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Miscellaneous Notes on Hawaiian Plants—4<sup>1</sup>

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FALLS CHURCH, VIRGINIA

This paper presents observations and critical, taxonomic, nomenclatural, historical, and distributional notes on native and exotic members of the Hawaiian flora in the genera *Thelypteris*, *Xyris*, *Canavalia*, *Prosopis*, *Jatropha*, *Rhamnus*, *Osmanthus*, *Emilia*, *Sonchus*, and *Wedelia*, with new combinations in *Canavalia* and a new forma in *Prosopis*. Several species are newly recorded for the Hawaiian Islands. Herbarium abbreviations are those of the I.A.P.T. Index Herbariorum, except that specimens in the Bishop Museum herbarium are marked "BISHOP" and specimens still in the author's possession are marked "Fo."

***Dryopteris sandwicensis*** (H. & A.) Christensen.

My transfer of this species to *Thelypteris* (Fosberg, B. P. Bishop Mus. Occasional Pap. 23: 30, 1962) was an error, which was called to my attention by Professor W. H. Wagner. The transfer intended should have been of *Stegnogramma sandwicensis* Brack., which is, indeed, a *Thelypteris* (*Cyclosorus*). This name cannot now be transferred. The type, from "C. Lua Pele Puna District, Hawaii" *U.S. Expl. Exped. 1* (US) is probably too close to *T. stegnogrammidoides* anyway. Dr. H. P. Fuchs told me recently that the name *Thelypteris* Schmidel is illegitimate. His arguments are not yet published. Therefore, it seems best not to make more transfers to *Thelypteris* until it is certain that they should not all go to *Lastrea* Bory, which, if Fuchs is correct, could only be avoided by conserving *Thelypteris*.

<sup>1</sup>Numbers 1, 2, and 3 of this series were published as B. P. Bishop Mus. Occasional Papers 12(15):1-11, 1936; 16(15):337-347, 1942; and 23(2):29-44, 1962.

**Xyris**

Never having seen or heard of *Xyris* in the Hawaiian Islands, I was surprised to see unmistakable *Xyris* "cones" in a dried bouquet on sale in Hilo. The florist informed me that the plant grew at the volcano and was called "ahanui." At my request Mrs. Juliette Wentworth looked for it. With the aid of Mrs. Violet Hanson, she found an abundant stand of the plant near Mountain View and collected several sheets for me.

Some time later, Mrs. Wentworth discovered another species of *Xyris*, quite distinct in appearance from the first, growing with the first at a location southeast of Mountain View. On November 25, 1963, I visited Hawaii and was taken to two localities in the vicinity of Mountain View, where I collected ample material of both species. They were growing together in disturbed lava soil in a well-drained environment southeast of Mountain View; the first species was also growing in a marshy place southwest of Mountain View. Later Miss Marie Neal gave me a sheet of a collection of the first species made in 1959 by Mr. Harold T. Yamayoshi in the same general area.

The family Xyridaceae is new to Hawaii, but is well known in tropical and subtropical North and South America, Africa, Asia, and Australia, the islands of the western Pacific, and in eastern North America as far north on the Atlantic Coast as Nova Scotia and Newfoundland. One of the Hawaiian plants matches *X. platylepis* of the Atlantic and Gulf Coastal Plain of the southeastern United States, whereas the other is the widespread *X. complanata* of southeast Asia and Australia. These doubtlessly were introduced to Hawaii at least ten years ago, as the heads have been used in dry flower arrangements for at least that long on Hawaii. The astonishing thing is that they have not been reported in Hawaiian botanical literature before now. The plants have basal leaves, grasslike in appearance, distichously arranged, and a naked, somewhat flattened flowering scape bearing what looks like a little pine cone at the top with bright yellow flowers peeping out from between the scales. There is nothing known in the Hawaiian Islands for which they could be mistaken.

***Xyris platylepis* Chapm.**

This species has broad heavy leaves from a distinctly bulbous base, heads ovoid, terete, tending to be acute at the apex.

Hawaii: "Off the Mamaloa Highway between Mountain View and Glenwood, along side roads, 18 to 22 miles, at between 2,000 and 2,200 feet elevation," Jan. 14, 1962, *Wentworth and Hanson* (Fo); above Mountain View, in swampy, muddy land, *Yamayoshi* in 1959 (BISHOP, Fo); about 1 mile southeast of Mountain View, in "Hawaiian Acres," on broken, not very rough aa lava surface in grass, moist in low places, 500 m., *Fosberg 44474* (US, BISHOP, Fo); about 1 mile toward Kilauea from Mountain View, in wet grassy disturbed place on broken lava clinker, 600 m., *Fosberg 44475* (US, BISHOP, NY), *44476* (US, BISHOP, SMU, Fo), *44477* (Fo). These specimens have been examined by L. B. Smith, and Nos. *44475* and *44476* by Robert Kral and John Lewis, all of whom concur in the determination as *X. platylepis* Chapm.

This species is native in the southeastern United States, where it grows in very acid sandy soil. Who introduced it to Hawaii is not known, but it was doubtless for use in flower arrangements and "dry bouquets," as it has been sold commercially in Hilo for this purpose for some years, under the name "ahanui." In Hawaii the volcanic soil where it is growing has a pH of 5.2 to 5.7, according to G. D. Sherman (Soil Survey of the Territory of Hawaii, p. 115, 1955).

#### ***Xyris complanata* R. Br.**

This has narrow grasslike attenuate leaves and scarcely bulbous red bases; heads oblong, elongate, tending to be curved, somewhat compressed, slightly tapering toward the blunt apex.

Hawaii: about 1 mile east of Mountain View, in "Hawaiian Acres," on broken, not very rough aa lava surface in grass, moist in low places, 500 m., *Fosberg 44473* (US, BISHOP, BM, Fo, L, SMU, NY). Determined by L. B. Smith; matches very well much of the material of this species in the Kew herbarium.

This species occurs from southeast Asia through Australia and, judging from the herbarium material, must be very common and weedy. Who introduced it in Hawaii is not known, but it may have been by the same person who brought *X. platylepis*, since they are growing together. There is also the possibility that one or both may have come in earth on the roots of some of the many trees that have been brought to Hawaii for forestry purposes.

**Canavalia galeata** (Gaud.) Vogel

In his admirable Revision of *Canavalia* (Brittonia 16: 106-181, 1964) Sauer sets up the subgenus *Maunaloa* to include what has previously been known as one species, *C. galeata*, or at most two, if *C. pubescens* H. & A. were so recognized. In his revision he maintains *C. pubescens* and divides *C. galeata* into four species that are distinguished with difficulty and by characters by no means as clear when the key is applied to specimens as they appear on paper. Their geographic ranges are not especially distinct, and the failure to cite exact locality data and the scale of the map on which the localities are plotted make it difficult to know whether or not the ranges are ecologically significant. These entities seem undoubtedly to exist, but their lack of sharpness, as well as the small total degree of difference, suggests that they should be regarded as varieties rather than species. On the basis of the same kind of difference, judging by the key and descriptions, a specimen from Kaupulehu Forest Reserve, North Kona, Hawaii, Fosberg 41728 (US, Fo), could have been described as still another species. Comparison with available material of *C. hawaiiensis* makes me think that this plant belongs in a single variable population on the Island of Hawaii, of which it is simply a much less pubescent individual or local population.

Varietal combinations are proposed for the new taxa described by Sauer in what seems a more convincing rank as follows:

**Canavalia galeata** var. **kauaiensis** (Sauer) Fosberg, comb. nov.

*C. kauaiensis* Sauer, Brittonia 16: 176, 1964.

**Canavalia galeata** var. **molokaiensis** (Deg., Deg. & Sauer) Fosberg, comb. nov.

*C. molokaiensis* Deg., Deg. & Sauer, in Degener, Fl. Hawaiiensis 109c C.m. 1962.

**Canavalia galeata** var. **hawaiiensis** (Deg., Deg. & Sauer) Fosberg, comb. nov.

*C. hawaiiensis* Deg., Deg. & Sauer, in Degener, Fl. Hawaiiensis 109c C.h. 1962.

*Canavalia galeata* var. *galeata* and *Canavalia galeata* var. *pubescens* (H. & A.) Gray are already available.

**Prosopis pallida** (H. & B. ex Willd.) H.B.K. Nov. Gen. et Sp. 6: 309, 1823.

*Acacia pallida* H. & B. ex Willd. Sp. Pl. 4: 1059, 1806.

Several names have been applied to the common *kiawe* or *algaroba*, which now makes up most of the dry lowland forests of the Hawaiian Islands. *Prosopis juliflora* (Sw.) DC. was generally used until attention was called to the fact that *Ceratonia chilensis* Mol. was the earliest name that had been published for the *Prosopis juliflora* complex. Most Hawaiian botanical writers then took up the name *Prosopis chilensis* (Mol.) Stuntze. This is still the correct name if all members of this group are to be included in a single species. Examination of a large series of specimens from localities ranging from Chile and Argentina to the southwestern United States, and field observations in localities scattered over a substantial part of this range, reveal a considerable diversity of plants. Arturo Burkart, in many papers on South American *Prosopis*, and Marshall C. Johnston, investigating the North American species (*Brittonia* 14: 88, 1962), both find that a number of species should be recognized in this complex. The plant introduced and extensively naturalized in the Hawaiian Islands, with racemes notably longer than the leaves and with thick linear pods without regular constrictions and containing considerable sugary pulp, seems to correspond well to *Prosopis pallida* (H. & B. ex Willd.) H.B.K., as indicated by M. C. Johnston (l.c. p. 88). *P. pallida* occurs naturally in the drier valleys from Colombia to Peru, away from the coast. It seems to have generally larger leaves than the coastal *P. limensis* Benth., which is surely nothing more than a variety of it. I. M. Johnston once suggested to me, in conversation, that the Hawaiian plant might be *P. limensis*.

The Hawaiian plant usually is spiny, the spines varying conspicuously in length, but a spineless form is fairly frequent. Humboldt, Bonpland, and Kunth (1823) recognized two species, *P. pallida* and *P. inermis*, differing only in one being spiny, the other spineless. *P. pallida* was originally described as *Acacia pallida* H. & B. by Willdenow, who says it is "*inermis*." It was therefore necessary to examine the type, which is a Humboldt specimen, in the Berlin Herbarium. Dr. Schulze-Menz kindly examined this specimen and sent me a photograph, determining that there were no stipular spines. Therefore *P. inermis* and *P. pallida* seem identical. A photograph of the Humboldt specimen of *P. inermis* in the Humboldt Herbarium in Paris, kindly sent by Professor Aubréville, seems to represent a plant identical with the Berlin specimen of *P. pallida* and with the

spineless Hawaiian plants. Thus *P. pallida* and *P. inermis* are exact synonyms, with the epithet *pallida* the correct one because of priority. Two entities may be distinguished, but only as formae, with f. *pallida* being the correct name for the spineless one. Hawaiian specimens of the two examined are as follows:

***Prosopis pallida* f. *pallida***

*Acacia pallida* H. & B. ex Willd. (s. str.)

Oahu: lower Kalihi, *Forbes 2537.0* (BISHOP); Honolulu, 100 ft., *St. John 20307* (BISHOP); same loc., *Fosberg 42015* (Fo); n.w. side of mud flats near Koko Head, *Harris C242149* (BISHOP); Palolo Valley, *Gerber 50* (BISHOP); s.l., *Mann and Brigham 200* (BISHOP); s.l., cultivated *Mann and Brigham*, s.n. (BISHOP).

***Prosopis pallida* f. *armata* f. nov.**

*P. pallida* sensu H.B.K., not *Acacia pallida* H. & B. ex Willd.  
Ramuli spinosi.

Differing from f. *pallida* in that the twigs are armed with spines.

Lanai: Maluea, 1,250 ft., *Munro 360* (BISHOP). Oahu: Honolulu, 100 ft., *St. John 20308* (BISHOP); same loc., *Inafuku* in 1931 (BISHOP); Koko Crater, 30 m., *Hume 188* (BISHOP); at base of Punchbowl, *Heller 2001* (BISHOP); Nanakuli, near sea, *Degener and Park 9955* (BISHOP).

Data on the introduction of *algaroba* into Hawaii are given by Wilcox (Haw. Agr. Exp. Sta. Press Bull. 26, undated) and by Yzendoorn (History of the Catholic Mission in Hawaii, 20, 1927), showing that in all probability the plants came from seeds brought by Father Bachelot from the Jardin des Plantes, Paris, in 1827. Since one of the *Mann and Brigham* specimens was from a cultivated plant, it may well have come from the original tree, on Fort Street, Honolulu, which was cut down in 1919. If so, the original introduction was spineless. If, as is commonly believed, all the Hawaiian plants are progeny of this tree, then the genetic difference between the two forms, at least as represented in Hawaii, is slight, indeed.

In spite of the fact that f. *pallida* apparently is collected more frequently than f. *armata*, the latter actually is much more common in the field, and the spiny character may well be genetically dominant.

The relationship, however, does not seem to be a simple Mendelian one, if the original introduction was spineless and since a series of intergrades in length of spines may be found. In the list of specimens cited above, those with spines, however short, are included in f. *armata*. A population analysis based on this character might reveal the precise nature of this variation. During a brief visit to Honolulu in December, 1963, several Oahu *kiawe* populations were checked for presence or absence of spines, however short or long. One hundred trees were examined just east of Hanauma Bay parking lot, southeast Oahu. Twenty-one of these were spineless. Another hundred were examined back of the beach east of the Blowhole, beyond Koko Head, Oahu. Of these, also, 21 were spineless. Fifty plants were examined just northwest of Makapuna Beach Park, Oahu. Twenty-two were spineless. However, the pods also vary in length, and information is not available on correlation between pod length and spininess. It is notable that even as common a plant as the *kiawe* still presents problems.

***Jatropha integerrima* Jacq.**

A very attractive ornamental shrub that is a relative newcomer to Honolulu has been identified as this species. It has been in cultivation in other parts of the tropics for many years, usually under the names *Jatropha hastata* Jacq. or *Jatropha diversifolia* A. Rich., both of which are considered synonyms of *J. integerrima*. For a discussion of the taxonomy of the American species of *Jatropha*, where the above reductions were made, see McVaugh, Bull. Torr. Bot. Club 72:274-275, 1945. The plant is a native of Cuba. It was collected on the campus of the University of Hawaii, March 13, 1963, Fosberg 43548 (US, Fo). It has leaves extremely variable in shape, and large clusters of gorgeous bright rose-crimson flowers.

***Rhamnus californicus* Esch.**

What seems to be this species is planted and appears to be establishing itself around the Fish and Game Department Station at Po-hakuloa, Hawaii (Fosberg 42162). A native of the chaparral belt in California, it may have been introduced as potential food for game birds. It is hoped that it will not make itself too much at home and become a pest.

**Osmanthus** Lour.

Johnson, Contr. N.S.W. Nat. Herb. 2:411-414, 1957, places *O. sandwicensis* and most other species from the Pacific in *Gymnelaea* (Endl.) Spach (= *Nestegis* Raf.) because of their racemose inflorescences and occasional microcrystalline deposits on the leaves. *Osmanthus*, based on *Olea fragrans* Thunb. (*Osmanthus fragrans* Lour.), has fasciculate flowers or a short fasciclelike panicle, but scarcely any other differences. *Osmanthus* and *Nestegis* possibly could be considered sections of one genus, but scarcely two genera. A more difficult question is whether or not *Osmanthus* (sensu lato) should be separated from *Olea* L., from which it differs principally in having imbricate rather than valvate corolla lobes.

**Emilia javanica** (Burm. f.) C. B. Rob.

Some years ago (Univ. Haw. Occasional Pap. 46:14, 1948) I applied the name *Emilia javanica* (Burm. f.) Rob. (based on *Hieracium javanicum* Burm. f.) to the common red-flowered *Emilia* or Flora's Paint Brush in Hawaii, basing this on its resemblance to Burmann's plate (Flora Indica Tab. 57, f. 1, 1768).

Dr. Josephine Koster (Blumea 7:290-291, 1952) did not accept this disposition of *Hieracium javanicum*, but suggested that it might be placed in the synonymy of *Emilia sonchifolia* L., a closely related, but, in the living condition, easily distinguished species with smaller heads, and shorter purple flowers not much exerted from the involucre. Her reason was that because no red-flowered species is known wild in Java, it is unlikely that *E. javanica* is correctly applied to the red-flowered species.

I was able to settle this question by locating the Burmann specimens of *Hieracium javanicum* Burm. f. in the Geneva Herbarium. One of these sheets is certainly the one from which the Burmann plate was drawn, and it strongly resembles the red-flowered plant in leaf shape, inflorescence, and the shape and attitude of the heads, although these are not well drawn in the plate. The flowers exceed the involucre by 2 mm. or slightly more.

In addition to the diagnosis based on the specimen mentioned above, Burmann cited in his protologue of this species "Sonchus flore purpureo in Java inventus. *Garcin herb.*"

A number of sheets of *Emilia sonchifolia* from the Burmann her-



barium are filed in the Geneva Herbarium. They are labeled *Cacalia sonchifolia* L., which is the basis of *Emilia sonchifolia* (L.) DC. Thus it is clear that Burmann knew the difference between these two species, even though when dried they are easily confused. It is probable, however, that the purple-flowered *Garcin* specimen mentioned by Burmann under *Hieracium javanicum* was really *E. sonchifolia* from Java, and that from it he took the epithet *javanicum*. Neither of Burmann's sheets of *H. javanicum* in the Geneva Herbarium bears a locality, and there is no reason to think that they are from Java. Thus, there seems little doubt that the name *Emilia javanica* is correctly applied to the red-flowered species common in Hawaii and in many other tropical localities.

#### **Sonchus asper** L.

The genus *Sonchus* has long been known from the Hawaiian Islands, but only *Sonchus oleraceus* L. has been reported.

A large, fistulose sow-thistle with prickly-appearing, lacerate leaves was found in Kipuka Puaulu in March, 1964, by C. H. Lamoureux (No. 2592); it scarcely looked like even an extreme form of *S. oleraceus*. The achenes are prominently winged and smooth, trinerved, not cross-wrinkled, suggesting *S. asper* L., another widespread species probably of Mediterranean origin. Two fragmentary sheets, without locality or collector, in the herbarium of Hawaii Volcanoes National Park also have winged achenes and seem to be the same. These sheets were compared with material from the United States and Europe in the U. S. National Herbarium and check very well with a large part of what is labeled *S. asper* L.

#### **Wedelia trilobata** (L.) Hitchc.

This is a widespread strand and lowland species in tropical America. It was first noticed planted as an ornamental on the campus of the University of Hawaii and collected on March 13, 1963, *Fosberg 43547* (Fo). It was then reported to have been brought in not long before by Paul Weissich. Within a year it had become a common plant, used for ground cover in Honolulu and on Hawaii, at least. It was collected in Hilo, November 31, 1963, *Fosberg 44449* (Fo). It should be watched, as it has many characteristics of an aggressive weed. If

it does not tend to spread where it is not wanted, it is an attractive addition to the flora. It is prostrate and covers the ground completely, bearing bright, deep-yellow daisylike heads of flowers. It has been seen similarly used as a ground cover in Miami, Florida, and in Sao Paulo, Brazil.