

## The Genus *Fimbristylis* (Cyperaceae) in Ceylon

TETSUO KOYAMA

The New York Botanical Garden, New York 10458, U.S.A.

Thirty two species of *Fimbristylis* (Cyperaceae) thus far documented from Ceylon are taxonomically discussed with particular emphasis on the collections of Thwaites and Trimen. In addition to the synonymy and critical citation of specimens, a key is provided to differentiate these species. *Fimbristylis tenera* is newly added to the Ceylon flora. The new combinations proposed are: *F. dichotoma* ssp. *glauca*, *F. fusca* ssp. *fulvescens*, *F. aestivalis* ssp. *major*, and *F. tenera* ssp. *oxylepis*.

Of the Cyperaceae of Ceylon *Fimbristylis* is the largest and the most critical genus particularly from the nomenclatural point of view. When Kern (1955, 1961) revised the Malaysian and related Southeast Asian members of this highly technical genus, he did not quite reach the Ceylonese species. Actually, the history of Ceylonese Cyperaceae goes back as far as to Linnaeus (1753), Retzius (1786, 1788) and Vahl (1806), who described a number of species based upon König's specimens from "India orientalis," many of which were assumingly collected in Ceylon. Thwaites (1864) added his new species from his own collections, the main part of which was left in the Ceylon National Herbarium at Peradeniya. Accordingly, the clarification of the Ceylonese species is highly significant to provide a basis for further revisions of *Fimbristylis* of India and the relevant regions of Asia. Nevertheless, to date no detailed study was attempted on *Fimbristylis* of Ceylon, perhaps because of the rather limited accessibility of the materials in the Peradeniya Herbarium.

During the two field expeditions in Ceylon (Koyama, 1970, 1974), *Fimbristylis* has received my special attention in the field, which resulted in a substantial accumulation of new collections of this interesting genus in the herbarium of The New York Botanical Garden. In the course of identifying these specimens, I have made a thorough examination of all the specimens of *Fimbristylis* housed in the Peradeniya Herbarium. The purpose of this paper is to discuss the Ceylonese species of *Fimbristylis* with a particular emphasis on the interpretation of such historical collections as Thwaites' and Trimen's.

I appreciate the assistance of Dr. F. Raymond Fosberg, who has given me this opportunity of studying the Ceylonese Cyperaceae. Messrs. T.R. Herat, R. Cooray, N. Balakrishnan and A.H.M. Jayasuria, staff members of the Smithsonian Ceylon Flora Project, certainly deserve my sincere thanks for their help in the field. The financial assistance from the Office of International Programs of the Smithsonian

Institution, which enabled me to carry out my field and herbarium work in Ceylon, is gratefully acknowledged.

**Fimbristylis** Vahl, Enum. Pl. 2: 285, 1806. Nomen conservandum.

*Iria* (L.C. Richard) R.A. Hedwig Gen. Pl. 360, 1806. — *Abildgaardia* Vahl, Enum. Pl. 2: 296, 1806. — *Echinolytrum* Desvaux, Journ. Bot. 1: 20, 1808. — *Trichelostylis* P. Beauvois in Lestib., Ess. Fam. Cyper. 40, 1819. — *Pogonostylis* Bertoloni, Fl. Ital. 1: 312, 1833. — *Miscospora* Bockeler in Flora 43: 113, 1860. — *Actinoschoenus* Bentham in Bentham & Hooker, Gen. Pl. 3: 1058, 1883.

Type species: *Fimbristylis dichotoma* (L.) Vahl. Over 200 species in tropical, subtropical and warm-temperate regions of the world, with the highest concentration of species in tropical Asia.

From Ceylon 32 species have been recognized as valid, and they are differentiated as keyed below. This total number of species, which constitutes only a little more than 10% of all, does not permit a discussion as to how to divide the sections of the genus. For the convenience sake I have inserted the sectional names, which were adopted in elsewhere (e.g., Kern, 1955; Koyama, 1961), in the appropriate places of the key.

As one thing, which I wish to make clear, I do not recognize *Actinoschoenus* as generically distinct, but regard it as congeneric to *Fimbristylis*, in which concept I fully concur with Clarke (1893) and Kern (1955). The characters of achenes of *Actinoschoenus* does not show any difference from those of *Fimbristylis*, but demonstrate a close affinity with those of *Fimbristylis* section *Abildgaardia*. This point is substantiated by the glumes, which are distichously disposed. The spikelets of *Actinoschoenus* with only one or rarely two fruit-bearing flowers indicate that they would have evolved from an *Abildgaardia*-type spikelet, in which the basal 2 to few glumes are empty and smaller than the upper flower-bearing ones. Phylogenetically *Actinoschoenus* undoubtedly forms a highly specialized offshoot arising from an *Abildgaardia*-type ancestor.

#### Key to the Ceylonese species of *Fimbristylis*

1. Achenes suborbicular, obovate, or obovate-elliptic; stigmas 3 or 2.
2. Glumes, at least the lower ones, distichously disposed; stigmas 3.
3. Spikelets several- to many-fruited; glumes falling off apart from the persistent rachilla; leaves bladed.
4. Spikelets 3–7 mm wide; achenes 2–2.5 mm long; inflorescence with 1 to 3 (rarely 4) large spikelets. (ABILDGAARDIA.)
  5. Tall plant with rigid culms 30–80 cm tall by 1–3 mm thick, and leaves 1–2.5 mm wide; inflorescences with 2 to 4 (mostly 3) spikelets, which are 1.3 to 3 cm long and straw-brown. 1. *F. triflora*.
  5. Low, slender plant with slender culms 6–40 cm tall by 0.3–0.8 mm thick, and leaves 0.5–1.2 mm wide; inflorescence mostly with a single terminal spikelet, rarely with 2 spikelets; spikelets glaucous-yellowish or yellowish-greenish. 2. *F. ovata*.
4. Spikelets 1.5–3 mm wide; achenes 0.7–1 mm long; inflorescences with many small spikelets in simple or compound corymbs (except in *F. zeylanica*, of which the

inflorescences have 1 or 2 spikelet(s) only). (FUSCAE).

6. Culms 10–70 cm tall; inflorescences with many spikelets.
7. Glumes glabrous; within a spikelet lower or most glumes distichous, upper or apical glumes spirally imbricated.
  - 7b. Leaf blades falcate 1.5–4 mm wide, flattish.
    3. *F. eragrostis*.
    - 7b. Leaf blades capillary, less than 1 mm wide, inrolled.
      13. *F. monticola*.
  7. Glumes pubescent; all the glumes within a spikelet substantially distichous.
    8. Leaf-sheaths cylindrical with rounded back; blades 1.2–2 mm wide; spikelets 2–2.5 mm wide.
      4. *F. fusca* ssp. *fulvescens*.
    8. Leaf-sheaths laterally flattened with an acute keel; blades 0.3–0.6 mm wide; spikelets 1.2–1.5 mm wide.
      5. *F. cinnamometorum*.
  6. Culms 5–10 cm tall; inflorescences with 1 or 2 spikelets.
    6. *F. zeylanica*.
3. Spikelets 1- or rarely 2-fruited; glumes falling together with the rhachilla, which is disarticulated at base; leaves reduced to bladeless sheaths. (ACTINOCCHOENUS).
  7. *F. thourarsii*.
2. Glumes spirally imbricated; stigmas 3 or 2.
9. Stigmas consistently 3; achenes triquetrous or trigonous.
  10. Leaves surrounding culm-basis bladed.
    11. Glumes acute or subacute at apex, not fimbriate on margins. (TRICHELOSTYLIS).
      12. Leaves with a ligule of a series of pubescence.
        13. Leaf blades 2–5 mm wide, the sheaths laterally flattened with an acute keel; culms 2–5 mm wide; corymbs open, compound or decompound.
          8. *F. complanata*.
        13. Leaf blades 0.5–1.5 mm wide, the sheaths not compressed, obtuse on back; culms 0.5–0.7 mm thick; corymbs simple to subcompound, subcontracted.
          9. *F. consanguinea*.
      12. Leaves without ligule.
        14. Plants rather stout with culms usually 30–100 cm tall, 1–4 mm thick; leaves 1–6 mm wide.
          15. Corymbs decompound with many spikelets; spikelets 1.3–1.5 mm wide; culms 35–120 cm tall.
            10. *F. dura*.
          15. Corymbs simple with 3 to 15 spikelets; spikelets 3–4 mm wide; culms (20–) 30–60 cm tall.
            11. *F. insignis*.
        14. Plants slender with culms 8–30 cm tall, 0.3–0.8 mm thick; leaves 0.25–1 mm (up to 3 mm in No. 12.) wide.
          16. Rhizome thick, oblique, 1–7 cm long, 3–7 mm across; leaves somewhat rosette-like, recurved, 0.5–3 mm wide.
            12. *F. falcata*.
          16. Rhizome very short or inconspicuous; leaves erect, not rosette-like, 0.25–1 mm wide.
            17. Leaves capillary about as long as the culms; achenes 0.7–0.8 mm long.
              13. *F. monticola*.
            17. Leaves filiform nearly half as long as the culms; achenes 0.5–0.6 mm long.
              14. *F. tenera*.
      11. Glumes emarginate or truncate at apex, copiously fimbriate on upper margins. (LEPTOCLADAE).
        15. *F. leptoclada*.
  10. All or upper few leaves surrounding culm-bases bladeless. (MILIACEAE).
    18. Lower leaves surrounding culm-bases bladed.
      19. Leaf-blades dorsiventral; sheaths cylindrical with rounded back; culms pentagonous.
        16. *F. quinquangularis*.

19. Leaf-blades laterally flattened, falcate; sheaths laterally flattened with acute keel; culms compressed-tetragonal. 17. *F. miliacea*.
18. All leaves bladeless; culms pentagonal. 18. *F. salbundia* ssp. *pentaptera*.
9. Stigmas 2, occasionally 3 in *F. cymosa* and *F. globulosa*.
20. Inflorescence corymbose with more than 2 rays and 5 spikelets.
21. Styles hardly flattened, glabrous, not fimbriate; stigmas sometimes 3, achenes sometimes obscurely trigonous.
22. Leaves at culm-bases many, long-bladed. (CYMOSAE).  
19. *F. cymosa* ssp. *spathacea*.
22. Leaves at culm-bases few, bladeless. (MILIACEAE). 20. *F. umbellaris*.
21. Styles dorsiventrally flattened, fimbriate or long-ciliate at least on upper part.
23. Leaves with a ligule, usually of a fringe of dense pubescence.
24. Glumes pubescent. (DICHELOSTYLIS).  
25. Spikelets rusty-brown; leaf-blades elongated, more than 10 cm long; lowest bract surpassing the corymb; annual without rhizome. 21. *F. pubisquamata*.
25. Spikelets grayish-brown; leaf-blades very short, usually less than 5 cm long; lowest bract shorter than the corymb; perennial with decumbent rhizome. 22. *F. ferruginea*.
24. Glumes glabrous. (FIMBRISTYLIS).  
26. Spikelets 2-4 mm wide; glumes usually with 2 to 4 lateral nerves. 23. *F. dichotoma*.
26. Spikelets 1.2-1.8 mm wide; glumes usually without distinct lateral nerves. 24. *F. bisumbellata*.
23. Leaves without a ligule.  
27. Spikelets 2-3 mm wide; achenes strongly trabeculate.  
23c. *F. dichotoma* ssp. *glauca*.
27. Spikelets 1-1.5 mm wide; achenes faintly cancellated or nearly smooth. (POGONOSTYLIS). 25. *F. aestivalis*.
20. Inflorescences head-like or consisting of 1 to 4 solitary spikelets only.
28. Inflorescences head-like with many spikelets; style glabrous. (POGONOSTYLIS). 26. *F. argentea*.
28. Inflorescences with 1 to 4 solitary spikelets; styles fimbriate except in *F. acuminata*. (NUTANTES).  
29. Inflorescences with 1 to 4 spikelets; leaf blades well elongated.  
27. *F. schoenoides*.
29. Inflorescences consistently with a single spikelet; leaves usually bladeless or nearly so.
30. Spikelet erect.  
31. Spikelet obtuse at apex; leaf blades occasionally remaining as a setaceous appendage of sheath. 28. *F. polytrichoides*.
31. Spikelet acute at apex; leaf blades always none.  
29. *F. acuminata*.
30. Spikelet obliquely patent. 30. *F. nutans*.
1. Achenes oblong-cylindrical; stigmas 2.
32. Inflorescence corymbose with few to several small spikelets; spikelets squarrose, 3-6 mm long; leaves with slenderly linear blade. (DIPSACEAE). 31. *F. dipsacea*.
32. Inflorescence of a single, terminal spikelet; spikelet 5-12 mm long; leaves reduced to bladeless sheaths. (MISCHOSPORAE). 32. *F. tetragona*.

1. ***Fimbristylis triflora*** (L.) K. Schumann ex Engler, Abhandl. Preuss. Akad. Wiss. 14, 1894; Alston in Trimen & Hook. f., Handb. Fl. Ceylon 6: 309, 1931.

*Cyperus triflorus* L., Mantissa Pl. Pars. alt. 180, 1771. Type from "India orientalis," König.

*Schoenus cyperoides* Retizius, Obs. Bot. 4, 8, 1789. Type from India.

*Abildgaardia tristachya* Vahl, Enum. Pl. 2: 297, 1806; Nees in Wight, Contrib. Bot. India 95, 1834; Thwaites, Enum. Pl. Zeyl. 347, 1864. A new name for *Cyperus triflorus* L. and *Schoenus cyperoides* Retz., hence superfluous and illegitimate.

*Fimbristylis tristachya* (Vahl) Thwaites, Enum. Pl. Zeyl. 434, 1864; Trimen & Hook. f., Handb. Fl. Ceylon 5: 59, 1900. Not of R. Brown, 1810, nor of Nees, 1834.

*Abildgaardia triflora* (L.) Abeywickrama in Ceylon Journ. Sci., Biol., 2: 135, 1959. Invalid combination.

Distribution: Tropical Africa, Madagascar, southern India, Ceylon. Rather tall perennial frequently growing in large colonies in saline swamps and around brackish ponds near sea-shore.

Specimens examined. Jaffna District: Jaffna, *Thwaites CP 852*, ex p., Sept. 1862 (PDA\*), *Trimen*, Feb. 1890 (PDA). Anuradhapura District: Wilpattu National Park, Kakkare Villu, *T. Koyama & Herat, 13317* (NY, PDA, US); Wilpattu National Park, between Kumbuk Wila and Kakkare Villu, *T. Koyama & Jayasuria 13947* (NY, PDA, US). Puttalam District: between Puttalam and Palay, east shore of Puttalam Lagoon, *T. Koyama et al., 13910* (NY, PDA, US); Chilaw, *Trimen s.n.*, Jan 1881 (PDA); Puttalam, *Silva s.n.*, July 1883 (PDA); Kalpitiya, *Gardner* in 1846 (PDA). Mannar District: Thalai Mannar, *Silva s.n.*, July 1916 (PDA). Trincomalee District: Trincomalee, *Glenie CP 852*, ex p. (PDA); Sober Island, *Glenie CP 852*, ex p. (PDA). Batticaloa District: Kalkudah Bay, 16 miles N of Batticaloa, *Mueller-Dombois*, 20 Apr. 1968 (PDA, US). Amparai District: Tandiadhi Kalapu Lagoon, S of Mile 215 on Road A-4, *T. Koyama et al. 14012* (NY, PDA, US). Hambantota District: Ruhuna National Park, *Comanor 669* (PDA, US).

A distinct species readily recognizable by its remarkably large spikelets as much as 3 cm long and bearing irregularly distichous grayish-brown glumes. In Ceylonese plants the simple corymbs bear 2 to 4, mostly 3, spikelets, while the African plants the corymbs often become partially subcompound with up to 6 spikelets.

## 2. *Fimbristylis ovata* (Burman f.) Kern in Blumea 15: 126, 1967.

*Carex ovata* Burman f., Fl. Ind. 194, 1768. Type from Java.

*Cyperus monostachyos* L., Mantis Pl. Pars alt. 180, 1771. Type from "India orientalis," *König*.

*Abildgaardia monostachyos* (L.) Vahl, Enum. Pl. 2, 296, 1806; Thwaites, Enum. Pl. Zeyl. 347, 1868.

*Fimbristylis monostachyos* (L.) Hasskarl, Pl. Jav. Rar. 61, 1848; Thwaites, Enum. Pl. Zeyl. 434, 1868; C.B. Clarke in Hook. f., Fl. Brit. Ind. 6: 649, 1893; Trimen & Hook. f., Handb. Fl. Ceylon 5: 59, 1900.

*Iriha monostachyos* (L.) O. Kuntze, Rev. Gen. Pl. 2: 1751, 1891.

Distribution: Tropical and subtropical regions of both hemispheres. In eastern Asia the range of this species extends northwards into warm-temperate region as far as to central Japan. Wet grasslands; rather often found on grassy patches on rocky sea coast.

\*) Abbreviations of herbaria follow Index Herbariorum, ed. 4. Utrecht, 1964.

Specimens examined. Anuradhapura District: between Ratmale and Talawa, ca. 7 miles SW of Anuradhapura, *T. Koyama 13607* (NY); Wilpattu National Park, 2.5 miles S of Maduru Odai, 3 miles S of Marai Villu, *Fosberg et al. 50841* (US). Mannar District: Aruvi Aru, Mile 125 on Road A-14, *T. Koyama et al. 13933* (NY, PDA, US). Polonnaruwa District: Polonnaruwa, ca. 5 km SE of the rest house, by the Polonnaruwa Tank, *T. Koyama et al. 13570* (NY, PDA, US). Trincomalee District: Teincomalee, *Trimen CP 3231* (K, PDA). Kandy District: Maha Oya Estate, *Alston 307* (PDA). Kurunegala District: Kuliyakitiya, *Amaratunga 997* (PDA). Colombo District: Negombo, *Simpson 7908* (PDA). Hambantota District: Tissamaharama, *Trimen CP 3231* ex p. (PDA); Hambantota, *Alston 1183* (PDA); Ruhuna National Park: Opposite Karangaswela, *Mueller-Dombois & Cooray*, Dec. 1963 (PDA); Uraniyawala, about 1 mile W of Buttawa, *Fosberg et al. 51013* (NY, PDA, US); 2 miles E of Veddeangewadiya, N of Kataragama, *Wirawan 653* (PDA); Kohombagaswala, *Cooray*, Nov. 1969 (NY, PDA).

3. ***Fimbristylis eragrostis*** (Nees & Meyen) Hance in Journ. Linn. Soc., Bot., 13: 132, 1873.

*Abildgaardia eragrostis* Nees & Meyen ex Nees in Wight, Contrib. Bot. India 95, 1834.

Type: China, *Meyen*.

*Fimbristylis nigro-brunnea* Thwaites, Enum. Pl. Zeyl. 434, 1864; C.B. Clarke in Hook. f., Fl. Brit. India 6: 648, 1893; Trimén & Hook. f., Handb. Fl. Ceylon 5: 62, 1900. Syn nov. Type: Ceylon, Matelle East, *Brodie CP 3779*.

Distribution: India, Ceylon, Indo-China, southern China. Open grassy slopes on mountains up to 1,800 m in Ceylon, and also on stable sandy grounds of coastal forest openings.

Specimens examined. Anuradhapura District: Wilpattu National Park: Kakkare Vilu, 192 m alt., *T. Koyama 13312* (NY), between Kokkare Villu and Kumbuk, Wila, *T. Koyama & Jayasuria 13948* (NY, PDA, US); 1/4 miles SSE of Maradan Maduwa, *Fosberg et al. 50727* (US). Matale District: Lakgala, *Brodie CP 3779* (K, PDA). Kandy District: Peradeniya, Hantana Road, *Müller-Dombois Oct. 1967* (PDA, US); between Pusselawa and Ramboda, along Nuwara-Eliya Rd. above Mile 32/8, ca. 1000 m alt., *T. Koyama & Herat 13611* (NY, PDA, US). Nuwara Eliya District: Hakgala, *Müller-Dombois Mar. 1968* (PDA, US); Welimada, *Müller-Dombois Sept. 1967* (PDA, US); between Ramboda and Nuwara Eliya, *Comamor 332* (US). Badulla District: Diyatalawa, *Müller-Dombois*, Sept. 1967 (PDA, US). Kurunegala District: Naram-mala, *Amaratunga 1275* (PDA). Batticaloa District: Uva, *Dupuis s.n.*, Feb. 1903 (PDA). Monaragala District: Mullegama, *Lazarides 7258* (PDA, US). Galle District: Hiniduma, *Lazarides 7346* (PDA, US). Hambantota District: Ruhuna National Park: Buttawa Flat, *Müller-Dombois*, Mar. 1968 (NY, PDA); Uraniyawala, ca. 1 mile W of Buttawa, *Fosberg et al. 51013* (NY, US).

Comparing *Fimbristylis nigro-brunnea* from Ceylon with *F. eragrostis* from southern China I have failed to see any taxonomic difference between them. In general, the specimens from Ceylon tend to bear the spikelets of comparatively darker brown than in the plants from China. This species, which normally grows in hard soil of grassy openings on mountain slopes, occurs in Ceylon also in stable sands of the coastal forest openings in the National Parks of Wilpattu and Ruhuna. These localities, which are nearly at the sea level, mark the lowest altitudinal record of the range of *F. eragrostis*.

4. ***Fimbristylis fusca*** (Nees) C.B. Clarke in Hook. f., Fl. Brit. Ind. 6: 649, 1893.

*Abildgaardia fusca* Nees in Wight, Contrib. Bot. India 95, 1834. Type from Nepal, *Wallich*.

Distribution: Indian Himalaya, southern and southwestern China, Formosa, Malay, the Ryukyus and southern Korea.

In Ceylon this species is represented by the following subspecies:

Subsp. **fulvescens** (Thwaites) T. Koyama, stat. nov.

*Abildgaardia fulvescens* Thwaites, Enum. Pl. Zeyl. 347, 1864. Type: Ceylon, Raigam Corle (=Raigam Korale), *Thwaites CP 679*, ex pte.

*Fimbristylis fulvescens* (Thwaites) Thwaites, Enum. Pl. Zeyl. 434, 1864; Trimen & Hook. f., Handb. Fl. Ceylon 5: 62, 1900.

Distribution: Endemic to Ceylon, rather uncommon. Wet grassy hillsides, often growing in shallow soil on stream banks sheltered by scrubby forests.

Specimens examined. Matale District: Matale: *Thwaites CP 679* ex p. (PDA). Kandy District: Hantana, *Thwaites CP 679* ex p., Aug. 1862 (PDA). Nuwara Eliya District: [No locality noted] in Patana grassland, *Simpson 8657* (PDA). Kurunegala District: Doluwa Kande, *Trimen CP 679* ex p., Dec. 1883 (PDA). Kegalle District: Alapalawala, along river Watura Oya, ca. 500 m alt., *T. Koyama 13554* (NY, PDA, US). Ratnapura District: Raigam Korale, *Thwaites CP 679* ex p. (K, PDA).

Trimen and Hooker fil. (1900) are of opinion that *Fimbristylis fulvescens* differs from *F. fusca* "in the broader spikelets with longer pedicels and glabrous glumes," and consequently, they regarded it as specifically distinct from the latter. Results of my comparison between *F. fulvescens* and good series of specimens of *F. fusca* from China and India do not support these points for segregation, except for the slightly narrower spikelets in continental *F. fusca*. Further, Trimen and Hooker fil. are not correct in saying that the spikelets of *F. fulvescens* are glabrous, because they are always pubescent as far as I have examined the specimens cited above, and as a matter of fact I have observed even that some of Ceylonese specimens possess slightly more densely pubescent glumes than in *F. fusca*. The only valid difference noted by me concerns the leaves, which are relatively longer and broader in *F. fulvescens* than in *F. fusca*, i.e., in the former leaf blades are 1/4 to 1/2 as long as the culms and attain the width of 2 mm, while in *F. fusca* its shorter leaves, which generally do not exceed 1/4 the height of the culms, very seldom exceed 1.5 mm in width. The two species are otherwise alike, showing a good coincidence in the details of glumes and achenes. As such I propose to relegate *F. fulvescens* to a subspecific status under *F. fusca*.

5. **Fimbristylis cinnamometorum** (Vahl) Kunth, Enum. Pl. 2: 229, 1837; Trimen & Hook. f., Handb. Fl. Ceylon 5: 61, 1900; Kern in Blumea 8: 123, 1955.

*Scirpus cinnamometorum* Vahl, Enum. Pl. 2: 278, 1806. Type: Ceylon, "habitat in cinnamometis Zeylonae," König.

*Fimbristylis cyperoides* R. Brown, Prodr. Fl. Nov. Holl. 228, 1810; C.B. Clarke in Hook. f., Fl. Brit. India 6: 650, 1893. Type from northern Australia.

*Abildgaardia cinnamometorum* (Vahl) Thwaites, Enum. Pl. Zeyl. 347, 1864. Excluding synonym, *F. fusca* Nees.

*Fimbristylis cyperoides* R. Brown var. *cinnamometorum* (Vahl) C.B. Clarke in Hook. f., Fl. Brit. India 6: 650, 1893.

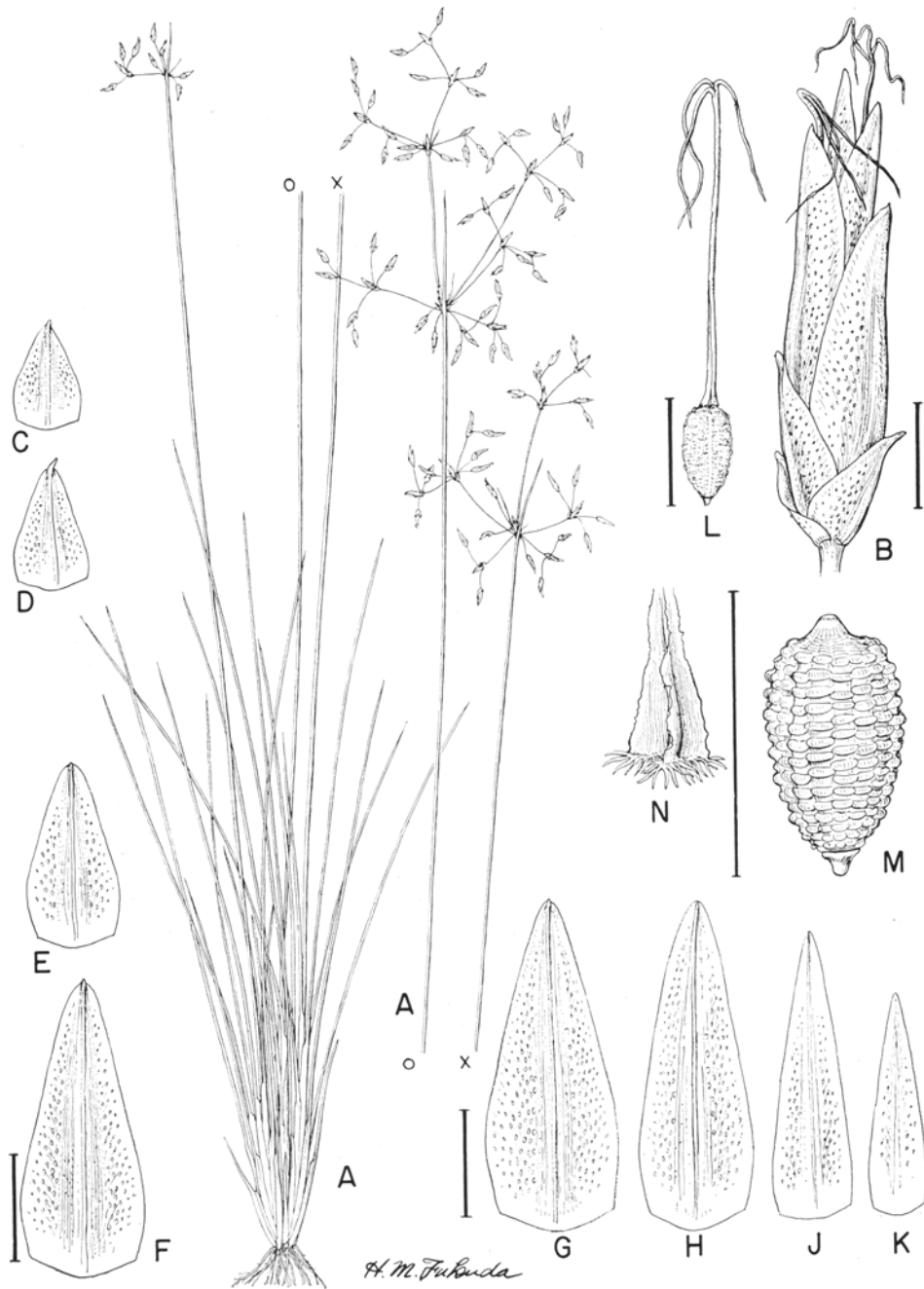


Fig. 1. *Fimbristylis cinnamometorum* from Wilpattu, T. Koyama & Jayasuria 13968 (NY). A: total plant; B: spikelet; C-K: glumes, from the lowest (C) to the uppermost (K); L: fruiting pistil; M: achene; N: style-base. Scales=1 mm. Drawn by Haruto Fukuda.



Distribution: Ceylon Burma, Thailand, Sumatra, Phillipines, New Guinea, northern Australia. Wet places at low altitudes.

Specimens examined. Ceylon, [without details] *Thwaites CP 2752* (K, NY, PDA), *Wight 2032* (NY). Anuradhapura District, Wilpattu National Park: between Kumbuk Wila and Kokkare Villu, *T. Koyama & Jayasuria 13946* (NY, PDA, US); Kakkare Villu, 192 m alt., *T. Koyama 13313* (NY); Maradan Maduwa, *Fosberg et al. 50726* (NY, US); between Kokkare Villu and Palukolawela, 200 m alt., *T. Koyama & Jayasuria 13968* (NY, PDA, US). Matale District: Meegahatenne, 2 miles S of Moragalla, *Ballard 1514* (K, NY); Dambula, *Alston 2409* (PDA). Nuware Eliya District: Hewaheta, *Thwaites CP 2752*, ex p. (PDA); Ramboda, *Thwaites CP 2752*, ex p. (PDA); Uva Province, 4000 ft. alt., *Dupuis s.n.*, Feb. 1903 (PDA). Ratnapura District: Ratnapura, *Thwaites CP 2752*, ex p. (PDA); Kuruwita, *Trimen s.n.*, June 1895 (PDA). Kalutara District: Kalutara, *Thwaites CP 2752*, ex p. (PDA). Colombo District: Maturajawela, *Amaratunga 379* (PDA). Galle District: Batapola, *Simpson 8621* (PDA). Matara District: Morawaka, 60 ft. alt., [Collector not noted], 28 Jan. 1905. (PDA).

C.B. Clarke (1893) separated *F. cinnamometorum* from Australian *F. cyperoides* in the annual habit against the perennial habit with a "very short rhizome" in the latter. In Ceylon, this species is as a rule short-lived perennial with a short rhizome, but may become annual especially on unstable sandy ground, where the water level fluctuates rather remarkably.

6. ***Fimbristylis zeylanica*** T. Koyama in Bot. Mag. Tokyo 83: 188, f. 2, 1970.

Type: Ceylon, Wilpattu National Park, *T. Koyama 13310*.

Distribution: Thus far known only from Ceylon by the collections cited below. Rare in wet sandy shore of ponds.

Specimens examined. Anuradhapura District, Wilpattu National Park: Kakkare Villu, 192 m alt., *T. Koyama 13310* (NY), Timpiri Wila, *T. Koyama 13942* (NY).

For an illustration see T. Koyama (1970). A distinct species with annual habit; its low capillary culms are few-leaved at the base, and bear only 1 to 3 flattened spikelets.

As was remarked under the original description, the close taxonomic affinity of this species can be seen only in *F. bahiensis* of Brazilian Bahia. The latter clearly differs from *F. zeylanica* both in the bladeless leaves and glabrous styles.

7. ***Fimbristylis thouarsii*** (Kunth) Merrill, Enum. Philip. Flow. Pl. 1: 127, 1923.

*Arthrostylis thouarsii* Kunth, Enum. Pl. 2: 284, 1837. Type from Mauritius.

*Arthrostylis filiformis* Thwaites, Enum. Pl. Zeyl. 352, 1864. Type: Ceylon, Carawitta Kanda, near Ratnapura, *Thwaites CP 3469*, ex pte. (BM, lectotype chosen here; isolectotypes in K and PDA); Dolosbage District, *Thwaites CP 3469* (K, PDA, part of syntype).

*Actinoschoenus filiformis* (Thwaites) Benth in Hooker, Icon. Pl. 14: 33, t. 1346, 1881; Trimen & Hook. f., Handb. Fl. Ceylon 5: 82, 1900.

*Fimbristylis actinoschoenus* C.B. Clarke in Hook. f., Fl. Brit. India 6: 650, 1893. A new name for *Arthrostylis filiformis* Thw., not *Fimbristylis filiformis* Kunth, 1837.

Distribution: Mauritius, India, Ceylon, Malesia. Rare in forests on low hills.

Specimens examined. Kandy District: Rangala, *Alston 274* (NY, PDA); between Rangala

and Looloowatte, off road from marker 23/5, ca. 1300 m alt., *Grube 227* (PDA, US); Summit of Rangala Ridge, *Trimen s.n.*, Sept. 1888 (PDA); Ambagamuwa, *Thwaites CP 3469*, ex p. (PDA). Ratnapura District: Karawita Kanda, *Thwaites CP 3469* ex p. (BM, K, PDA); Ellaboda Kanda, *Lewis & Silva s.n.* Mar. 1919 (PDA); Kegalle District: Ruwanwella, *Ferguson s.n.*, Nov. 1883 (PDA). Colombo District: Labugama, *Trimen s.n.*, Jan. 1885 (PDA).

The Ceylonese specimens have shown a good match to the Mauritius specimens. In Ceylonese plants most spikelets are consisting of four glumes, of which the uppermost one is the largest and bears a hermaphrodite flower. In some spikelets, a much reduced, linear-oblong glume remains above the flower as the fifth glume of the spikelet. Each spikelet is subtended by a small, ovate prophyll, which is conspicuously 2-keeled.

8. ***Fimbristylis complanata*** (Retzius) Link, Hort. Berol. Descript. 1: 292, 1827; Thwaites, Enum. Pl. Zeyl. 349, 1864; C.B. Clarke in Hook. f., Fl. Brit. India 6: 646, 1894; Trimen & Hook. f., Handb. Fl. Ceylon 5: 63, 1900.

*Scirpus complanatus* Retzius, Obs. Bot. 5, 14, 1791; Roxburgh, Fl. Ind. ed 1, 1: 228, 1820. Type from India.

*Trichelostylis complanata* (Retzius) Nees in Wight, Contrib. Bot. India 103, 1834.

*Fimbristylis autumnalis* Römer & Schultes var. *complanata* (Retzius) Kükenthal in Bot. Jahrb. 59: 50, 1924.

Distribution: pantropic; the range extending northwards in eastern Asia as far as to Japan. Wet open grasslands at low altitudes; occasionally found also in and around cultivated fields.

Specimens examined. Anuradhapura District: ca. 8 miles E of Habarane, *T. Koyama & Herat 13569* (NY, PDA, US). Matale District: Matale, *Thwaites CP 3220*, ex pte. (PDA). Kandy District: Ambagamuwa, *Thwaites CP 3220*, ex pte. (K, PDA). Ratnapura District: Kuruwita, *Trimen s.n.*, June 1895 (PDA).

This rather common species is not well documented from Ceylon. So far as I have examined the specimens, Ceylonese plants possess well developed stolons and rather broad leaf blades.

9. ***Fimbristylis consanguinea*** Kunth, Enum. Pl. 2: 228, 1837. Type: Africa, Cape of Good Hope, *Drège*.

*Fimbristylis connectens* Thwaites, Enum. Pl. Zeyl. 349 & 433, 1864. Type: Ceylon, Maturatta, *Thwaites CP 2967*, ex pte. (K, holotype; PDA, isotype).

*Fimbristylis kraussiana* Hochstetter ex Krauss in Flora 28: 757, 1845. Invalid name published as a synonym; Trimen & Hook. f., Handb. Fl. Ceylon 5: 63, 1900.

*Fimbristylis complanata* Link var. *kraussiana* C.B. Clarke in Hook. f., Fl. Brit. India 6: 646, 1893. Based on *F. kraussiana* Hochst. ex Krauss.

Distribution: South Africa, Madagascar, southern peninsular India, Ceylon, Java. Wet grasslands at rather high altitudes. In Ceylon locally abundant in wet "Patana" grasslands at altitudes between 1800 to 2500 m.

Specimens examined. Nuwara Eliya District: Maturata, *Thwaites CP 2967* ex p., *960* ex p. & *963* ex p. (K, PDA); Nuwara Eliya, *Thwaites CP 2967* ex p. (PDA); Mausakelle, *Ferguson*,

*s.n.* (PDA); Horton Plains: Ohiya Entrance, ca. 7100 ft. alt., *T. Koyama 13630* (NY, PDA, US); Pattipola Exit, along Pattipola Rd., 7100 ft., *T. Koyama & Mueller-Dombois 13302* (NY, PDA, US), *T. Koyama 13639* (NY), *T. Koyama & Herat 13643* (NY, PDA, US), *T. Koyama & Fosberg 13525* (NY, US); 1/4 mile from Far Inn, 7200 ft., *T. Koyama 13626* (NY); along approach from Pattipola, *Jayasuria & Wheeler 176* (PDA); Elk Plains, between Nuwara Eliya and Kande Ela, *Mueller-Dombois*, 18 May 1968 (PDA, US).

In comparison with South African specimens the plants from Ceylon tend to have shorter leaves, slightly more reduced umbels with darker spikelets. Yet, the plants from these remotely separated areas amazingly well match to each other.

This species considerably resembles a small form of *F. complanata* such as forma *exalata*, which is often seen in the northern part of its range. The cylindrical leaf sheaths with rounded back in *F. consanguinea*, however, separate it from *F. complanata*, in which the two-ranked sheaths are folded with an acute keel on the back.

10. **Fimbristylis dura** (Zollinger & Moritz) Merrill in Philip. Journ. Sci., Bot., **11**: 53, 1916; Alston in Trimen & Hook. f., Handb. Fl. Ceylon **6**: 390, 1930.

*Isolepis dura* Zollinger & Moritz ex Moritz, Syst. Verz. Zollinger Java Pfl. 97, 1846.

Type: Java, prope Tjikoya, *Zollinger 334 & 336*.

*Fimbristylis asperrima* Bockeler in Linnaea **37**: 40, 1871; C.B. Clarke in Hook. f., Fl. Brit. India **6**: 643, 1893; Trimen & Hook., f., Handb. Fl. Ceylon **5**: 58, 1900.

Type: India, M. Khasia, 4000 ped., *Hooker & Thomson* (K, lectotype chosen here); Ceylon *Thwaites CP 837* ex pte. (K, PDA, part of syntype); Malacca, *Griffith* (K, part of syntype).

*Trichelostylis asperrima* Nees ex Bockeler in Linnaea **37**: 41, 1871. Illegitimate name published as a synonym.

'*Fimbristylis chaetorrhiza* Kunth,' sensu Thwaites, Enum. Pl. Zeyl. 349, 1864. Concerning *Thwaites CP 837*, ex pte.

Distribution: from India and Ceylon through Indo-China eastwards to Java and Borneo. Grassy places sheltered by loose woods; uncommon in Ceylon.

Specimens examined. Anuradhapura District: Retigala Hill, *Willis s.n.*, Mar. 1905 (PDA). Kandy District: Peradeniya, *Thwaites CP 837*, ex pte. (K, PDA); Kandy, *Alston 310* (PDA). Kegalle District: Alapalawala, along River Watura Oya, ca. 500 m alt., *T. Koyama 13556* (NY). Galle District: Kottewa Forest Reserve, *Alston s.n.*, Aug. 1926 (PDA).

The small individuals of this species resemble the well-grown ones of *F. complanata*, but the former can be readily distinguishable from the latter by the longer bracts, which surpass the more copiously spicigerous corymb, and by the leaf sheaths that are round on the back. In *F. complanata* the bracts are always shorter than the subax corymb, and the two-ranked leaf sheaths are folded with an acute keel on the back. Furthermore, in *F. dura* the leaves have gotten no ligule at all, while the leaves of *F. complanata* possess a ligule of a series of short, whitish pubescence.

11. **Fimbristylis insignis** Thwaites, Enum. Pl. Zeyl. 349 & 433, 1864; C.B. Clarke in Hook. f., Fl. Brit. India **6**: 645, 1893; Trimen & Hook. f., Handb. Fl. Ceylon

5: 57, 1900. Type: Ceylon, between Negombo and Kornegalle, *Thwaites CP 3317*, ex pte.

*Fimbristylis thwaitesii* Böckeler in *Linnaea* **37**: 34, 1871. A superfluous name for *F. insignis* Thw.

Distribution: Ceylon, Thailand, Indo-China, southern China, Malesia. Wet places; rare in low countries.

Specimens examined. Colombo District: Colombo, *Ferguson* in 1884 (PDA); between Negombo and Kornegalle, *Thwaites CP 3317*, ex p. (K, PDA). Kalutara District: Pasdum Korale, *Trimen CP 3317*, ex p. (PDA). Galle District: Baddegama, [no collector cited] 4 Jan. 1927 (PDA). Hambantota District: Tissamaharama, *Alston 1182* (PDA).

12. *Fimbristylis falcata* (Vahl) Kunth, Enum. Pl. **2**: 239, 1837; Alston in *Trimen & Hook. f.*, Handb. Fl. Ceylon **6**: 310, 1931.

*Scirpus falcatus* Vahl, Enum. Pl. **2**: 275, 1806. Type from "India orientalis," König. *Trichelostylis torta* Nees in Wight, Contrib. Bot. India 105, 1834. Type from "Peninsula Indiae orientalis," *Wight Cat. No.* 1885.

*Trichelostylis chaetorrhiza* Nees in Wight, Contrib. Bot. Ind. 105, 1834. Type: "Peninsula Indiae orientalis," *wight Cat. No.* 1885.

*Trichelostylis latifolia* Nees in Wight, Contrib. Bot. India 106, 1834. Type from "Peninsula Indiae orientalis" Madras, *Wight, Cat. No.* 1887.

*Trichelostylis junciformis* Nees in Wight, Contrib. Bot. India 106, 1834. Type: Nepal, as ripas Irawaddi fluminis, *Wallich Cat. No.* 3520A, ex pte.

*Fimbristylis junciformis* (Nees) Kunth, Enum. Pl. **2**: 239, 1837; C.B. Clarke in *Hook. f.*, Fl. Brit. India **6**: 647, 1893; *Trimen & Hook. f.*, Handb. Fl. Ceylon **5**: 64, 1900.

*Fimbristylis latifolia* (Nees) Kunth, Enum. Pl. **2**: 239, 1837.

*Fimbristylis chaetorrhiza* (Nees) Kunth, Enum. Pl. **2**: 240, 1837; *Thwaites*, Enum. Pl. Zeyl. 349, 1864.

*Fimbristylis abbreviata* Böckeler in *Flora* **41**: 601, 1858. Type from "India orientalis," ex Herb. *Wallich*.

*Fimbristylis junciformis* Kunth var. *abbreviata* (Böckeler) C.B. Clarke in *Hook. f.*, Fl. Brit. India **6**: 648, 1893.

*Fimbristylis junciformis* Kunth var.; *latifolia* (Nees) C.B. Clarke in *Hook. f.*, l.c. 648, 1893.

Distribution: Pakistan, India, Nepal, Thailand, Indo-China, Malesia. Open grasslands.

Specimens examined. Ceylon, [without data] *Trimen s.n.* (PDA). Anuradhapura District: Wilpattu National Park, Kuda Patessa, *Wirawan et al.* 1037 (NY, PDA). Kandy District: Peradeniya, *Thwaites CP 970* (K, PDA). Amparai District: Gal Oya Reservoir, *Comanor 571* (NY, PDA, US). Hambantota District, Ruhuna National Park: 2 miles E of Vaddangewadiya, N of Kataragama, *Wirawan 654* (PDA); Uraniya, *Cooray & Balakrishnan*, Jan. 1969 (NY); Buttawa Plain, *Cooray*, Jan. 1969 (NY); Gonalabbe, *Cooray*, Nov. 1969 (NY, PDA).

C.B. Clarke identified Ceylonese plants as either var. *abbreviata* or var. *latifolia*, both of which, according to him, possess mostly solitary spikelets, and var. *latifolia* with short, flat, curved leaves. It is true that in Ceylonese plants spikelets are more frequently solitary, and the glumes are slightly more pubescent than in Indian plants, in which spikelets are generally clustered in 2 to 5, and the glumes tend to be glabrescent. But, after examining ample collections from Indian subcontinent, I have failed to draw a borderline between Ceylonese and Indian plants. A Ceylonese specimen, *Comanor 571* from Gal Oya, for instance, bears glabrescent spikelets, which are clustered in 3 to 5, and thus, this perfectly coincides with typical Indian form. From Pakistan, I have seen a series of plants, in which spikelets are solitary; their glumes are, however, either pubescent or glabrescent.

13. **Fimbristylis monticola** Hochstetter ex Steudel, Synops. Pl. Glumac. 2: 111, 1855; C.B. Clarke in Hook, f., Fl. Brit. India 6: 642, 1893; Trimen & Hook. f., Handb. Fl. Ceylon 5: 60, 1900. Type: India, Nilagiri Mts., *Hochenacker 940*.

*Fimbristylis tenuifolia* Thwaites, Enum. Pl. Zeyl. 434, 1864. Type: Ceylon: Ambagamuwa District: *Thwaites CP 3780*.

Distribution: confined to Ceylon and southern peninsular India. Rather rare on shady hillsides.

Specimens examined. Matale District: 33/7 Midlands, 1200 m alt., *Tirvengadam et al. 12a* (PDA). Kandy District: Ambagamuwa, *Thwaites CP 3780*, ex p. (K, PDA); Kallebokka, *Thwaites CP 3780*, ex p. (K, PDA). Nuwra Eliya District: Ramboda, *Thwaites CP 851*, ex p. (PDA).

In the Peradeniya Herbarium one of the sheets marked as *Thwaites CP 851* is a mixture of *F. monticola* and *Bulbostylis densa*. Indeed this species superficially resembles *B. densa* in the shape of corymbs and capillary vegetative parts, but it is readily separable from the latter in the partially two-ranked glumes and the styles, which fall off with their pyramidal base. *Fimbristylis monticola* exhibits a rather small range, which is discontinuous between Ceylon and southern India. This pattern of distribution is seen in *Carex leucantha* and *C. lindleyana*.

In some Ceylonese specimens, including *Thwaites CP 3780* (in part), the floral glumes occupying the most part of a spikelet are distichously disposed, while in other Ceylonese specimens and in a few specimens from India that I have examined so far, the glumes are spirally imbricated. Due to the scarcity of specimens it is hard to judge as to whether or not such distichous glumes constitute a normal condition in *F. monticola*. However, the achene characters and the shape and texture of floral glumes show the close relationship between *F. monticola* and *F. tenera*, and this fact still suggests the attribution of *F. monticola* to *Trichelostylis* rather than to *Abildgaardia*.

14. **Fimbristylis tenera** Schultes, Syst. Veg. 2, Mantissa, 57, 1824; C.B. Clarke in Hook, f., Fl. Brit. India 6: 642, 1893. New name for *Scirpus tenellus* Roxb., because of *Fimbristylis tenellum* Link, 1827.



Fig. 2. A-N: *Fimbristylis thourarii* from Kuruwita Kanda, Thwaites CP 3469 (NY). A: habit; B: inflorescence; C: spikelet; D: prophyll; E-H: four glumes, from the lowest (E) to the flower-bearing one (H); J: fruiting pistil; K-N: achenes. Scales=1 mm. O-U: *Fimbristylis monticola* from Thwaites CP 3780 (PDA). O: habit; P: part of corymb; Q: spikelets, in which most glumes are distichously disposed; R: spikelet, in which most glumes are spirally imbricated; S: floral glume; T: fruiting pistil; U: achene. Scales=1 mm. Drawn by Haruto Fukuda.

*Scirpus tenellus* Roxburgh, Fl. Ind. ed. 1, 1: 227, 1820, & ed. 2, 1: 224, 1832. Type from Coromandel Is.

*Trichelostylis tenella* (Roxburgh) Nees in Wight, Contrib. Bot. India 103, 1834. Not of Link, 1827.

Distribution: tropical Africa, Pakistan, India. Semi-dry sandy ground.

Specimen examined. Jaffua District: north shore of Jaffua Lagoon, ca. 10 miles SE of Navatkuli, *T. Koyama 14038* (NY).

A new addition to the flora of Ceylon. The plants representing the above collection bear pubescent floral glumes, and thus belong to the typical phase of this species. In southern India there occur subsp. *oxylepis* (Steudel, Synops Pl. Glumac. 2: 110, 1855) stat. nov., which differs from the typical phase in the glabrous glumes and the relatively slenderer leaves and culms.

15. **Fimbristylis leptoclada** Bentham, Fl. Hongk. 393, 1861; C.B. Clarke in Hook. f., Fl. Brit. India 6: 647, 1893; Trimen & Hook. f., Handb. Fl. Ceylon 5: 58, 1900. Type from Hongkong, China.

*Fimbristylis retusa* Thwaites, Enum. Pl. Zeyl. 349, 1864. Type: Ceylon, near Galle, *Thwaites CP 3760*.

Distribution: Ceylon, Thailand, Indo-China, southern China, Malaysia. Wet places at low altitudes.

Specimens examined. Kandy District: Ambagamuwa, *Trimen CP 3760*, ex p. (PDA). Kalutara District: Kalutara, *Trimen CP 3760*, ex p. (PDA). Ratnapura District: Raigam Korale, *Trimen CP 3760*, ex p. (PDA). Colombo District: Colombo, *Ferguson in 1881* (PDA). Galle District: Hiniduma, *Trimen CP 3760*, ex p. (PDA); Galle, *Trimen CP 3760*, ex p. (PDA).

The floral glumes of this species show a rare feature in *Fimbristylis*, i.e., the membranous glumes are spotted with red-brown tannin cells, and are copiously fimbriate on the upper margin, which is shallowly emarginate to rounded-truncate at the apex, a condition that recalls the glumes of *Scirpus tabernaemontani*.

16. **Fimbristylis quinquangularis** (Vahl) Kunth, Enum. Pl. 2: 229, 1837; Thwaites, Enum. Pl. Zeyl. 349, 1864; C.B. Clarke in Hook. f., Fl. Brit. India 6: 644, 1893; Trimen & Hook. f., Handb. Fl. Ceylon 5: 55, 1900.

*Scirpus quinquangularis* Vahl, Enum. Pl. 2: 279, 1806. Type from "India orientalis," König.

*Trichelostylis quinquangularis* (Vahl) Nees in Wight, Contrib. Bot. India 104, 1834.

Distribution: widely distributed in the Old World tropics from tropical Africa through India and Malesia eastwards to northern Australia, and north-eastwards to southern China and the Ryukyu Islands. Wet grassy places at low altitudes, often found in rice fields.

Specimens examined. Jaffna, *Simon s.n.*, Nov. 1920 (PDA). Anuradhapura District: between Tirappana and Galkulama, *T. Koyama 13592* (NY). Polonnaruwa District: Awukana, [Collector not noted] 20 Mar. 1905 (PDA). Matale District: 7 miles S of Dambula on Kandy

Road, Clayton 5077 (K, PDA); Nalanda, Alston 1053 (PDA). Kandy District: Haragama, Pallekelle Estate, Alston 226 (PDA); Peradeniya, Thwaites CP 838 ex p. & 958 (K, PDA). Galle District: Galle, Trimen CP 838 ex p. (PDA). Hambantota District: Ruhuna National Park, Konema Wewa, Cooray, 25 Mar. 1970 (NY, PDA).

17. *Fimbristylis miliacea* (L.) Vahl, Enum. Pl. 2: 287, 1806; Thwaites, Enum. Pl. Zeyl. 348, 1864; C.B. Clarke in Hook. f., Fl. Brit. India 6: 644, 1893; Trimen & Hook. f., Handb. Fl. Ceylon 5: 56, 1900.

*Scirpus miliaceus* L., Syst. Nat. ed 10, 868, 1759. Type from India.

*Fimbristylis littoralis* Gaudichaud in Feysin, Voy. Bot. 413, 1826; S.T. Blake in Arn. Arb. 35: 217, 1954.

*Trichelostylis miliacea* (L.) Nees in Wight, Contrib. Bot. India 104, 1834.

*Fimbristylis miliacea* Vahl var. *congesta* Trimen ex Trimen & Hook. f., Handb. Fl. Ceylon 5: 56, 1900. Type: Ceylon, Peradeniya, Thwaites.

Distribution: Tropical and subtropical regions of all the world. In eastern Asia the range extends into temperate regions as far as to central Japan and China. Open wet places at low altitudes; abundant as a weed in rice fields.

Specimens examined. Mannar District: Murukan, J. M. Silva s.n., July 1917 (PDA). Anuradhapura District: Wilpattu National Park: Manikepola Uttu, T. Koyama & Jayasuria 13952 (NY, PDA, US), T. Koyama, Herat & Cooray 13459 & 13464 (NY, PDA, US); near Ecrige Ara confluence with Modegagawa Aris, 30 m alt., Fosberg et al. 50794 (US); 1/4 mile SSE of Maradan Maduwa, Fosberg et al. 50745 (US); between Scagapadu Villu and Kattan-Kandel Kulam, Wirawan 973 (NY); 2 miles N of Yakkalla, T. Koyama & Herat 13596 (NY, PDA, US); Gneiss Plateau, Galpitiyala, a few miles from Ritigala, Ballard 1449 (K, NY); between Anuradhapura and Rambewa, T. Koyama & Herat 13600 (NY, PDA, US). Puttalam District: Iranavillu, Madampe, Amaratunga 2576 (PDA). Matale District: between Dambula and Habarane, near Mile 96 on Road A-6, T. Koyama & Herat 13565 (NY, PDA, US); between Dambula and Naula, near Mile 40 on Road A-9, Jayasuria 61 (PDA). Kurunegala District: Piduruwela, between Kurunegala and Narammala, Amaratunga 2212 (PDA). Kandy District: Peradeniya, Trimen CP 836 (K, PDA). Badulla District: Uma Oya, Trimen s.n., in 1880 (PDA). Kagalle District: Baddewela, T. Koyama 13549 & 13550 (NY, PDA, US) Polonnaruwa District: Ottawady Valley of downstream of Mahaweli Ganga, T. Koyama 13585 (NY, PDA, US). Monaragala District: Inginiyala National Park, near Baduluwila, T. Koyama et al. 13996 (NY, PDA, US). Colombo District: Danowita, Amaratunga, 194 (PDA); Giriulla, Amaratunga 999 (PDA). Kalutara District: Bolgoda, Amaratunga 2525 (PDA). Hambantota District: Ruhuna National Park, Komawa, Wewa, Cooray, 16 Dec. 1959 (NY).

In the Linnaean Herbarium *Scirpus miliaceus* is represented by two sheets, nos. 71.40 and 71.41. The former sheet, which is marked "*miliaceus*" in the hand of Linnaeus is *Fimbristylis quinqueangularis* Kunth, while the sheet 71.41 is *Fimbristylis miliacea* (L.) Vahl of common usage. S.T. Blake (1954) is of opinion that the sheet 71.40 should be considered as the type of Linnaeus, and consequently the name *F. miliacea* (L.) Vahl should become the correct name of plants commonly called *F. quinqueangularis*, and in the case *F. littoralis* Gaud. becomes the correct name of the so-called *F. miliacea*. Kern (1954), on the other hand, interpreted the two sheets as constituting a syntype, because there is no concrete evidence that the sheet 71.40 is the holotype. Then, Kern has chosen the sheet 71.41 as the lectotype of *Scirpus miliaceus* so that the common usage of *F. miliacea* (L.) Vahl can be conserved. I here follow



Kern's typification, and retain *F. miliacea* for this species.

18. *Fimbristylis salbundia* (Nees) Kunth, Enum. Pl. 2: 230, 1837.

*Trichelostylis salbundia* Nees in Wight, Contrib. Bot. India 105, 1834.

Distribution: India, Indo-China, Malesia.

In Ceylon this species is represented by the following:

Subsp. **pentaptera** (Nees) T. Koyama, stat. nov.

*Trichelostylis pentaptera* Nees in Wight, Contrib. Bot. India 105, 1834. Type: Ceylon, *MacRae*.

*Fimbristylis pentaptera* (Nees) Kunth, Enum. Pl. 2: 229, 1837; C.B. Clarke in Hook. f., Fl. Brit. India 6: 645, 1893; Trimen & Hook. f., Handb. Fl. Ceylon 5: 60, 1900.

'*Fimbristylis salbundia* Kunth,' sensu Thwaites, Enum. Pl. Zeyl. 349, 1864.

'*Fimbristylis quinquangularis* Kunth,' sensu Böckeler in Linnaea 37: 42, 1871. Concerning Ceylon, *Thwaites CP 823*.

Endemic to Ceylon and southern peninsular India. Rare in dry "Patana" grassland.

Specimens examined. Kandy District: Rangala, *Trimen s.n.*, Sept. 1858 (PDA); Peradeniya, 3/4 mile upslope from Univ. Circuit Bungalow, *Müller-Dombois & Cooray* 31 Oct. 1967 (PDA, US). Nuwara Eliya District: Nuwara Eliya, *Trimen CP 823, CP 843* (K, PDA), *Willis s.n.*, May 1906 (PDA); Sita Eliya, Mile 53/12 on Road A-5, *Mueller-Dombois*, May 1968 (PDA); Pattipola, ca. 2 miles from Pattipola Railway Station, 6200 ft. alt., *T. Koyama & Herat* (NY, PDA, TNS, US); Horton Plains World's End Drop, *Mueller-Dombois & Comanor*, July 1967 (PDA, US).

*Fimbristylis pentaptera* has been segregated by Nees, Kunth and C.B. Clarke from its close ally, *F. salbundia*, by the hairy culms. But, this point is not always valid since the culms of *F. pentaptera* vary from being densely pilose to glabrescent. In comparison of Ceylonese specimens cited above with a series of *F. salbundia* from Malesia and continental India, *F. pentaptera* differs from the latter chiefly in the dimensions of floral parts as follows:

	<i>F. salbundia</i>	<i>F. pentaptera</i>
Spikelets:	3.5-4.5 mm long.	4.5-6.2 mm long.
Flowering glumes:	2.0-2.5 mm long, with the costa ending below the glume apex.	2.25-3 mm long, with the costa usually projecting as a mucro.
Chenes:	obovate, 0.75-1 mm long.	orbicular-obovate, 1-1.2 mm long.
Anthers:	0.7-1 mm long.	1.5 mm long.

In *F. pentaptera*, it has also been noted that the individuals with hairy culms tend to bear comparatively larger spikelets, glumes and achenes than those of the plants with glabrescent culms. In the Peradeniya Herbarium a collection made by Craig [*since loco*] bears so slender culms and small spikelets that C.B. Clarke annotated it as "*Fimbristylis quinquangularis* Kunth, ... *Fimb. pentaptera* has hairy stems." This specimen, however, cannot be identified to be *F. quinquangularis* because of its completely bladeless leaves and the culms that are arranged in a row along a horizontal, knotty

rhizome, but it could pass as either *F. pentaptera* or *F. salbundia*. This particular specimen actually comes intermediate between the two, though its orbicular-ovate achenes and glumes, which are nearly 3 mm long, show its closer association with the glabrescent phase of *F. pentaptera*. As such the morphological differences between the two are rather small and not quite clearcut, yet their ranges of distribution are separated. On these bases I propose to treat *F. pentaptera* as a subspecies of *F. salbundia*.

19. ***Fimbristylis cymosa*** R. Brown, Prodr. Fl. Nov. Holl. 228, 1810. Type from Australia.

Distribution: Australia, Malesia, the Pacific Islands.

This polymorphic species is represented in Ceylon by:

Subsp. ***spathacea*** (Roth) T. Koyama in *Micronesica* 1: 83, 1964.

*Fimbristylis spathacea* Roth, Nov. Sp. Pl. 24, 1821; C.B. Clarke in Hook. f., Fl. Brit. India 6: 640, 1893; Trimen & Hook. f., Handb. Fl. Ceylon 5: 54, 1900. Type from India.

*Fimbristylis wightiana* Nees in Wight, Contrib. Bot. India 99, 1834; Thwaites, Enum. Pl. Zeyl. 349, 1864. Type from "Peninsula Indiae orientalis," Wight 1872.

*Fimbristylis spathacea* Roth var. *congesta* Trimen, Syst. Cat. Ceylon Pl. 102, 1885. Type: Ceylon: Talai Mannar, *J.M. de Silva*, 16 Jul. 1916.

Distribution: tropical and subtropical regions of both hemispheres. Common along sea coasts, both in sand and in scanty soil on rock.

Specimens examined. Jaffna District: 2 miles S of Elephant Pass, sea level, *T. Koyama et al.* 14049 (NY, PDA, US). Anuradhapura District: between Ratmale and Talawa, ca. 7 miles SSW of Anuradhapura, *T. Koyama* 13606 (NY, PDA, US); Pallugaturai, west coast of Wilpattu, *Fosberg et al.* 50909 (US); Wilpattu National Park, Kuda Pathessa, *Wirawan et al.* 1038 (NY, US). Mannar District: Talaimannar, *J.M. Silva, s.n.*, 16 Jul. 1916 (PDA). Puttalam District: Kalpitiya, *Trimen, s.n.*, Aug. 1883 (PDA). Trincomalee District: Trincomalee, *Glenie CP 3759, ex p.* (PDA), Sober Is. *Thwaites CP 3759 ex p.* (PDA). Colombo District: Colombo, *Ferguson CP 3759* (PDA), Mt. Lavinia, *Thwaites s.n.*, 28 Oct. 1881 (PDA). Matara District: Matara, *Thwaites s.n.*, 22 Feb. 1881 (PDA). Hambantota District: Hambantota, near the Lagoon, *Alston s.n.*, 3 Dec. 1926 (PDA).

There have been opposing opinions as to whether or not *F. spathacea* is specifically distinct from *F. cymosa* of Australia and the Pacific Islands. Having examined series of specimens from all the world, I am convinced that the only difference between the two consists in the pistils, i.e., in the former the thickly biconvex achenes have a distigmatic style, while in the latter the obtusely trigonous achenes have a tristigmatic style. In Cyperaceae such a difference in pistils may sometimes warrant a specific separation provided that such a difference is associated with other characters and/or there is no intermediate status between the digynous species and the trigynous species. In *Fimbristylis spathacea* some populations retain trigynous or imperfectly trigynous pistils among the digynous pistils, not permitting its clear separation from *F. cymosa*. I have seen these transitional plants in the Ryukyu Islands and Formosa. The same is true in *F. cymosa*, as can be seen rather frequently in the plants from Micronesia,

for instance. For this reason, *F. spathacea* is, in my opinion, no more than a subspecies of *F. cymosa*.

20. **Fimbristylis umbellaris** (Lamarek) Vahl, Enum. Pl. 2: 291, 1806.

*Scirpus umbellaris* Lamarek, Tabl. Encycl. Meth. Bot. 1: 141, Mar. 1791. No type mentioned.

*Scirpus globulosus* Retzius, Obs. Bot. 5, 19, Jul.-Nov. 1791. Type from India.

*Fimbristylis globulosa* (Retzius) Kunth, Enum. Pl. 2: 231, 1837; Thwaites, Enum. Pl. Zeyl. 349, 1864; C.B. Clarke in Hook. f., Fl. Brit. India 6: 644, 1893; Trimen & Hook. f., Handb. Fl. Ceylon 5: 57, 1900.

*Trichelostylis globulosa* (Retzius) Nees in Wight, Contrib. Bot. India 105, 1834.

Distribution: India, Indo-China, southern China, southwestern Japan, Malasia, Micronesia, Polynesia. Marshy places at low altitudes.

Specimens examined. Badulla District: Uva, *Trimen s.n.*, Jan. 1888 (PDA). Kurunegala District: Narammala, *Amaratunga 183* (PDA); Kuligapitiya, *Amaratunga 1411* (PDA). Colombo District: Ekala, *Amaratunga 2004* (PDA). Ratnapura District: Ratnapura, *Trimen CP 842* ex p., Dec. 1853 (PDA); Matuwagala, *Amaratunga 732* (PDA). Kalutara District: Kalutara, *MacRae CP 842*, ex p. (PDA). Amparai District: Senanaike Samudra, Padagoda, *T. Koyama et al. 13984* (NY, PDA, US).

For the correct name of this species we ought to pick up a rather unfamiliar epithet, *F. umbellaris*, because of the priority of just a matter of a few months.

21. **Fimbristylis pubisquama** Kern in Blumea 8: 131, 1955; T. Koyama in Bull. National Sci. Mus. [Tokyo], 17: 70, 1974. A new name for *Fimbristylis compressa* Böckeler, non Römer & Schultes.

*Fimbristylis compressa* Böckeler in Linnaea 38: 387, 1874; C.B. Clarke in Hook. f., Fl. Brit. India 6: 639, 1893; E.G. Camus in Lecomte, Fl. Génér. Indo-Chine 7: 108, 1912. Type: India, *Wight 2388* & *2902*. Not of Römer & Schultes, 1817.

*Fimbristylis gracilis* Arnott ex Böckeler, l.c. 387, 1874. Invalid name published as a synonym.

*Scirpus fuscus* Roxburgh ex C.B. Clarke in Hook. f., Fl. Brit. India 6: 639, 1893. As a synonym.

*Fimbristylis tenuifolia* Nees ex C.B. Clarke in Hook. f., l.c. 639, 1893. As a synonym.

Distribution: sporadically noted in southern India and Cambodia. In Ceylon, found at margins of saline swamps, in open grasslands near the sea-shore, and in abandoned rice paddy back from the sea coast.

Specimens examined. Jaffna District: south shore of Jaffna Lagoon, ca. 8 miles SE of Poonaryn, sea level, *T. Koyama et al. 14044* (NY, PDA, US). Puttalam District: between Puttalam and Palay, shore of Puttalam Lagoon, *T. Koyama et al. 13909* (NY, PDA, US). Trincomalee District: Peria Kulam, *Ferguson, s.n.*, Dec. 1885 (PDA). Amparai District: S of Irakkamam Tank, between Amparai and Akkaraipattu, *T. Koyama et al. 14004* (NY, PDA, TNS, US); Tandiadi Kalapu Lagoon, S of Mile 215 on Rd. A-4, *T. Koyama et al. 14016* (NY, PDA, TNS, US). Hambantota District: Ruhuna National Park, Yala, *Mueller-Dombois*, 3 May 1968 (PDA, US).

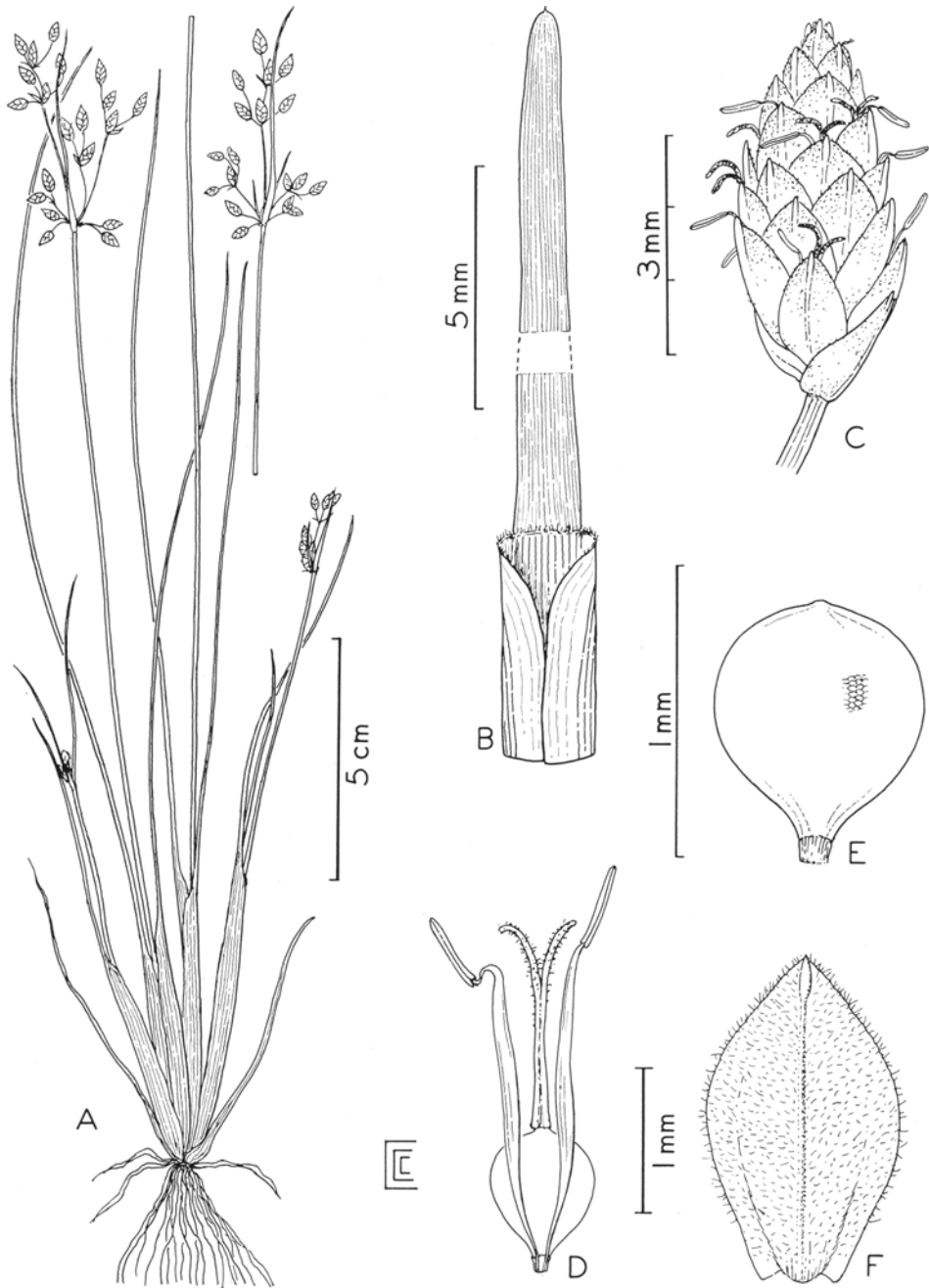


Fig. 3. *Fimbristylis pubisquama* from Tandiadi Kalapu Lagoon, T. Koyama *et al.* 14016 (NY). A: total plant; B: portions of leaf, showing sheath orifice and blade apex; C: spikelet; D: fruiting pistil with stamens; E: achene; F: glume. Scale length as indicated. Drawn by Charles C. Clare, Jr.

For a description see T. Koyama (1974). In Ceylon this species is highly variable in the height of culms, the degree of development of corymbs, and in the dimension of achenes and glumes. Yet, it can be recognized at once by the pubescent glumes, which are otherwise possessed only by *F. ferruginea* in Ceylon. With the ciliate hyaline ligules and flattened styles, which are fimbriate above, *F. pubisquama* belongs to the section *Fimbristylis*, and its affinity is considered to be with *F. bisumbellata*.

22. **Fimbristylis ferruginea** (L.) Vahl, Enum. Pl. 2: 291, 1806; Nees in Wight, Contrib. Bot. India 97, 1834; C.B. Clarke in Hook. f., Fl. Brit. India 6: 638, 1893; Trimen & Hook. f., Handb. Fl. Ceylon 5: 53, 1900.

*Scirpus ferrugineus* L., Sp. Pl. ed. 1, 1: 50, 1753. Type from Jamaica.

Distribution: pantropic. Both brackish and fresh in water open swamps at low altitudes.

Specimens examined. Jaffna District: Jaffna, *Thwaites s.n.*, Feb. 1890 (PDA); Elephant Pass, Mile 167 on Road A-9, *T. Koyama et al. 14050* (NY, PDA, US). Anuradhapura District: Wilpattu National Park, Sinna Uppu Villu, *Mueller-Dombois et al.*, 27 Apr. 1969 (NY, PDA, US); 1 mile E of Kolakanaweli, *T. Koyama & Herat 13576* (NY, PDA, US). Mannar District: Talaimannar, *Silva s.n.*, Jul. 1916 (PDA). Kurunegala District: Kurunegala, *Thwaites CP 848*, ex p. (PDA). Puttalam District: Kalpitiya, *Trimen*, Aug. 1883 (PDA). Colombo District: Kalaniya, Kelani River, *Ferguson*, Apr. 1855 (PDA); between Colombo and Panadura, mangrove off Road A-2, *Comanor 991* (NY, PDA, US); S of Negombo, Hamilton Canal Road at Mile 4/4, *Comanor 1140* (NY, PDA, US). Trincomalee District: Trincomalee, *Thwaites CP 848*, ex p. (PDA); Koddiyar Pattu Area, northern shore of Ullackalie Lagoon, ca. 1.2 miles E of Toppur, *T. Koyama et al. 14058* (NY, PDA, US). Amparai District: Tandiyadi Kalapu Lagoon, S of Mile 215 on Road A-4, *T. Koyama et al. 14013* (NY, PDA, US). Hambantota District: Ruhuna National Park, Uraniyawala, ca. 1 mile W of Buttawa, *Fosberg et al. 51015* (NY, US).

23. **Fimbristylis dichotoma** (L.) Vahl, Enum. Pl. 2: 287, 1806.

*Scirpus dichotomus* L., Sp. Pl. ed. 1, 50, 1753. Type from India.

*Scirpus diphyllus* Retzcius, Obs. Bot. 5, 15, 1788. Type from "India orientalis," König.

*Fimbristylis diphyllus* (Retzcius) Vahl, Enum. Pl. 2: 289, 1806; Thwaites, Enum. Pl. Zeyl. 348, 1864; C.B. Clarke in Hook. f., Fl. Brit. India 6: 636, 1893; Trimen & Hook. f., Handb. Fl. Ceylon 5: 53, 1900.

*Fimbristylis tomentosa* Vahl, Enum. Pl. 2: 290, 1806; Nees in Wight, Contrib. Bot. India 100, 1834. Type from "India orientalis."

*Fimbristylis ovalis* Nees in Wight, Contrib. Bot. India 98, 1834; Thwaites, Enum. Pl. Zeyl. 348, 1864. Type: India, "Peninsula Indiae orientalis," Wight 1871 (type of  $\alpha$ ). Type of  $\beta$  is from Nepal, etc.

*Fimbristylis royeniana* Nees in Wight, Contrib. Bot. India 99, 1834. Concerning  $\alpha$  &  $\beta$ . Type: India, "Peninsula Indiae orientalis," Wight in Herb. Royen (type of  $\alpha$ ); Wight 1874 (type of  $\beta$ ).

*Fimbristylis diphylla* Vahl var. *major* Thwaites, Enum. Pl. Zeyl. 433, 1864; Trimen & Hook. f., Handb. Fl. Ceylon 5: 54, 1900. Type: Ceylon, *Thwaites 3232*.

'*Fimbristylis rigidula* Nees,' sensu Thwaites, Enum. Pl. Zeyl. 349, 1864.

*Fimbristylis diphylla* Vahl var. *ovalis* (Nees) Trimen & Hook., Handb. Fl. Ceylon 5: 54, 1900.

For this polymorphic, cosmopolitan sedge I recognize the following three subspecies from Ceylon.

Key to the subspecies of *F. dichotoma*

1. Ligule of a series of dense pubescence; achenes creme-colored; stamens 1 or 2; glumes chartaceous, subacute at apex, brown to chestnut-brown, slightly shiny. Plants of inland wet habitats.
  2. Achenes cancellated by 5 to 11 vertical series of transversely oblong cells, the gynophore minute; style noticeably narrowed toward apex of conical base; spikelets 2.5-3 mm wide; stamens mostly 2. 23. subsp. *dichotoma*.
  2. Achenes cancellated by 15 to 24 vertical series of transversely oblong-hexagonal cells, the gynophore relatively large; styles tongue-like, gradually tapering from base to below stigmas, hence the style-base inconspicuous; spikelets 2.5-4 mm wide; stamens mostly 1. 23b. subsp. *podocarpa*.
1. Ligule absent; achenes lightly brown, stamens 3; glumes membranous with hyaline margins, rounded or obtuse at apex, lightly grayish-brownish, dull. Plants growing in dry sand under loose woods near the sea coast. 23c. subsp. *glauca*.

23a. *Fimbristylis dichotoma* Vahl subsp. *dichotoma*.

Synonyms as above.

Subspecies *dichotoma* is, as commonly known, extremely variable in the size of both vegetative and floral parts, in the degree of pubescence on leaves and culms, and as to whether the spikes are solitary or clustered as well as whether the corymbs are simple or compound.

The types of both *F. dichotoma* and *F. annua* have simple corymbs with solitary spikelets. In classifying the forms of subsp. *dichotoma* with simple corymbs, the duration of rhizomes has often been considered to be of importance, and hence the annual phase, which is supposed to have slender, pubescent leaves and culms, and relatively small corymbs, has been kept by a number of specialists as a taxon separate from subsp. *dichotoma* with perennial rhizomes, glabrescent leaves and culms, and relatively large corymbs. In Ceylon, whether a plant is annual or perennial has shown no correlation whatsoever to any morphological variations. Occasionally, low plants with narrow, densely pubescent leaves and culms, and small simple corymbs possess a short rhizomes as well as the remnants of the previous-year's upper ground parts, which means that these plants are at least biennial, and perhaps more likely are short-lived perennial. Even more frequently, relatively large plants with glabrescent leaves and culms, and rather large corymbs do not show any trace of rhizome nor a remnant of the previous-year's plant part, demonstrating that they are annual. Consequently, being unable to recognize *F. annua* as a taxon, I treat all the Ceylonese plants of subsp. *dichotoma* with simple corymbs and solitary spikelets together to form forma *dichotoma*.

In Ceylon, like in other parts of Asia, plants that possess compound corymbs with clustered spikelets are fairly well demarcated from forma *dichotoma* with solitary

spikelets. The plants characterized as such tend to be taller than forma *dichotoma*, and possess rigid and generally glabrous culms and glabrescent leaves. These vegetative features are consistently associated with biennial or perhaps short-lived perennial rhizomes. In southern Japan and the warmer parts of China, this phase has been known as forma *floribunda*, of which the type is from Japan. The Ceylonese plants with this combination of characters exactly coincide with forma *floribunda*.

The Ceylonese specimens thus classified into two forms, forma *dichotoma* and forma *floribunda*.

**Fimbristylis dichotoma** Vahl subsp. **dichotoma** forma **dichotoma**.

Anuradhapura District: Wilpattu National Park, Kuda Pathessa, *T. Koyama et al.* 13376 (NY, PDA); Road A-14, at Mile 123, *T. Koyama et al.* 13915 (NY, PDA, US). Puttalam District: Puttalam, *Trimen s.n.*, Aug. 1883 (PDA). Matale District: Dambula, *Trimen s.n.*, Dec. 1881 (PDA); between Naula and Dambula, vicinity of Mile 40, *Jayasuria* 62 (PDA). Kandy District: Madugoa-Urugala Road, *Simpson* 8803 (PDA); Peradeniya, *Alston* 879 (PDA). Kurunegala District: Kurunegala Rock, *Alston* 694 (PDA); Kurunegala, *Thwaites CP* 3737 (K, PDA) & 3232 ex p. (K, PDA). Ratnapura District: Raigam Korale, *Thwaites CP* 3232 ex p. (K, PDA). District unknown: Labbaigalla, *Thwaites CP* 3232 ex p. (PDA); Manamal Watta, *Thwaites s.n.*, Mar. 1887 (PDA). Hambantotta District: Ruhuna National Park: Uraniya, *Cooray*, 22 Mar. 1970 (NY, PDA); Buttawa Plain, *Cooray* 19 Mar. 1970 (NY); Vala, *Cooray*, 23 Jan. 1969 (NY, PDA).

**Fimbristylis dichotoma** Vahl subsp. **dichotoma** forma **floribunda** (Miquel) Ohwi, Journ. Jap. Bot. 14: 577, 1938.

*Fimbristylis diphylla* Vahl var. *floribunda* Miquel, Ann. Mus. Bot. Lugd.-Batav. 2: 144, 1865. Type from Japan.

Trincomalee District: Trincomalee, *Silva* 62 (NY). Kandy District: Peradeniya, *Thwaites CP* 839 (K, NY, PDA) & 840 (K, PDA); Madugoda Rd., *Simpson* 8472 (NY). Kegalle District: Baddewela, *T. Koyama & Samarakoon* 13548 (NY, PDA). Ratnapura District: Ratnapura, *Thwaites CP* 839 ex p. (K, PDA) & 840 ex p. (K, PDA). Hambantotta District: Ruhuna National Park, Kumbukkan Oya, *Cooray*, 31 July 1969 (NY, PDA).

23b. **Fimbristylis dichotoma** Vahl subsp. **podocarpa** (Nees & Meyen) T. Koyama in *Micronesica* 1: 87, 1964.

*Fimbristylis podocarpa* Nees & Meyen ex Nees in Wight, Contrib. Bot. India 98, 1834. Including  $\alpha$ ,  $\beta$  &  $\gamma$ . Type: China, *Meyen* (type of  $\alpha$ ).

*Fimbristylis annua* Römer & Schultes var. *podocarpa* (Nees & Meyen) Kükenthal in Bot. Jahrb. 59: 48, 1924.

*Fimbristylis diphylla* Vahl var. *podocarpa* (Nees & Meyen) Kükenthal in Bot. Jahrb. 69: 257, 1938.

Distribution: India, southern China, Indo-China, Malesia, Micronesia. Wet places at low altitudes.

Specimens examined. Badula District: ca. 8 miles E of Mahiyangana, 3.5 miles N of Mile 53 on Mahiyangana-Padiyatalawe Rd., *T. Koyama et al.* 13976 (NY, PDA, US). Amparai District: Senanaike Samudra, Padagoda, *T. Koyama et al.* 13985 (NY, PDA, US).

A new addition to the flora of Ceylon. In spite of its rather wide distribution in India subsp. *podocarpa* has not been previously documented from Ceylon. This subspecies differs from subsp. *dichotoma* in its broad, tongue-like styles, and its slightly larger achenes, which are cancellated on each side by mostly 15 to 24 vertical rows of epidermal cells in contrast to 5 to 11 in subsp. *dichotoma*. The achenes showing intermediate features exist, however, as I have occasionally seen achenes with 9 to 14 rows of epidermal cells on each side in the specimens from Japan and India. In these specimens the styles also show an intermediate state, i.e., they are not as conspicuously narrowed above the base as in typical subsp. *dichotoma*, but not quite as broad as those of typical subsp. *podocarpa*. The tubercles on the shoulder of achenes occur more frequently in subsp. *podocarpa* than in subsp. *dichotoma*, but this character again is not limited to subsp. *podocarpa*. Consequently, I am convinced that *F. podocarpa* is no more than a subspecies of polymorphic *F. dichotoma*.

23c. ***Fimbristylis dichotoma*** Vahl subsp. ***glauca*** (Vahl) T. Koyama, stat. nov.

*Fimbristylis glauca* Vahl, Enum. Pl. 2: 288, 1806. Type from "India orientalis," König.

*Fimbristylis royeniana* Nees [var.] *γ. microstachya* Nees in Wight, Contrib. Bot. India 99, 1834. Type from "Peninsula Indiae orientalis," Wight 1875.

Distribution: endemic to southern India and Ceylon. Occasional in sandy soil sheltered by loose woods in dry low countries; most habitats not far from the sea coast.

Specimens examined. Anuradhapura District, Wilpattu National Park: NE of Kruttu Pandi Villu, sea level, *T. Koyama 13408* (NY); Damalawila, *T. Koyama and Jayasuria 13944* (NY, PDA, US). Mannar District: Mannar Island, near Pesalai, 3 m alt., *Lazarides 7358* (PDA, US).

As mentioned in the key, subsp. *glauca* can be segregated from all the other phases of subsp. *dichotoma* in the complete absence of ligules, brownish achenes, and in the membranous glumes with an obtuse apex in contrast to the chartaceous ones with an subacute apex. In spite of rather weak morphological differences subsp. *glauca* is ecologically completely separated from the rest. While other subspecies are inland plants, which grow mostly in wet habitats, subsp. *glauca* is confined to the dry sandy soil under the coastal loose woods.

24. ***Fimbristylis bisumbellata*** (Forskål) Bubani, Dodecanth. 30, 1850.

*Scirpus bisumbellatus* Forskål, Fl. Aegypt.-Arab. 1: 15, 1775. Type from Egypt.

'*Fimbristylis dichotoma* Vahl, excl. basionym': Nees in Wight, Contrib. Bot. India 101, 1834; C.B. Clarke in Hook. f., F. Brit. India 6: 636, 1893; Trimen & Hook. f., Handb. Fl. Ceylon 5: 50, 1900.

*Fimbristylis pallescens* Nees in Wight, Contrib. Bot. India 101, 1834; Thwaites Enum. Pl. Zeyl. 348, 1864. A superfluous name.

Distribution: widely distributed from the Mediterranean region through tropical



Asia and eastwards to Malesia and northern Australia. Wet ground and rice fields; uncommon in Ceylon.

Specimens examined. Matale District: Matale, along Rd. A-6, *Jayasuria* 52 (NY). Kandy District: Haragama, Pallekelle Estate, *Alston* 265 (PDA); Pallekelle, Maha Oya Estate, *Alston* 301 (PDA). Badulla District: Dunhinda, *Thwaites* CP 3758, ex pte. (K, PDA); Oova, *Thwaites* CP 3758, ex pte. (K, PDA).

Characteristically *F. bisumbellata* stands as intermediate between *F. aestivalis* and *F. dichotoma*. The small individuals closely resemble the former, from which it is discernible primarily and often only in its trabeculate achenes. The large individuals become quite confusing with *F. dichotoma*, differing therefrom in more densely tufted, strictly annual habit, and in the slightly smaller spikelets, which are yellow-brownish and dull *vs.* dark brownish and more or less shiny.

25. *Fimbristylis aestivalis* (Retzius) Vahl, Enum. Pl. 2: 288, 1806; Trimen & Hook. f., Handb. Fl. Ceylon 5: 51, 1900.

*Scirpus aestivalis* Retzius, Obs. Bot. 4, 12, 1786. Type: Ceylon, *König*.

In Ceylon the following two subspecies are recognized.

1. Glumes 1–1.2 mm long; achenes 0.5–0.6 mm long; corymbs compound. 25a. subsp. *aestivalis*.
1. Glumes 1.5–2.2 mm long; achenes 0.7–0.8 mm long; corymbs subsimple. 25b. subsp. *major*.

25a. *Fimbristylis aestivalis* Vahl subsp. *aestivalis*.

Distribution: from India through Indo-China eastwards to Malesia and northern Australia, and northeastwards to China. Sporadically occurring in wet places such as rice fields.

Specimens examined. Northcentral District: 3 miles W of Yakkala, *T. Koyama* 13597 (NY). Kandy District: Haragama, *Alston* 1409 (PDA). Colombo District: Colombo, *Ferguson* s.n. (PDA).

25b. *Fimbristylis aestivalis* Vahl subsp. *major* [ (Trimen) ] T. Koyama, subsp. nov.

*Fimbristylis aestivalis* (Retzius) Vahl var. *major* Trimen, Syst. Cat. Flow. Pl. Ceylon 101, 1885. Nomen nudum. Type: Ceylon, Colombo, *Ferguson* CP 3943.

*Fimbristylis trimeni* Hooker f. in Trimen & Hook. f., Handb. Fl. Ceylon 5: 52, 1910.

A new name given to *F. aestivalis* var. *major*.

Corymbi plerumque simplices, 2–7-radiati; radii 1-vel 2-spiculosi; spiculae 5–7 mm longae; glumae 1.5–2.2 mm longae; nuces  $\frac{2}{3}$ – $\frac{3}{5}$  mm longae  $\frac{1}{2}$ – $\frac{2}{3}$  mm latae; stamina 2, interdum 1; caeteroquin ut subsp. *aestivalis*.

Distribution: India, Ceylon, China, Japan. Wet places at low altitudes.

Specimen examined. Colombo District: Colombo [without details], *Ferguson* CP 3943 (PDA). This is the type and the sole collection of this taxon from Ceylon.

When I was handling the Japanese specimens of *F. aestivalis*-complex, I had noticed that they did not quite agree with typical *F. aestivalis* of southern Asia, chiefly

because of the larger glumes with less cuspidate apex, slightly larger achenes and the looser corymbs than in the typical form. I have seen these two forms of *F. aestivalis* from Indian Assam, too, and have realized the existence of two infra-specific taxa involved in this species. Examination of the type collection of var. *major* Trimen has established the identity of this larger plant. Although Hooker fil. is of opinion that this larger plant is specifically distinct from *F. aestivalis*, I can recognize it only as a subspecies, because the two plants agree except for the floral details mentioned above.

Furthermore, subsp. *major* superficially approaches *F. griffithii* of India and Malasia, from which it differs in its generally hairy leaves, bracts and lower glumes, and substantially smooth achenes. In *F. griffithii*, the whole plants are glabrous, and the achenes are finely trabeculate on each side with several series of transversely hexagonal epidermal cells. *Fimbristylis squarrosa* has thus far not been found in Ceylon.

26. ***Fimbristylis argentea*** (Rottboell) Vahl, Enum. Pl. 2: 294, 1806; Nees in Wight, Contrib. Bot. India 100, 1834; Thwaites, Enum. Pl. Zeyl. 348, 1864; C.B. Clarke in Hook. f., Fl. Brit. India 6: 640, 1893; Trimen & Hook. f., Handb. Fl. Ceylon 5: 52, 1900.

*Scirpus argenteus* Rottboell, Descr. Pl. Rar. Progr. 27, 1772, & Descr. Icon. Rar. Nov. Pl. 51, t. 17, f. 6, 1773. Type: India König.

Distribution: confined to southeastern Asia: India, Ceylon, Thailand, Indo-China and Malay. On wet sandy ground of open grasslands.

Specimens examined. Anuradhapura District: Wilpattu National Park, Atha Villu, *Wirawan W21-3* (NY); Wilpattu National Park, between Kattankandal Kulam and Occhapu Junction, *Wirawan et al. 978* (NY); Anuradhapura, *Thwaites*, June 1884 (PDA); Kekirawa, *Thwaites*, July 1887 (PDA). Mannar District: Aruvi Aru, Mile 125 on Road A-14, *T. Koyama et al. 13925* (NY, PDA, US). Trincomalee District: Trincomalee, *Glenie CP2877* (K, PDA); Periya Kulam, ca. 7 miles NW of Trincomalee, *T. Koyama et al. 14062* (NY, PDA, US); Trincomalee Bay, *Wheeler 12413* (NY, PDA, US). Polonnaruwa District: Ottawady, valley of downstream of Mahaweli Ganga, *T. Koyama 13584* (NY, PDA, US); Gal Oya Reservoir, 270 m alt., *Comanor 562* (NY); near Ellawewa, *Balakrishnan 358* (PDA); Polonnaruwa, *Townsend 73/235* (K, PDA). Amparai District: east shore of Senanaikie Samudra, *Mueller-Dombois & Comanor*, July 1967 (PDA, US). Kurunegala District: Wariyapola, *Amaratunga 310* (PDA). Colombo District: Colombo, *Ferguson CP 2877* (PDA); Kotugoda, *Amaratunga 2261* (PDA). Hambantota District: Ruhuna National Park, Menik Ganga, *Cooray*, Sept. 1969 (NY, US); Ruhuna National Park, Rakinawala Waterfall, *Mueller-Dombois*, Oct. 1968 (PDA, US); Ruhuna National Park, 2 miles E of Vaddangewadiya, N of Kataragama, *Wirawan 656* (PDA).

27. ***Fimbristylis schoenoides*** (Retzius) Vahl, Enum. Pl. 2: 286, 1806; Nees in Wight, Contrib. Bot. India 97, 1834; Thwaites, Enum. Pl. Zeyl. 348, 1864, C.B. Clarke in Hook. f., Fl. Brit. India 6: 634, 1893; Trimen & Hook. f., Handb. Fl. Ceylon 5: 49, 1900.

*Scirpus schoenoides* Retzius, Obs. Bot. 5, 14, 1788. Type from "India orientalis," König.

Distribution: from India and Ceylon through Indo-China to Malasia and northern

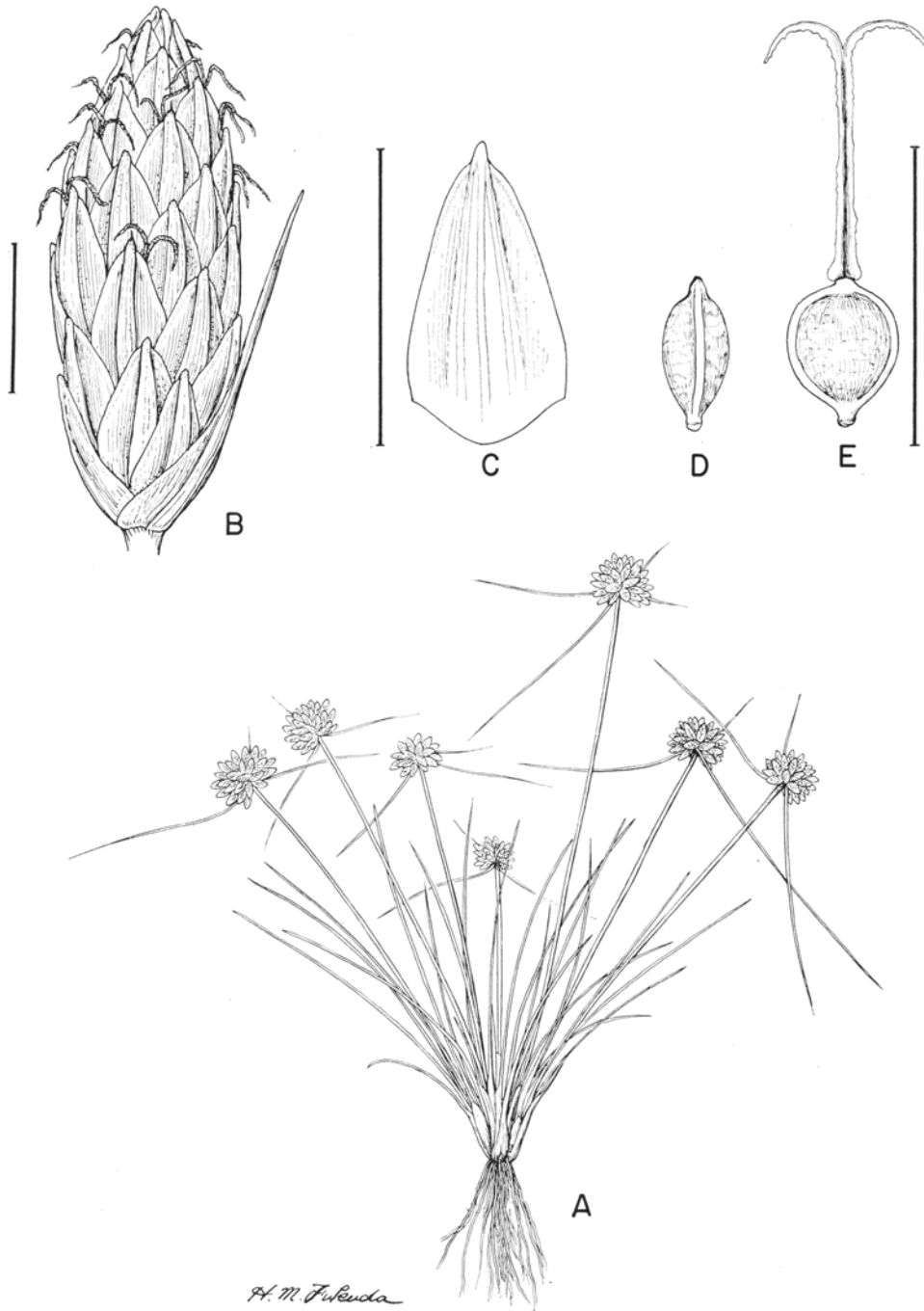


Fig. 4. *Fimbristylis argentea* from Trincomalee, T. Koyama *et al.* 14062 (NY). A: habit; B: spikelet with its subtending bract; C: glume; D: lateral view of achene; E: fruiting pistil. Scales=1 mm. Drawn by Haruto Fukuda.

Australia, also extending northwards to southern China. Wet grassy places in low countries, often seen at margin of rice fields.

Specimens examined. Anuradhapura District: Wilpattu National Park: Manikepola Uttu, ca. sea level, *T. Koyama et al. 13465* (NY, PDA, US); 1/4 mile SSE of Maradan Maduwa, *Fosberg et al. 50746* (US, PDA); along Road A-14, near Mile 123, *T. Koyama et al. 13914* (NY, PDA, US). Trincomalee District: Periakulam, near Trincomalee, *Ferguson, s.n.*, Dec. 1885 (PDA); Periya Kulam, ca. 7 miles NW of Trincomalee, *T. Koyama et al. 14063* (NY, PDA, US). Kurunegala District: Kurunegala, *Thwaites CP 833* (K, PDA); Mawatagama, *Simpson 9868* (PDA). Kegalle District: near Kegalle, *Alston 978* (PDA); Baddewela, *T. Koyama 13547* (NY, PDA, US). Kandy District: Pallekelle Estate, *Alston 277* (PDA). Colombo District: Gampaha, *Simpson 8603* (PDA); Minuwangoda, *Amaratunga 1531* (PDA). Matale District: between Naula and Dambula, near Mile 40, *Jayasuria 58* (PDA). Ratnapura District: Pinnawela, Balangoda, *Trimen s.n.*, Sept. 1895 (PDA). Galle District: Kimbiya, 60 ft., [No collector cited] Feb. 1905. Hambantota District: Ruhuna National Park, Uraniya, *Cooray*, 22 Mar. 1970 (NY, PDA).

28. ***Fimbristylis polytrichoides*** (Reztius) Vahl, Enum. Pl. 2: 248, 1806; Nees in Wight, Contrib. Bot. India 96, 1834; Thwaites, Enum. Pl. Zeyl. 348, 1864, C.B. Clarke in Hook. f., Fl. Brit. India 6: 632, 1893; Trimén & Hook. f., Handb. Pl. Ceylon 5: 49, 1900.

[*Gramen polytrichum* Rumphius, Herb. Amb. 6: 17, t. 7. f. 1, 1750.]

*Scirpus polytrichoides* Retzius, Obs. Bot. 4, 11, 1786. Type: Ceylon, *König*.

Distribution: widespread in the Old World tropics from tropical Africa through India and Indo-China to Malesia and northern Australia, also to southern China. Open wet ground, especially in sandy soil near the sea coast.

Specimens examined. Jaffna District: Elephant Pass, Mile 167 on Road A-9, sea level, *T. Koyama et al. 14051* (NY, PDA, US). Puttalam District: Chilaw, *Ferguson s.n.*, Nov. 1881 (PDA); Chilaw Lake, *Trimén s.n.*, ex p., Dec. 1880 (PDA); between Puttalam and Palay, along the shore of Puttalam Lagoon, *T. Koyama et al. 13908* (NY, PDA, US); Near Puttalam, *Trimén s.n.*, July 1883 (PDA). Trincomalee District: Trincomalee, *Glenie CP 3786* (K, PDA). Amparai District: Tandiadi Kalapu Lagoon, S of Mile 215 on Road A-4, *T. Koyama 14017* (NY, PDA, US); Vandeloos Bay, *T. Koyama 13578* (NY). Koddiyaru Pattu District: northern shore of Ullackalie Lagoon, ca. 1.2 miles E of Toppur, sea level, *T. Koyama et al. 14059* (NY, PDA, US). Hambantota District: Ruhuna National Park, Buttara, *Cooray*, 19 Mar. 1970 (NY, PDA).

29. ***Fimbristylis acuminata*** Vahl, Enum. Pl. 2: 285, 1806; Nees in Wight, Contrib. Bot. India 96, 1834; Thwaites, Enum. Pl. Zeyl. 348, 1864; C.B. Clarke in Hook. f., Fl. Brit. India 6: 631, 1893; Trimén & Hook. f., Handb. Fl. Ceylon 5: 48, 1900. Type: Malacca, *König*.

Distribution: Tropical Asia, from India to Malesia, also southern China. Marshy places at low altitudes.

Specimens examined. Anuradhapura District: Wilpattu National Park, Manikepola Uttu, *T. Koyama et al. 13463* (NY, PDA, US); Wilpattu National Park, Kakkare Villu, east shore, 192 m alt., *T. Koyama 13316* (NY). Kalutara District: Kalutara, *MacRae CP 2747* ex p. (K, PDA). Ratnapura District: Ratnapura, *Thwaites CP 2747* ex p. (PDA); Delgoda, *Lewis & Silva s.n.*, Mar. 1919 (PDA); Dippitigala, [No collector cited] Mar. 1905 (PDA); Kuruwita, *Trimén s.n.*, June 1895 (PDA). Colombo District: Maturajawela, *Amaratunga 141* (PDA).

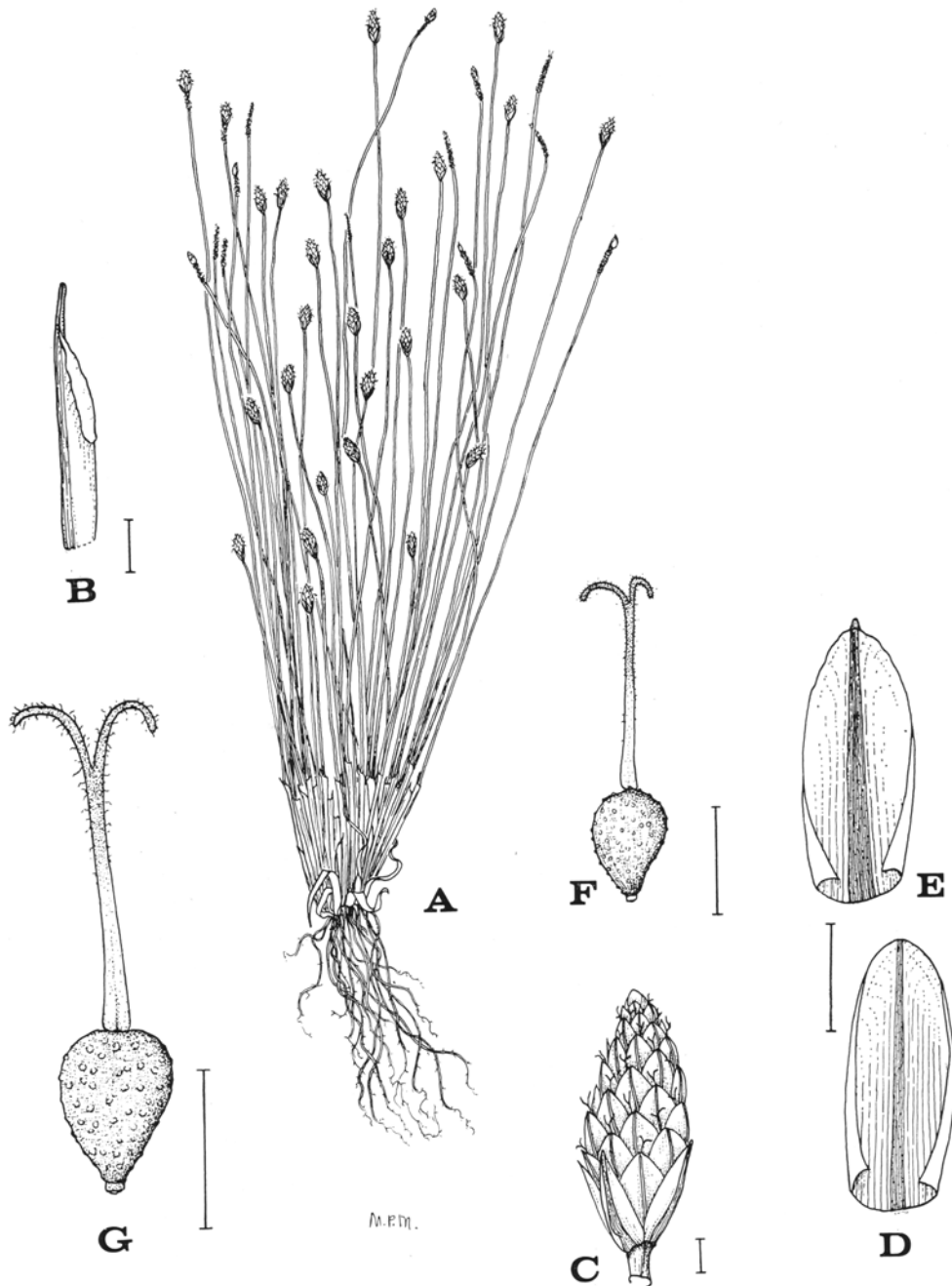


Fig. 5. *Fimbristylis polytrichoides* from Tandiadi Kalapu Lagoon, T. Koyama 14017 (NY). A: habit; B: leaf apex; C: spikelet; D, E: glumes; F: fruiting pistil; F: fruiting pistil in the same magnification as in the glume; G: fruiting pistil. Scales=1 mm. Drawn by Melissa P. Marshall.

Galle District: Baddegama, *Alston 1060* (PDA). Amparai District: Senanaikē Samudra, Pada-goda, *T. Koyama et al. 13982* (NY, PDA, US).

30. **Fimbristylis nutans** (Retzius) Vahl, Enum. Pl. 2: 285, 1806; Nees in Wight, Contrib. Bot. India 96, 1834; Thwaites, Enum. Pl. Zeyl. 348, 1864; C.B. Clarke in Hook. f., Fl. Brit. India 6: 632, 1893; Trimen & Hook. f., Handb. Fl. Ceylon 5: 48, 1900.

*Scirpus nutans* Retzius, Obs. Bot. 4, 12, 1786. Type: Malay, "Malacca," König.

Distribution: India, Malesia, northern Australia, also extending northwards to southern continental China, Formosa and the Ryukyus. Wet places at low altitudes.

Specimens examined. Ceylon, without details, *Arnott* (K, NY). Kurunegala District: between Moragala and Palewatta, *Trimen s.n.*, Mar. 1857 (PDA). Colombo District: Colombo, *Gardner CP 832* ex p. (PDA). Ratnapura District: Ratnapura, *Thwaites CP 832* ex p. (PDA); Kuruwita, *Trimen s.n.*, June 1895 (PDA); between Delgoda and Kuruwita, *Lewis & Silva s.n.*, Mar. 1919 (PDA). Galle District: between Badamua and Hiniduma, *Trimen s.n.*, Mar. 1881 (PDA).

31. **Fimbristylis dipsacea** (Rottboell) C.B. Clarke in Hook. f., Fl. Brit. India 6: 635, 1893.

*Scirpus dipsaceus* Rottboell, Descr. Icon. Rar. Nov. Pl. 56, t. 12, f. 1, 1773. Type from "India orientalis," König.

*Echinolytrum dipsaceum* (Rottboell) Desvaux, Journ. Bot. 1: 21, t. 1, 1808; Trimen & Hook. f., Handb. Fl. Ceylon 5: 65, 1900.

*Isolepis dipsacea* (Rottboell) Römer & Schultes, Syst. Veg. 2: 119, 1817; Thwaites, Enum. Pl. Zeyl. 350, 1864.

Distribution: Tropical Africa, India, Indo-China, southern China, Malesia. Wet sandy grounds at low altitudes.

Specimens examined. Polonnaruwa District: Giritale, *Simpson 8712* (PDA). Batticaloa district: Batticaloa, *Thwaites CP 668*, ex pte. (PDA). Ratnapura District: Raigam Korale, *Thwaites CP 668*, ex pte. (K, PDA).

32. **Fimbristylis tetragona** R. Brown, Prodr. Fl. Nov. Holl. 226, 1810; C.B. Clarke in Hook. f., Fl. Brit. India 6: 631, 1893; Trimen & Hook. f., Handb. Fl. Ceylon 5: 48, 1900. Type from Australia.

*Fimbristylis arnottii* Thwaites, Enum. Pl. Zeyl. 348, 1864. Type: Ceylon, Ratnapura, *Thwaites CP 830*, ex pte. (K, lectotype chosen here; PDA, isolectotype), Kaltara, *Thwaites CP 830*, ex pte. (part of syntype, K, PDA).

Distribution: Tropical southern Asia from India and Ceylon through Indo-China northeastwards to southern China, and eastwards to Malesia and northern Australia. Wet places at low altitudes, both in wild habitats and along border of rice fields.

Specimens examined. Jaffna District: Akkarayan Kulam, ca. 6 miles NW of Kokkavil, *T. Koyama et al. 14055* (NY, PDA, US). Kandy District: Madugoda, *Wheeler 12061* (PDA, US). Kegalle District: Kulugamma, [Collector unknown] March 1905 (PDA). Kulutara

District: Kalutara, *MacRae CP 830* ex p. (K, PDA); Naiduwa, *Amaratunga 2545* (PDA); Nugagoda, *Amaratunga 2536* (PDA). Ratnapura District: Ratnapura, *Thwaites CP 830* ex p. (K, PDA); between Delgoda and Karawita, *Lewis & Silva s.n.*, Mar. 1919 (PDA). Matara District: Bengamu, *Trimen s.n.*, Feb. 1881 (PDA).

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*Received August 19, 1974*