

# The Cyperaceae of Micronesia

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## Abstract

The Cyperaceae of Micronesia includes 67 species of 13 genera. These consist of Pacific, Malaysian and Pantropic elements in almost equal proportions. Based on a review of all major collections concerned, these species are enumerated with taxonomic discussion, and keys to genera and species are provided. In addition to numerous nomenclatural revisions the following new names and new combinations are proposed: *Mapania pandanophylla* ssp. *immensa*, *Mapania flavinux*, *Mapania parvibractea*, *Hypolytrum nemorum* ssp. *vitiense*, *Scirpus littoralis* ssp. *thermalis*, *Eleocharis congesta* ssp. *subvivipara*, *Fimbristylis cymosa* ssp. *umbellato-capitata*, *Fimbristylis cymosa* ssp. *spathacea*, *Fimbristylis dichotoma* ssp. *podocarpa*, *Machaerina mariscoides* ssp. *colpodes*, *Schoenus tendo* ssp. *achaetus*, *Rhynchospora rugosa* ssp. *lavarum* forma *ponapensis*, and *Carex brunnea* ssp. *Meyenii*.

## Introduction

This paper deals with a taxonomic study of the Cyperaceae hitherto recorded from Micronesia. A total of 67 species that I recognize to be valid are classified into 13 genera in accordance with a system proposed in my previous paper (T. Koyama 1961). Detailed comparison of these species with those of Malaysia, Polynesia, Australia, New Zealand and the Hawaiian Islands does not support the high degree of endemism of Micronesian Cyperaceae that had been suggested by previous Japanese investigators. More than two thirds of the total number of species appear to have migrated from Malaysia. Micronesia without doubt is one of the better botanized areas in the tropical Pacific. The ample collections were, however, scattered in several distant herbaria, resulting in a lack of any comprehensive study of this vast family in this area. My aim of visiting such herbaria since 1958 was to bring all data concerning the Micronesian Cyperaceae together in order that we may have an accurate entire picture of this important and predominant component of the Micronesian flora.

## Historical Summary and Sources of Material

As early as 1828 Presl described *Fimbristylis affinis* from the Mariana Islands in his *Reliquiae Haenkeanae*, Vol. I. In 1829 Gaudichaud described *Fimbristylis marianna*, *F. littoralis*, *Baumea mariscoides* and *Hypolytrum macrocephalum* from various parts of Micronesia as the result of Freycinet's botanical exploration. His species were later cited by K. Schumann in his flora (1900).

More records of the occurrence of the species of Cyperaceae in Micronesia appear in the regional lists such as that of the Carolines by Volkens (1902), and

of Guam by Safford (1905) and Merrill (1914). The Cyperaceae known at that time were included in the collections of Ledermann, Volkens, Gibbon, and the collectors of the Guam Experiment Station, besides the historical specimens mentioned above. Almost all of these Cyperaceae were studied by Kükenthal (1924).

Ample collections were then made by several Japanese botanists over some 12 years from about 1930. They are Kanehira and Hatusima's collections in Fukuoka, Hosokawa's collection in Taipei, Tuyama's collection in Tokyo and a few other small ones. Ohwi (1942) studied all the Cyperaceae of the first collection, while Hosokawa treated some of his own collection in his series of tropical papers (1935-40). Tuyama's collection like a few others has been left unstudied.

The latest and the most extensive collections are those of the United States botanists. The University of Hawaii-Bishop Museum group including H. St. John and E. H. Bryan, Jr. deposited their collections at the herbarium of the Bernice P. Bishop Museum in Honolulu. The master sheets of F. R. Fosberg's collections for his Pacific Vegetation Project are available at the Smithsonian Institution. The College of Guam at Agana has established a Micronesian herbarium, and Cyperaceae duplicates were sent to the Plant Research Institute in Ottawa by B. C. Stone while I was at the Institute. The majority of these collections are first cited in this paper.

The following are the herbaria in which the related specimens are deposited:

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|------|--|
| B    | Botanischer Garten und Museum, Berlin-Dahlem.<br>Ledermann, Volkens, Gibbon.                                   |
| BISH | Bernice P. Bishop Museum, Honolulu.<br>St.-John, Bryan, Jr., Stone, Wagner, Jr., Takamatsu, Fosberg, Hosokawa. |
| DAO  | Plant Research Institute, Canada Department of Agriculture, Ottawa.<br>Stone and his students.                 |
| FU   | Faculty of Agriculture, Kyushu University, Fukuoka.<br>Kanehira, Kanehira & Hatusima, Hatusima.                |
| GUAM | College of Guam Herbarium, Agana, Guam.<br>Stone, and his students.  |
| K    | Royal Botanic Gardens, Kew.<br>Ledermann.  |
| KAG  | Faculty of Agriculture, Kagoshima University, Kagoshima.<br>Kawagoe.   |
| NY   | The New York Botanical Garden, New York.<br>Guam Experiment Sta., Kanehira.                                    |
| P    | Muséum National d'Histoire Naturelle, Paris.<br>Gaudichaud.  |
| TAI  | Department of Botany, Faculty of Science, National Taiwan University, Taipei.<br>Hosokawa.                     |
| TI   | Department of Botany, Faculty of Science, University of Tokyo, Tokyo.<br>Tuyama, Koidzumi, Momose, Kamiya.     |
| US   | United States National Herbarium, Smithsonian Institution, Washington.<br>Fosberg, Kanehira, Hosokawa.         |

### Phytogeographical Summary

From the patterns of distribution the Cyperaceae in Micronesia can be divided into three major groups: Indo-Malaysia group, Pacific group, and Pantropic group. The proportions are nearly equal at a ratio of 23 : 24 : 25. The Western Caroline Islands with 57 of 67 species are the richest in Cyperaceae.

The main part of the distribution range of the Indo-Malaysia group covers the eastern part of India, the Indo-Chinese peninsula and Malaysia. In Micronesia the range extends from the Philippines and western Malaysia north-eastwards to the Western Carolines and the Marianas, and in some cases further east to the Eastern Carolines. Of a total of 23 species occurring in the Western Carolines 12 species extend into the Eastern Carolines whereas 10 species extend to the Marianas. Taxa: *Scirpodendron Ghaeri* (\*), *Mapania pandanophylla* with its ssp. *immensa* (\*), *Scleria levis*, *S. polycarpa* (\*), *S. scrobiculata* (\*), *S. sumatrensis*, *S. caricina* (\*), *Scirpus juncooides* (\*), *S. littoralis* ssp. *thermalis*, *Eleocharis ochrostachys* (\*), *Eleocharis dulcis* (\*), *Fimbristylis autumnalis* ssp. *tainanensis*, *F. globulosa* (\*), *F. pauciflora*, *F. nutans*, *Cyperus tenuiculmis* (\*), *C. pilosus*, *C. sulcinux*, *C. cyperinus* (\*), *C. zollingerianus*, *Rhynchospora rubra*, *Carex indica*. (Species with \* extend from the Western Carolines to the Eastern Carolines).

The Pacific group consists of those which are widely spread on the Pacific islands including Micronesia, Polynesia, New Guinea and New Zealand. Some species of this group occur also in Malaysia (particularly in the Philippines) and northeastern Australia like those of the Indo-Malaysian group but they never reach continental Asia. The species restricted to a certain small area in the Pacific Basin may be interpreted to have a much reduced range. Such local taxa show some peculiar distribution. Taxa: *Mapania macrocephala*, *Mapania parvibractea*, *Hypolytrum latifolium* ssp. *vitiense*, *Scleria novaehollandiae*, *Scleria rugosa*, *Fimbristylis tristachya*, *Fimbristylis cymosa*, *Cyperus javanicus*, *Machaerina falcata*, *Macherina mariscoides* including ssp. *colpodes*, *Schoenus punctatus*, *Schoenus calostachyus*, *Schoenus philippinensis*. Endemics: *Mapania flavinux*, *Hypolytrum dissitiflorum*, *Fimbristylis palauensis*, *Schoenus tendo* ssp. *achaetus*, *Carex fuirenoides*. Micronesia-Bonin link: *Fimbristylis dichotoma* ssp. *longispica*. Micronesia-Hawaii link: *Rhynchospora rugosa* ssp. *lavarum*, *Carex brunnea* ssp. *Meyenii*.

The pantropic group consists mostly of tall-culmed Cyperi. Taxa: *Scleria lithosperma*, *Scirpus Fuirena*, *Eleocharis geniculata*, *Fimbristylis littoralis*, *Fimbristylis monostachyos*, *Fimbristylis dichotoma*, *Cyperus digitatus*, *C. distans*, *C. rotundus*, *C. Iria*, *C. compressus*, *C. difformis*, *C. haspan*, *C. polystachyos*, *C. cyperoides*, *C. brevifolius*, *C. Kyllingia*, *C. ferax*, *Rhynchospora corymbosa*.

Note: in the text, the term "practical description" refers to a previously published useful botanical description.

### Acknowledgments

I appreciate the cooperation of the curators of the herbaria cited in the text for their permission of free use or the loan of specimens. My sincere thanks are also due to Miss M. C. Neal of the B. P. Bishop Museum, Dr. E. H. Walker, then botanist at the Smithsonian Institution, Prof. T. S. Liu of the National Taiwan University, and Dr. B. C. Stone of the College of Guam for their various personal help and kindness. A series of papers contributed by Dr. J. H. Kern on the Cyperaceae in Malaysia was often very suggestive in the course of this study.

### A Key to Genera of Micronesian Cyperaceae

1. Pistillate flower terminal, always only one to a spikelet; achenes bony, the angles inconspicuous or very obtuse.
  2. Spikelets bisexual with one terminal pistillate and more than 2 axillary staminate flowers. (Tribe MAPANIEAE).
    3. Leaf blades and bracts grass-like, i.e. dorsiventrally flattened.
      4. Pistillate flowers naked.
        5. Spikelets with 2 opposite prophylloid and several spirally arranged glumes. . . . . 1. *Scirpodendron*.
        5. Spikelets with 2 opposite prophylloid glumes only . . . . . 3. *Hypolytrum*.
      4. Pistillate flowers subtended by 3 squamellae. . . . . 2. *Mapania*.
    3. Leaves of bladeless sheaths; blade of involucre bract culm-like; culms pseudo-septate. . . . . 4. *Lepironia*.
  2. Spikelets unisexual. (Tribe SCLERIEAE). . . . . 5. *Scleria*.
1. Pistillate or fruit-bearing flowers axillary, 1 to several to a spikelet; achenes lignous, usually conspicuously angled.
  6. Fruit-bearing flowers subtended by a glume only, usually hermaphrodite, rarely unisexual.
    7. Spikelets prophyllate, i.e. the lowest glume of spikelets dissimilar to the others, bicarinate; inflorescence an umbel or a head. (Tribe CYPEREAE). . . . . 9. *Cyperus*.
  7. Spikelets non-prophyllate, i.e. all glumes of spikelets similar.
    8. All glumes of a spikelet flower-bearing, the lower larger than the upper. (Tribe SCIRPEAE).
      9. Pistils not jointed between stylebase and ovary (achene). . . . . 6. *Scirpus*.
      9. Pistils jointed between thickened stylebase and ovary (achene).
        10. Perianth bristles present; culms always unispiccate, clothed at base with a few bladeless sheaths only; involucre bract scale-like. . . . . 7. *Eleocharis*.
        10. Perianth bristles absent; leaves usually bladed; inflores-

- cences usually umbellate, rarely a solitary spikelet; involucre bracts leaf-like. . . . . 8. *Fimbristylis*.
8. Only a few glumes of a spikelet flower-bearing, the lower empty and smaller than the upper. (Tribe RHYNCHOSPORAEE).
11. Fruit-bearing flower(s) born above staminate flowers; in Micronesian plants blades laterally compressed, falcate. . . . . 10. *Machaerina*.
11. Fruit-bearing flower(s) born below staminate flowers; in Micronesian plants blades dorsiventrally flat.
12. Stigmas 3; floral scales 2-ranked. . . . . 11. *Schoenus*.
12. Stigmas 2; floral scales irregularly spirally imbricated rarely 2-ranked. . . . . 12. *Rhynchospora*.
6. Pistillate flowers enclosed in a bottle-like organ (perigynium); all flowers unisexual. (Tribe CARICEAE). . . . . 13. *Carex*.

## Genus 1. SCIRPODENDRON Kurz

Only Micronesian species . . . . . 1. *S. Ghaeri*.

1. **Scirpodendron Ghaeri** (Gaertn.) Merrill in Philip. Journ. Sci. (Bot.) 9: 268, 1914; Kanehira in Journ. Dept. Agr. Kyushu Univ. 4: 281, 1935; Ohwi in Journ. Jap. Bot. 18: 137, 1942; S.T. Blake in Proc. Roy. Soc. Queensl. 54: 73, 1943.

*Chionanthus Ghaeri* Gaertn., Fruct. 1: 189, t. 39, f. 6 a-e, 1781.

*Scirpodendron costatum* (Thwaites) Kurz in Journ. Asiat. Soc. Beng. 38 (2): 85, 1869; Volkens in Engl., Bot. Jahrb. 31: 458, 1902; Kükenth. in Engl., Bot. Jahrb. 31: 458, 1902.

Coarse perennial. Culms central, rigid, smooth, 20–30 cm tall, 8–12 mm thick. Leaves many, basal and subbasal; blades coriaceous, flat, 3–6 cm wide, up to 100 cm long, serrulate-scabrous on margins; sheaths dark purplish brown. Spikes several, congested in terminal head-like cluster 6–12 cm long and 5–8 cm across; involucre bracts several, leaf-like, the longer more than 150 cm long. Glumes broadly ovate, 8 mm long, obtusish at apex, inconspicuously keeled. Achenes rhombic-obovoid, mostly hexagonal, 10–15 mm long, 6–8 mm wide, obtuse-angled and concave-faced, chestnut-brown at maturity. [Illustr.] C. B. Clarke, Illustr. Cyper. t. 114, f. 7–12, 1909.

WEST CAROLINES: YAP: without definite locality. *Volkens 519* (B).—PALAU: Babelthaob Islet, Aimiriik. *Tuyama s.n.*! (TI); Babelthaob Islet, Gaspan. *Tuyama, s.n.*! (TI), *Okamoto, s.n.*! (TI).

EAST CAROLINES: PONAPE: without definite locality. *Kanehira 1685, ex p.*! (FU, TI), *Riesenberg 75*! (BISH); Colonia, Banks of Tawensokola River. *Stone 1817*! (GUAM).—KUSAIE: Maalem village. *Hosokawa 6331*! (TAI).—Also Ceylon, Malaysia, Samoa and northern Australia.

## Genus 2. MAPANIA Aublet

1. Culms central, leafy at base and usually few-leaved at the middle; achenes more than 3 mm long.
    2. Inflorescence a compound corymb with many elongate branches.
      3. Achenes 3-angled with 3-fid style, dark brown, broadest below the middle.
        4. Achenes 2.5-4 mm long; corymb rays not hispid. .... 2. *M. pandanophylla* ssp. *pandanophylla*.
        4. Achenes 4.5-5 mm long; corymb rays hispid. .... 2a. *M. pandanophylla* ssp. *immensa*.
      3. Achenes biconvex with 2-fid style, stramineous, broadest above the middle. .... 3. *M. flavinux*.
    2. Inflorescence a head. .... 4. *M. macrocephala*.
  1. Culms lateral, scape-like, with a few bladeless sheaths only. .... 5. *M. parvibractea*.
2. **Mapania pandanophylla** (F. v. Muell.) K. Schumann in K. Schum. & Holtr., Fl. Kais. Wilhelmsl. 25, 1889; K. Schumann & Lauterb., Fl. Deutsch. Schutzgeb. Südsee 189, 1900.
- ssp. **pandanophylla**.

*Hypolytrum pandanophyllum* F. v. Muell., Fragm. Phytogr. Austral. 9: 16, 1875.

*Thoracostachyum hypolytroides* (F. v. Muell.) C. B. Clarke in Hook. f., Fl. Brit. Ind. 6: 681, 1894; Kükenth. in Engl., Bot. Jahrb. 59: 8, 1924.

*Thoracostachyum pandanophyllum* (F. v. Muell.) Domin in Bibliothec. Bot. Heft 85, 4: 484, 1915; Uittien in Rec. Trav. Bot. Néerl. 33: 183, 1936; Hosokawa in Trans. Nat. Hist. Soc. Formosa 28: 152, 1938.

More or less tufted from ligenous rhizome; stolons as much as 50 cm long, clothed with brownish spathaceous scales. Leaves coriaceous, up to 2.5 m long, 5 cm wide, 3-costate, gradually acuminate at apex, serrulate-scabrous on margins. Culms up to 120 cm tall, smooth throughout, leafy below. Inflorescence paniculate-corymbose, 7-17 cm long, 7-10 cm wide; branches many, 2-4 cm long, smoothish; longer involucral leaves up to 120 cm long; spikes numerous but branches and branchlets are visible from outside, pale-brown, ovoid-globose at maturity, 7-8 mm long, 6-7 mm wide. Glumes broadly elliptic to semicircular, pale brown, 3-3.5 cm long, rounded at apex, 1-nerved. Prophylls lance-ovate, hyaline, ca. 3 mm long, spinulose on keel. Achenes ovoid-pyramidal, 3-angular, light purplish-brown and densely purple-maculate, 2.5-3.5 mm long including 1 mm long beak, broadest below the middle, cuneate at base; stigmas 3. Perigonophylls 3, lanceolate, acutish, as long as prophylls. [Illustr.] C. B. Clarke, Illustr. Cyper. t. 108, f. 7-10, 1909.

MARIANAS: Rota Is., Sabana. *Necker RS-6!* (US).

WEST CAROLINES: PALAU: Babelthaob Islet. *Ledermann 14399!* (K).

*Hosokawa 9689!* (BISH, TAI).—Also India, Malaysia and northern Australia.

2a. ssp. *immensa* (Kükenth.) T. Koyama, stat. nov. (Pl. 3, fig. B)

*Thoracostachyum hypolytroides* C. B. Clarke var. *immensum* Kükenth. in Engl., Bot. Jahrb. 59: 8, 1924; Kanehira in Journ. Dept. Agr. Kyushu Univ. 4: 282, 1935; Ohwi in Journ. Jap. Bot. 18: 137, 1942.

*Thoracostachyum pandanophyllum* Domin var. *immensum* (Kükenth.) Hosokawa in Trans. Nat. Hist. Soc. Formosa 28: 152, 1938.

*Thoracostachyum pacificum* Hosokawa in Trans. Nat. Hist. Soc. Formosa 32: 6, 1942.

Achenes 4.5–5 mm long, 2.8–3.5 mm wide, almost conical with very short base, attenuate to thick beak immediately above the base; corymb rays and raylets hispid on angles; otherwise as in ssp. *pandanophylla*.

EAST CAROLINES: PONAPE: without definite locality. *Kanehira 1673!* (FU, TI), *Kanehira & Hatusima 10770!* (FU); Tolomail. *Takamatsu 994!* (BISH); Mt. Nan-a-raut, 500 m. *Hosokawa 8199!* (TAI), Mt. Nan-a-raut, in moss forest at the summit. *Hosokawa 8222!* (TAI—Type of *Th. pacificum*); Nipit, near One, 200 m. *Hosokawa 5815!* (BISH); Kuporujō. *Takamatsu 668!* (BISH); Laperei. *Ledermann 13572!* (B, K).—Endemic in East Caroline Islands.

Subspecies *immensa* differs from ssp. *pandanophylla* only by the slightly larger achenes and hispid corymb branches as described above. With the very short stipe and depressed base the achenes of ssp. *immensa* tend to be more pyramidal than in ssp. *pandanophylla* having ovoid achenes with more projected base. But some intermediate shapes of achenes have been seen in the specimens of ssp. *pandanophylla* from western Carolines. In spite of such minor morphological differences the two subspecies are clearly separated geographically as ssp. *immensa* is restricted to eastern Carolines while widespread ssp. *pandanophylla* occurs in western Carolines.

3. *Mapania flavinux* T. Koyama, sp. nov. in sectione *Thoracostachyo*, differt a *M. bancana* achaenio flavo non fusco multo majore et a *M. floribunda* spiculis paucius florentibus et achaenii forma.

Laxiuscule caespitosa rhizomate lignoso. Folia ad basin culmi aggregata, et superiora 2 vel 3 caulina, laminis elongatis usque ad 120 cm longis 3 cm latis planis laete viridibus ad margines costamque valde serrulatoscabris, apice gradatim acuminata. Culmus centralis acute triqueter omnino laevis ad 1 m altus. Inflorescentia paniculato-corymbosa ovoideo-globosa 5–11 cm longa 3–8 cm lata composita perdense multispicata sed ramis ramulisque visibilibus; folia involucri ad 70 cm longa. Spicae ovoideo-globosae maturitate 5–8 mm longae ac latae. Glumae obovatae 1.8–2 mm longae flavescentes vel pallidae apice rotundae, costa subtrinervia. Prophylla lanceolata 2 mm longa apice obtusiuscula ad costam minute scabriuscula. Perigoniophylla 3 cum prophylo subaequantia lanceolata plus minus inaequalia. Achaenia obovata turgido-biconvexa 3–3.5 mm longa circ. 2.5 mm lata facie straminea et paulo rugosa basi cuneata apice contracta

et rostrum erectum 1.2-1.5 mm longum sensim producta; styli rami 2.

WEST CAROLINES: PALAU: Babelthaob Islet, Gaspan. *Tuyama s.n.l* (Holotype in TI).—Endemic in the West Carolines.

Although this newly proposed taxon is known only by the type collection it is easily recognized by the digynous, yellowish achenes only weakly longitudinally rugose on the upper half of each side. A spikelet consists of 5 squamellae, of which the three are perianth segments of the fruit-bearing flower by their apparent position. The so-called front squamella is missing. The lateral squamellae, which are in my opinion prophylls of the spikelet, are beautifully ciliate with dark brown short hairs as often seen in *Paramapania*.

4. ***Mapania macrocephala*** (Gaudich.) K. Schumann ex Warburg in Engl., Bot. Jahrb. 13: 265, 1891; K. Schumann & Lauterb., Fl. Deutsch. Schutzgeb. Südsee 189, 1900; Hosokawa in Trans. Nat. Hist. Soc. Formosa 28: 152, 1938; S. T. Blake in Journ. Arn. Arb. 28: 212, 1947.

*Hypolytrum macrocephalum* Gaudich. in Freyc., Voy. Bot. 414, 1826.

*Mapania palauensis* Hosokawa in Trans. Nat. Hist. Soc. Formosa 32: 7, 1942. Syn. nov. e typo! (Pl. 1, fig. B).

*Mapania yapensis* Hosokawa in Trans. Nat. Hist. Soc. Formosa 32: 8, 1942. Syn. nov. e typo! (Pl. 1, fig. A).

[Practical description] Hosokawa in Trans. Nat. Hist. Soc. Formosa 32: 7, 1942, under *Mapania palauensis*. [Illustr.] Pl. 1 and Pl. 3, fig. G of the text.

WEST CAROLINES: YAP: Mt. Daboi. *Hosokawa 8748!* (TAI—type of *M. yapensis*).—PALAU: Babelthaob Islet, Mt. Sul. *Hosokawa 9817!* (TAI—type of *M. palauensis*); Gaspan. *Tuyama s.n.l* (TI).—Also Malaysia and Polynesia.

In 1959, guided by Prof. T. S. Liu, I have examined the type specimens of *M. palauensis* Hosokawa and *M. yapensis* Hosokawa at Taipei and found them quite identical with *M. macrocephala*, a well known species of the section *Cephaloscirpus*. From Hosokawa's notes his bases for creating the new taxa seem to be the more or less lobed head of *M. palauensis* and the slightly shorter achenes of *M. yapensis*. I have seen some 14 specimens of *M. macrocephala* from the other regions for comparison. Heads are more commonly slightly lobed, and the achenes ranges from 4.5 to 7 mm in length. Micronesian specimens are, therefore, completely included in the variation range of *M. macrocephala*.

5. ***Mapania parvibractea*** (C. B. Clarke) T. Koyama, comb. nov.

*Hypolytrum parvibractea* C. B. Clarke in Kew Bull. 1899: 114, 1899.

*Mapania montana* K. Schumann & Lauterb., Fl. Deutsch. Schutzgeb. Südsee 189, 1900.

*Thoracostachyum lucbanense* (Elmer) Kükenth. ex Merrill in Philip. Journ. Sci. (Bot.) 11: 258, 1916; Kükenth. in Engl., Bot. Jahrb. 59: 9, 1924.

*Paramapania parvibractea* (C. B. Clarke) Uittien in Rec. Trav. Bot. Néerl. 33: 143, 1936; S. T. Blake in Journ. Arn. Arb. 28: 209, 1949; Kern



in *Blumea* 9: 217, 1958.

Rhizome ligneous, clothed with dark brown fibrous remnants of basal sheaths. Leaves many, tufted; blades elongate, as much as 80 cm long, 12 mm wide, flat above, plicate below, thinly coriaceous to herbaceous, light green, uncostate, gradually cuspidate at apex; sheaths light reddish-brown, persistent and disintegrating into fuscous fibers. Culms lateral, subscapose, clothed at base with a few brownish bladeless sheaths, usually 1-vaginate at the middle. Inflorescence a terminal corymb, simple to compound, hemisphaerical, 2.5–5 cm long, 4–7 cm wide; bracts spathaceous or scale-like, brownish, 1 cm long; branches smooth, up to 3 cm long. Spikes many, ovoid-globose, 3–6 mm long, 4–5 mm across at maturity, dark reddish-brown. Glumes elliptical, round-tipped, 1–1.5 mm long, castaneous, obscurely 1-nerved; prophylls narrowly lanceolate, as long as the glume, castaneous, prominently hispid-ciliate on keel. Achenes ovoid or more or less rhombic-ovoid, almost not angular, 1.8–2.2 mm long, about 1 mm across, cuneate at apex, yellow-brown to light brown, densely spotted with dark red-brown; beak very short; style branches mostly 3, sometimes 2, both intermixed on the same corymb. [Illustr.] Pl. 3, fig. C of text.

WEST CAROLINES: PALAU: Babelthaob Islet, Nagtkip. *Ledermann* 14559! (B, K).—Also throughout Malaysia and Fiji.

Recorded from Micronesia only by a single collection, of which I have seen a fragment through the courtesy of the late Mr. E. Nelmes of the Kew Gardens. Ledermann's collection has immature achenes only, but the very short beak of achenes is sufficient to distinguish it from very similar *M. radicans*. As to the identity of *Paramapania lucbanensis* I follow Kern (1958). The above description is based upon a series of New Guinean specimens deposited in the New York Botanical Garden.

When the genus *Mapania* of my concept is further divided into smaller genera as is done by some current cyperologists, *M. parvibractea* belongs to the genus *Paramapania* and *M. pandanophylla* and *M. parvinox* are included in the genus *Thoracostachyum*, while *M. macrocephala* will remain as a sole Micronesian member of the genus *Mapania* s. str. The delimitation and morphological interpretation of such genera are different person by person, and I sometimes found intermediates between any two genera. As was remarked in my previous paper (T. Koyama, 1959) I am not convinced of the validity of such genera when they are treated on a world basis.

### Genus 3. HYPOLYTRUM L. C. Richard

1. Inflorescence hemisphaerical, dense, erect; spikelets 5–8 mm long, hemisphaerical-globose; achenes elliptic, contracted at mucronate apex. . . . . 6. *H. nemorum* ssp. *vitiense*.
1. Inflorescence oblong-elliptic, rather loose, more or less nodding; spikelets 7–12 mm long, elliptic; achenes ovoid, gradually narrowed to long-beaked apex. . . . . 7. *H. dissitiflorum*.

6. **Hypolytrum nemorum** (Vahl) Sprengel, Syst. 1: 233, 1825.

ssp. **vitiense** (C. B. Clarke) T. Koyama, stat. nov. (Pl. 3, fig. E)

*Hypolytrum vitiense* C. B. Clarke in Kew Bull. Add. Ser. 8, 51, 1908.

*Hypolytrum latifolium* (non L. C. Rich.): Volkens in Engl., Bot. Jahrb.

31: 457, 1902; Kükenth. in Engl., Bot. Jahrb. 59: 7, 1925; Kanehira in

Journ. Fac. Agr. Kyushu Univ. 4: 279, 1935; Ohwi in Journ. Jap. Bot.

18: 137, 1942; Hosokawa in Trans. Nat. Hist. Soc. Formosa 32: 5, 1942.

Culms from ligneous rhizome, 30–80 cm tall, clothed at base with a few cinnamon cataphylls, smooth except on inflorescence axis. Leaves basal and 1 or 2 upper on the culm; blades flat, herbaceous, whitish-green, 1–2.8 cm wide, 3-costate, overtopping the inflorescence, gradually acuminate at apex. Inflorescence a hemisphaerical corymb, 4–6 cm long, 9–11 cm across, compound; rays up to 4 cm long, hispid-scabrous on angles; involucreal leaves about 2, the longer 20 cm long or more. Spikes globose at maturity, 5–8 mm long and as wide, ferruginous, many-flowered. Glumes oval, 2 mm long, membranous, light brown, indistinctly 1-nerved, mucronate at apex. Prophylls linear-lanceolate, hispid on keel, half as long as the mature achene. Achenes elliptic, biconvex, 3.8–4 mm long, 1.8–2 mm wide, contracted at both ends, light pale-brownish and maculate with reddish lineolae, very weakly rugose; style branches 2.

MARIANAS: without definite locality. *Fritz* (not seen, cited by Kükenthal l.c.).

WEST CAROLINES: YAP: without definite locality. *Volkens* 259 (B), *Kanehira* 1140! (FU), *Momosé s. n.*! (TI); Kolonie, Monte Kabul. *Tuyama s. n.*! (TI); Mt. Dabiol. *Hosokawa* 8748-a! (TAI); near Tarago. *Hosokawa* 8722! (TAI); between Molokai and Galakai. *Tuyama s. n.*! (TI).—PALAU: Babelthaob Islet. *Hosokawa* 9645! (TAI) [immature specimen]; Aimiriik. *Kanehira & Hatsusima* 4582 & 4597! (FU), *Okamoto* 22! (FU); Gardok. *Hatusima* 5006! (FU).—Fiji Islands.

In Micronesia this plant has long passed under the name of *H. latifolium*, which is now a synonym of *H. nemorum* of earlier date. The identity between the two was proved by Kern (1958), who examined the type of *H. nemorum* at Copenhagen.

The Micronesian specimens examined by me do not perfectly agree with *H. nemorum* of the Indo-Malaysia in the red-spotted, paler achenes that are only indistinctly rugose and larger but are identical with those of *H. vitiense* of Fiji with "nuce levi, rubromaculatâ" (C. B. Clarke's original description). In the Indian subcontinent the achenes of *H. nemorum* are invariably strongly rugose and rust-brown and scarcely exceed 3 mm in length. But in Malaysia *H. nemorum* shows a considerable variation particularly in achene characters: the achene length ranges from 1.8 mm to 3.75 mm; the shape varies from orbicular-ovate through ovate to elliptic; and even hardly rugose achenes are not rare. Several sheets of *H. vitiense* from Fiji were also examined at the New York Botanical

Garden. Their achenes are always very indistinctly rugose and longer than 3.5 mm, but the color is not constantly as pale as in Micronesian specimens. By these morphological reasons *H. vitiense* is here reinterpreted as a subspecies of the widespread *H. nemorum*.

**7. *Hypolytrum dissitiflorum*** Steudel, Syn. Pl. Glumac. 2, 132, 1855; Kükenth. in Engl., Bot. Jahrb. 59: 7, 1925; Kanehira in Journ. Fac. Agr. Kyushu Univ. 4: 279, 1935; Ohwi in Journ. Jap. Bot. 18: 137, 1942.

*Hypolytrum oligostachyum* K. Schumann & Lauterb., Fl. Deutsch. Schützgeb. Südsee 190, 1901.

*Hypolytrum dissitiflorum* Steud. var. *oligostachyum* (K. Schum. & Lauterb.) Kükenth. in Engl., Bot. Jahrb. 59: 8, 1925.

Culms tufted in small clumps from short rhizome, 50–90 cm tall, as much as 4 mm thick below, smooth except at very apex, 2- or 3-noded. Leaves basal and the upper 2 or 3 on the culm; blades flat, 8–20 mm wide, soft, herbaceous, overtopping the culm, light green, paler beneath, 3-costate, plicate; basal sheaths bladeless, stramineous-brownish or cinnamon. Inflorescence paniculate-corymbose, overtopping, up to 13 cm long, 6 cm wide, oblong, loose with slender branches; branches paired or in threes, as much as 8 cm long, (3-) 4- to 8-spiked; involucre leaves 1 or 2, the longer twice as long as the inflorescence. Spikes ovoid-globose, 7–12 mm long, 6–7 mm across, peduncled, brownish. Glumes, the lower few sterile, lanceolate, acuminate, the fertile ones obovate, 3–3.5 mm long, 1.5–1.8 mm wide, membranous, yellow-brown, the margins yellow, hyaline, the midvein distinct. Prophylls linear-lanceolate, hyaline, densely hispid on keel, 3–3.5 mm long. Stamens 2. Achenes ovate, biconvex, 3.8–4 mm long including 1.5 mm long beak, 1.5–1.7 mm wide, roughly longitudinally rugose, deep yellow-brown at maturity, cuneate at base, abruptly contracted above to short-beaked apex; style branches 2. [Illustr.] Pl. 3, fig. F of text.

EAST CAROLINES: TRUK: without definite locality. *Wong 271!* (BISH).—PONAPE: without definite locality. *Kanehira 630 & 870!* (FU), *Kawagoë s.n.!* (KAG), *Koidzumi s.n.!* (TI); Station Nanponmal, Kalaubuschwald. *Ledermann 13648* (B, K); Salbuk. *Takamatsu 603a!* (BISH); Mt. Tamatamansakir, 500 ft. *Glassman 2320!* (BISH); Mt. Nan-a-raut. *Hosokawa 6000!* (TAI); Nipit. *Takamatsu 902!* (BISH); Net-Palikir district; *Stone 1976!* (GUAM).—KUSAIE: without definite locality. *St.-John 21444!* (US), *Kanehira 1341!* (FU); Mt. Matante. *Takamatsu 562!* (BISH); Mt. Tefeyacht, 700 ft. *Glassman 2696!* (BISH); Taonsakk village. *Hosokawa 6239!* (TAI); Mt. Buache. *Hosokawa 6270!* (BISH, TAI).—Endemic in Micronesia.

#### Genus 4. LEPIRONIA L. C. Richard

Only Micronesian species. . . . . 8. *L. articulata*.

**8. *Lepironia articulata*** (Retz.) Domin in Bibliothec. Bot. 20, Heft. 85: 486, 1915; S. T. Blake in Proc. Roy. Soc. Queensl. 54: 71, 1943.

*Restio articulata* Retzius, Obs. Bot. Pt. 4, 14, 1786.

*Lepironia mucronata* L. C. Richard in Pers., Syn. Pl. 1: 70, 1805; Volkens in Engl., Bot. Jahrb. 31: 458, 1902; Kükenth. in Engl., Bot. Jahrb. 59: 9, 1924.

[Practical descr.] Chermezon in Fl. Madagascar, 39<sup>e</sup> fam., Cypérac. 244, 1937, under *L. mucronata*. [Illustr.] C. B. Clarke, Illustr. Cyp. t. 118 f. 8-16, 1909; Chermezon, l.c. 241, f. 23: 5-8, 1937. Both under *L. mucronata*.

WEST CAROLINES: YAP: without definite locality. *Volkens* 498 (B, not seen, citation based on Kükenth. l.c.); Tomil Islet. *Tuyama s.n.*! (TI).—Also Australia and southern Africa.

An aphyllous sedge recognizable at once by its septate, terete culms. Being a native of southern Hemisphere it is widely cultivated in southern China, Formosa, and perhaps in Malaysia for making a kind of rough mat well known as 'ampera'. The Micronesian plant seems to be of some cultivated origin related to sugar farms.

#### Genus 5. SCLERIA Bergius.

1. Perennial with ligneous rhizomes; plants usually coarse; partial panicles born on the upper part of culms only.
  2. Spikelets bisexual; inflorescence a terminal spike; achenes without any hypogynium. (Sect. HYPOPORUM). . . . . 9. *Scl. lithosperma*.
  2. Spikelets unisexual; inflorescence a panicle; achenes subtended by a hypogynium here termed as a disc. (Sect. SCLERIA).
    3. Leaves evenly distributed; lateral partial panicles usually absent or much smaller than the terminal one. . . . . 10. *Scl. levis*.
    3. Leaves, at least middle ones, pseudo-whorled, i.e. subverticillately clustered in group of 2 to 5.
      4. Hypogynium disc-like, the lobed not more than half the length of achene body.
        5. Contraligules 2 to 3 times as long as wide; bracteoles longer than very dense partial panicles, thus panicles slightly bearded. . . . . 11. *Scl. ciliaris*.
        5. Contraligules shorter than wide; bracteoles shorter than normally grown sidebranches.
          6. Achenes smooth; disc-lobes acute and toothed at apex. . . . . 12. *Scl. polycarpa*.
          6. Achenes distinctly tessellate; disc-lobes round at apex. . . . . 13. *Scl. scrobiculata*.
      4. Hypogynium cup-like, covering the lower 2/3 of the achene body. . . . . 14. *Scl. sumatrensis*.
1. Annual with fibrous roots only; plants usually slender and small; partial inflorescences distributed on the whole length of culms.

7. Spikelets paniculate; achenes falling off apart from the surrounding scales. (Sect. TESSELLATAE).
8. Plant glabrous; achenes ellipsoid-ovoid, 1.5 mm across or more, obscurely tessellate above the middle. . . . . 15. *Scl. novae-hollandiae*.
8. Plant usually more or less pubescent; achenes globular, 1–1.3 mm across, distinctly scrobiculate. . . . . 16. *Scl. rugosa*.
7. Spikelets congested in small heads at leaf axils; achenes falling off tightly inclosed in two surrounding scales. . . . . 17. *Scl. caricina*.
9. ***Scleria lithosperma*** (Linn.) Swartz, Prodr. Veg. Ind. Occid. 18, 1788; Volkens in Engl., Bot. Jahrb. 31: 458, 1902; Kükenth. in Engl., Bot. Jahrb. 59: 9, 1924; Kanehira in Journ. Fac. Agr. Kyushu Univ. 4: 282, 1935; Ohwi in Journ. Jap. Bot. 18: 138, 1942.

*Scirpus lithospermus* Linn., Sp. Pl. ed. 1, 51, 1753.

[Practical descr.] Core in Brittonia 2: 27, 1936; Nelmes in Kew Bull. 1955; Kern. in Blumea 11: 191, 1961. [Illustr.] C. B. Clarke, Illustr. Cyper. t. 123 f. 1–4, 1909; Core, l.c. t. 3 f. 2 (achene); Kern, l.c. f. 6h on p. 181 (achene).

MARIANAS: Agrigan. *Hosokawa 8012!* (BISH, TAI); Aramagan. *Kanehira 2189!* (FU); Pagan. *Hosokawa 7968!* (TAI); Saipan. *Hatusima 10689!* (FU); Tinian. *Hosokawa 7709!* (TAI), *Tuyama s.n.!* (TI).—GUAM: without definite locality. *Nelson 308!* (BISH).

WEST CAROLINES: YAP: without definite locality. *Kanehira 1118!* (FU), *Wong 411!* (BISH, US), *Volkens 180 & 539* (B), in monte Kabul. *Tuyama s.n.!* (TI), Barabatto. *Takamatsu 1873!* (BISH); Map Islet. *Hosokawa 8938!* (TAI, US).—Distribution pantropic.

10. ***Scleria levis*** Retzius, Observ. Bot. 4, 13, 1786.

*Scleria zeylanica* Poiret, Encycl. Meth. 7: 3, 1806; Kükenth. in Engl., Bot. Jahrb. 59: 10, 1925; Kanehira in Journ. Fac. Agr. Kyushu Univ. 4: 282, 1935; Ohwi in Journ. Jap. Bot. 18: 138, 1942.

*Scleria hebecarpa* Nees ex Wight, Contrib. Bot. Ind. 117, 1834; Ohwi in Journ. Jap. Bot. 18: 137, 1942.

[Practical description] Ohwi in Mem. Coll. Sci. Kyoto Univ. B, 18: 6, 1944 (under *Scl. hebecarpa*); Kern, in Blumea 11: 164, 1961. [Illustr.] Kern, l.c. f. 3h on p. 157 (achene).

WEST CAROLINES: YAP: near Mabo. *Hosokawa 8787!* (TAI); without definite locality. *Koidzumi s.n.!* (TI), *Fujikawa s.n.!* (TI).—PALAU: Malakal. *Stone 4570!* (DAO, GUAM); Babelthaob Islet. *Hatusima 5056!* (FU); Gaspan. *Hosokawa 7012!* (TAI), Aimiriik. *Kanehira & Hatusima 4554!* (FU); Korrör Islet. *Kanehira & Hatusima 4527, 4675 & 4913!* (FU), Arakabesan near Korrör. *Kanehira & Hatusima 4844!* (FU); Komliangel. *Tuyama s.n.!* (TI).—Also India, southern China, Japan, Ryukyus, Malaysia and northern Australia.

This species is very variable particularly in size, shape and pubescence of achenes, and in the presence or absence of lateral partial panicles. In the speci-

mens cited above, achenes are almost glabrous and tend to be slightly elliptic and colored light bluish, and the lateral panicles are in most cases more developed than usual.

**11. *Scleria ciliaris*** Nees ex Wight, *Contrib. Bot. Ind.* 117, 1834.

*Scleria bancana* Miquel, *Fl. Ind. Batav. Suppl.* 602, 1860; Kükenth. in *Engl., Bot. Jahrb.* 59: 9, 1924; Kanehira in *Journ. Fac. Agr. Kyushu Univ.* 4: 282, 1935; Ohwi in *Journ. Jap. Bot.* 18: 138, 1942.

[Practical descr.] Kern. in *Blumea* 11: 174, 1961. [Illustr.] Kern, l.c. f. 5d on p. 167 (achene).

WEST CAROLINES: YAP: Tomil Islet. *Hosokawa* 8836! (TAI); Kolonie in monte Kabul. *Tuyama s.n.*! (TI), north of village Yebon, 100 ft. *Wong* 542! (BISH, US).—PALAU: Babelthaob Islet, Luise-Almonogui. *Hosokawa* 6823! (TAI), Aimiriik. *Tuyama s.n.*! (TI), Ngardokk. *Tuyama s.n.*! (TI), Eiraij. *Tuyama s.n.*! (TI), Gaspan. *Tuyama s.n.*! (TI); Korrör Islet. *Kanehira & Hatusima* 4392! (FU), *Ledermann* 14175 (B), *Gibbon* 1102 (B).

EAST CAROLINES: TRUK: Fefan, Mt. Tuktyap. *Hosokawa* 8392! (BISH, US), Wara Witipen. *Hosokawa* 8445! (BISH).—Also Ceylon, India, Indo-China, southern China and Malaysia.

**12. *Scleria polycarpa*** Böckeler in *Linnaea* 38: 508, 1874.

*Scleria margaritifera* Willd., *Sp. Pl.* 4: 312, 1805; Merrill in *Philip. Journ. Sci. (Bot.)* 9: 63, 1914; Kükenth. in *Engl., Bot. Jahrb.* 59: 9, 1925; Kanehira in *Journ. Fac. Agr. Kyushu Univ.* 4: 282, 1935; Ohwi in *Journ. Jap. Bot.* 18: 138, 1942.

'*Scleria hebecarpa* (non Nees)': Volkens in *Engl., Bot. Jahrb.* 31: 458, 1902.

[Practical descr.] Kern in *Blumea* 11: 183, 1961. [Illustr.] Kern, l.c. f. 6a on p. 181 (achene).

MARIANAS: GUAM: without definite locality. *McGregor* 540! (BISH, US); Mt. Lamlam. *Necker* 380! (US); upper Ylig River, near Tarzan Falls. *Stone* 3829! (DAO, GUAM); Mt. Almagosa. *Pedrus* 57! (DAO).—SAIPAN: Popaya, savanna. *Hofer* 70! (B).

WEST CAROLINES: YAP: without definite locality. *Wong* 250! (US), *Volkens* 150, 297 & 296 (B); Balabat. *Takamatsu* 1873! (BISH).—PALAU: Babelthaob Islet, Aimiriik. *Kanehira & Hatusima* 4530! (FU), *Tuyama s.n.*! (TI).

EAST CAROLINES: TRUK: without definite locality. *Koidzumi s.n.*! (TI); Tomil Islet. *Hosokawa* 8339! (TAI); Summer Islet. *Hosokawa* 6511! (TAI); Moen Island. *Stone* 2054! (GUAM).—PONAPE: Mt. Tamatamansakir, 1100 ft., *Glassman* 2323! (BISH); Param. *Takamatsu* 616! (BISH); Colonia, *Stone* 1976! (GUAM).—Also Malaysia, Polynesia, Solomon Islands and northern Queensland.

**13. *Scleria scrobiculata*** Nees & Meyen ex Nees in Wight, *Contrib. Bot. Ind.* 117, 1834.

'*Scleria multifoliata* (non Böckl.)': Kükenth. in *Engl., Bot. Jahrb.* 59:

10, 1925; Kanehira in Journ. Fac. Agr. Kyushu Univ. 4: 282, 1935; Ohwi in Journ. Jap. Bot. 18: 138, 1942.

[Practical descr.] Kern in Blumea 11: 185, 1961. [Illustr.] C. B. Clarke, Illustr. Cyper. t. 129 f. 3, 1909 (under *Scl. multifoliata*, achene); Kern, l.c. f. 6b on p. 181 (achene).

WEST CAROLINES: PALAU: KOROR Islet. *Kanehira & Okuya s.n.* (FU), *Kanehira 118!* (FU), *Kanehira & Hatusima 4417!* (FU); KOROR, Almijt. *Tuyama s.n.!* (TI).

EAST CAROLINES: PONAPE: Laperei, 100 m. *Ledermann 13604* (B).—Also India, southern China, Malaysia and northern Australia.

This plant has been recorded from Micronesia under the name of *Scl. multifoliata*, which is according to Kern (1916) synonymous with *Scl. purpurascens*. The two species are very similar, but can be separated by achene characters when collected in fruit: achenes of *Scl. scrobiculata* are creamy-white and truly scrobiculate, whereas in *Scl. purpurascens* they turn purplish-brown when mature and are only indistinctly cancellated.

14. *Scleria sumatrensis* Retzius, Observ. Bot. 5, 19, t. 2, 1789; Hosokawa in Trans. Nat. Hist. Soc. Formosa 25: 264, 1935.

[Practical descr.] Ohwi in Mem. Coll. Sci. Kyoto Univ. B, 18: 5, 1944; Kern in Blumea 11: 182, 1961. [Illustr.] C. B. Clarke, Illustr. Cyper. t. 129 f. 1-2, 1909; Kern in Blumea 11: 167, f. 5h, 1961 (achene).

WEST CAROLINES: PALAU: Mt. Grittel. *Hosokawa 9262!* (TAI); Babelthaob Islet. *Hosokawa 9714!* (TAI), ditto, Lake Ngelegal. *Tuyama s.n.!* (TI), ditto, Aimirrik. *Tuyama s.n.!* (TI), on the border of the Lake Ngaldokk near Malkyoku. *Hosokawa 7389!* (TAI).—Also Formosa and Malaysia.

15. *Scleria novae-hollandiae* Böckeler in Flora 58: 120, 1875.

*Scleria Merrillii* Palla in Allg. Bot. Zeitschr. 17, Beibl.: 8, 1911; Kükenth. in Engl., Bot. Jahrb. 59: 10, 1924; Kanehira in Journ. Fac. Agr. Kyushu Univ. 4: 282, 1935; Ohwi in Journ. Jap. Bot. 18: 138, 1942.

'*Scleria laxa* (non R. Br.)': Merrill in Philip. Journ. Sci. (Bot.) 9: 63, 1914.

'*Scleria biflora* (non Roxb.)': Hosokawa in Trans. Nat. Hist. Soc. Formosa 32: 6, 1942.

[Practical descr.] Kern in Blumea 11: 201, 1961. [Illustr.] Kern, l.c. f. 7h on p. 195 (achene).

MARIANAS: GUAM: Mt. Lamlam. *Gregory & Necker 381!* (BISH, US), Mt. Tenjo. *Moore 76!* (US), without definite locality. *McGregor 493!* (BISH, US), *Guam Exp. Station Herb. 173!* (BISH, US), Manengon, *Stone 4523!* (GUAM).

WEST CAROLINES: YAP: Tomil Islet. *Tuyama s.n.!* (TI).—PALAU: Babelthaob Islet, near Aimion. *Hosokawa 9745!* (TAI), Aimirrik. *Kanehira & Hatusima 4550 & 4553!* (FU).

EAST CAROLINES: PONAPE: George Islet. *Hosokawa 6056!* (TAI); Nam-

ponmal. *Ledermann 13658* (B); without definite locality. *Hatusima 10751!* (FU).—Also Philippines, New Guinea and northern Australia.

**16. *Scleria rugosa*** R. Brown, Prodr. Fl. Nov. Holl. 1, 240, 1810.

[Practical descr.] Ohwi in Mem. Coll. Sci. Kyoto Univ. B, 18: 9, 1944 (under *Scl. Onoei*); Kern in Blumea 11: 206, 1961. [Illustr.] Kern, l.c. f. 8b on p. 204 (achene).

WEST CAROLINES: PALAU: Babelthaob Islet, Aimiriik. *Tuyama s.n.!* (TI).—Also Japan, Ryukyus, Formosa, Malaysia and northern Australia.

New to the flora of Micronesia. This and the preceding one, both members of the section Tessellatae, provide good examples of Malaysian elements reaching western Micronesia. Tuyama's collection is a unicate with poor fruits, but very slender vegetative parts with more or less pubescent leaves sufficiently distinguish it from *Scl. novae-hollandiae*, which is more abundant in western Carolines.

**17. *Scleria caricina*** (R. Brown) Bentham, Fl. Austral. 7: 426, 1878; Volkens in Engl., Bot. Jahrb. 31: 458, 1902.

*Diplacrum caricinum* R. Brown, Prodr. Fl. Nov. Holl. 1, 241, 1810; Merrill in Philip. Journ. Sci. (Bot.) 9: 60, 1914.—Kükenth. in Engl., Bot. Jahrb. 59: 9, 1924; Kanehira in Journ. Fac. Agr. Univ. Kyushu 4: 277, 1935; Ohwi in Journ. Jap. Bot. 18: 137, 1942.

[Practical descr.] Ohwi in Mem. Coll. Sci. Kyoto Univ. B, 18: 3, 1944 (under *Diplacrum caricinum*); Kern in Blumea 11: 208, 1961. [Illustr.] C. B. Clarke, Illustr. Cyper. t. 134 f. 3 (spikelet); Kern, l.c. f. 8e on p. 204.

MARIANAS: GUAM: without definite locality. *Guam Exp. Station Herb. 245!* (US), *Nelson 324!* (BISH); Mt. Lamlam, 1000 ft. *Moore 239!* (US) & *240!* (BISH, US).

WEST CAROLINES: YAP: Tomil Islet. *Tuyama s.n.!* (TI); without definite locality. *Volkens 245* (B).—PALAU: Babelthaob Islet. Ngarathmao. *Tuyama s.n.!* (TI); Aimirrik. *Hosokawa 7286!* (TAI), *Kanehira & Hatusima 4491!* (FU); Kamsetsu. *Kanehira & Hatusima 4961!* (FU); Korrer Islet. *Kanehira & Hatusima 4436!* (FU), *Ledermann 14191* (B).

EAST CAROLINES: PONAPE: Laperei. *Ledermann 13554!* (B, BISH); Nut village. *Hosokawa 6094!* (TAI).—Also India, southern China, Japan, Ryukyus, Formosa, Malaysia and Australia.

#### Genus 6. SCIRPUS Linn.

1. Culms leafy at the middle, several-noded, pentagonous; three perianth bristles plate-like. . . . . 18. *S. Fuirena*.
1. Culms naked, clothed at base with a few bladeless sheaths only, not nodose, terete or obscurely 3-angled; perianth bristles needle-like or plumose.
  2. Inflorescence a head of few spikelets; culms slender, 1-3 mm thick, 20-60 cm tall; perianth bristles scabrous. . . . . 19. *S. juncooides*.
  2. Inflorescence corymbose with several spikelets; culms thick, 4-8 mm



thick, when normally grown 70–100 cm tall; perianth bristles plumose.  
 ..... 20. *S. littoralis* ssp. *thermalis*.

18. **Scirpus Fuirena** T. Koyama in Journ. Fac. Sci. Univ. Tokyo III, 7: 361, 1958.

*Fuirena umbellata* Rottb., Descr. & Icon. Pl. t. 19 f. 3, 1773; Volken's in Engl., Bot. Jahrb. 31: 457, 1902; Safford in Contrib. U.S. Nat. Herb. 9: 277, 1905; Merrill in Philip. Journ. Sci. (Bot.) 9: 62, 1914; Kükenth. in Engl., Bot. Jahrb. 59: 6, 1925; Kanehira in Journ. Dept. Agr. Kyushu Univ. 4: 279, 1935; Ohwi in Journ. Jap. Bot. 18: 135, 1942.

[Practical descr.] Ohwi in Mem. Coll. Sci. Kyoto Univ. B, 18: 94, 1944.

[Illustr.] C. B. Clarke, Illustr. Cyper. t. 49 f. 9, 1909 (Achene only).

MARIANAS: GUAM: without definite locality. *McGregor 433!* (BISH, US), *Nelson 367!* (BISH); upper Ylig River, near Tarzan Falls, Manengan volcanic savanna hills. *Stone 3875!* (DAO, GUAM).—SAIPAN: *Gibbon 1161!* (B).

WEST CAROLINES: YAP: Fura Pond. *Hosokawa 8862!* (TAI); without definite locality. *Wong 541!* (BISH, US), *Kanehira 1147!* (FU), *1246!* (BISH, FU, US), *3849!* (FU).—PALAU: Aimirik. *Hosokawa 7288!* (TAI), *Kanehira & Hatusima 4556!* (FU) & *4531 ex p.!* (FU); Babelthaob Islet, Airai Colony. *Hosokawa 7281!* (TAI); ditto, Airai Munic., Ngarekeai village, lower graded reaches of Arakita-ochi stream. *Fehlmann s.n.!* (BISH); Korror Islet, Arumizu. *Hosokawa 7411!* (TAI); ditto, Tarofeld. *Raymundus 146!* (B); Gokkep. *Takamatsu 1193!* (BISH).

EAST CAROLINES: PONAPE: without definite locality. *Kanehira 681!* (BISH, FU), *Hatusima 10754!* (FU); Kamel. *Hosokawa 6096!* (BISH, US); Mt. Tolotom, 1100 ft. *Glassman 2841!* (BISH); Nanponmal. *Ledermann 13656* (B).—Also tropical Africa, India, Malaysia, Formosa, southern China, Ryukyus and Polynesia.

19. **Scirpus juncoides** Roxb. [Hort. Beng. 81, 1814, nomen] Fl. Ind. ed. 1, 1: 228, 1820; Ohwi in Journ. Jap. Bot. 18: 135, 1942.

'*Scirpus erectus* (non Poir.)': Merrill in Philip. Journ. Sci. (Bot.) 9: 63, 1914; Kükenth. in Engl., Bot. Jahrb. 59: 9, 1924; Kanehira in Journ. Fac. Agr. Kyushu Univ. 4: 281, 1935.

Tufted annual with fibrous roots only. Culms slenderly terete, 20–60 cm tall, 1–3 mm thick, light green, weakly angular when dry, clothed at base with a few bladeless sheaths 3–10 cm long. Inflorescence a pseudo-lateral head of 2 to 7 spikelets; involucre culm-like, erect, up to 7 cm long, 1-furrowed toward base. Spikelets ovoid or ovoid-ellipsoid, stramineous-greenish, 6–13 mm long, 3–4 mm across, obtusish at apex, densely many-flowered. Glumes broadly elliptical, 3.5–4 mm long, thickly membranous, boat-shaped, rounded and mucronulate at apex, pale-brownish on both sides, keel broad, green. Achenes obovate-orbicular, unequally biconvex, 1.8–2.1 mm long, 1.5–1.7 mm wide, rounded and mucronate at apex, abruptly contracted at base, the sides very weakly pitted, brown-black and slightly shiny at maturity; style branches 2, sometimes with rudimentary

third one; perianth bristles 6, the longer exceeding the achene. [Illustr.] T. Koyama in Journ. Fac. Sci. Univ. Tokyo III, 7: 313, f. 9-a, 1958 (Achene).

MARIANAS: GUAM: *Guam Exp. Station Herb. 215!* (BISH, NY, US), *Thompson 215!* (BISH).

WEST CAROLINES: PALAU: Aimion, Katelwell. *Tuyama s.n.!* (TI); Babelthaob Islet, Galdok. *Hatusima 5079!* (FU).—Also India, Indo-China, southern China, Japan, Malaysia and Australia.

20. *Scirpus littoralis* Schrader, Fl. Germ. 1: 142, 1806.

ssp. *thermalis* (Trabut) T. Koyama, stat. nov.

*Scirpus littoralis* Schrader var. *thermalis* Traub in Battand. & Traub, Fl. Algér. (Monocot.) 99, 1899.

'*Scirpus subulatus* (non Vahl)': Ohwi in Journ. Jap. Bot. 18: 135, 1942.

'*Scirpus littoralis* (non Schrad.)': Kükenth. in Engl., Bot. Jahrb. 59: 6, 1924; Kanehira in Journ. Fac. Agr. Kyushu Univ. 4: 281, 1935.

Culms closely standing in a row along horizontal rhizome, terete or very obscurely trigonous toward the apex, glaucous, 60–120 cm tall, 5–8 mm thick below the middle, clothed at base with a few gray-brown sheaths only. Inflorescence a pseudo-lateral corymb with 3 to 7 unequal rays up to 5 cm long; involucre culm-like, subcompressed, erect, as long as the corymb. Spikelets clustered in 2 or 3, sometimes solitary, ovate-oblong, 7–12 mm long, 3–4 mm across, rust-brown, more or less acute at apex. Glumes oblong-ovate, membranous, rust-brown, pale on margins, keel slender, ending in a short mucro at contracted apex. Achenes broadly obovate, lenticular, 2 mm long, 1.5 mm wide, brown and smooth, rounded and mucronate at apex; style branches 2; perianth bristles 4, plumose with rusty-brown ciliae, slightly longer than achene. [Illustr.] T. Koyama in Can. Journ. Bot. 41: pl. III f. 6, D, 1963 (Achenes).

MARIANAS: GUAM: near mouth of Sasa River, tidal flats and adjacent coastal forest. *Stone 4150!* (DAO, GUAM).—SAIPAN: *Kanehira & Hatusima 4298!* (FU), *Hatusima 10658!* (FU), *Momose s.n.!* (TI); near Potamcho. *Hosokawa 9636!* (TAI); 'Sumpf.' *Höfer 34* (B).—TINIAN: Churo Pond. *Hosokawa 7777!* (TAI).—Also Africa, Malaysia, coastal Australia and New Caledonia.

Subspecies *thermalis* is a terete-culmed maritime race of *S. littoralis*, and differs from the terete-culmed inland race, ssp. *subulatus*, by thicker, obtuse-tipped glumes and far more luxuriant corymbs. In southeastern Asia and Australia the two subspecies are sometimes connected with various intermediate forms, while in western India and Asia Minor ssp. *subulatus* approaches ssp. *littoralis*.

Genus 7. ELEOCHARIS R. Brown

1. Spike cylindrical, nearly as wide as culm; culms thick, 3–5 mm across. (Sect. LIMNOCHLOA).
2. Culms solid, not septate. . . . . 21. *E. ochrostachys*.

2. Culms empty, transversely septate. . . . . 22. *E. dulcis*.
1. Spike ellipsoid or ovoid, much wider than culm; culms slender, usually less than 3 mm thick (Sect. *ELEOCHARIS*).
3. Stolons present; culms hair-like, 0.1–0.2 mm thick; spikes loosely few-flowered. . . . . 23. *E. acicularis*.
3. Stolon absent; culms slenderly terete, 0.6–2 mm thick; spikes densely many-flowered.
4. Achenes olivaceous; style branches 3; spike ovoid to oblong-lanceolate. . . . . 24. *E. congesta* ssp. *subvivipara*.
4. Achenes blackish; style branches 2; spikes ovoid-globose. . . . . 25. *E. geniculata*.

**21. *Eleocharis ochrostachys*** Steudel, Syn. Pl. Glum. 2, 80, 1855; Ohwi in Journ. Jap. Bot. 18: 132, 1942.

*Eleocharis variegata* Presl. var. *laxiflora* (Thwaites) C. B. Clarke in Hook. f., Fl. Brit. Ind. 6: 601, 1893; Kükenth. in Engl., Bot. Jahrb. 59: 4, 1924; Kanehira in Journ. Fac. Agr. Kyushu Univ. 4: 277, 1935.

'*Eleocharis fistulosa* (non Link)': Volkens in Engl., Bot. Jahrb. 31: 458, 1902.

[Practical descr.] Ohwi in Mem. Coll. Sci. Kyoto Univ. B, 18: 32, 1944; Svenson in Rhodora 31: 156, 1929, under *E. variegata* var. *laxiflora*. [Illustr.] Svenson, l.c. t. 188 f. 10 (achene).

MARIANAS: GUAM: 1 mile south of Piti village. *Moore 184!* (US).

WEST CAROLINES: YAP: without definite locality. *Kanehira 1152!* (BISH, FU, TI); District of Machabal, in Wasserlöcher der Pandanus-formation. *Volkens 151* (B, not seen, citation based on Kükenth. l.c.).—PALAU: Arekalong. *Takamatsu 1663!* (BISH); Babelthaob Islet, Molegojok. *Tuyama s.n.!* (TI); ditto, Aimiriik. *Hosokawa 7289!* (TAI), *Kanehira & Hatusima 4545!* (FU); Almonogui. *Kanehira & Hatusima 4697!* (FU); Babelthuap, Aimiriik, *Stone 1333!* (GUAM).

EAST CAROLINES: PONAPE: without definite locality. *Kawagoë s.n.!* (KAG), *Ledermann 13657* (B); Kolonie. *Kanehira 679!* (FU, TAI) & *1515!* (FU, US), *Hatusima 11037!* (FU); George village. *Hosokawa 5866!* (TAI); Nan-a-raut. *Takamatsu 1085!* (BISH), *Hosokawa 5963!* (BISH, TAI); Kamal. *Hosokawa 6105!* (BISH).—TRUK: Fefan Islet. *Hosokawa 8394!* (TAI).—Also India, Formosa, Ryukyus and Malaysia.

C. B. Clarke is of the opinion that *E. ochrostachys* of southeastern Asia is conspecific with *E. variegata* of Madagascar, no authentic material of which is at my disposal. I have carefully compared several selected sheets of *E. ochrostachys* with Chermезon's descriptions of *E. variegata*, and had a strong impression that the two might possibly be identical.

**22. *Eleocharis dulcis*** (Burm. f.) Trinius ex Henschel, Vita Rumph. 186, 1833; Kanehira in Journ. Fac. Agr. Kyushu Univ. 4: 277, 1935; Ohwi in Journ. Jap. Bot. 18: 133, 1942; Walker & Rodin in Contrib. U.S. Nat. Herb.

30: 456, 1949.

*Eleocharis plantaginoidea* W. F. Wight ex Safford in Contrib. U.S. Nat. Herb. 9: 267, 1905; Merrill in Philip. Journ. Sci. 9: 60, 1914; Kükenth. in Engl., Bot. Jahrb. 59: 4, 1924; Kanehira in Journ. Fac. Agr. Kyushu Univ. 4: 277, 1935.

[Practical descr.] S. T. Blake in Proc. Roy. Soc. Queensl. 50: 103, 1939; Ohwi in Mem. Coll. Sci. Kyoto Univ. B, 18: 32, 1944. [Illustr.] C. B. Clarke, Illustr. Cyper. t. 33 f. 1-5, 1909, under *E. plantaginea*; Svenson in Rhodora 41: t. 537 f. 6, 1939; S. T. Blake, l.c. t. 7 f. 6-9.

MARIANAS: GUAM: without definite locality. *McGregor 469!* (BISH, US); north of Talofoto River, in highland swamp. *Rodin 689!* (US).

WEST CAROLINES: PALAU: Gokkep. *Takamatsu 1188!* (BISH); Mari-kyoku. *Kanehira 444!* (FU); Babelthaob. *Hosokawa 7385!* (TAI); ditto, Ngaradok. *Tuyama s.n.!* (TI); Korrer Islet, Ngarabaket. *Tuyama s.n.!* (TI); ditto, im Tarofelde. *Raymundus 147* (B).

EAST CAROLINES: PONAPE: without definite locality. *Kawagoë s.n.!* (KAG).—Also Japan, Ryukyus, Formosa, southern China, India, Malaysia and Australia.

*E. dulcis* is more commonly known as *E. plantaginea*. The Chinese water chestnut is a tuber of its cultivar. *tuberosa* having taller and thicker culms, and larger tubers as much as 5 cm in diameter.

23. *Eleocharis acicularis* (Linn.) Römer & Schult., Syst. Veg. 2: 154, 1817; Volkens in Engl., Bot. Jahrb. 31: 458, 1902.

*Scirpus acicularis* Linn., Sp. Pl. ed. 1, 48, 1753.

[Practical descr.] Ohwi in Mem. Coll. Sci. Kyoto Univ. B, 18: 35, 1944; Fernald, Gray's Man. Bot. ed. 8, 253, 1950. [Illustr.] Fernald, l.c. f. 379.

WEST CAROLINE: YAP: zwischen Moos am Grunde der Cocospalmen gemein. *Volkens 254* (B, not seen, citation based on Volkens l.c.).—PALAU: Aimiriik. *Watanabe s.n.!* (ex p.) (TI).—Distribution circumboreal.

Watanabe's collection of this tiny spike-rush was mixed with *Fimbristylis littoralis*, and is supposed to have grown in rice paddy. It has elongate perianth bristles, hence the Micronesian plant can be referable to var. *longiseta* Svenson.

24. *Eleocharis congesta* D. Don, Prodr. Fl. Nepal. 41, 1825.

ssp. *subvivipara* (Böckeler) T. Koyama, stat. nov.

*Eleocharis subvivipara* Böckeler in Linnaea 36: 424, 1870.

Culms tufted from fibrous roots only, capillary to filiform, 5-20 cm tall, clothed at base with a few bladeless sheaths often more or less reddish. Spike lanceolate or lance-oblong, 7-17 mm long, 1.5-2.5 mm wide, reddish-brown, rather loosely many-flowered, frequently viviparous. Glumes oblong to elliptical, pale and tinged with reddish-brown, 1.5-2.5 mm long, obtuse at apex. Achenes obovate, 3-angled, 1-1.3 mm long, light tawny or yellowish; stylebase deltoid-ovate; style branches 3. Perianth bristles 6, exceeding achene. [Illustr.] C. B.

Clarke, Illustr. Cyper. t. 37 f. 13-16, 1909, under *E. subvivipara*.

WEST CAROLINES: PALAU: Mt. Luise-Almonogui. *Hosokawa 6856!* (BISH, TAI).—India, China, Japan and possibly in Malaysia.

Upon examination of a good set of *E. congesta* from northern India I am quite sure that *E. subvivipara*, *E. pellucida* (= *E. afflata* & *E. japonica*), *E. thermalis*, and a few of their close allies are conspecific. Subspecies *subvivipara* differs from ssp. *congesta* by generally more slender culms and oblong spikes that are frequently viviparous. For the detailed synonymy and discussion see T. Koyama (1961).

25. *Eleocharis geniculata* (Linn.) Römer & Schult., Syst. Veg. 2: 150, 1817.

*Eleocharis capitata* R. Brown, Prodr. Fl. Nov. Holl. 1, 225, 1810; Safford in Contrib. U.S. Nat. Herb. 9: 267, 1905; Merrill in Philip. Journ. Sci. (Bot.) 9: 60, 1914.

*Eleocharis caribaea* (Rottb.) S. F. Blake in Rhodora 20: 24, 1918; Ohwi in Journ. Jap. Bot. 18: 132, 1942.

[Practical descr.] Svenson in Rhodora 41: 50, 1939; S. T. Blake in Proc. Roy. Soc. Queensl. 50: 124, 1939; Ohwi in Mem. Coll. Sci. Kyoto Univ. B, 18: 44, 1944, under *E. caribaea*. [Illustr.] S. T. Blake, l.c. t. 10 f. 29-31.

MARIANAS: SAIPAN: *Hatusima 10663!* (FU).—GUAM: without definite locality. *McGregor 393!* (BISH, US), *Nelson 307!* (BISH), *Guam Exp. Station Herb. 74 & 102!* (BISH, US); near Piti village. *Moore 126!* (US); Ylig-Sigua ridge. *Rodin 665!* (US); between Ylig and Taloforo river, 300-400 ft. *Steere 65!* (US); under Ylig river, Manengon savanna hills. *Stone 3868!* (DAO); highland swamp above Taloforo river. *Rodin 693!* (US); mouth of Ylig river. *Rodin 766!* (US); Atangtano. *Bryan Jr. 1063!* (BISH); SRF Road, Apra Harbor, edge of mangrove formation. *Stone 4888!* (GUAM).

MARSHALLS: Arno Atoll, Ulien Islet. *Hatheway 806!* (US); *B.C. Stone 1090!* (BISH); Ailuk Atoll, Ailuk Islet. *Fosberg 33969!* (BISH, US).—Widespread in tropical and subtropical regions of the World.

For nomenclatural discussion see T. Koyama (1961).

#### Uncertain Species

*Eleocharis atropurpurea* Kunth: Kükenth. in Engl., Bot. Jahrb. 59: 4, 1924; Kanehira in Journ. Fac. Agr. Kyushu Univ. 4: 277, 1935. GUAM. *McGregor 102* (ex Kükenth.).

This species was not found in the Micronesian collections that I examined nor was seen *McGregor 102* on which Kükenthal's citation was based. If this *McGregor* number is the same as the Guam Experiment Station Herb. no. 102, it is *E. geniculata*. On the other hand it is possible that this tiny cosmopolitan plant occurs in Micronesia. Kanehira's citation is apparently based on Kükenthal.

## Genus 8. FIMBRISTYLIS Vahl

1. Spikelets more than 2, disposed in umbels or heads.
2. Leaves at culm-bases all bladed.
  3. Leaf sheaths bilaterally compressed with acute keel, more or less 2-ranked; floral scales sharply keeled thus spikelets angular; styles not compressed nor fimbriate; style-branches definitely 3. . . . . 26. *F. autumnalis* ssp. *tainanensis*.
  3. Leaf sheaths dorsiventrally compressed or with obtuse back, in most cases 3-ranked; floral scales with obtuse back thus spikelets terete; styles more or less compressed sometimes fimbriate above; style-branches 2 or 3.
  4. Ligule wanting; achenes dark-colored at maturity; style-branches 2 or 3.
    5. Style-branches 3; spikelets congested in globose head, the glumes tending to be slightly grayish. . . . . 27. *F. cymosa* ssp. *umbellato-capitata*.
    5. Style-branches 2; spikelets solitary or in cluster of 2 or 3, the glumes tending to be ferruginous. . . . . 27b. *F. cymosa* ssp. *spathacea*.
  4. Ligule a tuft of short hairs; achenes light brownish to creamy; style-branches definitely 2.
    6. Glumes with several parallel veins on back; achenes smooth.
      7. Spikelets oblong-cylindrical, less than 2.5 mm across; achenes brown at maturity. . . . . 28. *F. palauensis*.
      7. Spikelets ovoid, 5-6 mm across; achenes whitish-creamy at maturity. . . . . 29. *F. tristachya*.
    6. Glumes with a distinct keel otherwise nearly veinless; achenes trabeculate.
      8. Spikelets ovoid, less than 7 mm long, the glumes more or less castaneous-tinged, rarely pale-brown; anthers about 0.7 mm long.
        9. Achenes distinctly trabeculate with 5 to 12 rows of transversely oblong external cells; gynophore stipe-like, more or less inconspicuous. . . . . 30. *F. dichotoma* ssp. *dichotoma*.
        9. Achenes weakly trabeculate with 12 to 20 rows of rectangular external cells as if multistriate under low-power lens; gynophore distinct. . . . . 30b. *F. dichotoma* ssp. *podocarpa*.
  8. Spikelets oblong or oblong-ovoid, 7-15 mm long, the glumes tending to be rusty-brown; anthers more than 1 mm long.

10. Spikelets few, solitary or grouped; inflorescence more or less pseudo-lateral with straightish lowest involucre bract. . . . 30c. *F. dichotoma* ssp. *longispica*.
10. Spikelets many, congested in hemispherical heads; inflorescence really terminal with spreading involucre bracts. . . . . 30d. *F. dichotoma* ssp. *boninensis*.
2. All or some leaves at culm bases bladeless.
11. Some leaves with laterally compressed blade; involucre exceeding inflorescence. . . . . 31. *F. littoralis*.
11. All leaves bladeless; involucre shorter than inflorescence. . . . . 32. *F. globulosa*.
1. Spikelet solitary, terminal.
12. Leaves bladeless or nearly so; glumes imbricate.
13. Culms filiform, less than 15 cm tall; spikelets less than 6 mm long, few-flowered, erect. . . . . 33. *F. pauciflora*.
13. Culms as thick as wire, 20–50 cm tall; spikelets 6–10 mm long, many-flowered, usually more or less oblique. . . . . 34. *F. nutans*.
12. Leaves long-bladed; glumes 2-ranked at least in part. . . . . 35. *F. monostachyos*.
26. ***Fimbristylis autumnalis*** (Linn.) Römer & Schultes, Syst. Veg. 2, 97, 1817.
- ssp. ***tainanensis*** (Ohwi) T. Koyama, stat. nov.
- '*F. complanata* (non Link)': Volkens in Engl., Bot. Jahrb. 31: 458, 1902; Merrill in Philip. Journ. Sci. (Bot.) 9: 61, 1914.
- '*F. autumnalis* Römer & Schult. var. *complanata* Kükenth.': Kükenth. in Engl., Bot. Jahrb. 59: 6, 1924, concerning specimens cited, excl. basionym.
- F. autumnalis* Römer & Schult. var. *complanata* Kükenth. forma *hemisphaerica* Kükenth., l.c. 6, 1924.
- F. tainanensis* Ohwi in Journ. Jap. Bot. 14: 574, 1938, & 18: 133, 1942.
- F. complanata* Link var. *tainanensis* (Ohwi) Ohwi & T. Koyama ex T. Koyama in Bull. Arts & Sci. Div. Univ. Ryukyus (Math. & Nat. Sci.), No. 3, 71, f. 18, 1959.
- [Practical descr.] Ohwi in Journ. Jap. Bot. 14: 574, 1938, & in Mem. Coll. Sci. Kyoto Univ. B, 18: 63, 1944. [Illustr.] T. Koyama, l.c. f. 18 on p. 69, 1959.
- MARIANAS: GUAM: 2 km north of Agat. *Necker* 59! (US), Mt. Lamnam, 1000 ft. *Moore* 223! (US); Guam, without definite locality. *McGregor* 441 & 537! (the latter isotype of f. *hemisphaerica* Kükenth.) (US), *Guam Exp. Sta. Herb.* 241! (BISH).
- WEST CAROLINES: YAP: without definite locality. *Wong* 322! (BISH, US), *Volkens* 124 & 286 (B); Dogol Islet. *Tuyama* s.n.! (TI).—PALAU: Aimiriik. *Kanehira & Hatusima* 4497! (FU); Babelthaob Islet, Molegojok. *Tuyama* s.n.! (TI); Korrör Islet. *Kobayashi* s.n.! (TI).—Also Formosa.

In my previous treatment I have attributed *F. tainanensis* to a variety of *F. complanata* because of its vegetative parts: particularly strongly compressed culms and much reduced leaf blades. However, as I have remarked in my later paper (T. Koyama, 1961), a valid difference between *F. autumnalis* and *F. complanata* is in glumes that are 1.5–2 vs. 3–3.5 mm long. According to this point *F. tainanensis* seems to be better treated as a subspecies of *F. autumnalis* rather than that of *F. complanata*. Achenes of ssp. *tainanensis* that are definitely smaller than those of *F. complanata* also support the present transfer.

27. *Fimbristylis cymosa* R. Br., Prodr. Fl. Nov. Holl. 1, 228, 1810.

ssp. *umbellato-capitata* (Hillebr.) T. Koyama, stat. nov.

*F. cymosa* R. Br. var. *umbellato-capitata* Hillebr., Fl. Hawai. Isls. 473, 1888; Kükenth. in Engl., Bot. Jahrb. 59: 6, 1924; Hosokawa in Trans. Nat. Hist. Soc. Formosa 25: 262, 1935; Walker & Rodin in Contrib. U.S. Nat. Herb. 30: 457, 1949.

'*F. spathacea* (non Roth)': Safford in Contrib. U.S. Nat. Herb. 9: 277, 1905; Merrill in Philip. Journ. Sci. (Bot.) 9: 61, 1914.

*F. cymosa* R. Br. var. *pycnocephala* (Hillebr.) Kükenth. ex F. Brown, Fl. Southeast. Polynes. 1: 104, 1931; Christophersen in Bull. B. P. Bishop Mus. 128: 20, 1935.

*F. glomerata* (Retz.) Nees (in Linnaea 9: 290, 1834, nomen) ex Kunth, Enum. Pl. 2: 246, 1837; Kükenth. in Engl. Bot. Jahrb. 59: 5, 1924.

'*F. cymosa* (non R. Br.)': Kanehira in Journ. Fac. Agr. Kyushu Univ. 4: 278, 1935; Ohwi in Journ. Jap. Bot. 18: 133, 1942.

Tufted in clumps from very short rhizome. Leaves basal, densely tufted, the blade linear, thickish, stiffish, 5–30 cm long, 1.4–4 mm wide, recurved, abruptly acutish at apex, mostly smoothish on margins; sheaths dark brown, more or less disintegrating into fibers. Culms few, wiry, 10–60 cm tall, smooth. Inflorescence a simple umbel with few to several glomerules, sometimes partially sub-compound, or often congested to one large head; involucrel leaves 1–3, much shorter than inflorescence; rays when present 1–5 cm long, unequal. Spikelets congested in globose head 5–10 mm in diameter, ovoid or ovoid-oblong, 4–6 mm long, about 2 mm across, obtuse-tipped, grayish rusty-brown. Glumes rhombic-ovate, rounded at apex, rusty brown or grayish-ferruginous, keel ending below the hyaline apex, whitish hyaline margins very conspicuous. Achenes obovate, fuscous at maturity, 1 mm long, trigonous with obtuse dorsal angle; style branches 3.

MARIANAS: Anatahan. Kanehira 2150! (FU), Hosokawa 7827! (BISH, NY, TAI), & 7872! (TAI).—SAIPAN: without definite locality. Kamiya s.n., in part! (TI); Pagan, Mt. Pagan. Hosokawa 7927! (BISH, TAI), & 7953! (BISH, US), Mt. Salfai. Hosokawa 7966! (TAI).—ALAMAGAN. Hosokawa 7926! (TAI).—TIMIAN: without definite locality. Otani 9800! (FU); Lion Rock. Hosokawa 7790 & 7701! (BISH, TAI); Tyuro. Hosokawa 7739 & 7770! (TAI).—ROTA: without



definite locality. *Kanehira* 1821! (FU); near Mouchon. *Hosokawa* 7684! (TAI).—  
 GUAM: *Guam Exp. Sta. Herb.* 187! (BISH), without definite locality. *Nelson* 389!  
 (BISH), *McGregor* 374! (BISH, US); Pati Point. *Necker* 168, 319 & 369! (US);  
 Agana Heights, ca. 270 ft. *Moore* 398a! (US); Agaña. *Safford & Alvin Seale* 1075!  
 (US), beach east of Barrigada village. *Steere* 133! (US).

WEST CAROLINES: PALAU: Pelilieu Is. *Kanehira & Hatusima* 4784! (FU),  
*Tuyama s.n.*! (TI); Gatulel Is., Ailai. *Hosokawa* 7337! (BISH, TAI); Ulithi  
 Atoll, Mogmog. *Lessa* 60! (BISH).

EAST CAROLINES: Ponape, Napali. *Ledermann* 13979 (B, K).—Also  
 India (Ceylon), Ryukyus, Malaysia and Hawaiian Islands.

27b. ssp. *spathacea* (Roth) T. Koyama, stat. nov.

*F. spathacea* Roth, Nov. Sp. Pl. 24, 1821; Volkens in Engl., Bot. Jahrb.  
 31: 458, 1902; Kanehira in Journ. Fac. Agr. Kyushu Univ. 4: 279 in  
 part, 1935; Ohwi in Journ. Jap. Bot. 18: 134, 1942.

'*F. cymosa* (non R. Br.)': Walker & Rodin in Contrib. U.S. Nat. Herb.  
 30: 457, 1949.

*F. atollensis* H. St.-John in Pacif. Sci. 6 (2): 145, f. 2, 1952, & 14: 29, 1960.

Syn. nov. e typo.

[Practical descr.] Ohwi in Mem. Coll. Sci. Kyoto Univ. B, 18: 67, 1944,  
 under *F. spathacea*; H. St.-John, l.c., under *F. atollensis*. [Illustr.] H. St.-John,  
 l.c. f. 2, 1952, under *F. atollensis*.

MARIANAS: Saipan. *Kanehira* 1010! (FU).—Tinian. *Otani* 9799! (FU).—

GUAM: with out definite locality. *McGregor* 494! (US); near the cliff on Pati  
 Point, 480 ft. *Markley & Necker* 359! (US).

WEST CAROLINES: YAP: without definite locality. *Volkens* 122! (B, US),  
*Kanehira & Hatusima* 4329! (FU).—PALAU: Tohdaiyama. *Kanehira* 2028! (FU,  
 US), *Kanehira & Hatusima* 464! (FU), *Tuyama s.n.*! (TI); Pelilieu. *Tuyama s.n.*!  
 (TI).—Ifaluk Atoll, Ella. *Abbott & Bates* 74! (BISH).

EAST CAROLINES: TRUK: Truk Islet. *Wong* 129! (BISH); Natsushima  
 Islet. *Hosokawa* 6549 & 6650! (TAI), Murilo, *Stone* 2180 (BISH).—Namorik  
 Atoll, *Stone* 996 (BISH); Namonuito, Pesarach, *Stone* 2152 (BISH).—Pingelap  
 Atoll, Pingelap Islet. *St.-John* 21491! (BISH).—KUSAIE: Mot. *Takamatsu* 448!  
 (BISH); Mallean. *Hosokawa* 9499! (TAI).

MARSHALLS: Bikini Atoll: Bikini Islet. *Taylor* 46-1098! (US).—Rongelap  
 Atoll, Rongelap Islet. *Taylor* 46-1387! (US), & 46-1470! (BISH).—Eniwetok  
 Atoll: Engebi Is. *Bryan, Jr. s.n.*! (BISH); Aniyaanii Islet. *St.-John* 23721! (BISH,  
 the holotype of *F. atollensis*); Rumit Islet. *St.-John* 23849! (BISH); Japtan Is.  
*Taylor* 46-1292! (US); Bogon Islet. *St.-John* 23771! (US).—Arno Atoll, between  
 Ine village and Matolen. *Hatheway* 784! (BISH, US).—Aur Atoll, Tabal Islet.  
*St.-John* 21399! (BISH).—Kwajalein Atoll: without definite locality. *Wagner, Jr.*  
*3376a*! (US); Ebeye Islet. *Bryan, Jr. s.n.*! (BISH).—Likiep Atoll, Likiep Islet.  
*St.-John & Cowan* 21776! (US).—Jaluit: without definite locality. *Koidzumi s.n.*!

(TI), *Schnee s.n.* (B); Majuro, Uliga, Stone 938! (BISH); Ebon, Stone 1034! (BISH).

GILBERT ISLANDS: Tarawa Atoll. *Cameron s.n.*! (BISH).—Also Japan, Ryukyus, Malaysia, Wake Is. and India.

There have been many opinions as to the taxonomy of the *Fimbristylis cymosa* complex, which is one of the most variable groups of the genus in tropical Asia. Recently Kern in *Reinwardtia* 5: 39, 1961, relegated *F. spathacea* to the synonymy of *F. cymosa*, whereas Ohwi (1944, 1953) recognized the two as specifically distinct. Blake (1954) separated *F. pycnocephala* from *F. cymosa* in his treatment of New Guinean Cyperaceae.

My knowledge of *E. cymosa* is rather poor, as I have seen only seven specimens of the species from Australia, where it was originally described. But, in my observation, the glumes of *F. cymosa* are relatively loosely arranged on smaller, ovoid-globose spikelets, and are grayish with sharp keel, whereas in *F. spathacea* of the Indian subcontinent and southeastern Asia, the glumes are tightly imbricate on more oblong spikelets, and are always rusty brown with more obtuse keel. Achenes of *F. cymosa* are 3-angled, grayish and dull, but those of *F. spathacea* are lenticular, brown and slightly shiny when completely mature. These minor differences do not warrant any specific separation but seem to be sufficient to make subspecific differentiation. *F. spathacea* is thus reinterpreted as a subspecies of *F. cymosa*.

The examination of the holotype and many paratypes of *F. atollensis* proved that it is quite identical with *F. cymosa* ssp. *spathacea*. When St. John described it he unfortunately did not compare his plant with *F. spathacea*, but with *F. cymosa* quite in detail. The differences pointed out by him, therefore, naturally agree with those between ssp. *cymosa* and ssp. *spathacea* just discussed.

In the Pacific islands there is another plant hitherto called *F. cymosa* or *F. pycnocephala*. It is superficially well characterized by always capitate-contracted spikelets, a character not belonging to either of the two subspecies of *F. cymosa*. Its trigynous achenes and more or less grayish glumes show the affinity with ssp. *cymosa*, but its oblong spikelets with tightly imbricate glumes are like those of ssp. *spathacea*. I believe it to be a geographical race of ssp. *cymosa* in the Pacific islands and call it ssp. *umbellato-capitata*, raising Hillebrand's variety to the rank of subspecies.

28. ***Fimbristylis palauensis*** Ohwi in Journ. Jap. Bot. 18: 134, 1942.

'*F. marianna* (non Gaudich.)': Hosokawa in Trans. Nat. Hist. Soc. Formosa 25: 261, 1935.

*F. Fosbergiana* T. Koyama in Bull. Arts & Sci. Div., Univ. Ryukyus, (Math. & Nat. Sci.) No. 3, 66, f. 16a-e & 17, 1959. Syn. nov.

Tufted perennial. Culms slender, 30–60 cm tall, about 1 mm thick, smooth. Leaves basal, narrowly linear, 1/2 to 3/4 as long as culms, 1–1.2 mm wide, stiff, canaliculate, abruptly acutish at apex; sheaths fuscous, more or less disintegrating

into fibers. Inflorescence a simple umbel, rarely partially subcompound, loosely with 3 to 9 spikelets, 4 cm long and as wide; involucreal leaves 1-2 (-3), setaceous, about 1/3 as long as the umbel; rays up to 3.5 cm long, with 1 to 3 spikelets. Spikelets oblong-cylindrical, 8-15 mm long, 2-2.5 mm wide, terete, fulvous or fuscous, many-flowered, abruptly avute at apex. Glumes tightly imbricate, ovate-oval 4 mm long 2.5 mm wide, with 6 to 8 parallel veins on back, abruptly contracted at apex. Achenes obovate, biconvex, 1-1.2 mm long, 0.8 mm wide, light brown, smooth, stipitate with a conical gynophore; style 4.5-5 mm long, compressed, fimbriate, the upper 1/3 (branches) 2-cleft. [Illustr.] T. Koyama, l.c. figs. 16 & 17 on pp. 66-67, under *F. Fosbergiana*.

WEST CAROLINES: PALAU: Marukyoku. *Takamatsu 1710!* (BISH); Katelwell. *Tuyama s.n.!* (TI); Babelthaob Islet, Almonogui, Kamusetsu. *Hatusima 4869!* (FU, the holotype of *F. palauensis*), ditto *Kanehira & Hatusima 4897!* (FU); ditto Aimion in monte Ngarua. *Tuyama s.n.!* (TI); ditto, Mt. Luise-Almonogui. *Hosokawa 6589!* (US, the holotype of *F. Fosbergiana*; BISH & TAI, isotypes). Distribution: endemic to the western Carolines.

When I described *F. Fosbergiana* the holotype and paratype of *F. palauensis* were not at my disposal, and I at that time also found Ohwi's original description not agreeing with my plant. Ohwi's plants later examined by me bear very young spikelets in rather depauperated condition. The description given here is based on Hosokawa's and Tuyama's collections.

**29. *Fimbristylis tristachya*** R. Brown, Prodr. Fl. Nov. Holl. 1, 226, 1810; T. Koyama in Bull. Arts & Sci. Div., Univ. Ryukyus, (Math. & Nat. Sci.) No. 3, 66 f. 16f-g, 1959.

*F. marianna* Gaudich. in Freyc., Voy. Bot. 413, 1826, excl. vars.; Kükenth. in Engl., Bot. Jahrb. 59: 5, 1924; Kanehira in Journ. Fac. Agr. Kyushu Univ. 4: 279, 1935, in part; Ohwi in Journ. Jap. Bot. 18: 133, 1942.

*F. maxima* K. Schumann ex Schumann & Hollr., Fl. Kais. Wilhelmsl. 24, 1889; Volkens in Engl., Bot. Jahrb. 31: 458, 1902; Merrill in Philip. Journ. Sci. (Bot.) 9: 61, 1914.

*F. marianna* Gaudich. var. *foenea* Kükenth. in Repert. Sp. Nov., Fedde, 16: 432, 1920.

Tufted from short ligneous rhizome. Culms few, slender, 15-70 cm tall, rigid, compressed, smooth, thickened at base. Leaves all basal, rather many; blades narrowly linear, 1-2 mm wide, up to 2/3 the length of culms, stiffish, glaucous-green, scabrid on margins, abruptly acutish at apex; sheaths yellowish-to chesnut-brown, eventually more or less disintegrating into fibers. Inflorescence umbelliform, sometimes compound, often reduced to 2 to several peduncled spikelets; involucreal leaves 2 or 3, much shorter than to almost equaling the umbel; rays quite unequal, the longer up to 3.5 cm long. Spikelets broadly ovoid-ellipsoid, 6-10 mm long, 3.5-6 mm wide, stramineous-brown, abruptly contracted at apex, densely many-flowered. Floral scales broadly elliptic, 3.2-

3.8 mm long, about 3 mm wide, chartaceous, stramineous and parallelly several veined on back, brownish on membranous margins, contracted to mucronate apex. Achenes obovate-orbicular, 1-1.2 mm long, biconvex, contracted at apex, light brown, shiny, stipitate with cuncate gynophore; style 2 mm long, flattened, fimbriate; style branches 2, 0.8 mm long. [Illustr.] C. B. Clarke, Illustr. Cyper. t. 43 f. 12-14, 1909; T. Koyama, l.c., 1959.

MARIANAS: GUAM: without definite locality. *McGregor 494!* (BISH), *Nelson 316!* (BISH); Mt. Tenjo, 320 m. *Bryan, Jr. 1100!* (BISH), ditto, 900 ft. *Moore 75!* (US); ditto, *Rodin 535!* (US); near Talisay. *Fosberg 3526!* (BISH, US); south of s.e. of Umatac. *Fosberg 3543!* (BISH, US); south of Asan Point and Piti. *Anderson 85!* (BISH); plateau of Talofof. *Hosaka 3133!* (BISH); Manengon, *Stone 4844, 4530* (GUAM).

WEST CAROLINES: YAP: Kolonie in monte Kabul. *Tuyama s.n.!* (TI); near Fura Pond. *Hosokawa 8860!* (TAI); north of Gagil District. *Fosberg 25606!* (BISH, US); Kanif. *Takamatsu 1926!* (BISH); Yap, without definite locality. *Wong 543!* (US), *Volkens 145!* (US); Korrer Islet: central plateau. *Hosaka 3314!* (BISH).—Also Malaysia and Australia.

In the external appearance, especially in the stramineous-brownish color of spikelets and the chartaceous, shiny glumes with several parallel veins, this species closely resembles *F. schoenoides*. It, however, differs from the latter by much longer anthers (2 vs. 0.7 mm) and styles (3 vs. 1.5 mm).

**20. *Fimbristylis dichotoma*** (Linn.) Vahl, Enum. Pl. 2: 287, 1806; Ohwi in Journ. Jap. Bot. 18: 134, 1942.

ssp. *dichotoma*.

*Scirpus dichotomus* Linn., Sp. Pl. ed. 1, 50, 1753.

*F. diphylla* (Retz.) Vahl, Enum. Pl. 2: 289, 1806; Merrill in Philip. Journ. Sci. (Bot.) 9: 61, 1914.

*F. polymorpha* Böckeler in Linnaea 37: 14, 1871; Volkens in Engl., Bot. Jahrb. 31: 458, 1902.

*F. annua* (All.) Römer & Schult., Syst. Veg. 2: 95, 1817; Kükenth. in Engl., Bot. Jahrb. 59: 4, 1924; Kanehira in Journ. Fac. Agr. Kyushu Univ. 4: 278, 1935.

*F. annua* Römer & Schult. forma *diphylla* (Retz.) Kükenth. in Engl., Bot. Jahrb. 59: 4, 1924.

*F. annua* Römer & Schult. var. *Royenii* (Nees) Kükenth. forma *explicata* Kükenth., l.c. 5, 1924.

*F. annua* Römer & Schult. var. *tomentosa* (Vahl) Kükenth. in Engl., Bot. Jahrb. 59: 4, 1924.

*F. dichotoma* Vahl forma *diphylla* (Retz.) Ohwi in Journ. Jap. Bot. 18: 135, 1942.

[Practical descr.] Ohwi in Mem. Coll. Sci. Kyoto Univ. B, 18: 80, 1944.

MARIANAS: GUAM: without definite locality. *McGregor 518!* (BISH),

Guam *Exp. Sta. Herb.* 233! (US) & 246! (BISH), *Gaudichaud s.n.* (P); 4 km east of Agat. *Necker* 115 & 116! (BISH, US); 2 km north of Agat. *Necker* 67! (US); Mt. Tenjo, 320 m. *Bryan, Jr. s.n.*! (BISH), ditto, 1000 ft. *Moore* 305! (US); Atangtano. *Bryan, Jr.* 1064! (BISH); between Ylig and Sigua village, 300 ft. *Steere* 56! (US); Ylig-Sigua ridge, near Yona. *Rodin* 628! (US).

WEST CAROLINES: YAP: without definite locality. *Kanehira & Hatusima* 4344! (FU), *Kanehira* 1099! & 1243! (FU), *Volkens* 538 (B).—PALAU: without definite locality. *Kawagoë s.n.*! (KAG); Palau Islet. Arukoron. *Hosokawa* 7033! (BISH, TAI); Garudokku. *Takamatsu* 1398! (BISH); Babelthaob Islet, Almonogui. *Kanehira* 2120! (FU); ditto, Luis-Almonogui. *Hosokawa* 6822! (TAI); Ngarsul. *Ledermann* 14371 (B, K); Korrör Islet, Arumizu Sogen. *Hosokawa* 7428! (US); Korrör, without definite locality. *Kanehira* 117 in part! (FU), *Hatusima* 4856! (FU), *Kanehira & Okuya s.n.*! (FU).

EAST CAROLINES: PONAPE: without definite locality. *Ledermann* 13877 (B, K); Parkir, George village, colonization. *Hosokawa* 5868! (TAI); Agric. Exp. Sta. *Glassman* 2428 & 2430! (BISH); Auak. *Glassman* 2905! (BISH).—Net-Palikir, 500 ft., *Stone* 1978! (GUAM).—TRUK: *Kraemer* 7 (B).

30b. ssp. **podocarpa** (Nees & Meyen) T. Koyama, stat. nov.

?*F. affinis* Presl, Reliq. Haenk. 1: 191, 1928.

*F. podocarpa* Nees & Meyen ex Nees in Wight, Contrib. Bot. Ind. 98 (ex p.), 1834.

*F. annua* Römer & Schult. var. *podocarpa* (Nees & Meyen) Kükenth. in Engl., Bot. Jahrb. 5A: 5, 1924.

*F. dichotoma* Vahl var. *pallidisquama* Ohwi in Journ. Jap. Bot. 18: 135, 1942. Syn. nov. e typo.

Achenes trabeculate with 12 to 20 rows of rectangular epidermal cells, conspicuously stipitate with a gynophore, otherwise as in ssp. *dichotoma*. [Illustr.] C. B. Clarke, Illustr. Cyper. t. 42, f. 3-4 (under *F. diphylla* var. *pluristriata*) and f. 5-6, 1909.

MARIANAS: Agrigan. *Hosokawa* 7973! (TAI); Anatahan. *Hosokawa* 7865! (TAI); Saligan. *Kanehira* 2166! (FU; type of var. *pallidisquama*); Alamagan. *Hosokawa* 7917! (TAI); "In insulis Marianis". T. *Haenke* 24333! (Photo in BISH; type of *F. affinis*).

EAST CAROLINES: PONAPE: Kolonia. *Kanehira* 680! (FU); Nut village. *Hosokawa* 5548! (TAI); ditto, near Kaamal. *Hosokawa* 5490! (TAI).—Also India, Malaysia and Polynesia.

I regard *F. podocarpa* as a subspecies of *F. dichotoma*. Except for the difference in achenes it cannot be separable from the latter. In ssp. *dichotoma* achenes are trabeculate with 6 to 10 rows of transversely oblong external cells and the transverse septae are as conspicuous as the longitudinal lines, but in ssp. *podocarpa* the achenes have 12 to 20 rows of very fine transversely rectangular cells and the longitudinal lines, which are more or less stronger than those of

ssp. *dichotoma*, are more ridged than the weak transverse septae. Under a low-power lens, the achenes of ssp. *podocarpa* thus look as if they were striped whereas those of ssp. *dichotoma* are conspicuously tessellate.

30c. ssp. **longispica** (Steud.) T. Koyama in Journ. Fac. Sci. Univ. Tokyo III, 8: 112, 1961.

*F. longispica* Steud., Synops. Pl. Glum. 2, 118, 1855.

*F. annua* Römer & Schultes var. *pseudo-ferruginea* Kükenth. in Engl., Bot. Jahrb. 59: 5, 1924.

*F. dichotoma* Vahl var. *hahajimensis* (Tuyama) Ohwi in Journ. Jap. Bot. 18: 135, 1942.

Leaf blades 1–1.5 mm wide, the sheaths more castaneous; spikelets 7–15 mm long, few in pseudolateral reduced corymb.

WEST CAROLINES: PALAU: Marakal, near Korrör. *Hatusima* 4703! (FU); Korrör Islet. *Ledermann* 14174 (B, K).

EAST CAROLINES: PONAPE: without definite locality. *Ledermann* 13561 & 13589 (B, K).—Also Bonin Islands, Japan, and southern Korea.

Subspecies *longispica* habitally differs from all the other subspecies of *F. dichotoma* as it grows in a saline habitat. In Micronesia, in the Volcanic Islands and Idzu Islands it becomes dwarfed with narrow leaves and the inflorescence of a few digitate spikelets as described above, but in the mainland of Japan it bears broader leaves up to 4 mm wide and larger corymbose inflorescence with several rays when it grows on shores of brackish lagoons. However, in most cases it is difficult to differentiate var. *pseudo-ferruginea* from typical ssp. *longispica*.

30d. ssp. **boninensis** (Hayata) T. Koyama, stat. nov.

*F. boninensis* Hayata, Icon. Pl. Formosa 6: 109, 1916.

*F. urakasiana* Kükenth. in Engl., Bot. Jahrb. 59: 5, 1924; Hosokawa in Trans. Nat. Hist. Soc. Formosa 25: 262, 1935.

Spikelets usually aggregated in hemispherical heads on short rays, oblong-lanceolate, (6–) 8–12 mm long, 3 mm wide; anthers 1.5–1.8 mm long; plants tufted in large clumps; leaves stiffish, up to 5 mm wide, aggregated at culm-bases.

MARIANAS: Anatahan. *Hosokawa* 7842! (TAI, BISH), & 7875! (TAI).—Pagan, Mt. Pagan. *Hosokawa* 7955 & 7958! (TAI).—Urakas, auf der Asche des Vulkans. *Gibbon* 1158 (B, type of *F. urakasiana*, n.v.).—Also Bonin Islands.

I have not seen the type of *F. urakasiana* but Kükenthal's description is clear enough to identify it with *F. boninensis*. This plant might be an extraordinary large form of polymorphous ssp. *dichotoma*. The two plants agree with one another at least achene and glumes, however, with the longer anther as much as 1.5 mm long *F. boninensis* comes closer to ssp. *longispica*.

31. **Fimbristylis littoralis** Gaudich. in Freyc., Voy. Bot. 413, 1826.

'*F. miliacea* Vahl, excl. basionym': Merrill in Philip. Journ. Sci. (Bot.) 9: 61, 1914; Kükenth. in Engl., Bot. Jahrb. 59: 6, 1924; Kanehira in

Journ. Fac. Agr. Kyushu Univ. 4: 279, 1935; Ohwi in Journ. Jap. Bot. 18: 133, 1942.

*F. miliacea* Vahl var. *Hatusimae* (Ohwi) Ohwi in Journ. Jap. Bot. 18: 133, 1942.

'*F. Koidzumiana* (non Ohwi)': T. Koyama in Bull. Arts & Sci. Div., Univ. Ryukyus, (Math. & Nat. Sci.), no. 3, 71, f. 19, 1959.

[Practical descr.] Ohwi in Mem. Coll. Sci. Kyoto Univ. B, 18: 69, 1944, under *F. miliacea*.

MARIANAS: GUAM: Piti village, 4-50 ft. Moore 1431 (US); mouth of Ylig River. Rodin 7651 (US); Fena River banks, Stone 4477 (GUAM).

WEST CAROLINES: PALAU: Babelthaob Islet, Molegojok. Tuyama s.n.1 (TI); ditto, Kamsetsu. Kanehira & Hatusima 49061 (FU); ditto, Marikyoku. Hatusima 50591 (FU; holotype of *F. Hatusimae*); ditto, Ngarsul. Tuyama, s.n.1 (TI); Garudokku. Takamatsu 13991 (BISH); Aimiriik. Watanabe, s.n. in part1 (TI).

EAST CAROLINES: PONAPE: without definite locality. Kanehira 6781 (FU, TAI, TI), Ledermann 13513 (B), Hatusima 107441 (FU); Wone. Takamatsu 10241 (BISH); Agr. Exp. Sta. Glassman 24131 (BISH); Kichi village. Rehtau. Hosokawa s.n.1 (TAI); Oa. Takamatsu 9041 (BISH); George Islet, George village. Hosokawa 60591 (TAI).—Ifaluk Atoll, Falalap. Abbott & Bates 1181 (BISH).—KUSAIE: Okat River. Hosokawa 94681 (TAI).—Distribution: pan-tropic.

*F. Hatusimae*, later reinterpreted as *F. miliacea* var. *Hatusimae*, is here relegated to the synonymy of *F. littoralis*. It was originally segregated from *F. littoralis* (= *F. miliacea*, excl. basionym) by smaller spikelets and possibly pale basal sheaths less compressed than in *F. littoralis*. Spikelets of very variable *F. littoralis* range from 1.8 to 5 mm in length, and less compressed pale basal sheaths are rather common in plants from tropical America. Var. *Hatusimae* is, therefore, completely included within the range of *F. littoralis*. In my previous paper (T. Koyama, 1959) I have cited some specimens from Marianas and western Carolines under the name of *F. Koidzumiana* because of their larger spikelets up to 5 mm in diameter. They are, however, redetermined as *F. littoralis* for the same reason. The validity of *F. Koidzumiana* is very doubtful. *F. littoralis* is a correct name of what has long been called *F. miliacea*. As the Linnaean type of *Scirpus miliaceus*, on which *F. miliacea* was based is a specimen of *F. quinquangularis*, *F. miliacea* replaces *F. quinquangularis*. Examining the phototypes of Linnaean Cyperaceae I am in full agreement with S. T. Blake (1954) as to the nomenclature of *F. miliacea*.

32. *Fimbristylis globulosa* (Retz.) Kunth, Enum. Pl. 2: 231, 1837; Volkens in Engl., Bot. Jahrb. 31: 458, 1902; Safford in Contrib. U.S. Nat. Herb. 9: 277, 1905; Merrill in Philip. Journ. Sci. (Bot.) 9: 61, 1914; Kükenth. in Engl., Bot. Jahrb. 59: 5, 1924; Kanehira in Journ. Fac. Agr. Kyushu

Univ. 4: 278, 1935; Ohwi in Journ. Jap. Bot. 18: 134, 1942.

*Scirpus globulosus* Retz., Obs. Bot. 6, 19, 1791.

*F. hypsocolea* Hosokawa in Trans. Nat. Hist. Soc. Formosa 28: 152, 1938.

Syn. nov. e typo. (Pl. 2, fig. A)

Culms densely tufted, (30-) 40-90 cm tall, clothed at base with 2 or 3 bladeless sheaths oblique at orifice. Inflorescence a simple or partially compound umbel with several spikelets; rays few, up to 3 cm long; involucre leaves 2 or 3, about 1 cm long. Spikelets obovoid-ellipsoid to globose, 3-4 mm long, 2.5-3 mm wide, fuscous or rusty-brown. Glumes oblong, 2 mm long, rounded at apex, broadly white-hyaline on margins. Achenes obovate, biconvex, 0.7 mm long, minutely cancellated; style-branches 3 or 2.

MARIANAS: GUAM: Agana swamp. *Bryan, Jr. 1081!* (BISH).

WEST CAROLINES: YAP: *Wong 495!* (BISH, US), *Volkens 140, 293* (B).

-PALAU: Babelthaob Islet, Kamusetsu. *Kanehira & Hatusima 6960!* (FU); ditto, Molegojok. *Tuyama s.n.!* (TI); Aimiriik. *Kanehira & Hatusima 4590!* (FU); between Aimiriik and Gaspan. *Tuyama s.n.!* (TI); Korrer Islet, Ngarabaket. *Tuyama s.n.!* (TI); Korrer Agr. Exp. Sta. *Collector unknown 95!* (TAI; holotype of *F. hypsocolea*).

EAST CAROLINES: PONAPE: without definite locality. *Hatusima 10764 & 11084!* (FU), *Ledermann 13613a* (B); Mt. Poaipoi, 1600 ft. *Glassman 2484!* (BISH).—Also India, Indo-China, southern China, Formosa, Ryukyus, Malaysia and Polynesia.

The holotype of *F. hypsocolea* was examined at the National Taiwan University Herbarium at Taipei. As seen in Pl. 3, fig. A, it is nothing else than the very common form of *F. globulosa*. As was already pointed out by Ohwi (1944), the achenes of this species tend from trigyny to digyny. In plants from Micronesia lenticular achenes were slightly more abundant than the trigonous ones.

**33. *Fimbristylis pauciflora*** R. Brown, Prodr. Fl. Nov. Holl. 1, 225, 1810; Volkens in Engl., Bot. Jahrb. 31: 458, 1902; Kükenth. in Engl., Bot. Jahrb. 59: 4, 1924; Kanehira in Journ. Fac. Agr. Kyushu Univ. 4: 279, 1935.

Culms hair-like, densely tufted in large clumps, 5-20 cm tall; basal sheaths few, 1-3 cm long, light brown, membranous, oblique at orifice, sometimes with setaceous blade. Spikelet solitary, terminal, oblong-elliptic to lance-oblong, 4-6 mm long, 1-1.2 mm across, pale-brownish, few-flowered. Glumes erect, lance-oblong, 2.8-3 mm long, 1-1.2 mm wide, obsolete several-nerved, the back obtuse, cinereous-green, the margins narrowly rusty-brownish, obtusish at apex. Achenes obovate, 0.7-0.8 mm long, 0.5 mm wide, unequally biconvex with very depressed dorsal angle, rounded at apex, tawny at maturity, sparsely verruculose; style slender, 1.7 mm long, 3-cleft to 1/4.

WEST CAROLINES: YAP: Dogol. *Tuyama s.n.!* (TI); between Dogol and Okao. *Hosokawa 8907!* (BISH, TAI); oppido Okau. *Tuyama s.n.!* (TI); without definite locality. *Volkens 448* (B).—PALAU: Ogiwaru. *Takamatsu 1443!* (BISH).



—Also southern Ryukyus, Malaysia and northern Australia.

34. *Fimbristylis nutans* (Retz.) Vahl, Enum. Pl. 2: 286, 1806; Volkens in Engl., Bot. Jahrb. 31: 458, 1902; Kükenth. in Engl., Bot. Jahrb. 59: 4, 1924; Ohwi in Journ. Jap. Bot. 18: 133, 1942.

[Practical descr.] Ohwi in Mem. Coll. Sci. Kyoto Univ. B, 18: 86, 1944.

WEST CAROLINES: YAP: rote Berge von Gaguill. *Volkens 497* (B).—PALAU: Babelthaob Islet, Gaspan. *Tuyama s.n.*! (TI); Aimiriik. *Kanehira & Hatusima 45491* (FU); Korror Islet. *Kanehira & Hatusima 44341* (FU).—Also India, southern China, Formosa and Malaysia.

35. *Fimbristylis monostachyos* (Linn.) Hasskarl, Pl. Jav. Rar. 61, 1848; Ohwi in Journ. Jap. Bot. 18: 133, 1942.

*Cyperus monostachyos* Linn., Mant. Pl. 2: 180, 1771.

[Practical descr.] Ohwi in Mem. Coll. Sci. Kyoto Univ. B, 18: 58, 1944.

WEST CAROLINES: YAP: Map Islet. *Hosokawa 89301* (BISH, TAI).—PALAU: Babelthaob Islet, Marikyoku. *Hatusima 50291* (FU); ditto Keklau. *Tuyama s.n.* (TI); ditto, near Ngakurao. *Hosokawa 92671* (TAI); Palau Is., Mt. Grittel. *Hosokawa 9261* (US).—Distribution: pantropic.

#### Genus 9. CYPERUS Linn.

1. Rhachilla on spikelet not articulated.
2. Achenes 3-angled. (Subgen. CYPERUS).
3. Spikelets spicate on elongated rhachis.
  4. Rhachilla of spikelet winged with decurrent bases of glumes; styles twice as long as the achene.
    5. Spikelets stramineous, dense-flowered; spikes cylindrical with numerous spikelets, much longer than the width. . . . . 36. *C. digitatus*.
    5. Spikelets sanguineous except in no. 38, which has yellow spikelets, loose-flowered; spikes ovoid or ellipsoid with many spikelets, not more than twice as long as the width.
    6. Stolons absent; glumes loosely disposed.
      7. Large plant; culms up to 100 cm tall; spikelets sanguineous-reddish. . . . . 37. *C. distans*.
      7. Medium-sized plant; culms less than 60 cm tall; glumes yellowish. . . . . 38. *C. tenuiculmis*.
    6. Rhizome with slender, elongate stolons; glumes contiguous. . . . . 39. *C. rotundus*.
  4. Rhachilla of spikelet not winged, i.e. glumes without decurrent base; styles shorter than achene.
    8. Plant perennial, stoloniferous; glumes with obtuse keel. . . . . 40. *C. pilosus*.
    8. Plant annual with fibrous roots only; glumes strongly folded with acute keel.

9. Spikelets 5-8 mm long, few-flowered; glumes 1-1.5 mm long, round or shallowly emarginate at apex. 41. *C. Iria*.
9. Spikelets 1-2.5 cm long, many-flowered; glumes 3-3.5 mm long, acuminate at apex. . . . . 42. *C. compressus*.
3. Spikelets radiate at the apex of umbel rays; rhachis of spikes not developed.
10. Involucral leaves few, very unequal; culms slender, less than 70 cm tall; spikelets brownish.
11. Spikelets densely congested in glomerules; glumes sanguineous, rounded at apex; annual with fibrous roots only. . . . . 43. *C. difformis*.
11. Spikelets radiate in group of 3 to 7; glumes ferrugineous, acute at apex; perennial usually with elongate stolons. . . . . 44. *C. haspan*.
10. Involucral leaves many, nearly equal; culms robust, 80-100 cm tall; spikelets pale-green. . . 45. *C. alternifolius* ssp. *flabelliformis*.
2. Achenes lenticular. (Subgen. PYCREUS).
12. Spikelets dense; umbel rays as a rule not developed, rarely elongate to 3 cm; achenes not sulcate. . . . . 46. *C. polystachyos*.
12. Spikelets loose; umbel rays usually elongate to 7 cm; achenes sulcate. . . . . 47. *C. sulcinux*.
1. Rhachilla of spikelet articulate at least at the base of spikelet.
13. Achenes 3-angled.
14. Spikelets articulate only at base. (Subgen. MARISCUS).
15. Spikelets linear or linear-subulate, not compressed.
16. Spikelets spicate, greenish.
17. Spikelets divergent; spikes truly cylindrical. . . . . 48. *C. cyperoides*.
17. Spikelets obliquely patent; spikes narrowed toward the base. . . . . 49. *C. cyperinus*.
16. Spikelets congested in globose head, reddish-brown. . . . . 50. *C. compactus*.
15. Spikelets lanceolate, flat.
- 15b. Spikelets 6-7 mm long when normally grown, light brown or straw-colored, rather dense but the axis of spikes being still visible. . . . . 51. *C. javanicus*.
- 15b. Spikelets 3-6 mm long, light fuscous or grayish-fuscous, extremely dense thus the axis of spikes completely hidden. . . . . 51B. *C. ligularis*.
14. Spikelets articulate at base of all the glumes. (Subgen. TORULINIUM). . . . . 52. *C. ferax*.
13. Achenes lenticular.

18. Spikelets and achenes laterally compressed, an angle of achenes facing the rachilla. (Subgen. KYLLINGIA).  
 19. Glumes not winged on the keel. . . . . 53. *C. brevifolius*.  
 19. Glumes winged on the keel. . . . . 54. *C. Kyllingia*.
18. Achenes dorsiventrally compressed with one side facing the rachilla; spikelets with obtuse back. (Subgen. LIPOCARPHA). . . . .  
 . . . . . 55. *C. Zollingerianus*.
- 36. *Cyperus digitatus*** Roxb. [Hort. Beng. 81, 1814, nomen &] Fl. Ind. ed. 1, 1: 205; 1832; Ohwi in Journ. Jap. Bot. 18: 131, 1942.  
 [Practical descr.] Kükenth., Cypereae, in Pflanzenr. Heft 101: 55, 1935; Ohwi in Mem. Coll. Sci. Kyoto Univ. B, 18: 127, 1944.  
 WEST CAROLINES: PALAU: Babelthaob Islet. Marikyoku. *Hatusima* 5059! (FU).—Distribution: pantropic.
- 37. *Cyperus distans*** Linn. f., Suppl. Sp. Pl. 103, 1781; Ohwi in Journ. Jap. Bot. 18: 131, 1942.  
 [Practical descr.] Kükenth., Cypereae, 137, 1935; Ohwi, l.c. 132, 1944.  
 WEST CAROLINES: PALAU: Korrör Islet. *Kanehira* & *Okuya* 8! (FU); Babelthaob Islet, Gaspan. *Tuyama s.n.*! (TI).—Distribution: pantropic.
- 38. *Cyperus tenuiculmis*** Böckeler in Linnaea 36: 286, 1870.  
 '*Cyp. Zollingeri* (non Steud.)': Volkens in Engl., Bot. Jahrb. 31: 457, 1902; Ohwi in Journ. Jap. Bot. 18: 131, 1942.  
 [Practical descr.] Kükenth., Cypereae, 133, 1935; Ohwi, l.c. 131, 1944 (both under *C. Zollingeri*). [Illustr.] Kern in Reinwardtia 2: 108, f. 6, 1952, under *C. Zollingeri*.  
 WEST CAROLINES: YAP: am Rande der Buschgehörtze des Benningsenbergs, 200 m. *Volkens* 211 (B); Grashalde am Missionberg. *Volkens* 386 (B).—PALAU: Babelthaob Islet: west coast, Ngeremetengel. *Fosberg* 32451! (BISH); Almonogui. *Kanehira* & *Hatusima* 4011! (FU); Alkoron. *Hosokawa* 7018! (TAI); Ngarudokku. *Takamatsu* 12631 (BISH); Gokkep. *Takamatsu* 11831 (BISH); Korrör Islet. *Kanehira* & *Okuya* 1! (FU); Korrör, Steppe. *Raymundus* 159 (B).  
 EAST CAROLINES: TRUK: without definite locality. *Hatusima s.n.*! (FU); ditto. *Kawagoë s.n.*! (KAG); ditto, am Berger Vidiboen. *Kraemer* 12 (B).—Also Africa, India, Malaysia and Formosa.  
 Kern (1954) settled the nomenclature of this taxon, which has passed under the name of *C. Zollingeri*. According to him, as the type of *C. Zollingeri* is identical with *C. Ramosii* of the same section, the correct name of this species should be *C. tenuiculmis*.
- 39. *Cyperus rotundus*** Linn., Sp. Pl. ed. 1, 45, 1753; Volkens in Engl., Bot. Jahrb. 31: 457, 1902; Merrill in Philip. Journ. Sci. (Bot.) 9: 59, 1914; Kükenth. in Engl., Bot. Jahrb. 59: 3, 1924; Kanehira in Journ. Fac. Agr. Kyushu Univ. 4: 277, 1935; Ohwi in Journ. Jap. Bot. 18: 131, 1942.  
 [Practical descr.] Kükenth., Cypereae 107, 1935; Ohwi, l.c. 130, 1944. [Illustr.]

Kükenth., l.c. f. 13 on p. 109, 1935; S. T. Blake in Univ. Queensl. Papers 2 (2) : t. 4, 1942.

MARIANAS: GUAM: without definite locality. *McGregor 445!* (BISH, US); 1/2 mile west of Agana Bay area. *Moore 156!* (US).—Tinian. *Ohtani 9796!* (FU).

WEST CAROLINES: YAP: without definite locality. *Wong 469!* (US). *Volkens 120 & 121* (B); Dogol village. *Tuyama s.n.!* (TI); Takiol. *Takamatsu 1822b!* (BISH).—PALAU: Angaur. *Fosberg 31972!* (BISH, US), ditto. *Momose s.n.* (TI).

MARSHALLS: Arno Atoll, Ine Islet, Ine village. *Anderson 3674!* (BISH), *E. L. Stone 1038!* (US); Jaluit. *Schnee s.n.* (B).

WAKE IS.: Peale Islet. *Fosberg 34933!* (BISH, US); Wake Islet. *Fosberg 34948!* (BISH).—Distribution: temperate and tropical regions of all World.

Valiability and taxonomy were discussed in detail by S. T. Blake (1942). The tubers containing cyperene, cyperole and phenole compounds are used for Chinese drug.

40. *Cyperus pilosus* Vahl, Enum. Pl. 2: 354, 1806.

[Practical descr.] Kükenth., Cypereae 92, 1935; Ohwi, Cyper. Jap. 2: 134, 1944.

WEST CAROLINES: PALAU: Babelthaob Islet, Lake Ngelegal. *Tuyama s.n.!* (TI); Korrer Islet, Ngarabaket. *Tuyama s.n.!* (TI).—Also Africa, India, Indo-China, southern China, southern Japan, Malaysia and Australia.

This species is apparently new to the flora of Pacific Islands, and is a good example suggesting the close phytogeographic link between Micronesia and Malaysia. Both specimens cited above have slightly broader spikelets that are densely congested than in the plants from Indian subcontinent, and are close to var. *pseudo-babakensis* Kükenth.

41. *Cyperus Iria* Lin., Sp. Pl. ed. 1, 45, 1753; Hosokawa in Trans. Nat. Hist.

Soc. Formosa 28: 152, 1938; Ohwi in Journ. Jap. Bot. 18: 131, 1942;

Walker & Rodin in Contrib. U.S. Nat. Herb. 30: 455, 1949.

[Practical descr.] Kükenth., Cypereae 150, 1935; Ohwi, Cyper. Jap. 2: 138, 1944. [Illustr.] Britton & Brown, Illustr. Fl. Pac. N. U.S. ed. 2, 1: f. 730, 1913.

MARIANAS: GUAM: slough 1.25 miles north of Agat. *Necker 68!* (US).

WEST CAROLINES: PALAU: Babelthaob Islet, Gaspan. *Tuyama s.n.!* (TI); Korrer Islet. *Kanehira & Okuya 9745!* (FU), collector unknown 7, 17 & 50! (TAI).—Also Africa, Central Asia, India, China, Malaysia, Japan and Australia. Introduced to tropical America.

42. *Cyperus compressus* Linn., Sp. Pl. ed. 1, 46, 1753; Merrill in Philip. Journ.

Sci. (Bot.) 9: 59, 1914; Kanehira in Journ. Fac. Agr. Kyushu Univ.

4: 276, 1935; Ohwi in Journ. Jap. Bot. 18: 131, 1942.

[Practical descr.] Kükenth., Cypereae 156, 1935; Ohwi, Cyper. Jap. 2: 141, 1944. [Illustr.] Kükenth., l.c. f. 4a-d on p. 16, 1935 (spikelet); Britton & Brown, Illustr. Fl. N. U.S. ed. 2, 1: f. 729, 1913.

MARIANAS: GUAM: *Guam Exp. Sta. Herb.* 38! (B, BISH, US); without definite locality. *McGregor* 381! (B, BISH); Rota, Songsong village. *Fosberg* 31308! (BISH, US); Pagan, isthmus. *Anderson* 553! (BISH).

WEST CAROLINES: YAP: without definite locality. *Kanehira & Hatusima* 4335! (FU); Angaur. *Kawagoë s.n.*! (KAG).

EAST CAROLINES: PONAPE: Poilaplap. *Ledermann* 13872 (B); Subtik Islet. *Hosokawa* 6125 & 6153! (TAI).

MARSHALLS: Arno Atoll, Iné Islet, Iné village. *Hatheway* 886! (US); Kwajalein Atoll, Kwajalein Islet. *Fosberg* 31190! (BISH, US); Jaluit Islet. *Schnee s.n.* (B).—Distribution pantropic.

43. *Cyperus difformis* Linn., *Centur. Pl.* 2: 6, 1776; Merrill in *Philip. Journ. Sci. (Bot.)* 9: 59, 1914; *Kükenth. in Engl., Bot. Jahrb.* 59: 3, 1924; Kanehira in *Journ. Fac. Agr. Kyushu Univ.* 4: 276, 1935.

[Practical descr.] *Kükenth., Cyperaceae* 237, 1936; Ohwi, *Cyper. Jap.* 2: 144, 1944. [Illustr.] *Kükenth., l.c. f. 27 F-H* on p. 238, 1936.

MARIANAS: GUAM: *Guam Exp. Sta. Herb.* 45 & 236! (BISH); Piti village and vicinity. *Moore* 144! (BISH, US), & 173! (US); Piti district, Aguada. *Fosberg* 35566! (BISH, US); near the mouth of Ylig River. *Rodin* 764! (US); Valley of the Talofoto, *Stone* 4447 (GUAM).—Distribution: tropical and warm regions of all the World.

44. *Cyperus haspan* Linn., *Sp. Pl. ed. 1*, 45, 1753; Volkens in *Engl., Bot. Jahrb.* 31: 457, 1903; *Kükenth. in Engl., Bot. Jahrb.* 59: 3, 1924; Kanehira in *Journ. Fac. Agr. Kyushu Univ.* 4: 276, 1935; Ohwi in *Journ. Jap. Bot.* 18: 131, 1942.

'*Cyp. tenuispica* (non Steud.)': Ohwi in *Journ. Jap. Bot.* 18: 131, 1942.

[Practical descr.] *Kükenth., Cyperaceae* 247, 1936; Ohwi, *Cyper. Jap.* 2: 146, 1944. [Illustr.] *Kükenth., l.c. f. 28 E-G* on p. 243 (spikelet and achene).

WEST CAROLINES: YAP: Dogol. *Tuyama s.n.*! (TI); between Molokai and Galakai. *Tuyama s.n.*! (TI); Yap, without definite locality. *Volkens* 149, 305, 413 & 507 (B).—PALAU: Babelthaob, Lake Ngelegal. *Tuyama s.n.*! (TI); Aimiriik. *Hosokawa* 9713! (TAI); ditto. *Kanehira & Hatusima* 4529! (FU); Babelthaob without definite locality. *Ledermann* 14470 (B); Gaspan. *Tuyama s.n.*! (TI); Palau Islet, Gokkep. *Takamatsu* 1184! (BISH); Kamiyanganu Nekken. *Hosokawa* 9173! (TAI); Korrer Islet. *Ledermann* 14165 (B), *Kanehira & Hatusima s.n.*! (FU).—Ifaluk Atoll, Falalap. *Abbott & Bates* 132! (BISH).

EAST CAROLINES: PONAPE: without definite locality. *Hatusima* 11066! (FU).—Distribution: pantropic.

*C. haspan* closely resembles *C. tenuispica*, from which it differs by slightly smaller achenes and the shape of the glumes. As illustrated by *Kükenth.* (1936), in *C. haspan* the glumes are contiguous with a short upright mucro, whereas in *C. tenuispica* they are slightly loosely disposed with a more or less recurved mucro. Ohwi (1942) identified some of the Hatusima numbers cited above as

*C. tenuispica* possibly because of the absence of stolons and more or less elongated leaf blade. However, these vegetative characters are not always confined to *C. tenuispica*, and *C. haspan* presents a very similar appearance when it grows in dry habitats. All related Micronesian specimens can be determined as *C. haspan* by the floral characters mentioned above.

45. **Cyperus alternifolius** Linn., Mant. Pl. 2: 28, 1771.

ssp. **flabelliformis** (Rottb.) Kükenth., Cypereae, in Engl., Pflanzenr. Heft 101: 193, 1936.

*Cyp. flabelliformis* Rottb., Descr. & Icon. Rar. Pl. 42, t. 42 f. 2, 1773; Merrill in Philip. Journ. Sci. (Bot.) 9: 59, 1914.

[Practical descr.] Kükenth., l.c.

MARIANAS: GUAM: without definite locality. *Nelson 550!* (BISH, NY), *Guam Exp. Sta. Herb. 210!* (BISH, US).

WEST CAROLINES: PALAU: Korror Islet, Ngerebe'ed, 5-10 m alt. *Fosberg 32248!* (BISH, US).—Also Africa. Naturalized in Okinawa and the Bonin Islands.

The Micronesian plants of this species are undoubtedly of introduced origin. In tropical and subtropical Asia it is often cultivated for ornamental purposes and then established from escaped stocks.

46. **Cyperus polystachyos** Rottb., Descr. & Icon. Rar. Pl. 39, t. 11 f. 1, 1773;

Kükenth. in Engl., Bot. Jahrb. 59: 3, 1924; Kanehira in Journ. Fac. Sci. Kyushu Univ. 4: 277, 1935; Ohwi in Journ. Jap. Bot. 18: 132, 1942.

*Pycrus polystachyos* (Rottb.) P. Beauv., Fl. d'Oware 2: 48, t. 86 f. 2, 1807.

[Practical descr.] Kükenth., Cypereae 366, 1936; Ohwi, Cyper. Jap. 2: 156, 1944. [Illustr.] C. B. Clarke in Journ. Linn. Soc. 21: t. 3 f. 27, 1884.

MARIANAS: without definite locality. *Gaudichaud (P)*; Agrigan. *Hosokawa 8007!* (TAI); Saipan. *Momose s.n.!* (TI), *Kanehira & Hatusima 4273!* (FU), ditto, Chalan-Kanva, west coast of Island. *Fosberg 31277!* (BISH, US); Tinian. *Ohtani 9798!* (FU); Rota, Sabana. *Necker RS-11!* (US), Sabana 1500 ft. *Kondo s.n.!* (BISH); Pagnan. *Fosberg 31387!* (BISH, US).—GUAM: Agaña. *Fosberg 35238!* (BISH, US); near Lagnas, north of base of Orote Peninsula. *Fosberg 35560!* (BISH, US); Marine Drive, Agana, by road. *Stone 3887a!* (DAO); Fena River banks, *Stone 4489* (GUAM).

EAST CAROLINES: PONAPE: *Ledermann 13866* (B, K), *Gibbon 1128!* (US), *Hatusima 10990!* (FU), *Fujii s.n.!* (TI); Agr. Exp. Sta. *Glassman 2418!* (BISH); Colonia, *Stone 1959* (GUAM).—TRUK. *Hatusima 10713!* (FU).

WEST CAROLINES: PALAU: Peliliu Is. *Fosberg 31956!* (BISH, US); Ifaluk Atoll, north of Falalap. *Abbott & Bates 105!* (BISH).—Distribution: pantropic.

47. **Cyperus sulcinus** C. B. Clarke in Journ. Linn. Soc. 21: 56, 1884; Ohwi in Journ. Jap. Bot. 18: 132, 1942.

*Pycrus sulcinus* (C. B. Clarke) C. B. Clarke in Hook. f., Fl. Brit. Ind.

6: 593, 1893.

[Practical descr.] Kükenth., *Cypereae* 364, 1936. [Illustr.] Kükenth., l.c. f. 43 on p. 365, 1936.

WEST CAROLINES: PALAU: Babelthaob Islet, Kamusetu. *Hatusima* 5098! (FU).—Also India, Indo-China and Malaysia.

This species is known from the Pacific Islands only by a sole collection cited above, and presents a further example of Indian element occurring in the western Carolines (cf. note under *C. digitatus*).

48. *Cyperus cyperoides* (Linn.) O. Kuntze, *Rev. Gen. Pl.* 3(2): 333, 1898; Ohwi in *Journ. Jap. Bot.* 18: 131, 1942.

*Scirpus cyperoides* Linn., *Mant. Pl.* 2: 181, 1772.

*Cyp. Sieberianus* K. Schum. in *Engl., Pflanzenw. Ost.-Afr. C.* 122, 1895, in part; Hosokawa in *Trans. Nat. Hist. Soc. Formosa* 25: 261, 1935.

'*Mariscus cyperinus* (non Vahl)': Kanehira in *Journ. Fac. Agr. Kyushu Univ.* 4: 280, 1935.

'*Cyp. cyperoides* ssp. *cyperinus* (non Kükenth.)': Kanehira, l.c. 4: 276, 1935.

[Practical descr.] Kükenth., *Cypereae* 514, 1936; Ohwi, *Cyper. Jap.* 2: 159, 1944. [Illustr.] C. B. Clarke, *Illustr. Cyp.* t. 23 f. 5-6, 1909.

MARIANAS: Tinian. *Kanehira* 1057! (FU), *Ohtani* 9794! (FU), near Tyuro. *Hosokawa* 7755! (TAI); Saipan. *Hatusima* 10683! (FU).—Distribution: pantropic.

49. *Cyperus cyperinus* (Retz.) Suringar, *Het. Gesl. Cyperus in Mal. Archip.* 154, t. 6 f. 10, 1898; Volkens in *Engl., Bot. Jahrb.* 31: 457, 1902; Ohwi in *Journ. Jap. Bot.* 18: 132, 1942.

*Kyllinga cyperina* Retz., *Observ. Bot.* 5, 21, 1791.

*Mariscus cyperinus* (Retz.) Vahl, *Enum. Pl.* 2: 337, 1806; Merrill in *Philip. Journ. Sci.* 9: 62, 1914.

*Cyp. cyperoides* O. Kuntze ssp. *cyperinus* (Retz.) Kükenth. in *Engl., Bot. Jahrb.* 59 :3, 1924.

[Practical descr.] Kükenth., *Cypereae* 518, 1936; Ohwi, *Cyper. Japan* 2: 160, 1944. [Illustr.] C. B. Clarke, *Illustr. Cyp.* t. 22 f. 3-4, 1909.

MARIANAS: Alamagan. *Hosokawa* 7933! (TAI); Anatahan. *Hosokawa* 7832! (TAI).—GUAM: without definite locality. *McGregor* 418! (BISH), *Nelson* 239! (BISH); 2 miles southwest of Agana Area. *Moore* 109! (US); 1 mile east of Barrigada and Pagat Point Area. *Moore* 13! (US); Merizo, north of village. *Bryan, Jr.* 1233! (BISH); upland swamp near Telefofo River. *Rodin* 675! (US); near Finaguayac. *Moran* 4533! (BISH).

WEST CAROLINES: YAP: grassige Bergabhänge. *Volkens* 94 & 143 (B).—PALAU: Korrör Islet. *Kanehira & Okuya s.n.*! (FU), *Kanehira & Hatusima* 4441 & 4823! (FU), *Raymundus* 154 & 228 (B), *Hosokawa* 22! (TAI); Peliliu Is. *Hatusima* 4769! (FU).

EAST CAROLINES: Truk. *Hatusima s.n.*! (FU).—PONAPE: without definite locality. *Hosokawa 6142*! (TAI), *Ledermann 13512* (B, K); Agr. Exp. Sta. *Glassman 2425*! (BISH); Langar Islet. *Glassman 2396*! (BISH); U. District. *Glassman 2722*! (BISH); Colonia, *Stone 1972*! (GUAM).—India, southern China, Malaysia, Bonin Islands and eastern Australia.

As compared with the plants from Malaysia and India, Micronesian specimens are usually depauperate with more slender culms and looser spikelets, and the spikes are more frequently congested in a head. This form was cited by Ohwi under the name of forma *pictus* (Nees ex Wight) Ohwi in Journ. Jap. Bot. 18: 132, 1942.

50. *Cyperus compactus* Retz., Observ. Bot. Pt. 5, 10, 1789.

[Practical descr.] Kükenth., Cyperae 423, 1936; Ohwi, Cyper. Jap. 2: 159, 1944.

MARIANAS: GUAM: OSIR Road, edge of Apra Harbor, coral flat, very weedy. *Stone 4725*! (DAO, GUAM).—Also India, southern China, Formosa and Malaysia.

Apparently not previously recorded from the Pacific Islands. This new addition is a further example suggesting a floristic link between tropical Asia and western Micronesia (cf. note under *C. digitatus*).

51. *Cyperus javanicus* Houlttuyn, Nat. Hist. 2: 13, t 88 f. 1, 1782; Walker & Rodin in Contrib. U.S. Nation. Herb. 30: 456, 1949.

*Cyp. stuppeus* Forst. f. [Fl. Ind. Austr. Prodr. 89, 1786, name only; Kükenth. in Engl., Bot. Jahrb. 59: 3, 1924, name only] ex Kükenth., l.c. 59: 45, 1924.

*Cyp. pennatus* Lamarck, Illustr. 1: 144, 1791; Ohwi in Journ. Jap. Bot. 18: 132, 1942.

*Cyp. canescens* Vahl, Enum. Pl. 2: 355, 1806; Volkens in Engl., Bot. Jahrb. 31: 457, 1902.

*Mariscus stuppeus* (Forst. f. ex Kükenth.) Merrill in Philip. Journ. Sci. (Bot.) 3: 398, 1908, & 9: 62, 1914.

*Mariscus pennatus* (Lamarck) Domin in Bibliothec. Bot. 20, Heft 85: 440, 1915; Kanehira in Journ. Fac. Agr. Kyushu Univ. 4: 280, 1935.

[Practical descr.] Kükenth., Cyperae 476, under *C. pennatus*, 1936; Ohwi, Cyper. Jap. 2: 161, 1944. [Illustr.] Kükenth., l.c. f. 53 A-G, 1936.

MARIANAS: Agrigan. *Fosberg 31575*! (BISH, US), *Kondo s.n.*! (BISH).—Alamagan, around Partido village. *Fosberg 31641*! (BISH, US).—Anatahan. *Kanehira 2153*! (FU), *Hosokawa 7829*! (TAI).—Saipan. *Kanehira & Hatusima 4269*! (FU), *Kanehira 1016*! (FU), *Momose s.n.*! (TI), *Kawano s.n.*! (KAG).—Tinian. *Ohtani 9797*! (FU), *Kanehira 3834*! (FU), *Hosokawa 776*! (TAI); north field. *Kondo*! (BISH).—Pagan, Isthmus. *Anderson 554*! (BISH).—GUAM: without definite locality. *McGregor 371*! (BISH) & *418*! (B, US); Ajayan Bay. *Necker 174*! (US); 2 km north of Agat. *Necker 65*! (US); Yigo, 180 m. *Bryan,*



Jr. 1140! (BISH).

WEST CAROLINES: YAP: Dogor. *Tuyama s.n.*! (TI); Yap, without definite locality. *Kanehira* 68! (BISH, FU), *Kanehira & Hatusima* 4346! (FU), *Wong* 319! (US), *Volkens* 127 (B).—PALAU: Marikyoku. *Kanehira* 391! (FU); Babelthaob Islet. *Ledermann* 14376 (B, K); Korrör Islet. *Raymundus* 173 (B).—Korrör, *Stone* 4605 (GUAM).—IFALUK ATOLL, Falalap. *Abbott & Bates* 120! (BISH).

EAST CAROLINES: Truk, Umol. *Kawagoë s.n.*! (KAG); Wara. *Moore* 134! (US); Truk without definite locality. *Wong* 125! (BISH, US).—Pingelap. *St. John* 21471! (BISH).—PONAPE: Sabtik Is. *Hosokawa* 6139! (TAI); Near Colonia. *Hosokawa* 6043! (TAI).—Kusaie. *Kanehira* 1307! (FU), *Hosokawa* 6193! (TAI).—Ant Atoll, Nikalap. *Glassman* 2814! (BISH).—Mortlock Group, Lukunor Atoll, Lukunor Islet. *Anderson* 2149! (BISH); Oneop Islet. *Anderson* 2093! (BISH); Satawan Atoll, Moch Islet. *Anderson* 1120! (US).

MARSHALLS: Likiep Atoll, Likiep Islet. *Fosberg* 33859! (BISH, US).—Jaluit. *Koidzumi s.n.*! (TAI).—Also Africa, India, southern China, Malaysia and Hawaiian Islands.

**51B. *Cyperus ligularis* Linn., Pl. Jamaic. Pugill. 3, 1759.**

[Practical descr.] Kükenthal, *Cypereae* 475, 1936. [Illustr.] Clarke, *Illustr. Cyper. t. 27, f. 3, 1909.*

MARIANAS: GUAM: Harmon Village. *Stone* 4053! (GUAM).—Also tropical America and West Africa.

As supposed by the original collector, Dr. Stone, this western Hemisphere plant seems to be an introduction after the War. As indicated in the key this can be separable from *C. javanicus* by the more dense spikes with completely hidden rhachis and generally darker spikelets.

**52. *Cyperus brevifolius* (Rottb.) Hasskarl, Cat. Hort. Bogor. 24, 1844.**

*Kyllingia brevifolia* Rottb., *Descr. & Icon.* 13, t. 4 f. 3, 1773; Merrill in *Philipp. Journ. Sci. (Bot.)* 9: 62, 1914; Kükenth. in *Engl. Bot. Jahrb.* 59: 2, 1925.

[Practical descr.] Kükenth., *Cypereae* 600, 1936; Ohwi, *Cyper. Jap.* 2: 164, 1944, under *Kyllingia brevifolia*. [Illustr.] C. B. Clarke, *Illustr. Cyp. t. 1 f. 1-4, 1909.*

MARIANAS: GUAM: without definite locality. *Moran s.n.*! (BISH), *Guam. Exp. Sta. Hb.* 232! (BISH); Piti village and vicinity. *Moore* 167! (US); Fena River, headwaters, *Stone* 4472! (GUAM).

WEST CAROLINES: PALAU: Korrör Islet, Trop. Agr. Exp. Sta. *Hosokawa* 43! (TAI); Ifaluk Atoll. *Burrows s.n.*! (BISH).

EAST CAROLINES: PONAPE: Colonia near Catholic Mission. *Anderson* 833! (BISH); vicinity of Colonia. *Glassman* 2582a! (BISH); Agr. Exp. Sta. *Glassman* 2419! (BISH); Colonia, *Stone* 1971! (GUAM); Tiam. *Ledermann* 14006 (B, K); unter Kakos. *Gibbon* 1118 (B); MORTLOCK GROUP, Satawan Atoll, Moch Islet.

*Anderson 1128!* (BISH).—Distribution: tropical and warm regions of all the World.

**53. *Cyperus Kyllingia*** Endlicher, Cat. Hort. Acad. Vindb. 1: 94, 1842.

*Kyllingia monocephala* Rottb., Descr. & Icon. 13, t. 4 f. 4, 1773; Volkens in Engl., Bot. Jahrb. 31: 457, 1902; Safford in Contrib. U.S. Nat. Herb. 9: 303, 1905; Merrill in Philip. Journ. Sci. (Bot.) 9: 62, 1914; Kükenth. in Engl., Bot. Jahrb. 59: 2, 1924; Kanehira in Journ. Fac. Agr. Kyushu Univ. 4: 280, 1935; Ohwi in Journ. Jap. Bot. 18: 130, 1942.

'*Kyllingia brevifolia* (non Rottb.)': Kanehira, l.c. 4: 280, 1935.

[Practical descr.] Kükenth., Cyperae 606, 1936; Ohwi, Cyper. Jap. 2: 165, 1944, under *Kyllingia monocephala*. [Illustr.] Kükenth. l.c. f. 64 C-D, 1936 (spikelet).

MARIANAS: Anatahan. *Kanehira 2144!* (FU, US); Tinian. *Kanehira 1256!* (FU, US), *Ohtani 9795!* (FU); Saipan. *Kanehira 902!* (FU), *Höfer 120* (B); Rota. *Kanehira 3640!* (FU).—GUAM: without definite locality. *McGregor 440!* (BISH, US), *Necker 343!* (BISH), *Nelson 276!* (BISH), *Chamisso 167* (P); Agana. *Safford & Seale 1070!* (US); behind Tumon Bay. *Conover 592!* (BISH); Talofoto valley, *Stone 4306!* (GUAM).

WEST CAROLINES: YAP: without definite locality. *Wong 338!* (BISH, US), *Kanehira & Hatusima 4366!* (FU); an feuchten Stellen gemein. *Volkens 109* (B); Dogol village. *Tuyama s.n.!* (TI).—PALAU: Marikyoku. *Kanehira 399!* (FU); Korrör Islet. *Kanehira & Okuya 42!* (FU); in Busche und an Wegen. *Raymundus 14 & 152* (B); Babelthaob Islet, Lake Ngelegal. *Tuyama s.n.!* (TI).

EAST CAROLINES: Truk. *Wong 246!* (BISH, US).—PONAPE: Parkiir. *Kanehira 773!* (FU), *Hatusima 10949!* (FU); Ponape, without definite locality. *Ledermann 13423* (B).—KUSAIE: *Kamiya 238!* (TI); Utioa River. *Hosokawa 9369!* (TAI); Lili Islet. *Hosokawa 6468!* (TAI).

MARSHALLS: Arno Atoll, Iné Islet, Iné village. *Anderson 3666!* (BISH, US); Jaluit. *Schnee s.n.* (B).—Distribution: pantropic.

**54. *Cyperus ferax*** L. C. Richard in Act. Soc. Hist. Nat. Paris 1: 106, 1792; Volkens in Engl., Bot. Jahrb. 31: 457, 1902; Kükenth. in Engl., Bot. Jahrb. 59: 3, 1924; Ohwi in Journ. Jap. Bot. 18: 132, 1942.

*Torulium ferax* (L. C. Rich) Urb., Sym. Antill. 2: 165, 1900; Merrill in Philip. Journ. Sci. 9: 63, 1914; Kanehira in Journ. Fac. Agr. Kyushu Univ. 4: 283, 1935.

*Cyp. ferax* L. C. Rich. var. *Novae-Hannoverae* (Böckl.) Kükenth. in Engl., Bot. Jahrb. 59: 4, 1924; Kanehira in Journ. Fac. Agr. Kyushu Univ. 4: 276, 1935.

[Practical descr.] Kükenth., Cyperae 615, 1936; Ohwi, Cyper. Jap. 2: 162, 1944. [Illustr.] C. B. Clarke, Illustr. Cyper. t. 31 f. 1-4, 1909; Britton & Brown, Illustr. Fl. N. U. S. ed. 2, 1: f. 645, 1913.

MARIANAS: GUAM: mouth of Ylig River. *Rodin 772!* (US); 1/2 mile up

Ylig River. *Moore* 283! (US); *Guam Exp. Sta. Herb.* 305! (BISH, US); near Sumay. *Conover & Grather* 555! (BISH); Wettengel Junction. *Fosberg* 35302! (BISH, US).—Saipan. *Hatusima* 10665! (FU), *Höfer* 44 (B).—Rota, without definite locality. *Necker RC-5!* (US); Sabana. *Fosberg* 31843! (BISH, US).—Anatahan. *Hosokawa* 7854! (TAI).

WEST CAROLINES: YAP: without definite locality. *Volkens* 404 (B).—PALAU: Bebelthaob Islet, Ngarathmao, Ailol River. *Tuyama s.n.!* (TI); Konrei in Arukoron village. *Hosokawa* 7075! (TAI); Korrör Islet, in Tarofelde. *Raymundus* 25 (B); Peliliu. *Hatusima* 10665! (FU).—Ifaluk Atoll, Falalap. *Abbott & Bates* 116! (BISH).

EAST CAROLINES: TRUK: without definite locality. *Koidzumi s.n.!* (TI); Fefan. *Kawagoë s.n.!* (KAG); Summer Islet. *Hosokawa* 6490! (TAI); Truk Group, Moen Islet, Leue village. *Fosberg* 7511! (BISH, US).—PONAPE: M. Tolotom, 6000 ft. *Glassman* 2864! (BISH); without definite locality. *Kanehira* 851! (FU), *Hatusima* 10910! (FU), *Gibbon* 1131 (B).—MORTLOCK: Lukunor Atoll, Lukunor Islet. *Anderson* 2153! (BISH, US).—NAMONUITO: Pisarach. *Stone* 2183 (BISH).

MARSHALLS: Ailuk Atoll, Ailuk Islet. *Fosberg* 33967! (BISH, US); Arno Atoll, Iné Islet. *Fosberg* 3616! (BISH, US); Taklip Islet. *Anderson* 3741! (BISH).—Lae Atoll, Lae Islet. *Fosberg* 34014! (BISH, US); Likiep Atoll, Lado Islet. *Fosberg* 33845! (BISH, US); Wotho Atoll, Wotho Islet. *Fosberg* 34260! (BISH, US); Kwajalein Atoll, Kwajalein Islet. *Wagner, Jr.* 3381! (US); *Fosberg* 31172! (BISH, US); Majuro, Uliga, *Stone* 981 (BISH); Namorik Atoll, *Stone* 995 (BISH).—Distribution: pantropic.

The Linnaean name, *C. odoratus*, is accommodated to this species by some authors. According to the phototypes of the Linnaean Herbarium, a sheet marked as "10. odoratus" in Linnaeus' hand is a mixture of *C. polystachyus* and *C. malaccensis*, hence some other authors retain the binomial for *C. polystachyus* of the Subgen. *Pycneus*. On the other hand the Sloan Plates cited by Linnaeus under his *C. odoratus* are again a mixture of *C. giganteus* of the section *Papyrus* and a species of *Mariscus* that cannot be identified exactly. I agree with C. B. Clarke (1894) to treat this very confusing name as a nomen rejiciendum.

55. *Cyperus Zollingerianus* (Böckl.) T. Koyama in Bot. Mag. Tokyo 73: 438, 1960.

*Lipocarpha microcephala* Kunth, Enum. Pl. 2: 1837; Hosokawa in Trans. Nat. Hist. Soc. Formosa 28: 152, 1938; Ohwi in Journ. Jap. Bot. 18: 137, 1942.

[Practical descr.] Ohwi, l.c. 167, 1944, under *Lipocarpha microcephala*.

WEST CAROLINES: PALAU: Babelthaob Islet, Aimion. *Hosokawa* 9133! (TAI); Kamusetsu. *Hatusima* 4929! (FU); Korrör Islet. *Kanehira & Okuya s.n.!* (FU).—Also India, southern China, Japan, Formosa, Malaysia and Australia.

## Genus 10. MACHAERINA Vahl

1. Achenes almost lanceolate, gradually narrowed to glabrous beak; glumes black-brown, much longer than achene; leaves 1.2–2 cm wide. 56. *M. falcata*.
  1. Achenes elliptic, abruptly contracted to densely hairy beak; glumes rusty-brown, slightly shorter than achene; leaves 3–8 mm wide.
    2. Spikelets 3–4 mm long, solitary or in groups of 2 or 3; beak of achenes about 1 mm long. . . . . 57. *M. mariscoides* ssp. *mariscoides*.
    2. Spikelets 2.5–3 mm long, congested in globose head; beak of achenes 2/3–3/4 mm long. . . . . 57b. *M. mariscoides* ssp. *colpodes*.
56. **Machaerina falcata** (Nees) T. Koyama in Bot. Mag. Tokyo 69: 63, 1956.  
*Baumea falcata* Nees in Hook., Journ. Bot. 6: 29, 1854.  
*Cladium ponapense* Ohwi in Journ. Jap. Bot. 18: 136, 1942. Syn. nov.  
 e typo.

[Practical descr.] Kükenth. in Repert. Sp. Nov., Fedde, 51: 144, 1942.  
 [Illustr.] Pl. 4, fig. D, E.

EAST CAROLINES: PONAPE: Mt. Nan-a-raut, summit, 750 m. *Hatusima* 110361 (FU, holotype of *Cladium ponapense*), *Hosokawa* 5988! (TAI), *Takamatsu* 1075! (BISH).—Also Malaysia and Polynesia.

I agree with Kükenthal and Kern that *Cladium dissolutum*, *C. malesicum* and *C. samoense* are identical with the present species. Furthermore, *C. Bidwellii* of the Hawaiian Islands seems to me to be identical or at most not more than a subspecies of *M. falcata*.

57. **Machaerina mariscoides** (Gaudich.) Kern in Act. Bot. Neerl. 8: 266, 1959.  
 ssp. **mariscoides**

*Baumea mariscoides* Gaudich. in Freyc., Voy. Bot. 417, 1829.

'*Cladium Meyenii* Drake': Volkens in Engl., Bot. Jahrb. 21: 458, 1901.

*Cladium Gaudichaudii* W. F. Wight ex Safford in Contrib. U.S. National Herb. 9: 230, 1905; Merrill in Philip. Journ. Sci. 9: 59, 1914; Kükenth. in Engl. Bot. Jahrb. 59: 7, 1924; Kanehira in Journ. Fac. Agr. Kyushu Univ. 4: 276, 1935; Ohwi in Journ. Jap. Bot. 18: 136, 1942.

Culms from thick rhizome, more or less aphyllopodic, up to 90 cm tall, laterally compressed, 3.5–4 mm wide, few-noded. Bladed leaves all on culms, spaced, laterally compressed, acute at apex, cinereous-green, the longer overtopping the culm. Inflorescence an ablong panicle, 15–30 cm long; partial panicles 5 or 6, the lower ones interrupted; lower bracts much longer than panicle. Spikelets in group of two to four, rarely solitary, 3–4 mm long, ovoid, glumes 3–4, of which 1–3 being flower-bearing, lance-ovate, acute, rusty-brown, sparsely pubescent at least on the upper part. Achene only one to a spikelet, including beak about 3 mm long, the body elliptic, 2–2.2 mm long, obscurely 3-angled, glabrous, amber-brown, shiny with irregular depressions; the beak subulate-lanceolate, 1 mm long, densely hispid with white hairs; stigmas 3. Stamens 3.  
 [Pl. 4: fig. A, B]

MARIANAS: GUAM: without definite locality. *Nelson 277!* (BISH, NY); Mt. Tenjo and Mt. Reconnaissance Area, 800 m alt. *Moore 100!* (US); Mt. Tenjo, northeast slope. *Steere 164!* (BISH, US); near Sagua River, near volcanic hills, 100 m. *Stone 4216!* (GUAM, DAO); *Guam Exp. Sta. Herb. 258!* (BISH, US).

WEST CAROLINE: YAP: without definite locality. *Kanehira 1236!* (FU, NY), *Volkens 379 & 499* (B); Tomil Islet. *Tuyama s.n.!* (TI).—PALAU: KOROR. *Ledermann 14050* (B, K); Garudokku. *Takamatsu 1206!* (BISH); Baobelthuap Islet, Aimiriik. *Hosokawa 7270!* (BISH, TAI) and *7234!* (TAI), *Tuyama s.n.!* (TI); *Kanehira 2345!* (NY), *Kanehira & Hatusima 2245 & 4464!* (FU) and *1697!* (FU, NY); Almonogui. *Hosokawa 6930!* (TAI); Ngarathmao in monte Ngeleeleuus. *Tuyama s.n.!* (TI).—Distrib. endemic in Micronesia.

**57b.** ssp. *colpodes* (Lauterb.) T. Koyama, stat. nov.

*Cladium colpodes* Lauterb. in K. Schum. & Lauterb., Fl. Deutsch. Schutzgeb. Südsee 59, 1905; Kükenth. in Engl., Bot. Jahrb. 59: 7, 1924; Kanehira in Journ. Fac. Agr. Kyushu Univ. 4: 276, 1935.

*Cladium glomeratum* (Gaudich.) H. Pfeiff. in Repert. Sp. Nov., Fedde, 23: 349, 1927, not of R. Br.

*Cladium globiceps* C. B. Clarke var. *colpodes* (Lauterb.) Kükenth. in Bull. Jard. Bot. Buitenz. III, 16: 310, 1940.

Culms and leaves narrower; inflorescence mostly less than 20 cm long; spikelets 2.5–3 mm long, congested in heads 5–8 mm across; achenes with shorter beak 2/3–3/4 as long as the achene pody; otherwise as in ssp. *mariscoides*. [Pl. 4: fig. C]

WEST CAROLINE: PALAU: Babelthuap: Gaspan, by stream bank. *Stone 4658!* (GUAM); Eiraij. *Tuyama s.n.!* (TI); Ngatkip. *Ledermann 14483* (B, K).—also Malaysia.

I am unable to keep *Cladium colpodes* as specifically distinct from *Macherina mariscoides* (= *Cladium Gaudichaudii*). Both plants are very similar in both vegetative and floral characters except for the shorter beak of the achenes. Although the achene beaks of *C. colpodes* are slightly shorter and more conical than those of *M. mariscoides*, they quite well agree in elliptic, amber-brown body with irregular depressions and in the beaks that are densely hispid with straight, white hairs. Differences in size and arrangement of spikelets mentioned in the above description are too trifling to make specific segregation. I regard *C. colpodes* as a subspecies of *M. mariscoides* as they are geographically separated in spite of the minor morphological differences. Subspecies *colpodes* is known in Malaysia under the name of *C. juncooides*.

Kükenthal (1942) is of the opinion that *M. mariscoides* is conspecific with the Hawaiian *M. Meyenii*, and regarded the former as the variety of the latter. In 1959 I have compared the selected sheets of *M. mariscoides* with a good series of *M. Meyenii* at the herbarium of the Bernice P. Bishop Museum in Honolulu. Differences are, after all, only in the slightly longer achenes and spikelets of

*M. Meyenii*. I here treat it also as a subspecies of *M. mariscoides* chiefly because of its clear geographical separation. As to the dimension of achenes and spikelets *M. mariscoides* ssp. *mariscoides* is intermediate between ssp. *Meyenii*\* and ssp. *colpodes*.

#### Genus 11. SCHOENUS Linn.

1. Culms rigid, more than 1 mm thick and 50 cm tall, erect from very base, never rooting at lower nodes.
  2. Culms naked, i.e. clothed at base with a few bladeless sheaths only. . . . . 58. *Sch. tendo* ssp. *achaetus*.
  2. Culms phyllopodic, i.e. basal leaves with elongate blade.
    3. Spikelets less than 7 mm long. . . . . 59. *Sch. punctatus*.
    3. Spikelets more than 15 mm long. . . . . 60. *Sch. calostachyus*.
1. Culms filiform, soft, less than 1 mm thick and 40 cm tall, the lower part ascending and rooting at nodes. . . . . 61. *Sch. philippinensis*.

#### 58. *Schoenus tendo* Hook, fil., Handb. N. Zeal. Fl. 298, 1867.

ssp. *achaetus* T. Koyama, ssp. nov., intermedialis inter *Schoeno tendo* et *S. laevinuce*, differt a anteriore setis hypogynis deficientibus et glumis fuscis, et a posteriore glumis dorso non hispidis, nucibus stramineis non albescentibus et inflorescentia multo depauperata. (Pl. 4, fig. G)

'*Schoenus melanostachyus* R. Br.': as misapplied by Hosokawa in Trans. Nat. Hist. Soc. Formosa 28: 153, 1938.

'*Schoenus laevinux* Ohwi': Ohwi in Journ. Jap. Bot. 18: 136, 1942. Concerning only the specimens cited, excluding basionym.

Culms more or less tufted or closely 1-rowed from short horizontal rhizome, 40-70 cm tall, smooth, terete, sulcate when dry, clothed at base with a few bladeless sheaths tinged with sanguineous-purple. Panicle erect, oblong to narrowly oblong, rather dense, 3 to 7 cm long, 1 cm wide, with 2 or 3 tufts of spikelets; bracts with sanguineous-fuscous sheath, the blade up to 5 cm long. Spikelets lance-ovate, more or less falcate, single or paired, compressed, 4-5 mm long, about 1.5 mm wide, fuscous; glumes 6 or 7, the lower smaller and vacant, the fruiting ones 1 or 2, lance-ovate, sometimes sparsely hispidulous on back, the upper margins lighter-colored, subdensely ciliate. Achenes obovoid, trigonous with conspicuous angles, 0.8-1 mm long, smoothish, stramineous at maturity, short-stiped at base, the style 2.5 mm long, stigmas 3; perianth bristles none. Stamens 2.

EAST CAROLINES: PONAPE: without definite locality. *Hatusima 11015!* (FU, holotype of ssp. *achaetus*) & *11016!* (FU); Mt. Trunanshapoi in Nan-a-raut.

\* *Machaerina mariscoides* Kern ssp. *Meyenii* (Kunth) T. Koyama, stat. nov.

*Baumea Meyenii* Kunth, Enum. Pl. 2: 314, 1837.

*Cladium Meyenii* (Kunth) Drake, Illustr. Fl. Is. Mar. Pac. 2: 335, 1890-92.

Distribution: Hawaiian Islands.

*Hosokawa 5987!* (BISH, TAI); Mt. Ninani, 2500 ft. alt. *Glassman 2889!* (BISH).—Distrib. endemic.

As the above diagnosis shows, the new taxon differs from *Schoenus tendo* of New Zealand in lacking the perianth bristles and by more depauperated panicles. Ohwi (1942) determined the two Hatusima numebms cited above as *Schoenus laevinux* of northeastern New Guinea. I have seen several Brass and Clemens numbers of *Sch. laevinux* from the type area at the New York Botanical Garden and the Harvard University Herbarium and found it quite different from the Ponape plant at least in the whitish achenes and darker black-brown glumes conspicuously hispid on back, thus resembling those of *Sch. melanostachyus*. Hosokawa (1938) apparently erred in citing his collection, no. 5987 from Nan-a-raut, under *Sch. melanospermus*, which distinctly differs from either *Sch. tendo* or *Sch. laevinux* at least in conspicuously transversely rugose achenes.

**59. *Schoenus punctatus*** R. Brown, Prodr. Fl. Nov. Holl. 1, 232, 1810.

*Cladium aromaticum* Merrill in Philip. Journ. Sci. 9: 59, 1914; Kükenth. in Engl., Bot. Jahrb. 59: 7, 1924; Kanehira in Journ. Fac. Agr. Kyushu Univ. 4: 276, 1935.

[Practical descr.] Kükenth. in Repert. Sp. Nov., Fedde, 44: 25, 1938.

MARIANAS: GUAM: south of Piti, 300 m. alt. *McGregor 492!* (BISH, isotype of *Cladium aromaticum*).—Also Thursday Is.

**60. *Schoenus calostachyus*** (R. Br.) Poiret, Encycl. Meth. Suppl. 2: 251, 1811; Kükenth. in Engl., Bot. Jahrb. 59: 7, 1924; Kanehira in Journ. Fac. Agr. Kyushu Univ. 4: 281, 1935; Ohwi in Journ. Jap. Bot. 18: 136, 1942.

*Chaetospora calostachya* R. Br., Prodr. Fl. Nov. Holl. 1, 233, 1810.

*Schoenus triangularis* Volkens in Engl., Bot. Jahrb. 31: 458, 1902.

[Practical descr.] Kükenth. in Fedde's Repert. Sp. Nov. 44: 73, 1938; Ohwi in Mem. Coll. Sci. Kyoto Univ. B, 18: 26, 1944. [Illustr.] Clarke, Illustr. Cyper. t. 78, f. 7-9, 1909; Pl. 4, fig. H of the text.

WEST CAROLINES: YAP: without definite locality. *Kanehira 1165!* (FU), *Volkens 452* (B, type of *Sch. triangularis*); Tomil Islet. *Hosokawa 8796!* (TAI), *Tuyama s.n.!* (TI).—PALAU: Babelthaob Islet, Ngarathmao, monte Ngeleeleuus. *Tuyama s.n.!* (TI); Aimiriik. *Tuyama s.n.!* (TI), *Kanehira & Hatusima 4476!* (FU); Almonogui. *Hosokawa 6942!* (TAI).—Also Ryukyus, Malaysia and Australia.

**61. *Schoenus philippinensis*** (Palla) Kükenth. ex Merrill, Enum. Philip. Flow. Pl. 1: 128, 1923.

*Schoenus mariannae* Hosokawa in Trans. Nat. Hist. Soc. Formosa 25: 263, 1935. Syn. nov. e typo.

[Practical descr.] Kükenth. in Repert. Sp. Nov., Fedde, 44: 90, 1938. [Illustr.] Pl. 2; fig. B.

MARIANAS: Alamagan, open grassy place at the summit of the island. *Hosokawa 7934!* (TAI, holotype of *Sch. mariannae*).—Also Philippines.

In 1959 I saw the type of *Schoenus mariannae* at the herbarium of the National Taiwan University and was convinced that it is identical with *Sch. philippinensis*. It can be readily separated from the very similar *Sch. apogon* by the creeping base of culms rooting at nodes. This latter species is very common everywhere in tropical and subtropical Asia but has never been recorded from Micronesia. The occurrence of *Sch. philippinensis* in Alamagan gives a further example showing the link between Malaysia and western Micronesia.

Genus 12. RHYNCHOSPORA Vahl

1. Inflorescence a corymb or a compound panicle.
  2. Coarse plant about 1 m tall; leaves 1-1.5 cm wide; spikelets 7-9 mm long; achenes with subulate beak. . . . . 62. *R. corymbosa*.
  2. Slender plant about 30 cm tall; leaves canaliculate, less than 2 mm wide; spikelets about 5 mm long; achenes with conical beak. . . . . 63. *R. rugosa* ssp. *lavarum* f. *ponapensis*.
1. Inflorescence a head. . . . . 64. *R. rubra*.

**62. *Rhynchospora corymbosa*** (Linn.) Britton in Trans. N. Y. Acad. Sci. 11: 84, 1892; Safford in Contrib. U.S. National Herb. 9: 366; 1905; Merrill in Philip. Journ. Sci. 9: 62, 1914; Kükenth. in Engl., Bot. Jahrb. 59: 6, 1924; Kanehira in Journ. Fac. Agr. Kyushu Univ. 4: 280, 1935; Ohwi in Journ. Jap. Bot. 18: 136, 1942.

*Scirpus corymbosus* Linn., Cent. Pl. 2: 7, 1756.

*Rhynchospora aurea* Vahl, Enum. Pl. 2: 229, 1806; Volkens in Engl., Bot. Jahrb. 31: 458, 1902.

[Practical descr.] Ohwi in Mem. Coll. Sci. Kyoto Univ. B, 18: 17, 1944; Kükenth. in Engl., Bot. Jahrb. 74: 410, 1949. [Illustr.] Makino in Bot. Mag. Tokyo 17: 181, t. 7, f. 2 a-b, 1903.

MARIANAS: without definite locality. *McGregor 461!* (US), *Nelson 313!* (BISH); Mt. Santa Rosa, 270 m alt. *Bryan Jr.!* (BISH); 3 miles north of Sumai. *Conover s.n.!* (BISH); 1/2 mile west of Mt. Santa Rosa, *Muennink s.n.!* (US); Atangutano. *Bryan, Jr. 1065!* (BISH); Mt. Alifan, 70 m alt. *Bryan, Jr. 1206!* (BISH).

WEST CAROLINES: PALAU: Aimiriik. *Kanehira & Hatusima 4489!* (FU); Gokkep. *Takamatsu 1181!* (BISH); Babelthaob Islet. *Hosokawa 7376!* (TAI); Korror Islet. *Ledermann 14173* (B), ditto, Ngarabaket. *Tuyama s.n.!* (TI).—YAP: without definite locality. *Volkens 279* (B).

EAST CAROLINES: TRUK: without definite locality. *Kanehira 607!* (FU), *Kamiya s.n.!* (TI); Dublon Islet (= Natsu-shima). *Takamatsu 130 & 291!* (BISH); Zogeyashi-rin Islet. *Hosokawa 6486!* (BISH, TAI).—PONAPE: without definite locality. *Ledermann 15482a!* (B, BISH), *Kawagoë s.n.!* (KAG), *Kanehira 1513!* (FU); Parkir Colonia. *Hosokawa 5902!* (BISH, TAI).—Distrib. pantropic.

**63. *Rhynchospora rugosa*** (Vahl) Gale in Rhodora 46: 275, t. 835, f. 1 A-B, 1944.



ssp. *lavarum* (Gaudich.) T. Koyama, comb. nov.

*Rhynchospora lavarum* Gaudich. in Freyc., Voy. Bot. Coq. 415, 1826.

*Rhynchospora glauca* Vahl ssp. *lavarum* (Gaudich.) Kükenth. in Engl., Bot. Jahrb. 75: 150, 1950.

forma *ponapensis* (Hosokawa) T. Koyama, stat. nov. e typo.

*Rhynchospora ponapensis* Hosokawa in Trans. Nat. Hist. Soc. Formosa 25: 261, 1935; Kanehira in Journ. Fac. Agr. Kyushu Univ. 4: 432, 1935;

Ohwi in Journ. Jap. Bot. 18: 136, 1942.

Culms slender, up to 30 cm tall, with few filiform leaves. Partial inflorescence born at 2 to 4 nodes, occupying the upper 2/3 of the culm, interrupted. Spikelets corymbose but more or less congested on very short peduncle, elliptic, hardly 5 mm long, rusty-brown. Achenes obovate, 2.25 mm long including beak, the body lenticular, brownish, minutely rugulose, the beak conical, 0.75 mm long, the base 4/5 as wide as the achene body; perianth bristles 3 to 6, the longer slightly longer than the achene body. [Pl. 4; fig. F]

EAST CAROLINES: PONAPE: without definite locality. *Hatusima 11038 & 110541* (FU); Turnansapoi, in Mt. Nan-a-raut. *Hosokawa 59811* (TAI, holotype of *R. ponapensis*; BISH, isotype), Mt. Nianai, 2450 ft. alt. *Glassman 28911* (BISH), at the summit of Nanukawat. *Nakao s.n.1* (TI).—Distribution: endemic.

In 1959 at the herbarium of Bernice P. Bishop Museum I studied a rich collection of *R. lavarum* of the Hawaiian Islands and agreed with Kükenthal to treat it as a subspecies of the widespread *R. rugosa* (= *R. glauca*). Subspecies *lavarum* differs from ssp. *rugosa* in the much depauperated habit with almost spike-like inflorescences, but agrees with the latter in every floral character except for slightly more elongated perianth bristles. *R. ponapensis* from eastern Micronesia well coincides with ssp. *lavarum* in the very depauperated habit, but as it has shorter perianth bristles like those of ssp. *rugosa* it can be segregated from ssp. *lavarum* at the level of forma. Both typical ssp. *lavarum* and its forma *ponapensis* grow in small swamps on mountains, and are separable habitally from ssp. *rugosa* of tropical lowland marshes.

64. *Rhynchospora rubra* (Lour.) Makino in Bot. Mag. Tokyo 17: 180, 1903; Merrill in Philip. Journ. Sci. 9: 62, 1914; Kükenth. in Engl., Bot. Jahrb. 59: 6, 1924; Kanehira in Journ. Fac. Agr. Kyushu Univ. 4: 281, 1935; Ohwi in Journ. Jap. Bot. 18: 136, 1942.

*Schoenus ruber* Lour., Fl. Cochinch. 41, 1790.

*Rhynchospora Wallichiana* Kunth, Enum. Pl. 2: 289, 1837; Volkens in Engl., Bot. Jahrb. 31: 458, 1902.

[Practical descr.] Ohwi in Mem. Coll. Sci. Kyoto Univ. B, 18: 16, 1944; Kükenth. in Engl., Bot. Jahrb. 74: 491, 1949. [Illustr.] Makino in Bot. Mag. Tokyo 17: 180, t. 7, f. 1 A-B, 1903.

MARIANAS: GUAM: without definite locality. *McGregor 4121* (US); Mt. Tenjo. *Moore 771* (US), ditto, 320 m. alt. *Bryan, Jr. 11011* (BISH); Mt. Santa

Rosa, 270 m. alt. *Bryan, Jr. 1124!* (BISH); between Ylig and Sigua Village, 300 ft. *Steere 48!* (US); 4 km east of Agat. *Necker 118!* (US), & *120!* (BISH); south of Agat. *Fosberg 35222!* (BISH, US); south of Assan and Piti, 100 m. alt. *Anderson 87!* (BISH).

WEST CAROLINES: YAP: without definite locality. *Volkens 327!* (B, US), *Fujikawa s.n.!* (TI); Kolonia, Mt. Kabul. *Tuyama s.n.!* (TI); Mt. Matade, 160 m. alt. *Fosberg 25545!* (BISH, US); Balabat. *Takamatsu 1886!* (BISH); Tomil Islet. *Tuyama s.n.!* (TI).—PALAU: Marakar near Korrör. *Hatusima 4701!* (FU); Korrör Islet. *Kanehira & Hatusima 4694 & 4848!* (FU), *Hatusima 4701!* (FU), *Kanehira 202!* (BISH, FU); Korrör, Trop. Agr. Exp. Sta. *Hosokawa 21!* (TAI); Babelthaob Islet, Aimiriik. *Hosokawa 7238!* (TAI), *Tuyama s.n.!* (TI); Luise-Almonogui. *Hosokawa 6825!* (TAI); Ngeremetengel. *Fosberg 32495!* (BISH, US); Aulups'el Islet. *Fosberg 32367!* (BISH, US); Almonogui, near Arumaten. *Hosokawa 6778!* (BISH).—Also India, southern China, Ryukyus, southern Japan, Formosa, Malaysia and northern Australia.

Fujikawa's specimens from Yap has viviparous heads. Though this species is the commonest Asiatic beak-rush, it is completely absent from the East Carolines. This gives an idea that western Micronesia including the western Carolines and the Mariana Islands have a phytogeographical link with the Indo-Malaysian region while the eastern Carolines are more closely related to the Oceanic region as exhibited by *Rhynchospora rugosa* ssp. *lavarum* and *Machaerina*.

### Genus 13. CAREX Linn.

1. Stigmas 3; achenes and perigynia trigonous; the beak of perigynia recurved.
    2. Staminate part of spikelets longer than the pistillate part; glumes gradually tapering to cuspidate apex without any conspicuous awn. . . . . 65. *C. indica*.
    2. Staminate part of spikelets as long as or slightly shorter than the pistillate part; glumes truncate or shallowly emarginate at apex with long scabrous awn. . . . . 66. *C. fuirenoides*.
  1. Stigmas 2; achenes and perigynia lenticular; the beak of perigynia erect. . . . . 67. *C. brunnea* ssp. *Meyenii*.
65. *Carex indica* Linn., Mant. Pl. 2: 574, 1771.

'*C. fuirenoides* Gaudich.': as misapplied by Kanehira in Journ. Fac. Agr. Kyushu Univ. 4: 276, 1935; Ohwi in Journ. Jap. Bot. 18: 138, 1942. [Practical descr.] Kükenth., Cyper.-Caric. in Pflanzendr. 4 (20): 262, 1909; Nelmes in Reinwardtia 1: 271, 1951. [Illustr.] Pl. 5: fig. A of the text; Kükenth., l.c. f. 40, 1909.

WEST CAROLINES: PALAU: Kamusetsu. *Hatusima 4994!* (FU); Mt. Elsum. *Hosokawa 9252!* (BISH).—Also India, Indo-China, Malaysia, Solomon Islands, New Caledonia, Fiji and northern Australia.

For the taxonomic discussion see *C. fuirenoides*.

66. *Carex fuirenoides* Gaudich. in Freyc., Voy. Bot. Coq. 412, 1826; Safford in Contrib. U.S. National Herb. 9: 210, 1905; Kükenth. in Engl., Bot. Jahrb. 59: 10, 1925; Ohwi in Journ. Jap. Bot. 18: 138, 1942, in part!

*C. fuirenoides* Gaudich. var. *gracilis* Hosokawa in Trans. Nat. Hist. Soc. Formosa 25: 264, 1935. Syn. nov. e typo.

[Practical descr.] Kükenth., Cyper.-Caric. 287, 1909. [Illustr.] Boott, Illustr. Carex Pt. 4, t. 507, 1864; also Pl. 5: fig. B in the text.

MARIANAS: GUAM: without definite locality. *Guam Exp. Sta. Herb.* 279! (BISH, US); *Gaudichaud!* (P); Tarzan Falls, Manengon, in shade of forest, *Stone* 4751! (GUAM).

WEST CAROLINES: PALAU: Babelthaob Islet, Almonogui, Aimion. *Hosokawa* 6798! (TAI, holotype of var. *gracilis*); Mt. Luis-Almonogui. *Kanehira & Hatusima* 4937! (FU); Sin-Gaspan. *Hosokawa* 9762! (BISH); Makarakol. *Hosokawa* 9279! (BISH, TAI).—Distrib. endemic in Micronesia.

Strikingly resembling *C. indica* this Micronesian endemic differs from it in the glumes that are truncate or shallowly emarginate at the long-awned apex (Pl. 5, fig. B). Kanehira (1935) and Ohwi (1942) apparently failed to find that there are two different *Indocarices* in Micronesia. Hosokawa's determination on *Carex* sheets in the Taipei herbarium shows that he also misidentified *C. indica* with *C. fuirenoides*. In so doing he redescribed true *C. fuirenoides* as its var. *gracilis* because it is generally slightly slenderer than *C. indica*.

67. *Carex brunnea* Thunb., Fl. Jap. 38, 1784.

ssp. *Meyenii* (Nees) T. Koyama, stat. nov.

*C. Meyenii* Nees in Nova Act. Nat. Curios 19, Suppl. 1: 123, 1843.

*C. Kanehirae* Ohwi in Act. Phytotax. Geobot. 8: 67, 1939, & in Journ. Jap. Bot. 18: 138, 1942.

More or less tufted from short, decumbent rhizome. Leaves narrowly linear, 1.5–4.5 mm wide, stiffish; sheaths brown or fuscous, disintegrating into fibers. Culms slender, almost as long as leaves or slightly exceeding, 5–9-noded, 1.5 mm thick below. Inflorescence a loose panicle with several distant tufts of spikelets; bracts the lower about 2/3 as long as the total inflorescence. Spikelets 3–5-nate, on capillary peduncle, all androgynous, oblong-cylindrical, 1–2.5 (–) cm long, 2–4 mm thick. Glumes ovate, 2.5–3 mm long, rusty-brown, ovate, cuspidate at apex 2/3 to 4/5 as long as perigynium. Perigynia ovate-oblong to ovate-elliptical, 3.8–4 mm long, membranous, slenderly many-nerved, hispid on the upper part and on margins, cuneate at base, gradually tapering above to a beak 0.8–1 mm long, the orifice bidentate. Achenes obovate, lenticular, 1.5 mm long; stigmas 2, caducous.

WEST CAROLINES: PALAU: Aimirik. *Hatusima* 4979! (FU, type of *C. Kanehirae*); Ngarathmao. *Watanabe* 161! (TI).—Also Hawaiian Islands.

Examining *C. Meyenii* in Hawaii I am convinced that *C. Kanehirae* is

identical with it. As was explained by many authors this Pacific sedge is conspecific with the very variable *C. brunnea*, but is still definable as a good race by the larger glumes attaining more than 2/3 the length of the perigynia. In *C. brunnea* including many Asiatic and Malaysian races the glumes are mostly half as long as the perigynia. Subspecies *Meyenii* as reinterpreted here gives a further example showing the East Caroline and Hawaii phytogeographic link.

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### Explanation of Plates

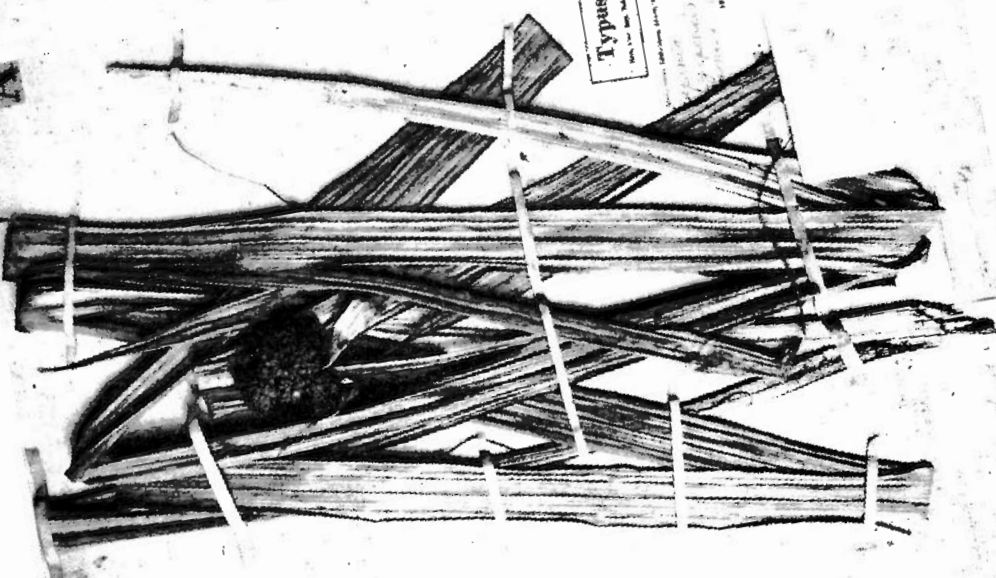
- Plate 1. *Mapania macrocephala* (Gaud.) K. Schum. ex Warb. A: holotype of *Mapania yapensis* Hosokawa. B: holotype of *Mapania palauensis* Hosokawa.
- Plate 2. A: *Fimbristylis globulosa* (Retz.) Kunth. Holotype of *Fimbristylis hyposcolea* Hosokawa. B: *Schoenus philippinensis* (Palla) Kükenth. ex Merril. Holotype of *Schoenus mariannae* Hosokawa.
- Plate 3. Achenes, prophylls, and glumes of Mapanieae. A: *Mapania pandanophylla* ssp. *pandanophylla*: achene from Palau (Hosokawa 9689, TAI). B: ssp. *immensa*: achene with squamellae from Ponape (Kanehira 1673, TI). C: *Mapania parvibractea*: achene, prophyll, and glume from Philippines (Ramos & Edano BS 28469, NY). D: *Mapania flavinux*: achene, prophyll, and glume from Palau, (Tuyama s. n., TI, type). E: *Hypolytrum nemorum* ssp. *vitiense*: achene with prophylls and glume from Yap, (Tuyama s. n., TI). F: *Hypolytrum dissitiflorum*: achenes, prophylls and glume from Caroline Is., (Koidzumi s. n., TI). G: *Mapania macrocephala*: achene from Palau (Tuyama s. n., TI). Scale in mm.
- Plate 4. Rhynchosporoideae. A: *Machaerina mariscoides* ssp. *mariscoides*: achenes from Yap (Kanehira 1236, NY). B: The same as A, from Guam (Stone 4216, DAO). C: ssp. *colpodes*: achenes from Palau, (Tuyama s. n., TI). D: *Machaerina falcata*: achene from Ponape (Hatusima 11036, FU, type of *Cladium ponapense*). E: the same from Ponape, (Takamatsu 1075, BISH). F: *Rhynchospora rugosa* ssp. *lavarum* f. *ponapensis*: achene from Ponape, (Hosokawa 5981, TAI, type of *R. ponapensis*). G: *Schoenus tendo* ssp. *achaetus*: spikelet and achene from Ponape, (Hatusima 11015, FU, type). H: *Schoenus calostachyus*: achene from Palau (Tuyama s. n., TI).
- Plate 5. A: *Carex indica* Linn. Aa: spikelet; Ab: pistillate glume; Ac: staminate glume. B: *Carex fuirenooides* Gaud. Ba: spikelet; Bb: pistillate glume; BC: staminate glume. From Palau (Hatusima 4994, FU).

**B**



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Micrographia, with which I have been supplied  
CAROLINE  
Higginz, plenaria, Jamaica  
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11

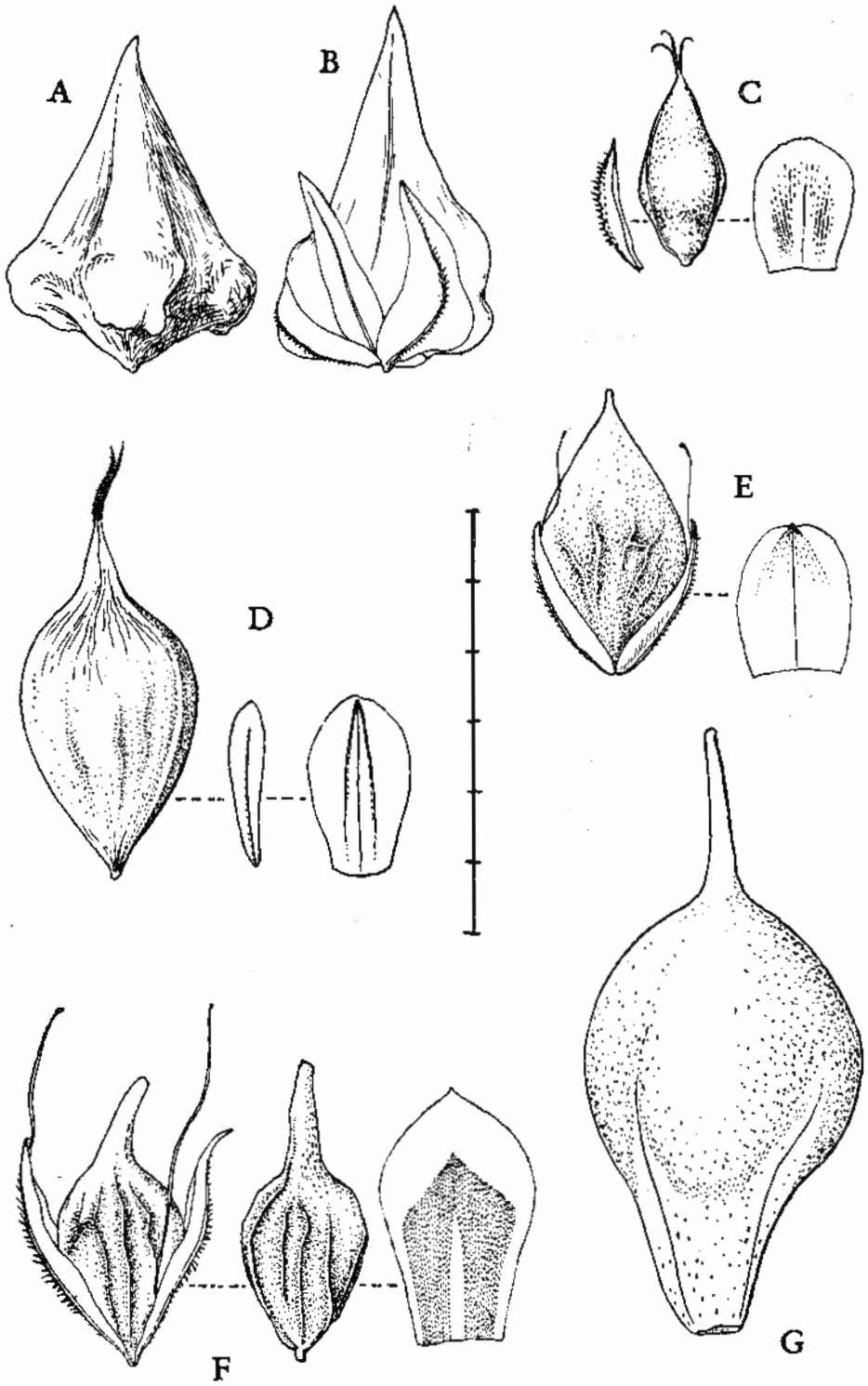
**A**



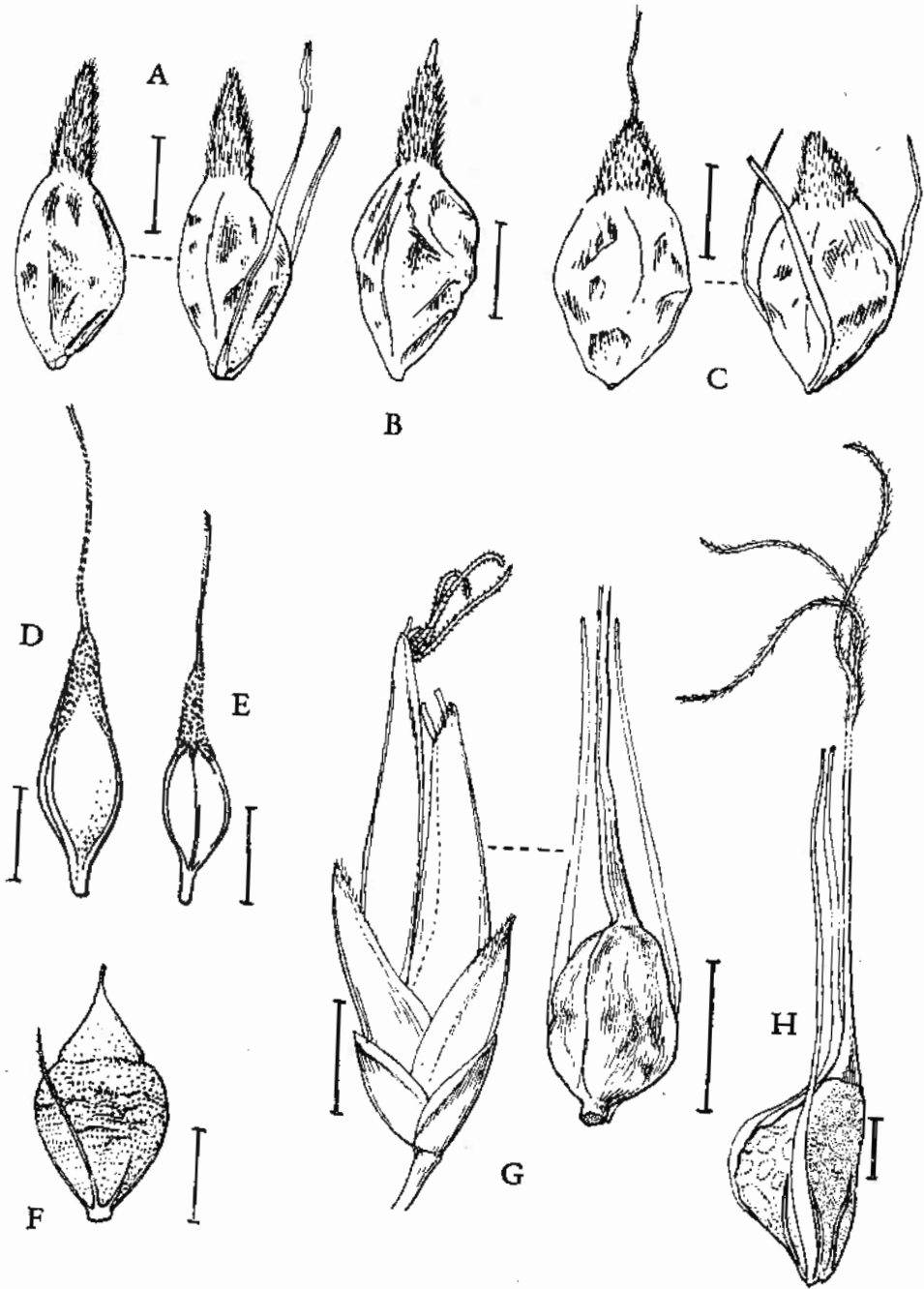
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Plate III





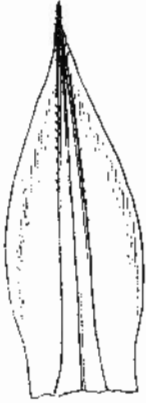




**Aa**



**Ba**



**Ab**



**Ac**



**Bb**



**Bc**