here).
 - 14. *T. meiandra* var. *χ. simulans*.
 - g. Pedicels less numerous (about 10–15 to an umbellet), in fruit 1–1.5 mm. thick; leaflets conspicuously reticulate-venulose above; lateral petiolules 11–27 mm. long; stigmas more often 3; native of northern Oahu. 14. *T. meiandra* var. *γ. Bryanii*.

- d. Stigmas mostly 5 or 6.
- e. Pedicels 6–9 mm. long; peduncles on a rachis ± 1 dm. long; native of West Maui.
14. *T. meiantra* var. τ . *ramosior*.
- e. Pedicels 20–24 mm. long; peduncles in a sessile umbel; not found on West Maui.
- f. Drupe ovoid to cylindric-ovoid, apically truncate, its calyx portion about 1 cm. tall; native of north-eastern Hawaii . . . 14. *T. meiantra* var. ζ . *hiloensis*.
- f. Drupe globose- or urceolate-ovoid, at apex protruding-conical (this portion 2–3 mm. tall), its calyx portion about 7–8 mm. tall; native of northern East Maui.
14. *T. meiantra* var. π . *polystigmata*.
- d. Stigmas mostly 3 or 4.
- e. Pedicels mostly 3–5 mm. long at anthesis; blades of leaflets narrow-oblong to widely oblanceolate or narrowly obovate; native of East Maui.
14. *T. meiantra* var. η . *leptomera*.
- e. Pedicels mostly longer.
- f. Inflorescence at most twice-umbellate, peduncles 1–3.5 dm. long, up to 30-flowered; native of Isl. Oahu.
14. *T. meiantra* var. θ . *longipedunculata*.
- f. Inflorescence normally thrice-umbellate.
- g. Umbellets numerously flowered, the fuller ones with 12–20 florets.
- h. Trees of East Maui; pedicels subrobust at anthesis.
- i. Drupes cylindric, about 11×5 mm., stylopodium hemispherical; native of southern East Maui . . . 14. *T. meiantra* var. κ . *mauiensis*.
- i. Drupes urceolate, 7×6 mm. or larger, stylopodium narrowly conic; native of northern East Maui . . . 14. *T. meiantra* var. ξ . *ovalis*.
- h. Trees of West Maui; pedicels delicate at anthesis, drupes globose-cubical or shortly trigonous-prismatic. . . 14. *T. meiantra* var. ν . *olowaluana*.
- h. Trees of Molokai; pedicels delicate at anthesis.
14. *T. meiantra* var. \omicron . *polyantha*.

- h. Trees of southeastern Hawaii; peduncles 6–12 cm. long, rays ± 22 (1 or 2 at times attached 1–3 cm. below tip of peduncle).
14. *T. meiandra* var. ν' . *rhynchocarpoides*.
- g. Umbellets fewer-flowered, the fuller ones with 5–12 florets.
h. Top of drupe hemispherical; rays delicate, ± 1 mm. thick; native of eastern Molokai.
14. *T. meiandra* var. χ . *Skottsbergii*.
- h. Top of drupe at most depressed-hemispherical.
i. Stylopodium elongate-conic, 3–4 mm. long (stigmas included); native of southeastern Hawaii. 14. *T. meiandra* var. ν . *rhynchocarpa*.
- i. Stylopodium smaller.
j. Leaf-petioles stoutish, usually 3.5–4.5 rarely to 7.5 cm. long; leaflets 5–9, broadly oblong-oval to obovate or subrotund; native of Isl. Lanai.
14. *T. meiandra* var. ϵ . *Hillebrandii*.
- j. Leaf-petioles longer (normally 5.5–10 cm. long).
k. Blades of 7–13 oblong to subovate, ovate, or subobovate leaflets obtuse or rounded at each end or even truncate at base, moderately to conspicuously depressed- and reticulate-venulose above, up to 11 cm. long and 7.5 cm. wide; rays 5–16; native of southernmost Hawaii.
14. *T. meiandra* var. ϕ . *Rockii*.
- k. Blades of 5–7 oval-elliptic leaflets gradually narrowed at each end, at most but weakly depressed- or reticulate-venulose, 4–8 cm. long and 2–4 cm. wide; rays 5–8; native of West Maui.
14. *T. meiandra* var. μ . *occidentalis*.
- c. Inflorescences mostly paniculate, the divisions more or less racemose-umbellate.
- d. Leaflets thin, larger lateral ones more or less parallel-sided and 15–20 cm. long, in age sparsely whitish-farinose

- beneath, petiolules 4–5 mm. long; native of northwestern Oahu 17. *T. micrantha*.
- d. Leaflets thick or coriaceous, mostly shorter (or if as long then basally truncate to cordate) and with curved edges, petiolules mostly longer.
- e. Entirely glabrous; rays suberect, arcuate; pedicels slender, elongate (12–17 mm. long); native of north-eastern Oahu 19. *T. kahanana*.
- e. Inflorescence and usually lower leaf-surfaces (except in var. *grandis*) pubescent; rays straightish and mostly spreading or reflexed, pedicels mostly thickish and short 15. *T. kauaiensis* and vars.

ABBREVIATIONS USED FOR NAMES OF HERBARIA CITED

Arn.	Herb. Arnold Arboretum, Jamaica Plain, Massachusetts.
Berl.	Herb. Berlin Botanical Garden, Berlin-Dahlem.
Bish.	Herb. Bernice P. Bishop Museum, Honolulu.
Brit.	Herb. British Museum (Natural History), London.
Calif. Acad.	Herb. California Academy of Sciences, San Francisco.
Carn.	Herb. Carnegie Museum, Pittsburgh.
Chi.	Herb. Chicago Natural History Museum, Chicago.
Corn.	Herb. Cornell University, Ithaca, New York.
Del.	Herb. Delessert, Geneva.
Goth.	Herb. Botanical Garden, Gothenberg, Sweden.
Gray	Herb. Gray, Harvard University, Cambridge, Massachusetts.
Kew	Herb. Royal Botanic Gardens, Kew.
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.
Stockh.	Herb. Natural History Royal Museum, Stockholm.
Univ. Calif.	Herb. University of California, Berkeley.
U.S.	Herb. United States National Museum, Washington, D.C.
Yunck.	Herb. Dr. T. George Yuncker, Greencastle, Indiana.

1. *Tetraplasandra hawaiiensis* A. Gray, Bot. U. S. Explor. Exped. 728. 1854; *ibid.* pl. 94. 1857.

- a. Blade of lateral leaflets subcuneately attenuate at base.
- b. Petiolules of lateral leaflets usually 0.8–2 cm. long; umbellets 7–11-flowered; pedicels 5–7 mm. long at anthesis, thickish, very densely and conspicuously tomentose; corolla depressed-conical to subhemispherical just before opening, about 3–4 mm. tall, not strongly angulate when dried; native of north-westernmost Hawaii. var. *β. awiniensis*.
- b. Petiolules of lateral leaflets 2–10 mm. long; umbellets commonly 3–6-flowered; pedicels 8–14 mm. long at anthesis, becoming more slender and less densely and less conspicuously tomentose; corolla conical just before opening, about 5 mm. tall, becoming strongly angulate on drying; native of West Maui.
var. *γ. gracilis*.
- a. Blade of leaflets broader and usually rounded to truncate at base.
- b. Petals usually 7 or 8, stamens usually 28–32, drupe 7–10-celled and usually 8–10 mm. thick; native of southern Hawaii.
var. *α. hawaiiensis*.
- b. Petals 5–7, stamens commonly only 17–20, drupe 9–13-celled and usually 5–7 mm. thick; native of Molokai, Maui, Lanai, and northwesternmost Hawaii. var. *δ. microcarpa*.

A tall, stout, much-branching tree 12–18 m. or more tall, bark smooth and pale, branchlets invested with tawny, coarse, stellate tomentum. Leaves 5–9-foliolate; petiole 1.5–2 dm. long (this with the rhachis 3–6 dm. long), stellate-tomentulose; leaflets on petiolules 0.2–2.2 cm. long (or terminal one longer), blade oblong or varying to ovate, ovate-oblong, or broadly lanceolate-oblong, at apex obtuse, at base (for lateral leaflets oblique) truncate to cuneately contracted, 1–1.7 dm. long and about 2.5–6 cm. broad, pale, coriaceous, glabrous above, densely tawny-tomentose beneath except hirsute with fuzzy hairs at and near the minutely tomentulose or partly subglabrous midrib (for leaflets of “watersprouts” ±2 dm. long and ±12 cm. wide, glabrous on both surfaces). Inflorescence of 1–3 terminal panicles, densely stellate-tomentose, up to ±3.5 dm. long including the peduncle (this nude or subnude, often 1.5–2 dm. long); peduncular or secondary branches few, umbellately arranged at tip of peduncle (or 1–5 placed racemosely lower down), umbellately branched directly into usually 4 or 5 pedicels (these up to 2–2.5 cm. long in type material) or into a few tertiary branches which in turn support the pedicels. Calyx obconic-urceolate, about 4–6 mm. tall

and broad, tomentulose. Petals usually 7 or 8, tomentulose, cohering at apex, 6–8 mm. long. Stamens 4 times as many as petals or fewer, in a single circle, recurved. Ovary 7–10-celled, its apex crowned with a short stylopodium, this with 7–10 at times indistinct stigmas; drupe globose or slightly depressed-globose, usually 10 mm. in diameter, many-(7–10-)ribbed when dry and truncate or slightly depressed-truncate at top, the abruptly rising stylopodium 1–2 mm. tall; pyrenae 7–10, compressed, chartaceous, closely contiguous.

Type: *United States South Pacific Exploring Expedition under Captain Charles Wilkes*, in the District of Puna, Isl. Hawaii, 1838–1842 (U.S.).

Distribution: Southern and eastern Hawaii.

Specimens examined (all from Isl. Hawaii): *Otto Degener* 2,181, along roadside in woods, South Kona, Aug. 24, 1926 (Chi.); *Degener* 21,759, tree 30 ft. tall, in woods among *aa* lava, Panaewa Woods *mauka* of Hilo, Feb. 1, 1952 (Chi.); *Degener* 21,788, tree 35 ft. tall, "water sprouts and seedlings glabrous," alt. 2,000 ft., where overtopping forest, Kulani Prison Road, Feb. 5, 1952 (Berl.; Bish.; Carn.; Chi., 2 sheets; Corn.; Del.; Gray, a large glabrous "watersprout" leaf only; Kew; N.Y.; Par.); *Degener* 21,834, beautiful tree 40 ft. tall, in forest on *aa* lava, along main road near Hoopuloa Lava Flow, Feb. 9, 1952 (Arn.; Chi.; Phila.; Univ. Calif.); *Degener & Wiebke* 2,181, along roadside in woods, South Kona, Aug. 24, 1926 (N.Y., 4 sheets; U.S.); *G. O. Fagerlund & A. L. Mitchell* 799, tree 20–25 ft. tall, Ohia-shrub-transition forest on *aa* flow, alt. 1,900 ft., south of Kalapana Trail, Aug. 17, 1943 (Bish.); *Joseph F. Rock*, Kapua, South Kona, January, 1912 (Gray, 2 sheets, my photograph no. 4,260); *Rock* 10,026, tree 50–60 ft. tall, not uncommon in upper forest, alt. 3,200 ft., Kapua, South Kona, Jan. 28, 1912 (Arn., 2 sheets); *Rock* (similarly) 10,026, Kapua, South Kona, February, 1912 (Bish.; Gray; U.S., 2 sheets, my photograph no. 4,259); *Carl Skottsberg* 459, lava flow west of Pahoia, Sept. 9, 1922 (Bish.; Goth.); *United States South Pacific Exploring Expedition under Capt. Wilkes*, District of Puna, 1838–1842 (type collection, Gray, my photograph no. 4,175; N.Y.).

***Tetraplasandra hawaiiensis* var. *β. awiniensis* Sherff, Bot. Leaflet no. 6: 37. 1952.**

Tree 7.5–15 m. tall. Leaflets a little narrower, usually all (not only the terminal one) gradually or subgradually narrowed to the

petiolule. Panicles of the inflorescence solitary or 2-5 congregated in a sessile umbel. Umbellets numerous (more often 7-11-) flowered, the thickish pedicels only 5-7 mm. long and very densely and very conspicuously yellowish-brown-tomentose. Flowers rather small, the petals only about 4 mm. long. Drupes a little smaller, about 6-8 mm. thick; pedicels finally elongate and more slender, often 1.5-2.1 cm. long.

Type: *Joseph F. Rock* 8,386, tree 25 ft. tall, woods of Awini, North Kohala, Isl. Hawaii, June, 1910 (Arn.).

Distribution: Northwesternmost Hawaii.

Specimens examined (Isl. Hawaii): *Otto Degener & Amy Greenwell* 21,898, beautiful tree of forested slopes, Pololu-Honokanenui region, North Kohala, Feb. 18, 1952 (topotypes, Bish.; Calif. Acad.; Chi., 3 sheets, my photograph no. 4,264; Del.; Gray; Kew; Mo.; N.Y.; Phila.; Univ. Calif.; U.S.); *Rock* 8,386 (type, Arn., my photograph no. 4,261; isotypes, Bish., my photograph no. 4,263; Gray, 3 sheets, my photograph no. 4,262).

Tetraplasandra hawaiiensis var. γ . ***gracilis*** Sherff, Bot. Leaflet no. 6: 38. 1952.

Leaves ± 4.5 dm. long; petiole ± 13 cm. long; leaflets 5-9, petiolule for the lateral ones 2-10 mm. long, blade smaller and narrow-oblong, at apex subacute or obtuse, at base (for the lateral ones) oblique and subcuneately attenuate, 6-12 cm. long and 3-4 cm. wide. Branches and branchlets of inflorescence more slender, the umbellets few-(commonly 3-6-)flowered, the pedicels slender and 8-14 mm. long at anthesis. Calyx small toward anthesis, about 3 mm. tall and 3-5 mm. thick; petals 5, near anthesis scarcely 6 mm. long; stamens ± 15 ; stigmas about 10; drupes urceolate-cylindric, about 10-costate, their calyx about 5 mm. tall and thick, the truncate top abruptly narrowed into a slender stylopodium about 1-1.3 mm. tall.

Type: *Joseph F. Rock & S. T. Hashimoto* 16,033, Waihee Valley, West Maui, September, 1918 (Bish.).

Distribution: Known only from general vicinity of type locality in West Maui.

Specimens examined (West Maui): *Degener, Greenwell, & Hatheway* 21,142, single tree on shrubby, forested slope, 35 ft. tall with trunk 1 ft. thick, in narrowest, rainiest part of Makamakaole Gulch, Nov. 28, 1950 (Bish.; Chi.; Gray; N.Y.); *Rock & Hashimoto* 16,033 (type, Bish., my photograph no. 4,268; isotype, Bish., my photograph no. 4,269).

The leaflets are similar to those of var. *awiniensis* but apically somewhat more acute.

Tetraplasandra hawaiiensis var. δ . **microcarpa** Sherff, Bot. Leaflet no. 6: 38. 1952.

Leaflets narrowly to widely oblong, up to 2 dm. long and to ± 8 cm. wide, obtuse to acute at tip, tomentose beneath or sometimes glabrous on both surfaces. Calyx smaller, at anthesis only 3–4 mm. tall and subequally thick; petals 5–7, only about 5–6 mm. long; stamens commonly only 17–20. Drupes smaller, the depressed-globose body only 5–7 mm. thick, truncate to convex at top, 9–13-celled; ribs sharper on drying.

Type: *Joseph F. Rock* 7,006, above Kaluaaha, Isl. Molokai, April, 1910 (Bish.).

Distribution: Molokai, Maui (where the leaflets often reach the maximum size), Lanai, and northwesternmost Hawaii.

Specimens examined (Isl. Molokai): *Edwin H. Bryan, Jr.* 618, tree 10 m. tall, trunk diam. ± 2.5 dm., heartwood pithy and cream-colored, sapwood hard and of light color, on slopes of gulches and flat, lower edge of rain-forest, alt. 300 m., Kainalu, July 24, 1927 (Bish., 2 sheets); *Otto Degener*, east part of Kaluaaha plateau, July 3, 1928 (topotypes, N.Y.; U.S.); *Degener* 18,017, forest, same place and date (topotypes, Mo.; N.Y., 3 sheets; U.S.); *Abbé Urbain Faurie* 269, alt. 600 m., Pukoo, May, 1910 (Arn.; Bish.; Par.); *Charles N. Forbes* 508-Mo, tree 25–30 ft. tall, ridges south of valley, Halawa, September, 1912 (Bish., 2 sheets); *William Hillebrand*, Molokai (Bish.; Gray; Kew; U.S., where locality is given as Leper Settlement [cf. "Kalauwau" of Hillebrand's text, p. 155, a locality unknown to me]); *Joseph F. Rock*, Kaluaaha (Kaluaaha), March, 1910 (topotype, N.Y.); *Rock* 7,006 (type, Bish., my photograph no. 4,266: isotypes, Arn., 2 sheets; Gray, 2 sheets, my photograph no. 4,265); *G. W. Russ*, Ahaino, above Forest Reserve Line, December, 1932 (Bish., 2 sheets); *H. St. John et alii* 12,846, tree 25 ft. tall, rain-forest, alt. 2,600 ft., ridge east of Mapulehu Valley, Dec. 29, 1932 (Yunck.).

East Maui: *Otto Degener*, along ditch trail between Honomanu Valley and Keanae, July 14, 1927 (Mo.); *Degener*, near ditch trail, Keanae Valley, July 19, 1927 (Mo.; N.Y.); *Degener* 17,787, near Keanae Valley, July 19, 1927 (Mo.; N.Y.); *Degener* 17,788 *pro parte* (this number used by Degener also for another East Maui plant, referable to *T. meiantra* var. *ovalis*, *qu. vide*), precipitous canyon

slope, along ditch trail at Keanae Valley on Honomanu Valley side, July 14, 1927 (Mo.; N.Y., 2 sheets; U.S.); *Degener & Wiebke* 2,316, only one tall tree on exposed cliff along ditch trail, Honomanu Valley, July 14, 1927 (N.Y., 3 sheets; Univ. Calif.; U.S.).

West Maui: *Degener*, "with both glabrous and tomentose leaves on same tree," half-mile north of Keahikauo, July 21, 1927 (N.Y., 2 sheets); *Degener* 2,319, tall trees in dicranopteris-tangled forest, same place and date (Mo.; N.Y., 3 sheets); *Charles N. Forbes* 108-M, ridge west of Iao Valley, June, 1910 (Bish.); *William Hillebrand*, "Kanapali" (Kaanapali; U.S., where mounted on same sheet with Hillebrand's Leper Settlement material from Molokai); *Horace Mann, Jr., & William T. Brigham* 378, West Maui (Bish.; Gray; Mo.).

Isl. Lanai: *Forbes* 141-L, mountains near Koele, June, 1913 (Bish.); *Forbes* 377-L, locality not stated, September, 1917 (Bish.); *George C. Munro* 39, edge of Huola, east side of mountain, August, 1913 (Bish., 3 sheets; U.S.); *Munro* 140, Lanaihale, west face, Nov. 17, 1913 (fruiting; Bish.); *Munro* 140, Maunalei mauka, July 19, 1915 (flowering; Bish.); *Rock* 8,016, Haalelepakai, main ridge, July 21, 1910 (Gray; U.S.); *Rock* 8,016a, Mahana ridge, July, 1910 (Bish.); *Rock* (similarly) 8,016a, Haalelepakai, south slopes of main ridge, August, 1910 (Gray, 2 sheets); *Rock & Hammond* 8,050, main ridge, July 22, 1910 (Arn., 2 sheets; Bish.).

Isl. Hawaii: *Degener & Wiebke* 2,185, sunny, mesophytic forest, east of Pololu Valley, Aug. 11, 1926 (Mo.; N.Y., 6 sheets; Univ. Calif.; U.S.); *L. H. MacDaniels* 327, spreading tree, 15 m. tall, Kohala ditch trail, sides of gulch in rain-forest, alt. 1,000 m., Dec. 6, 1926 (Bish.).

2. *Tetraplasandra waimeae* Wawra, *Flora* 56: 158. 1873; cf. Sherff, *Bot. Leaflet* no. 6: 25. 1952; *Tetraplasandra Elstonii* Hochr. *Candollea* 2: 481. 1925.

Leaflets mostly narrow-oblong. var. *β. angustior*.
 Leaflets broader. var. *α. waimeae*.

Trunk erect, 9–12 m. tall and ± 3 dm. in diameter, sparingly divided near top into short, ascending branches; bark smooth. Leaves clustered at ends of branches, 3–4.5 dm. long; leaflets 5–13, petiolules variously up to 3.5 cm. long; blades oblong to ovate-oblong or even obovate, 6–15 cm. long and 3.5–6.5 cm. wide, at apex obtuse to truncate or even emarginate, at base rounded to

broadly cuneate (and for lateral leaflets oblique), chartaceous to coriaceous, glabrous. Inflorescence a terminal umbel of several rays (with or without a short common rhachis), these 5–15 cm. long and with a terminal umbellet of 10–20 flowers on thick, compressed or angulate pedicels 2–5 cm. long. Calyx 8–12 mm. tall, thick-tubular to slender-urceolate, somewhat constricted below the wavy, denticulate border. Petals 7 or 8, triangular-lanceolate, 10–12 mm. long, pink or reddish, coriaceous, glabrous, finally expanded, the wide-open corolla up to 3.5 cm. across (this unique in the genus for size). Stamens normally 6, 7, or 8 times as many as petals, 8–10 mm. long, in two rows. Ovary variously 6–10-celled (cells sometimes 2-ovulate), the stigmas on a short, compressed stylopod of 1 mm. Drupe urceolate-globose, 1.3–3.2 cm. in diameter, somewhat fleshy, strongly ribbed when dry, truncate and 6–10-radiate at top, stylopodium cylindric-compressed, the 6–10 stigmas scarcely distinct at the oval-oblong apex; pyrenae compressed, separated by pulp, thick-coriaceous, deeply notched at upper inner angle, sharp at back and with 2 prominent ridges on each side.

Type: *Heinrich Wawra* 2,114, Halemanu, Isl. Kauai (presumably in Mus. Vienna).

Distribution: Kaholuamanu to Kumuweia Ridge and Halemanu, northwestern Kauai.

Specimens examined (all from *Isl. Kauai*): *Degener & Greenwell* 21,577, a 20 foot tree, in forest, Kumuweia Ridge east of Waïneke Swamp, Jan. 1, 1952 (Bish.; Carn.; Chi., 2 sheets; N.Y.); *F. Fagerlind & C. Skottsberg* 6,608, single trees, forest near Kalalau Lookout, Mar. 14, 1948 (Stockh.); *Charles N. Forbes* 432-K, mountains in vicinity of Kaholuamanu, September, 1909 (Bish.); *Forbes* 1,064-K, Waimea Drainage Basin, west side, July 3–Aug. 18, 1917 (Bish.); *William Hillebrand*, Waimea, 1871 (Gray, my photograph no. 4,211); *Hillebrand*, Halemanu (fragment, Bish.); *Albert S. Hitchcock* 15,550, vicinity of Kaholuamanu, Oct. 26, 1916 (U.S.); *Joseph F. Rock*, Kauai, October, 1916 (Bish., my photograph no. 4,290); *Rock*, 1,720, Halemanu, Feb. 14–26, 1909 (topotype, Bish., foliage only); *Rock* 1,744, Kaholuamanu, Mar. 3–10, 1909 (Bish.; U.S.); *Rock* 5,162, same place, September, 1909 (Gray); *Rock* 5,165, same place, Sept. 3, 1909 (Bish., my photograph no. 4,213); *Rock* 5,167, same place, September, 1909 (Gray, my photograph no. 4,214); *Rock* 5,168, in the mountains above Waimea, in forest of Kaholuamanu near Opaiwela, alt. 3,700 ft., Sept. 3, 1909 (Arn., 2 sheets); *Rock* 5,913, Opaiwela trail, alt. 3,700 ft., Sept. 3, 1909 (Bish.); *Carl Skottsberg*

1,009, alt. about 1,200 m., near Kokee ranger station, Waimea, Oct. 28, 1922 (Goth.).

As previously remarked in my Botanical Leaflet no. 6, page 25, Hillebrand may have accompanied Wawra on the type-collection trip, for his specimen at Gray Herbarium, "collected by Dr. W. Hillebrand, 1871," has the species named in honor of Wawra. Moreover, the fragment, a leaflet and entire flower, at Bishop Museum, "*ex coll. Hillebrand in Herb. Berlin*" bears on the label, "Halemanu," Wawra's type locality. Had Wawra not published the binomial *Tetraplasandra waimeae* in 1873, Hillebrand's binomial honoring Wawra would doubtless have appeared in 1888, when Hillebrand's posthumous Flora of the Hawaiian Islands was published.¹

Hochreutiner (*loc. cit.*) described his *Tetraplasandra Elstonii* from a specimen collected by himself, his no. 3,538, alt. about 1,300–1,400 m., Kaunupalanui, near Gay cottage on Kaholuamanu, Waimea, Isl. Kauai, Apr. 19, 1905. With him, *T. Elstonii* stood intermediate between *T. waimeae*, described originally from Halemanu, and *T. waialealae*, a species peculiar to the high summit swamp of Mt. Waialeale.² Unfortunately, *T. waimeae* had been described rather narrowly, the ovary for example being called not more than 8-celled. For *T. Elstonii* the ovary was described as 8- or 9-celled. However, among the specimens examined from both Halemanu and Kaholuamanu, and listed above for *T. waimeae*, variations from 6 to 10 cells are found. Much the same is true of Hochreutiner's other criteria listed; therefore *T. Elstonii* seems entirely synonymous with *T. waimeae*.

***Tetraplasandra waimeae* var. β . *angustior* Sherff, Bot. Leaflet no. 6: 26. 1952.**

Leaflets commonly narrow-oblong, the lateral margins usually almost parallel, petiolule 4–11 mm. long, blade apically retuse to rounded or obtuse and basally broad-cuneate to rounded (and for the lateral leaflets very oblique), up to 11 \times 3.5 cm. or 12 \times 4 cm.

¹ In his Flora, however, Hillebrand mentioned Wawra and Knudsen as collectors but omitted his own name.

² Skottsberg (Meddel. Göteborg. Bot. Trädg. 15: 415. 1944), in questioning the status of *T. Elstonii* as apart from *T. waimeae* and *T. waialealae*, seems to have overlooked the ecological consideration that *T. Elstonii* and *T. waimeae* were both from the drier forests of Waimea (on the leeward side of Kauai), while *T. waialealae* was a swamp inhabitant on Mt. Waialeale (and within the windward, rainy area on Kauai).

or 9×3.2 cm. or rarely 14×5 cm. Mature drupes up to 1.8 cm. tall and 1.5 cm. thick.

Type: *Amos Arthur Heller 2,734 pro parte*, in and near a bog at the head of Wahiawa Stream, Isl. Kauai, Aug. 21, 1895 (Phila.).

Distribution: Island of Kauai; see discussion below.

Specimens examined (all from Isl. Kauai): *Heller 2,734 pro parte* (type, Phila., my photograph no. 4,209); *Heller 2,734 pro parte*, in and near a bog at the head of Wahiawa Stream, Aug. 12, 1895 (Arn.); *Heller 2,734 pro parte*, on Kaholuamanu, Sept. 10–16, 1895 (Bish., my photograph no. 4,210; Corn., where dated Sept. 2–9, 1895; Par., 2 sheets).

Under his no. 2,734, Heller collected two kinds of material. The first will be treated below under *T. waialealae* var. *wahiawensis*. The second is the present var. *angustior* of *T. waimeae*. The specimen at Philadelphia was selected as the type, since it bore a fine inflorescence in the mature-fruit stage. The inflorescence is essentially sessile as in *T. waimeae* proper (*i.e.*, var. *waimeae*), not stalked as in *T. waialealae*.

Heller, it will be noted, gave two habitats, one, Kaholuamanu, and the other, at or near what is often called Wahiawa Swamp. Since the variety is so extremely rare as never to have been collected apparently by anyone else, it seems incredible that he found it in both of the widely separated habitats mentioned. In a number of cases I have found Heller's specimens to have been distributed with "crossed labels." Since we *know* that one form under his no. 2,734, namely *T. waialealae* var. *wahiawensis*, does grow at and near Wahiawa Swamp, it seems probable that his other form, the present *T. waimeae* var. *angustior*, came from somewhere on Kaholuamanu.

3. ***Tetraplasandra waialealae*** Rock, Coll. Haw. Publications Bull. no. 1: 10, *pl.* 1. 1911.

a. Leaflets 11–15, sessile to shortly petiolulate (petiolule 1–10 mm.); native of swampy areas in northwestern Kauai.

var. *ε. subsessilis*.

a. Leaflets 5–11, at least the lower petiolules of moderate (9–16 mm.) to greater (16–26 mm.) length.

b. Leaflet-blades 5.5–9 cm. long and 2.5–5 cm. wide, at apex subacuminate to obtuse; native of swampy places in southern Kauai. var. *δ. wahiawensis*.

- b. Leaflet-blades much larger, mostly 9–15 cm. long and 4–7 cm. wide.
- c. Leaflet-blades more often broad or broadish at each end, at apex abruptly narrowed into a shortly acuminate tip.
var. *a. waialealae*.
- c. Leaflet-blades cuneately contracted at base, apically sharp-attenuate and -acuminate.
- d. Calyx of immature drupe cylindric-prismatic.
var. *γ. acrior*.
- d. Calyx of immature drupe thick-urceolate.
var. *β. urceolata*.

Small tree 4.5–7.5 m. tall; trunk rather short, about 1.5–2 dm. thick, its bark white; branches long and suberect, the irregularly pinnate leaves crowded at their ends, 3–4.5 dm. long. Leaflets 7–11; blades dark-green and glossy, mostly oblong but a few oblong-ovate, at usually broad apex sometimes gradually but more often abruptly narrowed into a shortly acuminate tip, at base the lateral ones oblique and broadly rounded to cuneately contracted, thick-coriaceous, 7–14 cm. long and 3.5–6.5 cm. wide; lateral petiolules 1–2(–4) cm. long. Inflorescence a terminal, compound umbel of usually 4 peduncles, each about 7–13 cm. long and bearing ± 6 rays ± 6 cm. long, these each bearing an umbellet of usually 5 pedicels about 2–2.2 cm. long. Calyx more or less cylindric, purplish-black with an undulate border, 7–9 mm. tall. Petals 5–7, triangular, thick, glabrous, with a prominent median nerve, ± 1 cm. long. Stamens in 2 circles, 4 times as many as the petals. Ovary 6-celled; stigmas 6, on a conical stylopod 5 mm. tall. Mature drupes not seen.

Type: *Joseph F. Rock* 8,870, abundant on summit of Waialeale, alt. 5,000 ft., Isl. Kauai, Oct. 20, 1911 (Bish.; but see discussion below).

Distribution: Central to northeasternmost Kauai.

Specimens examined: *Degener & Greenwell* 21,730, a single fallen tree of 35 ft. in height (inflorescence a brilliant claret), in lower forest, ridge *mauka* (i.e., inland) from Papaa, Moloaa Forest Reserve, Jan. 16, 1952 (Bish.; Chi.; N.Y.); *Rock* 8,870 (isotypes, Arn., 2 sheets; Bish., my photograph no. 4,201; Gray, 3 sheets).

This species was founded upon mixed material, *Rock* 4,902 and *Rock* 8,870. The first cited habitat, however, was "Summit of Waialeale, elevation 5,000 ft.," and this may be taken as limiting

the species in its narrower sense to *Rock* 8,870, the tree with leaflets obtuse but mostly very short- or abrupt-acuminate tips. Indeed, *Rock*'s full-page plate is of that form. Excellent specimens of *Rock* 8,870 have been available for study, as above cited.

Rock 4,902 is seen to consist of two forms, both of them different from var. *waialealae* or the species proper in having apically sharp-attenuate and -acuminate leaflets, and one of them, from Kaluiti Stream, with urceolate (not cylindrical) fruiting-calyces. These are treated below under vars. *acrior* and *urceolata*.

***Tetraplasandra waialealae* var. β . *urceolata* Sherff, Bot. Leaflet no. 6: 23. 1952.**

Leaves ± 4.5 dm. long; petiole ± 1.5 dm. long, toward base ciliate, very minutely and numerous papillate, and sparsely puberulous; leaflets ± 9 , narrowly oblong or the bottom ones oblong-ovate, at apex sharply and somewhat gradually acuminate, at base very widely and at times obliquely cuneate, the blade 11–15 cm. long and 3.5–5.5 cm. wide, the petiolule 4–16 mm. long. Drupes at least when submature urceolate, about 16–17 mm. tall including stylopodium and stigmas and ± 1 cm. thick below the middle.

Type: *Joseph F. Rock* 4,902 *pro parte*, Kaluiti Stream, high plateau, alt. 4,800 ft., central Kauai, Sept. 22, 1909 (Bish.).

Distribution: Known only from type locality in central Kauai.

Specimens examined: *Rock* 4,902 *pro parte* (type, Bish., my photograph no. 4,203).

The leaflets are more gradually attenuate toward their tip than in var. *acrior* and the submature drupes, of which four are preserved on the type sheet, are thick-urceolate (more as in *T. waimeae* Wawra), not cylindrical-prismatic as in that variety. *Rock* (*loc. cit.*, also *Indig. Trees Haw. Isl.* 343. 1913) did not attempt delimitation of these varieties *urceolata* and *acrior* from *T. waialealae* proper, having collected them all within a distance of about 3 km. from each other. Study of a topographic map reveals, however, that the three habitats involved differ sharply in conditions of altitude, drainage, etc. (Regarding the whole subject of ecological barriers, some of which unquestionably exist between the three type habitats, see *Riley, The American Naturalist* 86: no. 826: 23. 1952.)

***Tetraplasandra waialealae* var. γ . *acrior* Sherff, Bot. Leaflet no. 6: 22. 1952.**

Leaflets 5-7, oblong or at times somewhat ovate or very slightly obovate, toward apex narrowed and very sharply acuminate, blade 8×3 cm. up to 18×7 cm. Drupes when submature cylindrical-prismatic and 1.5-2 cm. tall including the conical stylopodium, stigmas 5 or 6.

Type: *Joseph F. Rock* 4,902 *pro parte*, Kailiili Stream, Keaku Cave, Isl. Kauai, September, 1909 (Gray).

Distribution: Central Kauai.

Specimens examined (all from Isl. Kauai): *Albert S. Hitchcock* 15,481, alt. 3,600-5,080 ft., Waialeale, Oct. 22-24, 1916 (U.S., my photograph no. 4,206); *Rock*, Isl. Kauai, October, 1916 (Bish., my photograph no. 4,205); *Rock* 4,901, near summit of Waialeale, Sept. 22, 1909 (Arn.); *Rock* 4,902 *pro parte* (type, Gray, my photograph no. 4,202).

For remarks, see under var. *β. urceolata* above.

***Tetraplasandra waialealae* var. *δ. wahiawensis* Sherff, Bot. Leaf. no. 6: 24. 1952.**

Dwarf tree. Leaves submembranaceous, 2-3 dm. long, 7-11-foliolate, petiole 5-8 cm. long; leaflets ovate to oblong, at apex subacuminate or subacute to obtuse, at base oblique and very broadly cuneate, blade 5.5-9 cm. long and 2.5-5 cm. wide; petiolules now (for the type) 2-9 mm. now 1.2-2.6 cm. long. Branches of inflorescence: primaries (peduncles) ± 3 , finally robust, ± 9 cm. long and 7-9 mm. thick; secondaries (rays) ± 9 , finally robust, about 4.5-6.5 cm. long and under 4 mm. thick; pedicels about 3-5, finally robust and arcuate, 2-2.7 cm. long and 2.5-3 mm. thick.

Type: *Charles N. Forbes* 274-K, Wahiawa Swamp, Aug. 11, 1909 (Bish.).

Distribution: Southern Kauai.

Specimens examined (all from southern Kauai): *Forbes* 200-K, several trees, low, 4 ft. tall, flat-topped, petals 5, stamens 20, ovary 5-celled, on edge of Wahiawa Swamp, August, 1909 (topotype, Bish.); *Forbes* 274-K (type, Bish., my photograph no. 4,204); *Amos A. Heller* 2,734 *pro parte*, along the Hanapepe River, near the Falls, Aug. 14, 1895 (Gray, my photograph no. 4,208); *Heller* 2,734 *pro parte*, in and near a bog at the head of Wahiawa Stream, Aug. 21, 1895 (N.Y.; Univ. Calif.); *Heller* 2,734 *pro parte*, between the Hanapepe and Wahiawa rivers, Aug. 24, 1895 (Mo.); *Heller* 2,734 *pro parte*, in and near a bog at the head of Wahiawa Stream, Oct. 19, 1895

(U.S., my photograph no. 4,207); *Rev. John M. Lydgate*, Wahiawa Mts. (Bish., my photograph no. 4,198).¹

***Tetraplasandra waialealae* var. *ε. subsessilis* Sherff, Bot. Leafl. no. 6: 23. 1952.**

Leaves 3–4.5 dm. long, 11- or 13-(rarely 15-)foliolate; petiole stout, 6–9 cm. long; leaflets narrowly to moderately oblong, at apex (where often bent in the dry state) subacuminate or rarely obtuse, at base oblique, coriaceous, sessile to shortly petiolulate, petiolules 1–10 mm. long, blade 8–13 cm. long and 3.5–5 cm. wide. Peduncles 9–13 cm. long, stout; secondary branches now 3 or 4 (as on the type) now ± 8 , straight or curved, 4–7 cm. long; pedicels 3–6, now all straightish (as on the type) now some of them curved, 0.8–2 cm. long. Mature drupes sometimes 5- but commonly 6-ribbed otherwise ovoid to subfusiform, 19–21 mm. tall to calyx-limb (this spreading, brown in dried state, about 1 mm. wide); stylopodium conical, reaching about 5 mm. above calyx, bearing usually 6 much less often 5 or very rarely 7 stigmas.

Type: *Lucy May Cranwell*, *Olof H. Selling*, & *Carl Skottsberg* 2,925, forests in the vicinity of Lehua makanoi, Alakai, Isl. Kauai, Aug. 13, 1938 (Bish.).

Distribution: In the swampy areas of northwestern Kauai.

Specimens examined (all from northwestern Kauai): *Cranwell et alii* 2,925 (type, Bish., my photograph no. 4,197: isotype, Goth., my photograph no. 4,200); *Otto Degener* 21,473, in open forest at 3,000 ft., east rim of Kalalau Valley, Dec. 27, 1951 (Bish.; Chi.); *Degener & Greenwell* 21,725, a 10-foot tree, among shrubs and trees, Alakai Swamp, Jan. 19, 1952 (Chi.); *Otto Degener & Henry Wiebke* 2,183, sunny, open swamp, Waineke Swamp, Kokee, June 28, 1926 (N.Y., 2 sheets, my photograph no. 4,199); *Fagerlind & Skottsberg* 6,587, near Kawaikinana Stream, Kokee-Mohihi Road, Mar. 13, 1948 (Stockh.); *L. H. MacDaniels* 811, slender tree 4 m. tall, swampy ground in mixed forest, Alakai Swamp, alt. 1,300 m., Feb. 17, 1927 (Bish.).

¹ *Forbes* 205-K, vicinity of Wahiawa Swamp, August, 1909 (Bish.), is a spray from a seedling. One leaf is about 2.5 dm. long, its 5 leaflets narrowly ovate to lanceolate-oblong and acute to sharply attenuate-mucronate. A second leaf is simple, its ovate-oblong blade 14 cm. long and about 7.7 cm. wide. The third is simple, but the blade, about 11 cm. long, has on each side a large basal lobe 2.5–3 cm. long, giving an over-all width of more than 1.1 dm. The plant is doubtless to be referred to the present var. *wahiawensis*.

Skottsberg (Meddel. Göteb. Bot. Trädg. 15: 415. 1944) gave a special description of *Cranwell et al.* 2,925, but referred it to the species proper. He apparently overlooked the sessile and coriaceous nature of the leaflets, which he did note, however, as being "11-13 instead of 5-9."

4. ***Tetraplasandra pupukeensis*** Skottsberg. Meddel. Göteb. Bot. Trädg. 10: 149, fig. 17. 1936.

a. Leaflets strongly reticulate- and depressed-veiny on upper surface, pedicels numerous (13-30), 1.4-4 cm. long.

b. Leaflets ovate to oblong-ovate, large, the terminal one up to 1.5 dm. long and 9 cm. wide, lateral leaflets 5-9 cm. wide.

var. β . *venosa*.

b. Leaflets usually narrower and smaller, lateral leaflets commonly 2-4 (rarely -6) cm. wide.

c. Lateral leaflets oblong or oblong-oval, apically subacuminate to truncate or rounded or even emarginate, usually above 3.5 cm. wide; stylopodium 3 mm. tall.

var. γ . *megalopoda* and f. *trigona*.

c. Lateral leaflets oblong-lanceolate or oblong-rhomboid to narrowly ovate, apically acute to acuminate, commonly 2-3.5 cm. wide; stylopodium 1.5-2 mm. tall.

var. ϵ . *decipiens*.

a. Leaflets smoothish to weakly veiny on upper surface.

b. Leaflets or some of them acutish to acuminate at tip, commonly glossy above at least when dry; umbellets 10-25-flowered.

var. δ . *nitida*.

b. Leaflets obtuse to rounded or truncate at tip, dull or but weakly glossy above, umbellets mostly 10-12-flowered.

var. α . *pupukeensis*.

Small tree. Leaves 2-3.5 dm. long, 5-7-foliolate; petiole 4-9.5 cm. long; leaflets at points 3-5 cm. apart on rhachis, pale and at times glossy, on upper surface obsolete to moderately reticulate-venulose, blade of terminal one about 8-12 \times 5-8 cm., ovate to obovate, at apex broadly rounded to subtruncate and more or less emarginate, on a stipe 1-3 cm. long, this subarticulate near its upper end; blade of lateral ones ovate-elliptic or rotund-elliptic, very obtuse at each end and at base often oblique, for the intermediate ones 8-12 \times 5.5-7 cm., for the lowermost ones 5-8 \times 4-5.5 cm.; petiolules 2-10 mm. long. Inflorescence a twice compound

umbel at end of a leafy branch, peduncles ± 5 , with scattered nodes, 5–11 cm. long and 2–4 mm. thick, straight or barely curved; pedicels about 10–12, angulate, becoming more or less robust and 1.5–2.2 cm. long. Calyx at anthesis obconic to urceolate, 7–9 mm. tall and ± 6 mm. broad at top. Petals 6 or 7, ovate-triangular, at apex cucullate, 8–9 mm. long, at base 3–3.5 mm. wide, fleshy, rosaceous, presently deciduous. Stamens about 20, the outer about 5.5, the inner about 4.5 mm. long, fleshy; anthers 3.5–4 mm. long, curved at top. Stylopodium conic, 2 mm. tall; stigmas commonly 6, subsessile. Drupes ovoid-urceolate, obtusely 5–7-angled and deeply 5–7-sulcate; calyx 11–12.5 mm. tall and 8–10 mm. thick, with conspicuous, spreading border ± 1 mm. wide for its limb; stylopodium 2–2.5 mm. tall and thick, sharply 5–7-rayed, the 5–7 stigmas rather sharply distinct.

Type: *Carl Skottsberg* 1,816, alt. about 300 m., Pupukea-Malaehana trail, "Pupukea Forest Reserve," Sept. 15, 1926 (Goth.).

Distribution: Extreme northern Oahu.

Specimens examined (all from Oahu): *Edward Y. Hosaka* 124, alt. 1,800 ft., Pupukea-Paumalu Forest Reserve, Jan. 12, 1930 (Bish.); *Kazuto Nitta* 76, moderately dry slope, Pupukea, Jan. 12, 1930 (N.Y., my photograph no. 4,291); *Skottsberg* 1,816 (type, Goth., my photograph no. 4,177: isotype, Bish., my photograph no. 4,218).

***Tetraplasandra pupukeensis* var. β . *venosa* Deg. & Sherff**
ex Sherff, Bot. Leaflet no. 6: 40. 1952.

Blades of leaflets thicker, strongly reticulate- and depressed-veiny on upper surface, ovate to oblong-ovate, apically obtuse to rounded, basally roundish or more often very broadly cuneate, terminal one up to 1.5 dm. long and to 9 cm. wide, lateral ones mostly a third smaller in length and width. Inflorescence twice umbellate, peduncles ± 3 , about 7–13 cm. long, robust (5–7 mm. thick), more or less scurfy; pedicels 13–28 in a terminal umbellet or a single one placed 1–2 cm. lower down, 1.4–2.8 cm. long, sub-robust. Calyx obconic at anthesis, about 7 mm. tall and at its limb about 5 mm. wide; petals about 8; stamens ± 16 ; drupes (only somewhat immature ones seen) cylindrical-prismatic, 5- or commonly 6-ribbed, calyx about 12 mm. tall and 7–8 mm. thick, stylopodium conic, its height about 2 mm. and diameter at base 3 mm., stigmas 5 or more often 6.

Type: *Otto Degener*, in gully southeast of Kahuku entrance of Pupukea-Kahuku Trail, Isl. Oahu, Nov. 22, 1931 (N.Y., 2 sheets).

Distribution: Northern Oahu.

Specimens examined (all from Oahu): *Degener*, Isl. Oahu (N.Y., 2 sheets); *Degener*, Pupukea-Kahuku, July 19, 1931 (N.Y.); *Degener*, in gully southeast of Kahuku entrance of Pupukea-Kahuku Trail, Nov. 22, 1931 (type, N.Y., 2 sheets, my photographs no. 4,224 and no. 4,225).

***Tetraplasandra pupukeensis* var. γ . *megalopoda* Sherff**, Bot. Leaflet no. 6: 40. 1952.

Leaflets rather small; their blade variously oblong, oblong-oval, or (especially for terminal leaflet) obovate to subrhomboid-obovate, apically subacuminate to truncate or rounded, even emarginate, basally cuneate-contracted, under 11.5 cm. long and 6 cm. wide, conspicuously reticulate- (and on upper surface depressed-) veiny, more or less glossy above. Peduncles large, 1.7–2.6 dm. long and 4–9 mm. thick, at tip \pm 30-pedicellate, perhaps solitary; pedicels somewhat slender, straight to curved or rarely a few deflexed-ascending, 2.5–4 cm. long. Calyx at anthesis obconic, about 8 mm. tall and at limb about 6 mm. broad; petals \pm 8, stamens \pm 16; drupes (only immature ones known) with a cylindric-prismatic calyx, this ribbed, about 11 mm. tall and at limb 7 mm. thick; stylopodium conic, 3 mm. tall, stigmas commonly 5 rarely 6.

Type: *David LeRoy Topping* 2,921, Pupukea-Kahuku Trail, Nov. 23, 1924 (Univ. Calif.).

Distribution: Northern Oahu.

Specimens examined (all from Oahu): *Otto Degener* 2,921, Pupukea-Kahuku Trail, Nov. 23, 1924 (topotype, N.Y.); *Degener* 17,792 *pro parte*, along summit-divide toward east of Pupukea-Kahuku Trail, shrubby rain-forest, Dec. 6, 1931 (topotype, N.Y., my photograph no. 4,272); *Degener* 18,250 *p. p.*, forest, directly *mauka* of Kawela Bay, Apr. 2, 1933 (N.Y.); *Degener & Emilio Ordoñez* 12,066, forest, C.C.C. Trail, Kawailoa, July 3, 1938 (Mo.; N.Y.; U.S.); *Topping* 2,921 (type, Univ. Calif., my photograph no. 4,222).

Tetraplasandra pupukeensis* var. *megalopoda* f. *trigona Deg. & Sherff *ex* Sherff, Bot. Leaflet no. 7: 7. 1952.¹

¹Through typographical error, the joint authorship *Degener & Sherff* was erroneously applied (*loc. cit.*) to the varietal epithet, *megalopoda*, whereas it was intended for the formal epithet, *trigona*.

Pedicels barely shorter, more or less deflexed-ascending; drupes commonly tri- less often tetragonous, stigmas commonly 3 less often 4.

Type: *Degener* 17,792 *pro parte*, along summit-divide toward east of Pupukea-Kahuku Trail, shrubby rain-forest, Isl. Oahu, Dec. 6, 1931 (Mo.).

Distribution: Known only from type locality in northeastern Oahu.

Specimens examined (Isl. Oahu): *Degener* 17,792 *pro parte* (type, Mo., my photograph no. 4,298); *Degener* 18,248, rain-forest at summit-divide toward east of trail, Pupukea-Kahuku Dec. 6, 1931 (N.Y.).

Degener 17,792 was previously cited (Bot. Leaflet no. 6: 41. 1952) among the specimens of var. *megalopoda*. The stigmas on the few immature fruits present numbered in some cases 4 in others 5. Recently the fine sheet from the Missouri Botanical Garden came to hand, with an abundance (± 45) of mature drupes. These were almost uniformly 3-stigmatate and 3-angulate, this being exceptional in *T. pupukeensis*, the varieties of which normally show 4, 5, or 6 stigmas and drupe-angles.

***Tetraplasandra pupukeensis* var. δ . *nitida* Deg. & Sherff**
ex Sherff, Bot. Leaflet no. 6: 39. 1952.

Petiole up to 12.5 cm. long, petiolules of lateral leaflets 4–12 mm. long; blades of leaflets variously oblong, lanceolate-oblong, ovate, even subovate, at apex variously obtuse to acuminate, at base contracted or rarely roundish, commonly glossy above when dry, lateral nerves more often conspicuous. Inflorescence sessile, twice umbellate; peduncles ± 4 , curved or straight, 8–16 cm. long, subrobust (about 5–6 mm. thick), 10–25-flowered; pedicels 1.5–2 cm. long, robust, about 2 mm. thick. Calyx at anthesis obconic, 7 mm. tall and near top ± 5 mm. broad; petals about 8–10; stamens 16–28; stigmas ± 5 ; drupes unknown.

Type: *Degener, Murashige, & Kerr* 21,017, tree 20 ft. tall, in rainy forest, alt. 3,500 ft., Mt. Kaala, Isl. Oahu, July 10, 1949 (Chi.).

Distribution: Known only from type locality on Mt. Kaala, northwestern Oahu.

Specimens examined: *Degener, Murashige, & Kerr* 21,017 (type, Chi., my photograph no. 4,271: isotypes, Arn.; Bish.; Gray; N.Y.; Phila.; Univ. Calif.; U.S.).

Tetraplasandra pupukeensis var. ϵ . **decipiens** Deg. & Sherff
ex Sherff, Bot. Leaf. no. 8: 8. 1953.

Similar to var. *megalopoda* in its peduncles, florets, and drupes, but differing in its 5-9 leaflets, these smaller, oblong-lanceolate or oblong-rhomboid to narrowly ovate or (the terminal one) obovate, at apex acute to acuminate, at base more or less attenuate or cuneate and oblique, blade 4.5-10 cm. long and 2-3.5 cm. wide, lateral petioles 3-11 mm. long. Umbellets about 18-22-flowered, pedicels 16-20 mm. long. Stamens 10-12. Drupes 4-5-angled, prismatic, the calyx about 1-1.1 cm. tall and 5-6 mm. thick, the stylopodium small-conic and 1.5-2 mm. tall including the 4-6 stigmas.

Type: *Otto Degener* 17,974, windy rain-forest near top, Koolau Mountains, northern Oahu, Aug. 25, 1935 (N.Y.).

Distribution: Northern Oahu.

Specimens examined (northern Oahu): *Degener* 17,791 *p. p.*, in shrubby rain-forest, growing with but rarer than no. 17,792 (under his no. 17,792 *Degener* collected two forms: *T. pupukeensis* var. *megalopoda* and its f. *trigona*), along summit-divide toward east of Pupukea-Kahuku Trail, Dec. 6, 1931 (N.Y.); *Degener* 17,974 (type, N.Y., my photograph no. 4,354); *Degener* 18,249 *p. p.*, rain-forest at summit-divide toward east of trail, Pupukea-Kahuku, Dec. 6, 1931 (N.Y., my photograph no. 4,355).

The slender leaflets, with their more attenuate tips and bases and their veiny, coriaceous upper surfaces, offer a deceptive resemblance to those of *T. oahuensis* var. *venulosior* (whence the varietal name). The various characters of flowers and fruits, however, are more in agreement with those of *T. pupukeensis*, particularly the var. *megalopoda*.

5. **Tetraplasandra lihuensis** Sherff, Bot. Leaf. no. 8: 8. 1953.

Leaflets coriaceous, at base more often truncate or barely subcordate, peduncles nodeless, pedicels robust. . . . var. α . *lihuensis*.
Leaflets submembranaceous, at base contracted or rounded but not truncate, peduncles mostly with node near middle, pedicels slender at least in fruit. . . . var. β . *gracilipes*.

Leaves glabrous, ± 5 dm. long including petiole (this ± 11 cm. long and toward base ± 1 cm. thick), ± 13 -foliolate; leaflets coriaceous, more or less oblong (the smaller terminal one ovate), subattenuate above middle, at apex subacute to obtuse, at base sometimes oblique and more often truncate or barely subcordate, blade

10–19 cm. long and about 6.5–9 cm. wide; lateral petiolules sub-robust, 5–15 mm. long. Inflorescence thrice umbellate; peduncles ± 3 , umbellately grouped, ± 1 –1.5 dm. long and ± 5 mm. thick, irregularly scaly, without nodes, at apex umbellately ± 6 -radiate; rays very scaly, sharply angled, without nodes, 4–6.5 cm. long, somewhat spreading to suberect, at apex umbellately about 7–9-pedicellate; pedicels robust, angulate, at anthesis about 8–13 mm. long. Calyx cylindric-obconic near anthesis, about 5 mm. tall and at middle about 2–3 mm. thick, its limb membranaceous, undulate, and broadly (about 2 mm.) extended. Corolla not yet expanded, about 6–7 mm. tall and thick, petals 7 or 8. Stamens numerous, in several series. Stigmas about 8 (in young flowers). Drupes not seen.

Type: *Charles N. Forbes 164-K*, Power-Line Trail from Lihue, southeasternmost Kauai, Aug. 6–9, 1909 (Bish.).

Distribution: Southeastern Kauai.

Specimens examined: *Forbes 164-K*, (type, Bish., my photograph no. 4,196); *Forbes 286-K*, tall tree, leaves glaucous, Wahiawa Mountains, August, 1909 (Bish.).

Both of the specimens examined had their leaflets numerous but irregularly black-punctulate, but this character seemed due to some fungus growth.

***Tetraplasandra lihuensis* var. β . *gracilipes* Sherff, Bot. Leaf. no. 8: 9. 1953.**

Leaves ± 11 -foliolate, leaflets submembranaceous, basally contracted or rounded but not truly truncate; lateral petiolules slender, 8–18 mm. long. Peduncles ± 4 , slender, about 7–9 cm. long and 2–3 mm. thick, more often with a single node near middle, at tip about 8–14-rayed; rays slender, without nodes, 2–4 cm. long, at tip few- or several-pedicellate; pedicels finally slender, ± 8 –13 mm. long (only 4 seen). Flowers not seen. Drupes ovoid-globose, calyx ± 8 mm. tall, glabrous, limb obsolete; stylopodium convex-hemispherical or mitriform, 2–3 mm. tall (on type specimen densely and minutely erect-hispidulous), abruptly contracted into a style about 1 mm. long; stigmas 4 or imperfectly 5.

Type: *L. H. MacDaniels 847*, tree 10 m. tall, in rain-forest, alt. 850 m., upper Lihue ditch, southeasternmost Kauai, Feb. 21, 1927 (Bish.).

Distribution: Southeasternmost Kauai.

Specimens examined: *MacDaniels* 847 (type, Bish., my photograph no. 4,356).

Unfortunately, *T. lihuensis* proper is as yet unknown in its fruiting state, nor is var. *gracilipes* known so far in its flowering state; hence, association of the two as members of the same species is somewhat arbitrary. It seems doubtful, however, that var. *gracilipes* will be found more different from *T. lihuensis* proper than are the varieties of the large-flowered *T. waialealae* from that species.

The stylopodium of the mature drupes of var. *gracilipes* is hispidulous. Small hairs can be found even at the limb of the fruiting calyx. Most of the hairs appear to belong there naturally (if so, affording a most anomalous character) rather than to have resulted from some fungus growth.

6. *Tetraplasandra kohalae* Skottsberg. Meddel. Göteborg. Bot. Trädg. 15: 414. 1944.

Small tree. Leaves 2.5–4 dm. long, 5–7-foliolate; petiole 7.5–11.5 cm. long; blade of leaflets elliptic-oblong, at apex shortly to even subobtusate or obtuse, at base rounded and for the lateral leaflets somewhat oblique, on both surfaces clearly reticulate-nerved with nerves (except for the midnerve) depressed, about 15 secondaries at each side of midnerve, 6.5–12 cm. long and 3.5–5.5 cm. wide (for random leaflets selected, the blade measuring 12 × 5, 11.6 × 5.5, 11 × 5.2, 9 × 4.4, 8.5 × 4, 8 × 4.4, 7 × 3.8, and 6.5 × 3.3 cm.); petiolule 8–14 mm. long. Inflorescence of one or perhaps more umbellets each on a peduncle ±1 dm. long; umbellets 23–28-fruited (flowers unknown as yet), pedicels finally 1.5–1.8 cm. long. Drupe large, ovoid-cylindric, 22 mm. tall and about 8–10 mm. thick (submature ones of type collection having calyx 14–16 mm. tall and stylopodium adding 2 mm. more, thickness of about 7–8 mm.), the calyx-limb narrow, thickened-undulate; stylopodium 3 mm. tall, depressed-conic, thus barely sloping to the very short style, this with 2 or 3 stigmas.

Type: *Lucy May Cranwell, Olof H. Selling, & Carl Skottsberg* 3,151, close to second ditchman's house, Upper Hamakua ditch trail, at head of Alakahi Valley, Kohala Mountains, Isl. Hawaii, Sept. 7, 1938 (Goth.).¹

Distribution: Known only from type locality in northern Hawaii.

¹ The type number given on the original labels was 3,151, not 3,156 as erroneously printed in Skottsberg's original text.

Specimens examined: *Cranwell et alii* 3,151 (type, Goth., my photograph no. 4,176; isotype, Bish., my photograph no. 4,217).

7. **Tetraplasandra lanaiensis** Rock, Coll. Haw. Publications Bull. 1: 12, pl. 2. 1911.

Small tree about 5 m. tall, glabrous throughout, freely but irregularly branching, with smooth, whitish bark. Leaves 3–4 dm. long; leaflets 5–7, dark-green above and lighter beneath, subcoriaceous, the lateral with blade oblong or less often narrow-obovate, at apex obtuse to abruptly subacuminate, at base subrotund or more often broadly cuneate, 8–10 cm. long and 4–6 cm. wide, petiolule 6–15 mm. long; terminal with blade more or less obovate, at times a little larger, on a petiolule 2–4 cm. long and more or less plainly articulate toward blade. Inflorescence thrice umbellate on a rhachis ± 2.5 cm. long, not erect but drooping; peduncles 3–5, usually 1.5–2.3 dm. long, bearing umbels of about 17–21 drooping 2- or 3-nodate rays, these mostly 7–9 cm. long and bearing 7–13 flowers normally in a terminal umbellet (rarely 1 or 2 placed lower down); pedicels (at anthesis) slender, 1–1.3 cm. long. Calyx tubular-obconic, about 6 mm. tall, with a denticulate border; petals 5 or 6, lanceolate, greenish-yellow, about 7 mm. long; stamens 10 or 12; ovary 3-celled; stigmas sessile. Drupe unknown.

Type: *Joseph F. Rock* 8,088, not common, only two trees observed, on dry forehills in Kaiholena Valley,¹ associated with *Osmanthus sandwicensis*, *Suttonia lanaiensis*, *Sideroxylon spathulatum*, *Maba sandwicensis*, etc., alt. 2,000 ft., Isl. Lanai, Aug. 2, 1910 (Herb. College Hawaii).

Distribution: Known only from central Lanai.

Specimens examined (all from Isl. Lanai): *Charles N. Forbes* 307-L, Lanai, September, 1917 (Bish.); *Forbes* 386-L, tree 9–10 ft. tall, leaves glossy above, smooth and pale below, petals yellow, 6, stamens 17 or 18 in 2 series, ovary 4-celled, Kaiholena, September, 1917 (Bish.); *Forbes* 388-L, Lanai, September, 1917 (Bish.); *George C. Munro*, Lanai, Aug. 31, 1915 (U.S.); *Munro*, Kaiholena, Mar. 18, 1922 (U.S.); *Munro* 335, Hookio, Aug. 21, 1915 (Bish.); *Munro* 461, Isl. Lanai, same date (Bish.); *Rock* 8,088 (isotypes, Arn., 2

¹ In his original text and on his labels, Rock gave the broader term "Mahana Valley," but later (Indig. Trees Haw. Isls. 343. 1913) wrote: "The tree . . . was seen only in Kaiholena Valley, crowded by other trees at an elevation of 2,000 feet. Kaiholena Valley, belonging to the drier regions of Lanai, is extremely interesting and harbors a very multiformous tree flora."

sheets; Bish.; Gray, 4 sheets, my photographs no. 4,173 and no. 4,174).

Unfortunately, *T. lanaiensis* is not as yet known in its fruiting state, while the apparently close *T. Munroi* is not as yet known in a flowering state. In *T. Munroi*, however, the rays of the inflorescence are without nodes, while in *T. lanaiensis* they have 2 or 3 nodes each, this character alone making distinction easy. From *T. meandra* var. *Hillebrandii*, apparently frequent on Lanai, *T. lanaiensis* can be distinguished, in the absence of flowers and fruits, by its less coriaceous, less venulose, apically more tapering or often sub-acuminate leaflets.

8. **Tetraplasandra Munroi** Sherff, Bot. Leaflet no. 7: 7. 1952.

Tree; leaves (a single one seen so far) ± 4 dm. long (petiole ± 12 cm. long included); leaflets ± 9 , petiolule 7–12 mm. long; blade coriaceous, oblong-ovate to oblong or (for terminal leaflet) even oblong-obovate, 7–12 cm. long and 3–6 cm. wide, at apex obtuse or even emarginate, at base rounded to broadly cuneate, scarcely oblique. A single umbel seen, this twice compound, finally about 1.6 dm. wide, its stem bent, slender (3–4 mm. thick) and ± 19 cm. long; rays ± 20 , slender (about 0.8–1.5 mm. thick), sharply angulate, entirely without nodes, straight or arcuate, 5–6.5 cm. long; pedicels commonly 6–8, slender or even filiform, straight or more often arcuate, very sharply angulate, finally 11–16 mm. long. Flowers not seen. Mature drupes drying to a grayish-brown, now 3- now 4-angulate, deeply and broadly grooved between the angles, 7–10 mm. long (including the small, conic stylopodium and 3 or 4 stigmas) and 4.5–5.5 mm. thick.

Type: *George C. Munro* 694, Kaiholena Valley, Isl. Lanai, Mar. 18, 1922 (Bish.).

Distribution: Known only from type locality in central Lanai.

Specimens examined: *Munro* 694 (type, Bish., my photograph no. 4,172).

The type had been referred interrogatively to *T. lanaiensis* Rock, a species known as yet only from the same general locality in central Lanai. That species, known so far only in the flowering state, differs in having smaller leaflets, these less blunt at the tip and more gradually narrowed to a more oblique base, their petiolules shorter and broader; the rays definitely 2- or 3-nodate and a third or so longer. *T. lanaiensis* has, moreover, a mammoth, thrice-

compound umbel ± 4 dm. broad. *T. Munroi* should be restudied in the field as to flowers and as to the nature of a complete inflorescence. The detached, twice-compound umbel described from the type sheet may, with its elongate stalk, prove to have been just one main part of a thrice-compound umbel that had seemed too large for a herbarium specimen. It may be remarked here that collectors of *Tetraplasandra* specimens should be especially careful to preserve enough of the complete inflorescence down to and including the nearest leaf-petioles, to permit correct conclusions as to how compound or decompound it really is.

9. **Tetraplasandra Lydgatei** (Hillebr.) Harms in Engl. & Prantl, Pflanzenfam. III, 8: 20. 1898; *Triplasarandra Lydgatei* Hillebr. Fl. Haw. Isl. 153. 1888.

a. Leaflets glossy and leathery on upper surface. . . . var. ϵ . *coriacea*.

a. Leaflets otherwise.

b. Inflorescence sessile or subsessile, its thick, scarcely visible footstalk (rhachis) ± 1 cm. tall.

c. Peduncles ± 13 (in herbarium specimens some may have been cut away), about 9.5–12 cm. long and 1.5–3 mm. thick, 20–30-flowered, pedicels 15–22 mm. long.

var. γ . *Forbesii*.

c. Peduncles about 4–6, only 3.5–6.5 cm. long, more slender, 10–20-flowered.

d. Peduncles up to about 18–20-flowered, pedicels finally 8–10 mm. long; drupes 5–6 mm. tall and thick, mostly 3-angled. var. β . *brachypoda*.

d. Peduncles about 12-flowered, pedicels finally 13–18 mm. long; drupes ovoid-globose, 8–10 mm. thick and somewhat taller, obtusely 4-angled. var. α . *Lydgatei*.

b. Inflorescence on a definite, slenderish footstalk 1.5–2.5 cm. tall.
var. δ . *leptorhachis*.

Small tree, quite glabrous. Leaves 2–3 dm. long, 5–11-foliolate; petiole ± 8 –9 cm. long; blades of leaflets elliptic-oblong or at times narrowly obovate, at tip obtuse to truncate and slightly emarginate, below middle gradually narrowed to a frequently oblique base, thin-chartaceous, 6–10 cm. long and 2–4.5 cm. wide; petiolules delicate, 8–23 mm. long. Inflorescence twice-umbellate from a short, common rhachis of about 13 mm.; peduncles 4 or 5, slender, ± 6.5

cm. long, bearing terminal umbellets of about 12 pedicels, these slender and about 13–18 mm. long. Calyx broad-obconical, 5 mm. tall, with undulating border. Petals 5, cohering at their tips, 6 mm. long. Stamens 12, about 4 mm. long, anthers straight or recurved. Ovary 4-celled, its disk slightly raised with 4 sessile stigmas. Drupe ovoid-globose, 8–10 mm. in diameter, obtusely 4-angled, the short conical apex finally elongated into a short stylopod.

Type: *Rev. John M. Lydgate*, Wailupe, Isl. Oahu (formerly in Berl.; see remarks below).

Distribution: Known only from type locality in southeasternmost Oahu.

Specimens examined (Isl. Oahu): *Charles N. Forbes* 2,511-O, Wailupe Valley, May 4, 1917 (topotype, Bish., my photograph no. 4,293); *Hillebrand & Lydgate*, Wailupe (Bish., a leaf and peduncle with 7 drupes, *ex herb. Lydgatei*, type collection, my photograph no. 4,186).

This species was founded by Hillebrand upon a plant attributed to Lydgate and which had been collected at Wailupe, southeasternmost Oahu. The type was in the Berlin Herbarium and perished with the destruction of that herbarium in World War II. I have before me, however, a sheet from the Bishop Museum Herbarium, bearing a 7-foliolate leaf and a single peduncle about 6.5 cm. long, with seven pedicellate fruits still attached. These were from Lydgate's own herbarium and are authentic for the species. The original label gives "Niu or Wailupe" but presumably Hillebrand, who collected jointly with Lydgate many of the specimens that went into Lydgate's herbarium,¹ had definite knowledge that Wailupe was the real locality. The pedicels are slender and 13–16 mm. long. Hillebrand (*loc. cit.*) gave the length as 16–18 mm. ("8–9 lines"). The species in its narrower sense seems never to have been collected again in recent years except for *Forbes* 2,511-O.

***Tetraplasandra Lydgatei* var. β . *brachypoda* Sherff, Bot. Leaflet no. 6: 19. 1952.**

Peduncles normally 4–6, about 3.5–5.5 cm. long and 1–1.5 mm. thick, up to about 18–20-flowered, pedicels slender and finally 8–10

¹ Indeed, on the label itself, Hillebrand and Lydgate are both named as the collectors. (For a special note regarding a "collection of Hawaiian plants collected or named by Dr. Hillebrand" and possessed by Mr. Lydgate, see *Occas. Papers, Bishop Mus.* 6: 5: 8. 1918).

mm. long; drupes when dry 5–6 mm. thick and tall, a few 4-angled the rest 3-angled.

Type: *D. LeRoy Topping & Will Bush* 3,701, tree 30–40 ft. tall, same one as for *Degener et al.* 6,099, Dec. 3, 1933 (N.Y.).

Distribution: Southeasternmost Oahu.

Specimens examined (all from Isl. Oahu): *Otto Degener* 18,244, moderately dry, open forest, western slope of central ridge of Niu Valley, June 4, 1932 (topotypes, Mo.; N.Y.); *Degener, Swezey, Park, & Nitta* 6,099, in moderately dry, open woods on side of trail on western slope of central ridge of Niu Valley, June 4, 1932 (topotypes, Gray; N.Y.; U.S.); *Charles N. Forbes with J.C. Bridwell* 2,461-O, ridge between Niu and Wailupe, Apr. 11, 1917 (Bish.); *Topping & Bush* 3,701 (type, N.Y., my photograph no. 4,185: isotypes, Mo.; N.Y., 2 sheets; U.S., my photograph no. 4,189).

The foliage of herbarium specimens examined is notably pallid and many of the leaves are 11- or 13-foliolate. *Degener* (Fl. Haw. fam. 281. June 29, 1934) has presented a beautiful plate of this variety, drawn from one of the *Topping & Bush* specimens. With him, however, it was assumed to represent *T. Lydgatei* proper.

***Tetraplasandra Lydgatei* var. γ . *Forbesii* Sherff, Bot. Leaflet no. 6: 20. 1952.**

Tree ± 6 m. tall, bark dark or blackish, leaves 7-foliolate. Peduncles ± 13 to an umbel, 9.5–12 cm. long and 1.5–3 mm. thick, drying reddish-brown, 20–30-flowered; pedicels very slender, commonly 15–22 mm. long; drupes ovoid-globose, sharply 3- or most often 4-angled, 4–6 mm. thick and 8 mm. tall including stylopodium and stigmas.

Type: *Charles N. Forbes* 1,942-O, tree about 20 ft. tall, darkish bark, leaves with 7 leaflets . . . turning yellow with age . . . ridge west of Waiālae Valley, near the top, rather dry locality, Isl. Oahu, Oct. 15, 1914 (U.S.).

Distribution: Known only from type locality, southeastern Oahu.

Specimens examined (Isl. Oahu): *Forbes* 1,942-O (type, U.S., my photograph no. 4,187: isotype, Bish., a mere fragment, but with fuller data); *L. H. MacDaniels* 466, Palolo-Waiālae Ridge, Jan. 27, 1927 (topotype, Bish.).

The elongate, numerous peduncles and pedicels at once distinguish this variety.

Tetraplasandra Lydgatei var. *δ. leptorhachis* Deg. & Sherff
ex Sherff, Bot. Leaflet no. 6: 20. 1952.

Leaflets 5 or 7. Inflorescence a twice compound umbel on a rhachis about 3–4 mm. thick and 1.5–2.5 cm. long; peduncles 4–8, drying a greenish-brown, 4–7.5 cm. long and about 2 mm. thick, 18–32-flowered; pedicels slender, 12–16 mm. long, greenish-brown when dry; drupes ovoid, sharply 3- or 4-angulate, when submature 4–5 mm. thick and 6–7 mm. tall.

Type: *Otto Degener* 17,796, open, windy rain-forest, slope northeast of Nuuanu Valley, Isl. Oahu, Nov. 20, 1926 (U.S.).

Distribution: Southeastern and central Oahu.

Specimens examined (all from Isl. Oahu): *Otto Degener*, slope northeast of Nuuanu Valley, Nov. 20, 1926 (topotype or perhaps isotype, N.Y.); *Degener*, Wahiawa, Nov. 25, 1926 (N.Y., my photograph no. 4,191); *Degener* 17,796 (type, U.S., my photograph no. 4,190; isotypes, Mo.; N.Y.; Yunck.).

In *T. Lydgatei* proper (*i.e.*, var. *Lydgatei*), also in the vars. *brachypoda* and *Forbesii*, the flowering axis or rhachis is reduced to a short, thick stump 1 cm. or so long, a mere anchorage for the peduncles of the compound umbel. In var. *leptorhachis* the rhachis stands out distinctly as a slender stalk.

The geographic range is remarkable, extending as it does northwestward from Nuuanu Valley in far southeastern Oahu to Wahiawa, well past the center of Oahu. Recourse to my private copy of *Degener's* "Rosetta Stone" (a key prepared by him some years ago to summarize his collection data and deposited in my keeping) shows that on the date given for Wahiawa, he collected "in the mountains east of Wahiawa."

Tetraplasandra Lydgatei var. *ε. coriacea* Sherff, Bot. Leaflet no. 6: 21. 1952.

Leaflets 5–9, their blades elliptic-oblong, 8–12 cm. long and 3.5–5.7 cm. wide, glossy and leathery on upper surface. Peduncles of the inflorescence (an immature one seen) ± 10 , about 3–3.5 cm. long, provided at the middle with a bract (this widely ovate, sharply acuminate, ± 3 mm. long, finally deciduous), umbellately clustered upon a thick rhachis about 1 cm. long, ± 35 -flowered; pedicels slender, about 6 mm. long, calyx about 1.5–2 mm. tall; immature corolla as yet unopened, sharply hexagonal, about 3.2 mm. tall and about 2.5 mm. thick.

Type: *Richard S. Cowan* 563, alt. 1,800 ft., Halawa Valley Ridge Trail, Koolau Range, southeastern Oahu, Mar. 2, 1947 (Bish.).

Distribution: Known only from type locality in southeastern Oahu.

Specimens examined (Isl. Oahu): *Cowan* 563 (type, Bish., my photograph no. 4,192).

The glossy, leathery upper surface of the leaves is very distinctive. The packet on the type sheet contains three more or less mature drupes, but there is nothing to indicate that they actually came from the type tree. Their pedicels are 8 mm. long, two are 3- and one is 4-gonous, and all are about 1 cm. tall, stylopodium and stigmas included.

10. ***Tetraplasandra oahuensis*** (A. Gray) Harms in Engler & Prantl, *Pflanzenfam.* III: 8: 30. 1898; *Gastonia? oahuensis* A. Gray, *Bot. United States Explor. Exped.* 726. 1854; *Triplasarandra oahuensis* (A. Gray) Seem. *Jour. Bot.* 6: 139. 1868; *Gastonia oahuensis* A. Gray *ex* Hillebr. *Fl. Haw. Isls.* 153. 1888.

a. Inflorescence having rays between peduncle and pedicels.

b. Leaves ± 4.5 dm. long including petiole, or if smaller, with rays usually 4-7 cm. long.

c. Lateral petiolules 1-4 mm. long; leaflets 5 or 7; peduncle robust (± 5 mm. thick) and short (± 4.5 cm. long), rough and transversely or circumferentially pocked; rays ± 15 -pedicellate; native of subcentral Oahu.

var. ζ . *pseudorhachis*.

c. Lateral petiolules 5-20 mm. long; leaflets ± 9 ; peduncle more slender and elongate (8- ± 16 cm. long), smoothish unless for a few bracteal scars; rays 5-12-pedicellate.

d. Leaflets ± 11 ; peduncle slender and elongate (± 1.6 dm. long); rays ± 3 -3.7 cm. long; pedicels about 5-7; native of southeastern Oahu. var. δ . *pseudolongipes*.

d. Leaflets 7-9; peduncle about 8-10 cm. long; rays more often 4-7 cm. long; pedicels 8-12; native of north-westernmost Oahu. var. θ . *hailiensis*.

b. Leaves about a third shorter including ± 6 cm. long petiole, leaflets 5-9.

c. Median and lower leaflets oblong to oval or obovate; rays under 3 cm. long. var. α . *oahuensis*.

- c. Median and lower leaflets elliptic to elliptic-oblong or narrowly oval; rays 3.5-4 cm. long. var. ϵ . *Fauriei*.
- a. Inflorescence lacking rays, the pedicels attached directly to the peduncle.
- b. Leaflets for most part very coriaceous and on usually glossy upper surface depressed-venulose; umbellets \pm 30-flowered; native of northeastern Oahu (Punaluu and Kaaawa).
var. η . *venulosior*.
- b. Leaflets otherwise; umbellets up to \pm 20-flowered; natives farther west or south.
- c. Peduncle 5-8.5 cm. long, leaflets ovate to broad-oblong, 4-6.5 cm. broad, obtuse to subacute at apex, abruptly broad-cuneate to subtruncate at base; petiolules 3-10 mm. long. var. γ . *eradiata*.
- c. Peduncle \pm 16-18 cm. long, lateral leaflets oval-oblong to narrowly oblong or oblong-ob lanceolate, mostly under 4 cm. broad, obtuse to rounded at apex, narrowly to moderately cuneate at base; petiolules 7-20 mm. long.
var. β . *longipes*.

Evidently arborescent, branchlets stout, marked with the leaf-scars. Leaves 5-9-foliolate, glabrous (as is the whole plant), \pm 22 cm. long including the slender petiole (this \pm 6 cm. long); leaflets moderately fleshy and thick, dull, closely but inconspicuously feather-veined; blades 4.5-9 cm. long and 2-3.8 cm. wide, the median ones oblong or oval, terminal and basal ones inclining toward obovate or terminal pair (on type, U.S.) oblanceolate, all obtuse (on type) to barely subacute (isotype, Gray) at tip and broadly to narrowly cuneate at base; petiolules 5-8 mm. long. Umbels probably thrice compound, but only a single, detached compressed-angled peduncle about 9.5 cm. long present on type sheet, this having borne several short (2.5-2.8 cm.), slender or subrobust, compressed-angled rays (three left on type and one on isotype [Gray] at and just below its tip); bracts if any caducous; umbellet at tip of ray about 6-pedicellate (in fruit); pedicels 5-10 mm. long. Petals 5, triangular-lanceolate, valvate in aestivation, expanding in anthesis but caducous. Stamens 10; filaments short, subulate; anthers 2-celled, oblong, opening longitudinally. Drupes immature; their calyx-tube clavate, 4-5-angled, 4.5 mm. tall and about 3 mm. thick at the very short, truncate, repand limb; their ovary inferior, 4- or 5-celled, crowned with a tiny, conical, now 4- now 5-rayed stylopodium about 1 mm. tall, bearing an (as yet) undeveloped and entire stigma.

Type: *United States Exploring Expedition under Captain Charles Wilkes*, at altitude of 2,000 feet, on the mountains behind Honolulu, Island of Oahu (U.S.).

Distribution: Known only from vicinity of Konahuanui and Olympus, southeastern Oahu.

Specimens examined (all from Isl. Oahu): *Charles N. Forbes*, Konahuanui, Nov. 4, 1908 (topotype, Bish., my photograph no. 4,349); *Forbes (with Mrs. G. E. Kelly)* 2,390-O, Castle Trail between Konahuanui and Olympus, Aug. 1, 1916 (Bish.); *D. Wesley Garber* 245, Konahuanui-Olympus Trail, Feb. 15, 1920 (Bish.); *U.S. Explor. Exped. under Capt. Wilkes*, alt. 2,000 ft., mountains behind Honolulu (type, U.S., my photograph no. 4,295: isotype, Gray, my photograph no. 4,294).

The above description has been made to follow the original one by Gray very closely, with a few additions made directly from the type and isotype, both now before me. Hillebrand (Fl. Haw. Isls. 153. 1888) gave a treatment for this species (under the name *Triplasandra oahuensis*) and cited "the slopes of Waiolani and Konahuanui," Isl. Oahu, for its habitat. A study of his specimens available to me, however, shows that his own specimens were of a tree varietally different, treated below as var. *eradiata*.

Gray's immature material had the stigmas as yet entire, and he regarded the flowers as sterile because of the diminutive ovary. However, the ovary was 4- or 5-locular and, from our knowledge today of the genus we know that the "entire" stigma doubtless would have divided presently into several distinct stigmas as the flowers developed.¹ Gray's type is all too scanty but is sufficient to show that a peduncle about 9.5 cm. long bears rays and that these bear in turn pedicels. (How many peduncles were present in an umbel or whether the umbel was sessile or mounted on a rhachis is not evident from the type collection.)

The material confused by Hillebrand with this species differed at once in having pedicels placed directly on the peduncles, not on the rays. This and other differences are noted in the description for var. *eradiata*.

The specimen collected by Forbes at Konahuanui has leaflets somewhat more coriaceous and depressed-venulose. The two stout

¹ Commonly the number of stigmas on a mature drupe in *Tetraplasandra* equals the number of pyrenae or cells, but at least in var. *eradiata* of this species the stigmas may be fewer.

peduncles are umbellately grouped, 7.5–8.5 cm. long, and one has two of its fifteen 1.5–2.4 cm. long rays scattered to 3.5 cm. lower than the terminal umbellet; its pedicels are but 3–6 mm. long.

Tetraplasandra oahuensis var. β . **longipes** Sherff, Bot. Leaflet no. 8: 4. 1953; *Triplaspandra oahuensis* var. β . Hillebr. Fl. Haw. Isls. 152. 1888.

Terminal and lowermost leaflets rhomboid-obovate, blade ± 5.5 –6 cm. long and ± 4 cm. wide; petiolules 7–20 mm. long. Peduncles umbellately 2–4-congregated, ± 16 –18 cm. long, moderately scurfy, ± 22 -flowered (rays lacking); pedicels very slender, sparsely scurfy, 1.2–2 cm. long; corollas not yet expanded, under 5 mm. tall; calyx glabrate to more or less tomentulose-scurfy or -mealy, obconic, about 6 mm. tall; stamens at least 10–15; immature stigmas 4 or 5. Drupes unknown in mature state; immature ones cylindrical, black (at least when dry), calyx about 12 mm. tall and about 5 mm. thick, limb brown-margined, spreading and conspicuous, the small and conical stylopodium under 1.5 mm. tall, stigmas commonly 2 at times 3.

Type: *Joseph F. Rock* 4,831, Niu Valley, Island of Oahu, Aug. 22, 1909 (Bish.).

Distribution: Known only from type locality in southeasternmost Oahu and from upper part of Kipapa Gulch far to the northwest.

Specimens examined: *Edward Yataro Hosaka* 956 *p. p.*, a 20 ft. tree, wooded slope, alt. 1,600 ft., south ridge, Kipapa Gulch, Apr. 2, 1933 (Bish.); *Joseph F. Rock*, Niu Valley, 1911 (Arn.); *Rock* 4,831 (type, Bish., my photograph no. 4,273).

Hillebrand's var. β . was collected by him at Niu and was this variety.

Tetraplasandra oahuensis var. γ . **eradiata** Sherff, Bot. Leaflet no. 8: 5. 1953.

Small tree, leaves about 3 dm. long, leaflets 7–13, coriaceous, glabrous; blade ovate to broad-oblong, 6–8.5 cm. long and 4–6.5 cm. wide, at apex obtuse to subacute or more rarely subacuminate, at base oblique and abruptly wide-cuneate to subtruncate; petiolules 3–10 mm. long. Peduncles 3–5, at times arising from a rachis under 1.3 cm. long, themselves 5–8.5 cm. long, at their tip umbellately about 16–20-pedicellate, pedicels finally 13–15 mm. long. Calyx cylindrical-prismatic, 4–6 mm. tall. Petals 5 or 6, about 6 mm.

long. Stamens 10–15, a half shorter than the petals, anthers recurved.¹ Ovary 5- or 6-loculate. Drupes prismatic-ovoid to shortly prismatic-cylindric, 5- or 6-angled, the calyx 7.5–8 mm. tall and about 5–5.5 mm. thick; stylopodium 5- or 6-rayed, depressed-conic, about 2 mm. tall (including in the same umbellet the now 2 or 3 now 5 or 6 stigmas).

Type: *William Hillebrand*, Nuuanu, Island of Oahu, 1867 (Gray).

Distribution: Southeastern Oahu.

Specimens examined (Isl. Oahu): *Hillebrand*, Konahuanui (Bish., a liberal fruiting fragment *ex herb. Hillebrandii olim in Herbario Berolinensi*); *Hillebrand*, Nuuanu, 1867 (type, Gray, my photograph no. 4,223*b*: isotype, Kew, my photograph no. 4,274*b*).

The two Hillebrand sheets each bear two specimens and the label in each case gives the name *Triplasandra oahuensis* Seem., also both Nuuanu and Mt. Kaala for the habitat. One specimen on each sheet is in the flowering state and is seen to belong to the type collection of Hillebrand's *T. kaalae*, an inhabitant of Mt. Kaala. The other specimen on each sheet has mature fruit and is seen to match very closely Hillebrand's description (Fl. Haw. Isls. 153. 1888) of *Triplasandra oahuensis* Seem., our *Tetraplasandra oahuensis*.² It differs, however, from Gray's type material in such important respects that it may well be separated varietally. These important respects are seen quickly on reference to the varietal key given above.

***Tetraplasandra oahuensis* var. *δ. pseudolongipes* Deg. & Sherff** *ex Sherff*, Bot. Leaflet no. 8: 4. 1953.

Leaves (at least in dry state) pallid, ± 4.5 dm. long (including petiole, this ± 13 cm. long), ± 11 -foliolate; blade of leaflets under 1 dm. long and under 4.5 cm. wide, more often oval-oblong to oblong or subobovate, at apex more often weakly acuminate, at base cuneately contracted; petiolules slender, 7–10 mm. long. Peduncle

¹ In the absence of flowers on the type and isotype specimens examined, I have relied upon Hillebrand's text for the petals and stamens.

² Since Hillebrand knew his *T. kaalae* only from Mt. Kaala, it is of course obvious that the specimens in fruit were the ones that came from Nuuanu. In his text, Hillebrand cited the "slopes of Waiolani and Konahuanui." As Konahuanui slopes down on its northwest side into Nuuanu, we may well suppose that by naming Konahuanui specifically, Hillebrand was merely revealing more explicitly the exact habitat of the specimens previously attributed in a loose way to "Nuuanu" (in reality a long valley extending upwards of 8 km. to the southwest).

(a single one seen) ± 1.6 dm. long, smooth (but one scar present), at its tip ± 10 -radiate; rays curved, suberect, smooth, about 3–3.7 cm. long, at tip umbellulately about 5–7-pedicellate; pedicels sharply angled, smooth to scurfy, 6–9 mm. long. Flowers not seen. Drupes in submature state about 11 mm. tall including stylopodium (this about 1.5 mm. tall); stigmas now 2 now 3.

Type: *Otto Degener* 2,968, Konahuanui, Island of Oahu, Dec. 28, 1924 (N.Y.).

Distribution: Southeastern Oahu.

Specimens examined (Isl. Oahu): *Degener* 2,968 (type, N.Y., my photograph no. 4,347); *C. N. Forbes* (with *Dean Lake*) 1,973-O, Waimano Ridge, Oct. 27–30, 1914 (Bish., leaflets 7 or 9, more coriaceous and more venulose).

In the absence of flowers, the fruits, which are essentially typical for *T. oahuensis* var. *oahuensis* except with fewer stigmas, have been relied upon for placing this variety in this species. Closely related to var. *pseudolongipes* apparently is *Degener* 17,976, a 20 ft. tree, Middle Halawa Ridge, Oahu, May 26, 1935 (N.Y.). The leaves are smaller; leaflets 5 or 7, mostly broader, also thicker and more venulose; peduncles 5, rays more slender at least at anthesis; stamens ± 15 . Mature drupes are much to be desired.

***Tetraplasandra oahuensis* var. ϵ . *Fauriei* Sherff, Bot. Leaflet no. 8: 3. 1953.**

Leaflets now dull now more or less coriaceous and glossy and on upper surface also depressed-venulose, median ones narrowly oblong, their blade more often 8–9.5 cm. long and 2.5–3.3 cm. wide; lowermost elliptic-oblong to scarcely oval, blade 5–8 cm. long and under 3.3 cm. wide; three terminal ones narrowly elliptic-oblong to oblanceolate, apically at times truncate-rounded or even retuse. Peduncle (a single one seen) ± 12 cm. long, more or less scurfy toward base, elsewhere glabrous, at tip about 8-rayed; rays slender, arcuate, suberect, 3.5–4.5 cm. long, at apex umbellulately 5–8-pedicellate; pedicels slender, glabrous, 6–8 mm. long. Drupes immature, their calyx cylindric to cylindric-obconic, about 9 mm. tall; stylopodium under 2 mm. tall including stigmas (these 2 or 3 even 4 or 5 but as yet not discrete).

Type: *Abbé Urbain Faurie* 270 *pro parte*, Konahuanui, Island of Oahu, October, 1909 (Par.).

Distribution: Known only from type locality in southeastern Oahu.

Specimens examined: *Faurie* 270 *p. p.* (type, Par., my photograph no. 4,346; isotype, Arn., my photograph no. 4,353).

***Tetraplasandra oahuensis* var. ζ . *pseudorhachis* Sherff, Bot. Leaflet no. 8: 3. 1953.**

Leaflets 5 or 7, lateral ones subsessile with petiolules only 1–4 mm. long; petiole slender, up to 1 dm. long. Peduncle solitary, robust, ± 4.5 cm. long and ± 5 mm. thick, more or less marked with transverse pocks, at tip ± 12 -rayed; some rays conspicuously elongate (up to ± 8 cm. long), all more or less pocked-scurfy, ± 15 -flowered; pedicels slender, 8–11 mm. long; stamens 10–16; drupes ovoid-prismatic, commonly 3- or 4-angled, calyx about 11 mm. tall, stylopodium hardly 1 mm. tall, stigmas 3 or 4 or more rarely 5.

Type: *G. W. Russ*, Waimano Gulch, Island of Oahu, August, 1929 (Bish.).

Distribution: Known only from type locality in subcentral Oahu.

Specimens examined: *Russ*, Waimano Gulch, August, 1929 (type, Bish., my photograph no. 4,350).

The type had been determined as *T. meindra*, but the florets have 10–16 stamens as in *T. oahuensis* and the ripe drupes too are more typical for the latter species. The lone stout, short peduncle might be mistaken for the rhachis found in some *Tetraplasandra taxa*, whence the epithet *pseudorhachis*. However, it bears a multiplicity of secondary branches (a rhachis so-called bearing seldom more than 5 or 6) and these tend to disjoint from the apex as rays often do, leaving conspicuous circular pocks ± 5 mm. across.

***Tetraplasandra oahuensis* var. η . *venulosior* Sherff, Bot. Leaflet no. 8: 2. 1953.**

Leaflets 5–7, lowermost ones ovate or oval-oblong, median ones ovate-oblong or oblong, terminal ones obovate or widely oblanceolate, all rounded to obtuse at apex or rarely abruptly subacute, at base oblique and cuneate to rounded, coriaceous, on upper surface more often subglossy and conspicuously depressed-venulose, lateral petiolules 3–8 mm. long; petiole 6.5–8 cm. long. Peduncle (a single one seen) slender, about 9 cm. long, smoothish above, at tip umbellulately and densely ± 30 -pedicellate; pedicels compressed, smooth, 9–14 mm. long. Florets immature, stamens 10–16. Drupes unknown.

Type: *Edward P. Hume* 165, alt. 450 m., steep hillside, north ridge, Kaaawa, Island of Oahu, Apr. 12, 1931 (Bish.).

Distribution: Northeastern Oahu.

Specimens examined: *Otto Degener*, Pig-God Trail, rainy summit, Punaluu, Isl. Oahu, May 31, 1931 (N.Y., my photograph no. 4,352); *Degener* 18,015 *pro parte*, Pig-God Trail, windy, forested summit, Punaluu, Jan. 17, 1932 (Mo.; N.Y.); *Degener* 18,242, same place and date (Mo.; N.Y., my photograph no. 4,292); *Hume* 165 (type, Bish., my photograph no. 4,351).

***Tetraplasandra oahuensis* var. *θ. hailsiensis* Deg. & Sherff** *ex* Sherff, Bot. Leafl. no. 8: 6. 1953; *Tetraplasandra meiantra* var. *hailsiensis* Deg. & Sherff *ex* Sherff, Bot. Leafl. no. 7: 10. 1952.

Leaves up to ± 4 dm. long including petiole (this 5.5–10 cm. long), leaflets 7–9, petiolules 5–15 mm. long; blades of leaflets oblong or more often oval-oblong or ovate, apically obtuse to subacute, basally oblique and commonly truncate to broadly rounded, coriaceous, reticulately depressed-venulose above, up to 11 cm. long and to 7.5 cm. broad. Inflorescence sessile or subsessile, thrice umbellate; peduncles ± 4 , about 8–10 cm. long and 3–5 mm. thick; rays terminal or a single one placed lower down on peduncle, about 12–16, subrobust, more often 4–7 cm. long; pedicels 8–12, subrobust, 9–16 mm. long. Petals ± 7 , stamens ± 11 . Drupes globose-prismatic, strongly 4- or at times 5-angled when dry, calyx 7–8 mm. long, the depressed-conic stylopodium under 2 mm. tall, stigmas 4 or sometimes 5.

Type: *Otto Degener* 18,016, decadent forest, top of Haili Gulch, Isl. Oahu, Nov. 28, 1931 (first sheet, N.Y.; second sheet, U.S.).

Distribution: Known only from type locality in northwestern-most Oahu.

Specimens examined: *Degener* 18,016 (first type sheet, N.Y., my photograph no. 4,283; second type sheet, U.S., my photograph no. 4,284: isotypes, Mo., 2 sheets; N.Y.); *Degener* 18,247, about 4 dying trees in dryish, decadent forest, top of Haili Gulch (Makua vicinity), Nov. 28, 1931 (Mo., my photograph no. 4,285; N.Y.).

11. ***Tetraplasandra waianensis* Deg.** Fl. Haw. fam. 281, with plate. 1938; *Tetraplasandra waianeensis* Deg. *ex* Skotts. Meddel. Göteborg. Bot. Trädg. 15: 414. 1944 (sphalm).

Leaflets oblong, 3–4 cm. wide. var. *a. waianensis*.
 Leaflets broadly oval-oblong or sometimes subcordate-subrotund,
 5–8.5 cm. wide. var. *β. palehuana*.

Glabrous tree commonly 3–4 m. tall and with few, thick branches, or at times a much-branched shrub. Leaves 1.5–3 dm. long, 5–9-foliolate; petiole 4–8 cm. long; leaflets coriaceous, oblong, at apex bluntly acute to shallowly cuspidate, the lateral obliquely rounded at base with blades 4–9 cm. long and 3–4 cm. wide, on petiolules 1–6 mm. long, the terminal one evenly cuneate at base and at times more or less obovate, its petiolule jointed near blade and commonly 2–3 cm. long. Inflorescence sessile or upon a thick rhachis up to 6 cm. long, twice umbellate; peduncles 4–8, spreading, 6–12 cm. long, each bearing about 3 scars of caducous, triangular-ovate, 4 mm. long bracts, 20–30-flowered; pedicels slender, \pm 2 cm. long. Calyx cylindrical-obconic, 6 mm. tall, with undulate border; petals about 8, subequal, lanceolate, acute, 7 mm. long, about 2 mm. wide; stamens about 28, unequal in length, filaments 1–2 mm. long, anthers 2–3 mm. long; ovary 4-celled, style 1 mm. long, stigmas 4. Drupe (known as yet only in submature state) narrowly urceolate-cylindric, truncate at apex, 10–12 mm. tall as to its calyx and 3–4 mm. thick, stylopodium subsleenderly conic, \pm 1 mm. tall including the 4 or rarely 3 stigmas.

Type: *Otto Degener* 11,318, in forest, Middle Palawai Ridge, Waianae Range, Isl. Oahu, May 12, 1936 (herb. not cited).

Distribution: At and near Palawai Gulch, Waianae Mountains, Isl. Oahu.

Specimens examined (all from Isl. Oahu): *Degener* 11,318 (type collection, Gray, my photograph no. 4,220; Mo.; N.Y., my photograph no. 4,219); *Degener* 17,973, northeast slope of Puu Kumakalii, Waianae Range, Apr. 1, 1936 (with neither flowers nor fruits; N.Y.); *Grady L. Webster* 1,443, much-branched shrub 3.5 m. tall, alt. 2,600 ft., South Palawai Gulch, Mar. 27, 1948 (Bish.).

The "*T. waianeensis*" of Skottsberg's text seems to have been an unintentional misspelling.¹

¹ Curiously enough, Skottsberg elsewhere (*ibid.* 508) intentionally altered *waiianensis* to *waianaeensis* for *Bidens waiianensis* Sherff, remarking: "Named for the Waianae Mts.; the specific epithet has to be *waianaeensis*; *waiianensis* is inadmissible." The International Rules, Art. 70 (*Brittonia* 6: 26. 1947), demanded, however, the retention of the original spelling of a name or epithet "except in the case of a typographical error, or of a clearly unintentional orthographic error." My *Bidens waiianensis* was published in 1920 (*Bot. Gaz.* 70: 104) with an *intended* omission of the final *ae* of Waianae in the interest of brevity. No typographical error was involved in the resulting epithet *waiianensis*, nor, since the resulting epithet was intentionally created with the *ae* missing, can there be said to have been a *clearly unintentional orthographic error*. Thus it seems that the spelling *waiianensis* must stand. I suspect, moreover, that Degener's later use of this spelling for a new *Tetraplasandra* came from his naturally wishing

In general habit of foliage and shape of mature drupes, *T. waiianensis* is all too close to *T. pupukeensis* of the northern part of the Koolau Range on Oahu. In the shape of the submature drupes, however, both *T. waiianensis* and its var. *palehuana* appear specifically different from *T. pupukeensis* and the several varieties and forms of that species. The submature (about half-matured) drupes in *T. waiianensis* and its variety are slenderly cylindric or cylindric-subprismatic, the calyx 2.5–3 times as tall as thick. In *T. pupukeensis* and its subordinate entities, they are urceolate to obconic, the calyx less than 2 times as tall as thick.

Tetraplasandra waiianensis var. β . **palehuana** Sherff, Bot. Leaflet no. 8: 11. 1952.

Leaf-petiole ± 1 dm. long; leaflets 5–11, broadly oval-oblong or sometimes subcordate-subrotund, at apex obtuse or rounded or rarely subacuminate, mostly 7–12.5 cm. long and 5–8.5 cm. wide. Flowers unknown. Mature drupes ovoid-prismatic, coarsely 4- or sometimes 5-angled, deeply and broadly grooved between the angles, truncate at top, calyx portion 10–11 mm. tall and narrowly undulate-bordered at top, the slenderly conic stylopodium with its ill-defined style and usually 4 but sometimes 5 stigmas rising ± 2.5 mm. above calyx-limb.

Type: *Charles N. Forbes* 1,674-O, Palehua, Waianae Mountains, Isl. Oahu, Apr. 1–4, 1911 (Bish.).

Distribution: At and near Palehua, Isl. Oahu.

Specimens examined (Isl. of Oahu): *Otto Degener* 17,971, Middle Palawai Ridge, Waianae Mts., May 12, 1936 (topotype, N.Y., my photograph no. 4,297); *Forbes* 1,674-O (type, Bish., my photograph no. 4,296).

12. **Tetraplasandra kaalae** (Hillebr.) Harms in Engl. & Prantl, Pflanzenfam. III, 8: 30. 1898; *Triplasarandra kaalae* Hillebr. Fl. Haw. Isls. 154. 1888.

to use a Latin adjective already in use for Waianae. I have therefore followed his spelling for the epithet in the genus *Tetraplasandra*. There seems an abundance of precedents for this course. To take but one example: *Pyrus ioensis* (Wood) Bailey is the official name for a North American crab-apple and is spelled as here given in all standard works (e.g., Gray's Man. Bot. edit. 8: 759. 1950). The epithet *ioensis* refers to Iowa, but might equally well have referred to many such geographic names as Ioka, Iola, and Iona, to be found in a standard atlas. By contrast, the epithet *waiianensis* could well apply to no other place in the Hawaiian Islands than Waianae except Waianu and Waijanui, both localities so inconsequential that they are omitted from the official United States topographic maps (Maui, ed. of 1933, and Oahu, eds. of 1917 and 1930).

Umbels thrice compound, umbellets 10–15-flowered, drupes globose-ovoid, their calyx as broad as tall; leaves 2–3 dm. long, leaflets 7–11, petiolules 12–25 mm. long..... var. *a. kaalae*.

Umbels now 3 times now 4 times compound, umbellets 3–5-flowered, drupes ovoid, their calyx about 8 mm. tall and 6 mm. thick; leaves ± 2 dm. long, leaflets 5, lateral petiolules only 2–7 mm. long..... var. *β . multiplex*.

A small tree up to ± 9 m. tall, glabrous, ultimate branchlets slightly scurfy. Leaves about 2–3 dm. long; petiole 4–12 cm. long, clasping at base. Leaflets 7–11; blade ovate or ovate-oblong, at apex subacute or obtusely acuminate to rounded or even subretuse, at base broadly cuneate to rounded and (except for terminal leaflet) oblique, 7–12 cm. long and 3.5–8 cm. wide, coriaceous, glabrous on both surfaces, moderately or inconspicuously reticulate-venulose, drying a dark- or light-green and dull or in places glossy; petiolule 12–25 mm. long. Inflorescence thrice compound; 3–5 peduncles from a short (under 1 cm.), common rhachis, each 4–7 cm. long, compressed-angular and with ± 3 bract-scars, bearing at top a radiate umbel; rays 10–15, angular, curved or straightish, 2.5–4.2 cm. or in some toptype or near-toptype material (e.g., *Degener et al.* 21,018 and *Selling* 3,338) 4–8 cm. long, with usually 2–4 bract-scars, 10–15-pedicellate; pedicels 5–13 mm. long, in a terminal umbellet. Calyx narrowly to broadly obconic, glabrous, 2–3 mm. tall; petals 6, finally expanded, 6–8 mm. long, stamens 12–18; ovary 4- or rarely 3-celled. Drupe globose-ovoid, when dry strongly 4- or rarely 3- or 5-angled, broadly and deeply grooved between the angles, its calyx 7–8 mm. tall and narrowly undulate-bordered, its top convex and abruptly constricted to a very short, slender stylopodium, this holding the 3–5 (commonly 4) stigmas 2.5–3 mm. above calyx-limb.

Type: *William Hillebrand*, alt. 4,000 ft., on top of Mt. Kaala, northwestern Oahu (formerly at Berl.).

Distribution: On and near Mt. Kaala, northwestern Oahu.

Specimens examined (Isl. Oahu): *Otto Degener* 18,014, forest, up ridge on right side of head of Makua Valley, June 26, 1932 (N.Y.); *Degener* 18,245, ridge at head of Makua Valley on south side, June 26, 1932 (N.Y.); *Degener* 18,246, only one dying tree above forest, southeast side of Makua Valley near its head, Jan. 3, 1932 (N.Y.); *Degener* 21,016, second ridge east of Dupont Trail, north of Kaala, July 24, 1949 (Bish.; Chi.; Del.; Gray; Kew; N.Y.); *Degener & Miss Amy Greenwell* 21,015, forested slope at 1,800 ft. alt., Dupont

Trail, north slope of Kaala, Oct. 23, 1949 (Berl.; Bish.; Chi.; Del.; Gray; Kew; Mo.; N.Y.; Par.; Phila.; U.S.); *Degener, Greenwell, & Hatheway* 20,682, single tree on forested western slope, alt. 1,400 ft., east branch of East Makaleha Valley, July 4, 1950 (Bish.; Chi.; N.Y.; U.S.); *Degener, Murashige, & Kerr* 21,018, tree 25 ft. tall, dryish, forested slope, alt. 2,500 ft., Mt. Kaala, Oahu, July 10, 1949 (Arn.; Bish.; Calif. Acad.; Chi., 2 sheets; Del.; Gray; Kew; Mo.; N.Y.; Par.; Phila.; Univ. Calif.; U.S.); *Degener, Ordoñez, & Selling* 12,236, single tree in decadent forest, southeast of Kolekole Pass, Sept. 3, 1938 (N.Y.); *William Hillebrand*, Kaala (Bish., fragments *ex* type coll. *in herb. Hillebr. olim in Herb. Berol.*, my photograph no. 4,194); *Hillebrand*, Mt. Kaala, 1867 (topotypes, perhaps even isotypes, Gray, my photograph no. 4,223a; Kew, my photograph no. 4,274a); *Olof H. Selling* 3,338, near Kolekole Pass, July 3, 1938 (Bish.).

Hillebrand apparently had not seen mature drupes. *Degener, Ordoñez, & Selling* no. 12,236, from near Kolekole Pass, matches type material very closely but excels in having submature drupes. *Selling* 3,338 from the same locality has mature drupes and longer rays, four of one umbel measuring 7–8 cm. long. Skottsberg, who determined *Selling* 3,338 as *T. kaalae* (Meddel. Göteb. Bot. Trädg. 15: 413. 1944) expressed uncertainty as to his determination, since the *Selling* plant possessed no flowers and for *T. kaalae* no drupes had been described. However, until such time as more complete suites can be obtained with both flowers and fruits, we may derive some assurance from what is known about *T. kaalae* var. *multiplex*. In that variety, the type sheet of which bears both flowers and mature fruits, the flowers are essentially as in Hillebrand's flowering material of *T. kaalae* and the fruits are very similar to those of *Selling*'s fruiting material of *T. kaalae*, though a trifle smaller and more nearly ovoid (*i.e.*, less globose-ovoid).

Hillebrand (*op. cit.* 151) set his *T. kaalae* in that portion of his key having the "drupe cylindrical, truncate," although his failure to describe a drupe in his text description makes it seem fairly certain that he had not seen one for *T. kaalae* and was surmising its shape from a glance at the floral calyx. For *T. kaalae* none but globose-ovoid, convexly topped drupes are known.

***Tetraplasandra kaalae* var. β . *multiplex* Sherff, Bot. Leaflet no. 8: 11. 1953.**

Leaves ± 2 dm. long, 5-foliolate; leaflets moderately smaller, lateral petiolules only 2–7 mm. long; inflorescence now 3 times now

4 times umbellate, peduncles 3–7 cm. long; rays now few (± 8) now more numerous (± 17), only 2–4.5 cm. long, at apex sometimes branched umbellately into 5–7 subordinate rays (subrays), these sharply angulate, more or less arcuate, ± 1.5 cm. long; pedicels 3–5 in a terminal umbellet, slender, about 3–4 mm. long. Drupes ovoid, the calyx portion about 8 mm. tall and 6 mm. thick, the top more pyramidal.

Type: *G. W. Russ*, Makua, northwestern Oahu, January, 1930 (Bish.).

Distribution: Known only from type locality in northwestern Oahu.

Specimens examined: *Russ*, Makua, Oahu, January, 1930 (type, Bish., my photograph no. 4,193).

The type had been determined at the Bishop Museum as *T. kaalae*, but the differences are so numerous as to justify at least a distinct varietal status. The type sheet bears a flowering spray having two 5-foliolate leaves and a sessile, thrice compound umbel with but two peduncles. Separately mounted are two more inflorescences. These have a long stalk, one 4.5 cm. and one 7 cm. long. By comparisons within the genus, these stalks appear better designated as peduncles than as rachises. It is assumed that two or more are umbellately clustered; this being the case, the whole inflorescences (that is, the two separately mounted ones) are 4 times umbellate, with a set of subrays between the rays proper and the pedicels.

13. ***Tetraplasandra bisattenuata*** Sherff, Bot. Leaflet no. 6: 26. 1952.

Leaves 5- or 7-foliolate, ± 2 –2.5 dm. long; petiole 6–7 cm. long; leaflets fusiform in outline, their blade attenuate at both ends otherwise oblong, only 6–9 cm. long and 2.5–4.5 cm. wide; petiolules rather long (up to 3.5 cm.). Inflorescence similar to that of *Tetraplasandra waialealae*; peduncles (a single one seen) ± 8.5 cm. long; secondary branches 3.5–4 cm. (not “mm.” as erroneously printed in original description) long, about 4- or 5-flowered; pedicels about 1.5–1.8 cm. long; calyx (more or less cylindrically) obconic at anthesis, about 7–8 mm. tall and 4–5 mm. thick, presently 4- or 5-angled; corolla hemispheric-conic when shed, about 5.5 mm. tall and slightly broader. Petals about 6, stamens about 12–19.

Type: *Rev. John M. Lydgate*, 4–5 ft. tall, Hii Mountains, southeastern Kauai (Bish.).

Distribution: Known only from type locality in southeastern Kauai.

Specimens examined: *Lydgate*, 4–5 ft. tall, Hii Mts., Isl. Kauai (type, Bish., my photograph no. 4,195).

The type had been labeled *Tetraplasandra waialealae* Rock, but from that species it differs in its small, long-petiololed leaflets, which are gently attenuate or acuminate at both ends, also in the small calyces and doubtless small fruits.

14. ***Tetraplasandra meiandra*** (Hillebr.) Harms in Engler & Prantl, Pflanzenfam. III, 8: 30. 1898; *Heptapleurum* (?) *waiameae* Wawra, Flora 56: 159. 1873; *Triplasandra meiandra* and var. (?) Hillebr. Fl. Haw. Isls. 152. 1888; *Triplasandra waiameae* (Wawra) Heller, Minn. Bot. Studs. 1: 871. 1897.

For key to varieties, see general key, p. 59.

A small, glabrous tree up to ± 7 m. tall, branching from near base. Leaves 2–4.5 dm. long, petiole 4–9 cm. long and dilated-clasping at base; leaflets 7–13, blades 6–11 cm. long and 2–5 cm. wide, variously oblong or ovate or (especially for terminal ones) oblanceolate to obovate, at apex obtuse to subacute or acuminate, at base cuneately contracted or sometimes rounded, coriaceous and often glossy when dried, more or less reticulate-venulose with venation depressed above and salient below, lateral petiolules now (for type material) ± 3 mm. long now (for most material) 5–15 mm. long, terminal petiolule 1–3 cm. long and jointed near blade. Inflorescence thrice umbellate, sessile or on a short, stout rhachis; peduncles 3–5, often 1–2.5 dm. long, nodulose with 3–5 bract-scars, bearing at top an umbel of 12–21 rays (or 1–3 of these irregularly placed lower down on peduncles); rays angulate, straight or curved, 2–5 cm. long, mostly enodulate, with an umbellet of 8–12 florets at top, their pedicels slender to somewhat thickish, 6–14 mm. long. Bracts broadly ovate, 4–8 mm. long, caducous long before anthesis. Calyx obconic-cylindrical, with a short, repand-denticulate border. Petals 5–8, triangular-lanceolate. Stamens as many as petals and shorter. Ovary 2- rarely 3- celled. Drupe urceolate-cylindrical, compressed, calyx 10–11 mm. tall and 5–6 mm. thick, stigmas 2 or rarely 3, sessile on the broad, conical, exserted vertex, this about 3 mm. tall.

Type: *Heinrich Wawra* 1,638, western ridge of Nuuanu, southeastern Oahu (Mus. V.).¹

¹ Wawra (*loc. cit.*) cited Waiolani, Isl. Oahu, as the type locality. For the type locality I have followed, however, Hillebrand, who says: "Wawra's specific

Distribution: Island of Oahu, especially in the Koolau Range.

Specimens examined (all from Isl. Oahu): *Richard S. Cowan* 557, fruits red-tipped, alt. 2,000 ft., Halawa Valley ridge trail, Koolau Range, Mar. 2, 1947 (Bish.); *Otto Degener* 17,972, Waimano, June 9, 1935 (Mo.; N.Y.); *Degener* 17,978, forest, C.C.C. Trail, Aiea, Feb. 16, 1936 (N.Y.); *Degener, Salucop, & Arlantino* 11,820, open summit rain-forest, Aiea, Dec. 6, 1937 (Del.; Gray; Mo.; N.Y.; U.S.); *Faurie* 270 *pro parte*, Konahuanui, October, 1909 (Arn.; Bish.); *Faurie* 273, alt. 800 m., Waiandai, May, 1910 (Arn.); *Charles N. Forbes*, Konahuanui, Nov. 4, 1908 (Bish.); *Forbes*, Waiolani Ridge, Sept. 17, 1908 (Bish.); *Forbes* 1,034-O, Konahuanui, Jan. 16, 1909 (Bish.); *William Hillebrand*, Nuuanu (fragment of practically type material—see footnote—at Bish., my photograph no. 4,253); *Vaughan MacCaughey*, gulch slope, "table-land," Kaena, Mar. 27, 1915 (Bish.); *L. H. MacDaniels* 62, small tree 3 m. tall, alt. 700 m., Waipio-Waiawa Ridge, Oct. 6, 1926 (Bish.); *Mann & Brigham*, Konahuanui (Bish.); *Joseph F. Rock*, Punaluu Mountains, Aug. 23, 1908 (Bish.); *Rock* 8,722, Konahuanui, Jan. 8, 1910 (Bish., my photograph no. 4,254); *Rock & Shaw*, Olympus, October, 1912 (Bish.); *H. St. John* 20,215, tree 7 m. tall, trunk diam. 1 dm., moist woods, alt. 1,400 ft., Waimano Trail, Waimano, Mar. 23, 1941 (Bish.); *D. L. Topping* 2,968, Konahuanui, December, 1926 (Univ. Calif.).

This species is remarkable within the genus, indeed within the Hawaiian Araliaceae and perhaps as much so throughout the Hawaiian phanerogams, for the extreme amount of varietal diversification displayed. Hillebrand regarded it as a "collective species," and his view has been accepted here. Unfortunately, however, the materials for many of the recognizable varieties are so scanty as to make futile any attempt at phylogenetic alignments of the numerous varieties with reference to each other. Accordingly they are listed here in purely an alphabetical sequence.

In addition to the above cited specimens is one (*R. S. Cowan* 980, tree 7 m. tall, leaves thick, rigid, dark green above, Halawa Ridge Trail, Isl. Oahu, Apr. 25, 1948—Bish.) with slender subrays between rays and pedicels, as in *T. kaalae* var. *multiplex*. Florets are lacking, however, and the several drupes are too immature to place the specimens certainly with the *T. meindra* complex.

name is wrong; his specimens were collected during a joint excursion with the author upon the western ridge of Nuuanu, Oahu." Just why Wawra should have used the specific epithet *waimaeae*, pertaining to Waimea of far-northern Oahu, for a species that he himself attributed to Waiolani of southeastern Oahu, I do not know.

Tetraplasandra meiandra var. β . **bisobtusa** Sherff, Bot. Leaflet no. 6: 36. 1952; *Triplasarandra meiandra* var. γ . Hillebr. Fl. Haw. Isls. 152. 1888.

Tree 3.5–9 m. tall. Leaflets ± 11 , their blades 7.5–9 cm. long and 3–3.7 (–4.5) cm. wide, oblong, obtuse at both ends or narrowed at base, thick-chartaceous, the lateral ones on petiolules ± 3 mm. long. Inflorescence compound-umbellate; peduncles 5–11 cm. long, 15–25-flowered, pedicels 10–14 mm. long. Petals and stamens 5–8; stigmas 2 or 3, sessile.

Type: *William Hillebrand*, Kawaihae iuka (Kawaihae-Uka), North Kohala, Isl. Hawaii (formerly in herb. Hillebr., Berl.).

Distribution: Known only from type locality in North Kohala, Isl. Hawaii.

Specimens examined: *Hillebrand* 264, tree 30 ft. tall, Kohala Range, Isl. Hawaii (Bish.; Kew; topotypes or perhaps isotypes, my photograph no. 4,314).

Tetraplasandra meiandra var. γ . **Bryanii** Sherff, Bot. Leaflet no. 8: 10. 1953.

Leaves 7- or 9-foliolate, petiole slender, about 8–9 cm. long; leaflets coriaceous on upper surface (where also somewhat glossy and conspicuously venulose), ovate or oblong (terminal one subrhomboid to obovate), at apex more or less acuminate, at base scarcely or not at all oblique but widely or moderately cuneate, the blade 8.5–11 cm. long and 4–6.5 cm. wide; lateral petiolules 11–27 mm. long. Peduncles (only single, unattached ones seen) perhaps solitary, smoothish, few-nodate, 11–23 cm. long, at apex umbellately about 10–15-pedicelled; pedicels finally 2.2–3.2 cm. long, straightish or curved, erect or spreading-ascending, moderately slender (1–1.5 mm. thick). Florets not seen. Drupe ovoid-cylindric, compressed or three-angled; its calyx slenderly urceolate, 11–14 mm. tall and 6–8 mm. thick, the expanded limb conspicuous; stylopodium conic, 4–5 mm. tall including the 2 or more often 3 stigmas.

Type: *Edwin H. Bryan, Jr.*, 878, small tree 5–6 m. tall, in very wet rain-forest near the summit-ridge, alt. 2,150 ft., Kawaihoa, Isl. Oahu, Nov. 20, 1934 (Bish.).

Distribution: Northern Oahu.

Specimens examined: *Edwin H. Bryan, Jr.*, 878 (type, Bish., my photograph no. 4,357; isotype, U.S., my photograph no. 4,358).

Tetraplasandra meiandra var. δ . **Degeneri** Sherff, Bot. Leaflet no. 6: 27. 1952.

Tree, leaves ± 4 dm. long (including petiole, this ± 1 dm. long); leaflets up to 9 or 11, their slender petiolules mostly 8–10 mm. long; blades diversely oblong oval-oblong or oblong-obovate, coriaceous, at apex retuse or rounded, at base oblique and very broadly cuneate to rounded, now 7×4.7 cm. now 9×6.8 cm. now 12×5.5 cm. Inflorescence thrice umbellate, more or less verruculose; primary branches or peduncles ± 4 (apparently supported on a thick rhachis ± 2 cm. long), spreading, 9–14.5 cm. long and 3–6 mm. thick; secondary branches or rays numerous, even 18 or 21, slender, sharply angulate, 3–5.5 cm. long and 1–2 mm. thick; tertiary branches or pedicels more often 8–12, sharply angulate, 10–12 mm. long shortly before anthesis. Fruits and fully developed flowers not seen. Flowers close to anthesis small; calyx cylindric-prismatic, 6 mm. tall and about 3 mm. thick, at top very narrowly brownish-margined; corolla as yet unopened, conic, 4 mm. tall, petals 5, stamens 5.

Type: *Otto Degener* 18,021, in rain-forest, Kokee, northwestern Kauai, June 24, 1926 (N.Y.).

Distribution: Known only from type locality in northwestern Kauai.

Specimens examined: *Degener* 18,021 (type, N.Y., my photograph no. 4,215; isotype, Mo., my photograph no. 4,216).

The large inflorescence on the type spray measures 2.7 dm. in diameter. The abundance of rays or secondary branches and the diminutive size of the florets distinguish this handsome tree at once from the other Kauai members of the genus.

Tetraplasandra meiandra var. ϵ . **Hillebrandii** Sherff, Bot. Leaflet no. 6: 31. 1952.

Leaves 1.8–2.5 dm. long including the stoutish petiole (this 3.5–7.5 cm. long), leaflets 5–9; blades thick and coriaceous, conspicuously and depressedly reticulate-venulose above, broadly oblong-oval to subrotund, at apex rounded (sometimes even emarginate) to obtuse or rarely almost subacuminate, at base more or less oblique and abruptly contracted or at times widely cuneate, 4.5–11.5 cm. long and 3.5–8.5 cm. wide; petiolules stout, lateral ones 5–16 mm. long. Inflorescence thrice or at times twice umbellate, peduncles 1, or more often 3 or 4, frequently robust, smoothish,

angulate, 4–13 cm. long; rays 8–10(–19), sharply angulate, 6–12-flowered, 2.5–7 cm. long, devoid of nodal scars; pedicels finally slender, 6–12 mm. long; petals 5–7, about 4 mm. long; stamens 5–7. Drupes cylindrical, becoming prismatic on drying, 1.5 cm. long (including the broadly conic, almost 2 mm. tall stylopodium and 3 or 4 stigmas) and 5–7 mm. thick.

Type: *William Hillebrand*, Isl. Lanai, 1870 (Gray).

Distribution: Island of Lanai.

Specimens examined (all from Isl. Lanai): *Charles N. Forbes* 104-L, mountains near Koele, June, 1913 (Bish.); *Forbes* 199-L, same place and date (Bish.; U.S.); *Hillebrand*, Lanai, 1870 (type, Gray, my photograph no. 4,228: isotype fragment *ex herb. Hillebr. in Herb. Berol.*, Bish.); *George C. Munro*, Lanai (Bish.); *Munro*, Poomai, Apr. 18, 1914 (U.S.); *Munro* 199, Hookio Ridge, Sept. 28, 1913 (Bish.); *Emilio Ordoñez* (*Degener distrib. no.*) 12,988, Waialala Gulch, July 7, 1940 (Mo.; N.Y.; U.S.); *Joseph F. Rock* 8,015, Mahana ridge, Aug. 3, 1910 (Bish., my photograph no. 4,230); *Rock & Hammond* 8,015, alt. 2,600 ft., top of ridge leading to Haalelepakai, July 21, 1910 (Arn.; Gray, my photograph no. 4,229).

Hillebrand had determined his collection originally as representing a new species of *Triplasandra*, but later (*Fl. Haw. Isls.* 153. 1888) he treated it, along with Oahu and Molokai material, as constituting his *Triplasandra meiantra* var. δ .

***Tetraplasandra meiantra* var. ζ . hiloensis** Sherff, Bot. Leaflet no. 6: 34. 1952; *Triplasandra meiantra* var. ζ . Hillebr. *Fl. Haw. Isls.* 153. 1888.

Somewhat similar to var. *longipedunculata*, but leaflets larger, 10–15 cm. long. Inflorescence either twice or thrice umbellate, peduncles 10–17.5 cm. long, bearing at their apices an umbel of 15–20 pedicels or of rays each of which in turn bears an umbellet of pedicels; drupes ovoid-truncate, 1 cm. tall and 6–7 mm. thick, the 5, 4, or 6 stigmas on a slender stylopodium and reaching about 1 mm. above calyx-limb; pedicels finally 2–2.4 cm. long, slender, arcuate.

Type: *Rev. John M. Lydgate*, woods of Hilo, Isl. Hawaii (formerly in herb. Hillebr., Berl.).

Distribution: Hilo, northeastern Hawaii.

Specimens examined: *Lydgate*, woods of Hilo (Bish., one leaflet and one mature drupe from Hillebrand's type, formerly at Berlin).

C. N. Forbes 719-H (Bish.) lacks flowers and fruits but may belong to this variety. It was collected along a trail between Haleloulu and Wailuku River, South Hilo, Isl. Hawaii, June 5, 1915. The single leaf examined has a petiole 1.8 dm. long, a rhachis 2.7 dm. long (measured to joint of terminal petiolule), leaflets mostly obtuse at each end or broadly contracted below, blade 12–13 cm. long and 6–7 cm. wide.

***Tetraplasandra meiandra* var. η . *leptomera* Sherff, Bot. Leafl. no. 6: 30. 1952.**

Tree ± 9 m. tall, buds resinous; leaves delicate, ± 2.5 dm. long; leaflets 7–9 (–11), blades narrow-oblong to broadly oblanceolate (for terminal leaflet narrowly obovate), at apex rounded to obtuse or rarely subacute, more or less gradually narrowed below to a cuneate base, 8–10 cm. long and only 2–3 (for terminal leaflet –4) cm. wide, median nerve doubtless scarlet in fresh state; petiolules slender, 5–10 mm. long. Inflorescence thrice umbellate; peduncles 3 or 4, slender, angulate, irregularly scurfy, 8.5–10.5 cm. long; rays 15–23, glabrate, angulate, at anthesis ± 4.5 cm. long and 1–1.5 mm. thick, about 10-flowered; pedicels slender, at anthesis only 3–5 mm. long; petals narrowly lanceolate, 3–4 mm. long, outwardly reddish and inwardly greenish-white (according to Forbes), alternating with the 6 stamens. Drupes unknown.

Type: *Charles N. Forbes 1,930-M*, tree 30 ft. tall, buds gummy, petals reddish outside, greenish-white inside, stamens 6 and alternate with petals, 3 or 4 main peduncles . . . Lauman Forest, south slope of Haleakala, East Maui, Mar. 11, 1920 (U.S.).

Distribution: Known only from type locality in East Maui.

Specimens examined: *Forbes 1,930-M* (type, U.S., my photograph no. 4,239; isotype, Bish., my photograph no. 4,240).

***Tetraplasandra meiandra* var. θ . *longipedunculata* Skottsbo. Meddel. Göteb. Bot. Trädg. 15: 412. 1944; *Triplasandra meiandra* var. ϵ . Hillebr. Fl. Haw. Isl. 153. 1888; *Tetraplasandra meiandra* var. ϵ . Rock, Indig. Trees Haw. Isl. 347. 1913.**

Petiole 3.5–7 cm. long; leaflets (5–)7–9(–13); blades oblong to oblong-lanceolate or moderately oblong-obovate, apically rounded to subacuminate or even acuminate, basally oblique and mostly broad-cuneate, coriaceous, 6–9(–12) cm. long and 2.5–4.8(–6.5) cm. wide; petiolules 5–15 mm. long. Inflorescence once or twice umbellate; rhachis or scape rudimentary or lacking; peduncles solitary

or 2-6, elongate, 1-2.5 or even to 3.5 dm. long; pedicels 15-30, terminal, straightish to deflexed-ascending, 11-18 mm. long. Flower 5-8-merous, calyx about 5.5 mm. tall, limb manifest, its broadly subtriangular lobes apiculate and 1 mm. long; petals triangular, 4 mm. long, 2-3 mm. wide; stamens 5-8, filament 1.7 mm. long, anthers 1.5 mm. long and ± 0.85 mm. wide; stylopodium conic, 1.5 mm. tall, stigmas 3-5 but mostly 4, or very rarely all or a few 2 (see discussion below), sessile. Drupe subovoid-prismatic to elongate-urceolate-prismatic, 3-5-angled, round-grooved between angles, calyx 9-10 mm. (in type) to 14 or even 16 mm. tall, its border often crenulate and conspicuously expanded, stylopodium broadly pyramidal, 2-3 mm. tall including stigmas.

Type: *William Hillebrand & Rev. John M. Lydgate*, Niu, southeasternmost Oahu (formerly in herb. Hillebr. in Berl.).

Distribution: Throughout the Koolau Range, Isl. Oahu.

Specimens examined (all from Isl. Oahu): *Richard S. Cowan* 30, Waikane-Schofield Trail, Koolau Range, Sept. 22, 1946 (Bish.); *Cowan* 504, lower side of trail, moist slope, Kaunala-Waimea, Koolau Range, Feb. 9, 1947 (Bish.); *Cowan* 711, tree 5 m. tall, alt. 1,500 ft., near trail, Kipapa Gulch, Oct. 5, 1947 (Bish., forma with longer drupes and 2 stigmas, my photograph no. 4,226); *Cowan* 745, tree 6 m. tall, fruits reddish-brown, Anahulu Trail, Kawailoa, Koolau Range, Nov. 30, 1946 (Bish.); *Cowan* 963, leaves thick-coriaceous, dark-green, glossy, Halawa Ridge Trail, Koolau Range, Apr. 25, 1948 (Bish., the dried leaflets dull, pale-green, and sub-chartaceous); *Otto Degener*, rainy summit, Pig-God Trail, May 31, 1931 (N.Y.); *Degener* 17,791 *p. p.*, shrubby rain-forest, along summit-divide toward east of Pupukea-Kahuku Trail, Dec. 6, 1931 (N.Y.); *Degener* 17,977, Pig-God Trail, Punaluu, July 4, 1935 (N.Y.); *Degener* 18,243, windy, rainy top of ridge north of South Halawa Gulch, Apr. 17, 1932 (N.Y.); *Degener* 18,249 *p. p.*, rain-forest at summit-divide toward east of trail, Pupukea-Kahuku, Dec. 6, 1931 (N.Y.); *Degener* 18,250, directly mauka of Kawela Bay, forest, Apr. 2, 1933 (Mo.); *Degener & Clarence Nihei* 20,222, single large tree in rain-forest at 2,200 ft., Waialae Nui Ridge (U.S.); *C. N. Forbes*, mountains between Punaluu and Kaipapau, Nov. 14-21, 1908 (Bish.); *Forbes* 2,210-O, Headgate trail, Wahiawa, Aug. 17-20, 1915 (Bish.); *Forbes* 2,215-O, Wahiawa-Kahana trail, Aug. 17-20, 1915 (Bish.); *Hillebrand & Lydgate*, Niu (Bish., leaf and fruiting peduncle from type collection in Berl., my

photograph no. 4,257); *Edward Y. Hosaka* 613, tree 20 ft. tall, on denuded ridge, alt. 2,000 ft., south ridge, Kipapa Gulch, July 4, 1932 (Bish.); *Hosaka* 956 *p. p.*, 20 ft. tree, wooded slope, alt. 1,600 ft., Kipapa Gulch, Apr. 2, 1933 (Bish.); *Joseph F. Rock*, main ridge, Punaluu Mts., Nov. 14–21, 1908 (Gray); *Rock* 188, Oahu (Arn.); *Rock* 191, Punaluu Mts., August, 1908 (Bish.); *Rock* 1,307, same place, Feb. 5, 1909 (Bish., forma approaching var. γ . *Bryanii*); *Rock* 8,826, shrub 6 ft. tall, on the ridge leading to Hauula, Punaluu-Hauula, Koolau Mts., August, 1911 (Arn.; Bish.; Gray, 2 sheets, my photograph no. 4,256); *Rock* 8,832, small shrub, Punaluu, Koolau Mts., trail to Punaluu Camp, August, 1911 (Bish.; Gray); *Rock & C. N. Forbes*, top of main ridge, Punaluu Mts., Nov. 14–21, 1908 (Arn.; Gray); *Harold Saint-John* 10,579, shrubby tree, "stigmas 2, stamens 5," alt. 2,300 ft., narrow divide, Punaluu-Kaluanui, Sept. 28, 1930 (Bish., where stigmas are 3; Par.; Univ. Calif., where stigmas are 2–5; U.S.); *Olof H. Selling* 3,631, Punaluu, Koolau Mts., Sept. 27, 1938 (Bish.; Goth., my photograph no. 4,180; cited by Skottsberg for var. *longipedunculata*); *Carl Skottsberg* 1,862, alt. 700–750 m., ridges above Kahana Bay, Sept. 17, 1926 (Bish.); *Amy Suehiro*, alt. 2,400 ft., near main divide, Waikane-Schofield Trail, Oct. 16, 1932 (Bish.); *Suehiro*, 10 ft. off trail, alt. 3,000 ft., Kaipapau, Oct. 15, 1933 (Bish., stigmas mostly 3, less often 2).

Skottsberg seems to have seen only the collection by Selling. His designation of *longipedunculata* as a "*nov. nom.*," followed immediately by "*Syn. Var. ϵ . Hillebr. p. 153,*" places the type, however, as the Niu specimen originally cited by Hillebrand. The Niu specimen was in Hillebrand's private herbarium, which later went into the Berlin Herbarium, which was destroyed recently by war. It appears, however, that the *type collection* was obtained jointly by Hillebrand and Lydgate. Fortunately, Lydgate's own specimen (now before me) was preserved at Bishop Museum and remains today to typify the variety.

The type locality for this variety, Niu, and that for var. *meiandra*, Nuuanu, are both in southeasternmost Oahu and only about 10 km. apart. Typically, var. *meiandra* differs in its thrice compound umbels, these with rays between the peduncles and pedicels, also in its normally 2, not 3–5, stigmas. However, occasionally material of var. *longipedunculata* occurs with but 2 stigmas for some or all of the flowers and fruits (*e.g.*, *Cowan* 711; *St. John* 10,579; *Suehiro*, Kaipapau), thus displaying a partial approach toward var. *meiandra*.

Tetraplasandra meiandra var. *ι. makalehana* Sherff, Bot. Leaflet no. 6: 36. 1952; *Triplasandra meiandra* var. *β.* Hillebr. Fl. Haw. Isls. 152. 1888.

Tree ± 4.5 m. tall, trunk ± 2 dm. thick; leaflets 7-9; blades ovate to oblong, at apex obtuse to barely acuminate, at base rounded or cuneately contracted, coriaceous to chartaceous, 10-17.5 cm. long and 5-7.5 cm. wide; petiole 6.5-8.5 cm. long; petiolules of lateral leaflets 4-10 mm. long. Inflorescence thrice (more rarely unipedunculate and then twice) umbellate, peduncles ± 2 (at times 5 and standing on an elongate rhachis according to Hillebrand), slender, 6-8 cm. long; rays 8-14, smooth, about 2.5-4 cm. long, 8-14-flowered; pedicels slender, 7-11 mm. long; bracts 4 mm. long. Petals and stamens 5, stigmas now 2 now 3, stylopodium depressed-conic and short; drupe ovoid and compressed or trigonous, about 8 mm. tall.

Type: *William H. Hatheway* 209, tree 15 ft. tall, trunk 8 inches in diameter, base of fruit green, its tip scarlet, pollination by bees, on dry, sunny slope . . . alt. 1,200 ft., east side, Makaleha Stream, Isl. Oahu, Aug. 21, 1950 (Chi.).

Distribution: Known only from type locality in northwestern Oahu.

Specimens examined: *Hatheway* 209 (type, Chi., my photograph no. 4,275; isotype, Gray, my photograph no. 4,276); *Joseph F. Rock* 17,053, Makaleha Ridge, Isl. Oahu, April, 1918 (topotype, Bish.); *Rock* 17,155, right ridge of Makaleha, May 4, 1918 (topotype, Bish.).

The large leaflets are especially noteworthy for this variety.

Tetraplasandra meiandra var. *κ. mauiensis* Sherff, Bot. Leaflet no. 6: 29. 1952.

Leaves large, 3-4 dm. long including the 5-8 cm. long petiole; leaflets 5-9; blades variously elliptic-oblong to ovate or subcuneate-obovate, at apex obtuse to rounded or slightly emarginate, at base oblique and cuneately contracted, up to 13.5 cm. long and to 7.2 cm. wide, median vein scarlet beneath; petiolules rather elongate, 1-2.5 cm. long. Inflorescence sessile or subsessile, thrice umbellate, more or less scurfy; peduncles 3-6, often robust, 8-15 cm. long, subcompressed; rays 10-25 (at times 1-3 arising lower down on peduncle), sharply angulate, 5-10 cm. long, commonly 10-20-flowered; pedicels 5-9 mm. long; petals 3.5-4 mm. long. Drupes cylindrical, about 11 mm. long including the hemispherical stylopodium (this about 2.5 mm. tall) and about 5 mm. thick; stigmas 3 or 4, small.

Type: *Joseph F. Rock* 8,666, lava fields, Auahi (Auwahi), East Maui, November, 1910 (Gray).

Distribution: Known only from East Maui.

Specimens examined (all from East Maui): *Charles N. Forbes* 1,713-*M*, large tree 35 ft. tall, trunk 1+ ft. in diameter, peduncles 5 or 6, rays 15-23 (occasionally 1-3 below), pedicels 13, leaflets 11 or 10, their midrib crimson beneath, ridge, left-hand side of Kipahulu, above the waterfall, Nov. 26, 1919 (Bish.); *Forbes* 1,726-*M*, large tree, 25-30 ft. tall, trunk diameter 3 ft., above Mokulau Landing, Dec. 7, 1919 (Bish.); *Forbes* 2,051-*M*, south slope of Haleakala, Mar. 20, 1920 (topotypes, Bish.; U.S.); *George C. Munro* 401, Auhi (Auwahi) or Ulupalakua, Feb. 12, 1915 (Bish.); *Rock* 8,666 (type, Gray, my photograph no. 4,233: isotypes, Arn., 2 sheets; Bish., my photograph no. 4,234; Gray, my photograph no. 4,236; U.S., my photograph no. 4,235); *Rock* 12,506, lava fields, Auwahi, March, 1912 (Bish.).

This variety is the one illustrated by *Rock* (*Indig. Trees Haw. Isls. pl.* 138. 1913) for an "Auahi" (Auwahi) tree of *T. meiantra* var. δ ., growing at an elevation of 3,000 ft., and with trunk diameter of 2 ft. An isotype at Gray Herbarium has a glaucous hue to portions of the leaflets' upper surface. Definitely distinctive of the variety, however, seem to be the large leaves and leaflets (the latter with basally more cuneately contracted blade and with their median nerve crimson beneath when fresh and at times even when dry), the elongate petiolules, and the more elongate rays.

***Tetraplasandra meiantra* var. λ . *molokaiensis* Skotts.** *Meddel. Göteb. Bot. Trädg.* 15: 412. 1944; *Tetraplasandra meiantra* var. δ . *Hillebr. Fl. Haw. Isls.* 152. 1888.

Skottsberg's varietal epithet *molokaiensis* technically rests upon *T. meiantra* var. δ . Hillebr. (see discussion below under var. *Skottsbergii*). Hillebrand's description of the var. δ . is a generalized or composite one drawn evidently from varietally unlike *taxa* native severally to the islands of Oahu, Molokai, and Lanai. His herbarium perished with the destruction of the great Berlin Herbarium in World War II, hence his cited material is no longer extant. His first locality cited was Wailupe of far southeastern Oahu, which must be taken as the type locality. To date, however, I have found no specimens from Wailupe or vicinity that would seem to represent the var. δ . and so permit a fresh and exclusive description to be drawn (as apart from his Molokai material—my var. *polyantha*—

and his Lanai material—my var. *Hillebrandii*). In the absence of such a description, it is of course impossible for the present to assign its equivalent, *i.e.*, var. *molokaiensis*, to its proper place in the analytical key to the numerous varieties of *T. meiandra*.

***Tetraplasandra meiandra* var. μ . *occidentalis* Skottsbo.**
Meddel. Göteb. Bot. Trädg. 15: 413. 1944.

Small tree. Petiole 6–7.5 cm. long. Leaflets 3–5 or more commonly 7; blades oval-elliptic to oval-oblong, at apex rounded to acute, at base mostly oblique and more or less broad-cuneately contracted, 4–8 cm. long and 2–4 cm. wide, smoothish; petiolules 5–13 mm. long. Peduncles (solitary so far as known) 3.5–9.5 cm. long; rays 5–8, about 2.5–5 cm. long, 6–8(–10)-flowered; pedicels 8–12 mm. long. Flower 5- or 6-merous, 12–13 mm. long. Calyx cylindrical-campanulate, 7 mm. tall, about 3 mm. thick, its limb subentire; petals narrowly triangular, reddish-violet, 6 mm. long, 2.5–3 mm. wide; stamens 5 or 6, filament 4 mm. long, the strongly curved anthers about 2.2 mm. long and 1.3 mm. wide; stylopodium broadly conic, 1.5–1.7 mm. wide; stigmas 3 or 4, sessile. Drupe unknown.

Type: *Cranwell, Selling & Skottsberg* 2,675 (misprinted 2,695 originally but corrected in Skottsbo. *loc. cit.* p. 518), alt. about 1,400 m., headwaters of Honokahua Stream, near Nakalalua, West Maui, July 26, 1938 (Goth.).

Distribution: Summit of Puu Kukui and northwestward along headwaters of Honokahua Stream, West Maui.

Specimens examined (all from West Maui): *Albert S. Hitchcock* 14,824, upper forest, alt. 3,000–5,000 ft., Puu Kukui, Sept. 24–26, 1916 (U.S.); *Skottsberg* 781 (misprinted 785 in Skottsberg's text), Puu Kukui, Oct. 9, 1922 (Bish.; Goth., my photograph no. 4,181); *Cranwell, Selling, & Skottsberg* 2,675 (type, Goth., my photograph no. 4,178: isotype, Bish.); *Selling* 3,879, between Nakalalua and summit of Puu Kukui, July 28, 1938 (Bish.; Goth., my photograph no. 4,179).

***Tetraplasandra meiandra* var. ν . *olowaluana* Sherff, Bot. Leaf. no. 6: 37. 1952.**

As to foliage more or less similar to var. *ramosior*, but with leaflets at times more acuminate or more rounded at apex. Inflorescence thrice umbellate (rhachis absent); peduncles ± 3 , elongate, more often 1–1.5 dm. long, 8–15-radiate; rays angulate, 3–6

cm. long, 8–15-flowered; pedicels slender, 5–8 mm. long. Drupes globose-cubical or shortly (*breviter*) trigonous-prismatic, calyx about 6 mm. tall and about as thick, stylopodium conic and ± 1.6 mm. tall, stigmas now 3 now 4.

Type: *Charles N. Forbes* 2,276-*M*, tree 30 ft. tall, one seen in gully far up, Olowalu Valley, West Maui, May 9, 1920 (Bish.).

Distribution: Known only from type locality in West Maui.

Specimens examined (all from West Maui): *Otto Degener* 2,315, rain-forest, near summit of Mt. Eke, Aug. 29, 1927 (Bish.; Mo., 2 sheets; N.Y., 2 sheets); *Charles N. Forbes* 422-*M*, Honokahau Drainage Basin, Sept. 25–Oct. 17, 1917 (Bish.); *Forbes* 2,276-*M*, Olowalu Valley, May 9, 1920 (type, Bish., my photograph no. 4,278); *Forbes* 2,313-*M*, ridge, left-hand side, Olowalu Valley, May 10, 1920 (topotype, U.S., my photograph no. 4,279); *Joseph F. Rock* 8,207, dense forest on the Honokawai (Honokowai) ridge leading to summit of Puu Kukui, Aug. 23, 1910 (Arn.; Gray); *Rock* 16,009, Mt. Eke, September, 1918 (Bish.); *Harold St. John* 10,231, tree 25 ft. tall, wooded ridge, alt. 4,000 ft., Haelaau, above Honokowai, Feb. 6, 1930 (Bish.; N.Y.); *R. L. Wilbur & G. L. Webster* 835, 1.5 m. shrub, rain-forest at edge of bog, alt. 4,500 ft., Puu Kukui, June 23 & 26, 1948 (Bish.); *Wilbur & Webster* 863, rain-forest, alt. 3,000 ft., Puu Kukui, June 28, 1948 (Bish.); *Wilbur & Webster* 890, 5 m. tree, "stamen 5–8," rain-forest, alt. 3,000 ft., Puu Kukui, June 29, 1948 (U.S.).

***Tetraplasandra meiandra* var. ξ . *ovalis* Sherff, Bot. Leaflet no. 6: 31. 1952.**

Leaves ± 3.3 dm. long, petiole 4.5–9 cm. long; leaflets 9–11, blade commonly oblong- or elliptic-oval, at apex obtuse or rounded, at base oblique and more or less wide-cuneately narrowed, smooth and obscurely or moderately venulose, 6–11 cm. long and 3.2–6.2 cm. wide; petiolule slenderish, 5–8 or even –17 mm. long. Inflorescence thrice umbellate; peduncles ± 3 , robust to subrobust, subangulate, scurfy, 6.5–14 cm. long; rays ± 20 –22, sharply angulate, finally 3–5.2 cm. long, about 9–14-flowered; pedicels slender, finally 7–11 mm. long; petals moderately to broadly or even deltoïdly lanceolate, about 3.5–4 mm. long. Drupes (only immature ones known) urceolate, about 7 mm. tall including the narrowly conic stylopodium and the usually 4 stigmas, about 6 mm. thick.

Type: *Joseph F. Rock* 8,582, Waikamoi Trail, Olinda, September, 1910 (Gray).

Distribution: East Maui.

Specimens examined (all from East Maui): *Otto Degener*, Pipe-Line Trail, Olinda, north-central East Maui, June 16, 1927 (topotype, N.Y., my photograph no. 4,238); *Degener*, same place, July 16, 1927 (N.Y.); *Degener (& Wiebke)* 2,317, rain-forest, ditch-trail, Olinda, June 16, 1927 (topotypes, N.Y., 2 sheets, my photograph no. 4,237); *Degener* 17,788 *pro parte* (this number used by Degener also for another plant, referable to *T. hawaiiensis* var. *microcarpa*, *qu. vide*), Pipe-Line Trail, Olinda, June 16, 1927 (Mo.; N.Y.); *Rock* 8,582 (type, Gray, my photograph no. 4,246: isotype, Bish., my photograph no. 4,247); *Rock* 10,070, Kailua, trail to Honomanu, October, 1910 (Bish.).

***Tetraplasandra meiandra* var. *o. polyantha* Sherff, Bot. Leaflet no. 6: 28. 1952.**

Petiole 6–8 cm. long; leaflets 5–9, blade oblanceolate or narrowly to moderately obovate to elliptic-rectangular, at apex obtuse to rounded or more rarely truncate or very rarely emarginate, at base oblique and cuneate-contracted to rounded, 5.5–10.5 cm. long and 3–5.6 cm. wide, petiolule 4–10 mm. long. Inflorescence more or less scurfy, thrice umbellate; peduncles ± 3 , about 8–12 cm. long, robust, compressed; rays now ± 12 now (for the same specimen) ± 24 , sharply angulate and more or less compressed, 3–4.7 cm. long, 8–18-flowered, at times one or two placed lower down; pedicels slender, at anthesis 4–7 mm. long; petals 4–5 mm. long. Drupes unknown.

Type: *Otto Degener* 17,795, rain-forest, near Pepeopae Bog, Apr. 23, 1928 (N.Y.).

Distribution: Eastern Molokai.

Specimens examined (all from eastern Molokai): *Otto Degener*, west of Pepeopae, Apr. 12, 1928 (topotype, N.Y.); *Degener*, southeast of Pepeopae Bog, May 9, 1928 (topotype, N.Y.); *Degener* 17,793, rain-forest, west of Pepeopae, Apr. 12, 1928 (topotypes, Mo.; N.Y.) *Degener* 17,795, (type, N.Y., my photograph no. 4,231: isotype, N.Y., my photograph no. 4,232); *Degener* 18,018, rain-forest, west of Pepeopae, Apr. 12, 1928 (topotype, N.Y.); *Degener* 18,019, rain-forest, vicinity of Pepeopae Bog, Apr. 23, 1928 (topotypes, Mo.; N.Y.); *Abbé Urbain Faurie* 271, alt. 600 m., Pukoo, May, 1910 (Arn.; Par.); *Joseph F. Rock* 6,175, edge of gulch above Kamoku, Mar. 21, 1910 (Gray; U.S.).

Hillebrand's material from Maunahui, within 5 km. of the Pepeopae Bog, was included by him, as stated below under var. *Skottsbergii*, in his *Triplasandra meiandra* var. δ ., called by later writers *Tetraplasandra meiandra* var. δ . His Maunahui specimen in the Berlin Herbarium was destroyed in World War II, but doubtless was the present variety.

***Tetraplasandra meiandra* var. π . *polystigmata* Sherff, Bot. Leaflet no. 7: 9. 1952.**

Leaves up to 3.5 dm. long, petiole 7–11.5 cm. long; petiolules (5–)10–20 mm. long; blades of leaflets oval-oblong to oblong or ovate, at apex truncate or truncate-emarginate to rounded or subacute or even subacuminate, at base oblique and truncate to rounded, coriaceous, on upper surface reticulately depressed-venulose, 6–12.5 cm. long and 4–7 cm. wide. Inflorescence sessile, thrice umbellate, peduncles ± 5 , ± 11 cm. long, slender; rays 10–20, all terminal or 1–3 placed lower down on peduncle, ± 3.5 cm. long; pedicels about 6–8, slender, finally 1–1.5 cm. long. Drupes globose or urceolate-ovoid, their calyx about 7–8 mm. long, their apex exerted-conic and 2–3 mm. long including the 5 or at times 6 stigmas.

Type: *Joseph F. Rock* 12,508, Honomanu trail, Haleakala, East Maui, May, 1911 (Gray).

Distribution: East Maui.

Specimens examined (East Maui): *Otto Degener* 17,785, Opuola Stream in vicinity of ditch trail, July 7, 1927 (topotype, N.Y.); *Degener* 17,786, forest, Pipe-Line Trail, Olinda, July 16, 1927 (N.Y., my photograph no. 4,288); *Joseph F. Rock* 12,508 (type Gray, my photograph no. 4,286: isotype, Bish.); *Carl Skottsberg* 878, Kula Pipe Line, Haleakala, alt. about 1,200 m., Oct. 18, 1922 (Bish., my photograph no. 4,287).

Closely allied to the var. *ovalis* of the same region but having larger and mostly more veiny leaflets, commonly 5 or 6 not 4 stigmas, 6–8 rather than 9–14 florets to an umbellet, etc.

***Tetraplasandra meiandra* var. ρ . *prolifera* Sherff, Bot. Leaflet no. 6: 32. 1952.**

Leaves ± 3.5 dm. long, more often 9–13-foliolate; leaflets on a petiolule 4–5 or more often –10 mm. long; blade oblong or oblong-oval or at times oblanceolate-obovate, at apex obtuse or rounded and sometime emarginate, at base oblique and rounded or wide-

cuneately narrowed, up to 12 cm. long and to 5.5 cm. wide, veinlets scarcely reticulate or conspicuous on upper surface but without doubt often crimson in the living state; inflorescence sessile, thrice umbellate; peduncles ± 3 , subrobust, smoothish, angulate, 3.5–7 cm. long; rays 8–15, umbellately or at times subumbellately clustered, angulate, smooth, 3–5 cm. long, about 12–18-flowered; pedicels finally 8–12 mm. long; petals not seen; drupes ovoid, their calyx about 9 mm. tall and thick, stylopodium hemispherical (about 6 mm. broad and 3–3.5 mm. tall, its apex contracted into a short and slender style), stigmas 2.

Type: *Joseph F. Rock* 12,509, Puuwaawaa, Isl. Hawaii, February, 1912 (Bish.).

Distribution: Known only from type locality in northwestern Hawaii.

Specimens examined (all from Isl. Hawaii): *Rock*, Puuwaawaa, August, 1917 (topotype, Bish.); *Rock* 3,857, same place, June 17, 1909 (topotype, Bish.); *Rock* 12,509 (type, Bish., my photograph no. 4,241: isotype, Gray, my photograph no. 4,242).

The shape and dimensions of the mature fruit are described from a Forbes specimen, a forma with the leaflets slightly narrower and apically less rounded, also somewhat more clearly reticulate-venulose and lacking the reddish hue of the type's principal veins.

***Tetraplasandra meiandra* var. *s. prolificoides* Sherff, Bot. Leaflet no. 6: 33. 1952.**

Tree ± 9 m. tall, very similar to the var. *prolifera* but with leaflets a little smaller and proportionately wider, the veinlets somewhat more conspicuous, petiolule a little shorter, pedicels only 4–6 mm. long, the umbellets hence more compact.

Type: *Joseph F. Rock* 3,855, woods back of Puuwaawaa, Isl. Hawaii, June 17, 1909 (Gray).

Distribution: Known only from Puuwaawaa and vicinity, northwestern Hawaii.

Specimens examined (all from Isl. Hawaii): *G. O. Fagerlund & A. L. Mitchell* 945, tree 30 ft. tall, Waiho, Puuwaawaa, Nov. 21, 1944 (Bish.); *Rock* 3,855 (type, Gray, my photograph no. 4,243); *Rock* 3,858, Puuwaawaa, June 16, 1909 (topotype, Gray.)

***Tetraplasandra meiandra* var. *τ. ramosior* Sherff, Bot. Leaflet no. 6: 36. 1952.**

Tree ± 6 m. tall, leaflets 9–11; blades narrowly oblong to oval or (of terminal leaflet) obovate, coriaceous, at apex subacuminate, at base cuneately contracted, 7–12 cm. long and 2.5–4.8 cm. wide, on upper surface more or less depressed-reticulate-venulose; petiolules elongate, 1–3 cm. long, petiole 7–9 cm. long. Inflorescence on a rhachis, this ± 1 dm. long; peduncles about 6–9, about 4.5–6 cm. long, ± 8 -radiate; rays compressed or angulate, 1.5–3.5 cm. long, ± 7 –10-flowered; pedicels slender, 6–9 mm. long. Petals and stamens not seen; immature drupes urceolate-cylindric, their calyx about 6 mm. tall and 4 mm. thick, stylopodium conic and about 2 mm. tall including the commonly 5 rarely 4 stigmas.

Type: *G. R. Ewart, III*, & *G. C. Munro* 129, growing 6 m. tall, alt. 3,900 ft., Haelaau-Puu Kukui trail, West Maui, Dec. 18, 1928 (Bish.).

Distribution: West Maui.

Specimens examined (West Maui): *G. R. Ewart, III*, no. 100, alt. 3,900 ft., in rain-forest, Haelaau, Dec. 19, 1928 (topotype, Bish., my photograph no. 4,282); *Ewart & Munro* 129 (type, Bish., my photograph no. 4,281).

The presence of a rhachis supporting the inflorescence is exceptional in *T. meiandra* (but cf. quotation from Hillebrand under var. *makalehana*).

***Tetraplasandra meiandra* var. *v. rhynchocarpa* Sherff, Bot. Leaf. no. 6: 33. 1952.**

Large tree, up to 18 m. tall. Leaves ± 3.5 dm. long; leaflets ± 9 , their blades oblong or more rarely ovate or subobovate, at both ends obtuse or at the oblique base rounded or more rarely subtruncate, 6–12(–15) cm. long and 3.5–5.5(–6.8) cm. wide; petiolules slender, 3–8 mm. long. Inflorescence twice or possibly thrice compound; peduncles (a single one seen) ± 10.5 cm. long, somewhat scurfy, compressed, about 5 mm. thick; rays umbellate, 9+, subglabrate, angulate, 5.5–6.7 cm. long and 2–3 mm. thick, ± 10 -flowered; pedicels finally 8–15 mm. long, scarcely slender; petals not seen; drupes elongately cylindric-prismatic, their calyx finally 12–14 mm. long and 5–6 mm. thick, topped by a conic, elongate, snout-like stylopodium, this 3–4 mm. tall including the 3 or 4 stigmas.

Type: *Joseph F. Rock* 12,993, Kilauea Volcano Forest Reserve, Isl. Hawaii, August, 1917 (Bish.).

Distribution: Southeastern Hawaii.

Specimens examined (Isl. Hawaii): *Otto Degener* 17,790, in jungle, between Glenwood and 29 Miles, June 24, 1929 (N.Y.); *Degener* 18,252, same place and date (Mo.; N.Y.); *Degener & Wiebke* 2,184, wet jungle, between Glenwood and Kilauea, July 27, 1926 (topotypes, Mo., 2 sheets; N.Y., 3 sheets; U.S.); *Rock*, Kilauea Volcano, December, 1914 (topotype, Bish.); *Rock*, a large tree 50–60 ft. tall, near 29 Miles Forest, August, 1917 (Bish.); *Rock* 12,993 (type, Bish., my photograph no. 4,251).

***Tetraplasandra meiandra* var. *v'*. *rhynchocarpoides* Deg. & Sherff** *ex* Sherff, Bot. Leaflet no. 7: 8. 1952.

Tree ± 9 m. tall, very similar in its leaves to var. *v. rhynchocarpa*. Inflorescence sessile, thrice umbellate; peduncles ± 5 , more or less robust, 6–12 cm. long; rays ± 22 , all placed at or one or two placed 1–3 cm. below tip of peduncle, 1–1.5 mm. thick, 3–7 cm. long, at tip 12–20-flowered; pedicels slender, finally 9–13 mm. long, straight or at times somewhat arcuate. Submature drupes deltoid-ovate in side view, basally truncate; calyx about 5.5 mm. tall and toward base about 0.5 mm. thick; stylopodium conic, elongate and snout-like, about 3.5 mm. long including the 3 or 4 stigmas.

Type: *Otto Degener* 21,787, tree 30 ft. tall, overtopping forest at alt. 2,000 ft., Kulani Prison Road, Isl. Hawaii, Feb. 5, 1952 (Chi.).

Distribution: Southeastern Hawaii.

Specimens examined: *Degener* 21,787 (type, Chi., my photograph no. 4,303; isotypes, Berl.; Bish.; Del.; Gray; Kew; Mo.; N.Y.; Par.; Phila.; U.S.); *Fagerlind & Skottsberg* 6,298, alt. about 6,000 ft., woods near clearing (watering place), Kulani forest, Isl. Hawaii, Feb. 8, 1948 (Stockh.).

A sister variety to var. *rhynchocarpa* (likewise of southeastern Hawaii). It differs, however, in having more numerous (± 22 , not ± 9), slender (1–1.5 mm., not 2–3 mm. thick) rays, slender not thickish pedicels, these 12–20 not ± 10 in an umbellet, and drupes much smaller, their calycular portion ± 5.5 mm. not 12–14 mm. tall.

***Tetraplasandra meiandra* var. *phi*. *Rockii* Sherff**, Bot. Leaflet no. 6: 33. 1952.

Leaves ± 3.5 dm. long; leaflets 7–13, petiole 5–10 cm. long; blades thicker and more coriaceous, oblong or at times subovate or subobovate, at both ends obtuse or rounded, at base oblique, commonly depressed- and reticulate-venulose above, 7–11 cm. long

and 4–6.5 cm. wide; petiolules 4–12 mm. long, now narrow now broader. Inflorescence thrice umbellate; peduncles about 5, robust, compressed, rugose, 5–9.5 cm. long; rays 5–16, angulate, somewhat scurfy, more often 3–6 cm. long, 5–12-flowered; pedicels thick, 5–8 mm. long; petals not seen; drupes cylindric-ovoid, 11–12 mm. tall (including the short, depressed-hemispherical stylopodium and the 3 or 4 stigmas) and about 7 mm. thick.

Type: *Joseph F. Rock* 10,006, alt. 3,000 ft., woods of Naalehu, Kau, Jan. 9, 1912 (Gray).

Distribution: Known only from type locality in southernmost Hawaii.

Specimens examined: *Rock* 10,006 (type, Gray, my photographs no. 4,248 and 4,249: isotypes, Arn.; Bish., my photograph no. 4,250; Gray, 2 sheets).

Rock (*Indig. Trees Haw. Isl.* 349, *pl.* 139. 1913) gave a short description and an excellent illustration of this tree, which he referred to *Tetraplasandra meiandra* var. ζ . The type of *T. meiandra* var. ζ . (var. ζ . *hiloensis* of this text) came, however, from the woods of Hilo, northeastern Hawaii, and had peduncles 10–17.8 cm. long, fruiting pedicels very slender and elongate (*Hillebrand* gave the length as 10–12 lines, and the fragment of his type from Berlin at Bishop Museum has a pedicel 22 mm. long!), and 4–6 stigmas on a short, slender stylopodium resting upon the truncate or slightly depressed apex of the drupe, this surrounded by the conspicuous brownish border of the calyx-limb.

***Tetraplasandra meiandra* var. χ . *simulans* Sherff, Bot. Leaflet no. 6: 35. 1952.**

Leaves ± 3.5 dm. long, petiole elongate (11–13.5 cm. long), leaflets few (± 7); their blades somewhat narrowly oblong to oblong-obovate, at apex more often subabruptly contracted and shortly acuminate or rarely rounded or even emarginate, at base rounded or wide-cuneately narrowed, not conspicuously reticulate-venulose, sometimes apparently glaucous above, 10–13.5 cm. long and 4–6.4 cm. wide; petioles 6–16 mm. long. Inflorescence normally sessile and only twice umbellate; peduncles 3 or 4, more often elongate and even 12–18 cm. long, compressed and subangulate; rays lacking; pedicels very numerous (up to ± 30), more elongate, after anthesis 22–25 mm. long and only 0.5–1 mm. thick; petals 6 or 7, ± 6.5 mm. long; mature drupes unknown; very immature drupes obconic-cylindrical, calyx about 6 mm. tall and 3 mm. thick, stylopodium conic and much compressed, ± 2 mm. tall including the 2 stigmas.

Type: *Joseph F. Rock* 8,429, Awini, Kohala, northwesternmost Hawaii, June, 1910 (Bish.).

Distribution: Northwesternmost Hawaii.

Specimens examined: *Rock* 8,429 (type, Bish., my photograph no. 4,244: isotypes, Arn.; Bish., my photograph no. 4,245; Gray; U.S.).

In its lack of rays between peduncles and pedicels, also in its large number of pedicels, this variety simulates the otherwise quite different *T. kohalae* Skottsbo., the type locality of which is only a few kilometers to the southeast of Awini. Besides these two characters, the peduncular length, the acutish tips of most of the leaflets, the elongate petioles, and the small number of leaflets for such large leaves, combine to distinguish the var. *simulans* easily from all others on the Island of Hawaii. Indeed, were it not for the multiplicity of connecting intermediate or overlapping varieties known in the great *T. meandra* complex, var. *simulans* might seem better segregated as a distinct species.

***Tetraplasandra meandra* var. ψ . *Skottsbergii* Sherff, Bot. Leaflet no. 6: 28. 1952; *T. meandra* var. *molokaiensis* Skottsbo. Meddel. Göteborg. Bot. Trädg. 15: 412. 1944 as to Molokai material but exclud. syn. var. δ . Hillebr.**

Petiole up to 10.5 cm. long; leaflets 7–9, their blades widely elliptic-rectangular to subobovate, at apex broadly rounded or very obtuse and often emarginate, at base oblique and rounded or contracted, 6–10 cm. long and 3–6.5 cm. wide (“9 × 6.1, 8.5 × 5.3, 7.8 × 4.7, 6.5 × 3.7, 6 × 4.7, 6 × 3 cm.”); petiolules 6–9 mm. long. Inflorescence twice (or thrice?) umbellate; peduncles 8–19 cm. long; rays 11–17, commonly 4–6.5 cm. long, 5–8-flowered; pedicels 7–10 mm. long. Drupes (only immature ones known) cylindrical, 9–10 mm. long including the hemispherical stylopodium, this ± 2.5 –3 mm. tall; stigmas 3 or 4 (more rarely 5), sessile.

Type: *Lucy May Cranwell* 3,528, Kawela, Isl. Molokai, June 26, 1938 (Goth.).

Distribution: Eastern Molokai.

Specimens examined: *Miss Cranwell* 3,528 (type, Goth., my photograph no. 4,182: isotype, Bish., my photograph no. 4,227); *C. N. Forbes* 562 *Mo*, Wailau Valley, September, 1912 (Bish.).

Skottsberg (*loc. cit.*) advanced the name *molokaiensis* as a *nomen novum* for Hillebrand’s original, *Triplasandra meandra* var. δ ., of

the *Tetraplasandra meiandra* var. δ . of later authors. He then gave a fresh description (evidently modified from his observations of the *Cranwell* material in the direction of Hillebrand's really irreconcilable description) and cited Miss Cranwell's material from Molokai as an example. *His real type basis for the name molokaiensis was, however, the type of Hillebrand's var. δ .* Reference to Hillebrand (Fl. Haw. Isls. 153. 1888) shows Wailupe, Isl. Oahu, as the first cited locality. Two additional localities were listed, namely (1) Maunahui on Molokai and (2) Isl. Lanai; these are referred in this text to var. σ . *polyantha* and var. ϵ . *Hillebrandii* respectively. The identity of the Wailupe and other Oahu specimens constituting a satisfactory basis for Hillebrand's var. δ . in its properly restricted sense is discussed elsewhere (*vide* p. 112). We may observe for the present, however, that henceforth the var. δ ., *typically of Oahu*, must bear under our International Rules of Nomenclature the inapt name *molokaiensis*; also, that the *Cranwell* specimen from Molokai, the specimen that led Skottsberg originally to create the epithet *molokaiensis*, must be separated varietally as another variety, namely var. *Skottsbergii*.

***Tetraplasandra meiandra* var. ω . *tenuistylis* Sherff, Bot. Leaflet no. 6: 35. 1952.**

Leaves ± 4 dm. long, ± 11 -foliolate; blades of leaflets commonly oblong, apically obtuse to rounded, at base wide-cuneately contracted and sometimes oblique, somewhat noticeably reticulate-venulose, 8–14 cm. long and 4–6.5 cm. wide; petiolules slender or fairly broad, 8–18 mm. long. Peduncles (perhaps solitary) 5.5–10 cm. long, more or less robust (4–11 mm. thick lower down), becoming smooth; rays ± 10 –15 angulate, smoothish, 3.5–5.5 cm. long, about 10–15 flowered; pedicels subrobust, finally 8–12 mm. long; petals not seen; drupes urceolate-ovoid, truncate at apex, about 12–12.5 mm. tall including the slender stylopodium (style) and the 2 or 3 stigmas, ± 7 mm. thick.

Type: *Joseph F. Rock* 10,362, Volcano Kilauea, Isl. Hawaii, December, 1914 (Bish.).

Distribution: Known only from Volcano Kilauea, southeastern Hawaii.

Specimens examined: *Rock* 10,362 (type, Bish., my photograph no. 4,252: isotype, Gray).

The leaflets have a brownish venation in the dry state, but the original color seems to have been reddish or crimson.

Tetraplasandra meiandra var. *ω'*. **tenuistyloides** Deg. & Sherff *ex* Sherff, Bot. Leafl. no. 8: 10. 1953.

Tree ± 0.5 m. tall, sparingly branched. Leaves up to ± 4.5 dm. long (including petiole, this up to ± 13 cm. long), up to 9-foliolate; leaflets with blade oblong or subobovate, apically obtuse to rounded or even emarginate, basally oblique and obtuse to subtruncate, up to 13 cm. long and to 7 cm. wide, coriaceous, more or less reticulate-venulose above; lateral petiolules 5–20 mm. long. Inflorescence (a single one seen) thrice-umbellate, sessile, smoothish; peduncles ± 4 , about 6–7.5 cm. long and 5 mm. thick, scarcely nodulate; rays ± 8 –10, terminal, weakly curved, almost entirely enodulate, slender, 2–4 cm. long, terminally about 8–10-pedicelled; pedicels umbellulately grouped, finally 6–8 mm. long and 1–2 mm. thick. Florets unknown. Drupes (sub-mature ones seen) ovoid, compressed or trigonous; calyx about 1 cm. tall and 7–8 mm. thick, apically constricted; stylopodium conic, about 3 mm. tall (including the 2 or 3 or rarely 4 stigmas, these-scarcely definite in shape), true style lacking.

Type: *Otto Degener* 21,790, tree 30 ft. tall, sparingly branched and spindly, Kulani Forest, Isl. Hawaii, Feb. 3, 1952 (Chi.).

Distribution: Known only from type locality in eastern (slightly southeastern) Hawaii.

Specimens examined: *Degener* 21,790 (type, Chi., my photograph no. 4,362a, not 4,362 as originally printed: isotypes, Berl.; Bish.; Calif. Acad.; Gray; Kew; N.Y.; Par.; Phila.; Univ. Calif.).

Close to var. *ω*. *tenuistylis* but differing distinctly above the calyx-limb in the drupes. From var. *ν*. *rhynchocarpa* of the same region, its thicker and shorter drupes seem easily to separate it.

15. **Tetraplasandra kauaiensis** (H. Mann) Sherff, Bot. Leafl. no. 7: 10. 1952; *Heptapleurum kauaiense* H. Mann, Proc. Amer. Acad. 7: 168. 1867; *Agalma kauaiense* Seem. Jour. Bot. 6: 103. 1868; *Pterotropia kauaiensis* (H. Mann) Hillebr. Fl. Haw. Isls. 150. 1888; *Heptapleurum kauaiense* Mann *ex* Drake del Cast. Ill. Fl. Ins. Mar. Pacif. 183. 1890 (sphalm); *Dipanax kauaiensis* (H. Mann) Heller, Minnesota Bot. Studs. 1: 871. 1897.

- a. Stigmas commonly 6 or 7; tree of Wahiawa Mts., southern Kauai var. *η*. *koloana*.
 a. Stigmas fewer, trees from elsewhere.
 b. Stylopodium none or obsolete.
 c. Stigmas normally 3 or 4.

- d. Leaflets large, their blade often 1.5–2 dm. long and 7–11 cm. wide, lower petiolules mostly 1–3 cm. long, pedicels finally 5–13 mm. long.
- e. Leaflets more or less glabrescent beneath; native of Kau, southern Hawaii var. *γ. grandis*.
- e. Leaflets densely tomentose beneath; native of north-eastern East Maui var. *ε. nahikuensis*.
- d. Leaflets smaller, their blade 4–10 cm. long and 2–5 cm. wide, lower petiolules under 5 mm. long, pedicels in fruit only 2–4 mm. long; native of southeasternmost West Maui var. *θ. occidua*.
- c. Stigmas normally 2, leaflets with definitely cordate base; native of Lanai var. *β. dipyrena*.
- b. Stylopodium normally distinct (but in var. *robustior* very short).
 - c. Stigmas normally 5 (rarely 4); native of northwestern Kauai var. *ζ. robustior*
 - c. Stigmas normally 3 (rarely 2); native of southwestern East Maui var. *δ. intercedens*.
 - c. Stigmas normally 4 (sometimes 3 or 5); native of western Kauai var. *α. kauaiensis*.

Tree 9–15 m. tall, the smooth trunk erect and sparingly divided at its top into a few ascending, stout branches, these bearing large, terminal leaf-whorls, the young shoots and inflorescence tomentose with fawn-colored or tawny, stellate scales. Leaves 4–9 dm. long, leaflets 11–21; petiole 8–18 cm. long; blade narrowly oblong to ovate-oblong, at base more or less oblique and rounded to truncate or barely subcordate, at apex acuminate to rounded, chartaceous to somewhat coriaceous, on lower surface densely stellate-tomentose, on upper surface glabrescent or here and there very minutely but at times abundantly sprinkled with stellate hairs or scales, 6–18 cm. long and 3–8 cm. wide; petiolules 2–15 mm. long. Inflorescence a large panicle, its usually 5 primary branches 1–3 dm. long and mostly alternate on a rhachis about 5–7 cm. long; the rays or secondary branches 4–7 cm. long, mostly alternate except for the ± 10 terminal umbellately clustered ones; flowers racemose toward and subumbellulate (umbellets 10–20-flowered) at the tips of the rays on pedicels 3–5 (finally sometimes up to 11) mm. long. Corolla about 11–12 mm. across at anthesis; petals (spreading at anthesis, 5–6 mm. long, tomentose) and stamens 6 or 7 or rarely to 9. Ovary

usually 3-5-(usually 4-) celled. Drupe ovoid but \pm 4-angled, about 10-12 mm. tall, ringed with calyx-limb below, at, or above its middle; stylopodium distinct but under 1 mm. long, bearing 3-5 usually 4 stigmas.

Type: *Horace Mann, Jr., & William T. Brigham* 606, alt. 2,000-3,000 feet, mountains above Waimea, Isl. Kauai (Gray).

Distribution: Island of Kauai, western part.

Specimens examined (all from Isl. Kauai): *Degener & Greenwell* 21,578, forested gulch, edge of Kumuweia Ridge east of Waineke Swamp, Jan. 8, 1952 (Bish.; Brit.; Carn.; Chi.; N.Y.; etc.); *Degener & Greenwell* 21,579, tree 40 ft. tall, commonly locally in forest at 2,000 ft., Kopewai (Kopiwai) Trail, Kokee region, Jan. 11, 1952 (Berl.; Bish.; Brit.; Carn.; Chi.; Gray; Kew; N.Y.); *C. N. Forbes* 430-K, Kaholuamanu behind Waimea, September, 1909 (Bish.; Par.; U.S.); *Forbes* 1,097-K, large tree 40-50 ft. tall, trunk 1.5-2 ft. in diam., bark gray and lichen-covered, Waimea Drainage Basin, west side, July 3-Aug. 18, 1917 (Bish., 2 sheets); *Mann & Brigham* 606 (type, Gray, my photograph no. 4,310: isotype, U.S., my photograph no. 4,311); *J. F. Rock*, drier districts below Kaholuamanu, Mar. 5, 1909 (Arn.); *Rock* 2,488, Kaholuamanu, Mar. 5, 1909 (Arn.; Bish.; Gray); *Rock* 2,488a, Halemanu, October, 1909 (Bish.; Gray); *Rock & Marshall*, borders of a meadow called Malua Poha, back of Halemanu, October, 1909 (Arn.).

Tetraplasandra kauaiensis* var. β . *dipyrena (H. Mann) Sherff, Bot. Leaflet no. 7: 11. 1952; *Heptapleurum dipyrenum* H. Mann, Proc. Amer. Acad. 7: 168. 1867; *Dipanax Mannii* Seem. Jour. Bot. 6: 141. 1868; *Pterotropia dipyrena* (H. Mann) Hillebr. Fl. Haw. Isls. 150. 1888; *Dipanax dipyrena* (H. Mann) Heller, Minnesota Bot. Studs. 1: 870. 1897.

Small tree, probably little more than 6 m. tall. Leaves 3-6 dm. long, leaflets 11-15, somewhat smaller and more coriaceous than in var. *kauaiensis*, also more acuminate at tip and more definitely cordate at base, on upper surface finally more nearly or completely glabrous. Rhachis of inflorescence 5-8 cm. long; peduncles \pm 5, subumbellately or somewhat alternately disposed, at times 4 dm. long or more; rays 2-5 cm. long; pedicels shorter, 2-5 mm. long even in fruit. Drupe ovoid but usually somewhat 4-angled, 12 mm. long, stylopodium none, stigmas 2 (in type) or at times 3 (or even 4, *vide Hillebrandii*); calyx-limb a ring at or above middle.

Type: *Horace Mann, Jr., & William T. Brigham* 349, a small tree 15 or 20 ft. tall, Isl. Lanai (Gray).

Distribution: Known today only from Island of Lanai, but Hillebrand (*loc. cit.*) listed also East Maui and Hawaii.

Specimens examined (all from Lanai): *William Hillebrand*, *ann.* 1870 (Gray); *Mann & Brigham* 349 (type, Gray, my photograph no. 4,317); *George C. Munro*, valley south of Puhielelu, Apr. 10, 1916 (Bish.); *Munro*, Lanai, Nov. 17, 1915 (U.S., 2 sheets); *Munro* 469, ridge of Halelepakai (Haalelepaakai), Oct. 17, 1915 (Bish.; Univ. Calif.).

***Tetraplasandra kauaiensis* var. γ . *grandis* Sherff**, Bot. Leaflet no. 7: 14. 1952.

Leaflets rather large, blade often 2 dm. long and 7–11 cm. wide, oblong to (especially for the lower ones) ovate, at apex obtuse to acuminate, at base oblique and truncate to cordate, often more or less glaucous above (at least in dry state), becoming more or less glabrous beneath; median petiolules 4–8 mm. lowermost ones 1.5–3 cm. long. Panicle very large, often almost 1 m. long, its rhachis at times 1.5 dm. long, peduncles 5–7.5 dm. long; rays numerous (± 15 – 20 placed racemosely along the peduncle and ± 7 – 9 umbellately at peduncle's apex), up to ± 9 cm. long; pedicels slender, commonly 9–16 in a terminal umbellet and 3–6 irregularly scattered along the ray, finally 7–13 mm. long. Petals 6–8, lanceolate to ovate-triangular, at anthesis 6–8 mm. long; stamens 6–8. Drupes commonly trigonous otherwise slenderly ovoid, annulate above the middle, mitriform above the annulus (calyx-limb), at apex bearing a very tiny or obsolete stylopodium and 3 or more rarely 2 stigmas.

Type: *Joseph F. Rock* 10,019, alt. 2,000 feet, dense Hilea forest, gulch from Kanolohu to Kumanua, Kau, Isl. Hawaii, Jan. 17, 1912 (Gray).

Distribution: Known only from type locality in southern Hawaii.

Specimens examined (Isl. Hawaii): *Rock* 10,019 (type, Gray, my photograph no. 4,320: isotypes, Arn., 7 sheets, my photographs nos. 4,321, 4,322, and 4,323; Bish.; Gray, 3 sheets; Par., 2 sheets; Univ. Calif. 3 sheets).

With this variety should be compared a tree found in easternmost Hawaii: *Carl Skottsberg* 1,125, lava field west of Pahoia, Sept. 9, 1922 (Bish.; Goth.). I have seen two leaves only; these glabrous on both surfaces, 9-foliolate, the leaflets with faintly sinuate margins. Flowers and fruits are much to be desired.

***Tetraplasandra kauaiensis* var. δ . *intercedens* Sherff**, Bot. Leaflet no. 7: 13. 1952.

Leaflets $\pm 13-19$, blade commonly oblong, that of the laterals apically acute or acuminate and basally truncate or barely cordate. Peduncles 4-6, umbellately grouped, often 3-3.5 dm. long, the rays slender and up to ± 8 cm. long; a few (4-10) florets grouped in an umbellet, the others racemose along the ray; pedicels about 2-3 mm. long at anthesis, in fruit about 4-5.5 mm. long. Drupes globose-ovoid, about 9-10 mm. tall (including the stylopodium ± 1 mm. long and the commonly 3 rarely 2 stigmas), annulate above the middle with the calyx-limb, hemispherical or tumid-conic at top.

Type: *Joseph F. Rock* 8,641, a very tall tree, alt. 3,000 ft., dry districts, Auwahi, southern slopes of Mt. Haleakala, East Maui, Nov. 12, 1910 (Bish.).

Distribution: Southwestern East Maui.

Specimens examined (all from East Maui): *C. N. Forbes* 1,973-*M*, 80 ft. tall, trunk 2 ft. in diam., only about 14 trees seen, 30-40 ft. average height, Auwahi, Mar. 15, 1920 (topotypes, Bish.; Calif. Acad.); *Forbes* 2,169-*M*, common in the dying forest, 30-35 ft. tall, trunk 6-8 inches in diam., bark smooth and gray, umbellately branched or nearly so at top, slope of Haleakala, Kula side, Apr. 8, 1920 (Bish., 2 sheets; Par.; Univ. Calif.; U.S.); *William Hillebrand*, East Maui (U.S.); *Rock* 8,641 (type, Bish., my photograph no. 4,318: isotypes, Arn., 4 sheets; Goth.; Gray, my photograph no. 4,319; Univ. Calif., 2 sheets; U.S., 2 sheets).

In this variety are found the few (3 or sometimes 2) stigmas characteristic of most var. *dipyrena* material combined with the possession of a distinct stylopodium as found in var. *kauaiensis* (hence the name "*intercedens*"). It is the *Pterotropia dipyrena* of Rock's illustrations (Indig. Trees Haw. Isls. pls. 144 and 145. 1913), based upon his collections on the *southwestern* (his "southeastern" was an error!) "and strictly southern slopes of Mt. Haleakala."

***Tetraplasandra kauaiensis* var. ϵ . *nahikuensis* Sherff, Bot. Leaflet no. 7: 13. 1952.**

Leaflets oblong or at times ovate-oblong or even ovate, blade often 1.5-1.8 dm. long and 8-10 cm. wide, at apex commonly acuminate, at base oblique and rounded to truncate, petiolule up to 2.5 cm. long. Inflorescence large, the drooping peduncles ± 4 dm. long; rays slender, 4-10 cm. long, irregularly alternate and a few terminally umbellate; pedicels 5-12 mm. long, moderately slender, 5-8 disposed in a terminal umbellet the rest racemosely. Petals 4-5 mm. long. Drupes ovoid, annulate at or slightly below the middle

with the calyx-limb, apically conic, without a distinct stylopodium, about 8–9 mm. tall, stigmas now 3 now 4.

Type: *Joseph F. Rock*, Nahiku, northeastern East Maui, May 10, 1911 (Arn.).

Distribution: Known only from northeastern East Maui.

Specimens examined (all from East Maui): *C. N. Forbes* 239-M, large tree, 35 ft. tall, Nahiku, July, 1910 (topotypes, Bish.; U.S.); *Joseph F. Rock*, Nahiku, Jan. 14, 1909 (topotypes, Bish., 2 sheets, my photograph no. 4,325); *Rock*, Nahiku, May, 1911 (topotypes, Arn., 2 sheets); *Rock*, Nahiku, May 10, 1911 (type, Arn., my photograph no. 4,324: isotypes, Gray, 2 sheets); *Rock* 8,641a, Nahiku, Jan. 1–8, 1909 (topotypes, Bish., 3 sheets); *Rock* 12,510, alt. 2,000 ft., Nahiku, April, 1911 (topotypes, Bish., 3 sheets; Gray, 2 sheets; Univ. Calif.; U.S.).

Rock (Indig. Trees Haw. Isls. 359. 1913) treated this and the tree above described as var. *intercedens* as *Pterotropia dipyrena*. Var. *intercedens*, from southern and southwestern East Maui, has the drupes annulate with the calyx-limb *above* the middle, the upper part *swollen-conic or hemispherical*, the 3 or rarely 2 stigmas on a *definite stylopodium*; pedicels at fruiting about 4–5.5 mm. long. Var. *nahikuensis*, from northeastern East Maui, has the drupes annulate *at or a little below* the middle, the upper part *conic*, the stigmas 3 or as often 4, a *definite stylopodium lacking*; pedicels at fruiting 5–12 mm. long.

***Tetraplasandra kauaiensis* var. ζ . *robustior* Sherff, Bot. Leaflet no. 7: 12. 1952.**

Branches and branchlets of inflorescence twice as thick as in var. *kauaiensis*, the flowering umbellets a half wider, petals of the larger florets lanceolate and about 6 mm. long. Drupes broadly oblong in outline, about 12 mm. tall and about 10 mm. thick, obtusely rounded at apex, stylopodium very short, stigmas commonly 5 rarely 4.

Type: *Amos Arthur Heller* 2,884, large tree, 30–40 ft. tall, with soft wood, on the brow of the plateau, at an elevation of about 3,500 feet, above Kaholuamanu, Isl. Kauai, Oct. 16, 1895 (Bish.).

Distribution: From above Kaholuamanu to Kokee, northwestern Kauai.

Specimens examined (all from Isl. Kauai): *Cranwell, Selling, & Skottsberg* 3,095, Kokee, Aug. 25, 1938 (Bish.; Goth.); *Degener &*

Wiebke 2,180, large trees in open forest with much precipitation, Kokee, June 23, 1926 (Calif. Acad.; N.Y., 4 sheets; Univ. Calif.); *A. A. Heller* 2,884 (type, Bish., my photograph no. 4,337: isotypes, Arn., my photograph no. 4,338; Chi.; Corn.; Gray; Mo., 2 sheets; Phila.; Univ. Calif.; U.S.); *L. H. MacDaniels* 800, height 25 m., open forest, alt. 1,300 m., Kokee, Feb. 18, 1927 (Bish.); *Carl Skottsberg* 1,010, near Kokee ranger station, Oct. 28, 1922 (Goth.).

Typical *T. kauaiensis* is found on Kauai at Halemanu, Kumuweia Ridge, drier districts below Kaholuamanu, and (type locality) at 2,000–3,000 ft. altitude, Waimea. It is replaced at Kokee and on the brow of the plateau above and northeast of Kaholuamanu with the var. *robustior*.

***Tetraplasandra kauaiensis* var. η . *koloana* Sherff, Bot. Leaflet no. 7: 12. 1952.**

Leaflets ± 9 , their blade narrowly oblong to widely ovate, at times 1.8 dm. long and 1.1 dm. wide, that of the lateral ones more or less obtuse at the apex and rounded or subtruncate at the oblique base. Peduncles ± 3 , spreading, ± 17 cm. long; rays slender, more often 4–6 cm. long; pedicels about 8–12 in a terminal umbellet, slender, 11–16 mm. long. Stigmas commonly 6 rarely 7; drupes immature, the conical but laterally concave apex ± 3.5 mm. tall, its stylopodium scarcely 0.5 mm. tall.

Type: *Charles Noyes Forbes* 276-K, tall tree, Wahiawa Mountains, southern Kauai, August, 1909 (Bish., 2 sheets).

Distribution: Known only from type locality in southern Kauai.

Specimens examined: *Forbes* 276-K (2 type sheets, Bish., my photographs nos. 4,339 and 4,340).

***Tetraplasandra kauaiensis* var. θ . *occidua* Deg. & Sherff *ex* Sherff, Bot. Leaflet no. 8: 7. 1953.**

Tree ± 8 m. tall. Leaves 1.5–3 dm. long; leaflets 9–15, lowermost ones with ovate or even oval-subrotund blade, the others with an oblong or the terminal one with an obovate blade, all small (blade 4–10 cm. long and 2–5 cm. wide), at tip obtuse to scarcely acute, at base oblique and truncate to weakly cordate, coriaceous, glabrous and often glossy above, more or less stellate-furfuraceous beneath; lateral petiolules only 1–2 (rarely -5) mm. long. Inflorescence smaller, its rhachis $\pm 1-3$ cm. long, primary branches ± 3 , under 1.5 dm. long; rays (secondary branches) slender, finally more often

2.5–4 cm. long, racemosely and (at apices of ± 5 branches) umbellately disposed; florets (only a few seen) rarely below commonly at tips of rays and about 5 or 6 in an umbellet; pedicels at first very short (under 2 mm.) and thick, finally (with fruits) 2–4 mm. long. Petals and stamens ± 5 . Mature drupes ovoid, calyx about 6–7 mm. tall, the swollen-conic apex about 4.5–5 mm. tall including the 3 or more often 4 subsessile stigmas.

Type: *Degener, Tam, Tousley, & Barber 22,025*, a 25-foot tree (its seed eaten by rats), topping lowly forested slope in rainy region, *mauka* of [*i.e.*, inland from] McGregor, southeasternmost West Maui, Mar. 9, 1952 (Chi.).

Distribution: Known only from type locality in West Maui.

Specimens examined: *Degener et alii 22,025* (type, Chi., my photograph no. 4,361: isotypes, Bish.; Brit.; Carn.; Chi., my photo-no. 4,362; N.Y.).

16. *Tetraplasandra turbans* Sherff, Bot. Leaflet no. 7: 16. 1952.

Tree ± 12.5 m. tall with trunk ± 2.5 dm. thick, with whitish and pulverulent branchlets, leaves ± 5 dm. long (including the very minutely pulverulent-hispidulous petiole, this about 11–12.5 cm. long and ± 6 mm. thick); leaflets about 17–19, at apex acute to almost acuminate, at base oblique and truncate to subcordate, coriaceous, glabrous above, more or less densely stellate-furfuraceous beneath, blade of lowermost ones deltoid-oblong and ± 5.5 cm. long by ± 3 cm. wide, blade of the others narrowly to moderately oblong and 7–10.5 cm. long by 2.5–3.5 cm. wide; petiolules 1–5 mm. long, pulverulent-furfuraceous; rhachis more or less glabrescent. Inflorescence furfuraceous (a lone complete one seen), terminating a rhachis ± 4 cm. long and ± 7 mm. thick, umbellately 5-branched or -pedunculate; peduncles slender (± 3 mm. thick), 12–15 cm. long, covered with scars, bearing toward apex about 10–15 very small branchlets, these only ± 1 cm. long, covered with scars, at and near their tip very densely floriferous, 10–16 florets most often crowded into an umbellet only 7–9 mm. thick. Pedicels under 1 mm. long. Calyx basal, disk-like; corolla (scarcely mature) globose-ovoid, about 3 mm. tall, 7–8-angulate; petals (as yet cohering but doubtless spreading at full anthesis) and stamens 7 or 8. Drupe (a lone, very immature one seen) on a pedicel ± 3.8 mm. long; its body (the ovary perfectly free from the basal calyx and hence completely superior) tetragonal (and obovoid), 4.5 mm. tall and ± 3.5 mm. thick, *at the depressed-truncate top crowned with a small marginal limb*; stigmas 4, sessile.

Type: *Charles Noyes Forbes*, Makaha Valley, Kaala Range, Isl. Oahu, Feb. 12-19, 1909 (Bish., 2 sheets).

Distribution: Northwestern Oahu.

Specimens examined: *Degener & Hatheway* 20,865, a 40-ft. tree with 10-in. trunk, open sunny forest at 1,700 ft., easternmost gulch of West Branch of East Makaleha Valley, Oct. 9, 1950 (Arn.; Berl.; Bish., Brit.; Carn.; Chi.; N.Y.; etc.); *Forbes*, Makaha Valley, Isl. Oahu, Feb. 12-19, 1909 (2 type sheets, Bish., my photograph nos. 4,335 and 4,336: isotypes, Calif.; Par.).

Forbes had labeled his collection *Pterotropia kauaiensis* var. β . Hillebr., a synonym for *Tetraplasandra micrantha* of this text. In *T. micrantha*, it is true, the calyx is similiar at anthesis to the calyx here, but rapidly elongates upward in early fruit so as to be adnate nearly or fully half-way up the ovary; in *T. turbans*, on the other hand, the calyx remains discoid at the bottom of a completely superior ovary in the maturing drupe, much as in *T. gymnocarpa*. In both species (*T. turbans* and *T. micrantha*), the leaflets are very furfuraceous beneath with myriads of tiny, whitish, stellately setulose scales, but the leaflets of *T. micrantha* are thinner and attain a length and breadth nearly twice as great. Moreover, in *T. micrantha* the inflorescence is much larger, its rhachis or peduncles often 3 dm. long; the florets are many fewer (only about 8-10 in a lone terminal umbellet, with several florets placed singly 1-3 cm. lower down on the flowering-branchlet) and on slender pedicels becoming 5-6 mm. long in early fruits (ripe fruits not seen).

Much to be desired are mature drupes. The description of an immature drupe rests for the present on the one found in the packet accompanying an isotype (Calif.). The thin, shallow, coroniform limb at the apical margin is a perplexing or disturbing character (whence the epithet, "*turbans*"), in that it simulates a calyx-limb and thus falsely suggests an inferior ovary.

17. ***Triplasandra micrantha*** Sherff, Bot. Leaflet no. 7: 11. 1952; *Pterotropia kauaiensis* var. β . Hillebr. Fl. Haw. Isls. 151. 1888; *Pterotropia kaalae* Skottsbo. Meddel. Göteborg. Bot. Trädg. 10: 151. 1936.

Leaves up to 7.5 dm. long and to 3 dm. wide, rhachis glabrous except when young; leaflets at least 7 or 9 (doubtless more), thin, lateral ones oval-oblong to elongate-oblong and more or less parallel-sided (terminal one obovate), at apex acuminate or occasionally emarginate, at base truncate or rounded-truncate, their blade up to

2 dm. long and to 6.5 cm. wide (that of terminal one ± 8 cm. long and ± 6 cm. wide), glabrous above, on lower surface at first densely, later sparsely whitish-farinoso with minute stellate hairs; lateral petiolules slender and but 4–5 mm. long. Inflorescence apparently, if we may rely upon the two cited sheets of Hillebrand material, a slender peduncle ± 3 dm. long, with 15–20 bracteal scars throughout its length, scantily and very minutely hispidulous, umbellately branched at apex with ± 6 delicate rays; these up to ± 9.5 cm. long and 1.5 mm. thick, stellate-hispidulous, in distal third or half racemously 1–5-pedicellate and at tip umbellately 4–10-pedicellate; pedicels very delicate (about 0.5 mm. thick), 3–7 mm. long, stellate-hispidulous. Florets small; calyx obconic, about 2 mm. tall and broad, stellate-hispidulous; petals 8, outwardly stellate-hispidulous, 3–3.5 mm. long and at base 1.1–1.3 mm. wide, at tip cucullately inflexed. Stamens 7 or 8, about 2.5 mm. long, the short, curved filament 1.2 mm. long, the anthers 2–2.2 mm. long and 0.8–0.9 mm. thick. Ovary 3–3.5 mm. thick. Stylopodium at most 1.3 mm. tall, disappearing with growth of drupe, leaving the commonly 2 or 3 (rarely 4) stigmas sessile on the conical apex. Mature drupes (a single, detached one seen in packet at Kew) ovoid, glabrous or glabrate; calyx broadly hemispherical, ± 11 mm. thick at top and ± 6 mm. tall, its limb subobsolete; portion above calyx swollen and mitriform-conic, ± 9 mm. tall including the sessile 2 or 3 (or even 4) stigmas.

Type: *William Hillebrand*, Kaala, northwestern Oahu (formerly in Berl., but later destroyed by war).

Distribution: Northwestern Oahu.

Specimens examined (Isl. Oahu): *Hillebrand*, Makaleha, Kaala (topotype or perhaps isotype, U.S., my photograph no. 4,316); *Hillebrand*, Kaala Mountains, 1871 (topotype or perhaps isotype, Kew, my photograph no. 4,312, excluding inverted fragment of panicle at left); *Hillebrand* 266, Waianae Range, June, 1861 (Kew, my photograph no. 4,313).

Certain details of flower and fruit are taken from Skottsberg (*loc. cit.*). Apparently Hillebrand had somewhat mixed material in mind for his description. The Kew sheet above cited has, in addition to leaves and inflorescence matching those on the U.S. sheet (and, with those, serving as the principal basis of my description), an inverted fragment of an immature panicle of some other species of *Tetraplasandra*. This has three scattered, stoutish, squarrose lateral branches 4–5 cm. long (the apex is missing) and

is densely stellate-hispidulous. It has been ignored in drawing my description.

18. *Tetraplasandra gymnocarpa* (Hillebr.) Sherff, Bot. Leaflet no. 7: 12. 1952; *Pterotropia gymnocarpa* Hillebr. Fl. Haw. Isls. 150 and 151. 1888; *Heptapleurum gymnocarpum* (Hillebr.) Drake del Cast. Ill. Fl. Ins. Mar. Pacif. 183. 1890; *Dipanax gymnocarpa* (Hillebr.) Heller, Minnesota Bot. Studs. 1: 870. 1897.

a. Stigmas commonly 2 rarely 3; drupes prismatic, 13–15 mm. tall, 1–4 in an umbellet; native of the Konahuanui-Olympus region, southeastern Oahu. var. *β. leptocarpa*.

a. Stigmas usually 3–5; drupes globose-ovoid to ovoid, more to an umbellet.

b. Petals usually 6; leaflets often 6–8 cm. wide; stigmas now 3 now 4, very rarely 2.

c. Petals 6–8 mm. long, pedicels finally often 1.5–2.5 cm. long; drupes ovoid, 11–14.5 mm. tall; native of Punaluu region, northeastern Oahu. var. *γ. megalocarpa*.

c. Petals about 4 mm. long, pedicels under 1.4 cm. long even in fruit; drupes globose-ovoid to ovoid, 6–9 mm. tall; widespread almost throughout the Koolau Range of Oahu. var. *α. gymnocarpa*.

b. Petals usually 5; leaflets mostly 3–5 less often to 6 cm. wide; stigmas now 3 now 4 or at times 5; native of the Pupukea-Kahuku Trail region of far northern Oahu.

var. *δ. pupukeensis*.

Small tree 3.6–6 m. or sometimes to 7.5 m. tall, only the youngest shoots mealy, otherwise glabrous. Leaves 3–5.5 dm. long, rather dark-green; leaflets 9–17, oblong to ovate-oblong or the lowermost ones ovate, at apex obtuse or more often obliquely acuminate, at base oblique and rounded, chartaceous to coriaceous, glabrous on both surfaces, shiny above, blade 7.5–15 cm. long and 3–8 cm. wide, petiolule 4–18 mm. long. Rhachis of panicle rather short (2–5 cm.) with 3–5 umbellately radiating primary branches or peduncles, these 1–3.7 dm. long; secondary branches or rays slender, elongate (more often 5–11 cm. long), disposed umbellately at tip of and racemosely along the peduncle, floriferous mostly by terminal umbellets of 10–16 florets and often by a few florets racemosely disposed somewhat lower along the ray. Pedicels slender, 6–9 mm. or in fruit up to 14 mm. long. Calyx very short, with a loosely undulating border. Petals 6 or rarely 7, cohering at the apex, about 4 mm. long. Stigmas

now 3 now 4, rarely 2; stylopodium none. Drupes globose-ovoid to ovoid, 6–9 mm. tall and 4.5–6.5 mm. thick, several-angled. Ovary practically free and naked, 3- or 4- or very rarely 2-celled; pyrenae thin-papery, ovoid, beaked above and faintly notched below the beak.

Type: *Rev. John M. Lydgate*, valley of Niu, Island of Oahu (formerly extant at Berlin).

Distribution: Koolau Range of Oahu.

Specimens examined (all from Isl. Oahu): *R. W. Baxter*, tree 20 ft. tall, alt. 1,100 ft., Pupukea-Kahuku Trail, February, 1939 (Mo., 2 sheets); *E. H. Bryan, Jr.*, tree 10 m. tall, trunk diameter 15 cm., alt. 900 ft., Pupukea, Jan. 23, 1929 (Bish., 2 sheets); *Otto Degener*, Pupukea-Kahuku region, Mar. 31, 1929 (N.Y.); *Degener & Martin Martinez* 11,920, in rain-forest, C.C.C. Trail, Aiea, Mar. 15, 1936 (U.S.); *C. N. Forbes* 1,638-O, tree 20–25 ft. tall, flat-topped, branches subumbellate, umbels in threes, leaves thick, dark-green above and pale beneath . . . midrib dark-red, stamens 6, petals 6, trail between Konahuanui and Olympus, back of Manoa Valley, Feb. 14, 1911 (Bish.); *Forbes* 2,062-O, ridge north of Waimea Valley, Feb. 10–13, 1915 (Bish.); *Forbes* 2,182-O, slopes of Konahuanui, Mar. 11 and 12, 1915 (Bish.); *Forbes with C. M. Cooke, Jr.*, mountains between Punaluu and Kaipapau, May 3–9, 1909 (Bish.); *Forbes with J. C. Bridwell* 2,457-O, between Niu and Wailupe, Apr. 11, 1917 (Bish.); *D. Wesley Garber* 238, Konahuanui-Olympus Trail, Feb. 15, 1920 (Bish., 2 sheets); *William Hillebrand*, Niu (topotype, Gray, my photograph no. 4,327); *Hillebrand & Lydgate*, Niu (isotype, Bish., my photograph no. 4,326); *E. Y. Hosaka* 111, in woods, alt. 1,500 ft., Pupukea-Paumalu Forest Reserve, Jan. 12, 1930 (Calif. Acad.); *L. H. MacDaniels* 114, small tree 5 m. tall, exposed rain-forest, lee slope, alt. 850 m., Konahuanui, Dec. 21, 1926 (Bish.); *MacDaniels* 535, Pupukea Military Trail, Jan. 29, 1927 (Bish.); *A. Meebold*, alt. 1,500–1,800 ft., Pupukea, May, 1932 (Bish.); *Kazuto Nitta* 73, slightly damp slope, Pupukea, Jan. 12, 1930 (N.Y.); *Joseph F. Rock* 406a, Konahuanui, Jan. 8, 1910 (Bish.; Calif. Acad.; U.S.); *D. P. Rogers*, 20 ft. below Kipapa Trail, head of Waiawa Valley, Waipio, Sept. 29, 1946 (Bish.); *Harold St. John* 10,104, tree 20 ft. tall, in thicket, alt. 1,900 ft., Kaluanui, Nov. 30, 1929 (Bish., 2 sheets; Par.; Univ. Calif.); *St. John* 10,147, tree 20 ft. tall, woods along ridge, alt. 1,200 ft., Pupukea-Paumalu Forest Reserve, Jan. 12, 1930 (Arn.; Bish., 2 sheets; Par.; Univ. Calif.).

Tetraplasandra gymnocarpa var. *β. leptocarpa* Sherff, Bot. Leaflet no. 7: 15. 1952.

Leaflets ± 11 , blades more or less oblong or (the three terminal ones) oblong-oblongeolate, at apex acute to subacuminate, at base oblique and rounded, weakly powdery-mealy beneath, the slender petiolules and the rachis glabrescent. Inflorescences becoming glabrous, rachis ± 16 cm. long, its branches or peduncles ± 20 – 23 cm. long, umbellately grouped; rays 4–6 at tip of and up to 4 irregularly but remotely scattered along a peduncle, slender, 4–6 cm. long. Florets not seen. Drupes few (1–4) in an umbellet (this terminal on a ray), prismatic, 4–5-angled, toward apex conic or mitriform, at apex commonly 2- rarely 3-stigmatate, 13–15 mm. tall, under 5 mm. thick, stylopodium lacking; pedicels finally 10–15 mm. long.

Type: *Charles Noyes Forbes* 1,608-O, trail between Konahuanui and Olympus, Island of Oahu, November, 1910 (Bish., 2 sheets).

Distribution: Known only from type locality in southeastern Oahu.

Specimens examined: *Forbes* 1,608-O (2 type sheets, Bish., my photographs nos. 4,330 and 4,331).

***Tetraplasandra gymnocarpa* var. γ . *megalocarpa* Sherff**, Bot. Leafl. no. 7: 15. 1952.

Leaflets often 6–7 cm. wide, very oblique at base. Peduncles (primary branches of the inflorescence) ± 3.5 dm. long; rays (secondary branches) very slender, elongate (often 10–13 cm. long); pedicels more elongate, finally often 1.5–2.5 cm. long. Petals ± 6 , lanceolate or lanceolate-linear, 6–8 mm. long; stamens ± 6 . Drupes ovoid, 11–14.5 mm. tall, stigmas now 3 now 4 very rarely 2, stylopodium absent.

Type: *Joseph F. Rock & Gerret P. Wilder* 8,827, alt. 2,000 feet, in one of the inner gulches of the Koolau Mountains, Punaluu, Island of Oahu, August, 1911 (Gray).

Distribution: Known only from type locality in northeastern Oahu.

Specimens examined (all from Isl. Oahu): *Degener, Park, Bush, Potter, & Topping* 11,921, in rain-forest, summit of Koolau Range beyond Pig-God Trail, Punaluu, July 4, 1935 (topotypes, Bish., my photograph no. 4,334; Corn.; Del., 2 sheets; Mo., 2 sheets; U.S.); *Rock* 406, Punaluu, Dec. 24–29, 1908 (topotypes, Bish.; Gray; Univ. Calif.); *Rock* 421, same place, Dec. 24–28, 1908 (topotypes, Gray, 2 sheets); *Rock* 449, in the woods of Punaluu, above Hauula, Dec. 24–28, 1908 (topotype, Arn., my photograph no. 4,315); *Rock &*

Wilder 8,827 (type, Gray, my photograph no. 4,332: isotypes, Arn., 4 sheets, my photograph no. 4,333; Bish.; Gray, 2 sheets; U.S.); *Olof H. Selling* 3,671, Koolau Mts. at Punaluu, Sept. 27, 1938 (topotype, Bish.).

Rock (Indig. Trees Haw. Isls. 355. 1913), in his treatment of *T. gymnocarpa* (*Pterotropia gymnocarpa* in his text), described the drupes of *his own* specimens as "12 to 15 mm. long, and about 7 mm. in diameter," thus showing that his plate 143, which was made from his own material, was none other than an illustration of var. *megalocarpa*, as it has since been named.

Tetraplasandra gymnocarpa* var. δ . *pupukeensis (Deg.) Sherff, Bot. Leaflet no. 8: 12. 1953; *Pterotropia gymnocarpa* var. *pupukeensis* Deg. Fl. Haw. fam. 281. Aug. 24, 1938.

Large tree with spreading crown bearing few, thick branches. Leaves 2–5.5 dm. long, coriaceous, on upper surface dull (in type collection) or at least in dry state more or less glossy; leaflets 9–25, oblong-ovate, at apex acuminate to acute or rarely rounded, at base truncate to obliquely rounded or rarely acute, the central blades 6–13 cm. long and 3–5 or less often to 6 cm. wide but the basal ones shorter and relatively wider and terminal one shorter and relatively narrower, petiolule commonly 3–7 mm. long. Inflorescence somewhat furfuraceous, borne laterally when flowering and fruiting, the rachis \pm 5 cm. long, bearing about 8 umbellately or subumbellately grouped primary branches or peduncles; these spreading to somewhat drooping, 15–25 cm. long, bearing rays scattered racemously and at the tip grouped umbellately; rays mostly 3–6 cm. long, floriferous now only in terminal umbellets of 8–12 florets now also more or less racemously in their terminal half. Petals 5 or very rarely 6, maroon, thick, 6 mm. long, 2.5–4 mm. wide in same flower, spreading to reflexed, ovate-lanceolate, apically acute. Stamens 5 or very rarely 6. Stigmas now 3 now 4 or at times 5; drupes broadly globose-ovoid, 10–12 mm. tall.

Type: *Degener, Salucop, & Arlantino* 11,919, several trees in dense forest, Pupukea-Kahuku Trail near Puu Moa, Isl. Oahu, Apr. 3, 1938 (herb. not specified).

Distribution: Koolau Range from northern end interruptedly southeastward to the upper parts of Kipapa Gulch, Island of Oahu.

Specimens examined (all from Isl. Oahu): *Otto Degener* 18,015 *pro parte*, lower forest, Pupukea-Kahuku Trail *makai* of Puu Moa, May 28, 1932 (topotypes, Mo.; N.Y., my photograph no. 4,329);

Degener 18,253, "precise locality unknown," "Pupukea-Kahuku region, on Pupukea end," Mar. 31, 1929 (Mo.; N.Y.); *Degener, Salucop, & Arlantino* 11,549, tree 7 ft. tall, near summit, C.C.C. Trail, Aiea, Dec. 6, 1937 (Bish.; petals 5, drupes not seen); *Degener, Salucop, & Arlantino* 11,919 (type collection, Bish., 2 sheets; Corn., my photograph no. 4,328; Del.; Mo.; U.S.); *F. Fagerlind & C. Skottsberg* 6,085, Pupukea forest reserve, Koolau Range, Jan. 25, 1948 (Stockh.; leaflets truncate to somewhat subcordate); *H. Hapeman*, Oahu, Apr. 14, 1908 (Mo.); *E. Y. Hosaka* 301, tree 35 ft. tall, along wooded stream-bed, alt. 1,000 ft., Waikakalaua Gulch, Sept. 14, 1930 (Bish.); *Hosaka* 688, tree 25 ft. tall, on denuded slope, alt. 2,500 ft., south ridge, Kipapa Gulch, Waipio, Sept. 18, 1932 (Bish., stigmas mostly 3, rarely 4); *H. Morley*, small tree 12-15 ft. tall, in rain-forest, alt. 2,500 ft., ridge south of Kipapa Gulch, Waipio, Dec. 10, 1933 (U.S., petals 5, stigmas 4 or imperfectly 5); *Carl Skottsberg* 1,814, alt. about 300 m., Pupukea Forest Reserve, Sept. 15, 1926 (Goth.).

Seemingly this is a good variety, but its recognition is at times more difficult than that of most varieties, certainly of the other varieties of *T. gymnocarpa*.

19. ***Tetraplasandra kahanana*** Deg. & Sherff *ex* Sherff, Bot. Leaflet no. 8: 6. 1953.

Entirely glabrous, without doubt a tree; leaf-scars on the branchlets finally large and conspicuous. Leaves ± 4 dm. long including the slender petiole (this ± 1 dm. long and 3-4 mm. thick), 7- or 9-foliolate; leaflets dull, weakly coriaceous and subobscurely veiny, narrowly to moderately oblong or oblong-ovate or (especially the terminal three) obovate; their blade 8-12.5 cm. long and 3-6 cm. wide, at apex subobtuse to subacute, at base scarcely oblique and broadly to rather narrowly cuneate; petiolules slender, lateral ones 10-15 mm. long. Inflorescence (a single one seen) ± 3 dm. long, its 3 peduncles umbellately grouped, curved-erect, about 2-2.7 dm. long, remotely and alternately branched or radiate from near base to top; rays slender, curved-suberect, a few (± 5) placed along the peduncles and still more (± 7) at the top, 6-10 cm. long, terminally and umbellulately about 7-10-pedicellate; pedicels slender, at anthesis straightish to curved and erect to spreading, commonly 12-17 mm. long (rarely one of them transformed into a subray ± 3 cm. long and terminally subdivided into a few smaller pedicels). Calyx at anthesis obconic, 3.5-4 mm. tall and almost as broad. Corolla

before opening scarcely 4.5 mm. tall and 6 mm. thick, petals 5 or 6, a lone mature one (seen in packet on type sheet) lanceolate, reflexed, 6 mm. long. Stamens 5, filaments flat and scarcely 2.5 mm. long; anthers ovate, about 1.5 mm. long, attached below their center. Drupes (only very immature ones seen) obovoid; ovary inferior as to its lower half, its upper part depressed-hemispherical; stylopodium central, barely conical but several-rayed, stigmas not yet well-formed.

Type: *Otto Degener* 18,013, in forest, from Kahana church up ridge to summit of mountain southeast of Kahana Bay, Isl. Oahu, July 3, 1932 (N.Y.).

Distribution: Known only from type locality in northeastern Oahu.

Specimens examined: *Degener* 18,013 (type, N.Y., my photograph no. 4,344; isotype, N.Y., my photograph no. 4,345).

The five stamens place this species next to *T. meiandra*, but the racemosely (as well as at the tip umbellately) branched peduncles give an appearance to the inflorescence suggestive of *T. hawaiiensis*, *T. kauaiensis* and *T. gymnocarpa*. (In *T. meiandra* var. *meiandra* a single lateral branch or ray is very rarely emitted from a peduncle, somewhere near the top.)—A plate was prepared some years ago by Kwan Kee Park from the type material of *T. kahanana* but seems never to have been published.

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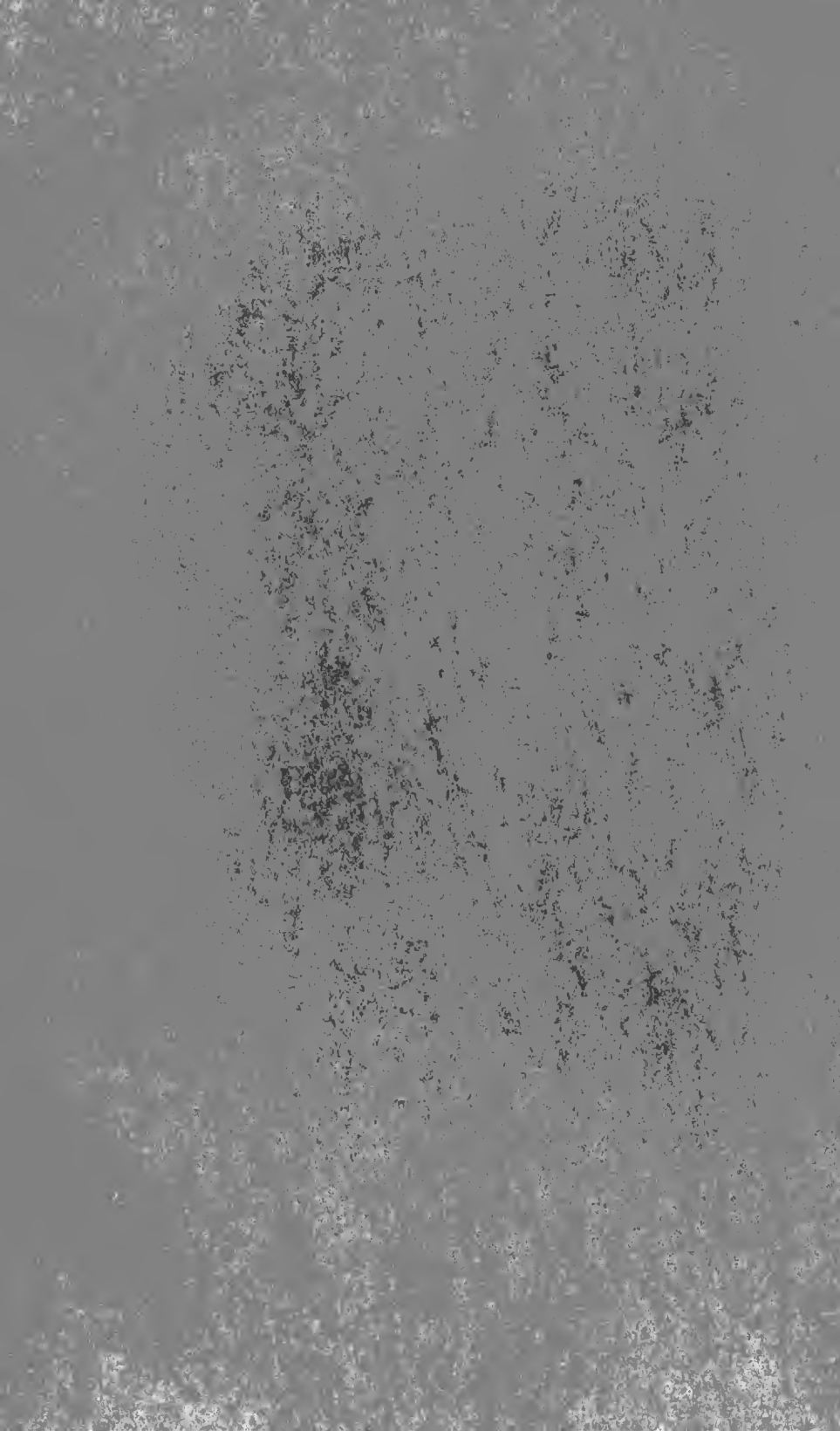
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