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NOTES ON MARSILEA VILLOSA KAULF

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Notes on Marsilea Villosa Kaulf

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Marsilea villosa, first collected by Chamisso on the island of Oahu, Hawaii, was described by Kaulfuss¹ as follows:

M. foliolis cuneato-obovatis rotundatis integerrimis strigosis, petiolis strictis coarctatis, capsulis subsessilibus villosissimis. Habitat in Oahu [Oahu]. Chamisso. Foliola subtus strigosa. Petioli 4-6 pollicares subcapillares strigosi. Capsulae lana ferruginea involutae.

Brackenridge² referred specimens of *Marsilea* collected in Oregon, California, and Oahu, Hawaii, to *M. villosa* Kaulf. He considered *M. vestita* Hk. and Grev. to be a synonym, stating in the text:

The plants from these several localities do not differ from each other in any essential respect. The leaves and peduncles in specimens from the same locality sometimes vary in being more or less villous. Our Oregon plant is evidently the *M. vestita* of Hooker and Greville³, although not quite so hairy

W. J. Robinson⁴ makes the following statement in regard to *M. villosa*:

The specimens examined indicate that the Hawaiian plant is a larger and less hairy species than that figured by Hooker and Greville.

Through the kindness of Dr. W. A. Setchell I have recently had the opportunity to examine the *M. vestita*, chiefly fruiting specimens, in the University of California Herbarium. Although there was considerable variation in this representative series of specimens, from numerous localities in the region extending from Oregon to Lower California, nearly all of the plants were less hairy than old fruiting specimens of *M. villosa* recently collected in Hawaii. The *M. vestita* of the west coast of North America grows in places that become completely dry in summer. Having had a large colony of *M. villosa* under observation since 1916, I can now positively state that the

¹ Kaulfuss, G. F., *Enumeratio filicum quas in itinere circa terram legit Cl. Adalbertus de Chamisso*, p. 272, 1824.

² Brackenridge, Wm. D., *U. S. Exp. Wilkes, Botany, Filices*, p. 340, 1854.

³ Hooker, W. J., and Greville, R. K., *Icones filicum*, vol. 2, tab. 159, 1831. in all its parts as represented by their figure.

⁴ Robinson, W. J., *A taxonomic study of the Pteridophyta of the Hawaiian Islands: Bull. Torr. Bot. Club*, vol. 39, p. 233, 1912.

pubescence of this species, and probably also of *M. vestita*, is a character which is dependent on environmental factors.

Marsilea villosa is now very rare in Hawaii, and is not represented in many herbaria. The habitats for the plant are old taro patches, places where *Colocasia antiquorum* was cultivated. According to Robinson⁵ all specimens of it in the Berlin Herbarium are sterile, and those collected by Remy have narrower leaflets and a more compact rootstalk than those collected by Chamisso.

A station for this plant was found in Palolo valley, within the city limits of Honolulu, in a small, poorly drained area formerly taro patches, but now overgrown with several species of grass and sedge, among which are a few large Kiawe trees (*Prosopis juliflora*). Among the sedges was an abundance of *Elaeocharis palustris* (L) R. Brown, which was recorded from Oahu by Kunth, though its existence in the Hawaiian group was doubted by Hillebrand.⁶

When the station was first visited in March, an area of about two acres was flooded with water, on the surface of which were floating thousands of *Marsilea* leaves. The plants gathered at that time were all sterile and were glabrous in all parts except the nodes, which varied from nearly glabrous to somewhat woolly (Pl. XIII). The length of the petioles varied directly with the depth of the water in which the plants were growing—long petioles in deep water, short petioles in shallow water—and were of unusual length on plants growing in water amongst grass. Plants taken from shallow water near the edge of the pond had petioles ranging in length from 3.5 to 4.0 centimeters; whereas many growing in water with grass had petioles of 23 centimeters in length. In proportion as the water dried up with the advance of summer, the plants became more and more conspicuously rusty woolly at the nodes, and the under side of the leaves became pubescent with whitish hairs. Finally when the water had disappeared, during the last week in April of the same year, the plants were found to be densely rusty woolly at the nodes, with occasionally a few scattered hairs along the rhizome. On a dry hummock a single fruiting specimen was found.

⁵Robinson, W. J., op. cit.

⁶Hillebrand, Wm., Flora of the Hawaiian Islands, p. 474, 1888.

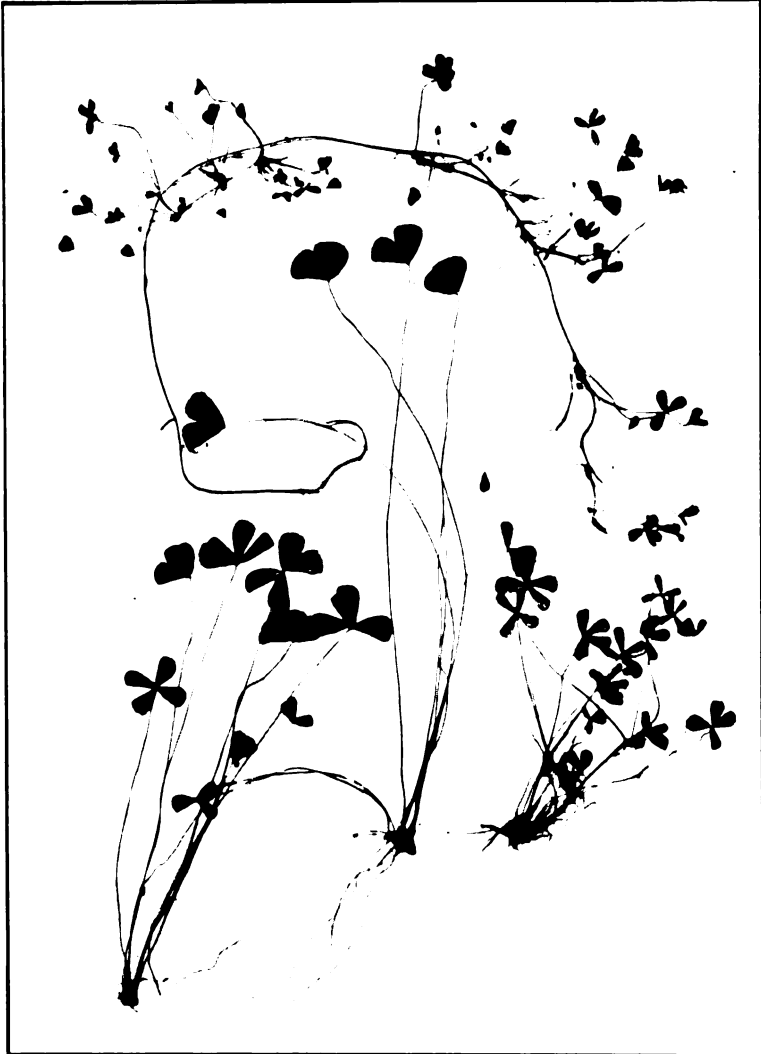
The locality was not revisited until May of 1917, at which time the water had not entirely dried up. Many fruiting specimens were collected where the water had disappeared, particularly along the edge of a road, where the rhizomes were covered with a loose volcanic ash. The sporocarps were covered with rust-colored silky hairs, and in many specimens were hidden in the dense rust-colored wool of the rhizome. It is notable that practically all fruiting plants were found either at the edge of the water—not in it—or in places that had become dry early in the season (see P. XIV). Plants growing in deeper water generally wither up and die before producing sporocarps. The locality was visited several times during the latter part of 1918, and finally July 1, 1919, when a portion of the area was found to be full of rubbish and dry. Only a few fruiting plants and no living sterile plants were seen.

Under culture in an aquarium, glabrous plants of *Marsilea villosa* behaved exactly as in nature, in respect to the development of pubescence, while the water was evaporating. All specimens experimented upon produced a vigorous vegetative growth, but died before producing sporocarps.

Following Brackenridge⁷ it is my opinion that *M. villosa* Kaulf. and *M. vestita* Hk. and Grev. are the same species. Differences in regard to the pubescence, length of petiole, and compactness of root-stalk of different herbarium specimens of these species are merely the result of environmental conditions at the time the specimens were collected. Differences in size and width of the leaves of different specimens are merely individual variations.

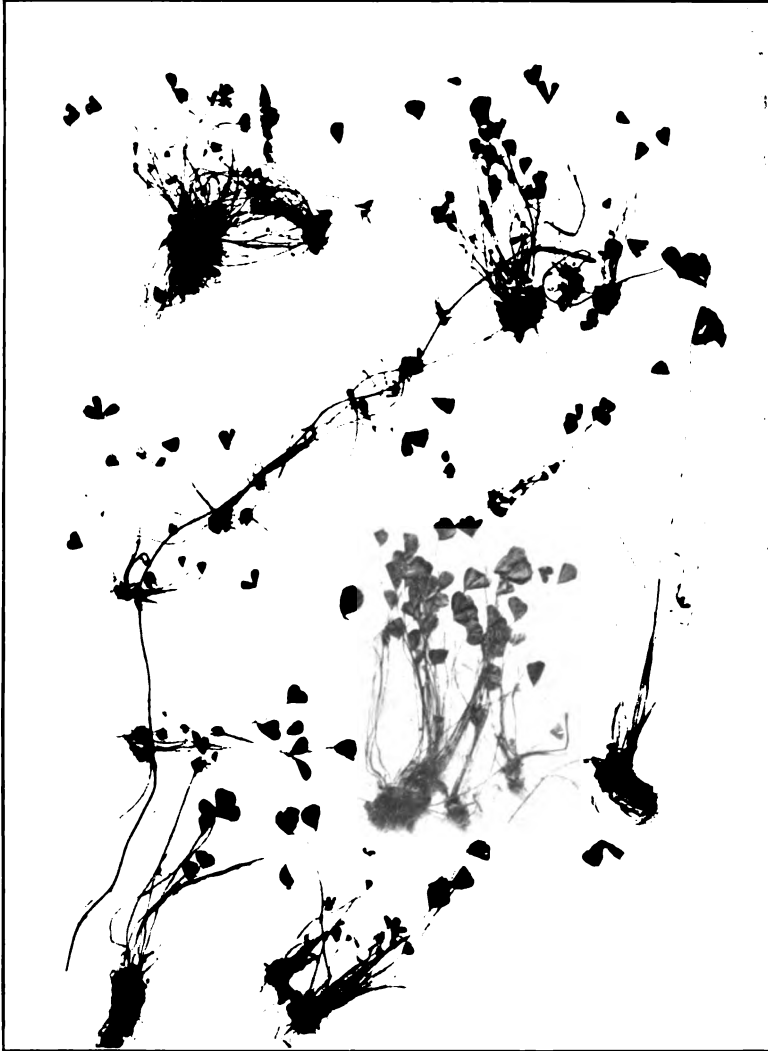
It is probable that *M. villosa* was brought from the West Coast of North America to Hawaii by natural means.

⁷ Brackenridge, Wm. D., op. cit.



MARSILEA VILLOSA KAULF. Sterile specimens showing variation in length of petioles in proportion to the depth of the water in which they grew—the longest petioles from the deepest water. The central specimen grew with grass in water. No. 2362 B. P. B. M. Herbarium.





MARSILEA VILLOSA KAULF. Fruiting specimens showing the compact rootstalks of the fruiting plants as compared with sterile plants. It will be noted that the fruiting specimens are villous in all parts, especially at the nodes which are densely rusty woolly. No. 2515. O B. P. B. M. Herbarium.