

THE CYPERACEAE OF COSTA RICA

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THE CYPERACEAE OF COSTA RICA.

By C. B. CLARKE.

SYNOPTICAL KEY TO THE GENERA.

- Subfamily I. **Scirposchoeneae**. Fertile flowers all with perfect stamens.
Empty glumes at the base of the spikelets, 2 or none; fertile glumes, 2-ranked; hypogynous bristles none; inflorescence subumbellate or capitate, never paniculate.
(CYPEREAE.)
- Style 2-branched; nut compressed laterally.
- Rachilla above the two empty glumes deciduous.. 1. *Kyllinga* (p. 444)
- Rachilla above the two empty glumes persistent.. 2. *Pycreus* (p. 445)
- Style 3-branched.
- Rachilla persistent..... 3. *Cyperus* (p. 447)
- Rachilla deciduous 4. *Mariscus* (p. 451)
- Rachilla breaking into as many joints as there are nuts 5. *Torulinium* (p. 454)
- Empty glumes at base 2 or none; fertile glumes in 3 to several ranks; inflorescence not paniced (except in *Fuirena*). (SCIRPEAE.)
- Style base bulbous, separable from the apex of the nut. Bristles usually obvious; culm leafless; spikelet terminal..... 6. *Eleocharis* (p. 454)
- Bristles none; plants commonly leafy.
- Style persistent, or else deciduous along with the style base..... 7. *Fimbristylis* (p. 457)
- Style deciduous, its discolored base remaining on the nut..... 8. *Bulbostylis* (p. 459)
- Style base not bulbous, passing gradually from the nut into the style proper.
- Plants glabrous; inflorescence capitate 9. *Scirpus* (p. 460)
- Plants pilose; inflorescence paniculate..... 10. *Fuirena* (p. 460)
- Empty glumes at base of spikelets 3 to several; styles bifid.
(RYNCHOSPOREAE.)
- Spikelet cylindric; rachilla breaking into as many joints as there are nuts..... 11. *Dulichium* (p. 460)
- Rachilla short, persistent.
- Bristles none; style branches 2, long; head of spikelets, one only..... 12. *Dichromena* (p. 461)
- Style branches 2, very short in those species having monocephalous inflorescence, long in those with inflorescence not monocephalous..... 13. *Rynchospora* (p. 462)
- Subfamily II. **Sclericariceae**. Flowers all unisexual, the fertile ones axillary.

- Fertile flower subtended by an oval glume. (SCLERICEAE.)
 Fertile spikelet of one basal pistillate flower and one or more staminate flowers, or rudiments of them above it. 14. *Scleria* (p. 465)
 Fertile spikelet subtended at base by a few staminate flowers 15. *Calyptrocarya* (p. 467)
 Fertile flower naked, inclosed within a utricle. (CARICEAE.)
 Utricle inclosing a long hooked bristle 16. *Uncinia* (p. 468)
 Utricle inclosing nothing but the pistil 17. *Carex* (p. 468)
 Subfamily III. **Mapanieae**. Flowers all unisexual; the terminal fertile one naked, and together with the 2 to 6 inferior and staminate, forming a small spikelet with the appearance of being 1-flowered with the flower perfect.
 Spikes compound-paniculate, subumbellate 18. *Hypolytrum* (p. 470)
 Spikes glomerate, forming a single dense head 19. *Mapania* (p. 471)

ANNOTATED CATALOGUE OF THE GENERA AND SPECIES.

1. KYLLINGA Rottb.^a

Spikelet of 4 or 5 glumes; rachilla jointed above the 2 lowest glumes, thence caducous; glumes 2-ranked; the third embracing a bisexual fertile flower, those above it empty; hypogynous bristles none; stamens 1 to 3, anterior; style bifid; nut laterally compressed.—Plants glabrous. Leaves all near the base of the stem. Inflorescence densely capitate, composed of 1 to 3 sessile spikes, each of an indefinite number of spikelets.

Species 45, distributed throughout the warmer parts of the world.

KEY TO THE SPECIES.

- Keel of nut-bearing glume smooth or setulose, not winged. (EUKYLLINGA.)
 Rhizome elongated, horizontal, stoutish.
 Leaves grassy, with long-attenuate apex 1. *K. brevifolia*.
 Leaves rather short, abruptly narrowed at apex 2. *K. pungens*.
 Leaves none, or hardly any; scariously colored 3. *K. peruviana*.
 Annuals or biennials, the rhizome very short or wanting.
 Nut-bearing glume glandless, setulose-scabrous on the keel. 4. *K. pumila*.
 Nut-bearing glume with scattered red glands, smooth on the keel. 5. *K. odorata*.

1. ***Kyllinga brevifolia*** Rottb. Descr. & Ic. 13: pl. 4. f. 3. 1773.
Schoenus coloratus L. Sp. Pl. 1: 43. 1753, in part.
 DISTRIBUTION: Around the world in the warmer regions.
 COSTA RICAN COLLECTIONS: Tufts, altitude 650 meters, Tonduz 9218.
2. ***Kyllinga pungens*** Link, Hort. Berol. 1: 326. 1827.
Kyllinga obtusata J. S. & C. B. Presl, Rel. Haenk. 1: 183. 1828.
 DISTRIBUTION: In South America frequent; in Africa and Asia rare.
 COSTA RICAN COLLECTION: San Carlos, Tonduz 2587.
3. ***Kyllinga peruviana*** Lam. Encyc. 3: 366. 1789.
Kyllinga vaginata Lam. Ill. 1: 148. 1791.
Kyllinga capitata Beauv. Fl. d'Owar. 1: pl. 31. 1804.
Kyllinga aphylla Kunth, Enum. 1: 127. 1837.

^a The character of the genus here, as also in the case of each of the following, is drawn up as having in view no other than the Costa Rican species.

Lyprolepis denudata Steud. Syn. Pl. Glum. 2: 130. 1855.

DISTRIBUTION: Tropical America and Africa.

COSTA RICAN COLLECTIONS: Puerto Limon, *Pittier* 4215; Boca Banana, *Tonduz* 9122.

4. *Kyllinga pumila* Michx. Fl. 1: 28. 1803.

Kyllinga caespitosa Nees in Mart. Fl. Bras. 2¹: 12. 1842, excluding Kunth synonym and variety β .

DISTRIBUTION: Common throughout tropical and temperate America; frequent in Africa.

COSTA RICAN COLLECTIONS: *Hoffmann* 231, 437, 469; *Polakowsky* 4, 160, 409; San Carlos, *Tonduz* 2583; Boruca, *Tonduz* 4793; Talamanca, *Tonduz* 8747; Rio Tufo, altitude 600 meters, *Tonduz* 8180; Turrialba, altitude 570 meters, *Tonduz* 8264; Rio Aqua Caliente, altitude 1,300 meters, *Pittier* 2403.

5. *Kyllinga odorata* Vahl, Enum. 2: 382. 1806.

Kyllinga elongata H. B. K. Nov. Gen. & Sp. 1: 211. 1815.

DISTRIBUTION: Very common in North and South America from Louisiana to Uruguay.

COSTA RICAN COLLECTIONS: *Hoffmann* 702; Rio San Juan, *Pittier* 2580; Greytown; Alajuelita, altitude 1,000 meters, *Tonduz* 8849; San José, altitude 1,100 meters, *Tonduz* 434.

2. PYCREUS Beauv.

Spikelets 5 to many-flowered; rachilla persistent; two lowest glumes empty, persistent; 4 or more next succeeding 2-ranked, bisexual, perfecting nuts, caducous in fruit from the lowest upward; a few of the uppermost sterile or vacant, arranged in about 3 spirals; hypogynous bristles none; stamens 1 to 3, anterior; style branches 2, on a plane passing through the rachilla; nut laterally compressed.—Plants glabrous. Stems leafy near the base, otherwise naked. Spikelets arranged in spikes, often dense, hardly digitate.

Species 63 distributed to the warmer regions of both hemispheres, a few extending to within the Temperate Zone.

KEY TO THE SPECIES.

Superficial cells of the nut, at least in many, longitudinally oblong; nut transversely and delicately undulate-lineate. (ZONATAE.)

Annual, tufted, often simply umbellate..... 1. *P. flavescens*.

Superficial cells of the nut subquadrate; nut minutely reticulate, punctulate, or granular. (RETICULATAE.)

Spikelets straw-colored or brownish-yellow.

Umbels crowded into a single head..... 2. *P. propinquus*.

Spikes subglobose, commonly umbellate..... 3. *P. helvus*.

Spikelets chestnut-brown or variegated with chestnut.

Annual, spikelets subinflated, arranged in loose spikes. 4. *P. lagunetto*.

Stems decumbent at base, often creeping; spikelets rigid, forming dense spikes.

Spikelets 3 mm. wide..... 5. *P. melanostachyus*.

Spikelets 2 mm. wide..... 6. *P. elegantulus*.

1. *Pycreus flavescens* (L.) Beauv.; Reichenb. Fl. Excurs. 1: 72. 1830–1832.

Cyperus flavescens L. Sp. Pl. 1: 46. 1753.

Cyperus fasciculatus Ell. Bot. S. C. & Ga. 1: 63. 1816.

Cyperus elliotianus Schult. in Roem. & Schult. Syst. Mant. 2: 100. 1824.

Pycreus elliotianus Nees, Linnaea 9: 283. 1834.

Cyperus durandii Boeck. Allgem. Bot. Zeitschr. 1: 185. 1895.

Cyperus tonduzianus Boeck. Allgem. Bot. Zeitschr. 1: 187. 1895.

DISTRIBUTION: Rather common in Europe, western Asia, and Africa; rare in America.

COSTA RICAN COLLECTIONS: Hoffmann 190; San José, altitude 1,100 meters, Tonduz 1532, 2832; San Francisco de Guadalupe, altitude 1,100 meters, Tonduz 1807.

2. ***Pycereus propinquus***^a Nees in Mart. Fl. Bras. 2¹: 7. 1842.

Cyperus propinquus Mart. and Schrad.; Nees, loc. cit., as synonym.

Cyperus olfersianus Kunth, Enum. 2: 10. 1837. Not *Pycereus olfersianus* Nees. 1842.

DISTRIBUTION: Quite frequent in the warmer parts of Africa and America.

COSTA RICAN COLLECTION: Cañas Gordas, altitude 1,100 meters, Pittier 11027.

3. ***Pycereus helvus***^b C. B. Clarke in Urb. Symb. Antill. 2: 16. 19. 1900.

Cyperus humboldtianus Schult. in Roem. & Schult. Syst. Mant. 2: 100. 1824.

Cyperus helvus Liebm. Dansk. Vid. Selsk. Skr. 2: 9. 1849.

DISTRIBUTION: Frequent in Mexico and Guatemala; rare in southern Brazil and about Montevideo.

COSTA RICAN COLLECTION: Turrialba, altitude 500 meters, Tonduz 8266.

Pycereus piceus, i. e. *Cyperus piceus* Liebm.,^c is a species of the section Zonatae, not very different from *P. flavescens* Reichenb.

4. ***Pycereus lagunetto*** (Steud.) C. B. Clarke.

Cyperus lagunetto Steud. Syn. Pl. Cyp. 2: 5. 1855.

Cyperus argentinus C. B. Clarke, Journ. Linn. Soc. 21: 64. 1884.

Annual, caespitose; umbel usually simple; spikelets 2 to 6 in each loose spike; glumes chestnut-brown, pale on the back; style bifid; nut compressed laterally, puncticulate or subreticulate, not transversely lineolate.

Stems 1 to 3 dm. long, rather slender. Leaves shorter than the stem, 2 to 3 mm. wide. Spikelets commonly 12 mm. long, 8 to 12-flowered, occasionally as much as 25 mm. long and 32-flowered. Glumes somewhat turgid, slightly inflated (not rigid, much flattened and indurated as in *P. melanostachyus* and *P. elegantula*). Species differing from *P. rivularis* by its loose inflorescence; perhaps rather to be regarded as a southern form of that.

DISTRIBUTION: Rather frequent in Argentina, but in tropical South America rare.

COSTA RICAN COLLECTIONS: San José, altitude 1,100 meters, Tonduz 2,831; Rio Agua Caliente, altitude 1,300 meters, Pittier 2,404.

5. ***Pycereus melanostachyus*** (H. B. K.) C. B. Clarke.

Cyperus melanostachyus H. B. K. Nov. Gen. & Sp. 1: 207.

Cyperus diandrus capitatus Britton, Bull. Torr. Club 13: 205. 1886.

Cyperus intricato-ramosus Boeck. Allgem. Bot. Zeitschr. 1: 186. 1895.

Stem oblique at base; umbel almost crowded into a single head, or rarely (forma "*umbellifera*" Boeckl. ms.) looser, with rays 1 to 4 cm. long; spikelets 3 mm. wide, linear-oblong, much flattened, rather hard, dark chestnut brown, almost black, shining, glumes sharply carinate, rigidly imbricate (but compare var. β below); style bifid; nut ellipsoidal, laterally compressed, obscurely puncticulate, not transversely lineolate.

DISTRIBUTION: Frequent from California to Argentina, very common in Mexico.

COSTA RICAN COLLECTIONS: Hoffmann 207; Tres Rios, Pittier 4336; Carrillo, altitude 300 meters, Cooper 514; Alajuelita, altitude 1,000 meters, Tonduz 678 bis; La Palma, altitude 1,500 meters, Pittier 678a, Tonduz 12627; San José, altitude 1,100 meters, Tonduz 3196; Alajuelita, altitude 1,000 meters, Tonduz 8847.

5a. ***Pycereus melanostachyus variegata*** (H. B. K.) C. B. Clarke.

Cyperus variegatus H. B. K. Nov. Gen. & Sp. 1: 208. 1815.

^a The specific name *olfersianus* is older and unoccupied.—EDITOR.

^b The specific name *humboldtianus* is older and unoccupied.—EDITOR.

^c Dansk. Vid. Selsk. Skr. 2: 12. 1849.

Inflorescence usually more lax; spikelets subspicately arranged, less flattened, more loosely imbricated, less polished, sometimes variegated chestnut color and green.

DISTRIBUTION: Both in Central America and in Argentina.

COSTA RICAN COLLECTIONS: Volcán de Poás, altitude 2,500 meters, *Tonduz* 10763.

6. *Pycneus elegantulus*^a C. B. Clarke in Dur. & Schinz, Fl. Afr. 5: 536. 1895.

Cyperus elegantulus Steud. Flora 25: 583. 1842.

Cyperus cimicinus J. S. & C. B. Presl, Rel. Haenk. 1: 166. 1830.

DISTRIBUTION: Quite common in Africa. Frequent in America all the way from Mexico to Southern Brazil.

COSTA RICAN COLLECTIONS: El Copey, altitude 1,800 meters, *Tonduz*, 12335; Carrillo, *Cooper*, 599.

This species is not easily distinguishable from small specimens of *P. melanostachyus*.

SPECIES OF PYCREUS TO BE LOOKED FOR IN COSTA RICA.

PYCREUS POLYSTACHYUS Beauv. Fl. d'Owar. 2: 48. pl. 86. fig. 2. 1807.

DISTRIBUTION: In all the warmer parts of the world. Occurs in the West Indies in many varieties and quite commonly; not yet received from Costa Rica. The plant resembles *P. propinquus* and *P. helvus*, its spikelets reddish.

3. CYPERUS L.

Spikelets 5 to many-flowered; rachilla persistent; two lowest glumes empty, the 4 or more next succeeding distichous, bisexual, perfecting nuts, deciduous from the base upward, a few of the uppermost glumes sterile or vacant, somewhat triserial; hypogynous bristles none; stamens 1 to 3, anterior; style-branches 3; nut trigonous, the anterior angle not rarely more or less depressed.—Plants glabrous. Stems naked except near the base, there leafy. Spikelets in digitately or spicately clustered spikes.

Species 280; scattered over almost all parts of the world that are warm or temperate, common in hot countries, rare in cold.

KEY TO THE SPECIES.

Spikelets digitate or congested. (PYCNOSTACHYAE.)

Annuals (here also *C. haspan*, no. 3).

Stem monocephalous; spikelets green 1. *C. tenerrimus*.

Spikes umbellate, ferruginous or brownish..... 2. *C. uncinatus*.

Perennials.

Stamen 1; plants large or of middle size.

Rays of the umbel short.

Leaves transversely lineolate..... 6. *C. virens*.

Leaves not transversely lineolate.

Spikelets much compressed..... 7. *C. surinamensis*.

Spikelets turgid, congested..... 8. *C. luzulae*.

Rays of the umbel longer than the stem..... 9. *C. simplex*.

Stamens 2 or 3; stems bearing many spikes.

Spikelets 1 to 2 mm. wide; nut small.

Glumes imbricated 3. *C. haspan*.

Glumes distant, forming a loose spikelet .. 11. *C. chorisanthus*.

Spikelets 2 to 3 mm. wide.

Stems leafless.

Plant dioecious 5. *C. canus*.

Spikelets bisexual 4. *C. alternifolius*.

Leaves present, long 10. *C. difusus*.

^a The specific name *cimicinus* is older and unoccupied.—EDITOR.

Spikelets spicately arranged. (CHORISTACHYAE.)

Annual.

Rachilla of spikelets scarcely winged.

Glumes rather obtuse 12. *C. sphacelatus*.

Glumes acute, mucronulate 13. *C. compressus*.

Rachilla of spikelets winged; large annual 15. *C. radiatus*.

Perennial.

Stolons many, slender, disappearing 14. *C. esculentus*.

1. ***Cyperus tenerrimus*** J. S. & C. B. Presl, Rel. Haenk. 1: 166. 1830.

Cyperus cymbaeformis Liebm. Dansk. Vid. Selsk. Skr. 2: 20. 1849.

Cyperus wawrai Boeck. Linnaea 38: 363. 1874.

Annual, stem monocephalous; bracts 4 to 8, very long, grassy; glumes elliptic, cymbiform, curved, obtuse, 5-costate, pale cinnamon color; style 3-fid; nut oblong, of two-thirds the length of the glume.

DISTRIBUTION: Central America, somewhat rare.

COSTA RICAN COLLECTIONS: Littoral zone, Salinas Bay, Tonduz 2713, 2866; Nicoya, Tonduz 13741.

2. ***Cyperus uncinatus*** Poir. Encyc. 7: 247. 1806.

Cyperus cuspidatus H. B. K. Nov. Gen. & Sp. 1: 204. 1815.

Cyperus aureus J. S. & C. B. Presl, Rel. Haenk. 1: 168. 1830.

Cyperus hamulatus Kunth, Enum. 2: 22. 1837.

DISTRIBUTION: In almost all warm countries; in Central America rather rare.

COSTA RICAN COLLECTIONS: San José, Tonduz 8606.

3. ***Cyperus haspan*** L. Sp. Pl. 1: 45. 1753.

Cyperus aphyllus Vahl, Eclog. Amer. 2: 6. 1798.

Cyperus nudus H. B. K. Nov. Gen. & Sp. 1: 203. 1815.

Cyperus adenophorus Schrad.; Nees in Mart. Fl. Bras. 21: 28. 1842.

Cyperus efoliatus Boeckl. Allgem. Bot. Zeitsch. 1: 226. 1895.

DISTRIBUTION: Throughout nearly all warmer regions; often a troublesome weed in fields. Very common in Central America.

COSTA RICAN COLLECTIONS: Pittier & Tonduz 3804b; La Cruz de Guanacaste, Pittier 2714; Turrialba, altitude 500 meters, Tonduz 8304; Cañas Gordas, altitude 1,100 meters, Tonduz 10952.

Tonduz no. 8304 is a large specimen, the stem a meter high, 5 mm. in diameter at summit. The spikelets are altogether those of typical *Cyperus haspan*. The summit of the stem is notably punctate with stomata. The stems in Pittier's no. 2714 are in like manner punctate. Old World specimens are usually much smaller, and with the stomata on the stem indistinct; nevertheless, there occur in the Old World large specimens, the long stems dotted with stomata at summit, but they are more rare here than in America.

4. ***Cyperus alternifolius*** L. Mant. 28. 1767.

DISTRIBUTION: Madagascar and Bourbon, where it is perhaps indigenous; extensively cultivated.

COSTA RICAN COLLECTIONS: Public parks at San José, altitude 1,100 meters, Tonduz 10888.

This plant is perhaps *C. flabelliformis* Rottb., forma *hortensis*? *C. flabelliformis* Rottb. is common in Africa and widely dispersed.

5. ***Cyperus canus*** J. S. & C. B. Presl, Rel. Haenk. 1: 179. 1828.

Dioecious, leafless; stem 1 m. high, robust; bracts 6 to 12, equal, surpassing the umbel; this ample, 1 to 3 dm. broad, compound and even decompound; spikelets almost countless, digitately clustered 3 to 8 in a place; style 3-fid.

DISTRIBUTION: Peculiar to Central America, where it is of frequent occurrence.

COSTA RICAN COLLECTIONS: Hoffmann 11; Huebsch. A remarkable species.

6. *Cyperus virens* Michx. Fl. 1: 28. 1803.*Cyperus sordidus* J. S. & C. B. Presl, Rel. Haenk. 1: 171. 1828.

DISTRIBUTION: Throughout warm and temperate America; frequent in Central America.

COSTA RICAN COLLECTIONS: Santa Maria, altitude 1,400 meters, *Tonduz* 14629; San Marcos de Dota, altitude 1,200 meters, *Tonduz* 2250; Cartago, altitude 1,400 meters, *Biolley* 8990; Río Tarrazú, *Tonduz* 7882.7. *Cyperus surinamensis* Rottb. Descr. & Ic. 35. pl. 6. f. 5. 1773.

DISTRIBUTION: Very common in the warmer parts of America.

COSTA RICAN COLLECTIONS: Diquís below Térraba, *Tonduz* 3578; Boca Banana, *Tonduz* 9124; San Carlos, *Pittier* 2586.8. *Cyperus luzulae* Retz. Obs. 4: 11. 1786.*Scirpus luzulae* L. Sp. Pl. 1: 75. 1753.*Cyperus polycephalus* Lam. Tabl. Encyc. 1: 147. 1791.*Mariscus polycephalus* Link, Hort. Berol. 1: 324. 1827.

DISTRIBUTION: In tropical America, common.

COSTA RICAN COLLECTIONS: *Polakowsky* 398; Buenos Aires, altitude 300 meters, *Tonduz* 4888; Térraba, altitude 250 meters, *Tonduz* 3580; Turrialba, altitude 500 meters, *Tonduz* 8275; El Cordoncillo, *Pittier* 3591; Río Grande de Térraba, *Tonduz* 6720; Boruca, *Tonduz* 4791; Carrillo, altitude 300 meters, *Tonduz* 1185; Talamanca, altitude 100 meters, *Tonduz* 8738, 8752, 9220; San Carlos, *Tonduz* 2586; Carrillo, *Cooper* 547, 584; San Miguel, *Biolley* 7464.9. *Cyperus simplex* H. B. K. Nov. Gen. & Sp. 1: 207. 1815.

DISTRIBUTION: Frequent in South America; in Central America somewhat rare.

COSTA RICAN COLLECTION: Pond at Rancho Redondo, alt. 1,400 meters, *Pittier* 1138.10. *Cyperus diffusus* Vahl, Enum. 2: 321. 1806.*Cyperus tolucensis* H. B. K. Nov. Gen. & Sp. 1: 206. 1815.

DISTRIBUTION: Throughout the warmer parts of both hemispheres.

COSTA RICAN COLLECTIONS: *Pittier* 3542; Vallée du General, *Pittier* 3377, 3379; Boruca, altitude 450 meters, *Tonduz* 3584, 4476; Old Harbor, *Tonduz* 3751; Talamanca, altitude 200 meters, *Tonduz* 9501; Alajuelita, altitude 1,000 meters, *Tonduz* 8848; Turrialba, altitude 550 meters, *Tonduz* 8359; Golfo de Osa, *Tonduz* 10102; Buenos Aires, altitude 250 meters, *Tonduz* 3587, 3592, 3615 bis.11. *Cyperus chorisanthus* C. B. Clarke, sp. nov.

Rays of the umbel both primary and secondary slender for the plant; many of the spikelets solitary, some in pairs or threes, 13 mm. long, 2 mm. wide, 14-flowered; glumes rather distant, ovate, but lanceolately produced; nut ellipsoidal, of about half the length of the glume, black in maturity.—Stems 60 cm. long, slender, at apex triquetrous and almost 3-winged. Leaves of the length of the stem, 1 cm. wide, obscurely 3-nerved. Umbel 1 to 2 dm. in diameter, loose; bracts 5 or 6, the lowest 25 cm. long, 6 mm. wide. Glumes 1 to 2 mm. long, spreading obliquely, green and scabrous on the keel. Stamens 3. Style hardly any; its branches 3, long, very slender, tawny.—Allied to *C. longifolius* Poir., differing in that the glumes are not imbricated, but distant.

Type U. S. National Herbarium no. 818147.

COSTA RICAN COLLECTIONS: Forests of Boruca, altitude 460 meters, *Tonduz* 4475.12. *Cyperus sphacelatus* Rottb. Descr. & Ic. 26. 1773.

DISTRIBUTION: Africa and America, frequent in the warmer parts of both.

COSTA RICAN COLLECTION: San Carlos, *Tonduz* 2589.13. *Cyperus compressus* L. Sp. Pl. ed. 2. 1: 68. 1762.

DISTRIBUTION: Widely dispersed throughout nearly all warmer parts of the earth.

COSTA RICAN COLLECTIONS: Río San Juan, *Pittier* 2581; San Domingo de Osa, *Tonduz* 10080.

14. *Cyperus esculentus* L. Sp. Pl. 1: 45. 1753.
Cyperus fulvescens Liebm. Dansk. Vid. Selsk. Skr. 2: 22. 1849.
 DISTRIBUTION: Warmer regions of the whole world.
 COSTA RICAN COLLECTIONS: Puerto Limon, *Pittier* 4214; Talamanca, *Tonduz* 8739.
15. *Cyperus radiatus* Vahl, Enum. 2: 369. 1806.
Cyperus campestris Schrad.; Nees, Mart. Fl. Bras. 2: 35. 1842.
 DISTRIBUTION: Very common in warm regions of the Old World; somewhat rare in those of the New World.
 COSTA RICAN COLLECTION: San Carlos, *Tonduz* 2592.
 [CYPERUS MACROLEPIS Boeckl. in Kneuck. Allgem. Bot. Zeitsch. 1: 226. 1895, represented by *Tonduz* no. 8185, appears to have been overlooked by Mr. Clarke.—EDITOR.]

SPECIES OF CYPERUS TO BE LOOKED FOR IN COSTA RICA.

- CYPERUS SESLERIODES H. B. K. Nov. Gen. & Sp. 1: 209. 1815.
 DISTRIBUTION: Common in Central America; in South America rare.
 Differs from *C. tenerrimus* Presl, in that its stems are ligneous at base, nodose-thickened, and fasciated on a very short rootstock; also in some other points.
- CYPERUS HUMILIS Kunth, Enum. 2: 23. 1837.
 DISTRIBUTION: In Central America, where it is of frequent occurrence.
 Differs from *C. tenerrimus* Presl, among other things, in that the glumes are neither cymbiform nor curved.
- CYPERUS AMABILIS Vahl, Enum. 2: 318. 1806.
Cyperus aureus H. B. K. Nov. Gen. & Sp. 1: 205. 1815, not Georgi. 1802.
Cyperus glareosus Liebm. Dansk. Vid. Selsk. Skr. 2: 16. 1850.
 DISTRIBUTION: Throughout almost all warm countries; frequent in Central America.
 Differs most notably from *C. uncinatus* Poir. in that the mucro of the glume is not uncinata, but straight, short, or even wanting.
- CYPERUS OCHRACEUS Vahl, Enum. 2: 325. 1806.
 DISTRIBUTION: Central America, common.
 Differs from *C. surinamensis* Rottb. among other points in that its glume is slightly inflated rather than compressed; from *C. virens* Michx. in that the trigonous apex of its stem is nearly smooth.
- CYPERUS ELEGANS L. Sp. Pl. ed. 2. 1: 68. 1762.
Cyperus viscosus Sw. Prod. Veg. Ind. Occ. 20. 1788.
 DISTRIBUTION: Common in the West Indies; frequent in other parts of tropical America.
 Differs from its allies in that its stems and foliage are usually minutely viscid-pubescent.
- CYPERUS PROLIXUS H. B. K. Nov. Gen. & Sp. 1: 206. 1815.
Comostemum schottii Nees, Linnaea 9: 283. 1834.
Cyperus amplissimus Steud. Syn. Pl. Glum. 2: 316. 1855.
 DISTRIBUTION: Warmer parts of America, frequent.
 A showy species, allied to *C. distans* L. f. Stem 1 to 1.5 meters long. Leaves 50 to 100 cm. long, 1 to 2 cm. wide. Umbel 40 to 60 cm. in diameter and copious. Spikelets 15 mm. long, 10 to 18; flowered, pale or brick-reddish.
- CYPERUS ARTICULATUS L. Sp. Pl. 1: 44. 1753.
 DISTRIBUTION: Almost all warm regions throughout the world.
 Stems stout, 10 to 20 cm. long, terete, false-septate. Bracts of the umbel almost none.

Cyperus rotundus L. Sp. Pl. ed. 2. 1: 67. 1762.

DISTRIBUTION: Common in all warmer parts of the world; a troublesome weed in cultivated lands.

Allied to *C. esculentus* L. and much resembling it; differing by its stolons, which are stout and woody, rather than slender and evanescent.

3. *MARISCUS* Gaertn.

Spikelets 1 to several-flowered; rachilla continuous, deciduous from a cushion just above the two lowest empty glumes; fertile glumes long persistent; otherwise like *Cyperus*.—Leaves in the Costa Rican species elongated, narrow, green.

Species 180, distributed to all the warmer parts of the globe.

KEY TO THE SPECIES.

Spikelets few-flowered, narrow; umbel simple.

Spikelets minute, maturing but 1 nut..... 1. *M. haenkei*.

Spikelets maturing 2 to 4 nuts, greenish straw-color..... 2. *M. sieberianus*.

Spikes of every ray of the umbel digitate; spikelets short, bearing few nutlets.

Spikes long.

Spikelets turgid, red-dotted..... 3. *M. mutisii*.

Spikelets green, linear-oblong..... 4. *M. ehrenbergianus*.

Spikes short.

Spikelets short, tawny, congested..... 5. *M. rufus*.

Spikelets oblong, maturing 3 to 7 nuts; rootstock horizontal.

Umbel crowded almost into a head..... 6. *M. manimae*.

Spikelets spicate, mostly loosely so.

Spikelets linear, maturing 2 to 4 nuts; spikes usually long.

Spikelets somewhat densely crowded..... 7. *M. jacquinii*.

Spikelets rather remote..... 8. *M. dissitiflorus*.

Spikelets usually maturing 4 to 16 nuts.

Spikelets linear, green..... 9. *M. flabelliformis*.

Spikelets yellowish-brown, flattened..... 10. *M. strigosus*.

Spikelets deep blood-red brown..... 11. *M. saturatus*.

1. *Mariscus haenkii* J. S. & C. B. Presl, Rel. Haenk 1: 181. 1828.

Cyperus pittieri Boeckl. Allgem. Bot. Zeitschr. 2: 19. 1896.

Umbel simple; spikes rather small, sessile or nearly so, dense, dark-brown; spikelets linear-oblong, maturing but 1 nut; fertile glume striate, acutish; style 3-fid; nut linear-oblong, two-thirds the length of the glume.—Fruiting spikelets 3 mm. long, 5 to 1 mm. wide, not turgid; rachilla broadly winged above the fertile glume, the wing resembling a second glume, but the rachilla also bearing a very small depauperate glume.

DISTRIBUTION: California; Mexico.

COSTA RICAN COLLECTION: Salinas Bay, Tonduz 2711.

2. *Mariscus sieberianus* Nees, Linnaea 9: 286. 1834.

DISTRIBUTION: Very common in the warmer parts of the Old World; in the New World rare.

2a. *Mariscus sieberianus evolutior* C. B. Clarke in Hook. f. Fl. Brit. Ind. 6: 622. 1894. Spikelets linear, 2 to 4 nut-bearing.

DISTRIBUTION: Heated regions of the Old World, rather frequent; in the New World less so.

COSTA RICAN COLLECTIONS: Talamanca, Tonduz 8737; El Rodeo de Paquita, altitude 900 meters, Tonduz 1621.

3. **Mariscus mutisii** H. B. K. Nov. Gen. & Sp. 1: 216. *pl.* 66. 1815.
Cyperus mutisii Griseb. Fl. Brit. West Ind. 567. 1864.
 DISTRIBUTION: Tropical parts of America.
 COSTA RICAN COLLECTIONS: Alajuelita, altitude 1,000 meters, *Tonduz* 8844; Rio Tiribí, *Tonduz* 6947.
4. **Mariscus ehrenbergianus** (Boeckl.) C. B. Clarke.
Cyperus ehrenbergianus Boeckl. Linnaea 36: 391. 1869-70.
Cyperus randuzii [*tonduzii*] Boeckl. Allgem. Bot. Zeitschr. 2: 17. 1896, slender variety excluded.
 Spikes 2 to 6, cylindric, dense, digitate on each rather long ray of the umbel; spikelets small, oblong, each maturing 1 to 3 tawny greenish nuts; glumes ovate, acute, imbricated in fruit; style 3-fid.
 DISTRIBUTION: Tropical America, sparse.
 COSTA RICAN COLLECTIONS: Nicoya, *Tonduz* 13743; El Rodeo de Paquita, altitude 900 meters, *Tonduz* 1621.
5. **Mariscus rufus**^a H. B. K. Nov. Gen. & Sp. 1: 216. *pl.* 67. 1815.
Cyperus ligularis L. Amoen. Acad. 5: 391. 1759.
Cyperus coriifolius Boeckl. Linnaea 36: 391. 1869-70, in part.
 DISTRIBUTION: Common in tropical Africa and America.
 COSTA RICAN COLLECTIONS: Sipurio, altitude 150 meters, *Tonduz* 8728; Puerto Limón, *Pittier* 4213; Boca Banana, *Tonduz* 9123; Limón, *Tonduz* 9795; Salinas Bay, *Tonduz* 2712; San Carlos, *Tonduz* 2590.
6. **Mariscus manimae** (H. B. K.) C. B. Clarke.
Cyperus manimae H. B. K. Nov. Gen. & Sp. 1: 209. 1815
Cyperus spectabilis coarctatus Boeckl. Linnaea 35: 606. 1867-68, in part.
 Stolon thickened into a rhizome 3 to 4 mm. in diameter; spikes 2 to 4, rather long-peduncled, forming a simple umbel, ovoid or cylindric, dense, tawny yellow green; spikelets oblong, maturing 3 to 7 nuts; glumes ovate, obtuse, striate, at length obliquely spreading, not caducous; style 3-fid; nut ellipsoid, trigonous, two-thirds to three-fourths as long as the glume.
 DISTRIBUTION: Mexico.
- 6a. **Mariscus manimae divergens** (H. B. K.) C. B. Clarke.
Cyperus divergens H. B. K. Nov. Gen. & Sp. 1: 208. 1815.
Cyperus triceps Nees, Linnaea 19: 697. 1847.
Cyperus asperimus Liebm. Dansk. Vid. Selsk. Skr. 2: 30. 1849.
 Spikes sessile or short-peduncled; summit of stem, together with the bracts and leaves, often densely or sparsely hispid-scabrous.
 DISTRIBUTION: In Central America (with the Andes at Quito) abundant.
 COSTA RICAN COLLECTIONS: *Hoffmann* 343; Cartago, altitude 1,400 meters, *Tonduz* 10756.
 Species common in Central America in many varieties and forms. In my opinion the following belong here:
- 6b. **Mariscus manimae apiculatus** (Liebm.) C. B. Clarke.
Cyperus apiculatus Liebm. Dansk. Vid. Selsk. Skr. 2: 32. 1849.
 Keels of the glumes excurrent.
- 6c. **Mariscus manimae hartwegianus** C. B. Clarke.
 Spikes crowded into a single head; spikelets dark-red, 10 to 12-flowered.
7. **Mariscus jacquinii** H. B. K. Nov. Gen. & Sp. 1: 216. 1815.
Carex hermaphrodita Jacq. Coll. 4: 174. 1790.
Cyperus thyrsiflorus Jungh. Linnaea 4: 24. 1831.
Mariscus longiradiatus Liebm. Dansk. Vid. Selsk. Skr. 2: 44. 1849.

^a The specific name *ligularis* is older and unoccupied.—EDITOR.

- DISTRIBUTION: An American species, frequent from California to Venezuela.
- COSTA RICAN COLLECTIONS: *Hoffmann* 54; San José, altitude 1,100 meters, *Cooper* 5990, *Tonduz* 1428, in part; Cartago, altitude 1,300 meters, *Tonduz* 10443.
- 7a. ***Mariscus jacquini* angustior** C. B. Clarke, subsp. nov.
Cyperus flavomaris *peduncularis* Britton, Bull. Torr. Club **13**: 215. 1886.^a
 Smaller, bracts and spikes narrower, less deeply colored.
 DISTRIBUTION: Frequent from California to Venezuela.
 COSTA RICAN COLLECTIONS: San Francisco de Guadalupe, altitude 1,100 meters, *Tonduz* 9699, 9043; San José, altitude 1,100 meters, *Tonduz* 1532.
 Hardly, by its denser spikes, specifically distinct from *M. dissitiflorus*.
8. ***Mariscus dissitiflorus*** C. B. Clarke in Urban, Symb. Antill. **2**: 45. 1900.
Cyperus dissitiflorus Nees, Linnaea **9**: 285. 1834.
Cyperus randuzii [*tonduzii*] *tenuis* Boeckl. Allgem. Bot. Zeitsch. **2**: 17. 1896.
 DISTRIBUTION: Louisiana to Venezuela.
 COSTA RICAN COLLECTIONS: *Biolley* 9461; Talamanca, altitude 200 meters, *Tonduz* 9505; San José, altitude 1,100 meters, *Tonduz* 1428, in part.
- 8a. ***Mariscus dissitiflorus lucidior*** C. B. Clarke in Urban, Symb. Antill. **2**: 45. 1900.
Cyperus pseudosphacelatus Boeckl. Cyp. Nov. **2**: 7. 1890.
 DISTRIBUTION: Texas to Guiana.
 COSTA RICAN COLLECTIONS: Along road at Guadalupe, *Tonduz* 9786.
9. ***Mariscus flabelliformis*** H. B. K. Nov. Gen. & Sp. **1**: 215. 1815.
Cyperus caracasanus Kunth, Enum. **2**: 86. 1837.
Cyperus breviradiatus Liebm. Dansk. Vid. Selsk. Skr. **2**: 26. 1849.
Cyperus hartii Boeckl. Cyp. Nov. **1**: 9. 1888.
 DISTRIBUTION: Tropics of both Old and New Worlds, more especially of the New.
 COSTA RICAN COLLECTIONS: *Polakowsky* 43, 541; Salinas Bay, *Pittier* 2717; Río Tuís, altitude 600 meters, *Tonduz* 8183; San José, altitude 1,100 meters, *Pittier* 225; *Tonduz* 433; slopes of La Carpintera, altitude 1,700 meters [*Pittier*], 4335; Turrialba, altitude 500 meters, *Tonduz* 8351; Alajuelita, altitude 1,000 meters, *Tonduz* 8842; Nicoya, *Tonduz* 13774; Río Zhorquín, *Tonduz* 8530; Talamanca, *Tonduz* 8737; San Rafael, *Pittier* 2584; Puerto Viejo, *Biolley* 7461; Golfo de Osa, *Tonduz* 10027.
Cyperus hartii Boeckl. is a feebler form, the spikelets sometimes bearing few nuts.
Mariscus flabelliformis differs from *M. jacquini* β and *M. dissitiflorus* by having the rays of its umbel much shorter, while the spikelets are often longer.
 Here many species have been proposed by various authors, which are not distinct.
10. ***Mariscus strigosus*** (L.) C. B. Clarke.
Cyperus strigosus L. Sp. Pl. **1**: 69. 1753.
 Rhizome hardly any; leaves and tracts long, narrow, not spongy; umbel simple or compound; spikes short-cylindric, dense, yellow-brown; spikelets linear, flattened, maturing 6 to 8 nuts, divaricately spreading; glumes elliptic, scarcely acute, at length obliquely spreading; style 3-fid; nut linear-oblong, curved, half the length of the glume.
 DISTRIBUTION: United States, common. Also in Mexico and Costa Rica.
 COSTA RICAN COLLECTIONS: Talamanca, *Tonduz* 8746 bis.
11. ***Mariscus saturatus*** (C. B. Clarke) Donnell Smith.
Cyperus saturatus C. B. Clarke, Engl. Bot. Jahrb. **37**: 517. 1906.
 Robust, leaves and bracts long, rather broad, somewhat triple-nerved; umbel compound, rather dense; spikelets in fascicles of 3 to 8 in a place, deep blood-red brown, narrowly oblong, 12 to 20-flowered; glumes in fruit hardly imbricate, their

^a This citation is made instead of *Cyperus flavus peduncularis* Britton, Proc. Am. Acad. **21**: 442. 1886, used by Mr. Clarke, the latter name being a nomen nudum.

margins slightly incurved; rachilla of the spikelets wingless; style 3-fid; nut broadly ellipsoid, tapering to each end, half the length of the glume, scabrous, especially at apex, with small elevated points.—Leaves nearly a meter long, as much as 2 cm. wide. Umbel subglobose, 9 cm. in diameter. Spikelets 12 mm. long, 3 mm. wide.

I doubt whether this be not really the *Cyperus laetus* of Presl.

COSTA RICAN COLLECTIONS: Llanos de Santa Clara, altitude 200 meters, *Donnell Smith* 4989, 6839; Tuís, altitude 600 meters, *Tonduz* 8185, 11391.

5. TORULINIUM Desv.

Spikelets terete or nearly so, maturing 4 to 16 nuts; rachilla breaking into joints; nut partly inclosed by the wings of the rachilla and deciduous with its node; otherwise like *Mariscus*.

Species 8, of which 7 are endemic in America, chiefly tropical; the other distributed to the warmer parts of both hemispheres.

1. *Torulinium confertum* ^aHamilt. Prod. Ind. Occ. 15. 1825.

Cyperus odoratus L. Sp. Pl. 1: 46. 1753, in part.

Cyperus ferax L. C. Rich. Act. Soc. Hist. Nat. Paris 1: 106. 1792.

Cyperus jubaeiflorus Rudge, Pl. Guian. 17. pl. 21. 1805.

Mariscus pohlianus Nees in Mart. Fl. Bras. 2¹: 50. 1842.

Dididium ferox Schrad.; Nees in Mart. Fl. Bras. 2¹: 54. 1842.

Mariscus ferax C. B. Clarke in Hook. f. Fl. Brit. Ind. 6: 624. 1893.

Cyperus laetus obtusiflorus Boeckl. Allgem. Bot. Zeitschr. 2: 2. 1896.

DISTRIBUTION: Occurs in all warm countries, more sparingly in the Old World, very common in the New and in Oceania.

COSTA RICAN COLLECTIONS: Rio Coto de Osa, *Pittier* 9987; La Florida, *Pittier* 11291; Talamanca, altitude 0 to 200 meters, *Tonduz* 8746, 9506; Tocorí, *Tonduz* 7712; San Rafael, *Pittier*, 2585; Puerto Viejo, *Biolley* 7457.

6. ELEOCHARIS R. Br.

Glumes rather many, or very numerous, in from 3 to many spirals; the lowest obtuse, usually vacant, little or not at all longer than the others; lowest flower bisexual, maturing a nut; hypogynous bristles 3 to 8, usually of about the length of the nut, retrorsely scabrous, sometimes wanting; stamens 3 to 1, anterior; style glabrous, its branches 3 or 2, linear; style base enlarged, pyramidal or bulb-like or conical, easily distinguished from the summit of the nut; nut trigonous, or plano-convex, sessile, narrowly or broadly obovoid; style persistent on the nut.—Stems glabrous, leafless, bearing a single spike.

Species 120, dispersed throughout the world; abundant in America.

KEY TO THE SPECIES.

Stoloniferous; stems robust; spikes rather long-cylindric; glumes firm, plano-concave, hardly keeled, deep straw-color. (Subgenus LIMNOCHLOA.)

Stems at apex triquetrous or acutely triangular..... 1. *E. mutata*.

Stems at apex terete or obscurely triangular..... 2. *E. variegata*.

Stems small, or of middle size; glumes membranaceous, 1 to 3-nerved on the keel; style bifid. (Subgenus ELEOGENUS).

Sheath delicately scarious at summit, rugose, easily worn off.

Stems slender or capillary 3. *E. ochreatea*.

Stems rather rigid 4. *E. olivacea*.

Sheath herbaceous at summit, or at least firm.

Annual, tufted..... 5. *E. capitata*.

Rootstock horizontal, stout 6. *E. nodulosa*.

^a The specific name *ferax* is older and unoccupied.—EDITOR.

Spike much broader than the stem; glumes membranaceous, often green on the keel; style 3-fid. (Subgenus *EUELEOCHARIS*.)

Nut costate lengthwise; transversely barred between the costae

(*ACICULARES*)..... 7. *E. acicularis*.

Nut cancellate, hardly costate lengthwise (*CHAETARIAE*)..... 8. *E. chaetaria*.

Nut smooth, or obscurely reticulate, not cancellate (*LEIOCARPICAE*).

Stems slender, or at least not stout.

Annuals, tufted; nut white.

Stems capillary or setaceous..... 9. *E. minima*.

Stems slender, 4-angled..... 10. *E. durandii*.

Rhizomatous.

Spike narrower at summit; nut white..... 11. *E. sulcata*.

Spike obovoid; nut tawny..... 12. *E. pachystyla*.

Stems 3 to 8 mm. in diameter, false septate..... 13. *E. geniculata*.

1. ***Eleocharis mutata*** R. Br. Prod. Fl. Nov. Hol. 224. 1810.

Scirpus mutatus L. Amoen. Acad. 5: 391. 1760.

Limnochloa mutata Nees, Linnaea 9: 294. 1834.

DISTRIBUTION: From Mexico to Uruguay; quite common in the West Indies and tropical America generally.

COSTA RICAN COLLECTION: Limon, *Pittier* 10342.

2. ***Eleocharis variegata*** Presl in Oken, Isis 21: 269. 1828.

DISTRIBUTION: Mascarene Islands.

2a. ***Eleocharis variegata laxiflora*** Ridley, Journ. Singapore Asiat. Soc. 23: 14. 1891.

Scirpus laxiflorus Thwaites, Enum. Pl. Zeyl. 435. 1864.

Scirpus plicarhachis Griseb. Cat. Pl. Cub. 239. 1866.

DISTRIBUTION: In southeastern Asia, frequent; more sparingly in Oceania and Central America.

COSTA RICAN COLLECTION: Buenos Aires, altitude 200 meters, *Pittier* 10593.

3. ***Eleocharis ochreatea*** (Grisebach) Nees; C. B. Clarke in Urb. Symb. Antill. 2: 63. 1900.

Chaetocyperus polymorphus Nees, Linnaea 9: 289. 1834, in part, nomen nudum.

Eleocharis ochreateus Nees, op. cit. 294, nomen nudum.

Scirpus ochreateus Griseb. Fl. Brit. West Ind. 570. 1864.

Heleocharis albivaginata Boeckl. Vidensk. Meddel. Kjöb. 133. 1869-70; Linnaea 36: 436. 1870.

H. pittieri Boeckl. Allgem. Bot. Zeitschr. 2: 35. 1896.

DISTRIBUTION: Warmer parts of America common; in the Old World less so, but in several varieties.

COSTA RICAN COLLECTION: San José, altitude 1,100 meters, *Pittier* 548.

4. ***Eleocharis olivacea*** Torr. Ann. Lyc. N. Y. 3: 300. 1836.

Stems 5 to 10 cm. long; sheath scarious at summit, loose, crisped, easily worn off; spikelet 5 to 8 mm. long; 7 to 30-flowered; style bifid; nut obovoid, plano-convex, olive-green, becoming tawny chestnut colored, smooth, obsoletely reticulate; style base small, bulbous-conical.—Rootstock slender. Spikelet ovoid, acutish. Hypogynous bristles 7, or sometimes 6, or even 3 only, surpassing the nut.

DISTRIBUTION: From Canada to Florida and Colorado sparingly; Costa Rica.

COSTA RICAN COLLECTIONS: La Palma, altitude 1,500 to 1,800 meters, *Tonduz*, 9697.

Species rather closely allied to *E. ochreatea*, Nees; differing by its firmer texture.

5. ***Eleocharis capitata*** R. Br. Prod. Fl. Nov. Holl. 225. 1810.

Scirpus caribaeus Rottb. Descr. & Ic. 46. pl. 15. f. 3. 1773.

Scirpus capitatus L. Sp. Pl. 1: 48. 1753, in part.

- Eleocharis setacea* R. Br. Prod. Fl. Nov. Holl. 225. 1810, not R. Br. op. cit. 224.
Eleogenus capitatus Nees, Linnaea 9: 294. 1834.
 DISTRIBUTION: Warmer regions of both hemispheres, common.
 COSTA RICAN COLLECTIONS: Talamanca, altitude 100 meters, Tonduz 9216.
6. *Eleocharis nodulosa* Schult. in Roem. & Schult. Syst. Mant. 2: 87. 1824.
Scirpus nodulosus Roth, Nov. Pl. Sp. Ind. Or. 29. 1821.
Eleogenus nodulosus Nees in Mart. Fl. Bras. 2¹: 104. 1842.
 DISTRIBUTION: From Missouri to Texas and Uruguay, very common.
 COSTA RICAN COLLECTIONS: Hoffmann 624; [Tonduz] 8845; El Tablazo, altitude 1,800 meters, Tonduz 7916, 7917.
7. *Eleocharis acicularis* R. Br. Prod. Fl. Nov. Holl. 224. 1810.
Scirpus acicularis L. Sp. Pl. 1: 48. 1753.
Chaetocyperus polymorphus Nees, Linnaea 9: 289. 1834, in part.
 DISTRIBUTION: In tropical and warm temperate regions of both Old World and New, very common.
 COSTA RICAN COLLECTIONS: Poás, altitude 2,500 meters, Pittier 2978, Tonduz 10762, 10764.
8. *Eleocharis chaetaria*^a Roem. & Schult. Syst. 2: 154. 1817.
Scirpus chaetarius Spreng. Syst 1: 203. 1825.
Cyperus setaceus Retz. Obs. 5: 10. 1779-91.
Eleocharis setacea R. Br. Prod. Fl. Nov. Holl. 224. 1810, not R. Br. op. cit. 225.
Chaetocyperus niveus Liebm. Dansk. Vid. Selskr. Skr. 2: 54. 1849.
Chaetocyperus rugulosus Nees, Bonplandia 3: 86. 1855.
Eleocharis triflora Boeckl. Flora 63: 437. 1880.
 DISTRIBUTION: In all tropical and temperate parts of the world, very common.
 COSTA RICAN COLLECTIONS: Polakowsky 404; Tres Rios, Pittier 4338; La Palma, altitude 1,500 meters, Pittier 311, 676, Tonduz 12646; Turrialba, altitude 500 meters, Tonduz 8265; Rio Tuís, altitude 600 meters, Tonduz 8184, 11253; Golfo de Osa, Tonduz 9938; Buenos Aires, Pittier 3586, Tonduz 4889; El Rodeo de Paquita, altitude 900 meters, Tonduz 1619.
9. *Eleocharis minima* Kunth, Enum. 2: 139. 1837.
Chaetocyperus urceolatus Liebm. Dansk. Vid. Selsk. Skr. 2: 55. 1849.
 DISTRIBUTION: Florida and Mexico to Rio de Janeiro.
 COSTA RICAN COLLECTION: Cañas Gordas, altitude 1,100 meters, Pittier 10951.
10. *Eleocharis durandii* Boeckl. Allgem. Bot. Zeitschr. 2: 34. 1896.
 Tufted, stems 10 to 30 cm. long, slender, sharply quadrangular; spikelet 4 to 7 mm. long, ellipsoidal, obtuse, dense; style 3-fid; bristles 6, about equaling the nut, white; nut small, trigonous, smooth, white, not much narrowed at summit, subtruncate, style base pyramidal, tawny.—Rhizome none (or according to Boeckeler occasionally long and slender). Stems strict; sheath firm at summit, on one side produced lanceolately. Bristles retrorsely scabrous. Style short, its branches 3, long. As to its nut and bristles, altogether recalling *E. microcarpa* Torr.; the species differs from that, perhaps not sufficiently, by its rather more robust stems.
 COSTA RICAN COLLECTIONS: Buenos Aires, altitude 300 meters, Tonduz 4887.
11. *Eleocharis sulcata* Nees, Linnaea 9: 294. 1834.
Scirpus sulcatus Roth, Nov. Pl. Sp. Ind. Or. 30. 1821.
Fimbristylis sulcata Roem. & Schult. Syst. Mant. 2: 52. 1824.
Scirpidium sulcatum Nees in Mart. Fl. Bras. 2¹: 98. 1843.

^a The older specific name *setacea* is available for this plant. Robert Brown refers *Cyperus setaceus* of Retzius and Willdenow to this genus, but fails to form the binomial.—EDITOR.

Limnochloa calyptrata Liebm. Dansk. Vid. Selsk. Skr. **2**: 56. 1849.

Heleocharis calyptrata Steud. Syn. Pl. Glum. **2**: 81. 1855.

Heleocharis rothiana Boeckl. Flora **43**: 3. 1860.

Heleocharis emarginata Klotzsch; Boeckl. Linnaea **36**: 443. 1870.

Heleocharis costaricensis Boeckl. Allgem. Bot. Zeitsch. **2**: 34. 1896.

Heleocharis purpureo-vaginata Boeckl. loc. cit.

DISTRIBUTION: From Mexico to Argentina; very common.

COSTA RICAN COLLECTIONS: Cañas Gordas, altitude 1,100 meters, *Pittier* 11026; Buenos Aires, altitude 300 meters, *Tonduz* 4884; Boruca, altitude 450 meters, *Tonduz* 4637.

12. *Eleocharis pachystyla* C. B. Clarke in Urb. Symb. Antill. **2**: 72. 1900.

Scirpus pachystylus C. Wright in Sauv. Fl. Cub. 174. 1873.

DISTRIBUTION: Cuba, Venezuela, Trinidad, Guiana, Pernambuco, Costa Rica.

COSTA RICAN COLLECTION: Cañas Gordas, altitude 1,100 meters, *Pittier* 11025.

13. *Eleocharis geniculata* R. Br. Prod. Fl. Nov. Holl. 224. 1810.

Scirpus geniculatus L. Sp. Pl. ed. 2. **1**: 71. 1762, in part.

Eleocharis constricta Schult. in Roem. & Schult. Syst. Mant. **2**: 87. 1824.

Limnochloa geniculata Nees in Mart. Fl. Bras. **21**: 99. 1842.

DISTRIBUTION: From Mexico to Uruguay, very common.

COSTA RICAN COLLECTIONS: Boruca, altitude 450 meters, *Tonduz* 3843, 4636; Agua Caliente, altitude 1,300 meters, *Pittier* 107; Rio Tuís, altitude 600 meters, *Tonduz* 11390; Turrialba, altitude 600 meters, *Pittier* 14254, *Tonduz* 8300; La Palma, altitude 1,500 meters, *Pittier* 10187; Talamanca, altitude 100 meters, *Tonduz* 9219; Desamparados, *Biolley* 3465, *Tonduz* 1501; Carrillo, altitude 300 meters, *Pittier*, 1184.

ELEOCHARIS SPECIES TO BE LOOKED FOR IN COSTA RICA.

ELEOCHARIS MONTANA Roem. & Schult. Syst. **2**: 153. 1817.

Scirpus montanus H. B. K. Nov. Gen. & Sp. **1**: 226. 1815.

Limnochloa truncata Liebm. Dansk. Vid. Selsk. Skr. **2**: 56. 1849.

DISTRIBUTION: Very common in Central America and occurring almost throughout the warmer parts of America.

Related to *E. sulcata* Nees, but differing in its longer, stouter rhizome and yellow nut, as well as in minor particulars.

7. FIMBRISTYLIS Vahl.

Glumes several or many, imbricated all around or (in section *Abilgaardia*) the lower somewhat 2-ranked; 1 to 3 lower vacant; several lower flowers bisexual and perfecting nuts; hypogynous bristles none; stamens 3 to 1, anterior, style branches, 3 or 2, linear; style base separated from the nut by a constriction or a line and deciduous with it; nut trigonous or plano-convex, sessile or substipitate.—Stolons none. Stems naked, i. e., nodes and leaves all near the base of the stem. Inflorescence umbellate, or monocephalous, or of a single spike.

Species 130, dispersed in warm countries everywhere, especially in the Old World; unknown in either mountainous or cold regions.

KEY TO THE SPECIES.

Style branches 2. (DICHELOSTYLIS.)

Nut conspicuously 5 to 9-costate on both faces..... 1. *F. diphylla*.

Nut rather obscurely reticulate, not costate lengthwise.

Spikelets ellipsoidal, obtusish 2. *F. castanea*.

Spikelets subcylindric, narrowed at apex 3. *F. spadicea*.

Style branches 3; fertile glumes imbricated all around. (TRICHE-
LOSTYLIS.)

Stems supporting but a solitary spikelet; nut pyriform..... 4. *F. preslii*.

Spikelets umbellate, small, subglobose..... 5. *F. miliacea*.

Style branches 3; fertile glumes somewhat 2-ranked; stem almost
always with but a single spikelet. (ABILDGAARDIA)..... 6. *F. monostachya*.

1. ***Fimbristylis diphylla*** Vahl, Enum. 2: 289. 1806.

Scirpus diphyllus Retz. Obs. 5: 15. 1779-1791.

Fimbristylis laxa Vahl, Enum. 2: 292. 1806.

Fimbristylis communis Kunth, Enum. 2: 234. 1837, certain synonyms excluded.

Fimbristylis pentastachya Boeckl. Flora 40: 36. 1857.

Fimbristylis polymorpha Boeckl. Vidensk. Meddel. Kjöb. 141. 1869.

DISTRIBUTION: In torrid and temperate regions of the whole world, also everywhere
common within such limits.

COSTA RICAN COLLECTIONS: [Tonduz] 8840; Hoffmann 189, 626; Talamanca, alti-
tude 100 meters, Tonduz 8673, 9221; San Carlos, Tonduz 2588, 2591; Boruca, altitude
450 meters, Tonduz 4480; San José, altitude 1,100 meters, Tonduz 1812, Pittier 647;
Rio Torres, Tonduz 647 bis; Vallée du General, Tonduz 3378; Térraba, Tonduz
3579; Rio Tuís, altitude 600 meters, Tonduz 8182; Turrialba, Tonduz 8256; Llanos
de Turrúcares, altitude 650 meters, Pittier 506.

2. ***Fimbristylis castanea*** Vahl, Enum. 2: 292. 1806.

Scirpus castaneus Michx. Fl. 1: 31. 1803.

Stem 2 to 7 dm. long; leaves long; umbel simple or compound; spikelets ellip-
soidal, obtusish, brown or tawny chestnut color; glumes glabrous, or rarely a little
pilose; style bifid; nut obovoid, obtuse, smooth, delicately reticulate, in color
approaching tawny.

DISTRIBUTION: Mexico and the United States, frequent; Costa Rica.

COSTA RICAN COLLECTION: Salinas Bay, Pittier 2719.

3. ***Fimbristylis spadicea*** (L.) Vahl, Enum. 2: 294. 1806.

Scirpus spadiceus L. Sp. Pl. 1: 51. 1753.

Fimbristylis cylindrica Vahl, Enum. 2: 293. 1806.

DISTRIBUTION: Warmer parts of America, common.

COSTA RICAN COLLECTIONS: Hoffmann 300; Punta Mala, Tonduz 6830; Salinas
Bay, Pittier 2718.

4. ***Fimbristylis preslii*** Kunth, Enum. 2: 228. 1837.

Abilgaardia pubescens Presl, Rel. Haenk. 1: 180. 1830.

Culm scabrous-puberulent, bearing a single spike; leaves setaceous, pilose; glumes
ovate, obtuse, imbricated on all sides of their axis; nut obovoid-pyriform,
being much narrowed from the middle to the base, yellowish brown; style
3-fid, promptly caducous along with its narrowly pyramidal base.

DISTRIBUTION: Mexico, Guatemala, Costa Rica, and Colombia.

COSTA RICAN COLLECTION: Nicoya, Tonduz 13743.

5. ***Fimbristylis miliacea*** Vahl, Enum. 2: 287. 1806.

Scirpus miliaceus Thunb. Fl. Jap. 37. 1784.

Trichelostylis miliacea Nees, Linnaea 1: 290. 1834.

DISTRIBUTION: In all warm countries; abundant in Asia and Oceania, in Africa
and America rare.

COSTA RICAN COLLECTIONS: Liebmann; Boruca, altitude 450 meters, Tonduz 4635.

6. ***Fimbristylis monostachya*** Hassk. Pl. Jav. Rar. 61. 1848.

Cyperus monostachyus L. Mant. 2: 180. 1771.

Abildgaardia monostachya Vahl, Enum. 2: 296. 1806.

DISTRIBUTION: In hot countries almost everywhere.

COSTA RICAN COLLECTION: Guanacaste, altitude 250 meters, Pittier, 2698.

8. **BULBOSTYLIS** Kunth.^a

Fertile glumes usually minutely pilose; style long, slender, glabrous, its branches 3, linear; style base extremely small, at length, after the falling away of the style becoming dark colored and remaining attached to the nut; otherwise like *Fimbristylis*.—Stolons none. Stems tufted, slender, naked. Leaves setaceous, or at least extremely narrow; sheaths almost always ciliate or bearded at the orifice. Inflorescence umbelled or of one head or spikelet.

Species 80, dispersed through all warm countries; particularly in Africa and America.

KEY TO THE SPECIES.

- Stem bearing a solitary spikelet..... 1. *B. paradoxa*.
 Spikelets umbellate.
 Spikelets, at least some of them, fascicled..... 2. *B. junciformis*.
 Spikelets pedicellate..... 3. *B. capillaris*.

1. ***Bulbostylis paradoxa*** Kunth, Enum. 2: 206. 1837.

Schoenus paradoxus Spreng. Syst. 1: 190. 1825.

Oncostylis paradoxa Nees in Mart. Fl. Bras. 2: 81. 1843.

Isolepis paradoxa Steud. Syn. Pl. Glum. 2: 100. 1855.

Scirpus paradoxus Boeckl. Linnaea 36: 739. 1869–70.

Rynchospora perrigida Boeckl. Allgem. Bot. Zeitschr. 2: 93. 1896.

Culm 8 to 16 cm. long, glabrous, bearing a single spike; spikelets ellipsoid, white-lanate; style 3-fid; nut obovoid, pale brown; transversely undulate-zoned; style base at length left upon the nut.

DISTRIBUTION: Tropical South America, frequent.

COSTA RICAN COLLECTIONS: Pittier & Tonduz 2698 b; burnt savannas at Buenos Aires, Tonduz 3590.

2. ***Bulbostylis junciformis*** (H. B. K.) Kunth, Enum. 2: 211. 1837.

Isolepis junciformis H. B. K. Nov. Gen. Sp. 1: 222. 1815.

Scirpus humboldtii Spreng. Syst. 1: 213. 1825.

Oncostylis junciformis Nees in Mart. Fl. 2¹: 85. 1843.

Isolepis berlandieri Steud. Syn. Pl. Glum. 2: 103. 1855.

DISTRIBUTION: From Mexico to Montevideo, frequent.

COSTA RICAN COLLECTIONS: Boruca, altitude 450 meters, Tonduz, 4,481; Buenos Aires, altitude 300 meters, Tonduz 4,883.

3. ***Bulbostylis capillaris*** (L.) C. B. Clarke in Hook. Fl. Brit. Ind. 6: 652. 1894.^b

Scirpus capillaris L. Sp. Pl. 2: 49. 1753.

Cyperus minimus L. Sp. Pl. 1: 44. 1753, in part.

Isolepis capillaris Roem. & Schult. Syst. 2: 118. 1824.

Oncostylis tenuifolia Nees in Mart. Fl. Bras. 2¹: 83. 1842.

Oncostylis ciliata Nees, op. cit. 83.

Fimbristylis capillaris A. Gray, Man. 530. 1848.

Trichelostylis capillaris Wood, Class-Book 742. 1861.

Scirpus microstachys Boeckl. Cyp. Nov. 2: 14. 1890.

Stenophyllus capillaris Britton, Bull. Torr. Club 21: 30. 1894.

DISTRIBUTION: From Canada to Argentina, common. Subspecies *trifida* common in warmer parts of the Old World.

COSTA RICAN COLLECTIONS: Nicoya, Tonduz 13742 bis.

^a *Bulbostylis* Kunth is antedated by *Stenophyllus* Raf.—EDITOR.

^b Mr. Clarke credits this combination to Kunth, Enum. 2: 211, cf. 205, 1837, but the binomial can hardly be regarded as technically published by Kunth.—EDITOR.

9. SCIRPUS L.

Spikelets with several or many perfect flowers; lowest one or two glumes sometimes empty, those next succeeding bisexual, perfecting nuts, the uppermost imperfect; glumes in several spirals, glabrous except marginally; style 3 or 2-fid, its base not enlarged, but passing gradually into the top of the ovary. Sheaths of the leaves not ciliate or bearded at the orifice.

Species 136, diffused all over the world.

Style persistent, its branches 3, rather long..... 1. *S. inundatus*.

Style deciduous, its branches 2, very short..... 2. *S. micranthus*.

1. **Scirpus inundatus** Poir. Encyc. Suppl. 5: 103. 1817.

Isolepis inundata R. Br. Prod. Fl. Nov. Holl. 1: 222. 1810.

Isolepis nigricans H. B. K. Nov. Gen. & Sp. 1: 220. 1815.

Scirpus nigricans Poir. Encyc. Suppl. 5: 104. 1817.

Stem 2 to 20 cm. long, monocephalous; spikelets 2 to 14, capitate, 4 to 8 mm. long; hypogynous bristles none; style 3-fid; nut oblong-obovoid, minutely conic-rostrate, smooth, yellow brown.

DISTRIBUTION: Australia, New Zealand, and western South America, common.

COSTA RICAN COLLECTIONS: Poás, altitude 2,500 meters, *Pittier*, 2979; *Tonduz* 10760; Irazú, altitude 2,300 meters, *Pittier* 853.

2. **Scirpus micranthus** Vahl, Enum. 2: 254. 1806.

Isolepis micrantha Roem. & Schult. 2: 110. 1817.

Hemicarpha subsquarrosa Nees in Mart. Fl. Bras. 2¹: 61. pl. 4. f. 1. 1842.

Isolepis caespitula Liebm. Dansk. Vid. Selsk. Skr. 2: 49. 1849.

DISTRIBUTION: Angola; also frequent in almost all parts of America.

COSTA RICAN COLLECTION: Talamanca, altitude 100 meters, *Tonduz* 8607.

SPECIES OF SCIRPUS TO BE LOOKED FOR IN COSTA RICA.

SCIRPUS CUBENSIS Kunth, Enum. 2: 172. 1837.

Anosporum cubense Boeckl. Linnaea 36: 413. 1869-70.

Crepidocarpus cubensis Klotzsch; Boeckl. Linnaea 36: 414. 1869-70, as synonym.

Isolepis echinocephala Oliver, Trans. Linn. Soc. 29: 167. pl. 107. 1875.

Spikes globose, dense, loosely umbellate; hypogynous bristles none; style bifid.

DISTRIBUTION: Tropical Africa and America, frequent.

10. FUIRENA Rottb.

Characters of *Scirpus* except as to the 3 inner hypogynous bristles, these being obovate and shaped like petals.—Stems nodose above the base and leafy. Inflorescence not umbellate. Glumes aristate, hispid-pilose.

Species 35, dispersed in the warmer parts of the whole world.

1. **Fuirena umbellata** Rottb. Descr. & Icon. 70 pl. 19 [i. e., second pl. 18] f. 3. 1773.

DISTRIBUTION: Common in almost all warm countries.

COSTA RICAN COLLECTIONS: Talamanca, altitude 100 meters, *Tonduz* 9222; Matina, *Pittier* 10316.

11. DULICHIMUM L. C. Rich.

Spikelets 5 to 8-flowered; glumes in 2 ranks; hypogynous bristles 6 to 8; style long, its base passing gradually into the summit of the ovary, its branches 2, short; nut oblong, plano-convex.—Stem rather stout, closely jointed throughout; the lower sheaths ending in a leaf, the upper in a bract. Rachilla as in *Torulinium* breaking

into 1-seeded joints. Type far removed from the Eucyperaceae by its closely jointed culm and its hypogynous bristles.

Species 1, American.

1. **Dulichium arundinaceum** (L.) Britton, Bull. Torr. Club **21**: 29. 1894.^a

Cyperus arundinaceus L. Sp. Pl. **1**: 44. 1753.

Schoenus spathaceus L. Sp. Pl. ed. 2. **1**: 63. 1762.

Cyperus ferrugineus L. Sp. Pl. ed. 2. **1**: 63. 1762, as citation.

Dulichium spathaceum L. C. Rich. in Pers. Syn. **1**: 65. 1805.

Scirpus spathaceus Michx. Fl. **1**: 32. 1802.

Stems 40 to 100 cm. long, with 20 to 40 nodes; leaves 10 cm. long, 6 mm. wide; panicle 10 to 30 cm. long; lower bracts leaf-like, distant from each other by about 1 to 5 cm. spikelets 2 cm. long, 3 mm. in diameter, subterete; hypogynous bristles rather rigid, surpassing the nut.

DISTRIBUTION: From Canada and Oregon to Florida and California, frequent; Costa Rica.

COSTA RICAN COLLECTIONS: Lomas del Silencio, Diquís Valley, altitude 600 meters, Pittier 1203.

12. **DICHROMENA** Vahl.

Glumes very many, closely compacted in many spirals; 3 or more of the lowest vacant, 1 to 3 next above these bisexual, perfecting nuts; several of the uppermost staminate only and infertile; hypogynous bristles none; stamens 3 or 2, anterior; style linear, its branches 2, linear, longer than the undivided part; nut sessile, obovoid or orbicular, compressed, crowned with pyramidal, depressed or conical persistent style-base.—Plants rather slender, the leaves narrow. Stems naked, monocephalous. Spikelets whitish, capitate. Bracts exceeding the inflorescence, narrow, dilated and whitish at base.

Species 13, peculiar to tropic and subtropic America.

Spikelets white, subspicately capitate..... 1. *D. ciliata*.

Spikelets cinnamon-color, 1 to 5, sessile..... 2. *D. radicans*.

1. **Dichromena ciliata** Vahl, Enum. **2**: 240. 1806.

Dichromena nervosa Vahl, Enum. **2**: 241. 1806, in part.

Schoenus globosus H. B. K. Nov. Gen. & Sp. **1**: 229. 1815.

Dichromena pura Nees, Linnaea **9**: 291. 1834.

Rynchospora nervosa Boeckl. Linnaea **37**: 529. 1873, the synonym *Dichromena pulchella* Kunth excluded.

DISTRIBUTION: Central America and tropical South America.

COSTA RICAN COLLECTIONS: Hoffmann 608; Turrialba, Tonduz 8228; San José, altitude 1,100 meters, Pittier 4216, Tonduz 432, 1232; Guanacaste, Tonduz 2708, 2709; Buenos Aires, Pittier 3585; Salinas Bay, Tonduz 2865; San Francisco de Guadalupe, Tonduz 8447; Alajuelita, altitude 1,000 meters, Tonduz 8841; Boruca, Tonduz 4477; Mano de Tigre, altitude 500 meters, Tonduz 4639.

1a. **Dichromena ciliata vahliana** C. B. Clarke, in Urban, Symb. Antill. **2**: 101. 1900.^b

Schoenus tenuifolius H. B. K. Nov. Gen. & Sp. **1**: 228. 1815.

Rynchospora vahliana Griseb. Fl. Brit. West Ind. 577. 1864.

Stolons long.

DISTRIBUTION: Cuba, Guadalupe, Costa Rica.

COSTA RICAN COLLECTION: Nicoya, Tonduz 13943.

^a The specific name *arundinaceum* as oldest is here adopted in accordance with current practice instead of *spathaceum* used in Mr. Clarke's manuscript.—EDITOR.

^b The name *tenuifolia* is older than *vahliana* and unoccupied.—EDITOR.

2. *Dichromena radicans* Schlecht. & Cham. *Linnaea* **6**: 38. 1831.*Dichromena pubera* Vahl, *Enum.* **2**: 241. 1806, in part.*Dichromena pubera microcarpa* Boeckl. *Linnaea* **37**: 529. 1873.

DISTRIBUTION: Central America, tropical South America; also in the West Indies, quite common.

COSTA RICAN COLLECTION: San Rafael de Cartago, Pittier 2583.

13. RYNCHOSPORA Vahl.

Glumes in many spirals or else obscurely 2-ranked; 3 or more of the lower empty, 1 to several above these bisexual and nut-bearing, the uppermost staminate or empty; hypogynous bristles sometimes wanting, when present 6 or 7, irregular; stamens 3 or 2, anterior; style bifid, in the series of the Haplostyleae very long, at apex shortly bidentate, in the series of the Diplostyleae deeply cleft, the branches linear; nut obovoid, compressed, crowned with the conical and persistent style base.—Inflorescence capitate or paniced, near umbellate. Leaves always obvious, linear.

KEY TO THE SPECIES.

Style long; the two branches short, or almost none. (HAPLOSTYLEAE.)

Stem monocephalous. (MONOCEPHALAE)..... 1. *R. globosa*.Heads globose, several, rarely but one. (POLYCEPHALAE)... 2. *R. cyperoides*.

Spikelets solitary or fascicled, disposed in corymbs. (CALYPTROSTYLEAE.)

Spikelets yellow, or yellow-brown..... 3. *R. aurea*.

Spikelets from greenish to chestnut brown.

Stem-leaves many, approximate; bristles none 4. *R. polyphylla*.

Stems less densely leafy; bristles often obvious.

Spikelets green, or somewhat chestnut-tinged.

Spikelets 7 to 8 mm. long..... 5. *R. schiedeana*.Spikelets 3 to 4 mm. long 6. *R. locuples*.

Spikelets chestnut-brown or tawny.

Bristles of about the length of the nut 7. *R. macrochaeta*.Bristles longer than the very small nut.... 8. *R. vulcani*.

Style linear; branches 2, linear, longer than the undivided part.

(DIPLOSTYLEAE.)

Bristles none. (PSILOSTACHYS.)

Nut transversely undulate.

Style base depressed, nearly discoid 9. *R. eximia*.Style base pyramidal..... 10. *R. robusta*.

Nut smooth, not undulate.

Spikelets 9 mm. long..... 11. *R. longispicata*.Spikelets 2 to 3 mm. long..... 12. *R. clarkei*.

Bristles scabrous anteriorly; nut smooth; head solitary, 1 to

4 cm. long. (FUSCAE) 13. *R. cephalotes*.

Bristles scabrous anteriorly; nut transversely undulate.

(GLAUCAE.)

Spikelets more or less fascicled in the corymbs.

Peduncles of the corymbs slender, nodding 14. *R. glauca*.Peduncles of the corymbs strictly erect..... 15. *R. schaffneri*.Spikelets mostly solitary..... 16. *R. marisculus*.1. *Rynchospora globosa* Roem. & Schult. *Syst.* **2**: 89. 1817.*Chaetospora globosa* H. B. K. *Nov. Gen. & Sp.* **1**: 230. 1815.*Schoenus globosa* Poir. *Encyc. Suppl.* **5**: 617. 1817.*Cephaloschoenus globosus* Nees, *Linnaea* **9**: 296. 1834.*Cephaloschoenus marginatus* Liebm. *Dansk. Vid. Selsk. Skr.* **2**: 63. 1849.*Rynchospora marginata* Steud. *Syn. Pl. Glum.* **2**: 142. 1855.

Rynchospora presleana Steud. loc. cit.

Rynchospora pohliana Steud. loc. cit.

DISTRIBUTION: From Mexico to Brazil, rather common.

COSTA RICAN COLLECTION: San José, altitude 1,100 meters, *Tonduz* 432.

2. ***Rynchospora cyperoides*** (Sw.) Mart. Denkschr. Acad. Wiss. Muench. **6**: 149. 1816-17.

Schoenus cyperoides Sw. Prod. Veg. Ind. Occ. 19. 1788.

Schoenus fragiferus Rudge, Pl. Guian. 15. *pl.* 17. 1805.

Rynchospora polycephala Wydler; Kunth, Enum. **2**: 291. 1837.

Ephippiorhynchium polycephalum Nees in Mart. Fl. Bras. **2**¹: 134. *pl.* 12. 1842.

DISTRIBUTION: Tropical Africa, rare; in America and the West Indies, frequent.

COSTA RICAN COLLECTION: Guanacaste, *Pittier* 2707.

3. ***Rynchospora aurea*** Vahl, Enum. **2**: 229. 1806.^a

Scirpus corymbosus L. Amoen. Acad. **4**: 303. 1759.

Schoenus surinamensis Rottb. Descr. & Ic. 68. *pl.* 21. *f.* 1. 1773.

Calyptrostylis fascicularis Nees in Mart. Fl. Bras. **2**¹: 139. 1843.

DISTRIBUTION: Tropical regions of all continents, very common.

COSTA RICAN COLLECTION: *Pittier* & *Tonduz* in Brussels Herbarium.

4. ***Rynchospora polyphylla*** Vahl, Enum. **2**: 230. 1806.

Schoenus polyphyllus Vahl, Eclog. Am. **2**: 5. 1798.

Mitrospora polyphylla Nees, Linnaea **9**: 295. 1834.

Rynchospora costaricensis Boeckl. Allgem. Bot. Zeitsch. **2**: 110. 1896.

DISTRIBUTION: Central America, West Indies, Venezuela, frequent.

COSTA RICAN COLLECTIONS: Buenos Aires, *Pittier* 3648; Boruca, altitude 450 meters, *Tonduz* 4483.

5. ***Rynchospora schiedeana*** Kunth, Enum. **2**: 300. 1837.

Calyptrostylis paniculata Liebm. Dansk. Vid. Selsk. Skr. **2**: 64. 1849.

A meter high; leaves 15 mm. wide; panicle 50 cm. long, 10 cm. wide; corymbs decompose, spikelets subsolitary, 7 to 8 mm. long, style scarcely divided; nut broadly ellipsoidal, smooth, lightly cancellate; beak long-conical, of three-fourths the length of the nut.

DISTRIBUTION: Mexico.

- 5a. ***Rynchospora schiedeana varica*** C. B. Clarke, subsp. nov.

Rynchospora schiedeana Hemsl. Biol. Centr. Am. **3**: 467. 1885, synonyms excluded.

Branches of the terminal panicle several, long, slender, divaricate, crowned at summit with pyramidal panicles.

Type U. S. National Herbarium no. 578583.

DISTRIBUTION: Mexico, Costa Rica.

COSTA RICAN COLLECTION: El Copey, altitude 1,800 meters, *Tonduz* 11736.

6. ***Rynchospora locuples*** C. B. Clarke, Engl. Bot. Jahrb. (**34**) Beibl. **78**: 5. 1904.

Stem a meter high; leaves 12 to 17 mm. wide; panicle 40 cm. long, 12 cm. broad, rather dense, excessively many-flowered; partial panicles pyramidal, rigid, compound; spikelets indefinitely many, 3 to 4 mm. long, lanceolate, straw-colored, maturing but one nut; nut 1 to 1.5 mm. long, oblong-ellipsoid, pale, reticulate; beak oblong-linear, longer than the utricle, whitish; bristles irregular, whitish, rigid, retrorsely barbed, some as long as the nut, some twice as long, sometimes almost obsolete.

Collected by *Tonduz* (no. 11919) at El Copey, Costa Rica, altitude 1,800 meters. Also Bogotá, Colombia, *Lindig* 1416.

Species allied to *R. schiedeana* Britton, differing by its small and innumerable spikelets.

^a The specific name *corymbosus* is older and unoccupied.—EDITOR.

7. *Rynchospora macrochaeta* Steud. in Lechler, Berber. Am. Centr. 56. 1857.*Rynchospora hoffmanni* Boeckl. Linnaea 37: 637. 1873.

Nearly glabrous, moderately stout or almost robust; panicle of 3 corymbs, these long-peduncled, dense, and paniculate; hypogynous bristles 4 to 6, rigid, little surpassing the nut; style long, scarcely divided; nut ellipsoid, smooth, reticulate, chestnut-colored, beak conic-linear, of the length of the nut.

DISTRIBUTION: New Grenada, Colombia, Peru, and Bolivia; Costa Rica.

COSTA RICAN COLLECTIONS: Summit of the Volcán de Barba, *Hoffmann* 65; Barba, altitude 2,750 meters, *Tonduz* 1951; Los Arcangeles Valley, Iscazú, altitude 2,000 meters, *Pittier* 239.

8. *Rynchospora vulcani* Boeckl. Linnaea 37: 638. 1873.*Rynchospora pittieri* Boeckl. Allgem. Bot. Zeitschr. 2: 109. 1896.

Almost glabrous, tall; panicle of 3 or 4 long-peduncled pyramidal corymbs; hypogynous bristles 4 or 5, twice as long as the nut; nut very small, subglobose, compressed, smooth, somewhat barred transversely, brown; beak attenuate above a conical base, shorter than the nut.

COSTA RICAN COLLECTIONS: Summit of the Volcán de Barba, *Hoffmann* 66; Volcán de Poás, altitude 2,600 meters, *Tonduz* 10758, 10761; Potrero del Alto, altitude 2,450 meters, *Pittier* 2990.

Species related to *R. macrochaeta* Steud. very closely; differing slightly by its very small but broader nut.

9. *Rynchospora eximia* (Nees) Boeckl. Linnaea 37: 601. 1873.*Spermodon eximius* Nees in Seeman, Bot. Voy. Herald 222. 1845-1851.*Psilocarya schiedeana* Liebm. Dansk. Vid. Selsk. Skr. 2: 60. 1849.

DISTRIBUTION: Mexico, Costa Rica.

COSTA RICAN COLLECTIONS: Boruca, altitude 450 meters, *Tonduz* 4479.10. *Rynchospora robusta* Boeckl. Linnaea 37: 616. 1873.*Dichromena robusta* Kunth, Enum. 2: 283. 1837.*Psilocarya robusta* Nees in Mart. Fl. Bras. 2¹: 116. 1842.

Rather robust, stoloniferous, sparsely pubescent; corymbs axillary and terminal, of many spikelets; mature spikelets ovoid-ellipsoid, with 4 to 8 nuts; bristles none; style deeply bifid; nut broadly obovoid, transversely undulate-lineolate; beak ovoid, of about the length of the nut.

DISTRIBUTION: Guatemala, Costa Rica, South America.

COSTA RICAN COLLECTION: Ciénaga de Agua Buena, altitude 1,100 meters, *Pittier* 11023.

11. *Rynchospora longispicata* Boeckl. Linnaea 37: 600. 1873.*Rynchospora filiformis* Griseb. Fl. Brit. West Ind. 576. 1864, not Vahl. 1806.*Dichromena filiformis* Kunth, Enum. 2: 281. 1837, synonyms excluded.*Spermodon filiformis* Nees in Mart. Fl. Bras. 2¹: 118. 1843.

DISTRIBUTION: Widely dispersed through tropical America.

COSTA RICAN COLLECTIONS: Buenos Aires, altitude 300 meters, *Pittier* 10587.12. *Rynchospora clarkei* Rose, sp. nov.^a

Stems 1 to 8 cm. long, monocephalous, the head composed of 1 or 2 spikelets; leaves 1 to 3 cm. long, linear; spikelets 2 to 3 mm. long, maturing 1 to 4 nuts; hypogynous bristles none; style branches 2, linear, rather long; nut 0.5 mm. long, obovoid, slightly turgid, smooth, grayish-green; beak depressed.

Type, sheet no. 818779, U. S. National Herbarium.

DISTRIBUTION: Mexico (Jalisco, Pringle 2319, type), Costa Rica.

COSTA RICAN COLLECTION: Buenos Aires, altitude 200 meters, *Pittier* 10585.

^a This species was given a name by Mr. Clarke, which is found to be a homonym. I have accordingly taken the liberty to name it for Mr. Clarke himself.—J. N. ROSE.

13. **Rynchospora cephalotes** (L.) Vahl, Enum. 2: 237. 1806.
Scirpus cephalotes L. Sp. Pl. ed. 2. 1: 76. 1762.
Schoenus cephalotes Rottb. Descr. & Ic. 61. pl. 20. 1773.
 DISTRIBUTION: Central America, and in South America as far as Chile; common.
 COSTA RICAN COLLECTIONS: Buenos Aires, altitude 300 meters, *Tonduz* 3644, 4885.
14. **Rynchospora glauca** Vahl, Enum. 2: 233. 1806.
Schoenus gracilis Sw. Prod. Veg. Ind. Occ. 19. 1788, in lesser part.
Rynchospora gracilis Vahl, Enum. 2: 234. 1806.
Rynchospora pungens Liebm. Dansk. Vid. Selskr. Skr. 2: 65. 1849.
 DISTRIBUTION: Almost all warm countries.
 COSTA RICAN COLLECTIONS: Boruca, *Tonduz* 3582; Buenos Aires, altitude 300 meters, *Tonduz* 4883 bis; Paramos del Abejónal, altitude 2,900 meters, *Tonduz* 7863.
15. **Rynchospora schaffneri** Boeckl. Linnaea 37: 575. 1873.
Rynchospora durandiana Boeckl. Allgem. Bot. Zeitschr. 2: 94. 1896.
 Glabrous, panicle narrow, composed of spiciform corymbs; spikelets 4 mm. long, chestnut-colored, ovoid-lanceolate, perfecting but one nut; style deeply bifid; nut obovoid-ellipsoid; beak hardly half as long as the nut, pyramidal, scabrous; hypogynous bristles 6, about equaling the nut.
 DISTRIBUTION: Mexico, Costa Rica.
 COSTA RICAN COLLECTIONS: El Copey, altitude 2,600 meters, *Tonduz* 14863; Portillo del Poás, altitude 2,500 meters, *Pittier* 327.
16. **Rynchospora marisculus** Nees, Linnaea 9: 297. 1834.
Rynchospora jubata Liebm. Dansk. Vid. Selsk. Skr. 2: 66. 1849.
 DISTRIBUTION: Mexico to Paraguay; frequent.
 COSTA RICAN COLLECTION: Ciénaga de Agua Buena, altitude 1,100 meters, *Pittier* 11022.

14. SCLERIA Berg.

Flowers unisexual, axillary; pistillate glumes open, i. e., not with united margins and utriculiform; hypogynous bristles none; nut bony, globose, more or less trigonous or obovoid, white, lead-colored, or purplish, inserted on a gynophore, which is often dilated into a 3-lobed disk, sometimes cup-like.—Spikelets few-flowered, sometimes androgynous with a single basal fertile flower and several staminate ones above it; sometimes unisexual, either staminate and many-flowered, or pistillate with but one fertile flower, but with several rudiments above it, or these almost obsolete. Leaves always obvious.

Species 180, dispersed all around the world within and near the Tropics, especially in the humid regions.

KEY TO THE SPECIES.

Spikelets not all unisexual, i. e., some androgynous with fertile spikes.

Roots fibrous; plants slender.

Inflorescence having the appearance of a single spike... 1. *S. distans*.

Inflorescence loosely paniced..... 2. *S. liebmanni*.

Plants less slender; with horizontal rhizome.

Inflorescence like a single spike..... 3. *S. hirtella*.

Inflorescence loosely paniced..... 4. *S. lithosperma*.

Spikelets all unisexual; plants rather robust.

Roots fibrous (TESSELLATAE) 5. *S. lacustris*.

Margin of disk not ciliate; perennials (EUSCLERIA).

Stems branched and straggling; ligule elongated..... 6. *S. reflexa*.

Stems erect; ligule ovate or short.

Panicles all composed of both pistillate and staminate spikelets.

Nut at length chestnut, red, or decolored..... 7. *S. melaleuca*.

Nut white, depressed at apex..... 8. *S. pterota*.

Upper part of panicle staminate, lower part pistillate. 9. *S. bracteata*.

Margin of disk ciliate; tall perennial (OPHRYOSCLERIA) 10. *S. paludosa*.

Margin of disk lacinate; leaves 4 cm. wide (SCHIZOLEPIS)... 11. *S. latifolia*.

1. ***Scleria distans*** Poir. Encyc. 7: 4. 1806.

Scleria tenella Griseb. Cat. Pl. Cub. 249. 1866, in part, not Kunth.

DISTRIBUTION: West Indies, Costa Rica.

COSTA RICAN COLLECTION: San José, altitude 1,100 meters, *Pittier* 648.

2. ***Scleria liebmanni*** Steud. Syn. Pl. Glum. 2: 179. 1855.

Scleria costaricensis Boeckl. Allgem. Bot. Zeitschr. 2: 157. 1896.

DISTRIBUTION: Dispersed from Mexico to Brazil.

COSTA RICAN COLLECTIONS: Boruca, altitude 450 meters, *Tonduz* 4484, 4634, 4792.

3. ***Scleria hirtella*** Sw. Prod. Veg. Ind. Occ. 19. 1788.

Scleria nutans Kunth, Enum. 2: 352. 1837.

DISTRIBUTION: Africa, including Madagascar; also in nearly all parts of America, common.

COSTA RICAN COLLECTION: Guanacaste, *Pittier* 2800.

4. ***Scleria lithosperma*** (L.) Sw. Prod. Veg. Ind. Occ. 18. 1788.

Scirpus lithospermus L. Sp. Pl. 1: 51. 1753.

Scleria tenuis Retz. Obs. 4: 13. 1786.

Scleria filiformis Sw. Prod. Veg. Ind. Occ. 19. 1788.

Schoenus lithospermus L. Sp. Pl. ed. 2. 1: 65. 1762, in small part.

DISTRIBUTION: In warm countries all around the world nearly; rare in Africa; in Asia, Oceania, and America rather common.

COSTA RICAN COLLECTION: Guanacaste, altitude 250 meters, *Pittier* 2,716.

5. ***Scleria lacustris*** C. Wright in Sauv. Fl. Cub. 185. 1873.

Scleria tonduzii Boeckl. Allgem. Bot. Zeitschr. 2: 160. 1896.

DISTRIBUTION: Cuba, French Guiana, Brazil, Costa Rica.

COSTA RICAN COLLECTION: Tuís Valley, altitude 600 meters, *Tonduz* 8181.

6. ***Scleria reflexa*** H. B. K. Nov. Gen. & Sp. 1: 232. 1815.

Scleria flagellum Nees, Flora 11: 303. 1828, scarcely Sw.

Mastigoscleria reflexa Nees in Mart. Fl. Bras. 2¹: 177. 1842.

DISTRIBUTION: From Mexico to southern Brazil, frequent.

COSTA RICAN COLLECTIONS: Turrialba, altitude 600 meters, *Tonduz* 9008; Golfo de Osa, *Tonduz* 10079.

Tonduz no. 11389 is a doubtful form = Spruce no. 500, collected at Para, i. e., *Scleria tenacissima*? Benth. Real *Scleria tenacissima*, Steud.^a, collected by Nees at Para, no. 422, has its nut reticulate-tuberculate. But to me, as to Bentham, the plants seem to be the same.

7. ***Scleria melaleuca*** Schlecht. & Cham. Linnaea 6: 29. 1831.

DISTRIBUTION: Common throughout tropical America.

COSTA RICAN COLLECTIONS: *Hoffmann* 873; *O. Kuntze*; Rodeo de Pacaca, *Pittier* 3326; Siquirres, *Pittier* 4207; Matina, *Pittier* 9747; Buenos Aires, *Pittier* 10635; Finca de Chirripó, altitude 100 meters, *Pittier* 16076; San Carlos, *Tonduz* 2582; Térraba, altitude 250 meters, *Tonduz* 3581, 3589; Boruca, altitude 450 meters, *Tonduz* 4482; Turrialba, altitude 0-550 meters, *Tonduz* 8230, 8393; Rio Zhorquín, *Tonduz* 8529.

^a Syn. Pl. Glum. 2: 175. 1855.

8. *Scleria pterota* Presl in Oken, *Isis* **21**: 268. 1828.
Scleria pratensis Lindl.; Nees, *Nov. Act. Nat. Cur.* **19**. Suppl. **1**: 121. 1843.
Scleria communis Kunth, *Enum.* **2**: 340. 1837, in part.
Scleria pittieri Boeckl. *Allgem. Bot. Zeitschr.* **2**: 159. 1896.
 DISTRIBUTION: Quite common in tropical America.
 COSTA RICAN COLLECTIONS: Buenos Aires, altitude 300 meters, *Tonduz* 4886; Guanacaste, altitude 250 meters, *Pittier* 2715; Turrialba, *Tonduz* 8230 bis.
9. *Scleria bracteata* Cav. *Ic.* **5**: 34. *pl.* 457. 1799.
Macrolomia bracteata Nees in Mart. *Fl. Bras.* **2**¹: 182. *pl.* 24. 1843.
 DISTRIBUTION: Abundant in tropical America.
 COSTA RICAN COLLECTIONS: Térraba, altitude 250 meters, *Tonduz* 3963; Boruca, altitude 450 meters, *Tonduz* 4640.
10. *Scleria paludosa* Kunth, *Enum.* **2**: 344. 1837.
Ophryscleria paludosa Nees in Mart. *Fl. Bras.* **2**¹: 185. 1842.
Scleria macrocarpa Salzm. *Linnaea* **38**: 521, 1874.
 DISTRIBUTION: In tropical America frequent.
 COSTA RICAN COLLECTION: Rio Ceibo near Buenos Aires, altitude 200 meters, *Tonduz* 4882.
11. *Scleria latifolia* Sw. *Prod. Veg. Ind. Occ.* **18**. 1788.
 DISTRIBUTION: West Indies, Mexico, Costa Rica, Venezuela.
 COSTA RICAN COLLECTION: Banks of Sarapiquí River, *Biolley* 7456b.

Under the name "*Scleria ciliaefolia*," there is in the Brussels Herbarium a plant (*Pittier & Tonduz* no. 3355), which was found on closer examination to be *Luzula racemosa* Desv. (*Buchenau, Engl. Bot. Jahrb.* **12**: 132. 1890.)

DURANDIA Boeckl.,^a a "new genus of the tribe of the Sclerieae" consisting of *D. macrophylla* Boeckl.,^b is founded on *Tonduz* no. 8402 collected in Costa Rica. The type is preserved in the Brussels Herbarium. By the kindness of Mr. de Wilde-man I have been permitted to examine it. The plant belongs to the Haemodoraceae, and is *Xiphidium coeruleum* Aubl.^c

15. CALYPTROCARYA Nees.

Flowers unisexual; pistillate flower appearing as if terminal, naked; hypogynous bristles none; style branches 2, linear; nut ovoid-conical, minutely pilose.—Spikes dense, pea-shaped, corymbose-panicled, extremely small, androgynous, the single terminal spikelet pistillate, 1-flowered, the lateral spikelets 2 to 4, staminate, 1-flowered. Proper pistillate glumes 2, in 2 ranks, boat-shaped, ovate. Staminate flowers monandrous.

Species 7, indigenous to tropical America.

1. *Calyptrocarya fragifera*^d Kunth, *Enum.* **2**: 364. 1837.
Calyptrocarya palmetto Nees in Mart. *Fl. Bras.* **2**¹: 195. 1843.
Becquerelia glomerulata Brongn. in Duperrey, *Voy. Coquille* **2**: 163. 1829.
Hypolytrum multinerve Hochst.; Steud. *Syn. Pl. Glum.* **2**: 133. 1855.
 DISTRIBUTION: Scattered throughout tropical America.
 COSTA RICAN COLLECTIONS: Cocos Island, *Pittier* 12376; (Nicaragua) San Juan del Norte, *Pittier* 9635.

^a *Allgem. Bot. Zeitschr.* **2**: 160. 1896.

^b *Op. cit.* 173.

^c *Pl. Guian.* **1**: 33. *pl.* 11. 1775.

^d The specific name *glomerulata* is older and unoccupied.—EDITOR.

16. *UNCINIA* Pers.

Flowers unisexual; prophylla 2, joined together and forming a bicarinate utricle inclosing the ovary; a setiform rudiment of the axis of a spikelet partly inclosed within the utricle, its stout uncinuate tip exerted from it.

Species 26, mostly inhabiting the South Temperate Zone, in Australia, New Zealand, the more southerly islands of Oceania, temperate South America, but also in Mexico and Jamaica.

KEY TO THE SPECIES.

- Spike dense, 3 mm. in diameter 1. *U. jamaicensis*.
Spike rather loose, 2 mm. in diameter 2. *U. tenuis*.

1. *Uncinia jamaicensis* Pers. Syn. 2: 534. 1807.

Carex uncinata Schk. Riedgr. 1: 13. pl. G. f. 30. 1801, not L. f.

DISTRIBUTION: From Central America to Argentina.

COSTA RICAN COLLECTIONS: El Copey, altitude 1,800 meters, *Tonduz* 11850; Barba [Pittier] 2003; Barba, altitude 2,000 meters, *Tonduz* 1693, 2084; Reventado, altitude 2,600 meters, *Pittier* 852; Volcán de Poás, altitude 2,600 meters, *Tonduz* 10762.

2. *Uncinia tenuis* Kunth, Enum. 2: 525. 1837.

Uncinia gracilis Decaisne in Hombr. & Jacq. Bot. Voy. Astrolabe 2: pl. 6. f. B. 1853.

DISTRIBUTION: Chili, Patagonia, Costa Rica.

COSTA RICAN COLLECTION: Volcán de Barba, altitude 2,750 meters, *Tonduz* 1904.

The Costa Rican habitat is entirely new.

7. *CAREX* L.

Flowers unisexual; prophylla 2, united into a utricle inclosing the bicarinate ovary; no rudiment of an axis within the utricle.

Species 1,300, distributed all over the world in the more humid regions.

KEY TO THE SPECIES.

Style branches 2. (VIGNEA.)

Some of the upper spikes pistillate at apex, staminate at base; none staminate at summit and pistillate at base. (VIGNEGYNAE) 1. *C. heptastachya*.

Some of the upper spikes staminate at apex, pistillate at base; none pistillate at summit and staminate at base. (VIGNEANDRAE) 2. *C. pichinchensis*.

Style branches 3. (EUCAREX.)

Some of the upper spikes staminate at summit, pistillate at base; none pistillate at summit and staminate at base. (In the Costa Rican species the spikes are cylindrical and paniced.) (CARICANDRAE.)

Spikes 3 to 10 cm. long, rather deeply colored.

Pistillate glumes elongated-lanceolate, hardly acute. 3. *C. jamesoni*.

Pistillate glumes aristate 4. *C. pittieri*.

Spikes 1 to 3 cm. long, greenish-ferruginous.

Plant of middle size; peduncles slender 5. *C. cladostachya*.

Plant a meter high or more; peduncles rigid 6. *C. jovis*.

1. *Carex heptastachya* Boeckl. Linnaea 39: 114. 1875.

Carex jonesii L. H. Bailey, Mem. Torr. Club 1: 16. 1889.

Carex durandii Boeckl. Allgem. Bot. Zeitschr. 2: 189. 1896.

Rootstock short, slender; stems densely tufted, 10 to 60 cm. long, slender, smooth, toward the triangular summit minutely scabrous; leaves commonly as long as the stems,

2 to 4 mm. wide, 16 to 20-striate, glabrous except as to the margin, this minutely scabrous; inflorescence appearing as if simply spicate, 3 to 5 cm. long, of 6 to 9 pale brownish spikes; lowest bract setaceous, sometimes short, sometimes 4 to 5 cm. long; spikes approximate, or a trifle distant, the very lowest one rarely 3 cm. distant from the others, most of them 6 to 12 mm. long, ellipsoid, some of the upper pistillate ones staminate at base, the terminal one rarely altogether staminate, never pistillate at base and staminate at apex; glume of the pistillate shorter than the utricule, ovate, scarcely acute, 1-nerved, brownish; style bifid, shorter than the utricule; utricule 3 to 3.5 mm. long, including the beak, plano-convex, ellipsoid, its beak oblong-conical, compressed, shorter than the body; utricule herbaceous, smooth, subsessile, glabrous, 9-nerved on the convex face, 3 to 5-nerved on the plane; margins smooth, at length incurved; beak on the plane face hardly bidentate, on the other cleft to the base, and its margins when young almost winged, when mature minutely and rigidly scabrous; nut ovoid-ellipsoid, compressed, nearly filling the utricule.

DISTRIBUTION: Tampico (Berlandier, 529); in New Granada and Venezuela, at 2,500 meters, frequent; Costa Rica.

COSTA RICAN COLLECTIONS: Poás, altitude 2,500 meters, *Pittier* 324, 2980, 2983, *Tonduz* 10759; Cerro de las Vueltas, altitude 3,000 meters, *Pittier* 10510; Cerro de Buena Vista, near the summit, altitude 3,300 meters, *Pittier* 3376.

2. *Carex pichinchensis* H. B. K. Nov. Gen. & Sp. 1: 233.

Carex dura Boott, Trans. Linn. Soc. 20: 122. 1846.

Carex sachapata Lechler, Berber. Am. Austr. 56. 1857.

Carex fuscoatra Boeckl. Linnaea 40: 378. 1876.

Of medium size or stoutish; leaves 5 to 10 mm. wide, beneath densely glandular-puberulent; spikes 5 to 30, cylindrical, 2 to 5 cm. long, dark chestnut-colored, at the very summit staminate; pistillate glume lanceolate, obtuse, much exceeding the utricule; style bifid; utricule 2.5 to 3 mm. long, ellipsoid, compressed, smooth, glabrous, rather obscurely or obsoletely nerved; beak one-fourth to one-third the length of the body of the utricule, short-cylindric, the margin either sparingly or hispidly scabrous, on the plane face scarcely divided at apex and pilose-ciliate, on the other deeply cleft.

DISTRIBUTION: Western tropical America, very common.

COSTA RICAN COLLECTIONS: Poás, altitude 2,500 meters, *Pittier* 331, 2981, 2982; Cerro de las Vueltas, altitude 3,000 meters, *Pittier* 10520; Cerro de la Muerte, altitude 3,100 meters, *Pittier* 10454; Cerro de Buena Vista, altitude 3,300 meters, *Pittier* 3381.

Nut occasionally deformed. See C. B. Clarke^a on this species as perhaps recently derived from *C. jamesonii*, Boott.

3. *Carex jamesoni* Boott, Trans. Linn. Soc. 20: 124. 1846.

Rather robust, leaves 5 to 10 mm. broad, beneath closely beset with minute glands; spikes 5 to 8 cm. long, linear, chestnut-brown, pistillate at the very base, staminate at apex; pistillate glume lanceolate, equaling the utricule; style 3-fid; utricule 3 mm. long, including the beak, narrowly ellipsoid, trigonous, smooth, glabrous, striate; beak half as long as the body, bidentate, hardly scabrous; nut triquetrous, sometimes deformed.

DISTRIBUTION: Mexico (*Galeotti* 5763); Costa Rica; very common in western tropical South America.

COSTA RICAN COLLECTIONS: El Copéy, altitude 1,800 meters, *Tonduz* 11921; Poás, altitude 2,650 meters, *Tonduz* 10757; Barba, altitude 2,750 meters, *Pittier* 303.

4. *Carex pittieri* Boeckl. Allgem. Bot. Zeitschr. 2: 190. 1896.

A meter high, leaves 5 to 10 mm. wide, beneath densely glandular-puberulent; inflorescence 40 to 50 cm. long, paniculate, of about 40 tawny-brownish spikes, these

^a Proc. Linn. Soc. 1895-96: 25, 26. 1896.

linear-cylindric, 8 to 15 cm. long, the uppermost pistillate at base, staminate at apex; pistillate glumes lanceolate, with an awn 5 to 6 mm. long; style branches 3, short; utricle, inclusive of the beak, 4 mm. long, linear-oblong, trigonous, glabrous, smooth, curved, striate; beak of hardly one-third the length of the body.

COSTA RICAN COLLECTIONS: Volcán de Poás, altitude 2,600 meters, *Pittier* 824; Volcán de Barba, altitude 2,750 meters, *Tonduz* 1952; Cerro de Buena Vista, altitude 3,100 meters, *Tonduz* 3380.

Liebmann has described several Mexican species of this section, but I have not been able to unite *C. pittieri* specifically with any specimen of Liebmann's in the Kew Herbarium. *C. jamesoni gracilis* L.H. Bailey, very like this in habit, panicle, and color of spikes, differs in that its pistillate glume is less aristate.

5. *Carex cladostachya* Wahlenb. Kong. Vet. Akad. Nya Handl. Stockh. **24**: 149. 1803.

Carex mexicana J. S. & C. B. Presl, Rel. Haenk. **1**: 204. 1830.

Carex hartwegii Boott in Benth. Pl. Hartw. 96. 1839-57.

DISTRIBUTION: From Mexico to Bolivia, common.

COSTA RICAN COLLECTIONS: Desamparados, altitude 1,100 meters, *Tonduz* 1483; Tres Rios, *Pittier* 4337; San Marcos, altitude 1,350 meters, *Tonduz* 7717; Alajuelita, altitude 1,000 meters, *Tonduz* 8843; Aserrí, *Tonduz* 1247d; San José, altitude 1,100 meters, *Tonduz* 1247 ter; El Copey, altitude 2,500 meters, *Tonduz* 12180; Poás, altitude 2,450 meters, *Pittier* 2984; Cabeceras del Bris, *Pittier* 10568; Río Birris, altitude 1,200 meters, *Pittier* 3126; Río Torres, *Tonduz* 1247bis; Cañas Gordas, altitude 1,100 meters, *Pittier* 7350, 11028; Santa Barbara, altitude 1,400 meters, *Tonduz* 1677; El Rodeo de Paquita, altitude 900 meters, *Tonduz* 1620.

C. polystachya Wahl.^a according to American authors, is represented by Pringle's no. 4840 from Oaxaca, and Bourgeau's no. 3026 from Orizaba. It is a stouter plant, with more rigid inflorescence and an ellipsoid or ovoid utricle; but in my opinion it is scarcely distinguishable specifically.

6. *Carex jovis* C. B. Clarke, sp. nov.

A meter high and more; leaves 1 cm. long, densely glandular-puberulent beneath; inflorescence 50 cm. long, peduncles rigid, suberect; corymbs rigid, narrow; spikes as much as 3 cm. long, 4 mm. wide, several of them pistillate at base and staminate at apex; pistillate glumes lanceolate, little surpassing the utricles; style 3-fid; utricle 2 to 3 mm. long including the beak, oblong, smooth, glabrous, trigonous, striate; beak about one-third as long as the body, deeply bidentate; nut oblong, trigonous.

COSTA RICAN COLLECTION: *Pittier* & *Tonduz* 10757 in the Brussels Herbarium (type).

18. *HYPOLYTRUM*, L. C. Rich.

Proper spikelets, very small, appearing as if composed of bisexual flowers in spikes resembling closely the spikelets of *Scirpus*, imbricated on all sides, 3-flowered; the two lower flowers opposite, staminate, each with only one stamen, the uppermost one a naked pistil, 1 to 4 oblong scales (i. e., sterile male glumes) being interposed between the two male flowers and the pistil; staminate glumes boat-shaped, somewhat hairy on the keel, distinct or sometimes more or less connate; style bifid.—Inflorescence paniculate-corymbose.

Species 42, distributed throughout almost all tropical countries; one at Nepal, one in the Hawaiian Islands.

1. *Hypolytrum nicaraguense* Liebm. Dansk. Vid. Selsk. Skr. **2**: 47. 1849.

Hypolytrum amplum var. (?) β , Nees in Mart. Fl. Bras. **2**: 65. 1843.

Hypolytrum selloianum Boeckl. Linnaea **37**: 134. 1871.

^a Kongl. Vet. Akad. Nya. Handl. Stockh. **24**: 149. 1803.

Stem a meter high, stout; leaves 3 cm. long; panicle ample, broadly pyramidal dense, often 12 cm. wide; nut, with its long-conic beak far surpassing the glume.

DISTRIBUTION: Nicaragua, Brazil, Costa Rica.

COSTA RICAN COLLECTION: Cocos Island, *Pittier* 12380.

Scarcely differs from *H. amplum* Kunth,^a a species dispersed through Guiana, Surinam, and along the Amazon in Brazil.

18. *MAPANIA* Aubl.

Spikes densely capitate; proper spikelets appearing like bisexual flowers, 6-squamellate; two lower squamellae opposite, boat-shaped, each with a single stamen, the third one lateral, plane, sterile or with a stamen, this succeeded by three that are sterile, often delicate; uppermost flower a single naked pistil; style trifid or bifid.—Plants glabrous, except as to the squamellae.

KEY TO THE SPECIES.

Leaves represented only by the broad leaf-like bracts..... 1. *M. silvatica*.
Basal leaves present, elongated, cauline except the bracts none... 2. *M. pycnocephala*.

1. *Mapania silvatica* Aublet, Pl. Guian. 1: 47. pl. 17. 1775.

Stem 30 to 60 cm. long, leafless; bracts 3, as much as 14 cm. long, 6 cm. wide; head ovoid, 1 to 2 cm. long, ferruginous; style trifid.

DISTRIBUTION: Venezuela, Guiana, Panama (*Barclay* 944), Costa Rica.

COSTA RICAN COLLECTION: Carrillo, *Pittier* 1187.

2. *Mapania pycnocephala* Benth. Journ. Linn. Soc. 15: 512. pl. 5, 6. 1887, by error *pycnostachya*.

Hypolytrum pycnocephalum Benth. Bot. Voy. Sulph. 177. 1844.

Stem 30 to 60 cm. long; basal leaves 30 to 40 cm. long, 2 to 3 cm. broad, narrowed at each end; bracts 3, resembling the leaves; head 1 to 2 cm. long, ovoid, ferruginous; style bifid.

DISTRIBUTION: Panama (Island of Gorgona, Choco Bay), Costa Rica.

COSTA RICAN COLLECTION: Carrillo, *Pittier* 1188.

^a Enum. 2: 272. 1837.