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About the Institute

The Hunt Institute for Botanical Documentation, a research division of Carnegie Mellon University, specializes in the history of botany and all aspects of plant science and serves the international scientific community through research and documentation. To this end, the Institute acquires and maintains authoritative collections of books, plant images, manuscripts, portraits and data files, and provides publications and other modes of information service. The Institute meets the reference needs of botanists, biologists, historians, conservationists, librarians, bibliographers and the public at large, especially those concerned with any aspect of the North American flora.

Hunt Institute was dedicated in 1961 as the Rachel McMasters Miller Hunt Botanical Library, an international center for bibliographical research and service in the interests of botany and horticulture, as well as a center for the study of all aspects of the history of the plant sciences. By 1971 the Library's activities had so diversified that the name was changed to Hunt Institute for Botanical Documentation. Growth in collections and research projects led to the establishment of four programmatic departments: Archives, Art, Bibliography and the Library.

To Dr. + Mrs. A. Love,
with aloha,

Otto + Isa D.

Book 7

of

FLORA HAWAIIENSIS

or

New Illustrated Flora of the Hawaiian Islands

by

Otto Degener, Sc.D.

Isa Degener, Dr. Rer. Nat.

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Dr. Kōve:

All sheets have been
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by our distribution
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Then, quite arbitrarily
when we think the
collection is thick
enough, we slip a
cover about every-
thing and distribute
to bookstores

QD

Only microsporangia present:

Capsules 1-celled; spores with 3 radiating lines; leaves developed, generally all alike

Capsules 3-celled, 3-valved; spores marked with 1 line only; leaves rudimentary, scale-like

Microsporangia and macrosporangia present; spores with 3 radiating lines; leaves generally of two kinds

1. *Lycopodium*.

2. *Psilotum*.

3. *Selaginella*.

1. LYCOPODIUM, L.

Spore-cases of one kind only — *microsporangia* —, sessile on the base of stem-leaves or of bracts in a terminal spike, 1-celled, kidney-shaped, opening transversely with 2 valves. Spores minute, sulphur-colored, the leaves mostly even-sided, rigid, imbricate or crowded in 4–16 ranks. — The spores develop a monococious prothallium, which is either tuberosus and colorless, or chlorophyllaceous and provided with foliaceous appendices on its summit.

A large genus, widely spread over every part of the globe.

Sterile leaves of one kind, homomorphous:

Fertile leaves similar to the sterile ones; stems erect:

Leaves spreading or reflexed, membranous:

Leaves broadly spatulate, mostly serrate, green

Leaves linear-lanceolate, entire, often reddish

Leaves imbricate, coriaceous, entire, pale

Fertile leaves gradually smaller; plant much divided,

pendulous

Fertile leaves bract-like in terminal spikes:

Spikes sessile:

Leaves acrosc, awl-shaped, curved

Leaves flat, lanceolate:

Spikes thicker at the base, simple or once or

twice forking

Spikes cylindrical, repeatedly forking:

Ultimate leaves in 4 ranks

Ultimate leaves in 3–2 ranks

Spikes pedunculate or on distantly leaved branchlets

Leaves of sterile branches dimorphous as in *Selaginella*;

plant climbing

1. *L. serratum*.

2. *L. erubescens*.

3. *L. Haleakalae*.

4. *L. polytrichoides*.

5. *L. cernuum*.

6. *L. nutans*.

7. *L. pachystachyon*.

8. *L. phlegmaria*, var. *Mamill.*

9. *L. venustum*.

10. *L. volubile*.

1. *L. serratum*, Thunb. *Fl. Japon.* p. 341, tab. 38. — Stems erect, or decumbent at the base, 4–6' high, 3–4 times forking, foliose throughout, fructiferous in the one or two last divisions. Leaves rather thin, all alike, in 6–4 ranks, horizontally patent or reflexed, spatulate, 3–6" × 1/2–1 1/2", very acute, irregularly crenate-serrate, contracted at the base, even petiolate, with the midrib often impressed underneath. Sporangia broad reniform, not apiculate. Spores pale whitish. — Luerssen, in *Flora*, 1876, p. 440. — *L. sulcinervium*, Spring, *Monogr. Lycop.* I, 39. — Brack. *Fl. U. S. E. E.* p. 322. — *L. varium*, Mann, *Enum.* no. 653.

Not uncommon on Oahu (west ridge of Nuuanu), Kauai, and probably all islands. The different seasons' growths are often (but not always) indicated by shorter leaves; also sets of full-sized fertile leaves are occasionally interrupted by sterile ones. — The

species extends over Japan, various parts of India, Ceylon and Java; or, if the too nearly allied *L. lucidulum* be united with it, also over the North American Continent. The weak differential character relied upon by Spring to distinguish his *L. sulcinervium*, viz. the faint rib, sulcate underneath, is only observed in very thin-leaved forms.

β var. *dentatum*. — Stem 1/2–1 1/2 ft. long, only one to three times forking at variable heights, rarely undivided. Leaves crowded, harsher, narrow-lanceolate, finely denticulate, less contracted at the base.

Highest mountains of Kauai, Maui and Lanai. Almost like *L. lucidulum*, and probably the Hawaiian plant referred to *L. varium*, R. Br. (Owhyhee, Menzies), in Spring's *Monogr.* II, p. 24, finds its true place here.

γ var. *subintegrum*. — Stem reddish, 6–8' long. Leaves subentire, patent and reflexed, broad-lanceolate, 3–4" long.

High mountains of Kauai!

2. *L. erubescens*, Brack. *Fl. U. S. E. E.* p. 320, tab. 45. — «The whole plant brown or reddish, 4–8' long. Stems tufted, erect, forking. Branches obtuse. Leaves all alike, in about 8 ranks, spreading, plane, linear-lanceolate, acute, quite entire, 1 1/2" × 1/2". Capsules compressed, reniform, pale yellow, persistent, those of the preceding years as low as the primary divisions of the stem.»

• *Haleakala*, Maui, in wet lands, 6000 ft.; high plateau of Kauai (Mr. Johnson) *Wahalaie*, Kauai, on rocks (Wawwa).

3. *L. Haleakalae*, Brack. *l. c.* p. 321, tab. 45. — «Stems tufted, stiff, erect, 4–6' high, forking. Branches thick, crowded, obtuse, their summits of about equal height. Leaves pale, in about 6 ranks, all alike, 2" × 1", ovate-lanceolate, acute, entire, but with 2 or 3 minute teeth near the point, nearly imbricate with recurved apex, the thick base decurrent on the stem. Capsules yellow, only in part concealed by the leaves, the old ones persistent on the stem to within a few inches from the ground.» • *Haleakala*, in wet lands, 7000 ft. elev. The species is closely allied to *L. compactum*, Hook. (from the Andes of Ecuador), but this latter has obtuse and distinctly serrate leaves with an incurved point and a manifest keel on the outer side.»

I have a few plants from the top of Eka, W. Maui in which the leaves are stiff coriaceous, pale straw-colored, rather obovate with a broad base, entire, densely imbricate in the upper, but patent in the lower portion of the stem, all distinctly carinate and some transversely wavy.

4. *L. polytrichoides*, Kaulf. *Enum. Fl.* p. 6. — Stem 6–12' high, erect or pendulous, repeatedly dividing at open angles from the very base, often 9–12 times, thereby appearing densely tufted, the branches very slender flaccid and terete, leafy throughout, fructiferous through several of the last divisions. Leaves of the young plant and sterile branches very dense, linear acrosc, erecto-patent, about 2" long, those of the main divisions in 6 or more ranks, subulate, incurved, with gradually dilating base. Fertile leaves in 4 or 3 ranks, shorter, lanceolate to broadly ovate,

Distr.: West Indies, tropical and subtropical South America.
Suriname: white sand savannas (mostly moist); very common; 26 coll.

6. *Lycopodium duidae* A. C. Smith *Bull. Torr. Bot. Cl.* 58 (1931) 311; Vareschi *Fl. Venez. I, 1* (1969) 35, pl. 3, pl. 6.

Distr.: Venezuela.

In Suriname only.

var. *guianense* Kramer in Kramer & van Donselaar *l.c.* (1968) 520.

Moist sand savannas; two collections.

From Zanderij to Colakreek, Kramer & Hekking 2778 (paratype); Kappelsavanne S. of Tafelberg, Kramer & Hekking 3040 (type).

7. *Lycopodium cernuum* L. *Sp. Pl.* 2 (1753) 1103; Underwood & Lloyd *Bull. Torr. Bot. Cl.* 33 (1906) 117; Maxon *Pter. Port.* (1926) 515; Alston *Fl. Surin. I, 1* (1938) 174; Small *Ferns S.E. States* (1938) 418, with plate; Maxon & Morton in Maguire *Bull. Torr. Bot. Cl.* 75 (1948) 79; Nessel *Fl. Brasil. 2:2* (1955) 123, fig. 110 etc.; Vareschi *Fl. Venez. I, 1* (1969) 38, pl. 1; Long & Lakela *Fl. trop. Florida* (1971) 64, with plate; Morton & Wiggins *Fl. Galap.* (1971) 76, fig. 6a-c. — *Lepidotis cernua* (L.) Pal. Beauv. *Mag. Encycl.* 5 (1804) 479. — *Palinhaca cernua* (L.) Franco & Vasc. *Bol. Soc. Brot. II.* 41 (1967) 25. — *Lycopodiella cernua* (L.) Pichi Sermolli *Webbia* 23 (1968) 166.

Distr.: tropical, subtropical, and some warm-temperate parts of the whole world.

Suriname: in sandy places, mostly on savannas, less often in savanna wood; common and widespread in suitable habitats; 33 coll.

8. *Lycopodium alopecuroides* L. *Sp. Pl.* 2 (1753) 1102; Alston *Fl. Surin. I, 1* (1938) 173; Small *Ferns S.E. States* (1938) 407, with plate; Herter *Syst. Lycop.* (1950) 97; Nessel *Fl. Brasil. 2:2* (1955) 94, fig. 77; Vareschi *Fl. Venez. I, 1* (1969) 38, pl. 3.

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©Otto & Isa Degener and Noah Pekelo, Jr.

The present list of Hawaiian names and their botanical and English equivalents is a provisional one begun by the senior writer almost fifty years ago. He had been stimulated by the superb compilation made by 1.) Brigham in 1893. This was obviously copied, somewhat enlarged, by 13.) Rock in 1913. To this list the Degeners in their manuscript added names used in the publications of 2.) Bryan & Walker, 4.) Doty, 5.) Emerson, 6.) Handy & Handy, 7.) Hillebrand, 8.) Merrill, 9.) Munro, 10.) Neal, 11.) Pekelo, 12.) Porter, 14.) Stimson & Marshall and, especially used in the fabulous dictionary authored by 15.) Pukui & Elbert. The vernacular plant names in the latter had been gleaned from innumerable sources, apparently excluding Brigham's pioneer work but including the *Flora Hawaiensis*. Here the two linguists discovered the writer's pseudo-Hawaiian name "*kamapuaa*" which he had dubbed his newly discovered coffee relative *Kadua (Hedyotis) kamapuaa* on August 10, 1932. Luther Earl Bishop's "Honolulu Botanic Gardens Inventory 1972" and Harold St. John's "List and Summary of the Flowering Plants in the Hawaiian Islands," both published in 1973, unfortunately came to the attention of the writers too late for consultation.

Besides the library sources mentioned, the Degeners collected vernacular plant names for miscellaneous publications; and from personal communications with Hawaiian acquaintances and friends such as Mr. Oliu [Oliver] Kiekie Pohina (1906-1973) of the once-isolated fishing village of Milolii, Kona, Hawaii. Realizing that many younger Hawaiians, especially of rural areas, know the names of native plants not from books but rather from daily conversation with their elders, the Degeners prevailed on Forester Noah Pekelo, Jr., of Molokai to join them in the present project as collaborator.

1. Brigham, W. T. A List of Hawaiian Names of Plants with Botanical Equivalents. Preliminary Cat. B. P. Bishop Museum 4:46-57. 1893. (Listed in library as Bot. Pamphlet 1351.)
2. Bryan, L. W., & Walker, C. M. Prov. Checklist Forest Plants Haw. 1:34, 1966.
3. Degeners' publications and field notes. 1922 to date.
4. Doty, M. S. Key to Frequently Found Genera Haw. Seaweeds, Ed. 8, 1957. (Mimeographed.)
5. Emerson, N. B. Unwritten Literature of Haw. Bur. Amer. Ethnology Bull. 38:1-288, 1909.
6. Handy, E. S. G., & E. G. Native Plants. Old Haw. 1:641-1972.
7. Hillebrand, W. Flora Haw. Isl. 1:673, 1888.
8. Merrill, E. D. Index Cards to Species of Plants Credited to Polynesia (unofficially named "the pink slips," and deposited at the New York Botanical Garden, Bishop Museum and elsewhere. The wealth of vernacular names cited has not yet been thoroughly studied because of the bulk of the Index and its inaccessibility).
9. Munro, G. C. Typewritten copy of his plant notes in Degeners' possession.
10. Neal, M. C. In Gard. Haw. 1:805, 1948; ed. 2:1:924, 1965.
11. Pekelo, N. Jr. Personal notes to date.
12. Porter, J. R. Haw. Names Vasc. Plants. Coll. Trop. Agr., Univ. Haw. Dept. Pap. 1:1-63, 1972.
13. Rock, J. F. List Haw. Names Plants. Terr. Haw. Bd. Agr. & For. Bot. 2:1-21, 1913.
14. Stimson, J. F., & Marshall, D. S. Dictionary of some Tuamotuan Dialects of the Polynesian Language. 1-623, 1964.
15. Pukui, M. K., & Elbert, S. H. Hawaiian-English Dictionary. Ed. 3, 1:370, 1965.

Dr. L. Löve will use
Hawaii

FLORA HAWAIIENSIS

Tallinn
as a
conveyor
name

Family : 19a
Genus : Palhinæa
Species : Sandwicensis

and perhaps a
few more
molecular
names

LYCOPODIACEAE

CLUBMOSS FAMILY

Tallinn
Hawaiian
Hawaiian
Hawaiian

Lycopodium cernuum sensu Degener, O. The Gametophyte of Lycopodium Cernuum in Hawaii.
Bot. Gaz. 80(1):26-47. 1925. *I cite my publications as a means of advertising*
Lycopodium cernuum sensu Degener, O. Plants Haw. Nat. Park. 20-22. 1930; 1945. Plants
Jaw. Nat. Parks. 1945. *occurs in all parts of the island to permit some*
Lycopodium cernuum sensu Selling, O. H. Studies in Haw. Pollen Statistics. Part 1. Spores
Haw. Pteridophytes. B.P. Bishop Mus., Spec. Publ. 37. 11-17, 19. Pl. 1, fig. 16. 1946.
*Lycopodium cernuum sensu Mann 1867, Wawra 1872, Forbes 1912, Robinson 1913, MacCaughy

1912, Christensen 1925, O. Degener 1930, Skottsberg 1926, Hosaka 1927, Neal 1928, Skotts-
berg 1936, Nessel 1939, Fowler 1940, Skottsberg 1942, Fagerlind & Mitchell 1944, Hubbard
1952, Neal 1965, O. & I. Degener 1967, Lamoureux 1967, Makinen 1978, I. Degener 1978.
I skipped lines for possible additions

Not Lycopodium cernuum L. Sp. Pl. 2:1103. 1953.

Lycopodium cernuum f. capillaceum sensu Hillebrand 1888. Not L. c. var. capillaceum Willd.
Sp. Pl. 5:30.1810.

Lycopodium cernuum var. crassifolium sensu Lehr 1961, O. & I. Degener 1961, 1968, 1969,
1969, 1971; L. c. f. crassifolium sensu Hillebrand 1888. Not L. c. var. crassifolium
Spring, Monogr. Lyc. 1. 1842.

Lycopodium cernuum var. curvatum sensu Nessel 1939. Not L. c. var. curvatum Sw. Syn.
Fil. 178, 402. 1866.

Lycopodium cernuum var. cynosum sensu Nessel 1939. Not L. c. var. cynosum L'Herit.

Lycopodium cernuum var. inflexum

? ? 1872.
Have you a clue, perhaps
it is someone like Wawra?

RMIM
Palhinæa sandwicensis Degeners & Löve sp. nov.

Dr. Löve; What
has Herbert Löve?
Have you Engler's
journal, perhaps?

*Lack of space allows only brief clues to synonymy.

Long-lived green (in shade) to yellowish green (in sun) glabrous somewhat shiny perenn-
ial with terete stems never subterranean but always epigeous. Horizontal stems of inde-
terminate length looping over the ground in shallow 1-10 dm. long curves to root adventi-
tiously only from small circumscribed area touching ground, brittle, 5-7 cm. thick, with
mostly entire uniform leaves arranged in irregular often oblique whorls, usually produc-
ing a few erect-spreading sterile branch systems up to about 15 cm. long of springy di-
chotomous branchlets. Erect stems fertile, never rooting, one arising from horizontal stem
several dm. beyond rooting node and beyond this main stem soon usually dichotomizing to
form twin horizontal stems similar to old one. Erect stem system 1.5-15 dm. tall and el-

lipsoïd to ovoid-ellipsoid, 7-17 cm. wide and orbicular; erect stem brittle, with numerous subopposite erect-spreading side branches near base up to 15 cm. long and toward apex of stem about 3 cm. long; branches beset flabelliformly with numerous flaccid-resilient branchlets which except for lowest in system terminate in stiffly nodding sessile strobili. Leaves on erect stem crowded, counting decurrent bases about 12-ranked, openly imbricate, coarsely decurrent, free part suberect, entire or nearly so. Branches about 3 mm. wide and branchlets down to 1 mm. wide, both so densely surrounded evenly with about 8-ranked strongly curved-uncinate leaves to be twice to thrice as large in diameter; leaves with free part 2-4 mm. long and linear-subulate with caudate apex, entire or nearly so. Roots adventitious, whitish, somewhat spongy, mostly horizontal, 5 - 20 cm. long, narrowly sparingly dichotomizing and producing uniformly thick-filiform dichotomizing rootlets. Strobili angular-terete solitary at tips of branchlets, 5-15 mm. long, 2-3 mm. wide, yellowish green and often toward base pale orange-tinged, with about 10 rows of densely imbricate sporophylls. Sporophylls crowded, barely 2 mm. long, broadly deltoid, abruptly contracted toward base, acuminate at apex, irregularly and sparsely dentate-serrate, with awn-like tip. Sporangia subglobose. Spores (according to ~~W.A.~~ Selling) "Tetrahedral, trilete 19 X 31 (17-21 X 30-34) micra, with rounded angles not reached by the scars. Proximal facets devoid of sculpture. Distal wall with reticulate ~~spore~~ thickenings, giving the impression of irregular waves; wall comparatively little arched. This type is unique in the Hawaiian flora." Gametophyte (incompletely known) green, subglobose, a few mm. thick, gelatinous, delicate.

Type Locality: O., & I. Degener 34,8--. In mist, rain, strung sunshine at 3,800 feet, 27 Miles, Volcano Hawaii. Penetrating scrub of mosses, Stereocaulon, Dieranopteris, Sadleria, Macaeherina, Metresideros, Vaccinium, Stphelia, Scaevola. Railliardia. July --, 1979." Type, NY; is² and/or cotypes at AAU, AD, ISC, MAAS, MICH, AK, TEX, UC, B, IND, BRI, BRNM, RPU, CAL, STU etc.

Local Range: Common on all the major islands, including Lanai, in scrub and open forests in dryish to foggy and rainy regions at lower and middle elevations. The sporophyte commonly observed may be hundreds to even thousands of years old as it grows forward actively and seemingly by "leaps and bounds." As older parts become yellowish and senescent to die within a few years, acres of this wawaeiole may appear as many different plants whereas they actually are like clons - fragments of the same individual plant that had developed from a single chance meeting of motile sperm and sedentary egg in the gametophyte.

Did I mail you this article. If not, I shall get xeroxes made of missing pages to mail to you. O. D.

THE GAMETOPHYTE OF LYCOPODIUM CERNUUM
IN HAWAII¹

OTTO DEGENER

(WITH PLATES IV-VII AND TWO FIGURES)

Hawaii National Park, but a few hours' ride from the city of Hilo, is situated at an elevation of 1200 m. on Mauna Loa, an active volcano. Here, within an area of 10-20 sq. km., may be found every type of habitat, ranging from that of the bare glassy flows of "pahoe-hoe" lava in the crater of Kilauea, or the Kau Desert, to that of the humid tree-fern forest. Near the brink of the crater itself is a series of earthquake crevices from which steam continuously rises. This extends about 1.5 km. from a region of volcanic ash, upon which a few stunted plants of a peculiar Hawaiian composite and of a heath manage to exist, to an area thickly covered by an almost impenetrable tangle of vegetation. The conspicuous species characteristic of the latter luxuriant type of vegetation are the tree *Metrosideros polymorpha* Gaud.; a small tree-fern of the endemic genus *Sudleria*; *Gleichenia dicholoma* Hook., which clammers over any support to a height of 30-45 dm.; and *Lycopodium cernuum* L., which forces itself up through the underbrush and frequently rises to a height of 15 dm.

In December 1922, the writer, searching for the gametophytes of club mosses, noticed several sickly plants of *Lycopodium cernuum* at the brink of a stream crack in the area known as the Sulphur Bank. Upon observing these plants more closely, a few small sporelings were discovered on the sloping sides of the crevice. With this clue as to the type of locality in which the gametophyte of the species might be found, similar situations were investigated. Thousands of young sporelings and gametophytes were discovered, but since the circumstances under which these plants were growing can be duplicated only in a region of volcanic activity, stations not influenced by subterranean heat will first be described.

¹ Contribution from the Department of Botany of the University of Hawaii.

Extra Range: Whether certainly endemic or just native awaits study by the most modern methods. Nessel (ibid., 348-368) courageously shows our present confusion. We need more morphological, cytological and chemical observations to learn the different taxa's position in the hierarchy. We know ~~n~~-chromosome counts ^(mainly from ibid. and from ibid.) are characterized by three levels of polyploidy. Regarding chemistry, studies ((McGill University) show the lignin to be related to that of Conifers. It is a promising field. etc., etc.

(See also *Diphysa* & *Styrax*, *Eucalyptus*)

Lycopodium 22, 27, 74, 70, 91, 112, 133, 136, 153, 201, 272
 151, 270, 296 O.D. thesis, 305, 398, 406b, 407, 413, 1/2/
 51, 466, 4/5/35, 503, 521, 624, 504d, 704, 730, 737, 819, 2/
 18/57, 12/29/58, 868, 889, 504h, 936, 7/5/62, 1036, 1056a
 12/10/63, 504i, 1193, 1233, 1297, 1311, 11/15/67, 4/5/62
 1365, 1382, 1431, 1502, 1637, 1535, 1557, 504m, 157/
 1575, 1591, 1535b, 1594, 7/2/23, 6/2/23, 4/50/24, 11/2/23,
 4/1/23, 1/1/23, 3/14/23, 4/1/23, 8/7/23, 11/5/23, 3/14/23,
 4/5/23, 5/16/23, 7/24/23, 8/30/24, 4/9/24, 5/4/24, 6/3/24, 4/2/25
 6/11/23, 5/24/23, 1710, 1718, 101-29, 3/12/59, 3/21/62, 12/63,
 11/9/66, 11/3/66, 1934, 1770, 2000, 2002, 2004, 7/4/7, 7/8/77,
 3/14/23, 1/15/23, 6/14/24, 4/14/77, 12/5/73, 20/77, 2065,
 202/05, 1/1/26, 2/10/8, 3/20/77, Pamphlets

504 are notebooks with indexed
 clippings letters or xeroxes
 of them

This is through
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have been
wading so
long above
were with the
groups we
typed a
new card
for our
filing
cabinet
O.D.

It does not
look like
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any more
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left to
type
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this
time
anyway.

Brown, O. D.

Palhinhaea sandwichensis, spec. nov.

Long-lived green (in shade) to yellowish green (in sun) glabrous somewhat shiny perennial with terete stems never subterranean but always epigeaeous. Horizontal stems of indeterminate length loping over the ground in shallow 1 - 10 dm long curves to root adventitiously only from small circumscribed area touching ground, brittle, 5 - 7 mm thick, with mostly entire uniform leaves arranged in irregular often oblique whorls, usually producing a few erect-spreading sterile branch systems up to about 15 cm long of springy dichotomous branchlets. Erect stems fertile, never rooting, one arising from horizontal stem several dm beyond rooting node and beyond this main stem soon usually dichotomizing to form twin horizontal stems similar to old one. Erect stem system 1.5 - 15 dm tall and ellipsoid to ovoid-ellipsoid, 7 - 17 cm wide and orbicular; erect stem brittle, with numerous subopposite erect-spreading side branches near base up to 15 cm long and toward apex of stem about 3 cm long; branches beset flabelliformly with numerous flaccid-resilient branchlets which except for lowest in system terminate in stiffly nodding sessile strobili. Leaves on erect stem crowded, counting decurrent bases about 12-ranked, openly imbricate, coarsely decurrent, free part suberect, entire or nearly so. Branches about 3 mm wide and branchlets down to 1 mm wide, both so densely surrounded evenly with about 8-ranked strongly curved-uncinate leaves to be twice to thrice as large in diameter; leaves with free part 2 - 4 mm long and linear-subulate with caudate apex, entire or nearly so. Roots adventitious, whitish, somewhat spongy, mostly horizontal, 5 - 20 cm long, narrowly sparingly dichotomizing and producing uniformly thick-filiform dichotomizing rootlets. Strobili angular-terete solitary at tips of branchlets, 5 - 15 mm long, 2 - 3 mm wide, yellowish green and often toward base pale orange-tinged, with about 10 rows of densely imbricate sporophylls. Sporophylls crowded, barely 2 mm long, broadly deltoid, abruptly contracted toward base, acuminate at apex, irregularly and ~~apexes~~ sparsely dentate-serrate, with awn-like tip. Sporangia subglobose. Spores tetrahedral, trilete, 19 x 31 micra, with rounded angles not reaching the scars. Gametophyte green, subglobose, a few mm thick, gelatinous, delicate.

(Incomplete translation into grammarfree "Latin") (but the terms are botanical):

Planta perennis, in umbra viridis in lux solis luteo-viridis, aliquot nitida, caules teres repentes subterraneus sed semper epigaeus. Caulis horizontalis indeterminatus, longus, cum adventitius radices, fragilis, 5 - 7 mm crassus (latus?), cum folia plerumque uniformis in verticillis irregularis saepe obliquus, ramis aliquot erecto-patentissimus, usque at 15 cm longi, pauci et dichotomus resiliens ramulis. Caules erecti fertilis, nunquam radicanes, dichotomus. Systema erects fertilis, nunquam radicanes, dichotomus, 1.5 - 15 dm altus, ellipsoideus; ad ovoid-ellipsoideus, 7 - 17 cm latus, orbicularis; caules erecti fragilis, cum multus suboppositus, erecto-patens rami prope basin usque at 15 cm longi, versus apex caulus circa 3 cm longi; rami onustus flabelliformis plurimus (multus?) flaccido-resiliens ramuli terminans, exceptus infimus, in strobili sessilae rigens nutans. Folia in caules erecti aggregatus, circa 12-farius (12-seriatus?), aperto-imbricans, grosse decurrentibus, pars liber suberectus, integer vel prope integer. Rami circa 3 mm latae, ramuli de 1 mm latae, ambo (duo? utriusque?) circumsinctus dense cum circa 8-seriatus (8-farius?) valde curvatus, foliae bis vel ter crassus; folia pars liber 2 - 4 mm longe, linearis-subulatus, apex caudatus, integris vel fere integris. Radices adventitiae, anguste dichotomus. Strobilus angulato-teretibus, solitarius ad apice ramuli, 5 - 15 mm longus, 2 - 3 mm latus (crassus?), luteo-viridis, saepe dilutus (pallens?) aurantiaco-tinctus; versus basis, circa 10-seriatus (10-farius?) sporophyllae dense imbricatus. Sporophyllae aggregatae, vix 2 mm longae, late ~~subulatae~~ deltatae, abrupte contractus versus basis, apex acuminatus, irregulariter et sparsim dentati-serrati, apex aristatus. Sporangium subglobosus, spora tetraedrus, triletus, 19 x 31 micra (micrometers?). Gametophytus viridis, subglobosus, aliquot millimeters crassus (latus?), gelatinus, subtilis.

Plate

Planta perennis, viridis in umbra, lutescens-viridis in luce solis,
glaberrima, & aliquot nitida, caulibus teres mucronatis subterraneis sed
semper epigeis. ~~Caulibus~~ ^{caulis} horizontalis subterminatus

~~Translucida, terrea, rotunda, suberosa~~
~~interstitia,~~

Plant perennial, green in shade, to yellowish-green in sun, glabrous and somewhat shiny with toment stems that are never rustaceous but always, spargaceous. Horizontal stems of indeterminate length, in shallow 1-1.5 cm long canes that root, adventitious when ~~forming~~ ~~grows~~, brittle, 5-7 mm thick, with mostly ~~long~~ leaves arranged in irregular or ~~oblique~~ whorls, usually ~~prolonging~~ with a few erect spreading branches up to about 15 cm long of spargy dichotomous branched. Erect stems fertile, never rooting, dichotomous. Erect stem 1.5-1.5 dm tall, ellipsoid to oval-ellipsoid, 7-12 cm wide and orbicular; erect stem brittle, with numerous subopposite erect spreading ~~the~~ branches new base up to 15 cm long at terminal apex of stem about 2 cm long; branches ~~flattened~~ ~~to~~ ~~be~~ ~~set~~ ~~flabelliform~~ with numerous flaccid-resilient branchlets ~~terminating~~, except for the lowest, in stiffly nodding sessile ~~trichia~~. Leaves on erect stem crowded, about 12-ranked, openly imbricate, coarsely decurrent, free part suberect, entire or nearly so. Branches about 2 cm wide, (incl) branchlets down to 1 cm wide, both densely invaginated with about 8-ranked strongly curved-unicostate leaves so to be twice to thrice as thick (in diameter); leaves with free part 2-4 mm long, ~~the~~ green-subulate with ciliate apex, entire or nearly so. Roots adventitious, normally ~~spargy~~ dichotomous. Strobiles egg angular-torate solitary at tips of branchlets, 5-15 mm long, 2-3 mm wide, yellowish green at top, pale green at base, ~~and~~ ~~with~~ ~~about~~ ~~10~~ ~~of~~ ~~small~~ ~~conical~~ ~~sporangia~~. Sporangia crowded, basally 2 mm long, broadly deltoid, abruptly contracted toward base, acuminate at apex, irregularly and sparsely dentate-serrate, with awn-like tip. Sporangia ~~sub~~ ~~base~~ ^{micro} ~~micro~~ ~~spores~~ (according to setting) tetrahedral, trilete, 17 x 21 (17-21 x 20 x 24) ~~microspores~~, with rounded angles not reached by the scars. Proximal facets devoid of sculpture. Cystoglyte green, subhyaline, a few mm thick, gelatinous, delicate.

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DRS. OTTO & ISA DEGENER
P. O. Box 154
Volcano, Hawaii 96785, U.S.A.
after July!

DRS. OTTO & ISA DEGENER
68-617 Crozier Drive
Waialua, Oahu, Hawaii
96791 U. S. A.

June 25/79

Dear Dr. Löve:

I guess our letters crossed once again or mine was delayed in the mails. I do hope the Fiji specimen arrived and was not stolen by the postoffice. Anyway, we Degeners are just floundering about; ~~we~~ we have decided to try to get your agreement to immediately publish the enclosed ms., in Moldenke's Phytologia. It is purposely noncommittal regarding our Haw., taxon; though it does place Linne's type with habitat "in Indiis." in the correct genus.

We may get some further information in answer to our letter to the L., Society in London. But at our ages, why wait for it?

You have no idea how busy Isa & I have been. To further Conservation, we have been mailing pertinent xeroxes with "thank you" letters to our own Legislators, who commended me officially in a Resolution. There is no use waiting until they have forgotten about me. Next, Isa & I were so surprised getting documents from New York awarding Isa & me (with one other person) "Distinguished Service Awards." For this we just ended writing other "thank you" letters. Furthermore, I am to get the Willdenow Medal from Berlin Sept. 11. I wish to write about Austrian & German influence in the Botany of the Islands: Chamisso, Wawra, Rock, Hillebrand, us, etc.

Isa will probably fly to Germany to accept the medal, returning with her mother, who is totally blind in one eye. She left last week to start giving up her apartment in Freiburg, and packing her most precious possessions. The trip to Berlin & back would be business and tax deductible, but all the remaining expenses would not be so.

I don't drive, and we have no bus transportation at Mokuia. So we shall fly to Volcano Saturday. We had planned to take our VW minibus, going by cargo, two days earlier than we go by plane. At Volcano, with Isa gone, I need but walk two blocks to the grocery store & postoffice to survive. Also, a friend in the neighborhood is a retired trained nurse, and in Hilo is the physician who implanted my pacemaker. So you see, Volcano is the logical place for me.

We were ready to fill our car with all our notes & your informational letters, books for storage & sale, some carpets, etc. NOW WE Discover that due to a fireman's strike here, the airport will be closed July 1, and probably the harbor as well. Were we to have our car at the wharf and the strike erupts, how would we get it home to Volcano? Though the Russian Govt., is built fundamentall on sand, such outrageous conditions would never be tolerated. ~~My~~ visit there was a real eye opener.

If I get your consent, I will set up the ms., on my typewriter at Volcano, and mail it to Moldenke.

At Volcano I shall activate by writing a description from one or two? fresh, living "lycopods" as I did of *P. cernua*, and write herbarium labels of an accumulation of herb. specimens. I must get them into herbaria of the World for safety while I am still alive. I don't want Isa to have all this drudgery hanging over her head.

Aloha,

Otto Degener

DRS. OTTO & ISA DEGENER
68-617 Crozier Drive
Waiānae, Oahu, Hawaii
96791 U. S. A.



*Refer
Certify*

*Dr. A. Love
5780 Chandler Court
San Jose, Calif 95123*

PALHINAEA CERNUA (L.) Deg., Deg. & Löve Comb. Nov.

O., v. D., Degener and A. Röve

After flying around the World with numerous stopovers in
warm and tropical regions two of us consulted with a ^{colleague} ~~third~~ regard-
ing the correct taxonomic disposition of a certain clubmoss that
has numerous close relatives of wide distribution. Our concensus
is the following:

Palhinaea cernua (L.) Deg., & Deg. & Löve Comb. nov.

Synonym: Lycopodium cernuum L. Sp. Pl. 2:1103. 1753, with the
type locality "Habitat in Indiis." Herman Nessel in "Die Bär-
lappengewächse (Lycopodiaceae)," page 353, 1939, errs in claim-
ing that the "Typ ist in Afrika heimisch."

Of course our rules suggest that if there are more than
two authors, the last two are to be lumped as "et al." Seemingly
ridiculous, let us ignore this ruling.



Kala Degener

WAILUA, OAHU, HAWAII

June 5, 1979.

Dear Dr. Löve:

Isa & I are rather upset that the letter to you with our "L. cernuum" scrap collected years ago was evidently lost in the mails. Perhaps it will turn up after all. We have no duplicate of the erect branch system, but NY & other herbaria must have them. What compounds the loss is the disappearance of xeroxes, which ones we don't know, which we bundled around the specimen. So yesterday we xeroxed again a few, not knowing whether you had seen them or not. We were not very thorough because of fatigue after the machine started balking.

I guess our last letters crossed in the mails. The "sensu, sensu, sensu ad infinitum" ms., is rather awkward except for local consumption. Also, we Degeners are terribly slow! This is our suggestion:

Let us simply publish *Palhinaea cernua* (L.) Deg., & Deg. & Löve in *Phytologia* at my cost - its nominal - basing it on Linnaeus' type coming from some "Habitat in Indiis." Then we can mention briefly the occurrence of related taxa (without mentioning whether they may be forms, vars or species) throughout tropical & warm regions and curiously enough, even in warm fumeroles in temperate ones.

Next, for the Fl. Haw., we can publish what we think about our local taxon, you "lumping" it abd Isa & I "splitting" it. Hatheway and I followed this method with a fern, I believe successfully.

We are unexpectedly trapped again: A divorced officer rented a unit from us around Christmas. Properly & legally he gave us a few days ago notice that he would vacate July 1 to return to the Military Post at Schofield. We had planned returning to Volcano within two weeks. Now we must hunt for a replacement, and PERHAPS do "janitorial work" to get the unit attractive again. Forgetting his key some nights ago, he broke his front door, and now Isa is watching a carpenter repair it. Luckily, we have his deposit to pay for this nuisance.

For our strictly Haw., taxon work I wrote London, as the carbon shows. It would hardly change anything with a *Phytologia* article should it fit in with your plans. Should we get a distinctive photo of the type, it might be worth reproducing it with owner's permission.

Getting back to Government, we realize that "big business" can act unjustly under US conditions. But EVER BIGGER business, like for instance Am. T. & T., would not. If everyone were to buy ten or so shares in such businesses, if profits were unreasonably high because of some unjust restraint in trade I, as consumer and purchaser of the service would automatically be protected: The loss I suffered as purchased I would regain as profit from the shares I owned. Thus we own trivial blocks of shares in various huge companies. Furthermore, as part owners of such companies, we vote wisely (we hope) and, whenever officers are to be given outrageously high salaries, we always vote against this. Had I children, I would advise them to invest widely and niggardly.

We despise the laborers who have worked for a sugar or pineapple company and never once risked part of their earnings to buy shares to get it on its feet. Then 30 - 50 years later, due to some rabble rouser they strike. They have forced most sugar & pineapple companies into bankruptcy. Then they yell for welfare and Isa & I, who have lived frugally all our lives, are taxed to keep these opportunistic idiotic loafers in comfortable idleness. The main industry now is Tourism and the illicit growing of marijuana. Isa & I are afraid to botanize in most places for fear of being shot at. One of our tenants had such a bad experience that he & wife left the Islands permanently.

When I started the "Cheng-Ho Trading & Exploring Co., about 25 years ago, all of us partners were paid in shares for the work we did on the vessel. When partners needed cash, they received that in place of shares. It was a successful company until we lost the 100 foot long boat by piracy by connivance by the Captain with the Governor of Tahiti. The State Dept., refused to protect me, because the vessel had been put under the French flag. I am not proud of the USA.

We insignificant beings don't know who Nationally will be our bomb-throwing enemies. So that our collection of often now extinct Haw., taxa shall not be wasted, we deposite important sets in preferably potential enemy museums. Should any of these, ^{destroy} our precious finds in the US, our duplicates may be safe behind enemy lines. Anyway, Science is international.

Now I have preached enough.

Aloha,

Otto Degener

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Botanischer Garten

Gießen, den 13. VI. 1939

Herrn

Dr. Otto Degener

Waialea Oahu, T. Hawaii

Sehr geehrter Herr Doktor!

Seben bin ich Ihnen den Besitz Ihres freundl. Schreibens, nebst Zeichnung und Beschreibung von Lycopodium serratum, gelangt, bester Dank hierfür.

Für Zeit habe ich sehr wenig Zeit, da ich meine Monographie über alle Lycopodien beenden will. - Aber damit Sie nicht so lange warten müssen, will ich gleich Ihren Brief beantworten.

Lycopodium serratum Thunbg. kommt nur in Ost-Asien und dessen Inseln vor. In meiner Monographie geht sie unter dem Namen Urosalpinx serrata (Thunbg.) Herb.

"Lycopodium sargassophilum Liebm. ist ein Synonym von Urosalpinx von den Sandwichsinseln kommt sehr stark ich am nächsten "Urosalpinx Helli Herb" mit lanzettlichen und zarter Beblätterung

Die abgebildete Pflanze (Zeichnung) ist eine typische Lycopodium sulcinervium Spring = Urosalpinx sulcinervis (Spr.) Herb.

Es kommt nur auf den Sandwichsinseln vor. Über ~~es~~ ^{verschieden} sind 3 weitere Formen bekannt geworden (Lycopodium v. densatum Hillebr. = Synonym)

I. Lycopodium sulcinervium Spr. var. kanaiensis Hillebr.

Stengel u. Seitenäste bis 30 cm lang, von Seitenästen ist kaum zu reden, da sehr wenig verzweigt. Durchmesser 2 mm, mit den Blättern 10-15 mm dick. Mountains of Kanai (Hillebrandt.)

II. Lycopodium sulcinervium Spr. var. Hillebrandii (Pardw.)

Pflanze im Habitus der Art gleichend, sehr kräftig im Stengel und sehr dicke Beblätterung. Oahu, Mount Kaala (Hillebrandt.)

III. Lycopodium sulcinervium Spr. var. nubigenum Hillebr.

Größer als die vorige Pflanze in allen Teilen und die Beblätterung breiter.

Nur auf den Sandwichsinseln

Lycopodium v. javanicum Sw. kommt nur auf Java vor.

Lycopodium serri. var. javanicum Mak. ist ein Synonym von
Lyc. serri. var. Thunbergii Mak. u. soll nach Heller auch auf Hawaii
vorkommen, was ich aber in Frage stelle.

Man kann erst entscheiden u. bestimmen, wenn man die Originale
sieht.

Wenn meine Monographie fertig ist, kann ich mich auch
den hawaiischen Pflanzen widmen.

Die Lyc. subinervosum Spr. (Zeichnung) können
Sie nach der Skizze selbst beschreiben.

Mit bestem Gruß

H. St. Hessel.

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Geologische Reichsanstalt
Wien, am 12. I. 19.

Sehr geehrter Herr Degner!

Vielen Dank für Ihre freundliche Karte vom 15. I. 38, die ich soeben erhalten habe. Sofort nach Einreffen der 34 Fragmente von Selaginellen werde ich sie bestimmen in Uebersendung Ihnen das Resultat mittheilen.

Also geht es Herrn Topping wieder gesundheitlich besser was mich sehr erfreut.

Ich bitte, um Ihren Wunsch noch nachzutheilen, mir von den hawaiischen Selaginellen *S. Menziesii* wieder einige Fragmente zu senden, damit ich außer dem Topping noch zwei Formen machen kann.

In meiner Monographie der Lycopodium habe ich folgende Arten in Formen für die Sandwich-Inseln notiert, vielleicht ist die Aufstellung für *Metlora* von Interesse!

- Woodsia Haleakalae* (Pracht.)
- " *Helleri* Herb.
- " *milnerianus* Grev.
- " " var. *kanaianus* (Hillebr.)
- " " " *Hillebrandii* (Pracht.) = *syn. Lycopodium serratum* v. *dentatum* Hillebr.
- " " " *mitis* (Hillebr.)
- " *serratum* (Thunb.) ?
- " *erubescens* (Pracht.)
- " " var. *hawaiiensis* (Schleg.)
- " " " *linearis* (Hillebr.) = *Lycopodium levirianum* Herb.
- " *polytrichoides* (Kuntz.)
- " " var. *peruvianum* (Pracht.)
- " *varians* (R. Br.) ?
- " *mitis* (Pracht.)
- " *phylloanthus* (Hook.)
- " *pachytrichus* (Grev.)
- " " var. *phylloanthus* (Grev.)
- " *phlegmaria* (L.) var. *Mannii* (Hillebr.)
- Lycopodium venustum* Gand.
- " *incellatum* Gand.
- " *herpetium* Hillebr.
- " *heterophyllum* (Hook.) Hillebr.
- " *montanum* Hillebr.
- " *serotinum* L. var. *crassifolium* Grev.
- " " var. *cyrenum* L. (Harit.)
- " *volubile* Forst. ?

THE UNIVERSITY OF BRITISH COLUMBIA

VANCOUVER 8, CANADA

DEPARTMENT OF BIOLOGY AND BOTANY

September 24, 1965

Dr. Otto Degener
University of Hawaii
Honolulu, Hawaii

Dear Dr. Degener:

Thank you for your letter. The business of Psilotum has turned out to be rather embarrassing for me. Initially, a Japanese biochemist and myself tried for some time to determine the structure of the new compound, which we called psilotin but it proved to be an intractable problem. My colleague returned to his country and other problems. In the meanwhile I invited an organic chemist to collaborate. Although it turns out to be a relatively simple compound it took him and his technical people almost two years to come up with the answer.

He then wrote up a manuscript - most of which included the results of his labours. I suggested that since my part in this was relatively minor as far as the chemistry was concerned (most of the paper was on the synthesis of psilotin) it would be better if a shorter paper were written as well in which our role could be better defined (i.e. that of the Japanese worker and myself in first isolating the compound). Well our lines got crossed up somewhere along the way - a manuscript by McInnes, Yoshida & Towers was submitted by McInnes to the Journal Tetrahedron. The manuscript was examined very briefly by me and since I was more concerned with not wanting to be a co-author I hardly looked at it. The galley proof was sent to the Japanese worker in Japan! After a delay he sent it to me and as it arrived at a dreadful time of the academic year and was already a month overdue I sent it to the chemist without reading it.

When I got your letter this morning I thought I would look at a copy of the manuscript which had been sent to me to see what

Aloha,

Perhaps you will get a letter from our good friend Dr. Harold Moldenk

checked make-up you also for L. clavatum & L. subserotinum (p. 58 of your work with these). Why can't it occur in Psilotum?

had been written about Psilotum itself. Nothing has been said in this manuscript about the analysis of the Hawaiian material. I am sending you a copy of the manuscript for your information.

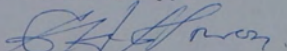
I must take full responsibility for the poor botanical treatment in this paper - I am the only botanist among the authors.

In view of the nature of this particular paper, I think it would be in order to write a short note in a botanical journal to the effect that the Hawaiian taxon also contains this particular compound (it would be even more interesting to examine Tmesipteris as well. So far I have not had much luck in getting material.) What do you think?

The Krajinas send their best wishes.

With regards,

Yours sincerely,



G. H. N. Towers
Professor and Head

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Hale Pogson

WAIALUA, OAHU, HAWAII

May 29, 1979.

Dear Dr. Love:

Now that Isa & I have been able to get back to describing *Palhinaea sandwicensis* from living material, we have tackled your Nov. 11 and other letters.

We do hope we can enlarge on the generic description to fill the entire page. As mentioned before, the character of the horizontal stem must be modified and we need more on the (probable) character of the gametophyte. I remember it as a delicate green "glob"like a bloody tick, and an early letter (1922-23? from Alma Stokey) even shows her hasty drawing of it. I thought she would work it up, but she never did. Should chromosome considerations perhaps go under the generic heading? Then why not put P. s. on page two???

THEN we shall have a full sheet of two pages for our perhaps a bit verbose text about P. s. The two sheets will ALWAYS be bound next to one another in the Flora anyway.

Is the genus P., perhaps more tropical than Lycopodium? The latter seems to us more temperate and even boreal, perhaps of evergreen forests. Is it more common in the Northern Hemisphere? Of course, we can get a fair idea from perusing Nessel in comfort.

What about the xerox I mailed you of Fowlers 4/5/62 letter with lignin reference and regarding Lycopodium s.l., that two groups occur so far as chromosomes are concerned!

Why does Pichi Sermolli put our plant in Lycopodiella?

We are delighted Selling has a key for our Club & Claw Mosses based on spores. We would be so interested to know what a key based on gams., would show; also chromosomes. Have you any information?

We are ashamed that we are so slow, but please remember we have duties to perform to earn a living from rental units, book sales, etc. We get far less income, thanks to taxes, from rents on property I starved to acquire than if I had the cash in a Savings Bank. Furthermore, Isa & I must be amateur carpenters, painters, plumbers & janitors because of prohibitive expense of hiring anyone. So many tenants are cheats and outright criminals. One promising young lawyer with wife but no children owed us rent for over two months, We won the judgment in Court against him. He "separated" from his wife, of course turning their property over to HER. Before we could get our cash, he popped into the Bankruptcy Court and without questioning by the tired, old judge had all debts forgiven including these for taxes! He left the house in a shambles, even canisters of drugs!

We are actually afraid to botanize on Oahu because of Cannabis growers who may shoot at any strange car.

Ignoring political views drummed into them, we consider Russian youths we observed during the 1975 Congress as superior to the Americans. During WW III, I fear we shall lose. The situation is frightening. We get many military couples as tenants, some being fine types of Americans, but within two years exposed to Cannabis, they are pretty worthless dopes. Submariners, in contrast, were outstanding.

We know from our cleaning lady (who we no longer can afford to hire one day per week), that many of the plantation laborers eat far better than we, and squander their earnings on illegal gambling and cockfighting instead of buying shares in the companies for which they work and whose policies they could help influence. Of course, I don't mean all are like that. They are not willing to assume any risk in a business. Then they strike. They forced most of the sugar & pineapple plantations into bankruptcy. Do you realize that the illicit traffic in Marijuana is said to exceed in cash from sugar & pineapple? These laborers then go on welfare, and we thrifty citizens are taxed to keep them in healthy idleness! Tourism seems to be the safest industry thus far.

Our friend, former Park Ranger and wife (the single daughter is married), were so upset that they spent their life savings on interesting trips, and are now living comfortably in a California auto court. How about it? Let's drop all work on Palihaea, etc and imitate them. The trouble is that Isa & I are in such a rut that we would be unhappy were we to get out of it. I bet you would find some dizzily vibrating gene in one of the Degener & Lve chromosomes.

on Welfare Aloha,

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P.S. Did you get the Palihaea paper from Fiji we mailed you? Why don't me three publish in Phytolegia?

Falkinhaea sandwicensis, spec. nov.

Long-lived green (in shade) to yellowish green (in sun) glabrous somewhat shiny perennial with terete stems never subterranean but always epigeaeus. Horizontal stems of indeterminate length loping over the ground in shallow 1 - 10 dm long curves to root adventitiously only from small circumscribed area touching ground, brittle, 5 - 7 mm thick, with mostly entire uniform leaves arranged in irregular often oblique whorls, usually producing a few erect-spreading sterile branch systems up to about 15 cm long of springy dichotomous branchlets. Erect stems fertile, never rooting, one arising from horizontal stem several dm beyond rooting node and beyond this main stem soon usually dichotomizing to form twin horizontal stems similar to old one. Erect stem system 1.5 - 15 dm tall and ellipsoid to ovoid-ellipsoid, 7 - 17 cm wide and orbicular; erect stem brittle, with numerous subopposite erect-spreading side branches near base up to 15 cm long and toward apex of stem about 3 cm long; branches beset flabelliformly with numerous flaccid-resilient branchlets which except for lowest in system terminate in stiffly nodding sessile strobili. Leaves on erect stem crowded, counting decurrent bases about 12-ranked, openly imbricate, coarsely decurrent, free part suberect, entire or nearly so. Branches about 3 mm wide and branchlets down to 1 mm wide, both so densely surrounded evenly with about 8-ranked strongly curved-uncinate leaves to be twice to thrice as large in diameter; leaves with free part 2 - 4 mm long and linear-subulate with caudate apex, entire or nearly so. Roots adventitious, whitish, somewhat spongy, mostly horizontal, 5 - 20 cm long, narrowly sparingly dichotomizing and producing uniformly thick-filiform dichotomizing rootlets. Strobili angular-terete solitary at tips of branchlets, 5 - 15 mm long, 2 - 3 mm wide, yellowish green and often toward base pale orange-tinged, with about 10 rows of densely imbricate sporophylls. Sporophylls crowded, barely 2 mm long, broadly deltoid, abruptly contracted toward base, acuminate at apex, irregularly and ~~sparsely~~ sparsely dentate-serrate, with awn-like tip. Sporangia subglobose. Spores tetrahedral, trilete, 19 x 31 micra, with rounded angles not reaching the scars. Gametophyte green, subglobose, a few mm thick, gelatinous, delicate.

Additions and queries

Line 1: "glabrous": glabra,

3: "loping over the ground in shallow 1 - 10 dm long curves":
undulantes super humum flexibus levibus 1 - 10 dm longis [undulantes =
undulating; is there a botanical Latin term for loping? The most
literal translation I can think of would be salientes, but this
would mean "leaping," "springing."]

"to root adventitiously": literally, ita ut adventitiae radicarentur

"only from small circumscribed area touching ground":
una parte solum, parva, circumscripta, humum attingentes,

5: "usually producing a few erect-spreading sterile branch systems
up to about 15 cm long": [instead of "ramis ... longis"] plerumque
generantes ramos aliquot erecto-patentes et steriles usque ad 15 cm
longos,

6: "one arising from horizontal stem several dm beyond rooting node
and beyond this main stem soon usually dichotomizing to form twin
horizontal stems similar to old one":
uno exoriente ex caule horizontali aliquot dm ultra nodum radican-
tem et mox ultra (hunc) caulem principalem ~~dichotomizante~~ plerumque
dichotomizante* in caules geminos horizontales cauli principali
similes.

Please forgive my lack of botanical knowledge here; I suspect that
I have misinterpreted. The suggested Latin translation means roughly,
"one arising ... rooting node, and soon, beyond (this) main stem,
it [the stem arising from the horizontal stem] usually dichotomizes
into twin horizontal stems similar to the main stem." Otherwise,
should this be something like (instead of "radican-tem et mox ...
similes"), radican-tem, caule principali mox ultra hunc nodum
dichotomizante* in caules geminos horizontales sibi similes ("... and
beyond this node the main stem usually dichotomizes into twin
horizontal stems similar to itself")?

12: "counting decurrent bases": cum decurrentibus basibus

faria/seriata: neither is a classical Latin word; from the
botanical Latin she has read, Hannah thinks that seriata is
probably the correct form.

⁵
1A: "evenly": aequaliter

faria/seriata?

*= made-up Latin word; there not a pure Latin equivalent. The closest
equivalents would be diffissi ("split") and dimidiati ("halved").

Lines 15-

16: "so ... to be ... as large in diameter": aequaliter et tam dense circumcincti ... curvatis ut totus orbis bis*vel ter crassior sit ("so densely ... that the whole diameter is ...")

OR: aequaliter et dense circumcincti ... curvatis et toto orbe** bis vel ter crassiores (... and [they are] in their whole diameter ...)

*Is there a botanical Latin term for diameter; classical Latin would usually use orbis (circle) but sometimes borrows the Greek diametros (tota diametros).

**Or tota diametro.

"curved-uncinate": curvato-uncinatis

17: "whitish ... dichotomizing rootlets": albulae, aliquot spongiosae, plerumque horizontales, 5 - 12 cm longae, anguste et parce dichotomi, ramulos generantes uniformiter crasso-filiformes et dichotomos

24: micra: μm ?

"with rounded ... the scars": angulis orbiculatis cicatrices non attingentibus

(Incomplete translation into grammarfree "Latin"){but the terms are botanical):

Planta perennis, in umbra viridis in lux^{ce} solis luteo-viridis^x, aliquot nitida,
caules^{ibus} teretibus^{tribus} repentes^{numquam} subterraneis sed semper epigeis. Caulisⁱ horizontalisⁱ
indeterminatus^{ae}, longus^{longitudinis}, cum adventitiisⁱ radicibus^{ibus}, fragilis, 5 - 7 mm crassus (latus?)^{latis},
cum foliis^{is} plerumque uniformibus^{ibus} in verticillis irregularibus saepe obliquis,
ramis aliquot erecto-patentissimis^{ibus}, usque ad 15 cm longis, paucis^s et dichotomis^{ibus} resiliens^{tibus}
ramulis. Caules erecti fertiles^e, nunquam radicanes^m, dichotomi^{is}. Systema erectum^a
fertile^m, nunquam radicanes^a, dichotomus, 1.5 - 15 dm altus^a, ellipsoideus^a
ad ovoid-ellipsoideus^o, 7 - 17 cm latus^a, orbicularis; caulis erectusⁱ fragilis,
cum multisⁱ suboppositisⁱ, erecto-patentibus^{ibus} rami^s prope basim^m usque ad 15 cm longi^s,
versus apex^{icem} caulisⁱ circa 3 cm longi; rami onustusⁱ flabelliformis^{iter} plurimus (multus?)^e
flaccido-resiliens^{tibus} ramuli^s terminans^{tibus}, exceptus infimisⁱ, in strobili^s sessilibus^{ibus}
rigens^{ter} nutans^{tibus}. Folia in caulis^{ibus} erecti^s aggregata^a, circa 12-faria^a (12-seriatus?)^x,
aperto-imbricatis^{tia}, grosse decurrentibus^a, parvis^{te} liberis^a suberectis^{an}, integer vel prope
integer^{ra}. Rami circa 3 mm latae^{ae}, ramuli de 1 mm latae^{ae}, ambo (duo? utriusque?)^e
circumscriptus^c dense cum^{foliis} circa 8-seriatusⁱ (8-farius?)^x valde curvatusⁱ, foliis^c
bis vel ter crassus; folia parvis^{te} liberis^a 2 - 4 mm longa^a, linearis-subulatus^{eo},
apice^o caudatus^{ra}, integra^{ra} vel fere integris^o. Radices adventitiae^x, anguste dichotomi^{is}.
Strobilus angulato-teretibus^{ibus}, solitarius ad apicem^o ramuli, 5 - 15 mm longus,
2 - 3 mm latus (crassus?)^{em}, luteo-viridis, saepe dilutus (pallens?)^{ae} aurantiaco-tinctus^{ae}
versus basimⁱ, circa 10-seriatusⁱ (10-farius?)^x sporophyllae dense imbricatus^{is}.
Sporophyllae aggregatae, vix 2 mm longae, late ~~lati~~ deltatae, abrupte contractus^{ae}
versus basim^{em}, ad apicem^{ae} acuminatus^{ae}, irregulariter et sparsim dentata-serrata^{ae},
apice^o aristatus^{ae}. Sporangium subglobosus^m, spores tetraedrys^{ae}, triletus^{ae},
19 x 31 micra (micrometers?)^x. Gametophytus viridis, subglobosus, aliquot
millimeters crassus (latus?)^{ae}, gelatinus, subtilis.