

## NOTES

NOTES ON *Sphenomeris chinensis* (L.) MAXON EX KRAMER

The distribution of "*Sphenomeris biflora* (Kaulf.) Tagawa" as indicated by Kramer, in *Blumea* 18:162-163, 1970, seems unusual among Micronesian species, being found in Guam and Alamagan, as well as farther north and west outside Micronesia. Collections from other Micronesian islands (Palau and Saipan) he places in *Sphenomeris chinensis* (L.) Maxon, an enormously widespread species, said by him to be lacking from the two above-mentioned islands.

Before accepting this distribution for our Geographical Check-list of Micronesian Plants we undertook to determine a fairly large series of collections from Micronesia not studied by Kramer and to compare Micronesian *Sphenomeris chinensis* with several populations from other areas referred to *S. chinensis* by Kramer. Micronesian material immediately available to us is all from the Marianas Islands, except for one Palau collection. The virtual absence of the genus from the Caroline Islands came as a surprise. It may be an accident of collecting, but probably not, as this fern tends to be common where found.

The principal character used by Kramer to separate *S. biflora* from *S. chinensis* is that the scales of the former are lighter colored, taper gradually from the base and near the base are from 3 to 6 cells wide, while those of *S. chinensis* are abruptly dilated at base and are 1-3 cells wide (4 at the abruptly broadened base). This pair of characters turned out to be singularly hard to apply, as these scales vary in width even on the same rhizome, and the cells are irregular in shape. Frequently rhizomes are lacking or embedded in a mass of roots (and earth). In the more than 30 Marianas collections seen, all those in which scales are clearly evident have at least some that are gradually widened to the base and with 4 or more cells, transversally. Most are not notably lighter in color. The fronds are mostly rather coriaceous and the ultimate segments are obovate, tending to be rounded distally, especially at the abaxial margin, frequently 1-2 notched, which we suppose is what Kramer means by "crenate." We consider that all of our Marianas

material falls within the range of Kramer's "*S. biflora*" though some specimens are perhaps doubtful. We have not seen the two Saipan specimens referred by Kramer to *S. chinensis*. The frond characters seem fully as constant and reliable, in the Marianas population, as are the scale features.

Our previous experience with *S. chinensis* has been principally with the populations in the Hawaiian and Marquesas Islands. We have always felt that the Marianas population differed somewhat from those in Polynesia, so we were not surprised when Kramer called the Guam ones *S. biflora*, though we had placed them in *S. chinensis*.

Since the assemblage of characters separating these two taxa is not very impressive, it seemed advisable to examine material of what Kramer regards as *S. chinensis* var. *chinensis*, which came from China, but from no specific locality. There is a fairly large representation of this species in the U.S. National Herbarium, much of it, however, lacking scale-bearing parts (rhizome and stipe bases).

A selection of sheets, most of them annotated by Kramer, from widely separated places in China, were examined and are cited below. The ultimate segments differed consistently in being cuneate with the tips truncate or irregularly denticulate. The rhizome scales, without exception, were narrow, 1-2 cells wide to almost the base, almost hair-like, but were mostly lighter in color, rather tan than rusty as in the Marianas material. Kramer (*Blumea* 15:573, 1967) calls those of *S. biflora* "paler ... than in *Sph. chinensis*."

Examination of a considerable series from Hawaii showed that the Hawaiian population differs in some respects from the Chinese one, as well as from that in the Marianas. The leaf cutting is closer to the Chinese, but with ultimate segments more often cut into oblong lobes, truncate at apex, but varying to cuneate. The fronds are thinner (usually) than in the Marianas. The scales are of a rusty color, usually narrow, but in practically all suitable specimens examined, with at least a few, often many, gradually widened toward the base, and more than 3 cells wide in the wider portion.

A small series from the Marquesas and a few sheets from Tahiti, Rurutu, and Samoa were exam-

ined to see if the "aberrant form" mentioned by Kramer from eastern Polynesia could be the plant common in Hawaii. They seem to fall into two forms. The material from Tahiti, Rurutu and Samoa seems, in frond-cutting, hard to distinguish from that in Hawaii and similarly variable. No wide scales were found, but most of the scales seemed to be 2 (3) cells wide toward the base. The Marquesan collections, except one (*Brown & Brown 475*), have perceptibly finer cutting, with slender, more narrowly oblong lobes, and scales consistently almost hair-like mostly uniseriate, very glossy dark brownish or reddish.

The one, rather juvenile but fertile, collection from Palau (*Canfield 318*) is hard to determine. No broad scales were found, but the segment tips are rounded, rather than truncate.

Kramer (*Blumea 15:273, 1967*) states that the oldest varietal epithet applicable to his *S. biflora* is furnished by *Davallia tenuifolia* var. *lata* Moore, which he lectotypifies by a specimen from the Bonin Islands. One specimen from the Bonin Is., Chichi Jima, *Fosberg 31504* (US) and a specimen from Iwo Jima, Volcano Islands, *Porter 8* (US), are in all respects very much like the Marianas material.

There are, in the U.S. National Herbarium, a fairly ample series of Asiatic specimens that resemble the Marianas plants, and which have mostly been annotated as *Sphenomeris biflora* by Kramer. These show considerable variation in leaf cutting, but are consistently somewhat coriaceous, have the ultimate segments fairly wide, with at least the abaxial margins curved inward, as in the Marianas plant.

Taking into account the variability of frond cutting seen in material admitted as *S. chinensis* by Kramer it is difficult to draw a sharp line between these two "species". The scale characters emphasized by Kramer seem at least as variable as the leaf-cutting and much harder to see. Hence we are inclined to separate the two on a subspecific level, only. Our reason for choosing the subspecific, rather than the varietal, rank is that in the vast population commonly referred to *S. chinensis* var. *chinensis* there are a number of discernible subpopulations, several of which have been called varieties, e.g. *S. chinensis* var. *divaricata* (Christ.) Kramer and *S. chinensis* var. *rheophila* Kramer, and at least two others that remain to be named.

The following systematic arrangement by no means represents an exhaustive study and does not account for the variability observed in the southwest

Pacific, Southern Asia, or in the Indian Ocean, but it will provide names for some Micronesian and Polynesian populations to which we need to refer.

*Sphenomeris chinensis* (L.) Maxon ex Kramer, *Acta Bot. Neerl.* 15:565, 1967.

*Trichomanes chinensis* L., *Sp. Pl.* 1099, 1753.

*Adiantum chusanum* L., *Sp. Pl.* 1095, 1753.

*Adiantum tenuifolium* Lam., *Encycl. Meth.* 1:44, 1783.

*Davallia tenuifolia* Sw., in Schrader, *Jour. Bot.* 1800 (2):88, 1801.

For description and more complete synonymy see Kramer, *Flora Malesiana* II, 3: 182-183, 1971.

This species is found throughout the Indo-Pacific tropics, excepting Australia. It is here treated as comprising two subspecies, usually regarded as species.

These may be distinguished by the following key:

1. Ultimate segments of fronds mostly at least 2 mm wide, obovoid, the outer (abaxial) margin curved inward distally, giving a more or less rounded apex; rhizome scales, at least some of them, gradually dilated toward the base, becoming 3-5 or more cells wide ..... *S. chinensis* ssp. *biflora*
1. Ultimate segments less than 2 mm wide, cuneate to oblong, apex truncate or slightly rounded; scales all or mostly linear or abruptly dilated at base, mostly 1-3 cells wide ..... *S. chinensis* ssp. *chinensis*

*Sphenomeris chinensis* (L.) Maxon ex Kramer ssp. *chinensis*.

Found throughout the range of the species excepting the Bonin, Volcano and Marianas Islands, presenting different facies locally, a number of which can be separated as varieties.

*Sphenomeris chinensis* (L.) Maxon ex Kramer var. *chinensis*

Ultimate segments of fronds narrow, cuneate, apically truncate; rhizome scales all narrowly linear or acicular.

Found in its typical form in China, widely reported elsewhere but populations elsewhere may be distinct varieties, mostly insufficiently studied.

China:

Anhui Prov.: Li Shan, N. W. Chemen, *Ching* 8743 (US)

Chekiang Prov.: near Taichow, 350-600m,

*Ching 1370* (US)

Chen Chiong, 40 mi S. of Siachu, 450–900 m,

*Ching 1816* (US)

Fukien Prov.: Sin Sei, Dionglloh & vic., *Chen 2410* (US)

Foochow, Metcalf, *Chen & Chen 617* (US)

Kuliang Hills, near Foochow, *Norton 1082* (US)

Asai Island, 20 mi from mouth of Min river, *Lin 11850* (US)

Yunnan Prov.:

Yaotou, bet. Mongdse and Manhou, 1000 m, *Handel-Mazzetti 5935* (US)

Shweli R. drainage basin to summit of Shweli-Salween watershed, E. of Tengueh, *Rock 7698* (US)

Szechwan Prov.: Mt. Omei, 1300–1500', *Liu 2099* (US)

Kwangtung Prov.: Chei Kai Mei, Tai Mo Shan, *Tsang 21245* (US)

Tai Tsean, Ying Tak, Wan Tung Shan, *Tsang & Wong 14458* (US)

Sam Kok Shan, 35 m, *Tsang 20579* (US)

Honam Island, Canton, *Merrill 9842* (US)

Hong Kong: Castle Peak Monastery, New Territory, *Taam 1448* (US)

Taiwan: Kangu, Taipeh, *Keng* in 1950 (US)

Micronesia: Caroline Is.:

Palau; N. Babeldaob, Ngerelong NW of school, 35 m, *Canfield 318* (US)?

*Sphenomeris chinensis* var. *divaricata* (Christ)

Kramer, *Blumea* 15: 572, 1968, Fl. Males. II, 1: 183–184, 1971.

*Odontosoria chinensis* var. *divaricata* Christ, *Jour. de Bot.* II, 2: 23, 1909.

Ultimate segments very slender but abruptly broadened near apex to 1–1.25 mm to accommodate sorus. Apex broadly rounded to subtruncate and often slightly erose.

The type came from Sao Tomé, Chevalier 14309 (P), not seen by us. The variety is found sparingly eastward to New Guinea but absent from Continental Africa. It is perhaps the commonest form in Sumatra, Java and New Guinea.

Adequate treatments may be found in the two cited references, with further synonymy and cited specimens.

*Sphenomeris chinensis* var. *rheophila* Kramer, *Blumea* 15: 573, 1968; Fl. Males. II, 1: 183, 1971.

Ultimate segments narrowly oblong to somewhat cuneate, subtruncate to broadly rounded at

apices, about 1 mm wide, 4–5 mm long.

Known only from Sumatra and Pahang.

Indonesia:

Sumatra: Waterfall of Asahan River, Si Monoeng-monoeng, near Oedjoeng Batol, above Vandar Poeloe, Asahan, *Bartlett 6718a* (US, isotype).

Other specimens are cited by Kramer (1968, p. 573).

*Sphenomeris chinensis* var. *hawaiiensis* Fosberg & Sachet, var. nov.

Fronds tenuis multisecta segmentis ultimis anguste cuneatis vel oblongis apicibus truncatis; squamae rhizomates ferrugineae plerumque angustae aliquot latiores basin versus.

Rhizome covered by ferruginous scales, mostly narrow, even at base, 1 to rarely 3 cells wide, but most plants with some broader scales, gradually wider to base, apical portions of all scales subulate, 1 cell, rarely two, wide; frond usually thin, finely divided, usually with some free apical segments, these narrowly oblong or more usually narrowly cuneate, truncate at apex.

A very common and variable plant in the Hawaiian Islands, usually placed in var. *chinensis*, but differing in aspect, in the occasional narrowly oblong free ultimate segments or lobes of segments, and in usually having some broader rhizome scales approaching those of subsp. *biflora*, and darker than usual for var. *chinensis*.

The following selected specimens illustrate these characters. This variety is here treated as endemic to the Hawaiian Islands, but some of the Society Island and Samoan material cited by Kramer (*Blumea* 18: 163–164, 1970) as an aberrant eastern Polynesian form may eventually be referred here.

Hawaiian Islands:

Kauai: Olokele Gulch, 1400 ft, *Hitchcock 15270* (US)

Oahu: Waimanu Valley, Waimanu Trail, *Sohmer 6082* (US)

Pupukea-Paumalu Forest Res., *Ishikawa 150* (US)

Fire Break Trail, *Topping 3492* (US)

Mountains E of Pearl Harbor, *Correll 12289* (US)

Pohakea Pass, Waianae Mts. 650 m, *Fosberg 9480* (US)

Molokai: Pukoo, *Hitchcock 15047* (US)

Maui: E. Maui, 3–1/2 mi due E. of Olinda, along Olinda flume, 4300 ft, *Henrickson 3777*

(US), 3782 (US)

Hawaii: Kukaiau Ranch, N. slopes of Mauna Kea, 3000 ft, *Rubtzoff 2680* (US)  
 Napau Crater Trail, *Stone 3071* (US)  
 "banks of C. Lua Pele, Puna Dist.", *U. S. Exploring Expedition 13* (US)  
 Mt. E. of Honaunau, 2–3000 ft, *Hitchcock 14566* (US)

*Sphenomeris chinensis* var. *tenuisecta* Fosberg & Sacht, var. nov.

Frons tenuis, delicatuli-multisecta, segmentis ultimis anguste-oblongis vel lineari-oblongis, squamae rhizomates lineares vel subulatae, brunneae nitidae.

Fronds very finely and almost completely divided, secondary rachises 0.4–0.7 mm wide, ultimate segments mostly well-separated, linear-oblong, 0.5 to rarely 1 mm wide, apices truncate to broadly obtuse or low-rounded, crosse to slightly denticulate at apices; rhizome scales very narrow, appearing practically acicular, dark brown and glossy, no broader scales seen (except in the somewhat aberrant collection *Brown* and *Brown 475* which has a few somewhat broader scales and which may not belong here).

The Marquesan population of this species has the finest cutting of any seen, being quadripinnate below, and with very narrow segments. The specimens included here are a part of those included in Kramer's aberrant east-Polynesian form of var. *chinensis*. The remaining specimens seen of this form have slightly coarser cutting and a few broader scales. They come closer to, and may eventually have to be included in var. *hawaiiensis*.

Marquesas Is.:

Nukuhiva: To'ovi'i, Taupua'o'oa, 800 m, *Decker 2006* (US, BISH, P, US); *Gillett 2193* (US)

Hiva Oa: Puamau Keiani, 660 m, *Schäfer 5384* (US)

Chemin d'Atuona à Hanamenu par Feani, 1170 m, *Schäfer 5184* (US)

Côté Atuona, 660 m, *Schäfer 5157* (US); 790 m, *5159* (US)

Atuona-Feani Trail, ridge crest, 1200–1300 m, *Sacht & Decker 1156* (US, holotype, BISH, P, MICH isotypes)

Puamau, along Puamau-Atuona Trail, 500–650 m, *Decker 1173* (US, BISH)

Road from Atuona to Puamau, just below Mt. Ootua, 660–690 m, *Sacht, Oliver and Schäfer 2121* (US)

Tahuata: Vaitahu, crête d'Amatea, 620 m, *Schäfer 5500* (US)  
 s. l., *Hallé 2167* (US)

*Sphenomeris chinensis* ssp. *biflora* (Kaulfuss) Jotani & Ohba, *Sci. Rept. Yokosuka City Mus.* 15: 34, 1969.

*Davallia biflora* Kaulfuss, *Enum.* 221, 1824.

*Odontosoria biflora* (Kaulfuss) C. Chr., *Ind. Fil.* 464, 1906.

*Davallia retusa*  $\beta$  *major* Presl, *Rel. Haenk.* 67, 1830.

*Davallia tenuifolia* var. *lata* Moore, *Ind. Fil.* 301, 1861.

*Stenoloma littorale* Tagawa, *Acta Phytotax. Geobot.* 6: 225, 1937.

*Stenoloma chusanum* var. *littorale* (Tagawa) Ito, *Bot. Mag. (Tokyo)* 52: 6, 1938.

*Sphenomeris biflora* (Kaulf.) Tagawa, *Jour. Jap. Bot.* 33: 203, 1938.

*Davallia ferruginea* sensu Gaud. possibly non Cav.

*Davallia retusa* sensu auct. *Micr.* non Cav.

*Odontosoria retusa* sensu auct. *Micr.* non (Cav.) J. Sm.

*Davallia tenuifolia* sensu Presl non Willd.

*Odontosoria chinensis* sensu auct. *Micr.* non (L.) Copel.

*Sphenomeris chusana* sensu auct. *Micr.* non (L.) Copel.

*Sphenomeris chinensis* sensu auct. Marianas non (L.) Maxon ex Kramer var. *chinensis*.

Fronds somewhat coriaceous, variable in degree of cutting but ultimate segments obovate, often asymmetrically so, broader than in ssp. *chinensis*, abaxial margin usually curved and apex rounded, pinnae or more usually secondary pinnae tending to be pinnatifid with asymmetric lobes; rhizome and stipe scales linear to frequently gradually tapering from base, lower portion 3–6 or even more cells wide, somewhat rusty brown, glossy, cells tend to be very irregular in shape.

Specimens corresponding to this subspecies have been seen from China, Japan, Taiwan, Philippines, Bonin Islands, Volcano Islands, and the Marianas. The type, which we have not seen, is from Luzon, Manila, Chamisso s. n. (B). The lectotype of *Davallia tenuifolia* var. *lata* is from the Bonin Islands, *Exped. Imp. Acad. Petersb.* 44 (K) also not seen. The type of *Stenoloma littorale* Tagawa, from Oshima Island, Shikoku Tasiro s. n. (KYO) also not seen by us.

Micronesian specimens have been seen by us from the Marianas Is.: Agrigan, Pagan, Alamagan,

Guguan, Sarigan, Anatahan, Saipan, Rota, and Guam.

Material examined from the Marianas Islands, only, cited here.

Marianas Is.:

Agrigan: In canyon on east side of island, *Fosberg 31630* (US, BISH).

Pagan I.: s. l. *Falanruw 3308* (US); *Hosokawa 7954* (US); outer slopes of volcano, *Falanruw 3297* (US); E of Freshwater Lake, 50 m, *Fosberg 31407* (US); Mt. Pagan, crater floor, *P. H. Moore 373* (US); slopes of Mt. Pagan, *P. H. Moore 362* (US); near Salt Lake, W. side of island, *Fosberg 31344* (US, BISH, K, MO).

Alamagan: S southwest coast, 150 m, *Falanruw 1909* (US).

Sarigan: s. l. *Hosokawa 7881* (US, A); above village, *Evans 2376* (US, BISH, POM, NY, MICH).

Anatahan: West end of north coast, below 75 m, *Falanruw 1687* (US).

Guguan, summit of volcano, 200 m, *Ronck (Falanruw's) 3113* (US).

Saipan: E end Sabanan Laulau, 1 mi. S of As Teo, 200 m, *Fosberg 31310* (US, BISH, POM, MICH, L, K).

Rota: Slopes above As Malote, S side of island, 250 m, *Fosberg 25088* (US, BISH, POM, MICH, TI, NSW, L).

Guam: Manengon savanna, *Falanruw 1374* (GUAM).

Chalandao Mt., 1 km S E of Jumujong Manglo Mt., 320 m, *Fosberg 35370* (US, BISH, POM, MICH).

Mt. Alutom, 900 ft, *Hosaka 3186* (US, BISH, NY).

Umatag, 75 m, *Fosberg 31263* (US, BISH, TI).

Mt. Tenjo, *Stone 5157* (GUAM); *Wagner 3741* (US); *Rodin 520* (US), *521* (US), *749* (US).

N. end of Tumon Bay, 5–100 ft, *G. C. Moore 393* (US).

Top of second hill N of Mt. Tenjo, 800 ft, *Steere 102* (US).

Masso River Valley, *Grether 3437* (US).

s. l. *G.E.S. 122* (US).

Near Agaña, *Safford & Seale 1051* (US).

Mt. Makahna, near Agaña, *Safford* in 1899 (US).

Mt. Santa Rosa, *Moran 4387* (US, UC).

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RECENT BEACHINGS OF WHALES ON GUAM

Although whales are often sighted along the coastal waters of Guam, the beaching of whales on Guam is rather uncommon. Kami and Lujan (1976) reported on the beaching of two specimens of the dwarf sperm whale, *Koiga simus* Owen, which occurred during 1970 and 1974. No further beachings are known to have taken place until 1980 and 1981 when three separate beachings occurred on the shores of Guam. It is the intent of this note to document the beaching of these whales.

*Peponcephala electra* (Gray)—melon-headed whale, or many-toothed blackfish

On the afternoon of April 6, 1980, Mr. Matthew Duenas of Inarajan found a live whale stranded on the beach at Inarajan Bay (Fig. 1). Mr. Duenas attempted to push the whale into the bay, but it repeatedly stranded itself on the beach. The stranding was reported to the Division of Aquatic and Wildlife Resources the following day. An inspection team comprised of Aquatic and Wildlife personnel and Terry J. Donaldson, student of the University of Guam Marine Laboratory, examined the dead whale that day.

A partial dissection revealed the stomach to be empty, however, digested material was found in the intestinal tract. Parasitic infestation of the musculature was observed. The head of the whale was retained for further study.

The length of this whale, from the tip of the upper jaw to the deepest part of the fluke notch, measured 2.5 m. This whale, which was a male, was initially identified as a melon-headed whale, or many-toothed blackfish, *Peponcephala electra* (Gray) by Terry Donaldson and subsequently confirmed by Dr. James Mead, associate curator of mammals at the National Museum of Natural History. This beaching incident has been recorded in the Scientific Event Alert Network (SEAN) Bulletin (Smithsonian Institution, 1980a).

According to Ridgway (1972), the genus *Peponcephala* was established by Nishiwaki and Norris in 1966 based on the reexamination of specimens of *Lagenorhynchus electra* Gray (1846), and is tentatively assigned to the family Globi-