

## Notes on Micronesian Cyperaceae

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**Abstract**—Critical notes on several Micronesian Cyperaceae are offered, including an arrangement of the Micronesian varieties of *Cyperus odoratus* L., including var. *odoratus*, var. *attenuatus* var. nov., var. *curtispiculus* var. nov. and var. *novae-hannoverae* (Boeck.) Fosberg & Sachet, comb. nov., lecto-typification of *Fimbristylis autumnalis* f. *hemisphaerica* Kükenthal, and reduction of two subspecies of *Machaerina mariscoides* (Gaud.) Kern.

### Introduction

While putting in order the Micronesian Vascular Plants, several items were encountered that were not satisfactorily disposed of by Koyama in his Cyperaceae of Micronesia (1964). Our interpretations of these problems are presented here. The species dealt with are *Cyperus odoratus* L., *Fimbristylis autumnalis* (L.) R. & S. and *Machaerina mariscoides* (Gaud.) Kern.

#### 1. *Cyperus odoratus* L. in Micronesia

**Cyperus odoratus** L. Sp. Pl. 46, 1753.

*Cyperus ferax* L. C. Rich., Act. Soc. Hist. Nat. Paris 1: 106, 1792; Kük., Pflr. IV, 20 (101: 1): 615–617, 1935; Koyama, Micronesica 1: 100, 1964.

*Torulinium ferax* (L. C. Rich.) Urb. Symb. Antill. 2: 165, 1900.

We are using *C. odoratus* for this species, as the type is Sloane's figure (Voy. Jamaica Nat. Hist. 1: 116, t. 74 Fig. 1, 1707) and the Sloane specimen at BM (Vol. II, fol. 46) from which this figure was drawn represents the species widely known as *C. ferax* L. C. Rich, as pointed out by Dandy in Exell, Fl. S. Tomé 369, 1944.

This species is pantropical and reaches temperate areas in North America and eastern Asia. It is extraordinarily polymorphic in such features as stature, complexity and openness of inflorescence, angles of inflorescence branching, length and number of florets in spikelets, length and width of leaves and bracts, etc. Detailed study may reveal several or many subtaxa, some of which Kükenthal (l.c.) has pointed out. We are maintaining var. *novae-hannoverae*, recognized by Kükenthal, and two varieties newly described by us.

Certain collections that we examined before we recognized the existence of the several varieties, and to which we have not had access since, are not cited or referred to varieties. Likewise, most specimens referred to in the literature which we have not seen are not considered.

We observed on three collections, "Iles Mariannes, *Gaudichaud*," Rota, *Marche* 270, and Guam, *Marche* 43, what appears to be vivipary, or perhaps "vegetative apo-

mixis," growth of small plantlets from the panicle. It is interesting that this has not been observed in the numerous modern collections of this species.

#### KEY TO MICRONESIAN VARIETIES OF *CYPERUS ODORATUS*

1. Spikelets mostly of 6 or more florets ..... *Cyperus odoratus* var. *odoratus*
1. Spikelets mostly of less than 6 florets ..... 2
  2. Spikelets mostly of 1–2 florets ..... *Cyperus odoratus* var. *curtispiculus*
  2. Spikelets mostly of 3–5 florets ..... 3
3. Spikelets set at right angles to rhachis, or reflexed .... *Cyperus odoratus* var. *novae-hannoverae*
3. Spikelets strongly ascending ..... *Cyperus odoratus* var. *attenuatus*

#### *Cyperus odoratus* L. var. *odoratus*

This is the form with elongate linear spikelets with many florets and the rhachilla disarticulating at maturity. It is common in wet places on almost every island in Micronesia where there are habitats for it. Its apparent scarcity on the high Caroline Islands and the absence of collections from Kosrae (Kusaie) are probably accidents of collecting.

##### MARIANAS:

Saipan I., s.l. Höfer 44 (not seen).

Rota I., Sabana, Fosberg 31843 (US, BISH, POM, NY).

Guam, s.l., G.E.S. 305 (US); 1/2 mi up Ylig River, G. C. Moore 283 (US) (inflorescence very congested); S. of Ylig River, Rodin 772 (US, UC); 1 mi S. of Piti, G. C. Moore 180 (US); Pipeline Road in Chaot River Ravine, Fosberg 59670 (US); Agaña Springs, Ph. Moore 805 (US), Evans 631 (US, BISH, POM, L); Wettengel Junction, Fosberg 35302 (US, BISH, POM, NY).

##### CAROLINE ISLANDS:

Palau, Kayangel, Ngeriungs I., Canfield 708 (US).

Yap, s.l., Volkens 404 (not seen).

Ulithi Atoll, Mogmog I., Fosberg & Wong 25487 (US, BISH, POM, NY, L); Falalap I., Fosberg 46961 (US, BISH, POM, L, MO, CANB) (tending toward var. *novae-hannoverae*).

Woleai Atoll, Falalop, I., Evans 503 (US); Falalis, Fosberg 47024 (US, BISH, POM, L).

Ifaluk Atoll, Falalap I., Abbott & Bates 116 (US); Fosberg 47262 (US, BISH, POM, L, MO).

Lamotrek Atoll, Lamotrek I., Fosberg & Evans 46913 (US, BISH, POM, L).

Murilo Atoll, Murilo I., Evans 1259 (US).

Nomwin Atoll, Nomwin I., Evans 1051 (US); Fananu I., Evans 1101 (US, BISH, POM, L).

Truk Group, Moen I., Leue Village, D. Anderson 751 (US, BISH, POM, NY); near Baker dock, Fosberg 24701 (US, BISH, POM); Moen Sapou, Fosberg 60200 (US, BISH, POM, NY, K, BRI).

Losap Atoll, Losap I., Evans 1333 (US).

Lukunor Atoll, Lukunor I., *Anderson 2153* (US, BISH, POM, NY, L).

Ponape, s.l., Gibbon 1131 (not seen).

MARSHALL ISLANDS:

Wotho Atoll, Wotho I., *Fosberg 34260* (US, BISH).

Lae Atoll, Lae I., *Fosberg 34014* (US, BISH).

Kwajalein Atoll, Kwajalein I., *Fosberg 26484* (US), *31172* (US, BISH); *Wagner 3381* (US).

Ailuk Atoll, Ailuk I., *Fosberg 33967* (US, BISH).

Likiep Atoll, Likep I., *Fosberg 27043* (US); Lado I., *Fosberg 33845* (US, BISH).

Majuro Atoll, W end of Majuro I. (Laura), *Fosberg 26961* (US, BISH, POM, NY, L).

Arno Atoll, Ine I., *Anderson 3616* (US, BISH); Taklip I., *Anderson 3741* (US, BISH, POM).

Jaluit Atoll, Pinlep I., *Fosberg 39465* (US).

GILBERT ISLANDS:

Butaritari Atoll, Butaritari I., *Herbst & Allerton 2737* (US).

Tarawa Atoll, Bikenibeu I., *Sachet 1431* (US).

***Cyperus odoratus* var. *attenuatus* Fosberg & Sachet, var. nov.**

A var. novae-hannoverae spiculis valde ascendentibus differt.

As in var. *novae-hannoverae* but spikelets strongly ascending, rather than at right angles or reflexed, giving the plant a very different appearance. The spikelets are rather strongly tapering. These differences seem to warrant varietal status.

These specimens were at first suspected to belong to some other species, but proved to have typical *Torulium* spikelets, merely oriented differently on the rhachis.

We have specimens only from Ailinglapalap, in the Marshall Islands, and Faraulap in the western Carolines, both low coral atolls. The Ailinglapalap specimen has a large open corymbiform inflorescence, that of the Faraulap specimen corymbiform but smaller.

CAROLINE ISLANDS:

Faraulap Atoll, Faraulap Islet, *Fosberg & Evans 47375* (US).

MARSHALL ISLANDS:

Ailinglapalap Atoll, Airik (part of Ailinglapalap Islet), 0–2 m, *Fosberg 26875* (US, holotype).

***Cyperus odoratus* var. *curtispiculus* Fosberg & Sachet, var. nov.**

*Cyperus digitatus* sensu Fosberg et al., *Smiths. Contr. Bot.* 22: 15, 1975, non Roxb., *Fl. Ind.*, ed. 1, 1: 209, 1820.

Planta altior, panícula decomposita, ultimis ramulis spicatis elongatis, spiculis teretibus plerumque bracteatis, 1–2 floribus.

Tufted plant to 1 m tall, inflorescence 2–3 times compound, corymbiform, conspicuously bracteate, bracts to several times as long as inflorescence, 6–7 secondary corymbs on peduncles of varying length, up to 16 cm, these in turn with either spikes or smaller peduncles bearing one or more spikes, corymbs and spikes bracteate, sheaths of bracts (prophylls ?) enclosing bases of peduncles, spikes elongate to 5 cm, 3–6 mm wide, pedunculate or not, rarely branched near base; spikelets patent to reflexed, linear, terete,

spaced to 1–2 mm apart, reduced to 1–2 scales and florets, some florets subtended by ovate-acute to linear subulate or flagelliform bractlets up to as long as or longer than spikelets.

This is an extreme form in complexity of inflorescence and in reduction of spikelets to one or two florets. We earlier misidentified it as *Cyperus digitatus* Roxb. of Subgenus *Cyperus*, a plant to which it has a marked superficial resemblance, but the details of the spikelets are very different. To the best of our knowledge, plants with this combination of characters and aspect are only found in Micronesia. Examination of a large range of specimens from other areas revealed a few South American and West Indian specimens with similarly reduced spikelets with only 1–2 florets, but they mostly had strongly ascending spikelets in shorter spikes and hence presented a different aspect. We do not dispose of them but do not think they belong in this variety. The Micronesian populations of this and the two other varieties admitted here merit further careful study, particularly the developmental aspects of the inflorescence. This may best be done in Micronesia where living plants may be seen in different stages and in different habitats.

MARIANAS:

Anatahan, trail north of village going through three ravines to rocky cliffs of N coast, at W end of N coast, below 250 ft., *Falanruw 1962* (US); behind village in wooded ravine, NW corner of island, 200 ft., *Falanruw 1600* (US).

Rota, s.l., *Necker R95* (US, holotype).

CAROLINE ISLANDS:

Palau: Ngerebeched taro swamp, Koror, *Blackburn 230* (US).

Ponape: s.l. *Nakao* in 1941 (KYO).

***Cyperus odoratus* var. *novae-hannoverae* (Boeck.) Fosberg & Sachet, comb. nov.**

*Cyperus novae-hannoverae* Boeck., Bot. Jahrb. 5: 91, 1884.

*Cyperus ferax* var. *novae-hannoverae* (Boeck.) Kük., Bot. Jahrb. 59: 4, 46, 1924; Pflr. IV, 20(101: 1): 618, 1935.

This is a plant with short terete spikelets, with mostly 3–5 florets, spikelets at 90° to rachis, or reflexed; it probably deserves recognition. We have not seen either Boeckeler's specimens nor those cited by Kükenthal, which may have been destroyed in the Berlin herbarium bombing. We refer some of our Micronesian specimens and several other Pacific ones here on the basis of the description of the spikelets, though the inflorescence is not "pauperior" as described by Kükenthal.

Plants with similarly short spikelets are found also in tropical America and may belong here, or study of the whole range of plants in detail may eventually either result in further segregation on other characters, or reveal that this merits only the rank of forma. Our plants seem to form a recognizable entity and for the present we maintain the group at varietal rank.

MARIANAS:

Rota I.: Sabana, 480 m, *Fosberg 25027* (US); *Hosaka 3039A* (US); 460 m *Herbst & Falanruw 6705* (US).

CAROLINE ISLANDS:

Palau: Koror, *Raymundus 25* (not seen). Babeldaob, *Ledermann 14295* (not seen). Babeldaob, *Raulerson 5784* (US).

Woleai Atoll, Falalis I., *Alkire 79* (US) "lu yalühush" "whole plant used in medicine."

Ifaluk Atoll, Falarik I., *Abbott & Bates 68* (US) "gutrugutr." Falalap I., *Abbott & Bates 134* (US) "gutrugutr."

Hall Is.: Namonuito Atoll, Piseras I., *Evans 873* (US); Murilo Atoll, Ruo I., *Evans 1172* (US).

Truk Group: Wöna (Moen) I., *Pelzer 62a* (US) "manow."

Mortlock Is.: Satawan Atoll, Kutu I., *Anderson 1218* (US).

Ponape: Mt. Tolotom, 600 ft., *Glassman 2864* (US) "use-n-ant" "used in soap."

MARSHALL ISLANDS:

Arno Atoll, Toklep I., *E. L. Stone 1033* (US) "bokor."

Majuro Atoll, Uliga I., *Fosberg 31197* (US).

Ailinglapalap Atoll, Bikajle I., 1–3 m, *Fosberg 26838* (US) "pukur."

Arno Atoll, Ine I., *E. L. Stone 1005* (US) (very slender, depauperate, small inflorescence) "bukör."

NON MICRONESIAN:

New Guinea: Ulalla, near Oro Bay, *Russell* in 1943 (US).

Sumatra: Sigamata, near Rantau Parapat, Bila, *Toroës 3149* (US).

## 2. Lectotypification of *Fimbristylis autumnalis* f. *hemisphaerica*

### *Fimbristylis autumnalis* var. *complanata*

f. *hemisphaerica* Kük., Bot. Jahrb. 59: 6, 1924.

Kükenthal cited three collections of his forma *hemisphaerica*, all represented by duplicates in US, as *McGregor 241, 441, 537*, not designating any one as type. The first citation is an error, as it should have been *Guam Experiment Station 241*. The third does not show the essential character of the form very well. Hence, *McGregor 441* is here selected from the three syntypes as lectotype. Since the Berlin sheet of this number, studied by Kükenthal, was probably destroyed, the US sheet may be regarded as the lectotype sheet. A further reason for excluding G.E.S. 241 is that Kükenthal (l.c.) did not add ! to this number to indicate that he had seen it, as he did with the other two.

## 3. The subspecies of *Machaerina mariscoides* in Micronesia

*Machaerina mariscoides* (Gaud.) Kern, Acta Bot. Neerl. 8: 266, 1959.

*Baumea mariscoides* Gaud., Bot. Voy. Uranie 417, 1829.

*Machaerina mariscoides* (Gaud.) Kern ssp. *mariscoides*.

*Machaerina mariscoides* ssp. *colpodes* (Lauterb.) Koyama, Micronesica 1: 103, 1964.

*Cladium colpodes* Lauterb. in Schum. & Lauterb., Fl. deutsch. Schutzgeb. Südsee 59, 1905.

*Cladium mariscoides* (Gaud.) F. Villar, in Blanco, Fl. Philip. ed. III, Nov. App., 209, 1882.

*Cladium gaudichaudii* W. F. Wight in Safford, Contr. U.S. Nat. Herb. 9: 230, 1905.

We have no difficulty in accepting Koyama's (1956, 1964) transfer of the "Baumea"

and "Vincentia" species groups from *Cladium* P. Br. to *Machaerina* Vahl. That such a careful and conservative cyperologist as J. H. Kern (1959) accepted this disposition strengthens our impression that it is a sound arrangement. We have not been so confident that the Palau plants of *Machaerina mariscoides* (Gaud.) Kern could be separated as done by Koyama (1964) into subspecies *mariscoides* and *colpodes* (Lauterb.) Koyama.

Guam and Yap specimens, as well as some from Palau, have been regarded as belonging to subsp. *mariscoides*, though under several names. The two have been separated by the spikelets of subsp. *mariscoides* being in groups of (1)–2–4, while those of ssp. *colpodes* are "congested in heads 5–8 mm across," plus minor characters of leaf length and width, inflorescence length, and average differences in relative length of body and beak of achene (style-base), and length of spikelet.

Difficulty in placing some Guam and Palau specimens in one or other of these subspecies drew our attention to the weak nature of the variation in the characters purporting to separate the two.

Although the length and width of leaves varied from collection to collection, there seems no correlation with any other character except perhaps size or vigor of the clump. Most of the inflorescences seen are under 20 cm long. Some specimens certainly have the hairy portion of the style (beak?) longer than others and there is some variation in the length of the body of the achene. The degree of condensation of the ultimate panicle-branches seems to show continuous variation rather than any clear breaks. The extremes, indeed, look different.

Correlation between any of these variations is scarcely, if at all, evident. The only geographic tendencies that we can see are that plants from Guam do not have as much tendency toward glomerules or "heads" of spikelets as those on Palau. But certainly some Guam specimens show glomerules of at least 5 or 6 spikelets. In this character as much variation occurs in a single panicle as between plants. We do not regard any of these differences as characterizing geographically separate populations, at least in the Micronesian material we have seen. We do not have enough specimens available of "*Machaerina colpodes*" or *M. mariscoides* from New Guinea or Malesia to support an opinion about their validity as species or subspecies outside Micronesia.

*Cladium gaudichaudii* W. F. Wight was a new name proposed to replace *Cladium mariscoides* (Gaud.) F. Villar (1882) non (Muhl.) Torrey (1836). In *Machaerina*, there is no obstacle to using the epithet *mariscoides*.

Specimens examined: MARIANAS: Guam: Cross Island Rd., just E. of Apra Heights, 100 m, *Fosberg 39241* (US); above Tenjo Vista, 130 m, *Fosberg 35219* (US); 1 km N. of Tenjo, *Stensland* in 1953 (US); S. of Asan Point and Piti, 100 m, *Anderson 81* (US); Asan, *G.E.S. 258* (US); N. E. side Mt. Tenjo, 700–800 ft., *Steere 164* (US); Mt. Tenjo and Mt. Reconnaissance area, 800 ft., *Moore 100* (US); s. l. *Nelson 277* (US).

CAROLINE IS.: Palau: Babeldaob: s. l., *Raulerson 5951* (US); Lake Ngardok, 30–35 m, *Fosberg 32555* (US), *32550* (US); Nekken, *Salsedo 99* (US); "Nekken Road," beyond Airai Airfield, *Cheatham 150* (US); Gaspan (Ngatpang), *Stone 4658* (GUAM); Garamiscan Colony, upper Garamiscan (Ngarumiscang) River, *Fosberg 25707* (US). The last two cited have been previously determined as ssp. *colpodes*.