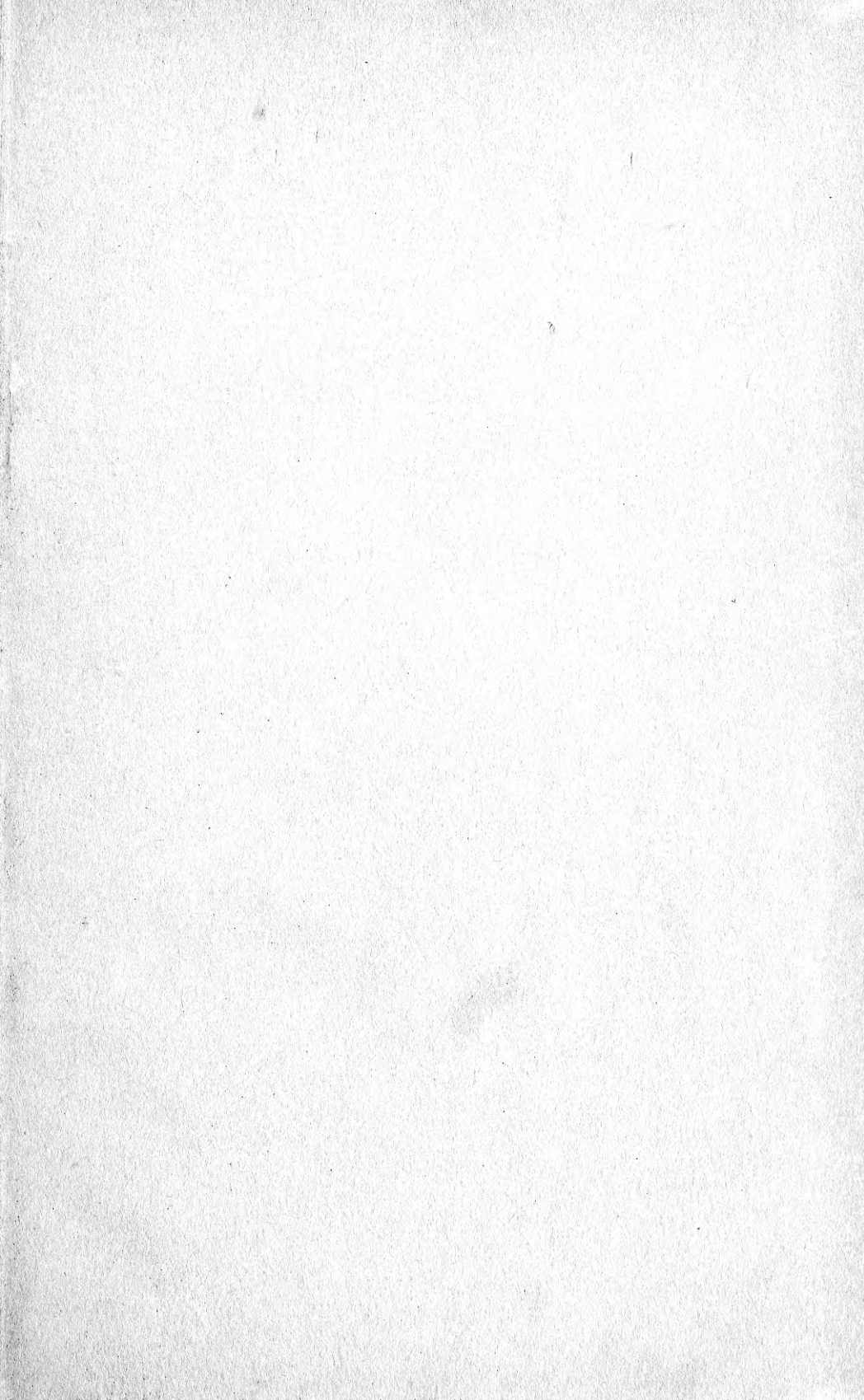
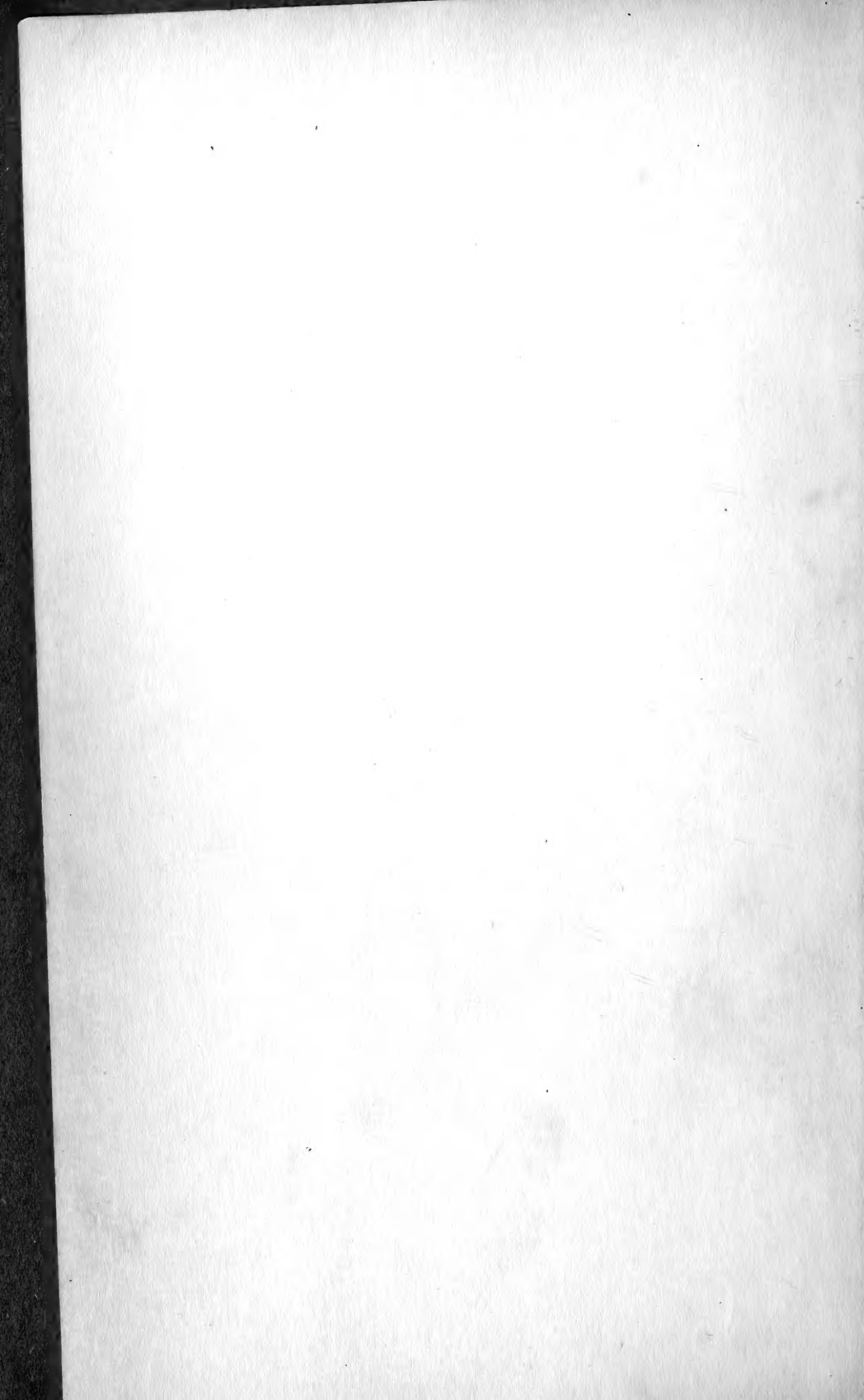


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FROM THE

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VOLUME 22, PART 1

REVISIONS OF NORTH AMERICAN GRASSES

By A. S. HITCHCOCK and AGNES CHASE



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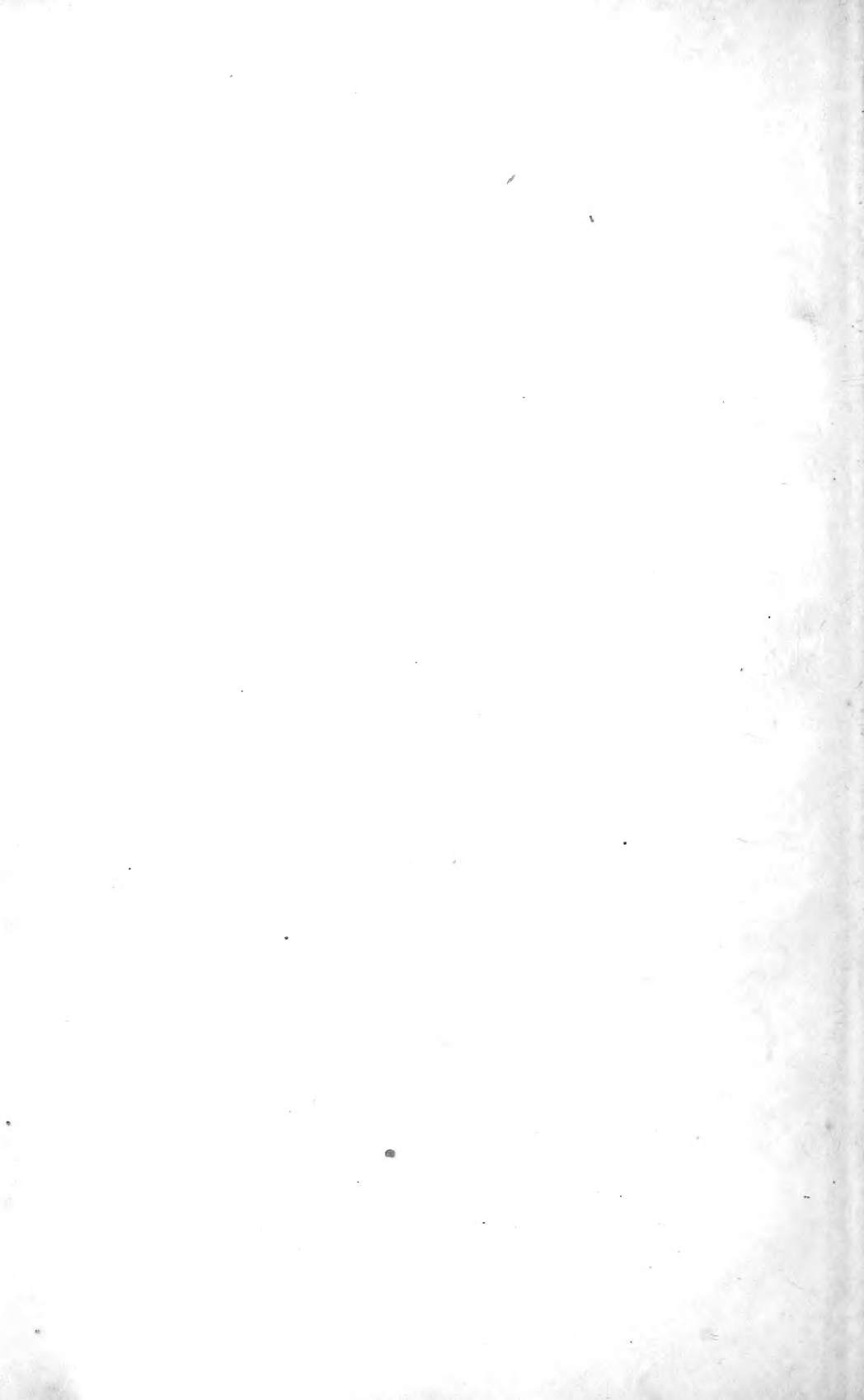
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PREFACE.

In the accompanying papers A. S. Hitchcock, systematic agrostologist of the United States Department of Agriculture, and Agnes Chase, assistant agrostologist, have continued the record of their studies upon North American grasses, presenting a revision of four of the smaller genera of the tribe Paniceae. The method of treatment is the same as that followed in an earlier paper entitled *The North American Species of Panicum* (published as volume 15 of the *Contributions*, 1910), of which Prof. Hitchcock and Mrs. Chase were joint authors.

The first two genera, *Ichnanthus* and *Lasiacis*, are tropical American, though one species of the former has been introduced into the Philippine Islands, and one species of the latter extends into southern Florida. The genus *Brachiaria* is found in the warmer parts of both hemispheres and in America extends into the southern United States. The genus *Cenchrus*, whose species are usually known as sandburs, is widely distributed in the warm and temperate regions of both hemispheres, some of the species being troublesome weeds.

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.



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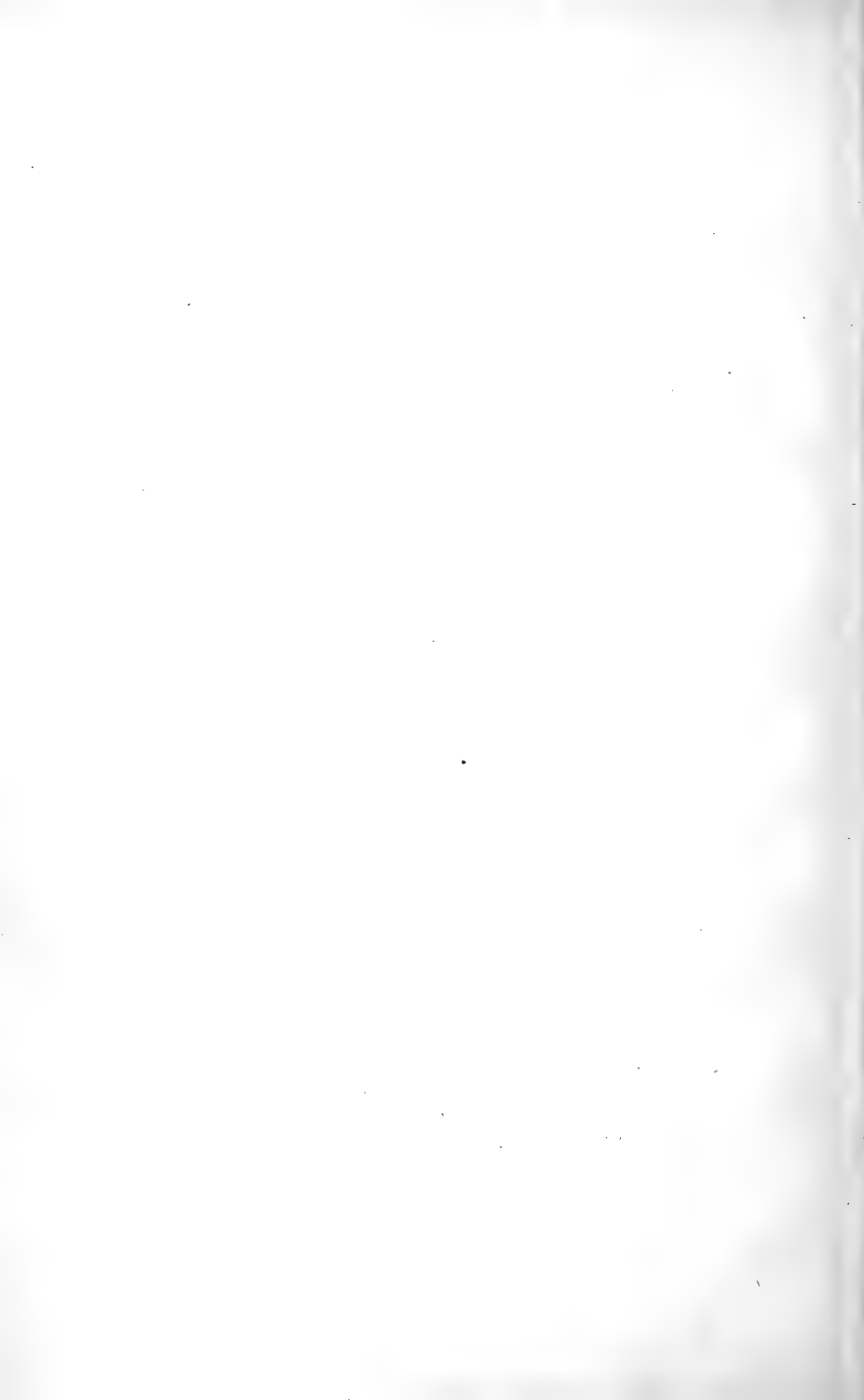
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THE NORTH AMERICAN SPECIES OF ICHNANTHUS.

By A. S. НИТЦКОК.

INTRODUCTION.

The genus *Ichnanthus* is closely allied to *Panicum*, the largest genus of the tribe Paniceae. The technical character that separates it is the presence of two winglike appendages at the base of the fertile lemma. In many of our North American species the appendages are obsolete and are indicated only by minute scars or excavations. Along with this technical character is that of a general resemblance in habit and in the appearance of the panicles and spikelets, especially the slightly boat-shaped tips of the glumes and lemmas. Most of the species have broad flat blades. One species, *I. ichnodes*, deviates from this concept in every respect except in the presence of well-marked appendages. Altogether the genus is an assemblage of somewhat diverse species, which are segregated from *Panicum* on rather weak technical grounds. The type species, with its large blades and prominent appendages, was more distinct from *Panicum* than most of the species that have since been united with it. As a genus *Ichnanthus* is less distinct than several groups, such as *Syntherisma*, *Lasiacis*, and *Echinochloa*, that were included by older authors in *Panicum* as sections.

There are about 25 known species of *Ichnanthus*, mostly South American, 10 extending into tropical North America and one, *I. pal-lens*, found also in the Philippines and tropical Asia.

DESCRIPTION OF THE GENUS AND SPECIES.

ICHNANTHUS Beauv.

Ichnanthus Beauv. Ess. Agrost. 56. 1812. Beauvois gives a generic description and mentions one species, *I. panicoides*, sent to him by Desfontaines from tropical America. This species, which has large appendages, is figured by Beauvois (*pl. 12. f. 1*).¹ Beauvois misunderstood the structure of the spikelet. He describes it as 3-flowered and calls attention to the unusual position of the intermediate floret, which, he says, consists of two paleae opposite and placed crosswise to the rest of the spikelet. He mistook the large appendages to the fertile lemma for an intermediate floret. The intermediate floret shown in his plate evidently represents the two appendages of the fertile lemma.

Navicularia Raddi, Agrost. Bras. 38. *pl. 1. f. 5*. 1823. Three species are described, *N. hirta*, *N. glabra*, and *N. lanata*. The third species, being the one figured, is taken as the type. In this the appendages are one-third as long as the fertile lemma. The usual reference to *Navicularia* is Bertol. Opus. Sci. Bologn. 3: 408. 1819, but this is an error; the name does not appear there. The name Bertolini gives is *Panicum loliaceum*; this Raddi cites under *Navicularia hirta*.

¹ For a history of the genus see Chase, Proc. Biol. Soc. Washington 24: 142-144. 1911.

DESCRIPTION.

Perennials or sometimes apparently annuals with erect or creeping culms and flat, usually broad, sometimes petioled leaf blades. Inflorescence paniculate, the open or contracted panicles terminal and axillary, the spikelets usually in pairs, unequally short-pedicelated along the stiffly spreading or ascending main branches, or rarely single in an open panicle. Spikelets with keeled glumes, thus appearing somewhat laterally compressed, similar in structure to those of *Panicum*, the glumes and sterile lemma usually rather strongly nerved, and commonly ending in an apiculation or convolute point. First glume usually more than half as long as the spikelet, clasping, 3-nerved, the second glume and sterile lemma about equal, longer than the fruit, 5-nerved, the lemma inclosing a membranaceous palea and rarely a staminate flower; fertile lemma usually acute or acutish, indurate, dorsally compressed, usually raised on a short stipe, the margins usually flat but in our species more or less inrolled, the base bearing on either side membranaceous appendages adnate to the lemma below, free above, the appendages in many of our species obsolete and indicated only by minute scars or excavations; palea entirely inclosed in the margins of the lemma.

Abnormal specimens occur, especially in nos. 2 to 4, in which the sterile lemmas are greatly multiplied, forming elongate curved spikelets, as much as 2 cm. long.

KEY TO THE SPECIES.

Appendages of fertile lemma well-developed wings.

Blades widest near the cordate base 9. *I. mexicanus*.

Blades narrowed toward the base, this not cordate.

Sheaths densely long-villous 8. *I. leiocarpus*.

Sheaths glabrate or somewhat pilose.

Blades lanceolate-linear, many times longer than wide; spikelets long-pedicelated 10. *I. ichnodes*.

Blades lanceolate-elliptic, not more than 6 times longer than wide.

7. *I. nemoralis*.

Appendages of fertile lemma reduced to scars.

Blades petiolate, the petiole 1 to 15 mm. long; first glume acute, about half as long as the spikelet.

Spikelets 3 mm. long; culms delicate, spreading, much branched; blades not over 6 mm. wide 1. *I. mayarensis*.

Spikelets 3.5 to 4 mm. long; culms erect, simple or sparingly branched; blades 1 to 3 cm. wide. 6. *I. lanceolatus*.

Blades more or less clasping, often oblique at base, usually over 1 cm. wide.

Glumes with attenuate tips, usually exceeding the sterile lemma and floret; blades thin, more or less pilose.

Spikelets with a few long stiff hairs near the margin toward the summit of both glumes; plants delicate; blades rarely over 4 cm. long and 1 cm. wide. 2. *I. tenuis*.

Spikelets glabrous or scabrous on the midnerves only; blades up to 7 cm. long and 2 cm. wide. 3. *I. nemorosus*.

Glumes acute or acuminate but not attenuate, the first shorter than the spikelet; blades firmer.

Blades lanceolate, 1 to 2 cm. wide, glabrous. . . . 4. *I. pallens*.

Blades oval to ovate-lanceolate, 1.5 to 3.5 cm. wide, often pubescent beneath 5. *I. axillaris*.



1. *Ichnanthus mayarensis* (Wright) Hitchc.

Panicum mayarensis Wright, Anal. Acad. Cienc. Habana 8: 296. 1871. "Mayarí Abajo," Cuba. The type specimen in the Gray Herbarium (*Wright* 3468) consists of several culms with decumbent bases, sessile or nearly sessile blades 2 to 3 mm. wide, and a panicle one-fourth the entire height of the plant.

Ichnanthus mayarensis Hitchc. Contr. U. S. Nat. Herb. 12: 229. 1909. Based on *Panicum mayarensis* Wright.

Ichnanthus wrightii Hitchc. Contr. U. S. Nat. Herb. 12: 229. 1909. "Wright's 3880. U. S. National Herbarium no. 559959 of this collection is the type." This was collected at Río Sèco in Arroyo Hondo, Pinar del Río, Cuba. The specimen consists of several delicate sterile culms rooting at the nodes, the thin blades as much as 1 cm. wide with petioles as much as 12 mm. long, and of a few culms, lacking the base, bearing small panicles. The plants appear to have grown in the shade.

DESCRIPTION.

Culms slender, wiry, straggling or spreading, rooting at the lower nodes, 20 to 40 cm. long, glabrous or the lower part minutely pubescent, striate, the nodes several; sheaths shorter (often much shorter) than the internodes, striate, glabrous or sparsely papillose-hispid on the surface, puberulent on the margin, especially toward the apex; blades lanceolate to narrowly elliptic, 2 to 5 cm. long, 3 to 6 mm. wide (or exceptionally as much as 1 cm. wide), striate, glabrous throughout or scaberulous above, abruptly narrowed at base into a petiole 1 to 5 mm. long, or on the sterile shoots as much as 15 mm. long; panicles 2 to 10 cm. long, usually long-exserted, the few main branches as much as 3 cm. long, rather stiffly spreading, the primary and secondary axes glabrous or scaberulous; spikelets about 3 mm. long, lanceolate, nearly terete, acute, glabrous, the unequal pedicels 0.5 to 2 mm. long; first glume 1.5 mm. long, broad and clasping at base, acute; second glume and sterile lemma equal, 3 mm. long, acuminate, strongly nerved, the sterile palea narrow, about 1 mm. long; fertile lemma 2 mm. long, acute, only slightly compressed dorsally, the margins inrolled, nearly or quite meeting, the scars at base about 0.5 mm. long, the stipe obsolete.

At the time *Ichnanthus wrightii* was described there were no specimens at hand except those collected by Wright. The specimens received since then show that the two forms must be united under one species.

DISTRIBUTION.

Dry pine woods and palm barrens, Cuba.

CUBA: Mayarí, *Wright* 3468. Arroyo Hondo, *Wright* 3880. Woodfred, *Shafer* 2966, 3058. Campo Florido, *León* 3450, 4143. Madruga, *León* 6373.

EXPLANATION OF PLATE 1.—*Ichnanthus mayarensis*. Specimen from Campo Florido, Cuba, *León* 4143 (U. S. Nat. Herb. no. 946900). Natural size.

2. *Ichnanthus tenuis* (Presl) Hitchc. & Chase.

Oplismenus tenuis Presl, Rel. Haenk. 1: 319. 1830. "Hab. in Meixico, Panama." A duplicate type has been examined at the herbarium of the Petrograd Botanical Garden.

Panicum exile Steud. Syn. Pl. Glum. 2: 45. 1854. Based upon *Oplismenus tenuis* Presl, the name changed probably because of *Panicum tenue* Roxb.

Panicum alsinoides Griseb. Fl. Brit. W. Ind. 550. 1864. "Hab. Jamaica!, March; St. Kitts!; Trinidad! *Pd.*" The description applies to *Ichnanthus tenuis*, but the specimen (sterile) in the Gray Herbarium collected in Jamaica by March is *Oplismenus setarius*. *Ichnanthus tenuis* is not known from Jamaica. The specimen of *P. alsinoides* in the Grisebach Herbarium from St. Kitts is also sterile and is probably not *Ichnanthus tenuis*.

Ichnanthus alsinoides Munro; Hemsl. Biol. Centr. Amer. Bot. 3: 500. 1885. Based on *Panicum alsinoides* Griseb.

Ichnanthus tenuis Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 334. 1917. Based on *Oplismenus tenuis* Presl.

DESCRIPTION.

Apparently annual; culms slender, spreading or creeping, rooting at the nodes, much branched, the fertile shoots ascending, 10 to 20 cm. high, glabrous or puberulent mostly in lines, purplish; sheaths shorter than the internodes, papillose-hispid with weak hairs; blades lanceolate, 2 to 5 cm. long, 4 to 10 mm. wide, sessile, rounded or slightly cordate at base, acute or acuminate, thin, glabrous or puberulent, often sparsely hispid, the margins scabrous; panicles terminal and axillary, 2 to 4 cm. long, or the axillary ones smaller, mostly on long slender peduncles, the few branches rather weakly spreading, as much as 2 cm. long, the axes slender, angled, scaberulous, and sometimes puberulent, often villous or with a few long hairs at the base of the branches; spikelets narrowly lanceolate, 3 mm. long, acuminate, hispid, the pedicels slender, unequal, the shorter one of the pair 1 mm. long or less, the other twice or thrice as long; first glume broad and clasping at base, nearly as long as the spikelet, attenuate into a slender point, glabrous or scaberulous; second glume and sterile lemma nearly equal, acuminate, the former attenuate-pointed, prominently nerved, sparsely hispid along the lateral nerves, the sterile palea small and narrow; fertile lemma 1.5 to 2 mm. long, dorsally compressed, oblong, rounded at the apex, the margins flat, widely separated, the scar about 0.3 mm. long, extending downward into a wing decurrent on the short stipe.

DISTRIBUTION.

Damp shady places, Guatemala to northern South America.

GUATEMALA: Cibilquitz, *Türckheim* 8799 (abnormal). Cobán, *Türckheim* 908 (abnormal).

COSTA RICA: Alajuela, *Jiménez* 164, 165, 701, 705. Boruca, *Tonduz* 3363, 4460. Buenos Aires, *Tonduz* 3647. Piedro del Convento, *Pittier* 3654. Río General, *Pittier* 3359, 3363.

PANAMA: Gatún, *Hitchcock* 9186. Culebra, *Pittier* 2119; *Amer. Gr. Nat. Herb.* 581; *Hitchcock* 9166. Chagres, *Fendler* 373 (abnormal). El Boquete, *Hitchcock* 8274 (abnormal). Cerro Vaca, *Pittier* 5366, 5370. Balboa, *Hitchcock* 8000 (abnormal). Bohío, *Hitchcock* 8394 (abnormal). Ancón, *Killip* 4029.

TRINIDAD: Maraval, *Broadway* 4912, 4913. Arima, *Hitchcock* 10313. Port of Spain, *Hitchcock* 10052, 10199. St. Joseph, *Amer. Gr. Nat. Herb.* 580.

COLOMBIA: Santa Marta, *Smith* 2129, 2135, 2572.

VENEZUELA: Tovar, *Fendler* 2532, 2544 (abnormal).

EXPLANATION OF PLATE 2.—*Ichnanthus tenuis*. Specimen from Río Grande, Panama, *Pittier* 2119 (U. S. Nat. Herb. no. 975195); also a branch with proliferous spikelets, collected between Bohío and Frijoles, Panama, *Hitchcock* 8394 (U. S. Nat. Herb. no. 946963). Both natural size.

= 3 *Echinochloa nemorosa* Kunth
based on *Panicum nemorosum* Swartz

3. *Ichnanthus nemorosus* (Swartz) Doell.

Panicum nemorosum Swartz, Prodr. Veg. Ind. Occ. 22. 1788. "Jamaica, Domingo." The type has been examined in the Swartz Herbarium at Stockholm. It is from Jamaica.

Milium nemorosum Moench, Meth. Pl. Suppl. 67. 1802. Based on *Panicum nemorosum* Swartz.

Ichnanthus nemorosus Doell in Mart. Fl. Bras. 2²: 289. 1877. Based on *Panicum nemorosum* Swartz.

DESCRIPTION.

Culms spreading and creeping, rooting at the nodes, much branched, pubescent or glabrescent, the nodes pubescent, the fertile shoots decumbent or rising to the height of 10 to 20 cm.; sheaths shorter than the internodes, pubescent or glabrescent, villous on the margin and collar; blades ovate-lanceolate to elliptic-lanceolate, 3 to 7 cm. long, 1 to 2 cm. wide, clasping at the usually asymmetric base, somewhat abruptly narrowed toward the apex, thin, sparsely hispid and scaberulous on both surfaces or glabrescent; panicles terminal and axillary, 1 to 4 cm. long, ovate or often narrow, the few branches weakly spreading or appressed, usually not over 2 cm. long, the axes angled and scabrous, villous at the base of the branches; spikelets 2.5 to 3 mm. long, glabrous, the pedicels short, 1 to 2 mm. long or less; first glume a little shorter than the second and about as long as the sterile lemma, broad and somewhat clasping at the base, 5-nerved, the lateral nerves contiguous, acuminate or attenuate-pointed, the keel scaberulous above; second glume and sterile lemma 5-nerved, the lateral nerves distant, the glume scaberulous on the keel, acuminate or attenuate-pointed, sometimes with a few hairs near the margin, the lemma smooth on the keel, acute or somewhat rounded at apex, the sterile palea well developed, nearly as long as the lemma; fertile lemma lanceolate, 2 mm. long, acutish, yellow-brown at maturity, the scar at base about 0.3 mm. long, bearing no wing below, the margins somewhat inrolled, distant.

This species resembles *I. pallens*, but is more delicate, has thinner blades, and is usually more prostrate; the spikelets are shorter and more obtuse.

DISTRIBUTION.

Shady banks and rich woods, West Indies, Mexico, and Central America.

SAN LUIS POTOSÍ: Las Canoas, *Pringle* 3827.

VERACRUZ: Misantla, *Purpus* 6217. Jalapa, *Hitchcock* 6649.

GUATEMALA: Guatemala City, *Hitchcock* 9047. Cubilquitz, *Türckheim* 4038.

COSTA RICA: La Palma, *Tonduz* 12509, 12515. La Esmeralda, *Tonduz* 1346.

Santa Rosa du Copey, *Tonduz* 11889. San José, *Hitchcock* 8479.

PANAMA: El Boquete, *Hitchcock* 8268, 8276, 8318, 8329. Chiriquí Volcano, *Hitchcock* 8195, 8205.

CUBA: Habana, *León* 3635. Sierra de Anafe, *Wilson* 11538 (*León* 2873). Banao Hills, Santa Clara, *León* 3997. La Perla, Oriente, *León* 3908. Retiro,

Wright 3881. Mogote de Mono, *Wright* 3882. Arroyo Hondo, *Wright* 3858.

SANTO DOMINGO: Without locality, *Poiteau*.

JAMAICA: Gordon Town, *Harris* 11476; *Hart* 923. Ramble, *Amer. Gr. Nat.*

Herb. 582. Troy, *Hitchcock* 9798. Catherines Peak, *Hitchcock* 9741. Castleton, *Harris* 11296. Clyde River, *Harris* 11447.

PORTO RICO: Cayey, *Sintenis* 2406.

LEEWARD ISLANDS: St. Kitts, *Britton & Cowell* 632.

WINDWARD ISLANDS: Grenada, *Broadway* 177.

TRINIDAD: Port of Spain, *Hitchcock* 10041. Caparo Woods, *Broadway* 4931.

EXPLANATION OF PLATE 3.—*Ichnanthus nemorosus*. Specimen from River Estate, Port of Spain, Trinidad, *Hitchcock* 10041 (U. S. Nat. Herb. no. 975139). Natural size.

4. *Ichnanthus pallens* (Swartz) Munro.

Panicum pallens Swartz, Prodr. Veg. Ind. Occ. 23. 1788. "Jamaica." The type has been examined in the Swartz Herbarium at Stockholm.

Panicum hemignostum Steud. Syn. Pl. Glum. 1: 77. 1854. "Paraguay." The type has been examined at the Paris Herbarium.

Ichnanthus pallens Munro; Benth. Fl. Hongk. 414. 1861. Based on *Panicum pallens* Swartz.

DESCRIPTION.

Culms much branched, spreading, creeping at the base, rooting at the nodes, the fertile culms ascending 30 to 80 cm. or sometimes more, puberulent; sheaths usually glabrous on the surface, villous on the margin; blades lanceolate, often somewhat falcate, 5 to 10 cm. long, mostly 1 to 2 cm. wide, somewhat clasping at the asymmetric narrowed base, somewhat abruptly narrowed to an acuminate point, the lower surface glabrous or slightly scaberulous, roughened with irregular crossveins, sometimes with a few scattered stiff hairs, the upper surface scaberulous, often with a few stiff hairs at the base and on the basal portion of the margin; panicles terminal and from several of the upper axils, 5 to 10 cm. long, rather compact, elliptic, the main branches ascending, as much as 6 cm. long, usually bearing secondary branches, the axes angled and scabrous, pubescent at the base of the branches; spikelets 3 to 3.5 mm. long, glabrous or rarely with a few stiff hairs; first glume 1.5 to 2 mm. long, somewhat clasping at base, attenuate-pointed, scabrous on the keel; second glume longer than the sterile lemma, acuminate but scarcely attenuate-pointed, scabrous on the keel and roughened on the lateral nerves; sterile lemma similar to the second glume, but shorter and less narrowed at the summit, the palea well developed, nearly as long as the lemma; fertile lemma oblong, 1.5 mm. long, rounded at apex, the margins inrolled, distant, the scars at base 0.3 mm. long, narrowly winged at the side.

DISTRIBUTION.

Shady banks and rich woods, tropics of the Western Hemisphere, from southern Mexico and Cuba southward; introduced in southeastern Asia.

VERACRUZ: Córdoba, *Hitchcock* 6454. Jalapa, *Hitchcock* 6675. Mirador, *Liebmann* 400, 401, 740 (abnormal).

CAMPECHE: Atasta, *Rovirosa* 642 (abnormal).

GUATEMALA: Cubilquitz, *Türkheim* 4038. Sepacuité, *Collins & Goll* 011 (abnormal). Senahú, *Goll* 178 (abnormal). Livingston, *Türkheim* 8792.

HONDURAS: San Pedro Sula, *Thieme* 17, 5590, 5594. Puerto Sierra, *Wilson* 614.

COSTA RICA: San José, *Cooper* 5991. Buenos Aires, *Pittier* 10591. Cañas Gordas, *Pittier* 7361. Boca de Zhorquin, *Tonduz* 8636. San Marcos, *Tonduz* 7564. Rodeo de Pacaca, *Pittier* 3269. Luis, *Tonduz* 11393. Ter-raba, *Tonduz* 3616. Boruca, *Tonduz* 3633.

PANAMA: Matías Hernández, *Pittier* 6923. Bocas del Toro, *Hart* 69, 72, 89. Culebra, *Hitchcock* 8023, 9164. Bas Obispo, *Hitchcock* 9210. Gatún, *Maxon* 4654; *Hitchcock* 9181. Alhajueta, *Pittier* 2335. Corozal, *Hitchcock* 9201. El Boquete, *Hitchcock* 8273, 8302, 8306. San Felix, *Pittier* 5204 (abnormal), 5230, 5272.

Colombia: Cuatrecasas 8775

Panicum ~~sp.~~ *latifolium* Sieb.
Bonn. 137. 1829 S. Gussone et al.
Herb. Gussone

Panicum kohautianum Presl, Bot. Bemerk.
119. (Abh. Böhm. Ges., 3: 549. 1845). "Based
on *Panicum latifolium* Sieb. flor. Mart.
Suppl. no 7... not *P. latifolium* L." a spec.
in herb. This marked is *P. latifolium*

"Spec of this member, ^{the locality,} ^{indeed.}

- CUBA: Monte Verde, *Wright* 750. Sancti Spiritus Mountains, *León* 6524 (abnormal). Camino Aguacate, *Wilson* 9210. Gran Piedra, *Shafer* 9015. Woodfred, *Shafer* 3022. Holguin, *Shafer* 1446. Baracoa, *Pollard, Palmer & Palmer* 15. El Guama, *Palmer & Riley* 130 (abnormal), 218. El Palenquito, *Eggers* 4814. San Diego de los Baños, *León* 4849.
- JAMAICA: Red Hills, *Harris* 11837. Ipswich, *Harris* 12511; *Hitchcock* 9619. Devon Pen, *Harris* 12472. Holliss Savanna, *Harris* 12258. Bull Head Mountain, *Hitchcock* 9531. Troy, *Hitchcock* 9799. Claverty Cottage, *Harris* 11523. Castleton, *Harris* 11298, 11485. Port Morant, *Hitchcock* in 1890. Cedar Hurst, *Harris* 11549.
- PORTO RICO: Rio Piedras, *Stevenson* 3327; *Hioram* 362; *Wetmore* 171. Sierra de Luquillo, *Eggers* 1172; *Chase* 6717. Maricao, *Sintenis* 214; *Chase* 6196. Bayamon, *Millsbaugh* 352; *Heller* 92. Mayaguez, *Holm* 3, 165; *Heller* 4374; *Cowell* 628; *Chase* 6321. Santurce, *Heller* 826. Ponce, *Heller* 6093. Santa Ana, *Goll* 136. Toa Alta, *Goll* 884. Utuado, *Britton & Cowell* 369, 883. Jayuya, *Britton & Cowell* 949. Alegriльо, *Britton, Stevens & Hess* 2576. Monte Montoso, *Britton & Cowell* 4139. Sierra de Naguabo, *Shafer* 3388, 3629. Fajardo, *Britton & Shafer* 1633. Campo Alegre, *Chase* 6805. San Juan, *Chase* 6362, 6405, 6411, 6628, 6629, 6640, 6774. Cayey, *Chase* 6736. Quebradillas, *Chase* 6571. Arecibo, *Chase* 6450. Vega Baja, *Chase* 6418.
- SANTO DOMINGO: Sánchez, *Rose* 4333. Santo Domingo City, *Rose* 3748. Without locality, *Wright, Parry & Brummel* 608.
- LEEWARD ISLANDS: Antigua, *Rose* 3487; *Wullschlaegel* 619. Montserrat, *Shafer* 710. Guadeloupe, *L'Herminier* 397; *Duss* 2686.
- WINDWARD ISLANDS: Martinique, *Duss* 772. Barbados, *Eggers* 7186; *Bot. Sta. Herb.* 458. St. Vincent, *Eggers* 6560. Grenada, *Broadway* 1103, 4615, 4672.
- TRINIDAD: *Bot. Gard. Herb.* 2281, 3189, 3191. Port of Spain, *Crueger* 74; *Hitchcock* 9955, 9966; *Amer. Gr. Nat. Herb.* 583, 584. Maraval, *Broadway* 4911. Tamana, *Broadway* 4960. Blanchisseuse, *Broadway* 3820. St. Joseph, *Hitchcock* 10013. San Fernando, *Hitchcock* 10104. Tabaquite, *Hitchcock* 10130. La Brea, *Broadway* 4977. Cedros, *Hitchcock* 10140.
- TOBAGO: *Broadway* 4039, 4080; *Eggers* 5685; *Hitchcock* 10240, 10248.
- COLOMBIA: Santa Marta, *Smith* 2133.
- BRAZIL: *Capanema* 5392, 5453; *Burchell* 1623. Rio Grande do Sul, *Malme* 506; *Lindman* 1413. Campina, *Campos Novaes* 1285 (abnormal), 1286. Rio Janeiro, *Glaziov* 17393, 17404.
- PARAGUAY: Sierra de Amambahy, *Hassler* 11269.
- ARGENTINA: Misiones, *Ekman* 654, 656.

EXPLANATION OF PLATE 4.—*Ichnanthus pallens*. Specimen from Port of Spain, Trinidad, *Hitchcock* 9955 (U. S. Nat. Herb. no. 946899). Natural size.

5. *Ichnanthus axillaris* (Nees) Hitchc. & Chase.

Panicum axillare Nees, *Agrost. Bras.* 141. 1829. "Itambé da Villa et Itacolumi etc. provinciae Minarum." The type specimen, collected by Martius, has been examined at the Munich Herbarium.

Ichnanthus axillaris Hitchc. & Chase, *Contr. U. S. Nat. Herb.* 18: 334. 1917. Based on *Panicum axillare* Nees.

DESCRIPTION.

Culms much branched, spreading or prostrate, rooting at the nodes, the fertile shoots ascending 10 to 20 cm. in open ground, or among shrubs clambering to the height of 1 to 1.5 meters, puberulent or glabrescent; sheaths villous, at least on the margin; blades oval, ovate, or ovate-lanceolate, 3 to 12 cm. long.

1.5 to 3.5 cm. wide, cordate-clasping at base, acute or acuminate, rather thick or firm, pubescent or glabrous beneath, scabrous above; panicles terminal and axillary, similar to those of *I. pallens* but on the average larger, sometimes as much as 20 cm. long; spikelets similar to those of *I. pallens* in arrangement and structure, but usually larger; glumes often sparsely pilose; sterile lemma containing a well-developed palea and a staminate flower; fertile lemma 2 mm. long, with prominent scars at base.

This species is closely related to *I. pallens*, from which it differs in the thicker, proportionately broader blades and larger, often sparsely pilose spikelets.

DISTRIBUTION.

Moist, more or less shaded slopes in the uplands, Porto Rico and Guatemala to Ecuador and Brazil.

GUATEMALA: Cubilquitz, *Türkheim* 7800.

COSTA RICA: "Chemin de Carrillo," *Biolley* 3112.

PANAMA: Frijoles, *Hitchcock* 8398. San Felix, *Pittier* 5203. Juan Diaz, *Killip* 4063.

PORTO RICO: Adjuntas, *Chase* 6472; *Sintenis* 4610; *Britton & Shafer* 2018. Utuado, *Britton & Cowell* 1008. Mayaguez, *Heller* 4479. Cayey, *Chase* 6735. Aybonito, *Sintenis* 2869.

TRINIDAD: Tabaquite, *Hitchcock* 10125; *Amer. Gr. Nat. Herb.* 585. Maraval, *Bot. Gard. Herb.* 5425. Port of Spain, *Hitchcock* 10033.

TOBAGO: *Hitchcock* 10263.

VENEZUELA: Santa Catalina, *Rusby & Squires* 353.

BRAZIL: Paraná, *Dusén* 7911.

ECUADOR: Balao, *Eggers* 14655.

EXPLANATION OF PLATE 5.—*Ichnanthus axillaris*. Specimen from Maraval, Trinidad, *Bot. Gard. Herb.* 5425 (U. S. Nat. Herb. no. 975122). Natural size.

6. *Ichnanthus lanceolatus* Scribn. & Smith.

Panicum lindeni Fourn. Mex. Pl. 2: 29. 1886. Not *P. lindeni* Griseb. 1866. The type specimen, collected in Yucatán by Linden, has been examined at the Paris Herbarium.

Ichnanthus lanceolatus Scribn. & Smith, U. S. Dept. Agr. Div. Agrost. Bull. 4: 36. pl. 5. 1897. "Old fields about Izamal, No. 854. George F. Gaumer, September, 1895." The type is in the United States National Herbarium.

DESCRIPTION.

Culms erect or slightly spreading at base, 40 to 60 cm. high, striate, glabrous or puberulent, the nodes about 4, glabrous, or puberulent below the sheath at the margin of the latter; sheaths shorter than the internodes, striate, glabrous on the surface or the lowermost villous, the margin villous; blades lanceolate to ovate-lanceolate, or the lower ovate, 5 to 7 cm. long, 1 to 3 cm. wide, the uppermost reduced, rather firm in texture, glabrous or slightly scaberulous beneath, scabrous above, narrowed from a rounded or cordate base into a petiole 1 to 10 mm. long; panicles terminal or also axillary, 5 to 12 cm. long, the one from the uppermost sheath smaller, the few branches rather stiffly spreading, as much as 6 cm. long, the axes scaberulous; spikelets about 4 mm. long, lanceolate, slightly compressed laterally, glabrous, the pedicels scabrous, unequal, the shorter of the pair about 1 mm. long, the longer about 3 mm.

all over the
scale 93%

107. *Desmodium* *var. varicosa* *laetis* M.
West. 1000 ft. alt.

long; first glume 2 mm. long, broad and clasping at base, acute; second glume and sterile lemma nearly equal, clasping at base, acuminate, the sterile palea small and narrow, about 1 mm. long; fertile lemma nearly 3 mm. long, acute, the margins flat and overlapping toward the apex, inrolled and nearly meeting toward the base, the scar at base very short, extending downward into a minute wing on the very short stipe.

DISTRIBUTION.

Forests and old fields; known only from Yucatán peninsula.

YUCATÁN: Izamal, *Gaumer* 854. Tiap, *Linden*.

QUINTANA ROO: Buena Vista Xbae, *Gaumer* 1111. Chichankanab, *Gaumer* 2181.

EXPLANATION OF PLATE 6.—*Ichnanthus lanceolatus*. Type specimen. Natural size.

7. *Ichnanthus nemoralis* (Schrad.) Hitchc. & Chase.

Panicum nemorale Schrad.; Schult. Mant. 2: 255. 1824. "In Brasilia, Princeps Sereniss. Maximil. Neowidensis." The type has not been examined but the description identifies the species.

Panicum martianum Nees, *Agrost. Bras.* 138. 1829. "Habitat ad Almadam [Brazil] (Mart.)." Nees describes three varieties of which the first, *a*, is the type. This is described as having the sheaths, except the margins, glabrous.

Panicum petiolatum Nees, *Agrost. Bras.* 140. 1829. "Habitat in udis ad Guaratinguetá, in vicinia Paraíba fluminis, provinciae S. Pauli," Brazil. The type specimen, collected by Martius, was examined in the Munich Herbarium.

Ichnanthus petiolatus Doell in Mart. Fl. Bras. 2²: 278. 1877. Based on *Panicum petiolatum* Nees.

Ichnanthus martianus Doell in Mart. Fl. Bras. 2²: 280. 1877. Based on *Panicum martianum a* Nees.

Ichnanthus nemoralis Hitchc. & Chase, *Contr. U. S. Nat. Herb.* 18: 334. 1917. Based on *Panicum nemorale* Schrad.

DESCRIPTION.

Culms as much as 1 meter tall, more or less decumbent at base, pubescent or glabrous; sheaths more or less pubescent, villous on the collar; ligule a ciliate membrane about 1 mm. long; blades elliptic or narrowly lanceolate, up to about 10 or 15 cm. long, as much as 3 cm. wide, narrowed into a petiole 1 to 2 mm. long, many-nerved, pubescent on both surfaces or glabrous above; panicle 10 to 15 cm. long, the few stout branches stiffly ascending, pubescent at base; spikelets about 4.5 mm. long, glabrous, or the glumes slightly roughened on the internerves toward the apex; fruit 3.5 mm. long, the appendages 1.5 mm. long.

DISTRIBUTION.

Among shrubs, Trinidad to Brazil.

TRINIDAD: *Bot. Gard. Herb.* 2278.

TOBAGO: *Broadway*, 4472. 20077

VENEZUELA: Island of Margarita, *Johnston* 208.

BRAZIL: Toca de Onca, *Rose* 26077; *Riedel* 1193, 1194A. Rio Janeiro, *Wilkes Expl. Exped.* 14; *Mertens*. State of Paraná, *Dusén* 7594. Without locality, *Salzmann*.

EXPLANATION OF PLATE 7.—*Ichnanthus nemoralis*. Specimen from Tobago, *Broadway* 4472 (U. S. Nat. Herb. no. 725595). Natural size.

Ichnanthus glaber (Raddi) Hitchc. (*Navicularia glabra* Raddi, Agrost. Bras. 39. 1823; *Panicum navicularia* Nees, Agrost. Bras. 136. 1829). This species has been confused with *Ichnanthus nemoralis* but differs in having narrowly lanceolate blades, glabrous sheaths (including margin), and an open panicle with slender branches and pedicels. The appendages of the fertile lemma are distinctly different, being firm and rather thick, gradually narrowed to a blunt point, extending above the base of the palea for 0.5 mm. and united below to the base of the fruit for about the same distance. The appendages of *I. nemoralis* and its allies are thin membranaceous wings. The notes here given are from a specimen collected by J. N. Rose on Corcovado, Rio de Janeiro, Brazil (no. 20181). The type of *Navicularia glabra*, collected "in saltibus montosis prope Rio-janeiro," has not been examined, but the specimen above cited agrees perfectly with Raddi's description.

There is an *Ichnanthus glaber* Link¹ mentioned as a synonym under *Panicum glaberrimum* Steud. The name has no taxonomic standing, as it was not properly published.

8. *Ichnanthus leiocarpus* (Spreng.) Kunth.

Panicum leiocarpon Spreng. Neu. Entd. 1: 243. 1820. "Hab. in Brasilia."

Navicularia lanata Raddi, Agrost. Bras. 40. 1823. "In herbis prope Rio-Inhumirim," Brazil. This is given as a synonym of *Panicum leiocarpon* by Nees,² who probably saw Sprengel's type at Berlin. Raddi describes and figures the glumes and sterile lemma as pubescent at apex, a character which is not mentioned by Sprengel. Sprengel's type has been examined; the spikelets are obscurely pubescent at apex but not bearded as stated by Raddi. As I have not seen Raddi's type, *Navicularia lanata* is included here somewhat doubtfully.

Ichnanthus leiocarpus Kunth, Rév. Gram. 1: Suppl. X. 1830. Based on *Panicum leiocarpon* Spreng.

DESCRIPTION.

Culms 1 to 2 meters tall, pubescent; sheaths villous or lanate; ligule a ciliate membrane, the hairs 1 to 2 mm. long; blades narrowly lanceolate, 10 to 20 cm. long, 1 to 3 cm. wide, pilose on both surfaces; panicle large and open, about 30 cm. long, obovoid, the axis villous below, scabrous above, the branches spreading, pubescent at base, these and the branchlets somewhat flexuous; spikelets about 4 mm. long, glabrous; first glume about half as long as spikelet; fruit narrow, brownish, 3 mm. long, the appendages about 1 mm. long.

DISTRIBUTION.

Trinidad to Brazil.

TRINIDAD: *Bot. Gard. Herb.* 3318.

BRAZIL: Bahia, *Riedel* 183. Rio Janeiro, *Beyrich*.

9. *Ichnanthus mexicanus* Fourn.

Ichnanthus mexicanus Fourn. Mex. Pl. 2: 34. 1836. "Trapiche de la Concepcion [Oaxaca] (Liebm. n. 457)." The type, in the Copenhagen Herbarium, is the terminal part of a culm with a panicle and one or two leaves. The description below is drawn from this specimen.

¹ Steud. Syn. Pl. Glum. 1: 94. 1854.

² Agrost. Bras. 147. 1829.

2. I. quodam modo, etc.
~~Constitution~~ de iuris
P. 1. 1. 1. 4. 1.
... ..



DESCRIPTION.

Culms tall, glabrous; sheaths densely villous or glabrate; ligule a very short, densely ciliate membrane; blades (only the upper seen) gradually narrowed from the cordate base to a slender point, 8 to 18 cm. long, as much as 2.5 cm. wide near base, pubescent on both surfaces; panicle 30 cm. long, about 8 cm. wide, rather densely flowered, the branches ascending, clustered, the longer ones as much as 10 cm. long, spikelet-bearing from base; spikelets single or in clusters along the scabrous rachis, 4 to 4.5 mm. long, the pedicels 1 to 2 mm. long, densely scabrous-hispidulous; first glume about as long as the spikelet, 3-nerved, pointed, scabrous, villous along the margins and at the apex; second glume about as long as the fruit, 5-nerved, scabrous, the long hairs sparse or wanting; sterile lemma similar to the second glume but weakly 5-nerved, the palea well developed, ciliate on the keels; fertile lemma about 3 mm. long, the boat-shaped point distinct, the appendages rather firm, ovate-oblong, distinct from near the base, about 0.5 mm. long.

DISTRIBUTION.

Known only from the type collection.

OAXACA: Trapiche de la Concepción, *Liebmann* 457.

EXPLANATION OF PLATE 8.—*Ichnanthus mexicanus*. Type specimen. Natural size.

British Honduras:

Keinlock 72.

10. *Ichnanthus ichnodes* (Griseb.) Hitchc. & Chase.

Panicum ichnodes Griseb. Fl. Brit. W. Ind. 551. 1864. Collected in Trinidad by Cruieger near Port of Spain, "heights of S. Anne." The type specimen in the Grisebach Herbarium consists of an incomplete leafy culm and a large spreading panicle.

Ichnanthus ichnodes Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 335. 1917. Based on *Panicum ichnodes* Griseb.

DESCRIPTION.

Plants erect from a somewhat decumbent base, bearing short knotty root-stocks and forming colonies; culms 1 to 2 meters tall, glabrous, or sparingly villous below; sheaths keeled, the lower overlapping, glabrous or sparsely villous, densely villous on the margin and on the collar; ligule a ciliate membrane about 1 mm. long; blades narrowly lanceolate to linear, the lower ones as much as 30 cm. long, 1 to 2 cm. wide, narrowed below, scabrous, sometimes sparsely villous, densely villous above near base; panicle oblong, as much as 30 cm. long, the branches fascicled or branched at base, finally spreading, pubescent or villous at base; spikelets blunt, about 2.5 mm. long; first glume very scabrous on the keel, more than half as long as spikelet, often sparsely villous; second glume roughened toward apex; sterile floret often staminate; fruit 2 mm. long, the appendages 0.5 mm. long.

The elongate blades and the large, much-branched, many-flowered panicles of blunt spikelets give this species the aspect of a species of *Panicum*. The small spikelets lack the point at the ends of the glumes and lemmas, but the appendages at the base of the fertile lemma show that the species belongs to *Ichnanthus*.

DISTRIBUTION.

Wood borders, in partial shade, Trinidad,

TRINIDAD: Port of Spain, *Amer. Gr. Nat. Herb.* 586, 587; *Bot. Gard. Herb.* 3182. St. Anne, *Crueger* 77. St. Joseph, *Hitchcock* 10178, 10179, 10191. Piarco Savanna, *Hitchcock* 10357. Pitch Lake, *Bot. Gard. Herb.* 2299.

EXPLANATION OF PLATE 9.—*Ichnanthus ichnodes*. Specimen from St. Joseph, Trinidad, *Hitchcock* 10179 (U. S. Nat. Herb. no. 946898). Natural size.

DOUBTFUL OR EXCLUDED SPECIES.

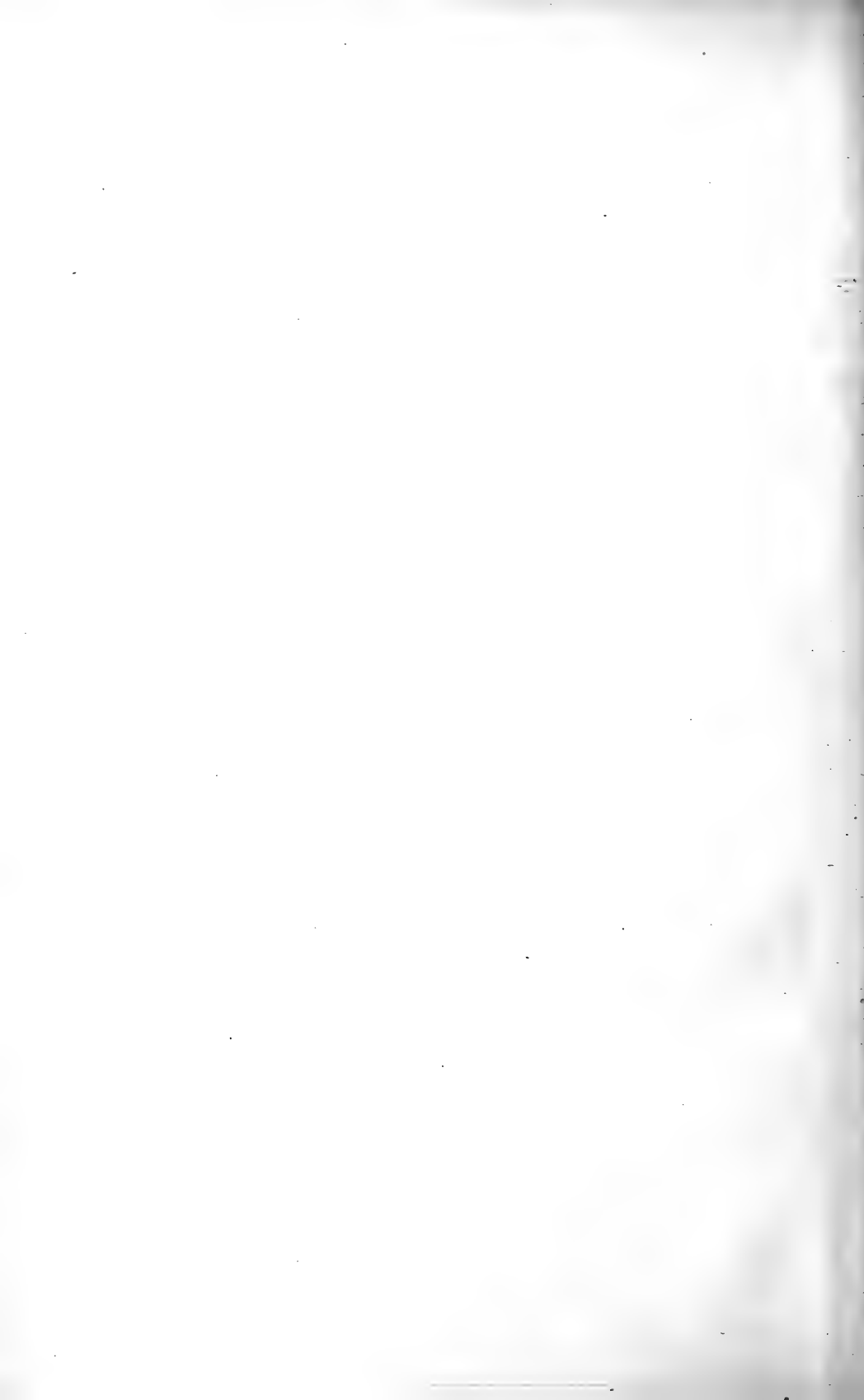
PANICUM SCHLECHTENDALII Fourn.; Hemsl. *Biol. Centr. Amer. Bot.* 3: 496. 1885, a name only; Fourn. *Mex. Pl.* 2: 22, 30. 1886. "P. pallens Schlecht . . . non Sw." No description except the few characters given in the key. These point to *I. nemorosus*.

PANICUM SCHLECHTENDALII var. MONSTROSUM Fourn. *Mex. Pl.* 2: 31. 1886. "Mirador (Gal. n. 5689)." Galeotti's specimen in the Paris Herbarium is a plant with abnormal spikelets. Probably *I. pallens*.

ICHNANTHUS APICULATUS Scribn. U. S. Dept. Agr. Div. Agrost. Circ. 30: 1. 1901. This is *Panicum cordovense* Fourn.

Brazil

Chnanthus trinitensis Mez
Trin. Gard. hb. sine no. Trinensis.



THE NORTH AMERICAN SPECIES OF LASIACIS.

By A. S. HITCHCOCK.

INTRODUCTION.

Lasiacis is one of the few genera of grasses, excepting bamboos, that have woody culms. It was long included in the allied genus *Panicum*, from which it is well distinguished by the woody culms, the general habit, and the technical characters of the spikelet, especially the shape of the fruit, the oblique position of the spikelets on the pedicels, and the woolly tips to the glumes and lemmas, these tufts of wool having suggested the generic name. Some of the species creep on the floor of the forest and some form a tangled mass of branching culms, while the majority form strong central canes which clamber up through shrubs or over the margins of woods for several meters.

The genus consists of 15 species, all confined to tropical America, one species reaching subtropical Florida.

DESCRIPTION OF THE GENUS AND SPECIES.

LASIACIS (Griseb.) Hitchc.

Panicum section *Lasiacis* Griseb. Fl. Brit. W. Ind. 551. 1864. Five species are included in the section: *P. divaricatum*, *P. sloanei*, *P. lanatum*, *P. compactum*, *P. martinicense*. Grisebach gives a satisfactory diagnosis of the section.

Lasiacis Hitchc. Contr. U. S. Nat. Herb. 15: 16. 1910. The designated type is *Panicum divaricatum* L.

DESCRIPTION.

Perennial, shrubby, often climbing grasses with much branched culms (herbaceous and simple in *L. procerima*), flat, often slightly petiolate blades, and open or somewhat contracted panicles terminating the main culm and primary branches, reduced panicles terminating the secondary, often fascicled branches. Spikelets subglobose, ovoid, or ellipsoid, placed obliquely on their pedicels, the glumes and sterile lemma broad, abruptly apiculate, papery-chartaceous, shining, often black at maturity, many-nerved, glabrous, or lanose at the apex only. First glume rarely over one-third the length of the spikelet, somewhat inflated-ventricose. Second glume and sterile lemma subequal, about as long as the fertile lemma, or the glume slightly shorter, the lemma inclosing a membranaceous palea and sometimes a staminate flower, rarely a second sterile lemma present. Fertile lemma white, bony-indurate, obovoid, obtuse, the margins inrolled, inclosing the edges of the indurate palea, both lemma and palea

bearing at the apex in a slight crateriform excavation a tuft of woolly hairs, the palea concave below, gibbous above, the apex often free at maturity.

All the species of *Lasiacis* have woody culms except *L. procerrima*. The spikelets differ from those of *Panicum* in the bony obovoid fruit, pubescent at the apex, the palea concave below and gibbous above.

KEY TO THE SPECIES.

Culms erect, simple, herbaceous; blades as much as 40 cm. long and 5 cm. wide, deeply cordate-clasping. 1. *L. procerrima*.

Culms much branched, woody; blades mostly less than 20 cm. long, narrowed at base or somewhat cordate.

Main stem prostrate, the fertile shoots prostrate, ascending, or erect.

Blades lanceolate, mostly less than 5 cm. long; fertile shoots strongly dorsiventral, mostly prostrate. 2. *L. rugelii*.

Blades linear-lanceolate, about 10 to 12 cm. long; fertile shoots ascending or erect from a decumbent base, not dorsiventral. . . . 3. *L. grisebachii*.

Main stem clambering, or much branched and forming a tangled mass.

Ligule noticeable, brownish, about 2 mm. long.

Blades glabrous beneath, scabrous on both surfaces, elongate, more than 10 times as long as wide; plants not forming a strong central clambering cane. 4. *L. oaxacensis*.

Blades puberulent beneath, glabrous or scabrous above, less than 10 times as long as wide; plants forming a strong central clambering cane. 5. *L. ligulata*.

Ligule inconspicuous, hidden within the mouth of the sheath, rarely as much as 1 mm. long.

Plants not high-climbing, decumbent and rooting at base, forming a tangled mass, with no strong central cane; spikelets clustered toward the ends of the branches. 6. *L. rhizophora*.

Plants high-climbing, forming a strong central cane; spikelets not clustered toward the ends of the branches.

Blades glabrous on both surfaces, often more or less scabrous. (See *L. ruscifolia*, this rarely with glabrous ovate-lanceolate blades.)

Main culm papillose-hispid; lateral flowering branches glabrous; panicles small and narrow 7. *L. leptostachya*.

Main culm (except sometimes the young shoots) glabrous.

Blades narrow, usually 3 to 4 mm., sometimes 5 mm., wide, 8 to 10 cm. long 8. *L. harrisii*.

Blades more than 5 mm. wide, if as much as 10 cm. long.

Panicle few-flowered, 5 to 10 cm. long; branches strongly zigzag, the branchlets strongly divaricate or reflexed; blades narrowly lanceolate, firm, mostly less than 1 cm. wide (sometimes wider on vigorous shoots). 9. *L. divaricata*.

Panicles many-flowered, usually 15 to 25 cm. long or more on the primary branches; branches straight or arcuate, not zigzag; blades mostly over 1.5 cm. wide.

Spikelets globose, about 3 mm. long. 10. *L. globosa*.

Spikelets lanceolate-ellipsoidal, 3.5 to 5 mm. long.

Spikelets 4.5 to 5 mm. long, on short stiff appressed pedicels; blades oblong-ovate or elliptic-lanceolate.

11. *L. sloanei*.

Spikelets 3.5 to 4 mm. long, on flexuous spreading pedicels; blades lanceolate or narrowly-lanceolate.

12. *L. patentiflora*.

1. At auction, may find a lot of 2000 lbs. of specimens of *Ammonia* *claytoni* *brucei* *...*

1 *Junonia ... a. altissima ...*
Museum Göttingen 5717 T

Blades pubescent on one or both surfaces (sometimes glabrous in *L. ruscifolia*).

Blades narrowly lanceolate, averaging 8 to 10 times as long as wide; panicle large and open; spikelets 4 to 5 mm. long.

13. *L. sorghoidea*.

Blades ovate-lanceolate or elliptic, sometimes lanceolate, often more or less cordate-clasping; panicle often compact, or at least the branches commonly compactly flowered; spikelets 3 to 4 mm. long.

Sterile lemma 1 14. *L. ruscifolia*.

Sterile lemmas 2 15. *L. anomala*.

1. *Lasiacis procerrima* (Hack.) Hitchc.

Panicum procerrimum Hack. Oesterr. Bot. Zeitschr. 51: 431. 1901. "Costarica: Inter frutices ad fluvium Tiliri prope La Verbena et Alajuelita (Pittier nr. 8819)." Hackel states that this is "Eine ausgezeichnete Art der Series: *Lasiacis* Benth. et Hook. Gen. III. p. 1103."

Lasiacis procerrima Hitchc. Proc. Biol. Soc. Washington 24: 145. 1911. Based on *Panicum procerrimum* Hack.

DESCRIPTION.

Culms several in a clump, rarely single, succulent, somewhat woody at base but not perennial, erect from a thick woody rootstock, simple, as much as 4 meters high and 1 cm. thick, glabrous, glaucous; sheaths usually overlapping, glabrous or rarely pubescent; ligule inconspicuous; blades narrowly lanceolate, 15 to 40 cm. long, 2 to 5 cm. wide, deeply cordate-clasping, the lobes overlapping, gradually acuminate at apex, glabrous and glaucous, rarely pubescent, the basal lobes sometimes ciliate; panicles open and much branched, as much as 1 meter long, the branches naked below, finally widely spreading, the lower in whorls, as much as 40 cm. long, the main axis smooth, the branchlets and pedicels scabrous; spikelets scattered, 3 to 4 mm. long, ovoid or elliptic.

DISTRIBUTION.

Banks and open woods, central Mexico to northern South America.

SENALOA: Colomas, *Rose* 1687.

TEPIC: Tepic, *Palmer* 1921 in 1892.

JALISCO: Río Blanco, *Palmer* 535 in 1886. Guadalajara, *Pringle* 1732, 11760.

COLIMA: Alzada, *Hitchcock* 7085.

MICHOACÁN: El Ocote, *Langlassé* 540.

VERACRUZ: Córdoba, *Fink* in 1893; *Amer. Gr. Nat. Herb.* 596. Orizaba, *Hitchcock* 6385. Mirador, *Liebmann* 305, 313. Veracruz, *Galeotti* 5717. Huitamalco, *Liebmann* 308. La Loja, *Liebmann* 309.

CHIAPAS: Ocuilapa, *Nelson* 3055.

GUATEMALA: Chinantla, *Seler* 2405. Cubilquitz, *Türckheim* 1028, 8781. El Palmar, *Kellerman* 6247. Cenaguilla, *Heyde & Lux* 3906. Cobán, *Türckheim* 2486. Guatemala City, *Hitchcock* 9067; *Popenoe* 737. Secoyocté, *Cook & Griggs* 119. Secanquim, *Goll* 43.

NICARAGUA: Jinotepe, *Hitchcock* 8694.

COSTA RICA: La Verbena, *Tonduz* 8819. El General, *Pittier* 12057. San José, *Hitchcock* 8445; *Jiménez* 886. Puntarenas, *Hitchcock* 8572. Cañas Gordas, *Pittier* 11011. Alajuela, *Jiménez* 532.

PANAMA: Corozal, *Pittier* 6774. Frijoles, *Hitchcock* 8393. Gatún, *Hitchcock* 7984. El Boquete, *Hitchcock* 8283. Taboga Island, *Hitchcock* 8087. Pedro Miguel, *Hitchcock* 7961.

COLOMBIA: San Andrés de la Sierra, *Pittier* 1645. Santa Marta, *Smith* 117. VENEZUELA: Without locality, *Fendler* 2429. Caoma, *Jahn* 314.

EXPLANATION OF PLATE 10.—*Lasiacis procerrima*. Specimen from El Boquete, Panama, *Hitchcock* 8283 (U. S. Nat. Herb. no. 946902). Natural size.

2. *Lasiacis rugelii* (Griseb.) Hitchc.

Panicum rugelii Griseb. Cat. Pl. Cub. 233. 1866. "Cuba occ.; in fruticetis montium pr. Matanzas (Rug. 188)." Grisebach describes the plant as climbing, because Rugel's label had upon it "scandens."

Lasiacis rugelii Hitchc. Bot. Gaz. 51: 302. 1911. Based on *Panicum rugelii* Griseb.

DESCRIPTION.

Culms much branched, prostrate, the main culms slender, mostly about 2 mm., sometimes 2.5 mm. thick, appressed-hispidulous, the sterile shoots prostrate, dorsiventral, the leaves strongly distichous, approximate, the fertile shoots sometimes ascending toward the end; sheaths overlapping, hispidulous, villous on the margin and around the summit; ligule inconspicuous; blades lanceolate or oblong-lanceolate, 2 to 5 cm. long, 4 to 12 mm. wide, hispidulous or puberulent on both surfaces; panicles few-flowered, usually not over 5 cm. long, the few branches spreading, the axes pubescent, scabrous on the angles; spikelets 5 mm. long.

DISTRIBUTION.

Rich thickets, western Cuba, Yucatán, and San Luis Potosí.

SAN LUIS POTOSÍ: San Dieguito, *Palmer* 151 in 1904. Río de las Gallinas, *Purpus* 5438.

QUINTANA ROO: Lake Chichankanab, *Gaumer* 23685.

CUBA: Sierra de Anafe, *Wilson* 11449. Valestina, *Wright* 3465. San Antonio, *Hitchcock* 176. Isle of Pines, *Britton & Wilson* 14860. Without locality, *Reed*.

EXPLANATION OF PLATE 11.—*Lasiacis rugelii*. Specimen from Valestina, Cuba, *Wright* 3465 (U. S. Nat. Herb. no. 975684). Natural size.

3. *Lasiacis grisebachii* (Nash) Hitchc.

Panicum grisebachii Nash, Bull. Torrey Club 35: 301. 1908. The designated type is from Madruga, Cuba, *Britton & Shafer* 758. Nash gives the specific name because Grisebach¹ refers Wright's no. 3457 to *Panicum martinicense* Griseb. This specimen Nash cites under *P. grisebachii*.

Lasiacis grisebachii Hitchc. Bot. Gaz. 54: 302. 1911. Based on *Panicum grisebachii* Nash.

DESCRIPTION.

Culms much branched, glabrous, the main culms creeping and rooting at the nodes, as much as 2 mm. in diameter, the sterile shoots erect or ascending, 20 to 40 cm. high; sheaths hispidulous, especially on the margin, or the surface glabrescent; ligule inconspicuous; blades narrowly lanceolate, 6 to 12 cm. long, 5 to 10 mm. wide, puberulent beneath, glabrous above, scabrous on the

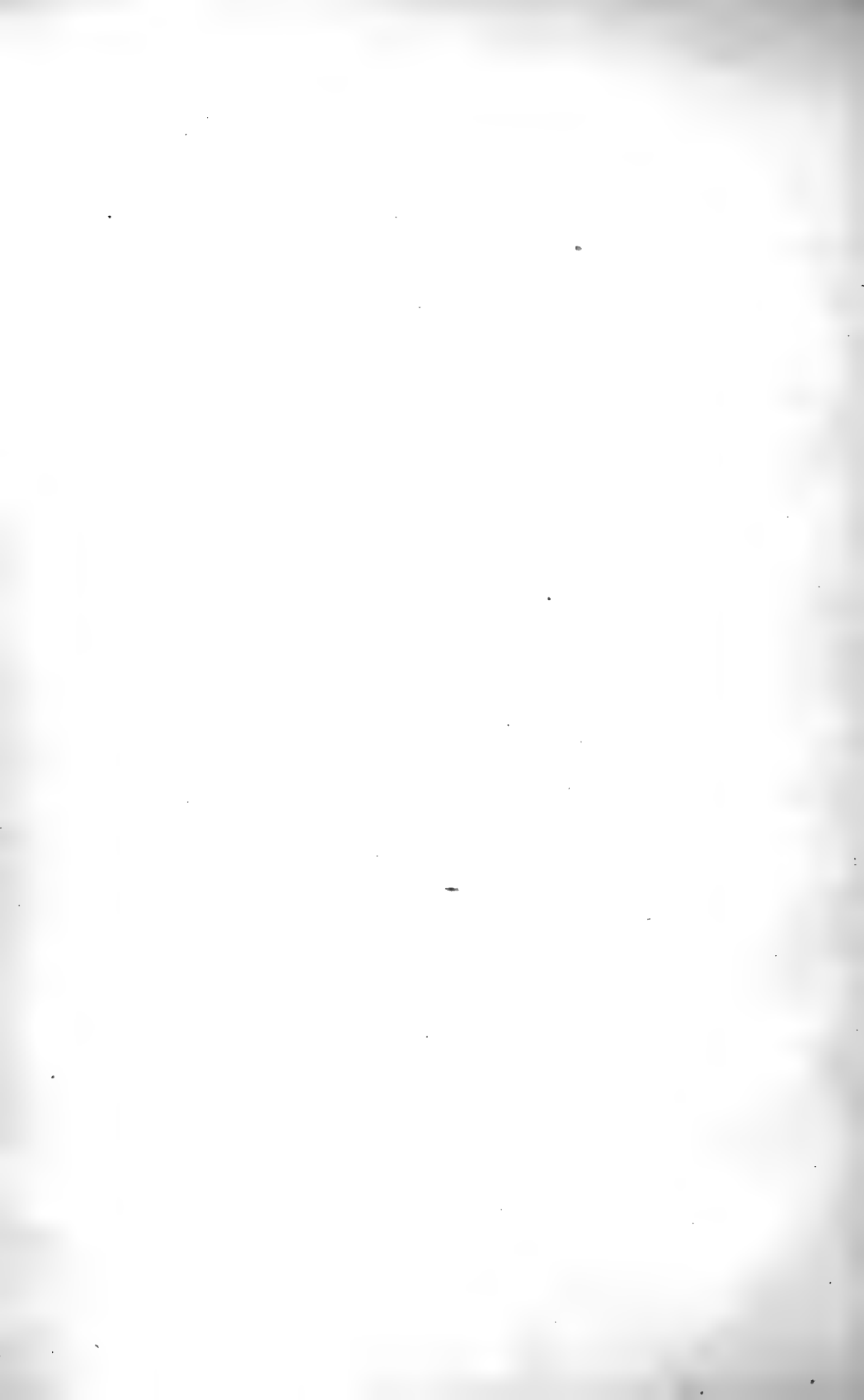
¹ Cat. Pl. Cub. 233. 1866.



ICHNANTHUS MAYARENSIS (WRIGHT) HITCHC.



ICHNANTHUS TENUIS (PRESL) HITCHC. & CHASE.



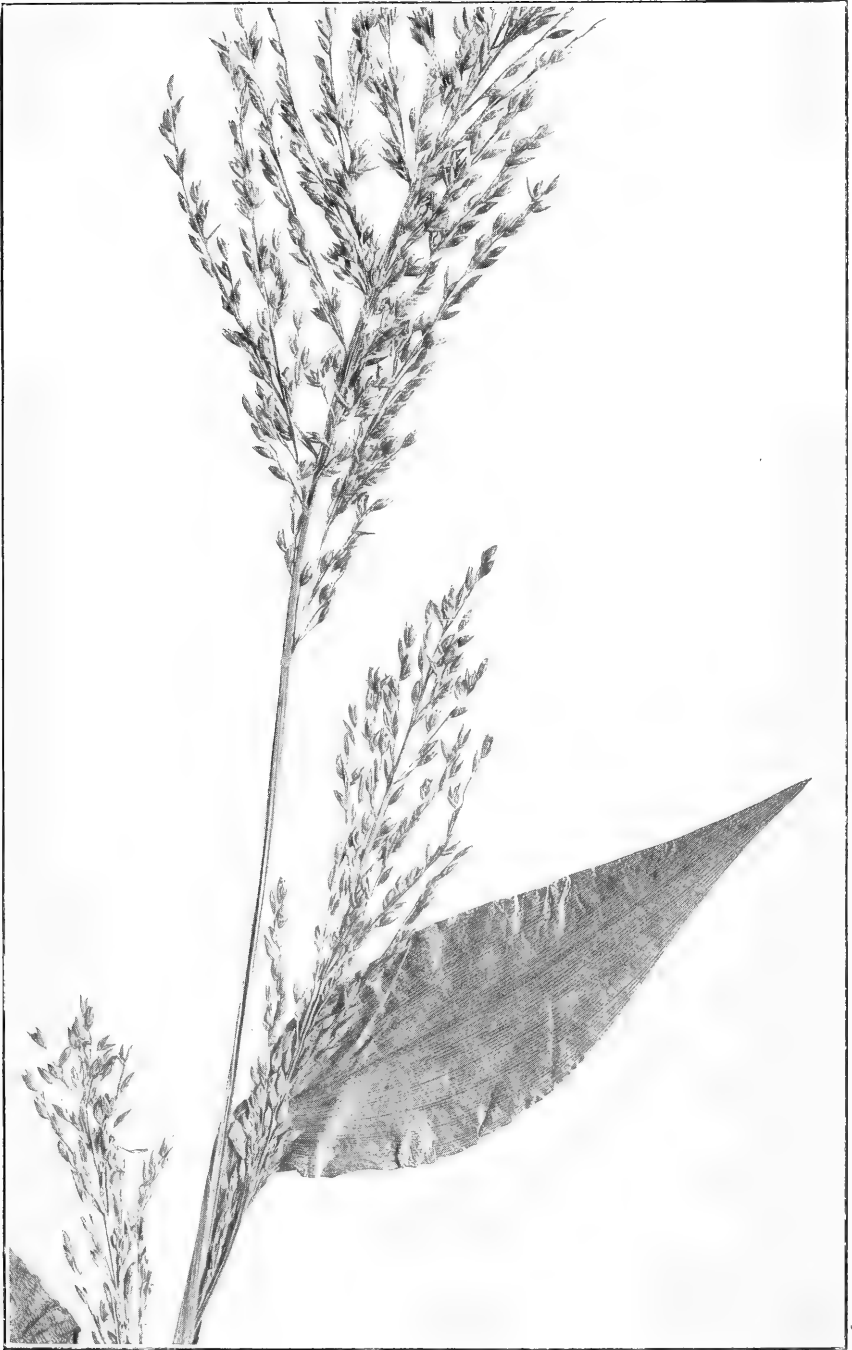


ICHNANTHUS NEMOROSUS (SWARTZ) DOELL.



ICHNANTHUS PALLENS (SWARTZ) MUNRO.





ICHNANTHUS AXILLARIS (NEES) HITCHC. & CHASE.



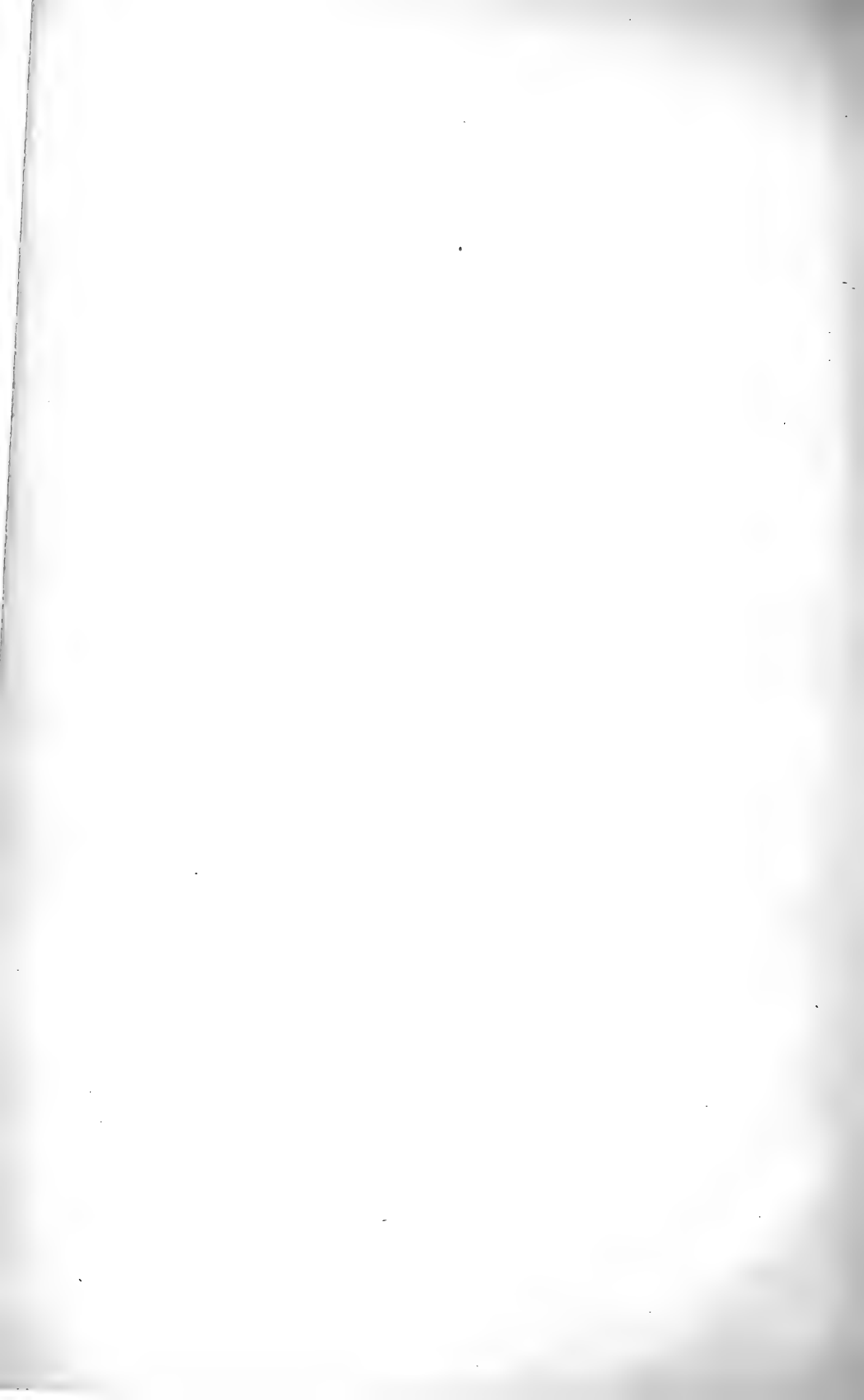
ICHNANTHUS LANCEOLATUS SCRIBN. & SMITH.

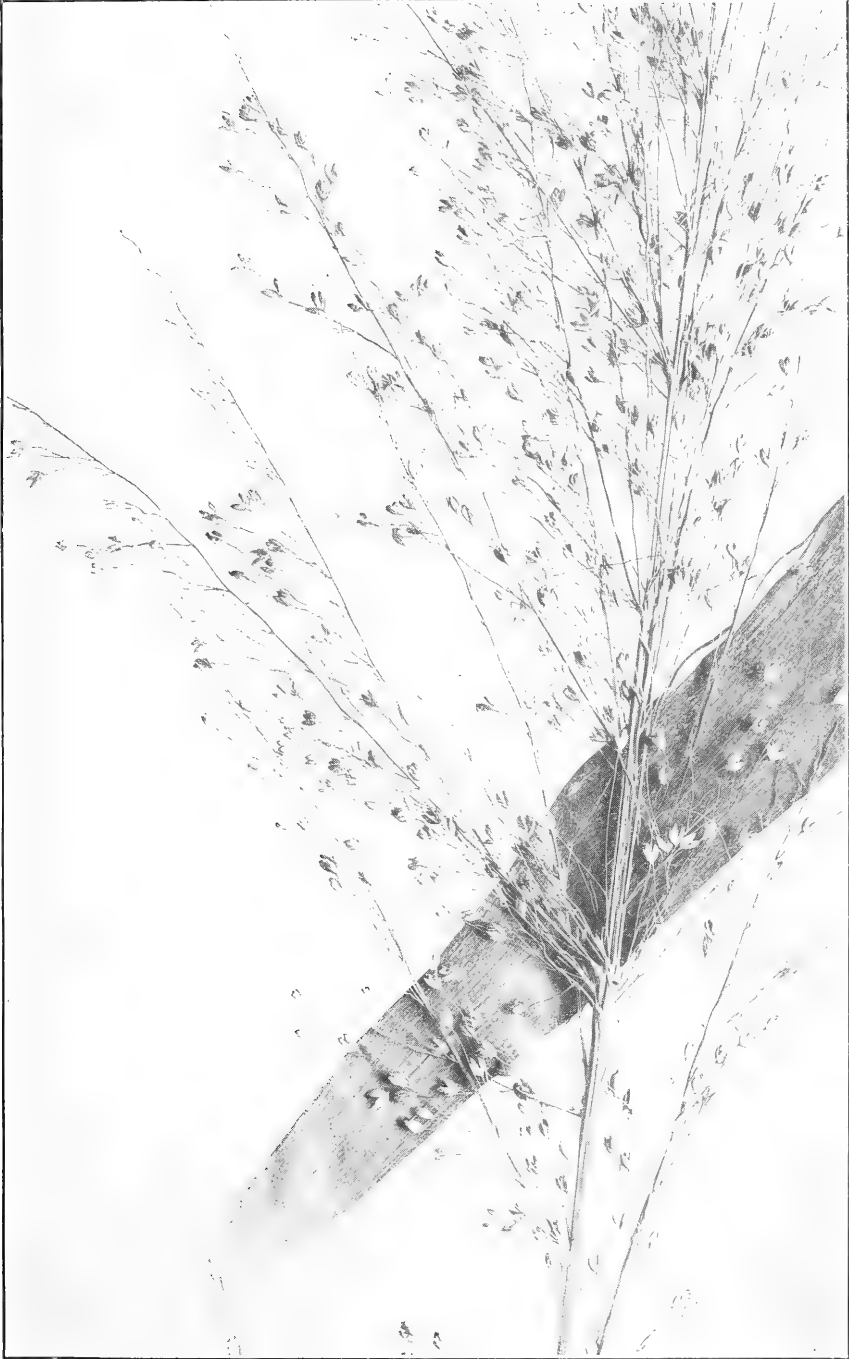


ICHNANTHUS NEMORALIS (SCHRAD.) HITCHC. & CHASE.



ICHNANTHUS MEXICANUS FOURN.





ICHNANTHUS ICHNODES (GRISEB.) HITCHC. & CHASE.

margin; panicles ovate, mostly 5 to 6 cm. (sometimes 10 cm.) long, the few branches rather stiffly ascending, few-flowered; spikelets 4 mm. long, similar to those of *L. divaricata*.

DISTRIBUTION.

Rich thickets, western Cuba; Veracruz to Honduras.

VERACRUZ: Córdoba, *Fink* in 1893.

HONDURAS: Puerto Sierra, *Wilson* 392.

CUBA: Valestina, *Wright* 3457. Matanzas, *Rugel* 187. Bahia Honda, *Shafer* 12006. Jamaica, *León* 1972. Manatí, *León* 5685. San Antonio, *Hitchcock* 131. Pinar del Río, *Baker* 3817. Guanajay, *Baker & Hermann* 4239. Sierra de Anafe, *León* 2874 (*Wilson* 11467); *Wilson* 11309. Buenaventura, *Wilson* 9238, 9332.

EXPLANATION OF PLATE 12.—*Lasiacis grisebachii*. Specimen from Pinar del Río, Cuba, *Baker* 3817 (U. S. Nat. Herb. no. 845457). Natural size.

4. *Lasiacis oaxacensis* (Steud.) Hitchc.

Panicum oaxacense Steud. Syn. Pl. Glum. 1: 73. 1854. "Oaxaca." The type specimen in the Paris Herbarium, collected by Lenormand, consists of a panicle and two leaves.

Lasiacis oaxacensis Hitchc. Proc. Biol. Soc. Washington 24: 45. 1911. Based on *Panicum oaxacense* Steud.

DESCRIPTION.

Plants straggling and branching, but not high-climbing nor with a strong central cane; culms decumbent and geniculate at base, rooting at the lower nodes, the ascending branches 1 to 2 meters long, glabrous; sheaths glabrous or rarely appressed-pubescent, the margin villous; ligule prominent, 2 to 5 mm. long, brownish; blades narrowly lanceolate, 10 to 25 cm. long, 1 to 2 cm. wide, abruptly narrowed at base, long-tapering at apex, scabrous on both surfaces; panicles open, as much as 30 cm. long and nearly as wide, the slender scabrous branches and branchlets ascending or the lower finally spreading, naked below, the spikelets clustered toward the tips, no smaller secondary panicles present; spikelets 4 mm. long, elliptic, often purple.

DISTRIBUTION.

Thickets and copses, southern Mexico to northern South America; also in Jamaica. *and Ecuador*

VERACRUZ: Pital, *Liebmann* 285. Zacuapan, *Purpus* 2157. Mirador, *Liebmann* 287. Motzorongo, *Smith* 581.

MICHOACÁN: Sierra Madre, *Langlassé* 556.

GUATEMALA: Guatemala City, *Popenoe* 735; *Hitchcock* 9045, 9080, 9107. Sanarate, *Kellerman* 6243. Cubilquitz, *Türckheim* 7701. Retalhuleu, *Kellerman* 6273.

HONDURAS: San Pedro Sula, *Thieme* 5585.

SALVADOR: Santa Ana, *Hitchcock* 8853. San Salvador, *Hitchcock* 8877.

NICARAGUA: Jinotepe, *Hitchcock* 8672, 8698.

COSTA RICA: San José, *Hitchcock* 8488, 8496. Llano Grande de Puriscal, *Jiménez* 887. San Francisco de Guadalupe, *Tonduz* 9818. Alajuela, *Jiménez* 152. Río Bebedero, *Jiménez* 724.

- PANAMA: El Boquete, *Hitchcock* 8267, 8281; *Maxon* 4999. Chiriquí Volcano, *Hitchcock* 8199, 8201; *Maxon* 5266. Hato del Jobo, *Pittier* 5422. Gatún, *Hitchcock* 9174; *Maxon* 4653.
- JAMAICA: Troy, *Hitchcock* 9800. Lindos Hill, *Harris* 11832. Ipswich, *Hitchcock* 9608. Upper Clarendon, *Harris* 12828.
- COLOMBIA: Santa Marta, *Smith* 2142.
- ECUADOR: El Recreo, *Eggers* 15572.

EXPLANATION OF PLATE 13.—*Lasiacis oaxacensis*. Specimen from Santa Ana, Salvador, *Hitchcock* 8853 (U. S. Nat. Herb. no. 946904). Natural size.

5. *Lasiacis ligulata* Hitchc. & Chase.

Panicum divaricatum γ *puberulum* Griseb. Fl. Brit. W. Ind. 551. 1864. Based on Crueger's collection from Trinidad.

Panicum fruticosum Salzm.; Doell in Mart. Fl. Bras. 2^o: 207. 1877, as synonym under *P. latifolium*. This is based on Salzmann's no. 695 from Bahia. I have not seen the type, but a specimen collected at Bahia by Salzmann, probably a part of the type collection, is *Lasiacis ligulata*. Steudel¹ cites Salzmann's name as a synonym under *Panicum praeagnans* Steud.

Lasiacis ligulata Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 337. 1917. The designated type is from St. Anns, near Port of Spain, Trinidad (*Hitchcock* 10007).

DESCRIPTION.

Clambering to a height of 5 to 10 meters, the robust glabrous central cane as much as 1 cm. in diameter, the wide-spreading main branches and the arcuate secondary ones not in fascicles, not zigzag; sheaths ciliate on the overlapping margin, otherwise glabrous; ligule a ciliate membrane, brown, 1 to 2 mm. long; blades flat, firm, 6 to 12 cm. long, 0.8 to 1.5 cm. wide, lanceolate, acuminate, narrowed to the base, glabrous on the upper surface, puberulent beneath, the margins scabrous; panicles terminating the numerous branches, exserted or partly included, oval in outline, rather open, 5 to 10 cm. long, usually half to three-fourths as wide, the branches few, spreading, finally reflexed, branching or flowering from near the base, usually bearing 5 to 10 short-pedicel spikelets; spikelets about 4 mm. long, obovoid and purplish black at maturity, the glumes and sterile lemma as well as the fruit with a lanate tuft at the tips.

DISTRIBUTION.

Copses and edges of woods, Guatemala to Ecuador and Brazil; also in Porto Rico. There is a specimen from Mexico (Mirador, *Liebmann* 298) which appears to be of this species, but the blades are glabrous.

GUATEMALA: Cublquitz, *Türkheim* 4036.

NICARAGUA: Volcán Mombacho, *Baker* 2454.

COSTA RICA: El General, *Pittier* 3365. Buenos Aires, *Tonduz* 3646, 6540. Pacaca, *Pittier* 3245. Talamanca, *Tonduz* 9213, 9492. Sarapiquí, *Biolley* 7465. Los Palmares, *Pittier* 10946. Zhorquin, *Tonduz* 8527. Cartago, *Cooper* 571. Santa María de Dota, *Tonduz* 2247. El Sapote, *Tonduz* 7234. Cañas Gordas, *Pittier* 7359, 11015.

PORTO RICO: Mayaguez, *Britton & Marble* 678. Arecibo, *Chase* 6454. Cayey, *Chase* 6734, 6747. Maricao, *Sintenis* 215. Luquillo Mountains, *Wilson* 350.

¹Syn. Pl. Glum. 1: 74. 1854.

Referred to *Pan. glutinosum* Lam. by Meyer,
Esq. 62. 1818.

L. scabrior Hitchc 1927
type von Tuerckheim 4030 Guatemala

Pittier 275 doubtful

Kewy Pittier 14162 Argona.

1916
Cuba

- VIRGIN ISLANDS: St. Thomas, *Britton & Marble* 1230. Tortola, *Shafer* 1147.
 TRINIDAD: Port of Spain, *Hitchcock* 9962; *Amer. Gr. Nat. Herb.* 589. St. Joseph, *Hitchcock* 10020. Tabaquite, *Hitchcock* 10120. Caparo Woods, *Broadway* 4923. Tamana Forest, *Broadway* 4952, 4959. Cedros, *Hitchcock* 10151.
 TOBAGO: *Hitchcock* 10261, 10262, 10269, 10275; *Broadway* 3551, 4038.
 COLOMBIA: Miraflores, *Pittier* 875. Cuesta de Tocotá, *Pittier* 685.
 BRITISH GUIANA: *Meyer*.
 DUTCH GUIANA: *Hostmann* 512.
 FRENCH GUIANA: Iles du Salut, *Sagot* 656.
 BRAZIL: Corcovado, *Rose* 20156, 20312. Bahia, *Salzmann*. Santa Rita, *Puttemans* 3657. Paraná, *Dusén* 11487, 14050. Matto Grosso, *Malme* 3357. Rio Janeiro, *Widgren*. Without locality, *Riedel*.

EXPLANATION OF PLATE 14.—*Lasiacis ligulata*. Specimen from Tobago, *Broadway* 4038 (U. S. Nat. Herb. no. 725606). Natural size.

6. *Lasiacis rhizophora* (Fourn.) Hitchc.

Panicum rhizophorum Fourn. Mex. Pl. 2: 31. 1886. Several specimens are cited from Orizaba and one from Martinique. The first specimen is selected as the type (Orizaba, *Bourgeau* 3025).

Lasiacis rhizophora Hitchc. Proc. Biol. Soc. Washington 24: 145. 1911. Based on *Panicum rhizophorum* Fourn.

DESCRIPTION.

Plants branching and straggling, not forming a strong central cane, decumbent at base and rooting at the lower nodes, the fertile culms ascending, 30 to 100 cm. long, glabrous or pubescent; sheaths appressed-hispidulous or glabrescent, villous on the margin; ligule inconspicuous; blades lanceolate to ovate-lanceolate, 7 to 14 cm. long, 1.5 to 3 cm. wide, somewhat cordate at base, rather abruptly narrowed above to an acuminate point, pubescent or scabrous beneath, scabrous above; panicles 8 to 15 cm. long, the branches stiffly ascending, naked below, the spikelets clustered toward their tips, the axes scabrous; spikelets 3 to 4 mm. long, ovoid.

DISTRIBUTION.

Copses and edges of woods, southern Mexico to Costa Rica.

VERACRUZ: Córdoba, *Hitchcock* 6461. Zacuapan, *Purpus* 6205. Orizaba, *Bourgeau* 3025; *Seaton* 60.

GUATEMALA: Chupadero, *Heyde & Lux* 3915. Cobán, *Türkheim* 715. Guatemala City, *Hitchcock* 9051.

COSTA RICA: San Cristóbal, *Wercklé* 518. Alajuela, *Jiménez* 168, 703. Alto del Rodeo, *Pittier* 1616. San José, *Hitchcock* 8502.


EXPLANATION OF PLATE 15.—*Lasiacis rhizophora*. Specimen from Cobán, Guatemala, *Türkheim* 715 (U. S. Nat. Herb. no. 975468). Natural size.

7. *Lasiacis leptostachya* Hitchc., sp. nov.

Plants forming a stout central cane, with numerous slender branches at the nodes, clambering to the height of several meters; main culms roughened and somewhat cinereous with papillae and irregularly appressed hairs; floral branchlets slender, conspicuously zigzag, smooth, 20 to 40 cm. long; sheaths glabrous or nearly so, densely long-ciliate on the margin, hirsute on the collar; ligule inconspicuous, about 0.5 mm. long; blades narrowly lanceo-

late, 7 to 10 cm. long, 5 to 10 mm. wide, narrowed toward each end, glabrous on both surfaces; panicles small and narrow, rather dense, 2 to 4 cm. long, few-flowered; spikelets about 5 mm. long, oblong-ovoid, pale; first glume about one-third as long as the spikelet; second glume and sterile lemma equal, as long as the spikelet, woolly at tip; fertile lemma as long as the sterile, woolly at the tip.

Type in the U. S. National Herbarium, no. 975428, collected in jungle, Jinotepe, Nicaragua, November 7, 1911, by A. S. Hitchcock (no. 8718).

Known only from the type specimen. 

EXPLANATION OF PLATE 16.—*Lasiacis leptostachya*. Type specimen. Natural size.

8. *Lasiacis harrisii* Nash.

Lasiacis harrisii Nash, *Torreyia* 13: 274. 1913. The designated type is *Marble* 222 from Cinchona, Jamaica. The specimen is in the herbarium of the New York Botanical Garden.

DESCRIPTION.

Plants bright green, clambering among bushes to the height of 5 meters or more, the main canes slender but strong, the very slender branches pendent, the young twigs commonly rosy purple; sheaths slender, glabrous except the margin and throat, or rarely the young ones sparsely hispid; ligule inconspicuous; blades linear-lanceolate, 5 to 10 cm. long, 2 to 6 mm. wide, gradually narrowed to an acuminate apex, thin and lax, glabrous, the margins scabrous; panicles narrow, mostly less than 5 cm. long, often partially included in the uppermost sheath, the branches short and appressed, the longer usually not more than 1 cm. long, and bearing not more than 4 spikelets; spikelets similar to those of *L. divaricata* but less turgid.

This species is easily recognized by its long narrow blades and pendent branches.

DISTRIBUTION.

Shaded slopes at higher altitudes, Jamaica and Porto Rico. In Jamaica it appears to be confined to the Blue Mountains ^{Jamaica} between 1,000 and 1,500 meters altitude; in Porto Rico it is found at about 800 meters altitude. The specimen from St. Jan was collected on Kings Hill at an altitude of about 250 meters.

JAMAICA: Catherines Peak, *Hitchcock* 9726, 9730; *Harris* 11552. Abbey Green, *Amer. Gr. Nat. Herb.* 588; *Harris* 11587. Strawberry Hill, *Harris* 11487. Cold Spring Gap, *Harris* 11354.

PORTO RICO: Maricao, *Stevens & Hess* 4882; *Chase* 6224, 6228. Quebradillas, *Chase* 6578. Cayey, *Chase* 6742.

VIRGIN ISLANDS: St. Jan, *Eggers* 3121.

EXPLANATION OF PLATE 17.—*Lasiacis harrisii*. Specimen from Maricao, Porto Rico, *Chase* 6228 (U. S. Nat. Herb. no. 946901). Natural size.

9. *Lasiacis divaricata* (L.) Hitchc.

Panicum divaricatum L. *Syst. Nat.* ed. 10. 2: 871. 1759. The type, collected in Jamaica by Patrick Browne, has been examined in the Linnaean Herbarium. It is the small-leaved smooth clambering form of the lowlands.

Panicum bambusoides Desv.; *Hamilt. Prodr. Pl. Ind. Occ.* 10. 1825. The type in the Paris Herbarium, from Porto Rico, has been examined.

Panicum chauvinii Steud. *Syn. Pl. Glum.* 1: 68. 1854. The type has been examined in the Paris Herbarium. It was collected in Guadeloupe by Duchassaing, the specimen having been received from Chauvin.

* Sign. Vauquelin, Martz 1870



Panicum divaricatum β *stenostachyum* Griseb. Fl. Brit. W. Ind. 551. 1864. The type was collected in Jamaica by March. The varietal name might indicate *L. harrisii*, but the specimen in the Grisebach Herbarium is *L. divaricata*.

Lasiacis divaricata Hitchc. Contr. U. S. Nat. Herb. 15: 16. 1910. Based on *Panicum divaricatum* L.

DESCRIPTION.

Plants usually glabrous throughout, except the margin of the sheaths; culms woody, much branched, clambering over shrubs to the height of 3 to 4 meters, the main culm strong, as much as 6 mm. in diameter, the main branches often fasciated, the vigorous secondary sterile shoots usually strongly divaricate or zigzag, the prophyllum prominent at the base of the branches; sheaths glabrous except the villous or ciliate margin and the sometimes hispid collar; ligule very short, not visible without displacing the blade; blades narrowly lanceolate, 5 to 12 cm. long, 5 to 15 mm. wide, or on the vigorous sterile shoots much larger, narrowed at the base, gradually narrowed above to an acuminate point, scabrous on the margin and sometimes slightly on the surface, the older ones deciduous from the sheaths, the basal portion of the fertile shoots bearing the old sheaths but otherwise naked; panicles terminating the main culm and the fertile branches, ovate or oblong, 5 to 20 cm. long, loosely flowered, the branches distant, spreading or often reflexed, the axes angled, scabrous, flexuous, the lower usually 2 to 4 cm. (sometimes as much as 10 cm.) long, the main branches ordinarily 5 to 10-flowered; spikelets ovoid, about 4 mm. long.

DISTRIBUTION.

Copses and edges of woods at low altitudes, especially in the vicinity of the seacoast, southern Florida, West Indies, and Mexico, south through tropical South America.

FLORIDA: Biscayne Bay, *Palmer* 630 in 1874. Miami, *Rolfs & Quaintance* 935; *Hitchcock* 194, 723; *Chase* 3904. Marco, *Hitchcock* in 1900. South Florida, *Chapman*. Palm Beach, *Curtiss* 5530; *Hitchcock* 2547. Indian River, *Curtiss* 3588. Cutler, *Eaton* 315. Tallahassee Hammock, *Eaton* 418. Key Largo, *Chase* 3930; *Pollard, Collins & Morris* 157. Key West, *Blodgett; Garber; Rugel* 111. Vacca Keys, *Small & Carter* 2864. Brevard County, *Fredholm* 5532.

LOWER CALIFORNIA: Sierra de la Laguna, *Brandegee* in 1890.

SINALOA: Rosario, *Rose* in 1897.

JALISCO: Tequila, *Palmer* 362 in 1886.

SAN LUIS POTOSÍ: Minas de San Rafael, *Purpus* 5439, 5440.

COLIMA: Manzanillo, *Hitchcock* 7027, 7028, 7035, 7044; *Palmer* 1089 in 1890. Alzada, *Hitchcock* 7087, 7099.

VERACRUZ: Pital, *Liebmann* 294. Orizaba, *Hitchcock* 6393. Zacuapan, *Purpus* 2905. Córdoba, *Hitchcock* 6456, 6458. Huitamalco, *Liebmann* 301. Yecotlatla, *Liebmann* 288. Jicaltepec, *Liebmann* 295.

YUCATÁN: Mérida, *Schott* 675. Izamal, *Gaumer* 1032.

GUATEMALA: Uxackanal, *Seler* 3004. Sapacuité, *Cook & Griggs* 138. Trece Aguas, *Lewton* 286. Morales, *Kellerman* 6268. Secanquim, *Goll* 24. Cubilquitz, *Türkheim* 7696. El Palmar, *Kellerman* 6264.

SALVADOR: San Salvador, *Renson* 323.

HONDURAS: Puerto Sierra, *Wilson* 169.

NICARAGUA: Jinotepe, *Hitchcock* 8722, 8723.

COSTA RICA: Nicoya, *Tonduz* 13748. Guanacaste, *Jiménez* 378. Puriscal, *Jiménez* 892. Rodeo, *Pittier* 1615.

PANAMA: Alhajuela, *Pittier* 2342.

BAHAMAS: New Providence, *Hitchcock* in 1890; *Britton & Brace* 187. Rose Island, *Britton & Millspaugh* 2130. Acklins Island, *Brace* 4305. Long Cay, *Brace* 4230. Andros, *Small & Carter* 8586.

CUBA: Valesina, *Wright* 748. Without locality, *Wright* 747. Sierra de Anafe, *Wilson* 11363. Herradura, *Tracy* 9047, 9094. Baracoa, *Pollard, Palmer & Palmer* 76. Nueva Gerona, *Palmer & Riley* 1001. Santiago, *Millspaugh* 1015. Arroyo del Sumidero, *Shafer & León* 13564. Sierra Mendoza, *Shafer* 11149. Woodfred, *Shafer* 3017. Cayo Paloma, *Shafer* 2571. Cayo Coco, *Shafer* 2720. Cayo Sabinal, *Shafer* 1073. Holguin, *Shafer* 1375. Farallón de la Perla, *Shafer* 8751. Río Yamurí, *Shafer* 7827. Sierra la Guira, *Palmer* in 1917. La Magdalena Cayamas, *Baker* 2501, 4611. El Canagre, *Baker* 5198. Habana, *León* 767. Jamaica, *León* 2602. Cojimar, *León* 1970, 1971. San Diego de los Baños, *León* 4662. Sancto Spiritus, *León* 904. Guantánamo, *Britton* 2106. Managua, *Baker & Wilson* 304. Tricornia, *Hitchcock* 158. Isle of Pines, *Millspaugh* 1422.

JAMAICA: Ipswich, *Harris* 12512; *Hitchcock* 9628. Mount Faraway, *Harris* 11486, 11490. Roberts Field, *Harris* 11491. Bryans Hill, *Harris* 11528, 11530. Castleton, *Harris* 11297. Montego Bay, *Hitchcock* 9687. Troy, *Hitchcock* 9802. Savanna-la-Mar, *Hitchcock* 9881. New Forest, *Hitchcock* 9838. Ramble, *Hitchcock* 9519. Holly Mount, *Hitchcock* 9449. Ewarton, *Hitchcock* 9420, 9426, 9427. Southern Manchester, *Harris* 12691. Bog Walk, *Hitchcock* 9304. Inverness, *Harris* 12725, 12740. Kingston, *Hitchcock* 9264, 9268, 9365. Gordon Town, *Hurt* 580. Cayman Brac, *Millspaugh* 1226.

SANTO DOMINGO: San Pedro de Macoris, *Rose* 4159, 4441. Santo Domingo City, *Rose* 3739, 4142. López, *Eggers* 2380. Rincón, *Fuertes* 1276. Without locality, *Wright, Parry & Brummel* 615.

HAITI: Morne Ouilville, *Christ* 1898. Gonaive Island, *Cook, Scofield & Doyle* 241.

PORTO RICO: San Juan, *Chase* 6365, 6379, 6782. Vega Baja, *Chase* 6426, 6431. Arecibo, *Chase* 6443, 6560; *Heller* 343. Sierra de Luquillo, *Chase* 6726. Fajardo, *Chase* 6663. Aguadilla, *Chase* 6606. Mayaguez, *Holm* 26; *Chase* 6157, 6310, 6814; *Underwood & Griggs* 144; *Sintenis* 68. Maricao, *Chase* 6192, 6225; *Britton, Stevens & Hess* 2623; *Britton, Cowell & Brown* 4490. Guanica Bay, *Chase* 6521, 6532; *Britton, Cowell & Brown* 4490, 4955. Coamo Springs, *Chase* 6543; *Goll* 699. Utuado, *Chase* 6462. Cayey, *Chase* 6335; *Sintenis* 2318, 2470. Lares, *Chase* 6587; *Sintenis* 5918. Manati, *Chase* 6610. Río Piedras, *Underwood & Griggs* 252; *Covgill* 648; *Barrett* 9. Cayo Muertos, *Britton, Cowell & Brown* 5006. Bayamon, *Goll* 227. Vieques, *Chase* 6683. Desecheo, *Hess* 429. Mona Island, *Hess* 454.

VIRGIN ISLANDS: St. Thomas, *Eggers* 189, 292; *Millspaugh* 519. St. Croix, *Rose* 3609; *Ricksecker* 257, 440b. Tortola, *Shafer* 1142.

LEeward ISLANDS: Antigua, *Wulfschlagel* 625; *Rose* 3392, 3659, 3660. Montserrat, *Shafer* 700. Guadeloupe, *L'Herminier*.

WINDWARD ISLANDS: Grenada, *Broadway* in 1896.

TRINIDAD: Chacachacare, *Hitchcock* 10062.

TOBAGO: *Hitchcock* 10254, 10256.

COLOMBIA: San Andrés de la Sierra, *Pittier* 1650. Cauca, *Pittier* 886. Without locality, *Triana* 274.

VENEZUELA: Carayaca, *Jahn* 312, 321.

BRAZIL: Campinas, *Campos Novas* 1282. Organ Mountains, *Wilkes Expl. Exped.* 12. Río Janeiro, *Glaziou* 20574. San Carlos do Pinhal, *Löfgren* 713. Río Grande do Sul, *Lindman* 1239. Paraná, *Dusén* 9643.

Sintensis' 5918 vL, ligulata-

Sintensis' 5918 - common

Bang 494 is *L. ligulata*

PARAGUAY: Sierra de Amambahy, *Hassler* 9864, 12087.

PERU: San Miguel, *Cook & Gilbert* 923.

BOLIVIA: Yungas, *Bang* 494.

ARGENTINA: Misiones, *Ekman* 616, 618.

EXPLANATION OF PLATE 18.—*Lasiacis divaricata*. Specimen from Ewarton, Jamaica, *Hitchcock* 9427 (U. S. Nat. Herb. no. 975613). Natural size.

10. *Lasiacis globosa* Hitchc.

Lasiacis globosa Hitchc. Contr. U. S. Nat. Herb. 17: 251, 1913. "Type in the U. S. National Herbarium, no. 691226, collected at Acapulco, Mexico, by Edward Palmer (no. 114 in 1894)."

This species is described by Presl¹ under the name *Panicum divaricatum* Lam. The specimen cited is from Acapulco.

DESCRIPTION.

Culms climbing, glabrous; sheaths glabrous, ciliate on the overlapping margin; ligule a narrow pilose membrane about 0.5 mm. long; blades firm, elliptic-lanceolate, scabrous on the margins and upper surface and more or less so beneath, those of the flowering branches 8 to 12 cm. long, 1 to 2 cm. wide; panicle pyramidal, loosely flowered, 6 to 15 cm. long, the branches very scabrous, widely spreading, the longer as much as 7 cm. long; spikelets on scabrous pedicels 1 to 2 cm. long, globose, 3 mm. long; first glume circular, gibbous, nerved, scabrous on the keel, ciliate on the membranaceous margin, about 1 mm. long; second glume and sterile lemma glabrous and shining, equal, a little shorter than the fertile lemma, reticulate-veined, lanate-ciliate on the rounded apex; fertile lemma umbonate, the point protruding from the second glume and sterile lemma, this and the apex of the palea woolly.

Characterized by its smooth blades and close or somewhat open panicle of small globose spikelets.

DISTRIBUTION.

Copses near the sea, southern Mexico to Panama.

GUERRERO: Acapulco, *Palmer* 114 in 1894; *Haenke*.

PANAMA: Chepo, *Pittier* 4688. Taboga Island, *Hitchcock* 8068.

EXPLANATION OF PLATE 19.—*Lasiacis globosa*. Specimen from Acapulco, Mexico, *Palmer* 114 in 1895, type collection (U. S. Nat. Herb. no. 744073). Natural size.

11. *Lasiacis sloanei* (Griseb.) Hitchc.

Panicum latifolium Hamilt. Prodr. Pl. Ind. Occ. 10. 1825. Not *P. latifolium* L. 1753.

Panicum sloanei Griseb. Fl. Brit. W. Ind. 551. 1864. The species is based on Sloane's plate² and Grisebach's two specimens from Jamaica, collected by Purdie and by Wulschlaegel, the second of which has been examined in the Grisebach Herbarium.

Lasiacis sloanei Hitchc. Bot. Gaz. 57: 302. 1911. Based on *Panicum sloanei* Griseb.

¹ Rel. Haenk. 1: 306. 1830.

² Voy. Jam. 1: pl. 71. f. 3. 1707.

DESCRIPTION.

Climbing to a height of 3 or 4 meters, forming a strong central cane, the culms glabrous, the branches solitary or two or three together, elongate; sheaths glabrous except the margin, the collar conspicuously villous; ligule inconspicuous; blades oblong-ovate or elliptic-lanceolate, 10 to 15 cm. long, 2.5 to 4 cm. wide, those of the branches smaller, narrowed at the asymmetric base, abruptly narrowed above to an acuminate point, somewhat papery in texture when dry, glabrous on both surfaces or scabrous above, scabrous on the margin; panicles open and usually loosely few-flowered, 10 to 20 cm. long, the branches distant and widely spreading, the lower as much as 10 cm. long, flexuous, scaberulous; spikelets 4 to 5 mm. long, elliptic.

DISTRIBUTION.

Climbing among bushes and small trees, West Indies and Mexico to South America.

SAN LUIS POTOSÍ: Las Canoas, *Pringle* 3808. Tamasopo Canyon, *Pringle* 3403.

VERACRUZ: Yecoatla, *Liebmann* 288. Consoquitla, *Liebmann* 292. Misantla, *Liebmann* 289. Papantla, *Liebmann* 297.

OAXACA: Cafetal Montecristo, *Reko* 3474.

NICARAGUA: Jinotepe, *Hitchcock* 8673, 8700.

COSTA RICA: Turrialba, *Pittier* 9056; *Tonduz* 8319.

CUBA: San Diego de los Baños, *León* 4563, 5148. Sierra Mendoza, *Shafer* 11147.

Sierra de Anafe, *Wilson* 11421. Matanzas, *Rugel* 872. Hanábana, *Wright* in 1865. Valesina, *Wright* 3878. Camoa Hills, *León* 766. Jamaica, *León* 1969. Cojimar, *León* 1973. San Antonio, *Hitchcock* 128. Guanajay, *Baker* 4587. Isle of Pines, *Britton & Wilson* 15134.

JAMAICA: Constant Spring, *Amer. Gr. Nat. Herb.* 590; *Hitchcock* 9280. Troy, *Hitchcock* 9801. Ipswich, *Hitchcock* 9606. Bog Walk, *Amer. Gr. Nat. Herb.* 591. Ewarton, *Hitchcock* 9413. Bryans Hill, *Harris* 11531. Gordon Town, *Harris* 11454. Halls Delight, *Harris* 11260. Ferry River, *Harris* 11325.

SANTO DOMINGO: Without locality, *Wright, Parry & Brummel* 614.

PORTO RICO: San Juan, *Chase* 6412. Mayaguez, *Chase* 6824, 6825. Vieques, *Shafer* 2549, 2570.

LEEWARD ISLANDS: Dominica, *Jones* 49.

WINDWARD ISLANDS: St. Vincent, *Eggers* 6546. Grenada, *Broadway* 947, 1385, 4666, 4674a.

TRINIDAD: Manzanilla, *Hitchcock* 10374.

COLOMBIA: Santa Marta, *Smith* 2145, 2148 in part.

EXPLANATION OF PLATE 20.—*Lasiacis sloanei*. Specimen from Ewarton, Jamaica, *Hitchcock* 9413 (U. S. Nat. Herb. no. 975676). Natural size.

12. *Lasiacis patentiflora* Hitchc. & Chase.

Lasiacis patentiflora Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 338. 1917. "Type in the U. S. National Herbarium, no. 865566, collected in the edge of woods on a mountain side, center of the island of Tobago, December 20, 1912, by A. S. Hitchcock (no. 10268)."

DESCRIPTION.

High-climbing, with a strong central cane as much as 8 mm. thick, the plant glabrous throughout except at the summit of the sheaths; branches numerous, solitary, widely spreading and finally repeatedly branching, the branches, and branchlets straight or arcuate, divergent at a rather narrow angle; sheaths

Kenneth S.

Juncus, 730. f. scabrior

Juncus 4089 b. L. ligulata

Panicum densiflorum var. laxiflorum (Scribn. & W. Chas.)
americana "spec. Swartz" in Willd. Herb.

with a ring of hairs at the summit or at least a tuft of hairs on either side, sometimes pubescent on the margins toward the summit; ligule about 0.5 mm. long, thin-membranaceous; blades on vigorous shoots as much as 14 cm. long and 2.5 cm. wide, but mostly about 8 to 12 cm. long and 1.5 to 2 cm. wide, acuminate, rounded-tapering to the base, usually somewhat asymmetric, glabrous, scabrous on the margin and somewhat so on both surfaces; panicles numerous, short-exserted, mostly 12 to 20 cm. long, nearly as wide, the slender axis and distant spreading flexuous branchlets angled, scabrous, the pedicels flexuous, spreading; spikelets pale, blotched with dark blue or purple at maturity, 3.4 to 3.8 mm. long, globose-obovoid, the glumes and sterile lemma lanate-ciliate toward the apex; fruit 3 mm. long, 2 mm. wide.

In habit and general appearance *L. patentiflora* resembles *L. sloanei*, from which it differs in the narrower average width of the blades and the more loosely flowered, rather large panicles with smaller spikelets on flexuous spreading pedicels.

DISTRIBUTION.

Borders of woods and jungles, Guatemala to Trinidad and Venezuela; also in Dominica and Paraguay.

GUATEMALA: Cubilquitz, *Türckheim* 8782.

SALVADOR: San Salvador, *Hitchcock* 8962.

NICARAGUA: Jinotepe, *Hitchcock* 8695.

COSTA RICA: Río Cañas, *Jiménez* 720.

LEEWARD ISLANDS: Dominica, *Ramage* in 1889.

TRINIDAD: Port of Spain, *Hitchcock* 10034, 10037, 10323, 10324; *Amer. Gr. Nat. Herb.* 592.

TOBAGO: *Broadway* 4841; *Hitchcock* 10255, 10257, 10268, 10270.

VENEZUELA: Carayaca, *Jahn* 303 in part.

BRITISH GUIANA: Upper Demerara River, *Jenman* 4089.

PARAGUAY: River Pilcomayo, *Rojas* 292.

EXPLANATION OF PLATE 21.—*Lasiacis patentiflora*. Specimen from Tobago, *Hitchcock* 10268, type collection (U. S. Nat. Herb. no. 975660). Natural size.

13. *Lasiacis sorghoidea* (Desv.) Hitchc. & Chase.

Panicum lanatum Swartz, Prodr. Veg. Ind. Occ. 24. 1788. Not *P. lanatum* Rottb. 1776. "Jamaica." The type specimen, marked "Jamaica, Swartz," has been examined in the Swartz Herbarium at Stockholm.

Panicum sorghoideum Desv.; Hamilt. Prodr. Pl. Ind. Occ. 10. 1825. "Porto Rico." The type specimen in the Paris Herbarium is labeled with some uncertainty as to locality, "America aequinox., Hispaniola." The note, "Je ne vois pas en quoi ce Panicum diffère du *P. glutinosum*," shows a close connection with the note under the original description, "Habitu *P. latifolio* affine, ab illo autem aequae ac *P. glutinoso* distinctum."

Panicum orinocense Willd.; Spreng. Syst. Veg. 1: 316. 1825, as synonym under *P. glutinosum* Lam. The type, received from Humboldt, is in the Willdenow Herbarium.

Panicum praegnans Steud. Syn. Pl. Glum. 1: 74. 1854. "*P. fruticosum* Salzmann. Oaxaca. Bahia." The fragmentary Oaxaca specimen, collected by Buchinger, is in the Steudel Herbarium at Paris. This appears to be *Lasiacis sorghoidea*. Salzmann's Bahia collection, labeled *P. fruticosum*, is *Lasiacis ugulata*. Steudel's description is not sufficient to distinguish between the two

species. The Oaxaca specimen is regarded as the type, as this is the one in the Steudel Herbarium.

Panicum lanatum sorghoideum Griseb. Fl. Brit. W. Ind. 551. 1864. Based on *Panicum sorghoideum* Desv.

Panicum martinicense Griseb. Fl. Brit. W. Ind. 552. 1864. "Jamaica! Wullschl.; [Martinique!, Panama!, Guiana]." Because of the specific name the plant from Martinique is taken as the type. This is the specimen mentioned earlier in the description, "*P. fuscum*, Sieb. Mart. 29."

Panicum swartzianum Hitchc. Contr. U. S. Nat. Herb. 12: 140. 1908. Based on *P. lanatum* Swartz, not *P. lanatum* Rottb.

Lasiacis swartziana Hitchc. Bot. Gaz. 51: 302. 1911. Based on *Panicum swartzianum* Hitchc.

Lasiacis sorghoidea Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 338. 1917. Based on *Panicum sorghoideum* Desv.

DESCRIPTION.

Culms much branched, erect or clambering to a height of 5 to 7 meters, the strong central cane as much as 1 cm. thick, glabrous or pubescent, the main branches sometimes 1 meter long or more, arcuate, bearing slender branchlets toward the pendent ends, or the branchlets fascicled on the main culm, the young shoots usually pubescent; sheaths pubescent, especially on the margin and collar, the surface sometimes glabrate; ligule inconspicuous; blades lanceolate or elliptic-lanceolate, those of the main culm or of vigorous shoots as much as 20 cm. long and 3 cm. wide, those of the fertile branches usually 8 to 12 cm. long and 1.5 cm. wide, or on the fascicled branchlets smaller, often falcate, velvety on both surfaces or only puberulent or glabrate above; panicles on the main culm and larger branches usually 10 to 20 cm. long, at maturity as wide or wider, rather compactly many-flowered, the branches long and again branched, the axes very scabrous; spikelets 4 to 5 mm. long.

The specimens cited vary in the amount of pubescence, but all are at least puberulent on the under surface of the blades. In some the young shoots are conspicuously villous or velvety-pubescent; in others they are glabrous. Possibly these represent distinct species. In general the main or primary panicles are large, and rather open with ascending branches. Extended field study of this complex group is necessary before it can be satisfactorily elaborated.

DISTRIBUTION.

Ravines, hedges, and borders of woods throughout tropical America.

SAN LUIS POTOSÍ: Las Canoas, *Pringle* 3808.

JALISCO: Guadalajara, *Hitchcock* 7348. San Nicolás, *Hitchcock* 7207.

GUANAJUATO: *Dugés* in 1897.

MICHOACÁN: Morelia, *Arsène* in 1909.

VERACRUZ: Zacuapan, *Purpus* 3779, 6206. Mirador, *Mohr* in 1857; *Ross* 613;

Liebmann 296, 300. Tlapacoyo, *Liebmann* 293. Misantla, *Liebmann* 289.

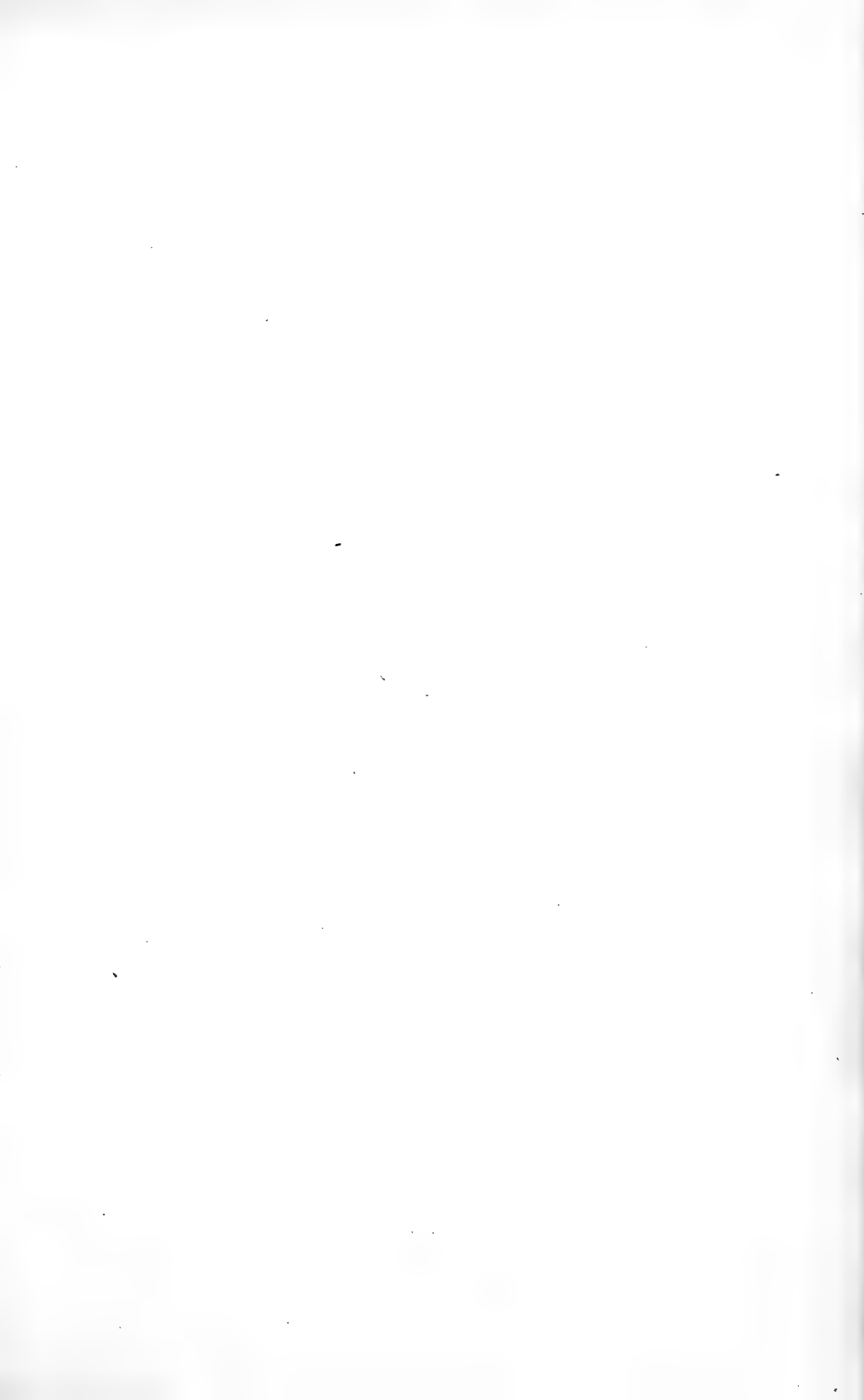
Orizaba, *Smith* 581; *Bourgeau* 2648; *Hitchcock* 6389. Jalapa, *Hitchcock*

6942, 6674, 6680; *Rose* 6144. Córdoba, *Bourgeau* "1459 and 1936"; *Fink*

in 1893; *Seaton* 393; *Hitchcock* 6442, 6455, 6458. Colipa, *Liebmann* 290.

MORELOS: Cuernavaca, *Ross* 254; *Pringle* 5960, 6663; *Hitchcock* 6824.

OAXACA: Tomellín Canyon, *Pringle* 6701. Tuxtepec, *Nelson* 372. Trapiche de la Concepción, *Liebmann* 284. San Pablo Huitzo, *Conzatti* 2012.





- GUATEMALA: Guatemala City, *Hitchcock* 9036, 9053, 9057, 9101; *Kellerman* 4735. Cobán, *Pittier* 1787. Los Amates, *Kellerman* 4786, Sierra de las Minas, *Kellerman* 6233. Río Dulce, *Smith* 1852. Without locality, *Heyde* 362.
- SALVADOR: San Salvador, *Hitchcock* 8925, 8951, 8952. Lake Ilopango, *Hitchcock* 8921.
- NICARAGUA: Jinotepe, *Hitchcock* 8665, 8674, 8690, 8699.
- COSTA RICA: Talamanca, *Tonduz* 9493. Terraba, *Pittier* 3638. Tuis, *Tonduz* 8186, 11397. Nicoya, *Tonduz* 13755. Las Pavas, *Pittier* 3114. San José *Pittier* 81; *Tonduz* 7207, 7234; *Cooper* 5998; *Hitchcock* 8451. Cartago, *Pittier* 7110; *Cooper* 98; *Smith* 4891, 4991; *Tonduz* 10423; *Maxon* 128. Tsaki, *Tonduz* 9434. Buenos Aires, *Tonduz* 4858. San Ramón, *Tonduz* 14375, 17908. El General, *Pittier* 3366. Boruca, *Pittier* 4455. Cañas Gordas, *Pittier* 11015. Río Ceiba, *Tonduz* 4858. Carrillo, *Biolley* 3106. Tres Ríos, *Pittier* 4328. Río Navarrito, *Pittier* 2406. Calabaza, *Tonduz* 10871. Rodeo, *Pittier* 1616. Shirores, *Tonduz* 9213. Tiribí, *Tonduz* 3076. Pacaca, *Pittier* 3332.
- PANAMA: El Boquete, *Hitchcock* 8269, 8270, 8282, 8286, 8311, 8315. Matías Hernández, *Pittier* 6924. Cerro Vaca, *Pittier* 5331, 5339. Gatún, *Hitchcock* 9175, 9177, 9182. Toro Point, *Hitchcock* 8054. Ancón, *Célestine* 63; *Williams* 4. Chagres, *Fendler* 371. Culebra, *Pittier* 2118. Miraflores, *Pittier* 2196. Pedro Miguel, *Hitchcock* 7955. Balboa, *Hitchcock* 8003.
- CUBA: Rincón, *Shafer* 12323.
- JAMAICA: New Forest, *Hitchcock* 9837, 9892, 9893. Catherines Peak, *Amer. Gr. Nat. Herb.* 593. Troy, *Hitchcock* 9796, 9808, 9813, 9817; *Harris* 12650. Ewarton, *Hitchcock* 9409. Gordon Town, *Hitchcock* 9380, 9381, 9382; *Hart* 685, 813. Newcastle, *Hitchcock* 9335; *Harris* 11398. Constant Spring, *Hitchcock* 9258. Salt Hill, *Harris* 11410. Flamstead, *Harris* 11469. Rams Horn Range, *Hitchcock* 9569, 9570, 9571. Richmond Hill, *Millspaugh* 1968. Upper Clarendon, *Harris* 12768. Mt. Lebanon, *Harris* 12488.
- PORTO RICO: Mayaguez, *Chase* 6809, 6822, 6823; *Heller* 4375; *Holm* 74, 116. Vega Baja, *Chase* 6419. Arecibo, *Chase* 6457. San Juan, *Chase* 6760. El Yunque, *Chase* 6728. Maricao, *Chase* 6218. San German, *Hess* 75. Coamo, *Sintenis* 3062. Aibonito, *Sintenis* 2861.
- VIRGIN ISLANDS: St. Croix, *Rose* 3624; *Ricksecker* 289. St. Thomas, *Millspaugh* 520; *Britton*, *Britton & Shafer* 141.
- LEEWARD ISLANDS: Antigua, *Rose* 3453, 3484, 3493, 3647. Montserrat, *Shafer* 253, 255, 701. Guadeloupe, *Duss* 3183, 3613.
- WINDWARD ISLANDS: Martinique, *Duss* 770. Grenada, *Eggers* 6224; *Broadway* 4674.
- TRINIDAD: Port of Spain, *Amer. Gr. Nat. Herb.* 594; *Hitchcock* 9950½, 9963, 9980, 10035, 10317. St. Joseph, *Hitchcock* 10170. Tabaquite, *Hitchcock* 10131. Chacachacare, *Hitchcock* 10061, 10064. Oropuche, *Broadway* 4976. Caparo, *Broadway* 4924. Without locality, *Bot. Gard. Herb.* 2298, 3190.
- TOBAGO: *Hitchcock* 10247.
- COLOMBIA: Santa Marta, *Smith* 2144, 2147, 2148, 2258.
- VENEZUELA: Palmasola, *Pittier* 6384. Caracas, *Rose* 21774.
- BRAZIL: Campinas, *Campos Novas* 1237, 1238. Minas Geraes, *Regnell* 308. Cuyabá, *Malmé* 1544B, 1723. Corumbá, *Malmé* 3053. Matto Grosso, *Lindman* 3185. Without locality, *Burchell* 6507.
- PARAGUAY: Colonia Elisa, *Lindman* 1701. Central Paraguay, *Morong* 641, 755. Pilcomayo River, *Morong* 1569.

ECUADOR: Between Río and Salto, *Jameson* in 1864. *Gualea*, *Sodiño* 3118, 3121.

BOLIVIA: Guanai, *Rusby* 191. Cochabamba, *Bang* 1289, 1291.

ARGENTINA: Misiones, *Ekman* 617, 619.

EXPLANATION OF PLATE 22.—*Lasiacis sorghoidea*. Specimen from Mayaguez, Porto Rico, *Holm* 116 (U. S. Nat. Herb. no. 733619). Natural size.

14. *Lasiacis ruscifolia* (H. B. K.) Hitchc.

Panicum ruscifolium H. B. K. Nov. Gen. & Sp. 1: 101. 1816. "Crescit in apricis et aridis Regni Mexicani, in radicibus montis ignivomi, Volcan de Jorullo."

Panicum compactum Swartz, Adnot. Bot. 14. 1829. Not *P. compactum* Kit. 1814. This was briefly described after Swartz's death by Wikström, who considered it distinct from *Panicum divaricatum* L. because of the dense panicle and wide blades. The specimen in the Swartz Herbarium at Stockholm is a single shoot with three leaves and an ovoid panicle about 8 cm. long. The spikelets are 3 to 3.5 mm. long.

Panicum megacarpum Steud.; Griseb. Fl. Brit. W. Ind. 551. 1864. This name is given by Grisebach as a synonym of *P. lanatum* β *sorghoideum* and credited to "Steud. in Pl. Lechler, 2219."

Panicum liebmannianum Fourn. Mex. Pl. 2: 33. 1886. "Consoquitla (Liebm. n. 299)." The type has been examined in the Copenhagen Herbarium. The panicles are narrow and compact, the blades pubescent beneath and minutely so above, the spikelets about 3.5 mm. long.

Lasiacis compacta Hitchc. Bot. Gaz. 51: 302. 1911. Based on *Panicum compactum* Swartz.

Lasiacis ruscifolia Hitchc. Proc. Biol. Soc. Washington 24: 145. 1911. Based on *Panicum ruscifolium* H. B. K.

Lasiacis liebmanniana Hitchc. Proc. Biol. Soc. Washington 24: 145. 1911. Based on *Panicum liebmannianum* Fourn.

DESCRIPTION.

More robust than any other species, freely branching, the shoots usually strongly dorsiventral; culms becoming several meters long, glabrous or rarely puberulent; sheaths often overlapping, glabrous on the surface or sometimes hispidulous toward the apex (in some Central American specimens papillose-hispid throughout), glabrous or often ciliate or villous on the margin, especially near the summit, the collar glabrous or villous; ligule inconspicuous; blades ovate-lanceolate or elliptic, sometimes lanceolate, the primary ones 10 to 15 cm. long, 3 to 6 cm. wide, narrowed or often cordate-clasping at the asymmetric base, rather abruptly narrowed to an acuminate but not attenuate apex, puberulent or glabrous beneath, glabrous or scabrous above, the secondary blades similar or reduced; panicles narrow and compact, 5 to 20 cm. long, or often with distant lower branches, these compactly flowered, or the panicle rarely somewhat open, with spreading, implicate but rather closely flowered branches, the axes hispidulous and scabrous; spikelets 3 to 4 mm. long, nearly globose at maturity.

This species is variable as to pubescence, and the panicles, at first dense, may with age become rather open. The blades are usually cordate and somewhat clasping and proportionately wider than in any other species. The specimens from the West Indies and Mexico have the blades pubescent beneath, but from Central America there are many specimens with glabrous blades. The latter region furnishes also specimens with papillose-hispid sheaths, in which the blades may be glabrous or pubescent beneath.

Lieb. n. 280 type : *P. liebmannianum* var
: *defanferatum* Fourc.

DISTRIBUTION.

Climbing over bushes, Mexico to northern South America; also in Cuba and Jamaica.

SONORA: Sierra de Alamos, *Rose* 12822.

CHIHUAHUA: Norogachi, *Palmer* 10 in 1885.

SINALOA: Imala, *Palmer* in 1891. Culiacán, *Brandegge* in 1904. San Blas, *Rose* 13369. Mazatlán, *Rose* 14112. Lodiego, *Palmer* 1645 in 1891. Rosario, *Rose* 14521.

DURANGO: Huasemote, *Rose* 3502.

TEPIC: Acaponeta, *Rose* 14409.

COLIMA: Manzanillo, *Hitchcock* 7034. Alzada, *Hitchcock* 7079.

MICHOACÁN: El Calabazal, *Langlassé* 458. Vallecitos, *Langlassé* 361.

MORELOS: Yautepec, *Pringle* 11293.

GUERRERO: Tlalixtaquilla, *Nelson* 2254. Acapulco, *Palmer* 115 in 1895.

JALISCO: Guadalajara, *Hitchcock* 7368.

OAXACA: San Miguel, *Sadani, Liebmann* 283. Trapiche de la Concepción, *Liebmann* 284. Rfo de Conaltepec, *Liebmann* 282. San Agustín, *Liebmann* 281. Guatulco, *Liebmann* 280. Oaxaca, *Conzatti & González* 1103.

VERACRUZ: Consoquitla, *Liebmann*, 299. Misantla, *Purpus* 5978. Zacuapan, *Purpus* 7877.

YUCATÁN: Izamal, *Gaumer* 878, 1025. Mérida, *Schott* 600.

GUATEMALA: Salamá, *Seler* 2446. Jumaytepeque, *Heyde & Lux* 3899. Cubilquitz, *Türkheim* 8620.

HONDURAS: San Pedro Sula, *Thieme* 31, 5585.

SALVADOR: Sonsonate, *Hitchcock* 8979, 8982. Santa Ana, *Hitchcock* 8850. San Salvador, *Hitchcock* 8903.

NICARAGUA: Corinto, *Hitchcock* 8743. Jinotepe, *Hitchcock* 8676, 8715, 8717, 8719. Quesalguague, *Baker* 2105. Masaya, *Hitchcock* 8710. San Juan del Sur, *Hitchcock* 8607.

COSTA RICA: Nicoya, *Tonduz* 13759. Las Vueltas, *Tonduz* 12858. Puntarenas, *Hitchcock* 8570, 8571, 8577, 8581. Surubres, *Biolley* 17383. Colonia Carmona, *Jiménez* 361, 369, 376. Alajuela, *Jiménez* 531. Rfo Bebedero, *Jiménez* 725.

PANAMA: Matías Hernández, *Pittier* 6892. Balboa, *Hitchcock* 8060. Panama, *Hitchcock* 9204. Old Panama, *Hitchcock* 8401. Aguadulce, *Pittier* 4987, 4998. Taboga Island, *Célestine* 47; *Pittier* 3603.

CUBA: Ensenada de Mora, *Britton, Cowell & Shafer* 12979. Sancti Spiritus, *León* 905. Guantánamo, *León* 3778. Isle of Pines, *Palmer & Riley* 904; *Curtiss* 520; *Britton, Britton & Wilson* 14659, 15065.

JAMAICA: Without locality, *Swartz* (in *Swartz Herbarium* at Stockholm).

COLOMBIA: Santa Marta, *Smith* 174.

VENEZUELA: La Moka (Siquire Valley), *Eggers* 13480.

PARAGUAY: Central Paraguay, *Morong* 755.

EXPLANATION OF PLATE 23.—*Lasiacis ruscifolia*. Specimen from Santa Ana, Salvador, *Hitchcock* 8850 (U. S. Nat. Herb. no. 946905). Natural size.

15. *Lasiacis anomala* Hitchc.

Lasiacis anomala Hitchc. Journ. Washington Acad. Sci. 9: 37. 1919. "Type in the U. S. National Herbarium, no. 865557, collected along the edge of jungle, Fort George Road, Port of Spain, Trinidad, November 27, 1912, by A. S. Hitchcock (Amer. Gr. Nat. Herb. no. 595)."

DESCRIPTION.

Culms woody, branching, clambering over bushes, glabrous, the main culm as much as 5.5 mm. thick, and 5 meters long; sheaths glabrous or more or less pilose, striate, ciliate, densely villous on the collar; ligule a short ciliate membrane; blades ovate-lanceolate or elliptic-lanceolate, as much as 10 cm. long and 3 cm. wide on the main flowering culms, usually 4 to 6 cm. long and 1 to 2 cm. wide on the lateral flowering branches, rather thin, narrowed and usually asymmetric at base, sometimes a little cordate-clasping, puberulent, or sometimes glabrate on the upper surface; panicles oblong-ovoid, 7 to 10 cm. long, 3 to 5 cm. wide, those on the lateral branches smaller, the lower branches somewhat distant, spreading or somewhat reflexed, all rather compactly flowered, puberulent, the pedicels angled, rather stout, 1 to 2 mm. long; spikelets ovoid, becoming nearly globose at maturity, 3 to 4 mm. long; first glume about one-third, second glume about two-thirds, as long as the spikelet; first and second sterile lemmas about equal and about as long as the fertile lemma, the glumes and lemmas slightly woolly at the tip, the second sterile lemma infolding the fruit more closely than usual for the first lemma in other species; fruit ovoid-globose, obtuse, because of the presence of a second sterile lemma the palea side facing the second glume.

This species has been confused with *L. ruscifolia* and was included under that name in a recent account of the grasses of the West Indies,¹ in which the following statement appears: "In all the Trinidad specimens the spikelets contain a second sterile lemma, a character not found in any other species known to us. This second sterile lemma equals the first, contains a hyaline palea, and infolds the fruit rather more closely than the sterile lemma commonly does in other species. The fruit borne one joint higher on the rachilla consequently faces in the direction opposite to the one usual in Paniceae; that is, the palea side of the fruit faces the second instead of the first glume." A reconsideration of the group led the writer to the conclusion that, "we have here a distinct species, for not only is there this unusual character of a second sterile lemma but also a distinct geographical range. Of the group to which it had been referred, all the specimens from Trinidad, the lower Orinoco, and eastern Brazil have a second sterile lemma, while outside of this range, that is, north and west, there is but one sterile lemma in all the specimens examined. In other respects, such as shape of blades and panicle, pubescence, and shape and size of spikelets, the new species does not differ from *L. ruscifolia*, from which it has been separated. The specimens of the new species, *Lasiacis anomala*, agree closely among themselves in all these characters, but also agree with many specimens referred to the more variable species, *L. ruscifolia*."

DISTRIBUTION.

Copses and edges of forest, Trinidad to eastern Brazil.

TRINIDAD: Port of Spain, *Amer. Gr. Nat. Herb.* 595; *Hitchcock* 10001. St. Joseph, *Hitchcock* 10021. San Fernando, *Hitchcock* 10117. Chacachacare, *Hitchcock* 10063. Cedros, *Hitchcock* 10136. St. Margarets, *Broadway* 2627. Moruga, *Broadway* 2504. Without locality, *Broadway* 2564; *Bot. Gard. Herb.* 2303.

VENEZUELA: Santa Catalina, *Rusby & Squires* 358. Island of Margarita, *Miller & Johnston* 184.

¹ *Hitchc. & Chase, Contr. U. S. Nat. Herb.* 18: 339. 1917.



BRAZIL: Rio Branco, *Kuhlmann* 3358. Ceara, *Gardner* 1889, 1894.

EXPLANATION OF PLATE 24.—*Lasiacis anomala*. Specimen from Cedros, Trinidad, *Hitchcock* 10136 (U. S. Nat. Herb. no. 975574). Natural size.

DOUBTFUL SPECIES.

Panicum maculatum Aubl. Pl. Guian. 1: 51. 1775. This can not be identified from the brief description. The species described under this name by Schultes (Mant. 2: 238. 1824) appears to be *Lasiacis ligulata*.

Panicum glutinosum Lam. Tabl. Encycl. 1: 174. 1791. Not *Panicum glutinosum* Swartz, 1788. Probably *Lasiacis sorghoidea*.

Panicum agglutinans Kunth, Enum. Pl. 1: 120. 1833. Based upon *Panicum glutinosum* Lam.

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LASIACIS PROCERRIMA (HACK.) HITCHC.



LASIACIS RUGELII (GRISEB.) HITCHC.

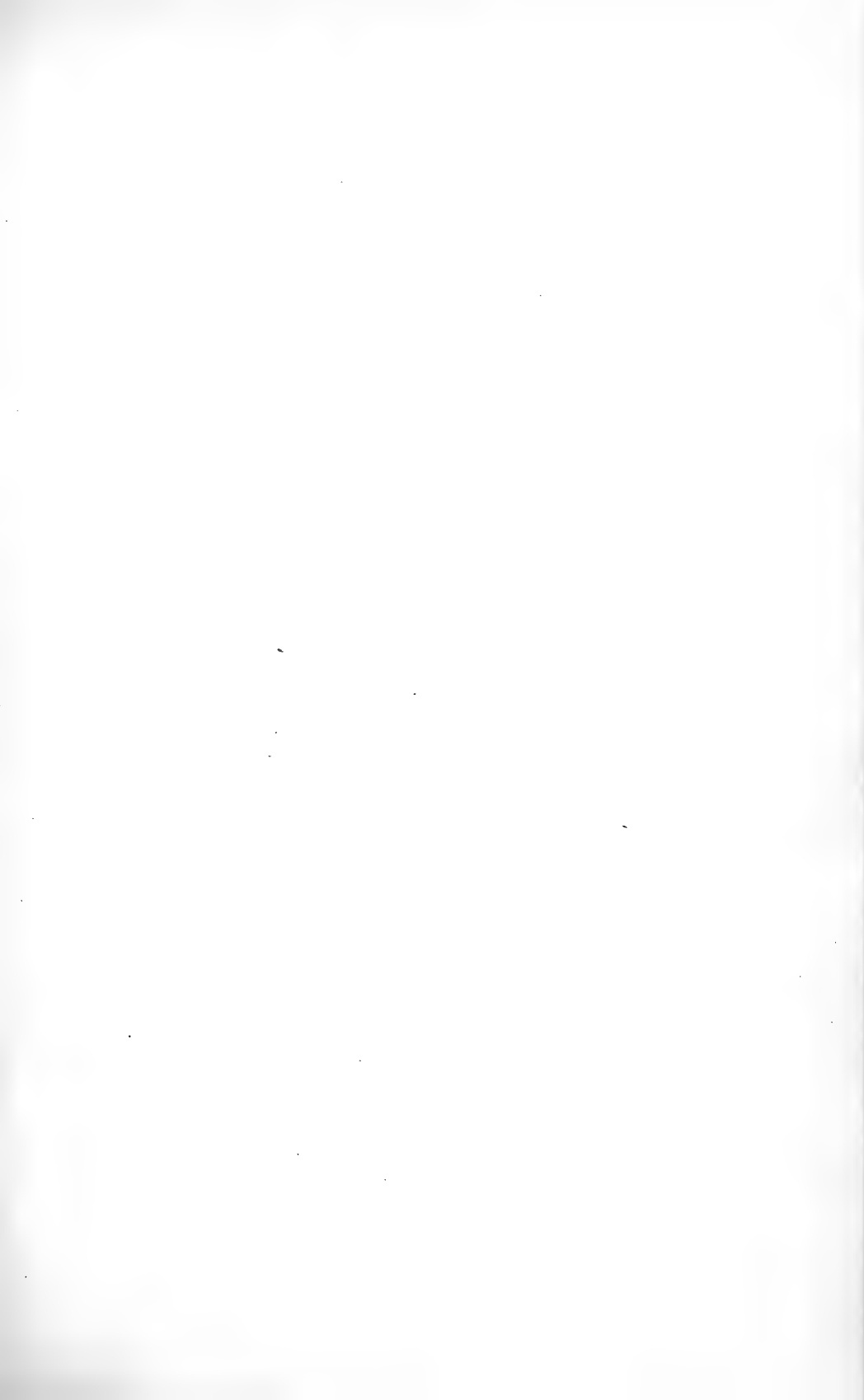


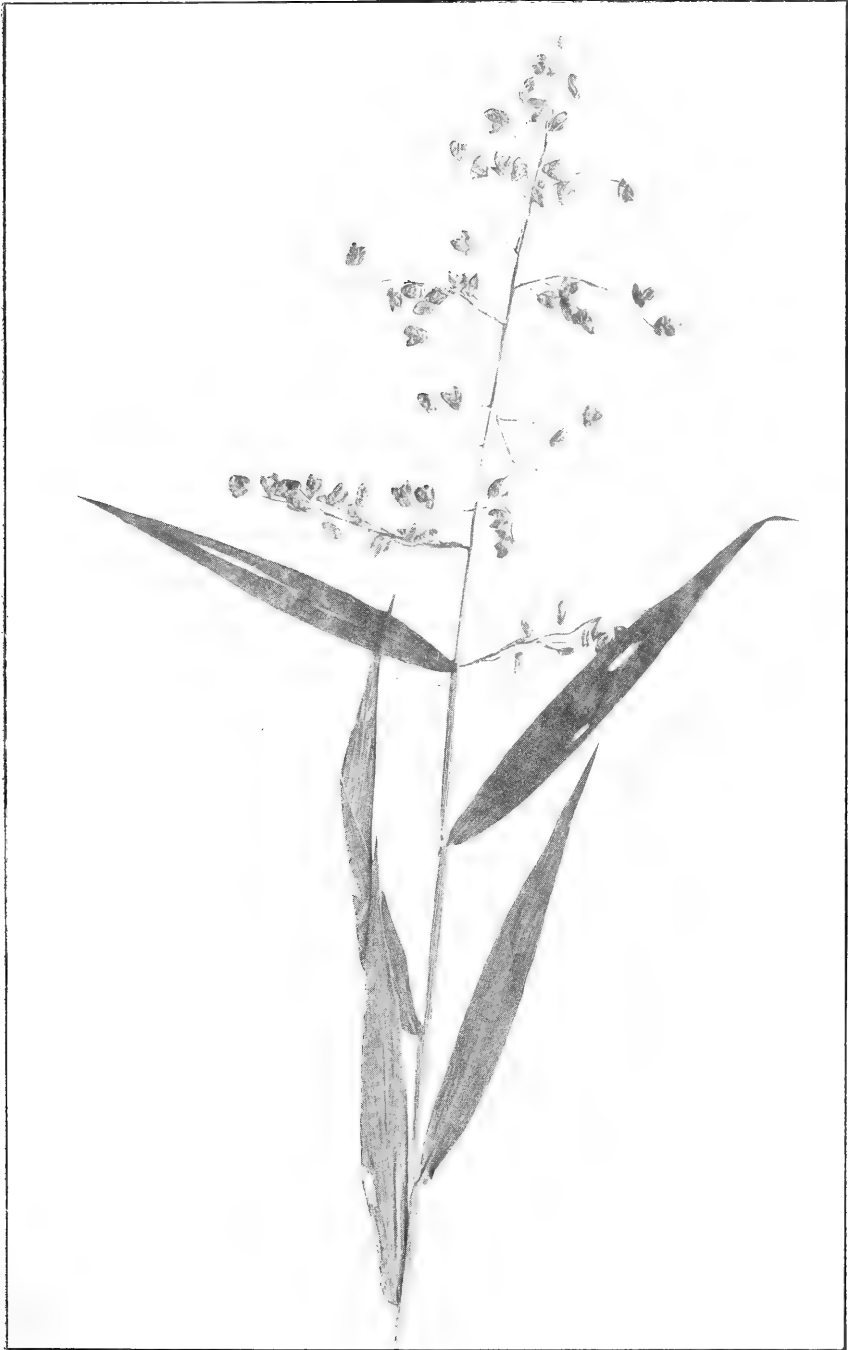


LASIACIS GRISEBACHII (NASH) HITCHC.

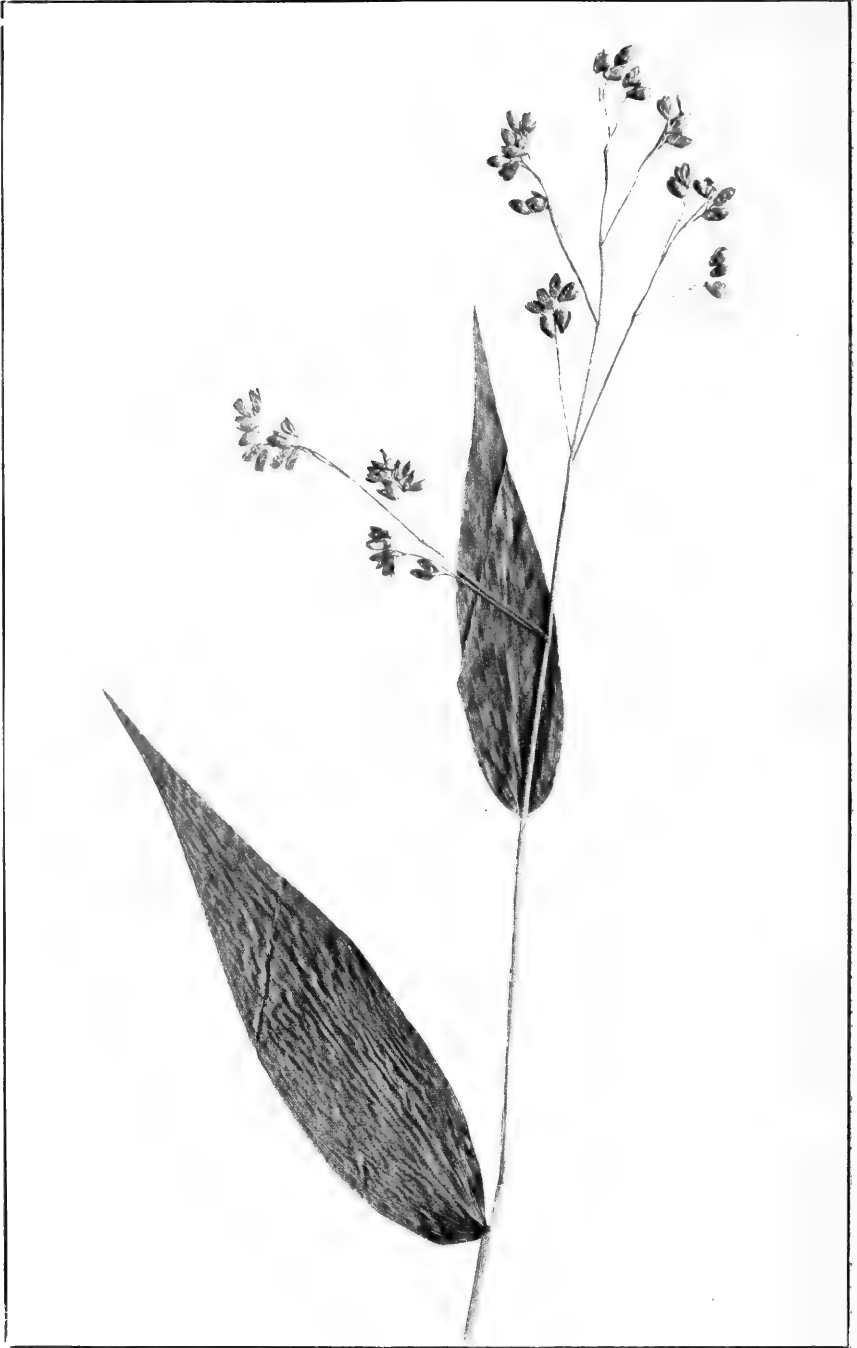


LASIIACIS OAXACENSIS (STEUD.) HITCHC.



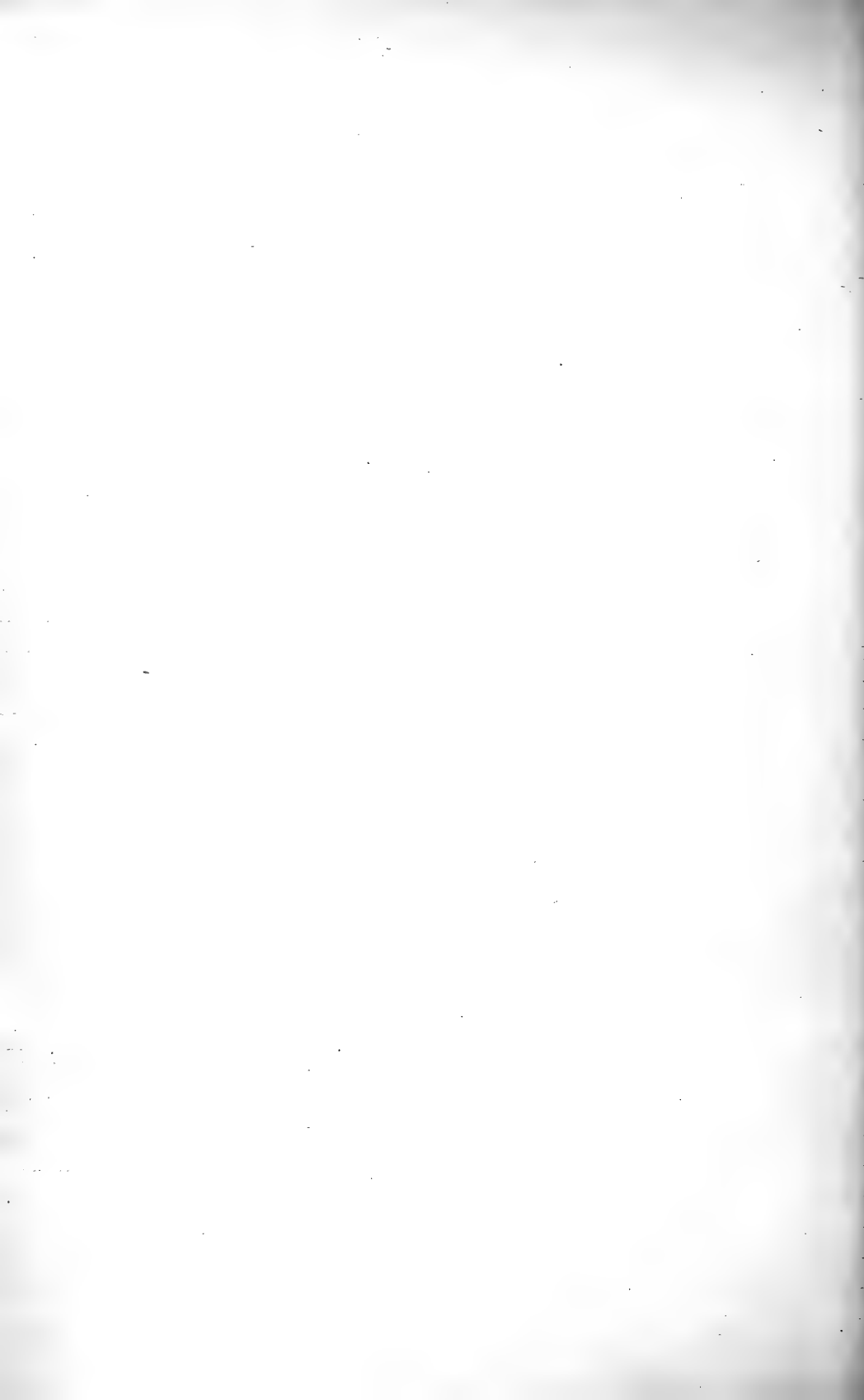


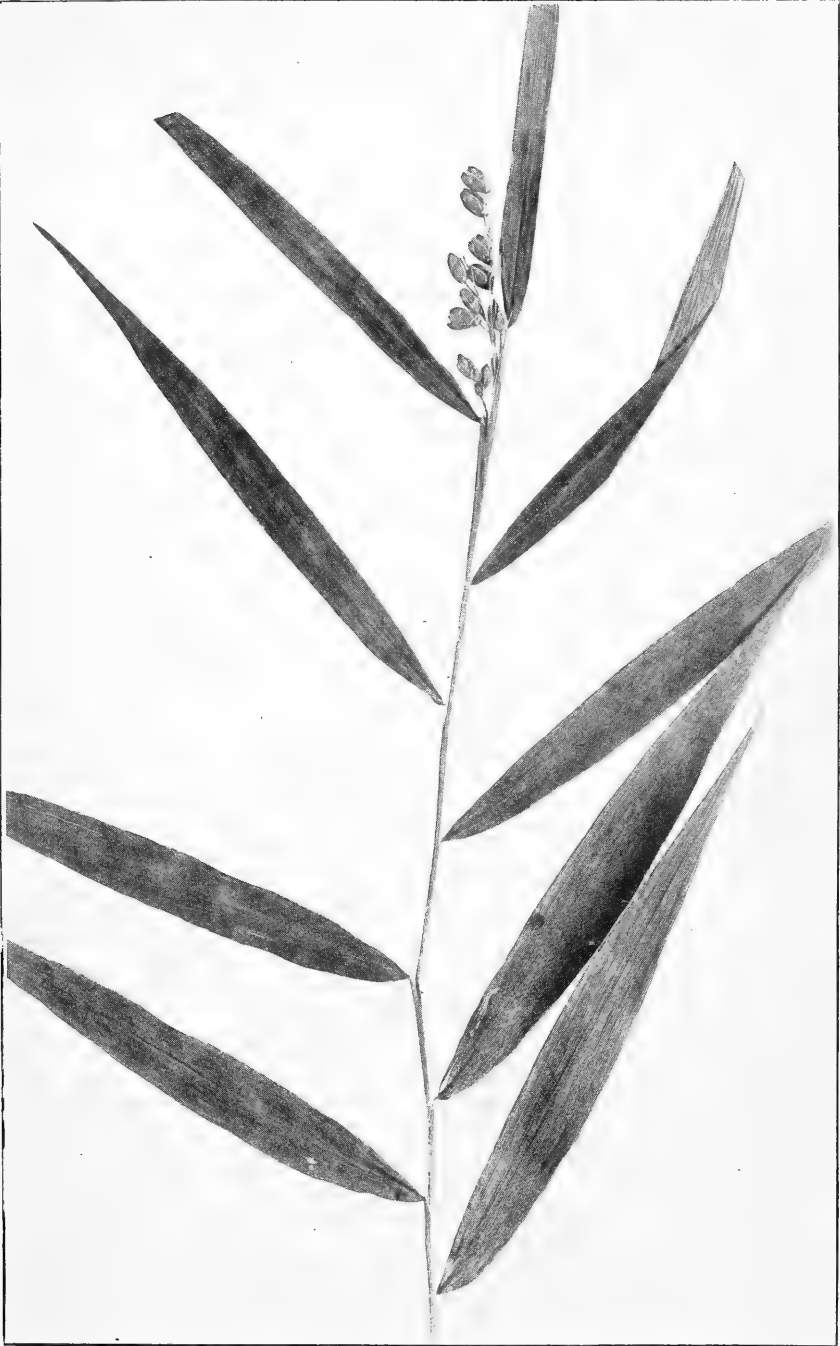
LASIACIS LIGULATA HITCHC. & CHASE.



LASIACIS RHIZOPHORA (FOURN.) HITCHC.





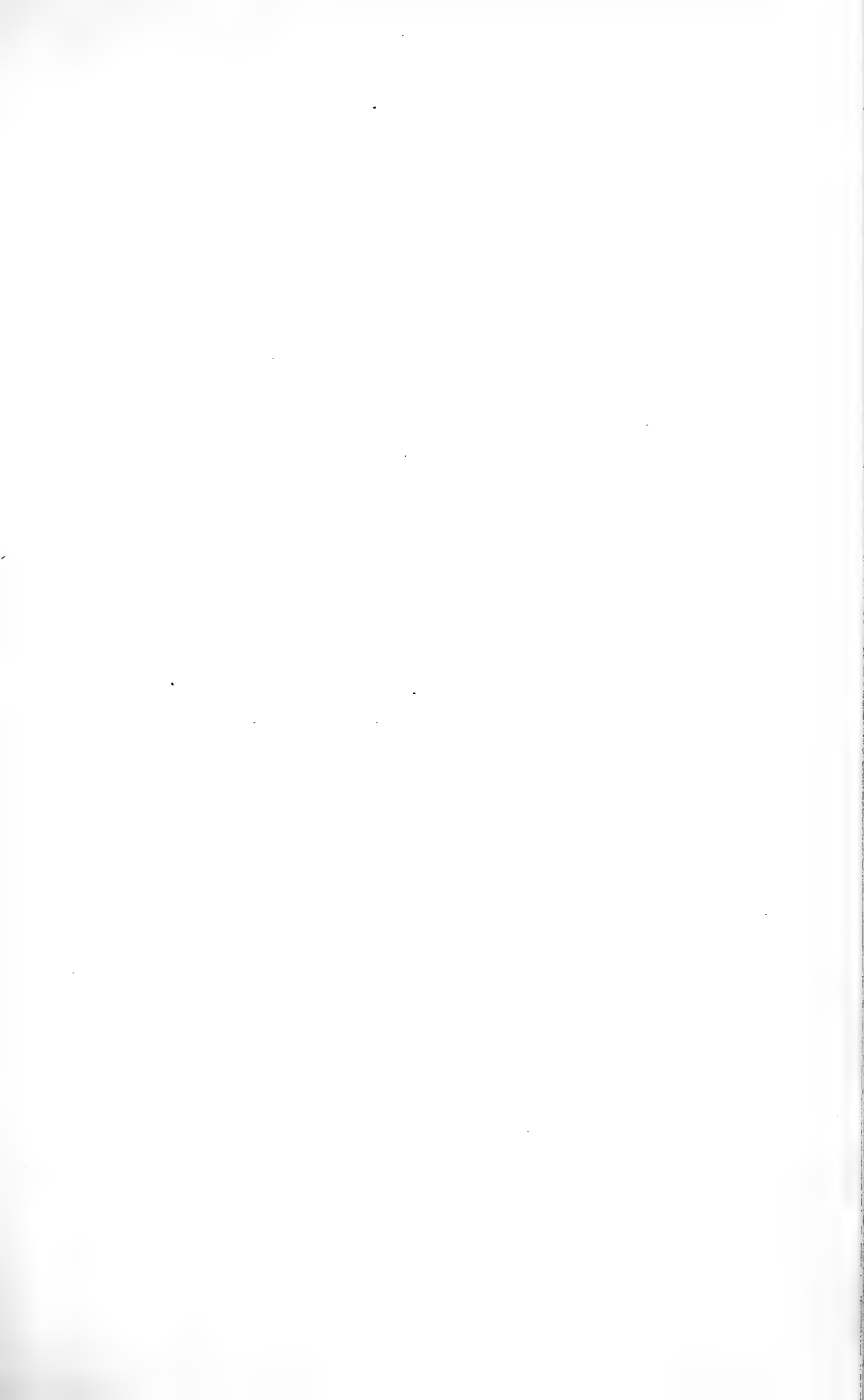


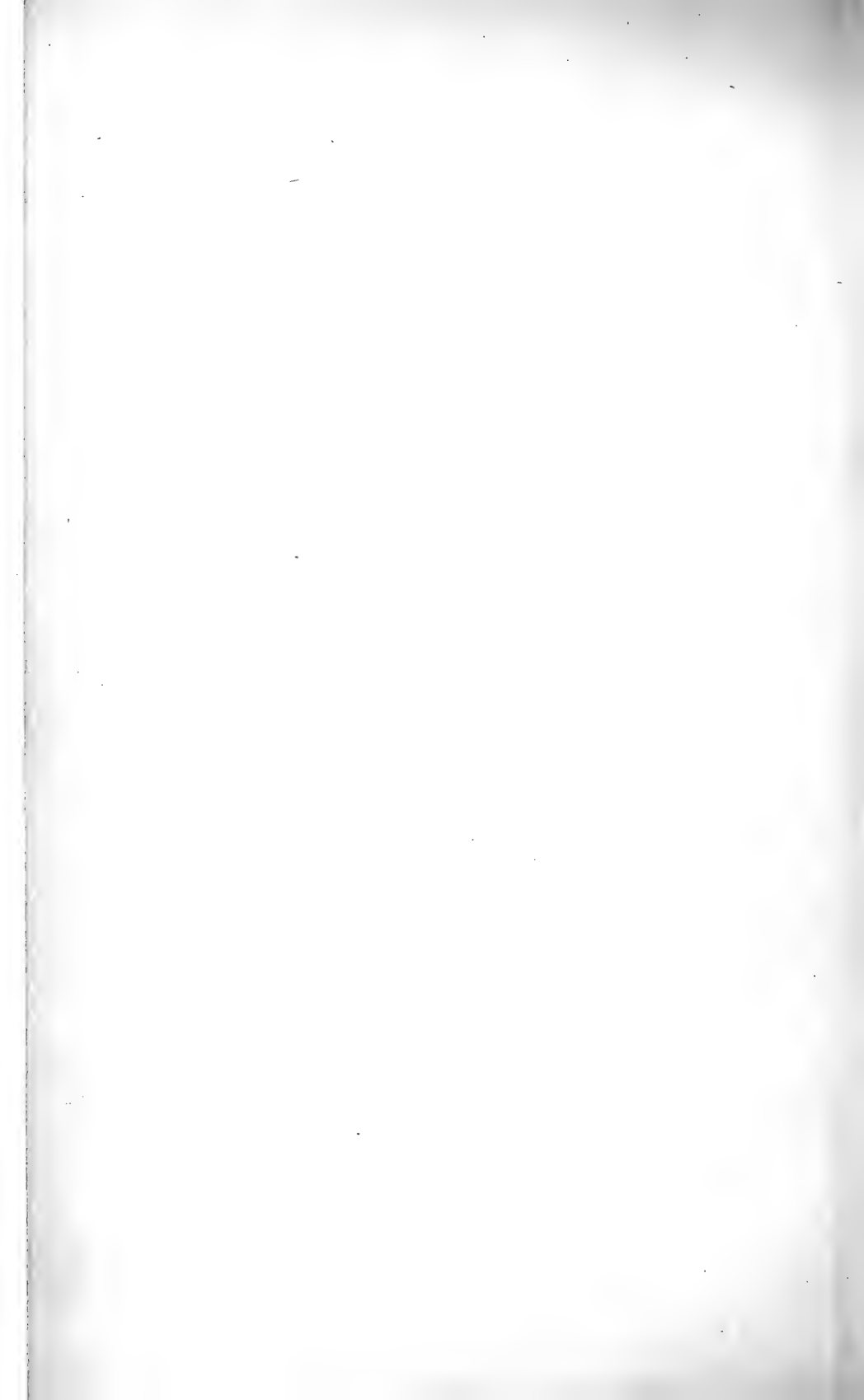
LASIAKIS LEPTOSTACHYA HITCHC.

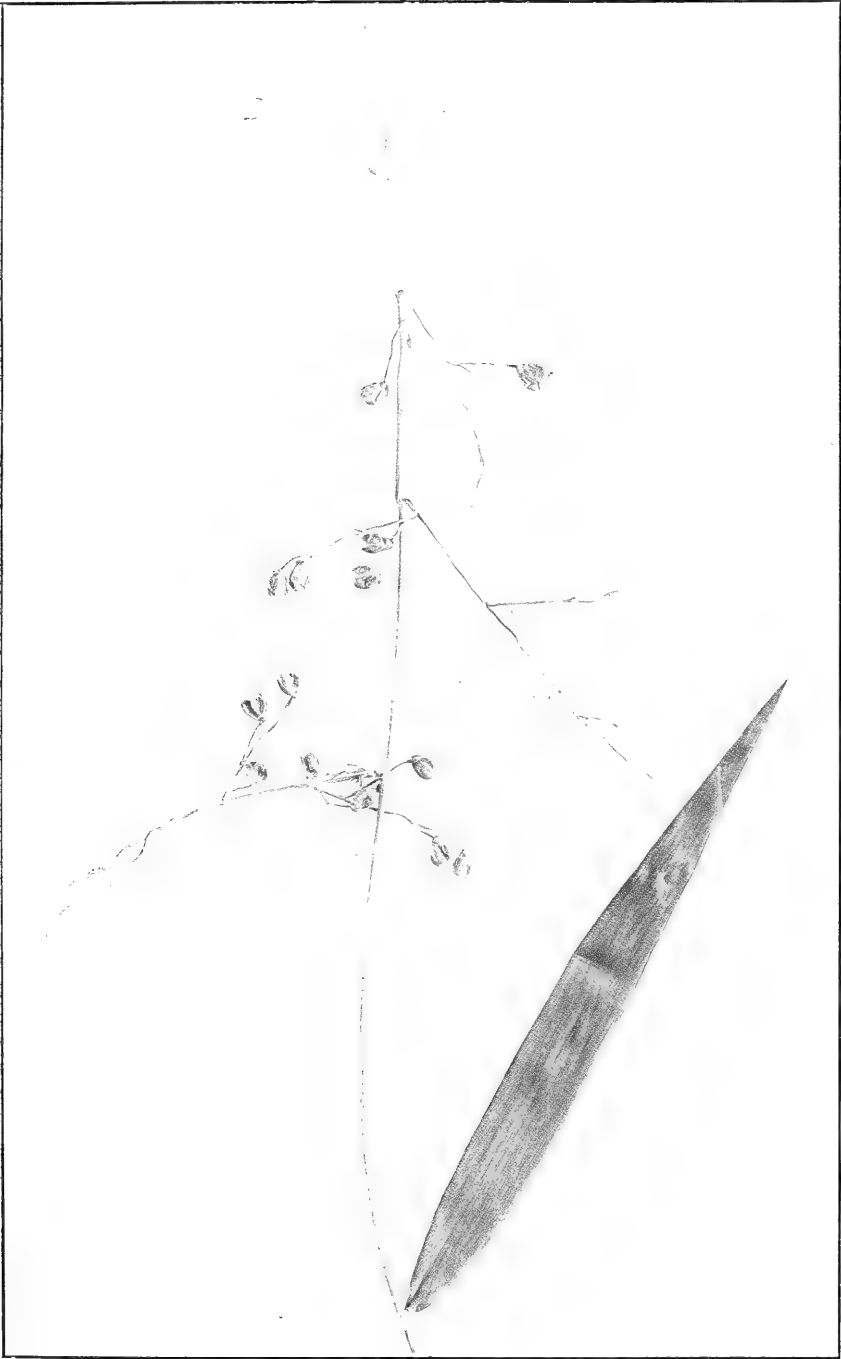
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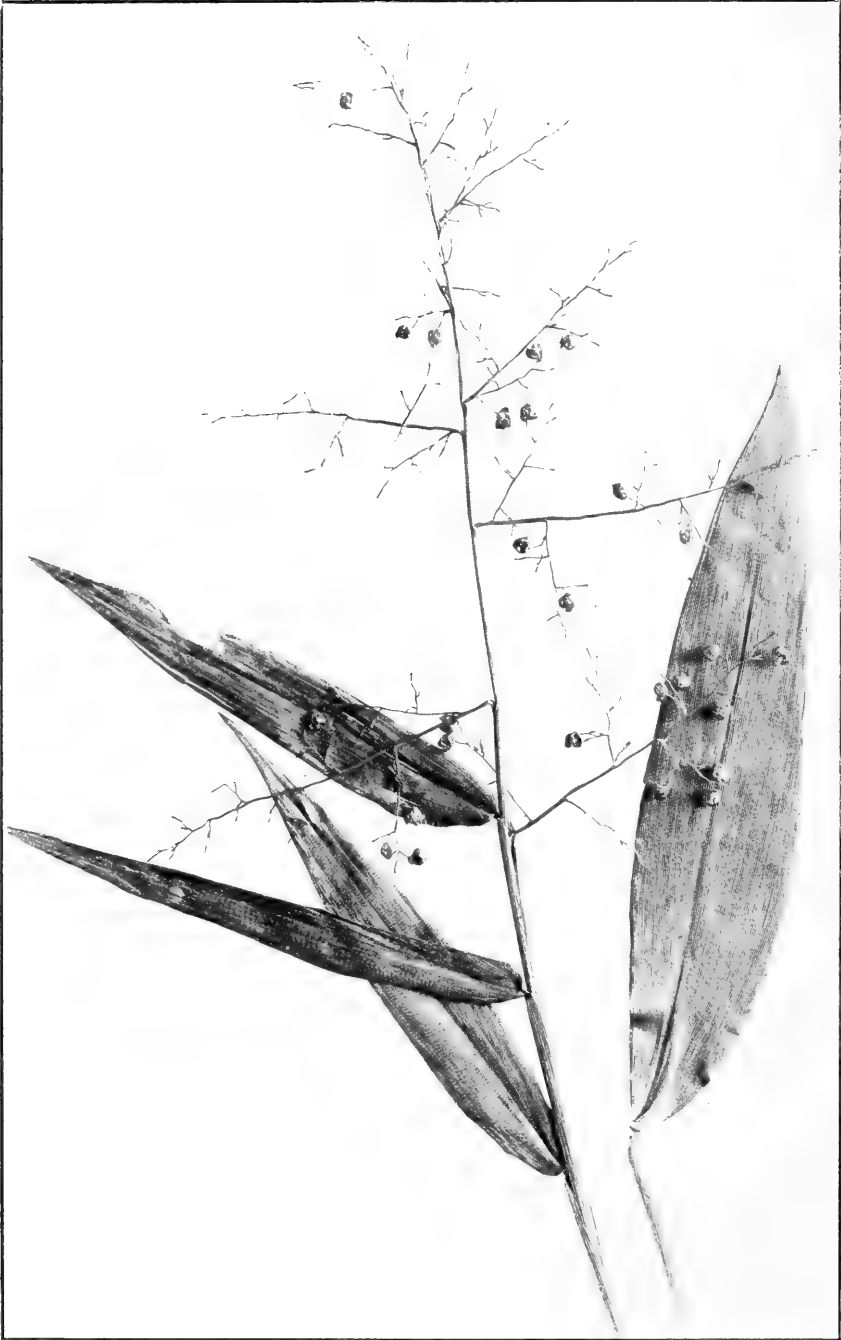
LASIACIS HARRISII NASH.



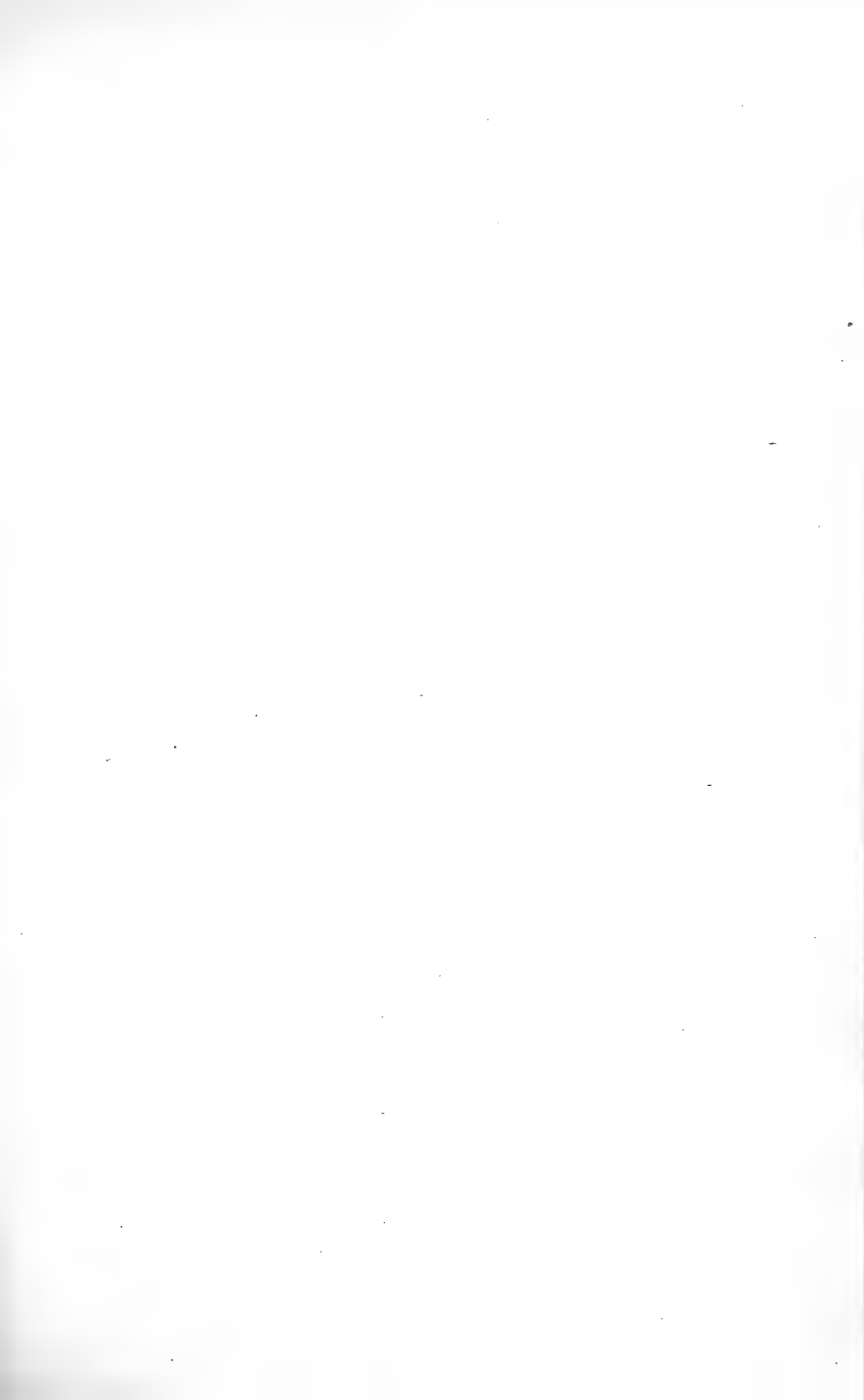




LASIIACIS DIVARICATA (L.) HITCHC.



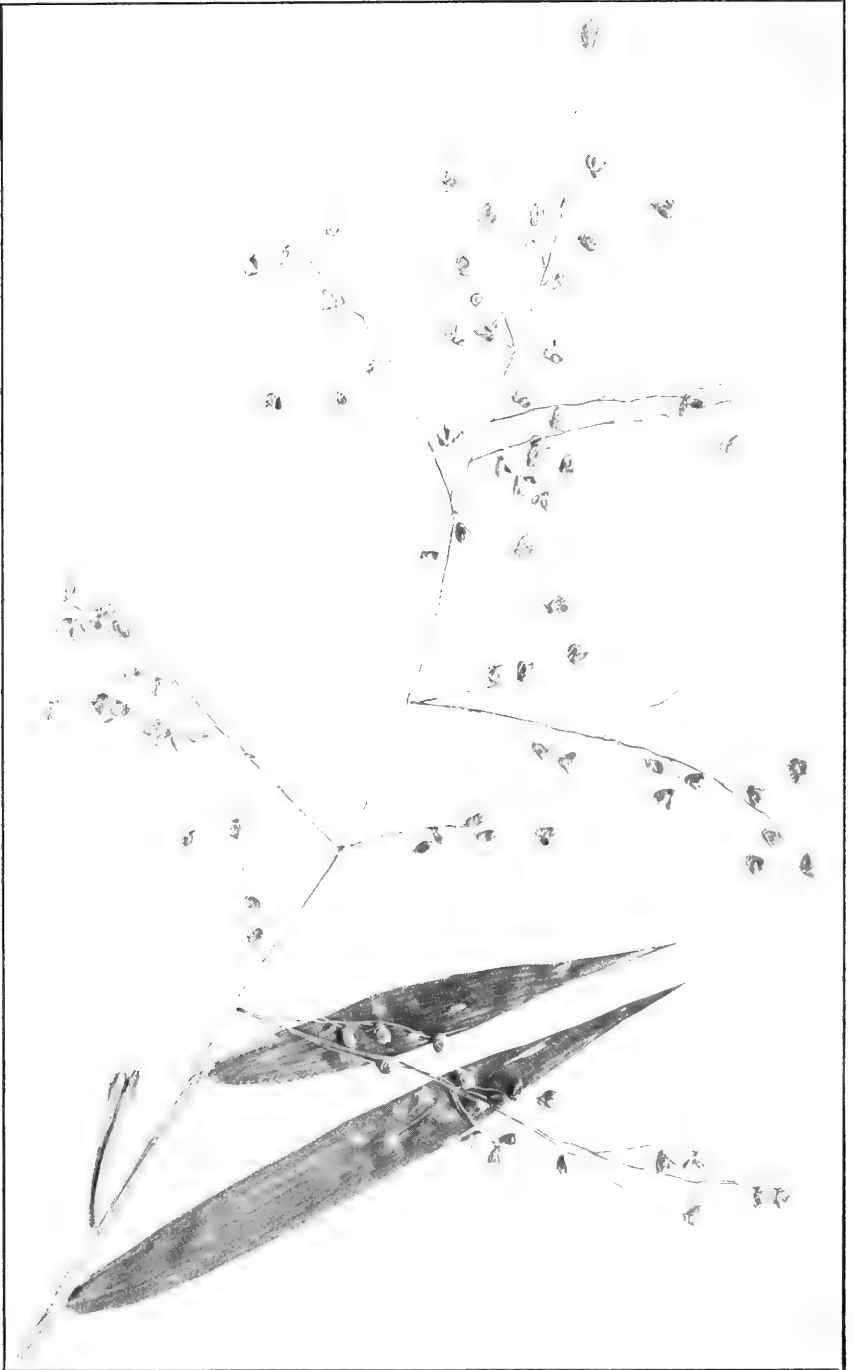
LASIACIS GLOBOSA HITCHC.



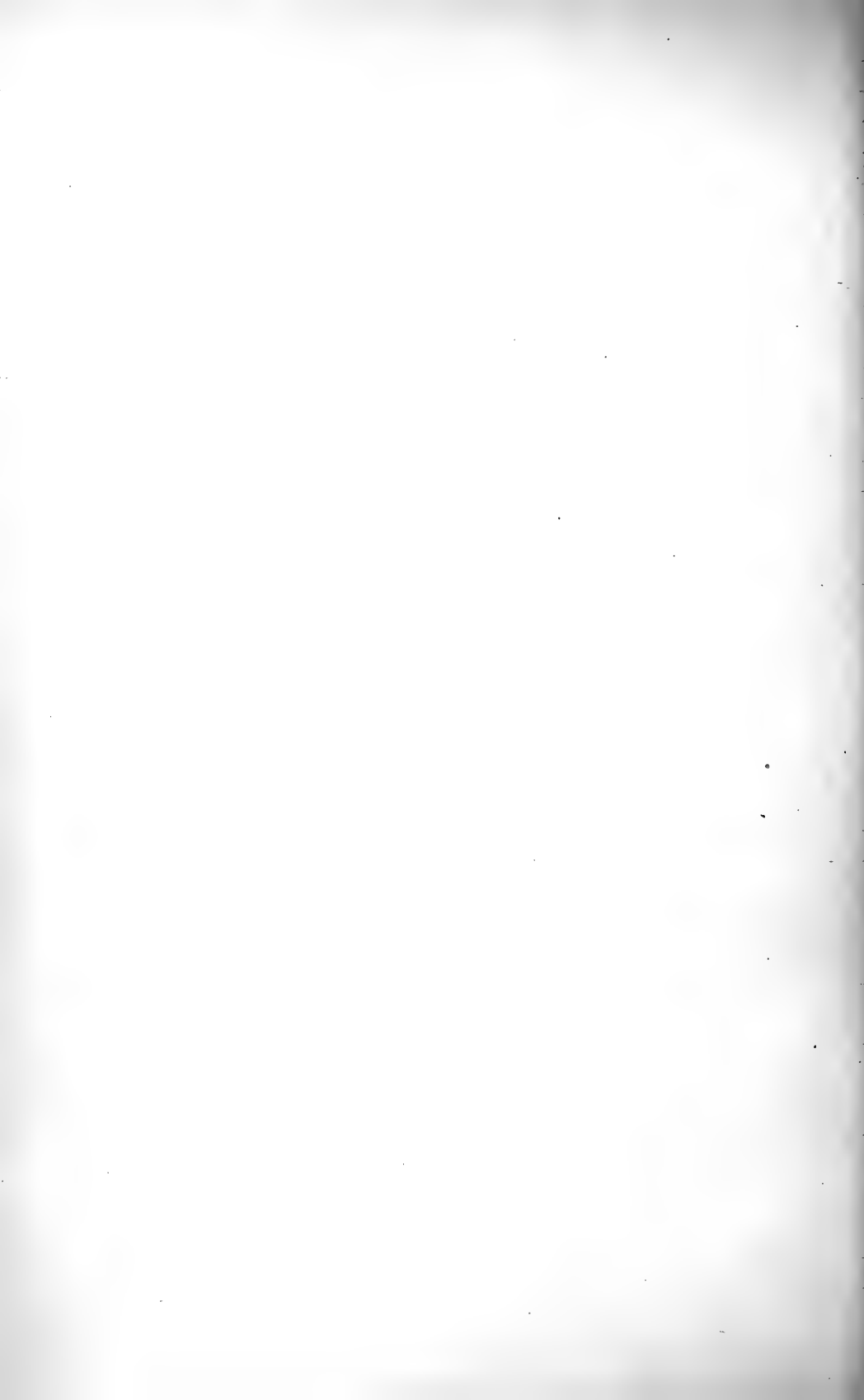




LASIACIS SLOANEI (GRISEB.) HITCHC.

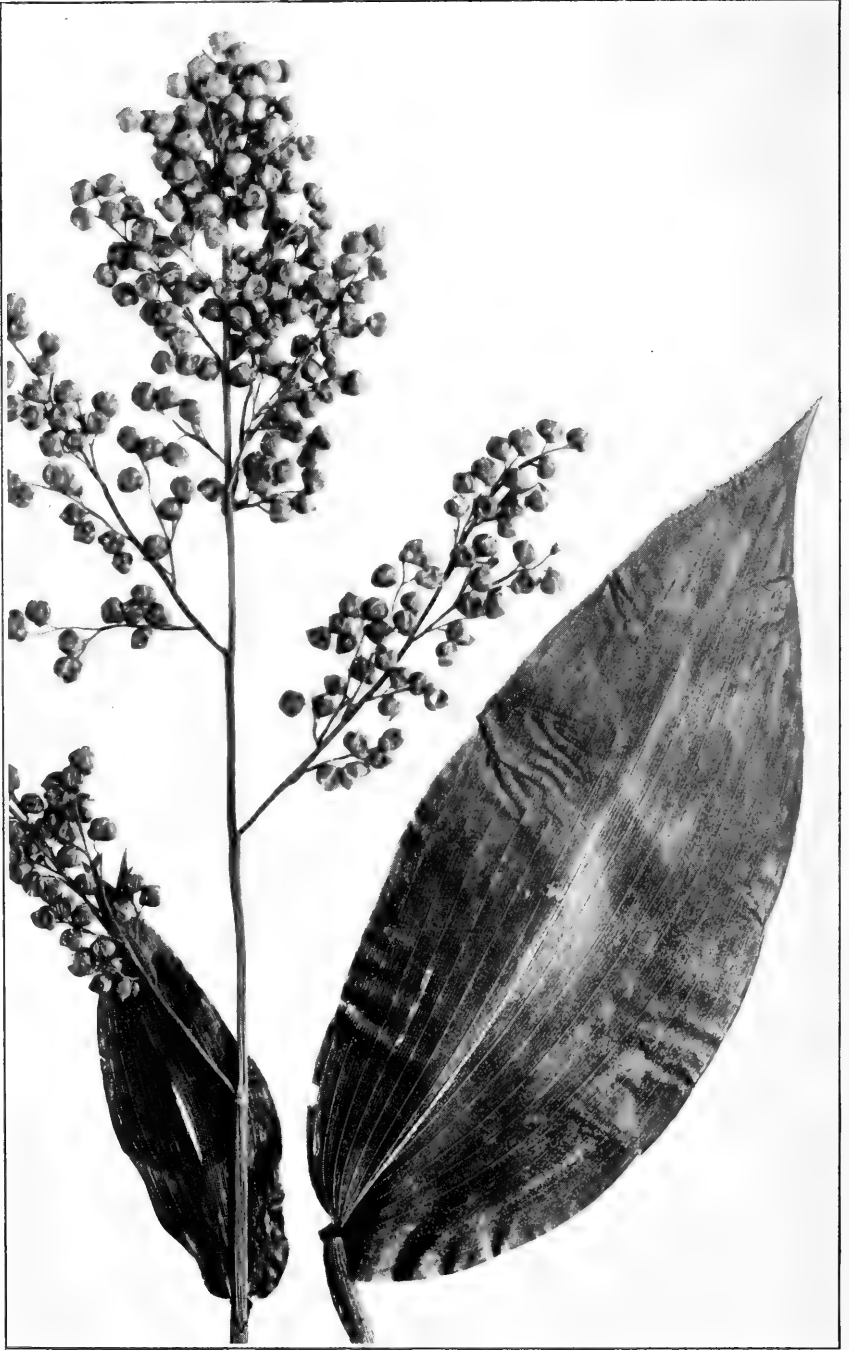


LASIACIS PATENTIFLORA HITCHC. & CHASE. *type*

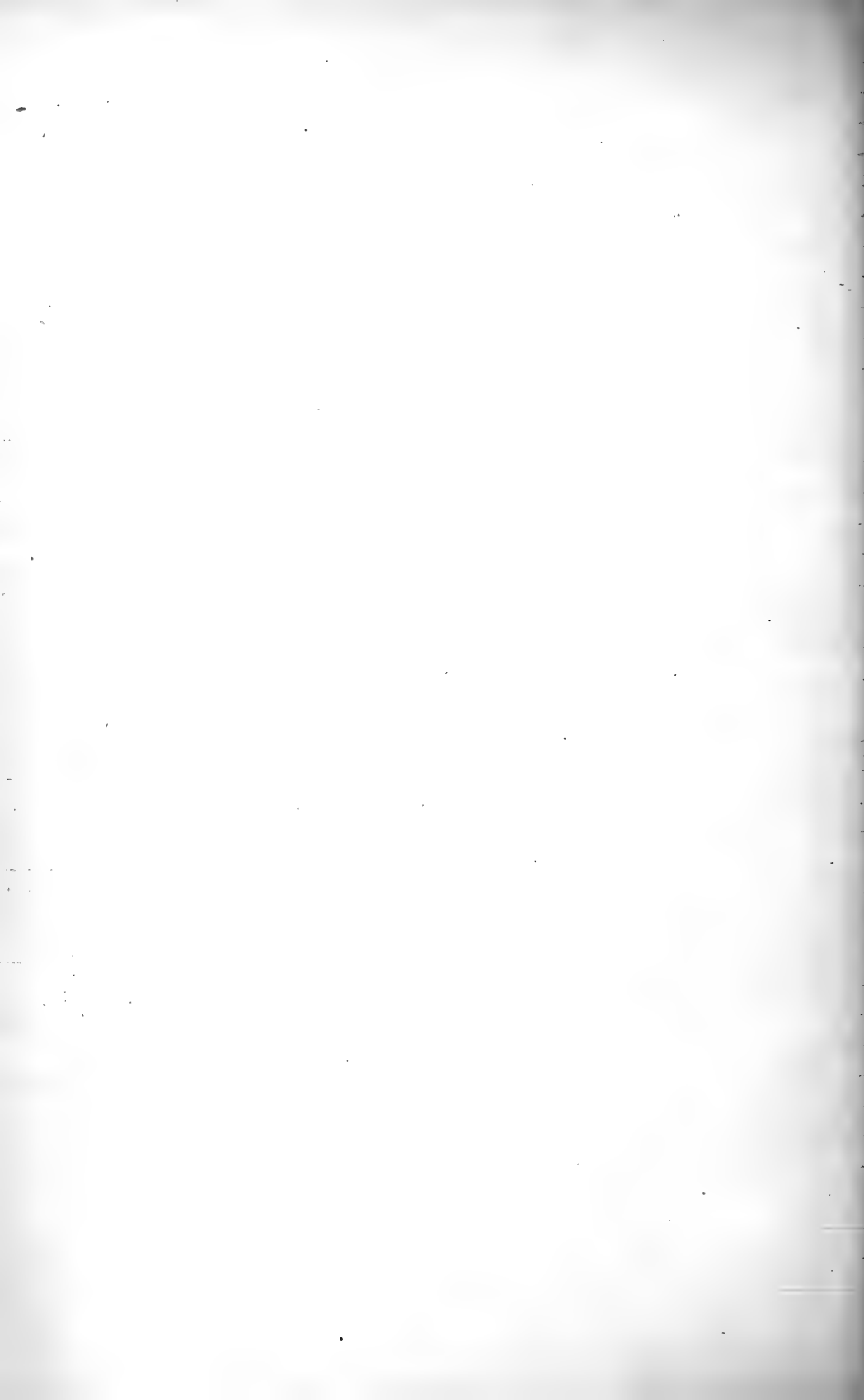


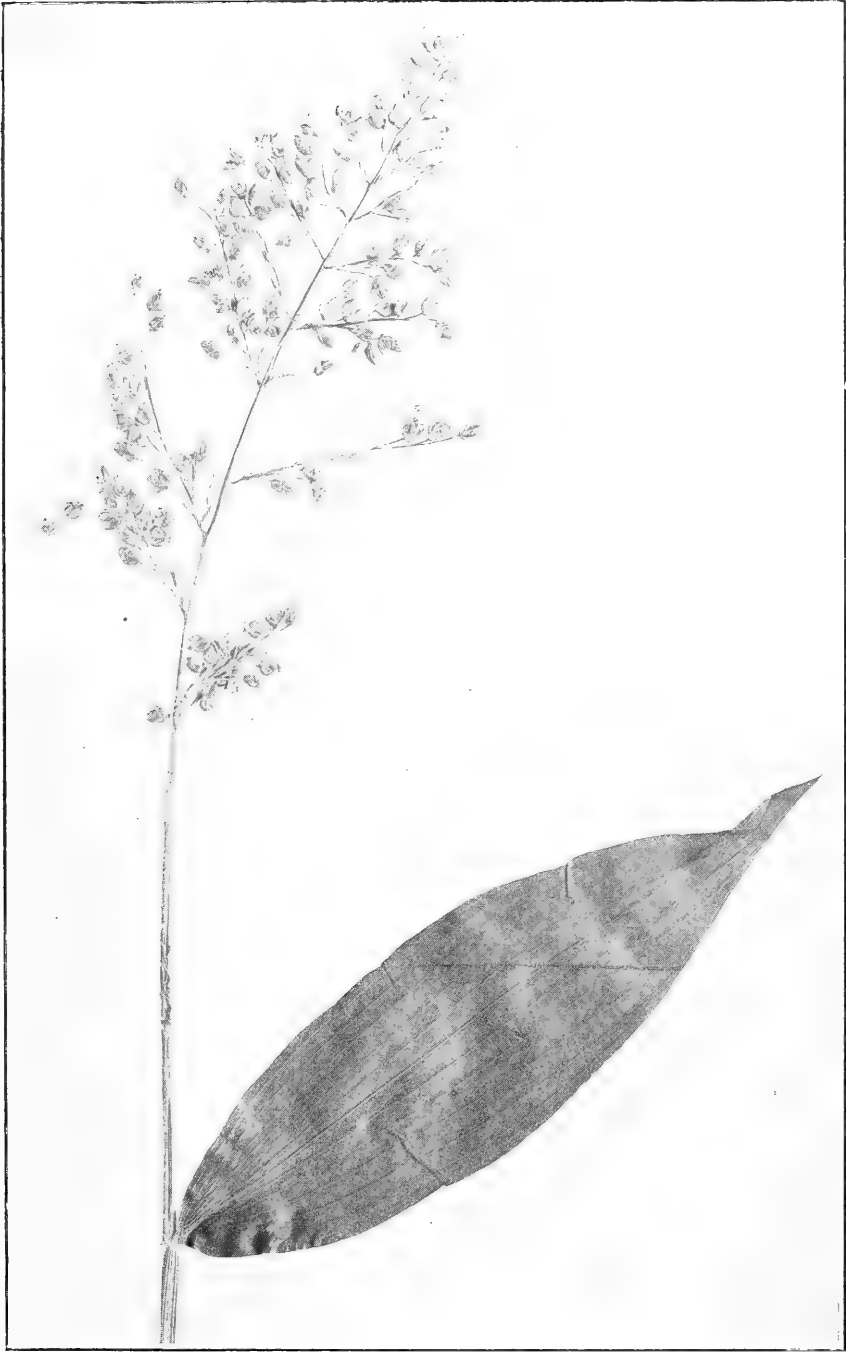


LASIACIS SORGHOIDEA (DESV.) HITCHC. & CHASE.



LASIACIS RUSCIFOLIA (H. B. K.) HITCHC.





LASIACIS ANOMALA HITCHC.

THE NORTH AMERICAN SPECIES OF BRACHIARIA.

By AGNES CHASE.

INTRODUCTION.

The group of grasses here discussed was until recent years commonly included in the genus *Panicum*. Although the genus *Brachiaria* was proposed in 1853, it was not accepted as valid until 1901. This is because its most distinctive character was overlooked—that of reversed spikelets (that is, spikelets with the back of the fertile lemma turned away from the axis instead of toward it, as in *Paspalum* and in the few species of *Panicum* having racemose inflorescence). As a section of *Panicum*, *Brachiaria* had been made to include a number of heterogeneous species, now referred to five distinct genera, on the one common character of racemose inflorescence.

From *Eriochloa* and *Axonopus*, in which also the spikelets are reversed, *Brachiaria* differs in having a well-developed first glume. From the first it differs also in the unspecialized lower rachilla joint, which in *Eriochloa* is enlarged, and from the second in the turgid spikelets and the racemose instead of digitate arrangement of the racemes.

Brachiaria is one of the few genera of Paniceae which belong chiefly to the Old World.

The text figures, drawn by the author, illustrate part of the inflorescence, one-half natural size, and two views of the spikelet and one of the fruit, magnified 10 diameters. In each case the specimen from which the drawing was made is indicated.

HISTORY OF THE GENUS.

The genus *Brachiaria* Griseb.¹ is based on "*Panicum* sect. *Brachiaria* Trin.," and a single species, *B. erucaeformis* (J. E. Smith) Griseb., is included. Grisebach cites, not the first work² in which Trinius proposes the section *Brachiaria*, but a later work, *Panicearum Genera*,³ in which Trinius includes a somewhat different group of species from those included in his first work. In

¹ In Ledeb. Fl. Ross. 4: 469. 1853.

² Gram. Pan. 51, 125. 1826.

³ Mém. Acad. St. Pétersb. VI Sci. Nat. 3²: 194. 1834.

De Graminibus Paniceis, Trinius divides *Panicum* into six sections: *a*, DIGITARIA (*Syntherisma*); *b*, PASPALUM; *c*, BRACHIARIA; *d*, ORTHOPOGON (*Oplismenus*); *e*, JUBARIA (*Chaetochloa*, *Pennisetum*, *Hymenachne*, *Valota*, and various other genera of Paniceae having plumelike panicles); and *f*, MILIARIA (*Anthaenantia*, *Tricholaena*, and species from other genera). The sections are all artificial, *Brachiaria* especially so, including, as it does, species of *Paspalum*, *Panicum*, *Thrasya*, and *Echinochloa*, the common character of the assemblage being the simple racemes. Four species having reversed spikelets are included, *Panicum falciferum* Trin., *P. polyphyllum* R. Br., *P. glumare* Trin., and "*P. granulare* LaM.," the last included as a variety under "*Panicum brizoides* Retz." (*P. punctatum* Burm.).

In Panicearum Genera, the work which Grisebach cites, the species with a single raceme (*Paspalum decumbens* and species of *Thrasya*) are placed in the new section *Harpostachys*, leaving the remainder under *Brachiaria*, an assemblage scarcely less heterogeneous than before. Two more species with reversed spikelets, *Panicum isachne* Roth (*P. erucaeforme* J. E. Smith) and *P. plantagineum* Link, are added, but the reversed position is not mentioned, nor are these six species grouped together. Since there is nothing in either work to indicate which species should be considered the type of *Brachiaria*, it seems best to follow Grisebach and take as the type *B. erucaeformis*. Grisebach, however, did not intentionally select this species as the basis of the genus; it was the only species of Trinius's section which occurred in the Russian Empire, the grasses of which he was describing. Grisebach does not mention the reversed spikelets. This character, first noted as generic by Nash¹ ("flowering scale with its opening toward the rachis"), confines the genus to *B. erucaeformis* and its allies. The genus so limited is somewhat diverse, but taken as a whole the morphological resemblances of the species segregated on the combined characters of racemose inflorescence and reversed position of solitary subsessile spikelets having a well-developed first glume indicate a fairly natural genus, the extremes being united by a series of intermediate species.²

Like several other genera of Paniceae, *Brachiaria* includes species that appear to be closely related to outlying species of *Panicum*. *Panicum helopus* Trin., from the Mascarenes, has solitary spikelets in strict racemes, and papillose-rugose, awn-tipped fruit as in *B. meiziana* and other species of *Brachiaria*, but the spikelets are placed as in *Panicum fasciculatum* and its allies. *Urochloa panicoides* Beauv., from Mauritius, is, judging from the poor illustration and in-

¹ In Small, Fl. Southeast. U. S. 50, 80. 1903.

² For further history of *Brachiaria* as section and genus, see Chase, Proc. Biol. Soc. Washington 24: 126-129, 1911.



adequate description, closely related to *P. helopus*, and approaches *Brachiaria* in the same way.

Our species represent nearly the extremes of diversity in the genus, with *B. erucaiformis*, the type but not the center of the genus, at one end, and *B. ciliatissima* at the other. The species most nearly related to the latter is *B. gilesii* (*Panicum gilesii* Benth.),¹ of Australia, of which a specimen of the type collection by C. Giles at Charlotte Waters is in the National Herbarium.

In the tropics or subtropics of the eastern hemisphere there are about 70 known species, a single one, *B. erucaiformis*, reaching southern Europe, there probably introduced in ancient times. In America are the six species described herewith. In Africa is a small group in which the spikelets are crowded and almost pectinate on the rachis. This includes *B. brizantha* (Hochst.) Stapf, the type collection of which (*Schimper*, Iter Abyssinicum no. 89, October 3, 1837) is represented in the National Herbarium, *B. falcifera* (Trin.) Stapf, *B. soluta* Stapf, and *B. decumbens* Stapf.²

Brachiaria miliiformis (*Panicum miliiforme* Presl³ the type of which, collected by Haenke in Luzón, was examined in the National Museum at Prague by Prof. A. S. Hitchcock in 1907) is apparently a common grass in the Philippines and has been distributed thence under various names. It is represented in the National Herbarium by the following: *Merrill* 332, 352, 9343, in *Kneucker Gram. Exs.* 610; *Elmer* 10414; *Loher* 1737; *Bur. Science* 7624, 12231; *Forestry Bur.* 16661. It was collected in Guam by J. B. Thompson (no. 263).

Other species referable to *Brachiaria*, but which, because of the impossibility at present of examining the type specimens in European herbaria and working up the synonymy, are not here transferred, are: *Panicum intercedens* Domin, *P. reversum* Muell., and *P. polyphyllum* R. Br., of Australia; *P. villosum* Lam. and *P. distachyon* L., of India; and *P. ambiguum* Trin., of the East Indies. Various species of true *Panicum* as well as *P. ambiguum* have been distributed under the last named. In this species the spikelets are paired or solitary, the first glume is nearly as long as the spikelet, and the fruit is awn-tipped.

DESCRIPTION OF THE GENUS AND SPECIES.

BRACHIARIA (Trin.) Griseb.

Inflorescence of several to many usually dense racemes along a common axis; spikelets solitary (rarely in pairs), sessile in 2 rows on one side of a 3-angled, sometimes narrowly winged rachis, the back of the fertile

¹Fl. Austral. 7: 477. 1878.

²Stapf (in Prain, Fl. Trop. Africa 9: 505-567. 1919) describes 55 species of *Brachiaria*, indicating that the species of this genus are chiefly African.

³Rel. Haenk. 1: 300. 1830.

lemma turned from the axis; spikelets dorsally compressed, sometimes turgid; first glume well developed; second glume and sterile lemma equal or nearly so, 5 to 7-nerved, the lemma inclosing a hyaline palea and sometimes a staminate flower; fruit indurate (in the type species smooth and shining), usually papillose-rugose, the lemma usually apiculate or awn-tipped, the margins inrolled.

Annuals or perennials with usually flat blades, the culms often decumbent and rooting at the lower nodes; confined to the warmer temperate and tropical regions of both hemispheres.

KEY TO THE SPECIES.

Spikelets pubescent.

Plants annual; spikelets 2.5 mm. long, the pubescence about evenly distributed 1. *B. erucaeformis*.

Plants perennial; spikelets 3.5 to 4.5 mm. long, the pubescence conspicuously uneven.

Fruit with a pubescent awn about 1 mm. long . . . 2. *B. ophryodes*.

Fruit awnless 3. *B. ciliatissima*.

Spikelets glabrous.

Plants perennial; spikelets about 3 mm. long; fruit awn-tipped.

4. *B. meiziana*.

Plants annual; spikelets 4 mm. long or more; fruit awnless.

Rachis 1 to 1.5 mm. wide; spikelets about 4.5 mm. long, not turgid, nor flat-beaked beyond the fruit. 6. *B. plantaginea*.

Rachis 2 mm. wide; spikelets about 4 mm. long, turgid, flat-beaked beyond the fruit 5. *B. platyphylla*.

1. *Brachiaria erucaeformis* (J. E. Smith) Griseb.

Panicum erucaeforme J. E. Smith in Sibth. Fl. Graec. 1: 44. pl. 59. 1806. "In arvis circa Junonis templum in insula Samo." The plate leaves no doubt as to the identity of the species.

Panicum isachne Roth in Roem. & Schult. Syst. Veg. 2: 458. 1817. "In India orient. Heyne." The type specimen has not been examined, but the description identifies the species.

Panicum caucasicum Trin. Gram. Icon. 3: pl. 262. 1831. "Figura ad specimen e Caucaso orientali." The plate identifies the species.

Panicum wightii Nees, Fl. Afr. Austr. 29. 1841. "In graminosis vallis ad Gekau. . . . (Drège)." Two unpublished names based on East Indian collections are cited as synonyms, "*Panicum wightianum* W.-Arn. et N. ab E. Glum. Ind. or. ined.," and "*Panicum Koenigii* Herb. Wight n. 14"; but since it is to be assumed that Nees drew up his description for the African flora from the Drège specimen, this is taken as the type. The description indicates a small specimen.

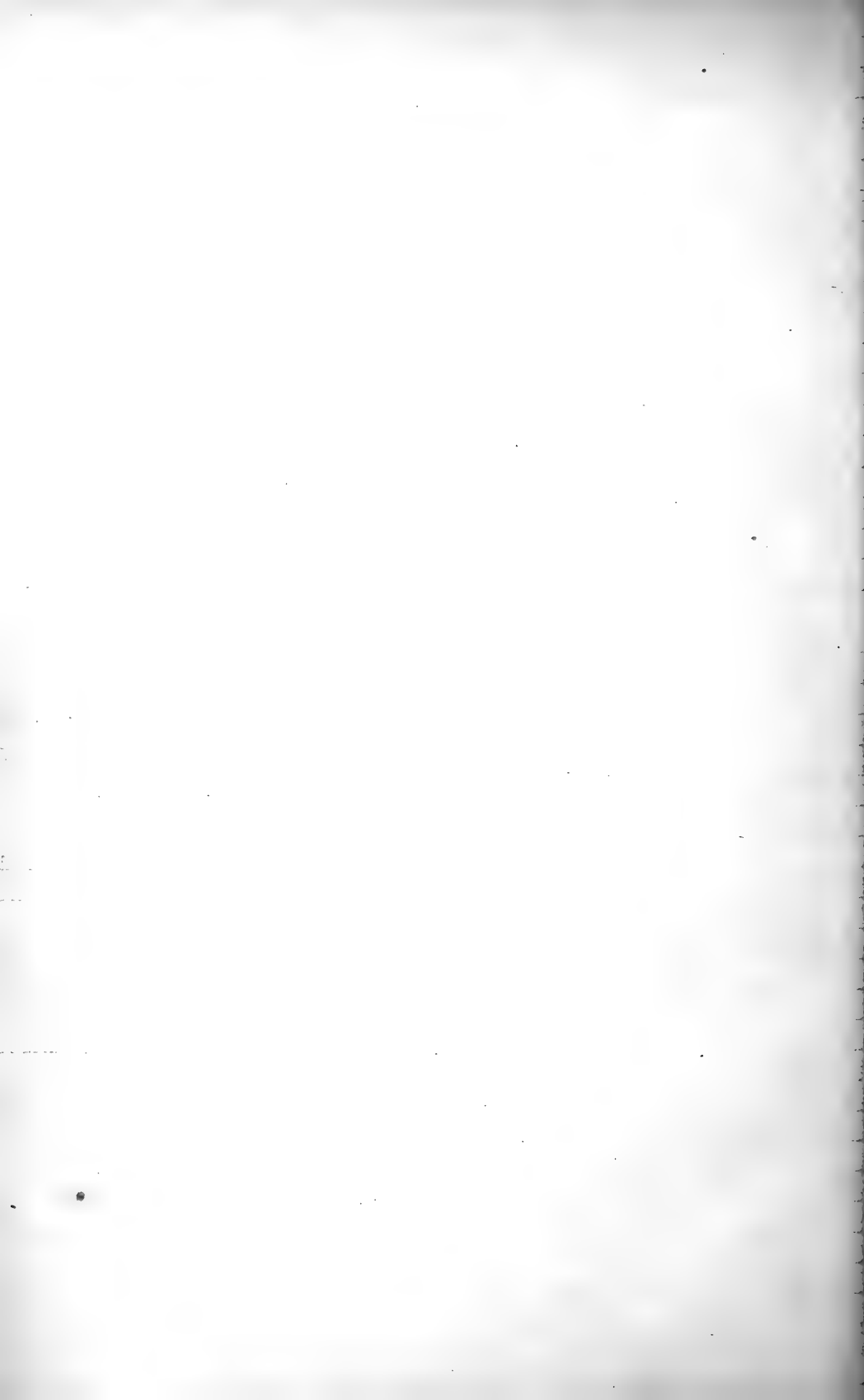
Echinochloa erucaeformis Koch, Linnaea 21: 437. 1848. Based on *Panicum erucaeforme*.

Panicum pubinode Hochst.; A. Rich. Tent. Fl. Abyss. 2: 363. 1851. "In pl. Schimp. Abyss., sect. III. no. 1855 . . . Crescit in convalle fluvii Tacazzé . . . (Schimper)." The spikelets are described as purple-tinged. It is on this color difference that the author distinguishes it from *P. erucaeforme*.

Brachiaria erucaeformis Griseb. in Ledeb. Fl. Ross. 4: 469. 1853. Based on *Panicum erucaeforme* J. E. Smith.

Panicum isachne var. *mexicana* Beal, Grasses N. Amer. 2: 114. 1896. "Specimen seen was cultivated from seed obtained in Mexico by U. S. Dept. Agricul., 1887." Beal gives "*P. eruciforme* Sibth. . . . var. *mexicana* Vasey, ined."

Q.
A.
Q.



as a synonym. In the National Herbarium is a specimen of *B. erucaeformis* bearing in Dr. Vasey's hand the note "Closely related to *P. erucaeforme*. Panicum new species. Cultivated by G. Vasey from Mexican seed, of Dr. Ed. Palmer, 1887." The species is not known from Mexico. It is probable that the plants came up as weeds where seed of some Mexican grass was sown and, samples of such seed not having been preserved, the fact that this was not the species planted was not detected.

Roemer and Schultes,¹ doubtless by a typographical error, give the name as "*cruciforme*" instead of "*erucaeforme*" (like *Eruca*), an error which is copied in many later works.

DESCRIPTION.

Plants annual, stoloniferous, extensively creeping, the slender ascending flowering shoots 20 to 50 cm. tall, branching; culms glabrous, commonly grooved when dry, the nodes densely pubescent; sheaths and both surfaces of the blades usually sparsely tuberculate-hirsute (or the blades glabrate), densely puberulent at the junction of sheath and blade; ligule a ring of hairs about 1 mm. long; blades flat, 1.5 to 10 cm. (mostly 2 to 6 cm.) long, 2 to 6 mm. wide, rounded at the base; panicle long-exserted, 2 to 10 cm. long, the 5 to 12 racemes erect-falcate, imbricate, or the lower distant their own length, the common axis and the rachises very slender, angled, the axis scabrous or sparsely pilose, the rachises and minute pedicels pilose; spikelets loosely imbricate, ovate-oblong, about 2.5 mm. long; first glume minute, truncate or notched, glabrous; second glume and sterile lemma about equal, 5-nerved, papillose-pilose, rather obtuse, but the summits commonly folding in, forming a point beyond the fruit; fertile lemma and palea about 1.8 mm. long and 0.9 mm. wide, pale, smooth, and shining, the 3 nerves of the lemma faintly visible.

In dry ground the plants form small tufts of suberect culms, a habit rarely seen in Old World specimens.

DISTRIBUTION.

Along ditches and in cultivated ground, mostly in arid regions, from Central India west to Spain, and in eastern and southern Africa; in the United States known only from specimens cultivated in the grass garden of the Department of Agriculture at Washington, D. C., and at Arlington, Virginia, and persisting for a short time as weeds, and from specimens grown at Pullman, Washington, and Biloxi, Mississippi. Sparingly introduced in Barbados, West Indies, and in the island of Guam.

2. *Brachiaria ophryodes* Chase, sp. nov.

Plants perennial, grayish green, 15 to 25 cm. tall; culms at first more or less erect, becoming decumbent, freely branching and rooting at the lower nodes, compressed, villous, or becoming glabrate above; sheaths mostly longer than the internodes, somewhat keeled, villous; ligule membranaceous, ciliate, 0.5 mm. long; blades flat, rather thick, 5 to 20 cm. long, 3 to 6 mm. wide, nearly linear



FIG. 1.—*Brachiaria erucaeformis*. From a cultivated specimen, U. S. Nat. Herb. 928637.

¹ Syst. Veg. 2: 426. 1817.

(or the uppermost shorter and lanceolate, and the basal ones as much as 15 cm. long), acuminate, the white cartilaginous undulate margin scabrous and, toward the rounded base, papillose-ciliate, more or less papillose-hispid on both surfaces; primary panicles long-exserted, the secondary panicles short-exserted or included at base, the common axis and rachises slender, angled, scabrous, the rachises villous at base; racemes 2 to 4, nearly erect, 3 to 4 cm. long, the short, thick pedicels bearing a few long white hairs; spikelets approximate. 4 mm. long, 2 mm. wide, with a dense, silky-villous, or furlike band down each side; first glume half as long as the spikelet, acuminate, villous below, the tip glabrous; second glume and sterile lemma equal, pointed beyond

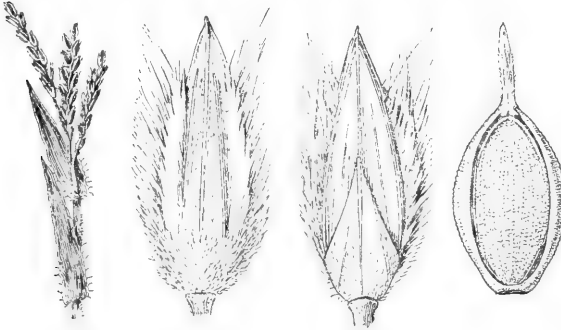


FIG. 2.—*Brachiaria ophryodes*. From the type specimen.

the body of the fruit, the glume villous except at the summit, bearing at each side of the principal lateral nerves a very dense band of ascending pale silky glistening hairs increasingly longer toward the summit, the 2 bands divided by the hidden nerve, or the inner band sometimes wanting, the bands abruptly terminating about one-fourth below the summit; sterile lemma inclosing a long palea and sometimes a staminate flower, 5 to 7-nerved, the third pair of nerves almost marginal, the lateral internerves and margins villous, the second or lateral pair of nerves bearing on the outer side a single band of dense hairs like those of the second glume; fruit about 2.5 mm. long (excluding the awn), 1.5 mm. wide, stramineous, transversely rugose, the lemma tipped with a puberulent awn sometimes nearly 1 mm. long.

Type in the U. S. National Herbarium, no. 693324, collected along an irrigation ditch in loamy soil, at Monterrey, Nuevo León, Mexico, July 6, 1910, by A. S. Hitchcock (no. 5538). Known only from the type collection.

Brachiaria ophryodes is allied to *B. ciliatissima*, from which it differs in the stouter and pubescent culms, in the more densely flowered racemes, in the abrupt termination below the summit of the spikelet of the band of glistening, silky hairs, and in the awn-tipped lemma.

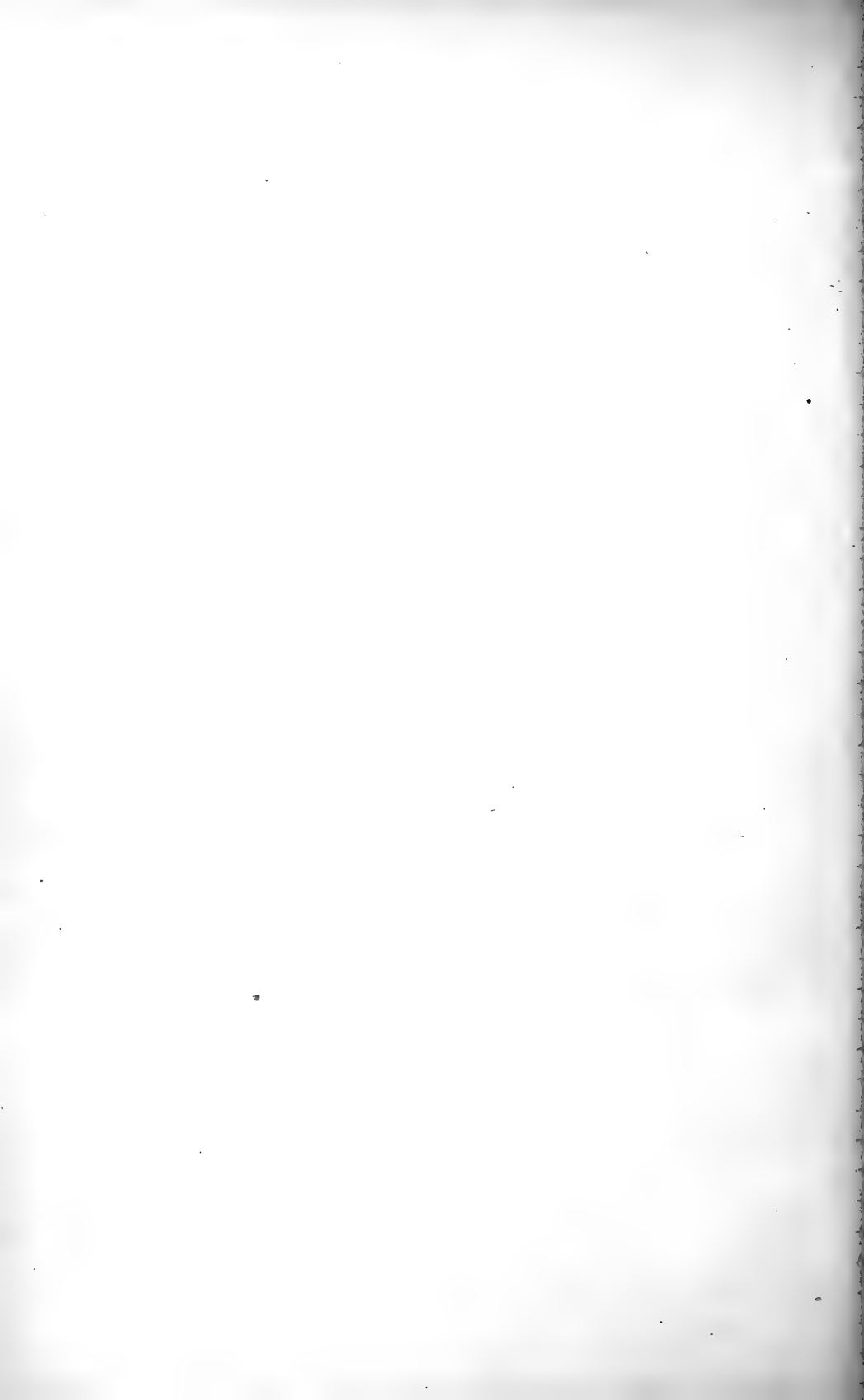
3. *Brachiaria ciliatissima* (Buckl.) Chase.

USA. N. Tex. Agr. Bur.
772: 221. 1921

Panicum ciliatissimum Buckl. Prel. Rep. Geol. Agr. Surv. Tex. App. 4. 1866. "Northern Texas." The type specimen is in the herbarium of the Academy of Natural Sciences, Philadelphia. No locality other than Texas is given on the label.

DESCRIPTION.

Plants perennial, producing long leafy stolons, with short internodes, rooting at the swollen nodes, the blades short, firm, divaricately spreading; flowering culms usually sparingly branching, erect or ascending, 15 to 40 cm. high, glabrous, the nodes bearded; sheaths sparsely (or sometimes rather densely) pilose, mostly shorter than the internodes; ligules densely hairy, less than 1 mm. long; blades 3 to 7 cm. long, 3 to 5 mm. wide, tapering from near the



rounded base to a sharp point, flat, puberulent or glabrous, usually ciliate along the lower part of the thick white margin; panicles finally long-exserted, 3 to 6 cm. long, rarely over 1 cm. wide, the common axis and rachises slender, angled, pubescent, the few branches erect or ascending, not strict racemes with spikelets regularly arranged as in the other species, 1 to 2 cm. long, sometimes reduced to 1 or 2 spikelets; spikelets mostly distant about their own length, 4 mm. long, about 1.8 mm. wide, pointed; first glume three-fourths the length of the spikelet or more, cuneate, 5-nerved, glabrous, or with a few silky hairs at the very base; second glume and sterile lemma subequal, exceeding the fruit, 5-nerved, the internerves densely silky pubescent, or in the lemma sometimes nearly glabrous, the portion from the lateral nerves to the margins densely clothed with glistening white silky hairs; fruit 3 mm. long, about 1.6 mm. wide, ellipsoid, apiculate, transversely rugose.

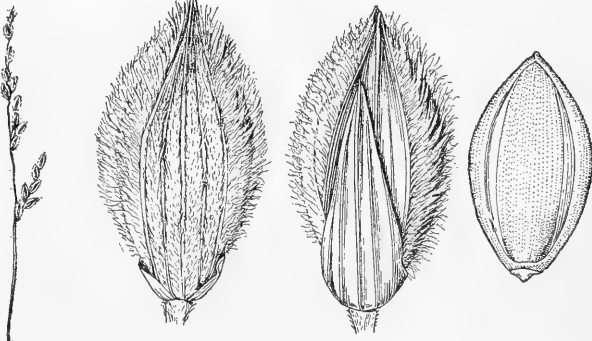


FIG. 3.—*Brachiaria ciliatissima*. Panicle from Tracy 7955; spikelet from the type specimen.

The reversed position of the spikelets places this species more naturally in *Brachiaria* than in *Panicum*. Moreover, *B. ophryodes* is obviously a connecting link between this species and *B. meziana*.

Open sandy ground, Arkansas and Texas.

DISTRIBUTION.

Open sandy ground, Arkansas and Texas.

ARKANSAS: Benton County, *Plank* 8.

TEXAS: Kerrville, *Hitchcock* 5320. Austin, *Hall* 824. College Station, *Hitchcock* in 1903. Abilene, *Tracy* 7955. San Antonio, *Amer. Gr. Nat. Herb.* 200. Kingsville, *Piper* in 1906. Rockport, *Chase* 6063. San Diego, *Smith* in 1897. Corpus Christi, *Hitchcock* 5348. Sarita, *Hitchcock* 5448. Pena, *Nealley* 31. Encinal, *Griffiths* 6381. Elsword, *Griffiths* 6441, 6445. Torrecillas, *Griffiths* 6432. Laredo, *Hitchcock* 5515; *Reverchon* 4150. Big Spring, *Hitchcock* 13358. Western Texas, *Buckley* in 1883.

4. *Brachiaria meziana* Hitchc.

Brachiaria meziana Hitchc. Contr. U. S. Nat. Herb. 12: 140. 1908. "The type specimen is no. 156925 of the U. S. National Herbarium (Pringle's 9592)." This specimen was collected in the Cerro de Guadalupe, Federal District, Mexico, altitude 2,250 meters, August 19, 1901.

DESCRIPTION.

Plants perennial, cespitose; culms flattened, glabrous or sparsely pilose, 15 to 40 cm. tall, at first erect or ascending and simple, later repeatedly branching and decumbent-spreading, sometimes as much as 70 cm. long, often rooting at the nodes; sheaths loose, pilose, or sometimes glabrate, densely ciliate on the

margin; ligule a ring of hairs about 1 mm. long; blades rather thick, 5 to 15 cm. long (rarely longer), 5 to 10 mm. wide, flat, rounded at the base, papillose-ciliate on the margins toward the base, sparsely pilose or nearly glabrous on both surfaces; primary panicles long-exserted, those of the branches short-exserted or included at the base, the common axis rather stout, angled, pilose; racemes mostly 5 to 10, usually approximate, 1.5 to 4.5 cm. long, the lower usually naked at the base; spikelets crowded, glabrous, 3 mm. long, about 1.8 mm. wide, ovate, abruptly acute, turgid, the minute pedicels long-pilose; first

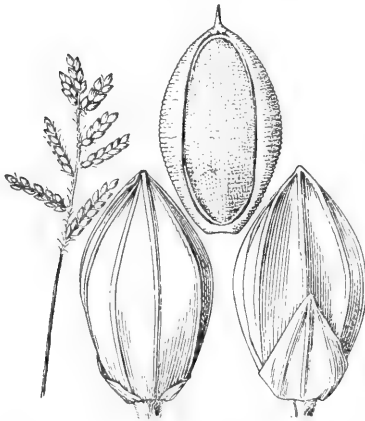


FIG. 4.—*Brachiaria meziana*. From the type specimen.

glume one-third to scarcely half the length of the spikelet, broad, acute or subacute, 3-nerved; second glume and sterile lemma equal, 5-nerved; fruit 2.5 to 2.6 mm. long (excluding the awn), about 1.5 mm. wide, papillose-roughened, the lemma tipped with an awn about 0.5 mm. long.

DISTRIBUTION.

Low moist open ground on the uplands of Mexico.

CHIHUAHUA: Chihuahua, *Pringle* 375.

COAHUILA: Saltillo, *Hitchcock* 5593.

DURANGO: Durango, *Hitchcock* 7619; *Palmer* 533 in 1896.

SAN LUIS POTOSÍ: San Luis Potosí, *Hitchcock* 5668. Cárdenas, *Hitchcock* 5770.

QUERÉTARO: Querétaro, *Hitchcock* 5802; *Agniel* 10262.

ZACATECAS: Zacatecas, *Hitchcock* 7516.

AGUASCALIENTES: Aguascalientes, *Hitchcock* 7492.

JALISCO: San Nicolás, *Hitchcock* 7225. Río Blanco, *Palmer* 254 in 1886.

PUEBLO: Atlixco, *Nelson* in 1893; Puebla, *Arsène* 315, 493.

FEDERAL DISTRICT: *Hitchcock* 5891; *Pringle* 9592; *Bourgeau* 222, 439; *Orcutt* 3692.

GUANAJUATO: Acámbaro, *Hitchcock* 6928. Irapuato, *Hitchcock* 7416.

OAXACA: Oaxaca, *Conzatti & González* 348.

5. *Brachiaria* ^{*extensa* Chase} *platyphylla* (Griseb.) Nash.

Paspalum platyphyllum Griseb. Cat. Pl. Cub. 230. 1866. "Cuba occ. (Wr[ight] 3441), in humidis pr. Zarabanda (Wr. a. 1865)." The type specimen in the Grisebach Herbarium consists of two plants, each with two racemes.

Panicum platyphyllum Munro; Wright, Anal. Acad. Cienc. Habana 8: 206. 1871. Based on *Paspalum platyphyllum* Griseb.

Brachiara platyphylla Nash in Small, Fl. Southeast. U. S. 81, 1327. 1903. Based on "*Panicum platyphyllum* Munro."

DESCRIPTION.

Plants annual, rather coarse; culms compressed, glabrous, decumbent at the base, rooting and commonly branching at the lower nodes, the flowering branches ascending, sparingly branching from the lower nodes; sheaths rather loose, sparsely pilose, at least along the margins and toward the summit; ligule a ring of hairs scarcely 1 mm. long; blades rather thick, 4 to 12 cm. long (rarely longer), 6 to 12 mm. (usually about 10 mm.) wide, flat, glabrous ex-

not *Paspalum pectinatum* Schult 1827

Parodi 1021, Lillo 3335. Argentina

cept near the margins at the rounded base, scabrous on the white marginal nerve; panicle short-exserted or included at base, the common axis flat; racemes 2 to 6, commonly distant nearly or quite their own length, 3 to 8 cm. long or the lowermost 9 cm. long, ascending or spreading, often arcuate; rachis villous at the very base, winged, 2 mm. wide, scabrous on the slightly upturned margin; spikelets usually barely imbricate, ovate, glabrous, 4 to 4.5 mm. long, about 2 mm. wide, the lower two-thirds turgid, flattened toward the summit; first glume scarcely one-third the length of the spikelet, broad, blunt, 3 to 5-nerved; second glume and sterile lemma equal, exceeding the fruit and forming a flat beak beyond it, 3 to 5-nerved, with faint transverse wrinkles between the nerves toward the summit; fruit 3 mm. long, 1.7 to 1.8 mm. wide, elliptic, turgid, papillose-roughened.

DISTRIBUTION.

Low sandy open ground, southern Louisiana and Texas and in western Cuba. *Argentina*

LOUISIANA: Shreveport, *Ball* 91; *Hitchcock* in 1903.

TEXAS: Houston, *Hall* 814; *Nealley* 70. College Station, *Reverchon* 1879; *Hitchcock* in 1903. *Harvester, Thurow* in 1898. *Ennis, Smith* in 1897. Jacksonville, *Joor* 25. *Harris County, Joor* 16.

CUBA: Pinar del Río, *Wright* 3441, 3853, 3867. San Diego de los Baños, *León* 4522, 4848. Sumidero, *Shafer* 13850; *Shafer & León* 13637, 13724 (also distributed under the same numbers as *León & Shafer*).

6. *Brachiaria plantaginea* (Link) Hitchc.

Panicum plantagineum Link, Hort. Berol. 1: 206. 1827. Described from a specimen grown in the Berlin Botanical Garden, the habitat given as unknown. In the Link Herbarium, in the herbarium of the Berlin Botanical Garden, is a specimen labeled "*Panicum plantagineum* Link, Lk. Hort 1, p. 206. Brasilia, *Beyrich*." The description does not apply perfectly to this specimen, in that the lower racemes are said to be long-peduncled and the palea of the neuter floret wanting. The racemes in this species are usually spikelet-bearing nearly to the base, but spikelets undeveloped or fallen might give the impression of a peduncle, and the sterile palea, normally present, may sometimes be obsolete. The type may not have been preserved. This is evidently the specimen which was examined by Trinius and which caused him¹ to refer his *P. leandri* to *P. plantagineum* Link.

Panicum leandri Trin. Gram. Icon. 3: pl. 335. 1836. "Figura ad specimen Brasilianum," presumably collected by Leandro de Sacramento, a Carmelite friar,

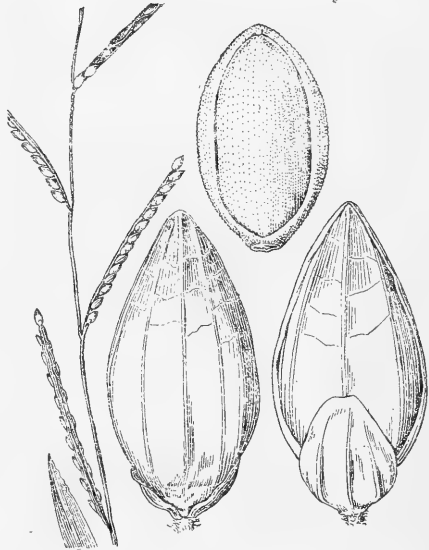


FIG. 5.—*Brachiaria platyphylla*. Part of panicle from León 4848; spikelet from the type specimen.

¹Gram. Icon. 3: Corr. et Emend. pl. 335. 1836.

who was stationed at Rio Janeiro and who sent botanical collections to Paris and Munich. The specimen was not found in the Trinius Herbarium, but the plate identifies the species.

Panicum distans Salzm.; Doell in Mart. Fl. Bras. 2^o: 186. 1877. A herbarium name given as a synonym of *Panicum plantagineum*.

Brachiaria plantaginea Hitchc. Contr. U. S. Nat. Herb. 12: 212. 1909. Based on *Panicum plantagineum* Link.

DESCRIPTION.

Plants resembling *B. platyphylla*, more widely creeping and commonly taller, the sheaths ciliate on the margin, otherwise glabrous or nearly so, the blades with a few hairs on the margins at the narrowed or slightly rounded base, rather lax, mostly 8 to 12 mm. wide, 5 to 20 cm. long, or rarely longer; panicle short-exserted or included at the base, the common axis more slender than in *B. platyphylla*, mostly folded; racemes 3 to 6, or on the branches 1 or 2, 3 to 10 cm. long, rarely longer, ascending or spreading, sometimes flexuous; rachis 1 to

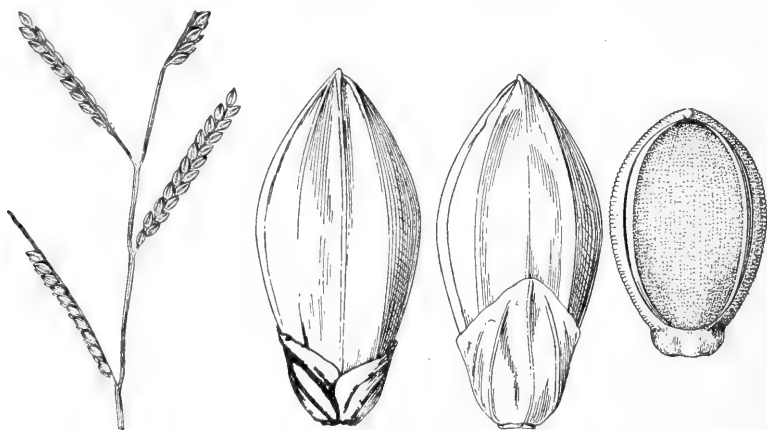


FIG. 6.—*Brachiaria plantaginea*. From Pringle 3904.

1.5 mm. wide, usually appearing more slender because of the infolded margins; spikelets glabrous, 4 to 4.7 mm. long, about 2 mm. wide, elliptic, less turgid than in *B. platyphylla*, depressed down the middle of the sterile lemma, this and the second glume not forming a flattened beak beyond the fruit; fruit plano-convex, 3 to 3.5 mm. long, minutely papillose-roughened, the rachilla joints between the glumes and lemmas slightly developed, placing the fruit nearer to the summit of the spikelet.

A species of wider range and more variable than *B. platyphylla*.

DISTRIBUTION.

Open, mostly moist ground, at an altitude of 900 to 2,100 meters in the uplands of Mexico, and south to Bolivia and southern Brazil. In 1879 it appeared in ballast at Philadelphia, Pennsylvania (*Burk*), and Camden, New Jersey (*Martindale*).

DURANGO: Durango, *Hitchcock* 7576; *Palmer* in 1896.

SAN LUIS POTOSÍ: Las Canoas, *Hitchcock* 5758; *Pringle* 3904. Cárdenas, *Hitchcock* 5752.

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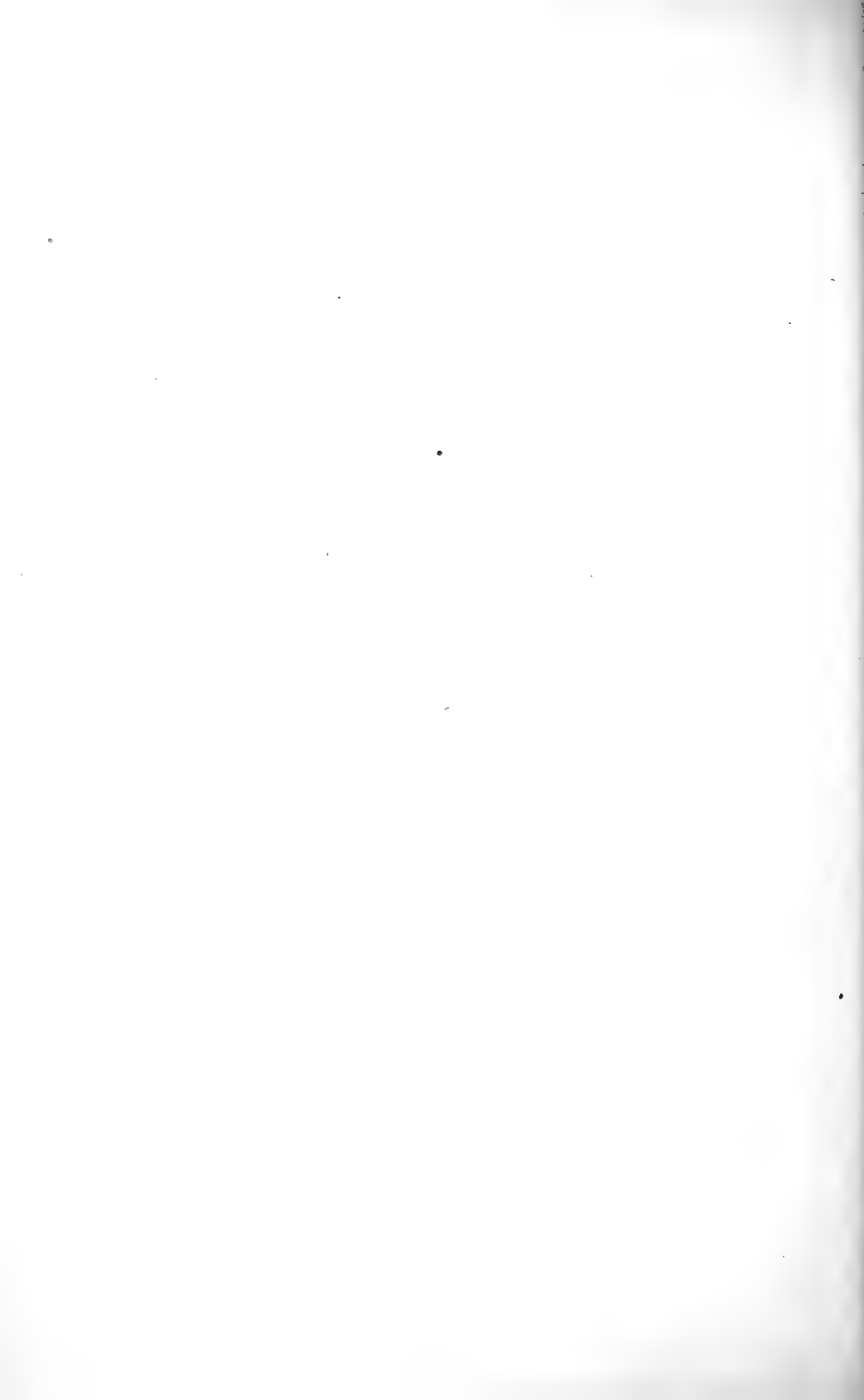
Guadalupe, Hitchcock 8475

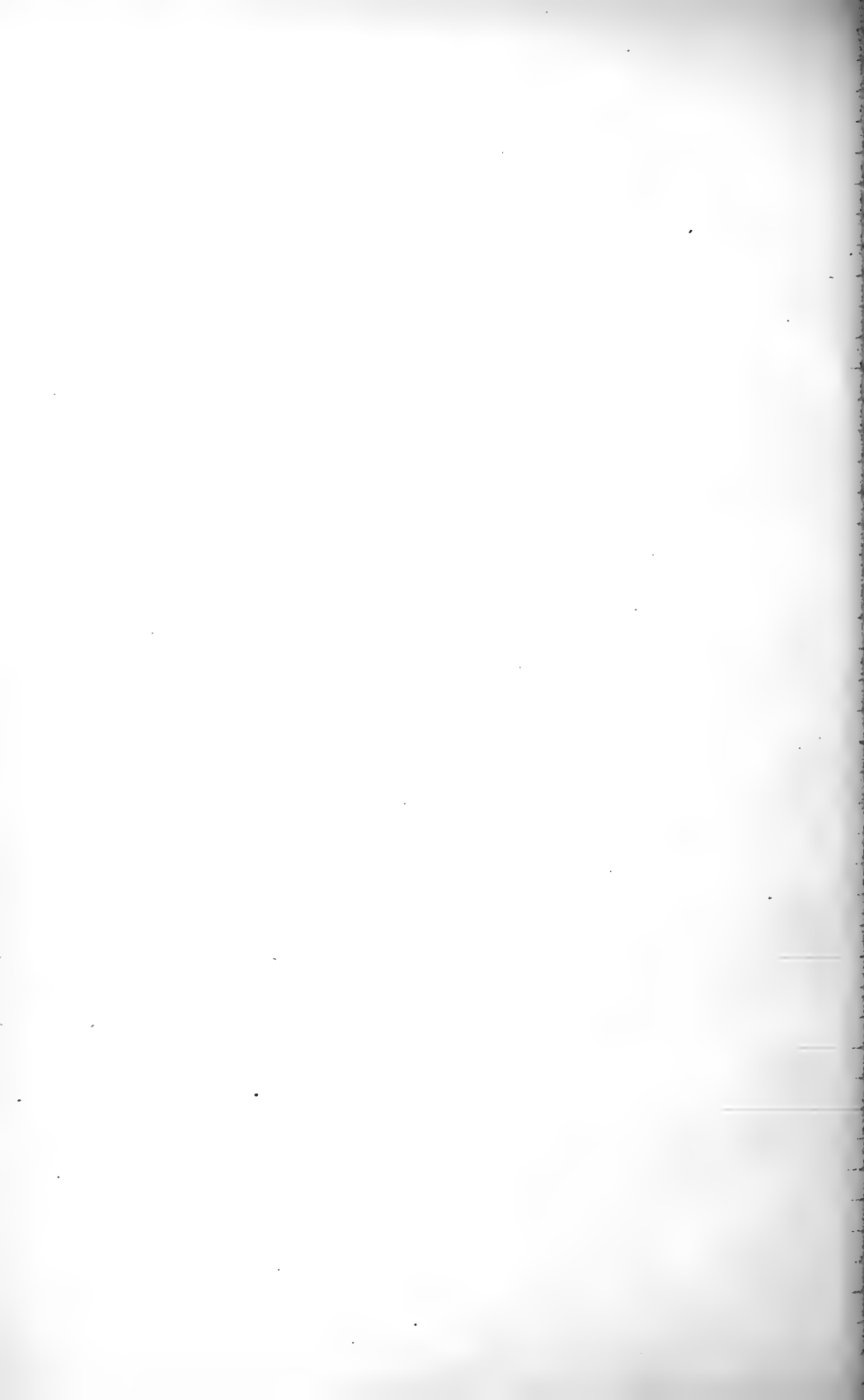
- MORELOS: Cuernavaca, *Hitchcock* 6853; *Orcutt* 3890.
 COLIMA: Jala, *Hitchcock* 7010. Colima, *Orcutt* 4616.
 AGUASCALIENTES: Aguascalientes, *Hitchcock* 7488.
 GUANAJUATO: Irapuato, *Hitchcock* 7410. Acámbaro, *Hitchcock* 6937.
 JALISCO: Guadalajara, *Hitchcock* 7320. Zapotlán, *Hitchcock* 7136. San Nicolás, *Hitchcock* 7192.
 VERACRUZ: Orizaba, *Hitchcock* 6315. Jalapa, *Hitchcock* 6653. Córdoba, *Hitchcock* 6405.
 OAXACA: Oaxaca, *Hitchcock* 6122; *Conzatti & González* 350a.
 MICHOACÁN: Uruápan, *Hitchcock* 6990.
 GUATEMALA: Guatemala City, *Hitchcock* 9071. San Miguel Usupanlán, *Heyde & Lux* 3556.
 SALVADOR: San Salvador, *Hitchcock* 8961.
 NICARAGUA: Masaya, *Hitchcock* 8647.
 COSTA RICA: San Francisco de Guadalupe, *Pittier* 16124. San José, *Tonduz* 3029, 6943. Alajuelita, *Pittier* 2998. Guadalupe, *Hitchcock* 8457; *Tonduz* 7592. Atenas, *Hitchcock* 8522. Alajuela, *Jiménez* 521.
 BRAZIL: Campinas, *Campos Novaes* 1252. Goyaz, *Gardner* 3499. Rio Quebra Anzol, *Dorsett & Popenoe* 161b. Quixada, Ceará, *Löfgren* 3912. Rio Tardo, Rio Grande do Sul, *Jurgens* G46. Locality unknown, *Riedel* 1950; *Glaziou* 3609.
 BOLIVIA: Without locality, *Bang* 2588.

EXCLUDED SPECIES.

- BRACHIARIA DIGITABIODES (Carpenter) Nash¹=*Panicum hemitomon* Schult.
 BRACHIARIA OBTUSA (H. B. K.) Nash=*Panicum obtusum* H. B. K.
 BRACHIARIA PROSTRATA (Lam.) Griseb.=*Panicum reptans* L.

¹ In Britton, *Man.* 77. 1901. Nash at this time accepted *Brachiaria* as a genus without reference to the reversed spikelets.





THE NORTH AMERICAN SPECIES OF CENCHRUS.

BY AGNES CHASE.

INTRODUCTION.

The sandburs, common and troublesome to man and stock in sandy regions throughout the warmer parts of the United States and southward, form a compact genus of closely related species and are the most highly specialized group of the tribe Paniceae. While these grasses, by reason of their aggressiveness, are familiar to all in the regions they inhabit, the species have been much confused. The revision here offered is based primarily upon the collections in the United States National Herbarium. Type specimens have been examined in the herbaria of the New York Botanical Garden, the Academy of Natural Sciences, Philadelphia, and the Charleston Museum. In 1907 A. S. Hitchcock visited the more important herbaria of Europe, making notes upon the type specimens of species based on American collections,¹ and taking photographs of them. While his work was primarily on the genus *Panicum*, his study of Linnaeus's and Grisebach's types included those of *Cenchrus*. For the loan of Fournier's types I am indebted to the herbarium of the Universitetets Botaniske Have, Copenhagen, and to that of the Muséum d'Histoire Naturelle, Jardin des Plantes, Paris, and for Sprengel's type to Dr. Urban of Berlin. Of some species the type specimens have not been seen. In such cases the fact is stated.

In this revision the method of work outlined in the Revision of the North American Species of *Panicum*² has been followed.

The text figures, drawn by the author, illustrate the outer face of bur, that is, the side in view when the bur is attached to the axis, two views of the spikelet, and one of the fruit. The figures are all magnified five diameters. In each case the specimen from which the drawings were made is indicated. The burs are variable, and the spikelets are often distorted by the pressure of the involucre. The burs and spikelets selected were as representative of the respective species as possible. The spikelets are not always from the bur figured, but in every case they are from the same plant.

¹ See Hitchcock, Types of American Grasses, Contr. U. S. Nat. Herb. 13: 113-158. 1908; and Hitchcock and Chase, op. cit. 15: 2-4. 1910.

² Hitchcock & Chase, Contr. U. S. Nat. Herb. 15: 1-8. 1910.

TERMINOLOGY.

The morphological nature of the bur characteristic of *Cenchrus* seems not to have engaged the attention of botanists until recent years. In his description of the genus Linnaeus refers to the bur as an involucre; in the *Species Plantarum* "female glumes" is the term used for bur, as shown by the description of *C. tribuloides* "glumis femineis globosis muricato-spinosis hirsutis." The great majority of authors, early and late, have used the term involucre or involucl, common involucre, or involucre of spines. Ray uses the word "echinus," which is about the equivalent of our word "bur." Sloane writes of the "little burs or large roundish prickly seeds." Morison and Scheuchzer use the term "locusta" for the bur, apparently regarding it as a spikelet, since locusta is the term in common use by early authors for spikelet. Adanson describes the bur under calyx; Cavanilles calls it a common calyx. Trinius at first uses the term "capitulus" and later the same word for the bur of *C. tribuloides* and "involucl" for that of *C. myosuroides*. Hackel uses the word "Hüllen," envelope or husk. Several authors have used the terms bur or false capsule (Scribner, Wooton and Standley) as well as the term involucre. Nash describes the bur as consisting of "two spine-bearing valves forming a bur" (in several species, especially in *C. pauciflorus*, there is a deep cleft on the outer face of the bur). In none of these usages is there any indication of what the bur is supposed to be morphologically.

Doell¹ suggests that the involucre is derived from a leaf. He states [translated]:

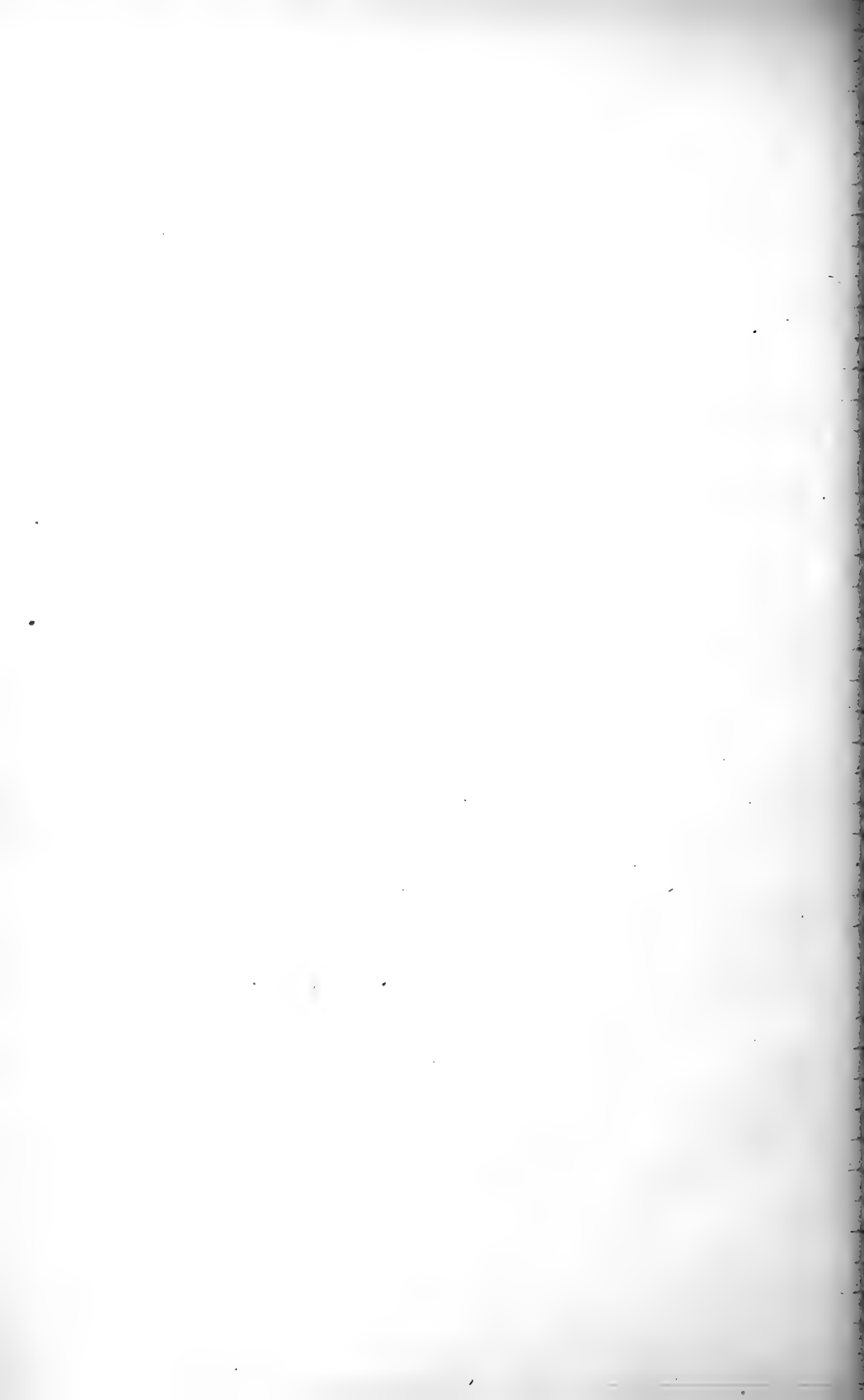
At the base of the spike of *C. tribuloides* and other species of this genus are often to be seen rudimentary bracts, from the axils of which spring branches provided with an involucre at base; this appears to me noteworthy. I suspect that the involucre itself has perhaps been formed from a many-cleft bract on the common axis. The nature and structure of the involucre will be discussed in another place. It is enough to say here that the involucre of *Cenchrus* has been derived from a single leaf.

The bract mentioned is that visible at the base of most panicles of grasses, usually represented by a minute ridge. The lowest bur of the spike in this genus is sometimes abortive, appearing as a narrow fascicle of bristles. Such an aborted bur must have been the branch that Doell observed in the axil of the bract.

Goebel,² as the result of a study of the development of the inflorescence of *Cenchrus echinatus* and *C. spinifex*, shows that Doell's conclusion was erroneous and that, instead, the bur is derived from cohesion of the members of a complex system of branches. This theory accords perfectly with observations made by the author.

¹ In Mart. Fl. Bras. 2^o: 309. 1877.

² Jahrb. Wiss. Bot. Pringsh. 14: 21-23. 1882.



In this revision "involucre" and "bur" are used as having no morphological significance, involucre meaning a covering or envelope only and bur a spiny fruit. The "body of the bur" is the cup-shaped or globose part formed by the coalesced part of the branchlets, from which the free ends extend. The "lobes" are the free ends of the innermost ring of branchlets which form the body. In some species they differ in appearance from the outer spines.

The inflorescence is, morphologically, a contracted panicle with short fascicled branches, these disarticulating from the main axis, all but a few of them being sterile. For convenience the inflorescence is here termed "spike," because it appears to be a spike, though morphologically it is a panicle.

HISTORY OF THE GENUS.

The sandburs were known to pre-Linnaean botanists from garden specimens only, or from a very few collections from the New World. Comparatively few references to them are found in pre-Linnaean botanical works. A common weed of the Mediterranean region, *Echinaria capitata*, with spikelets of spiny-lobed florets, crowded in a globose head, was commonly grouped with the sandburs by the early authors, and was included in *Cenchrus* by Linnaeus when he established that genus. The following phrase names have been identified as applying to species of *Cenchrus*:

Gramen Americanum spica echinata majoribus locustis. Scholz, Hort. Vrat. Cat. Bot. 258. 1587. This phrase name is cited by Plukenet (Phytographie 2: 177, pl. 92. f. 3. 1696), whose figure is a fairly good illustration of *Cenchrus echinatus*, and by others. Scholz's work has not been seen.

Amongeaba. Piso, Med. Bras. 120. 1648. The colored plate is a crude illustration of *Cenchrus echinatus* or *C. viridis*. It is more like the latter.

Gramen tribuloides spicatum maximum Virginianum. Pluk. Phytog. 2: 177. 1696. If the specimen or seed was sent from Virginia, as indicated by the name, it is doubtless *C. tribuloides*.

Gramen echinatum maximum spica rubra vel alba. Sloane, Cat. Plant. Jam. 30. 1696. Sloane's specimen so named, from Jamaica, preserved in the British Museum of Natural History,¹ is *C. echinatus*.

Gramen maritimum echinatum procumbens culmo longiori & spicis strigiosioribus. In Insula parva arenosa *Gun cayos* dicta non procul ab urbe *Port-Royal* collegi. Sloane, Cat. Plant. Jam. 30. 1696; Hist. Jam. 1: 108. pl. 65. f. 1. 1707. The plate represents a plant of *C. pauciflorus* very like Hitchcock's no. 9637 from Black River, Jamaica.

Gramen echinatum spicatum locustis crassioribus tribuloidibus Virginianum. E seminibus e Virginia transmissis. Moris. Pl. Hist. 3: 195. pl. 5. 1699. The figure represents *C. tribuloides*.

Gramen locustis tumidioribus, echinatis. Scheuch. Agrost. Hist. 77. 1719. Described from a specimen in the Royal Garden at Montpellier. The description of the slender, horrid spines spreading on all sides identifies this as some species of *Cenchrus*.

¹ See Hitchcock, Contr. U. S. Nat. Herb. 12: 131. 1908.

Panicastrella Americana, major, annua, spica laxa, purpurascens. Micheli, *Nova Pl. Gen.* 36. *pl.* 31. 1729. The phrase names of Sloane and of Plukenet given above as pertaining to *C. echinatus* are cited, but Sloane's phrase is changed by omitting "vel alba." The figure is a crude illustration of a *Cenchrus* bur. Micheli does not indicate which of his two species it is meant to show.

Panicastrella Americana, minor, annua, spica angustiori, densa, albicante. Micheli, *op. cit.* 37. "Gramen echinatum, maximum, spica alba. Sloan." is cited. Sloane's name, "spica rubra vel alba," applies to *C. echinatus*.

Linnaeus first describes the genus *Cenchrus* in the second edition of the *Genera Plantarum*,¹ placing it in his class "Polygamia monoecia," between *Aegilops* and *Valantia* (a genus of the *Rubiaceae*). The description is as follows:

"CENCHRUS*. *Panicastrella Mich.* 31.

CAL. *Involucra* plura, laciniata, echinata, in capitulum congesta: singulis sessilibus tres calyces includentibus.

Perianthium Gluma bivalvis, lanceolata, concava, acuminata, biflora, corolla brevior.

COR. altera mascula, altera hermaphrodita.

Propria singula bivalvis: valvulis lanceolatis, acuminatis, concavis, muticis: interiore minore.

STAM. singulis *Filamenta* tria, capillaria, longitudine corollulæ, *Antheræ* sagittatæ.

PIST. Hermaphroditis *Germen* subrotundum. *Stylus* filiformis, longitudine staminum. *Stigmata* duo, oblonga, pilosa, patentia.

PER. nullum.

SEM. subrotundum.

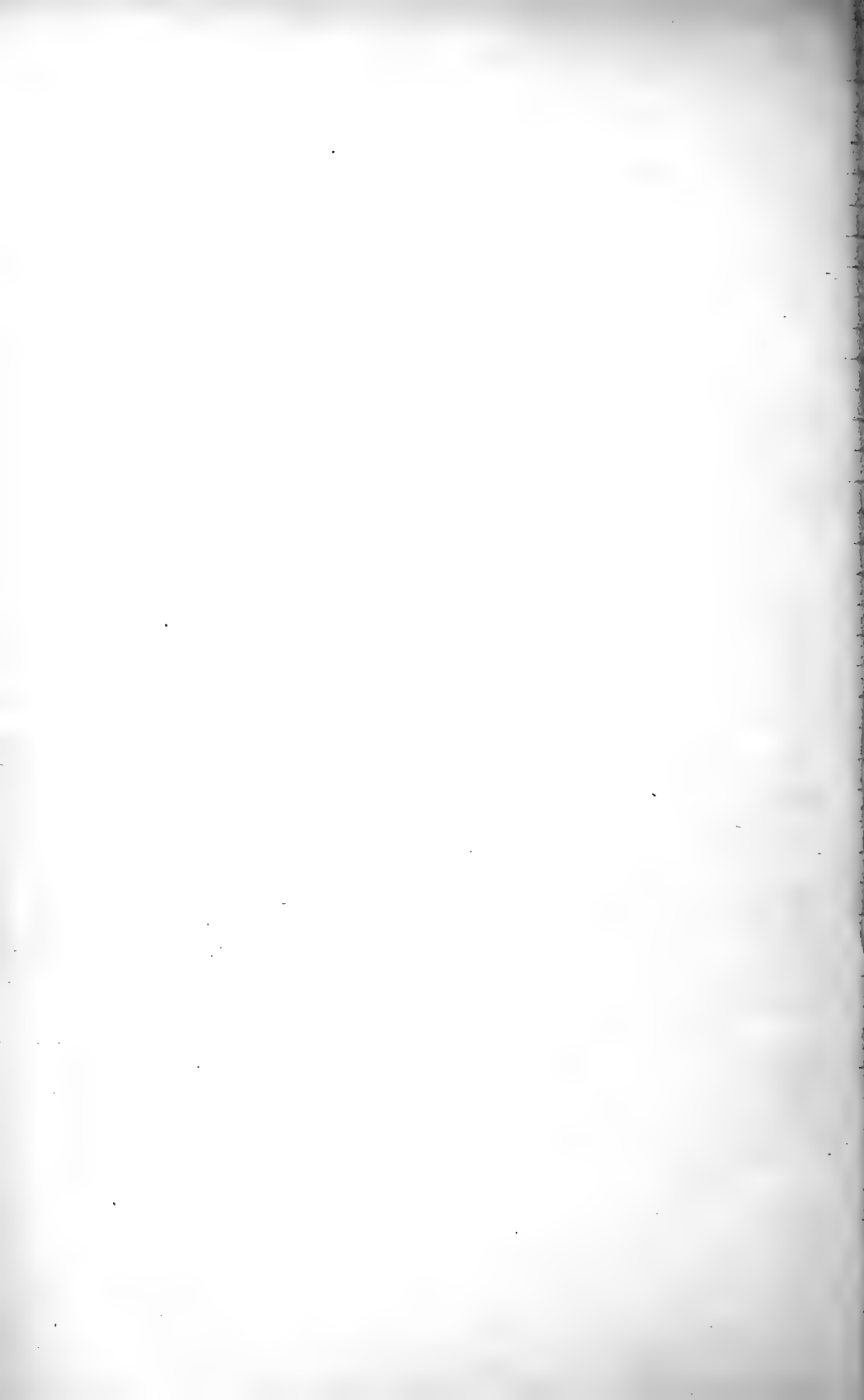
This description is copied exactly in the second, third, fourth, and fifth editions. In the *Species Plantarum*,² from which under botanical codes the name dates, Linnaeus includes five species: 1. *C. racemosus* (*Nazia racemosa* Kuntze), 2. *C. capitatus* (*Echinaria capitata* Desf.), 3. *C. echinatus*, 4. *C. tribuloides*, 5. *C. frutescens*. The generic description given above applies only to *C. echinatus* and *C. tribuloides*. In the first two species there is nothing that could be called an involucre including the flowers, the spines being borne on the glumes in the first and being the lobes of the lemmas in the second. The two florets described, one masculine, the other hermaphrodite, are found only in the third and fourth species. From the description it is evident that Linnaeus had dissected a bur of some species of *Cenchrus*, and the three "calyces" noted point to *C. echinatus* as the species he had, since in *C. tribuloides* there are rarely more than two spikelets. The fifth species, *C. frutescens* is not identifiable. The description is as follows:

"CENCHRUS capitulis lateralibus sessilibus, foliis mucronatis, caule fruticoso.

"Arundo graminea aculeata. *Alp. exot.* 105. *t.* 104.

¹ 493. 1742.

² 1049. 1753.



"Gramen orientale spicatum fruticosum spinosum, spicis echinatis in capitulum congestis. *Tournef. cor.* 39.

"*Habitat in America.*"

The description of a sessile lateral head does not apply to any grass known to us. In the second edition of the *Species Plantarum*¹ the habitat is changed to "Armenia." There is no specimen of this species in the Linnaean Herbarium.² The illustration given in Alpino's work³ does not represent any species of grass. It appears more like a species of *Salicornia*. The plant is described as creeping in wet places, in the island of Crete.

Panicastrella Micheli, cited by Linnaeus as a synonym in the *Genera Plantarum*, is discussed above. Both Micheli's phrase names are referable to *C. echinatus*.

Of the two species of Linnaeus to which his generic description applies *C. echinatus* is taken as the type of the genus.

Subsequent to 1753 the first and second species were each made the type of a distinct genus. *Nazia* Adans.⁴ was based on *C. racemosus*, and *Echinaria* Desf.⁵ on *C. capitatus*. Recently Lunell⁶ proposed the name *Nastus* (giving Dioscorides as author) for "*Cenchrus frutescens* Linn." "Not *Cenchrus* Hippocrates." Supposing *C. frutescens* L. to be congeneric with our American species of *Cenchrus*, Lunell transfers *C. carolinianus* Walt. to *Nastus*. The name *Nastus* Lunell is antedated by that of Jussieu, 1789, for a genus of *Bamboseae*.

Two generic names based on species now included in *Cenchrus* have been proposed. These are:

Raram Adans. *Fam. Pl.* 2: 35, 597. 1763. No species are given. The generic synonyms are: "Amongeaba. *Pis.* 120." (discussed above); "Panicastrella. *Mich.* t. 31." (discussed above); "Gramen. *Pluk.* t. 92. f. 30," cited by Linnaeus under *Cenchrus echinatus*; "Echinaria. *Heist.*"⁷, presumably the same as *Echinaria* Desf., to which Linnaeus's second species of *Cenchrus* is now referred; "Cenchrus. 3. *Lin. Spec.* 1050," which is *C. echinatus*. Selecting a type species by reference to Linnaeus's *Species Plantarum*, *C. echinatus* is taken as the type of *Raram*.

Cenchropsis Nash in Small, *Fl. Southeast. U. S.* 109. 1927. 1903. "Type, *Cenchrus myosuroides* H. B. K.," the only species included. This is distinguished (in the key, page 51) by an involucre of numerous rigid bristles thickened at the base, from *Cenchrus* which is said to have an "involucre of two spine-bearing valves."

¹ 1489. 1763.

² See Munro, *Proc. Linn. Soc.* 6: 55. 1862.

³ *De Plantis Exoticis* 104. 1627.

⁴ *Fam. Pl.* 2: 31, 581. 1763.

⁵ *Fl. Atlant.* 2: 385. 1799.

⁶ *Amer. Midl. Nat.* 4: 214. 1915.

⁷ Heister (*Syst. Pl. Gen.* 12. 1748) lists this name among others under "Gramineae. Ordo 1. Monacinae." There is nothing to indicate to what genus it refers.

DESCRIPTION OF THE GENUS AND SPECIES.

CENCHRUS L.

Spikelets sessile, one to several together, permanently inclosed in a bristly or spiny involucre or bur, composed of more or less coalesced sterile branchlets; burs sessile or nearly so on a slender, compressed or angled axis, its apex produced into a short point beyond the uppermost bur, the burs falling entire, the grains germinating within them; involucre (especially in our species) somewhat oblique, its body irregularly cleft, the lobes rigid, in most species resembling the spines, the cleft on the side of the bur next to the axis reaching to the tapering, abruptly narrowed or truncate base, the bristles or spines barbed, at least toward the summit; spikelets mostly glabrous or nearly so; first glume 1-nerved, usually narrow, sometimes wanting; second glume and sterile lemma 3 to 5-nerved, the lemma inclosing a well-developed palea and usually a staminate flower; fruit usually turgid, indurate, the lemma acuminate, the nerves visible toward the summit, the margins thin, flat, a prominent U-shaped ridge on the back just above the base, the radicle at germination breaking through its outer margin; stamens 3; styles 2, the stigmas plumose; grain dorsally compressed, with a punctiform hilum, free within the lemma and palea.

Annuals or perennials, mostly of sandy or arid soils. The burs at maturity are readily attached by their barbed spines to passing animals, the seed thus being widely distributed. In the Caribbean Islands sandburs have been found attached to the feet and plumage of water birds.

In America the species are found from Massachusetts to Oregon and south to Argentina and Chile. In the United States they are commonly called sandburs. Other names are burgrass, sand spur, hedgehog grass, and devil's burs. The species have some forage value, especially in the Southwestern States, where, starting growth in early spring, they produce an abundance of leafy forage which is readily grazed until the burs ripen. On the whole, however, the species are troublesome weeds in fields and waste ground.

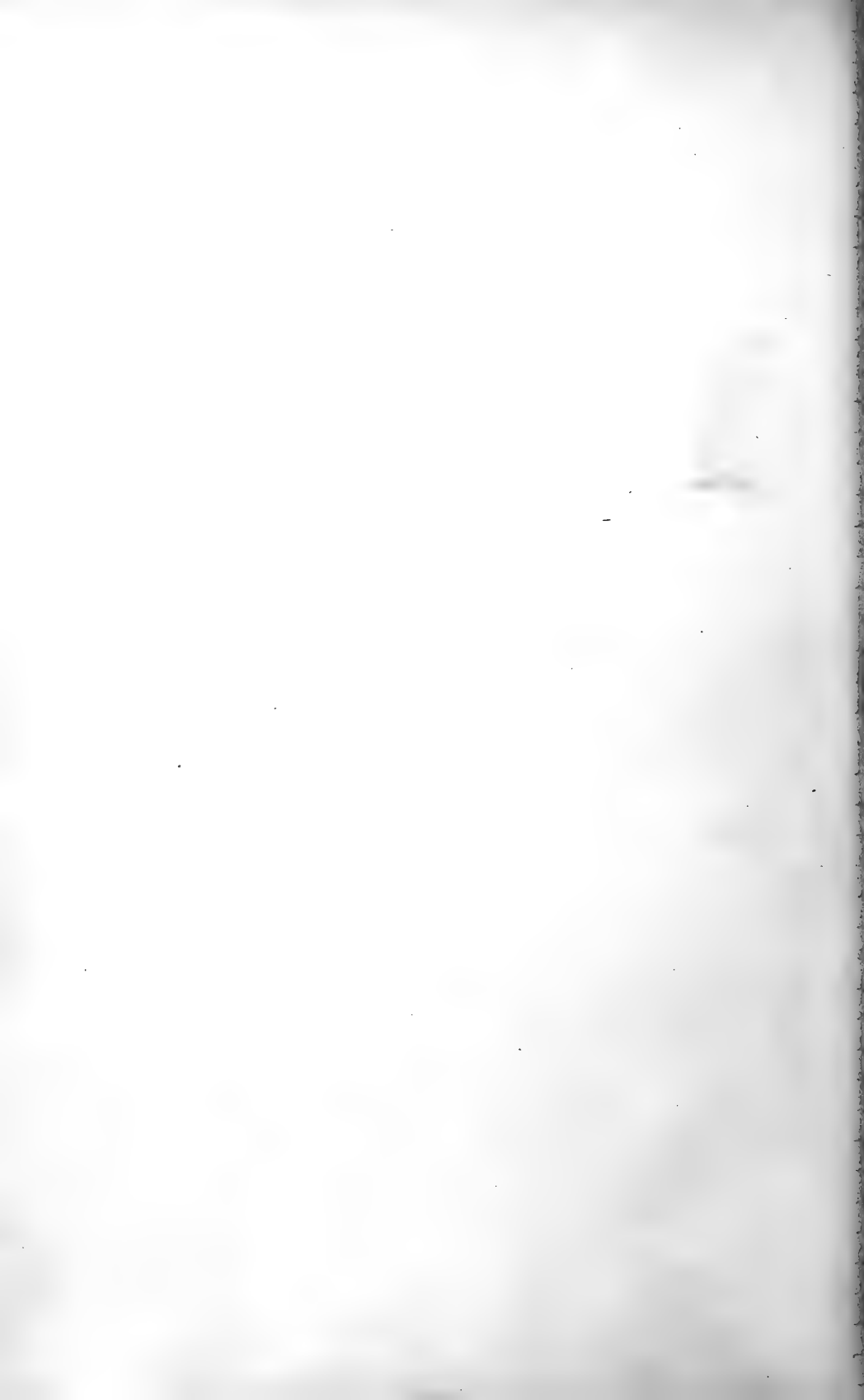
About 25 species are known, 15 in the western hemisphere, the others in arid parts of southwestern Asia, eastern Africa, Australia, New Zealand, Tasmania, and Hawaii.

In *Cenchrus* is found the extreme specialization of sterile branchlets of the inflorescence, the simplest form of which is found in *Panicum*, subgenus *Paurochaetium* (*Panicum chapmani* Vasey and its allies)¹, in which the ultimate branchlet of the narrow panicle is produced beyond the uppermost spikelet as a minute bristle, persistent on the axis, the spikelet falling without it. In the West Indian genus *Paratheria* and the Australian *Chamaeraphis*, with a single sterile branchlet below the spikelet, is found the simplest form of the series in which the articulation is at the base of the spikelet-bearing branch, the sterile branchlets falling attached to it. In *Pennisetum* the sterile branchlets are few to many, usually very slender, not rigid, free or rarely united at the very base. In *Cenchrus* the sterile branchlets are rigid and united below. This specialization reaches its extreme development in our North American species, in all but one of which the united branchlets form a cuplike receptacle in which the spikelets are partly hidden. The immense burs of *C. palmeri* are the utmost known development of the specialization of sterile branchlets. Several species of the eastern hemisphere are more like the introduced *C. catharticus*. In *C. pilosus* the bristles are antrorsely scabrous. In *C. australis* of Australia, with plumose, less rigid involucre, the genus approaches *Pennisetum*.

¹ Hitchcock & Chase, Contr. U. S. Nat. Herb. 15: 22. 1910.

Meehan's Monthly 2: 68. 1892 says
burs were brought back from Mex. War.

Anatomical & chemical study. Younken
& La Wall. Amer. Journ. Pharm. 94:
567-1922.



In all our species the bur varies in size and in the length of the spines. This variation is not so important, systematically, as it would seem at first sight, since the bur is only a fascicle of branchlets and as such varies relatively much less than do the branchlets of an ordinary panicle. The spikelets in a single bur are unequally developed; usually one is larger with plumper grain than the rest. In the illustrations it is these better-developed spikelets that are shown and their measurements that are given in the descriptions.

In three specimens of *C. pauciflorus* (Pammel's no. 657 from Des Moines, Iowa, a plant collected by Jones at Grinnell, Iowa, and Hitchcock's no. 6128, from Oaxaca, Mexico,) the lowest burs are undeveloped, the well-developed spikelet being naked or having a few rudimentary bristles below it on the very short peduncle.

KEY TO THE SPECIES.

Involucral lobes united at the base only; spikes dense.

Plants perennial; involucral lobes terete, scabrous. . . . 1. *C. myosuroides*.

Plants annual; inner involucral lobes sulcate down the outside, densely villous-ciliate within 2. *C. catharticus*.)

Involucral lobes united above the base.

Blades involute, squarrose, numerous, conspicuously distichous, not over 2.5 cm. long, about 1 cm. apart. 3. *C. distichophyllus*.

Blades not involute and squarrose, nor conspicuously distichous, much longer and farther apart.

Involucre with a ring of slender bristles at base. Plants annual.

Bristles antrorsely scabrous, much exceeding the involucral lobes. 4. *C. pilosus*.

Bristles retrorsely barbed, not much exceeding the involucral lobes.

Burs, excluding the bristles, not over 4 mm. wide, numerous, crowded in a long spike; lobes of the involucre interlocking, not spinelike 5. *C. viridis*.

Burs, excluding the bristles, 5 to 7 mm. wide, not densely crowded; lobes of the involucre erect or nearly so or rarely one or two lobes loosely interlocking, the tips spinelike.

Spikelets about 5.5 mm. long; involucral lobes villous at base within 6. *C. echinatus*.

Spikelets 6.5 mm. long; involucral lobes long-ciliate except at summit. 7. *C. insularis*.

Involucre with flattened spreading spines, no ring of slender bristles at base.

Body of the bur ovate, not over 3.5 mm. wide, tapering at base; plants perennial.

Burs glabrous; spines 4 to 6 mm. long. . . . 8. *C. gracillimus*.

Burs pubescent; spines rarely over 4 mm. long, usually shorter. Body of bur 3 to 3.5 mm. wide; spines 3 to 4 mm. long.

. 9. *C. incertus*.

Body of bur less than 3 mm. wide; spines 2 to 3 mm. long.

. 10. *C. microcephalus*.

Body of the bur globose, 5 mm. wide or more, not tapering at base; plants annual.

Burs, including spines, 7 to 8 mm. wide, finely pubescent.

. 11. *C. pauciflorus*.

Burs, including spines, 10 to 40 mm. wide, densely woolly.

Burs several to many; spines not over 8 mm. long.

. 12. *C. tribuloides*.

Burs 1 to 4; spines 1 cm. long or more. . . 13. *C. pulmeri*.

1. *Cenchrus myosuroides* H. B. K.

Cenchrus myosuroides H. B. K. Nov. Gen. & Sp. 1: 115. pl. 35. 1816. Collected by Humboldt and Bonpland on Flamingo Key, off the port of Batabanó, Cuba. The type specimen has not been examined, but the plate identifies the species.

Panicum cenchroides Ell. Bot. S. C. & Ga. 1: 111. 1816. Not *P. cenchroides* Rich. 1792. Collected by "Dr. Baldwin, who found it on Jekyl Island, Georgia." The type specimen in the Elliott Herbarium consists of the upper part of a culm with inflorescence.

Pennisetum pungens Nutt. Gen. Pl. 1: 54. 1818. Based on *Panicum cenchroides* Ell.

Pennisetum myosuroides Spreng. Syst. Veg. 1: 303. 1825. Based on *Cenchrus myosuroides* H. B. K.

Cenchrus elliottii Kunth, Rév. Gram. 1: 51. 1829. Based on *Panicum cenchroides* Ell.

Cenchrus alopecuroides Presl, Rel. Haenk. 1: 317. 1830. Not *C. alopecuroides* Thunb. 1794. The type specimen was collected by Haenke, but the habitat was unknown to Presl. It was probably from the coast of Peru. The type was examined in the herbarium of the German University at Prague by A. S. Hitchcock in 1907. No locality is given on the label.

Cenchrus setoides Buckl. Prel. Rep. Geol. Agr. Surv. Tex. App. 3. 1866. "Prairies, Northern Texas." The type specimen in the herbarium of the Academy of Natural Sciences, Philadelphia, consists of the upper parts of three culms with spikes. The name on the ticket is a slightly different form from that published. A second ticket reads "Texas, *Linscum & Buckley*."

Cenchropsis myosuroides Nash in Small, Fl. Southeast. U. S. 109, 1927. 1903. Based on *Cenchrus myosuroides* H. B. K.

DESCRIPTION.

Plants perennial, solitary or in small clumps, usually 1 to 2 meters tall, glabrous as a whole; culms rather robust and woody, terete, commonly glaucous, erect or geniculate below (rarely decumbent with ascending flowering branches), commonly branching from the lower 2 to 5 nodes, most of the branches sterile, sometimes fascicled, forming conspicuous knobs at the node; sheaths loose, usually not clasping the internodes, firm, strongly nerved; ligule 2 to 3 mm. long, firm-membranaceous, with a densely ciliate margin; blades



FIG. 7.—*Cenchrus myosuroides*. From León & Voisard 835, Cuba.

ascending or spreading, firm, 15 to 40 cm. long, 5 to 12 mm. wide, tapering from the rounded flat base to an attenuate, often involute tip, scabrous on the upper surface, rarely sparsely pilose at the base; inflorescence usually short-exserted, 10 to 25 cm. long, 5 to 9 mm. wide, strict, erect, dense, the common axis slender, angled, puberulent; burs 1-flowered, at first appressed, spreading in age, 5 to 7 mm. (mostly about 5 mm.) long, at maturity about as wide, the bristles retrorsely scabrous, united at the base only, the lowest row shorter, slender and spreading, the inner bristles slender, not flattened nor nerved, about equaling the spikelet, erect or nearly so; spikelet 4.5 to 5.5 mm. long, 1.5 to 1.8 mm. wide, acuminate; first glume about one-third the length of the spikelet; second glume and sterile lemma 3 to 5-nerved, the glume slightly shorter than the equal sterile lemma and fruit.

De la Cour, Eliezerica, 1794, p. 1.

Cenchrus cotharticus Delile, Cat. Hort. Monsp.
1838: 4. 1839. The species is described,
the description being copied by Schlechten-
dal, *Linnaea* 13: Litt. 103. 1839.

--Dr. A. Thellung, Zurich, Swit-
zerland in letter Sept. 10, 1920.

Cenchrus cotharticus Delile, Cat. Hort.
Monsp. 1838: 4. 1839. The species is
described, the description being copied
by Schlechtendal, *Linnaea* 13: Litt
103. 1839.

Dr. A. Thellung, Zurich
Switzerland in letter Sept. 10, 1920.

DISTRIBUTION.

Moist sandy open ground or scrubland near the coast, southern Georgia and Florida, the Florida Keys, and in southern Louisiana and Texas, south through Mexico, ascending to 2,000 meters, and in the West Indies and South America.

GEORGIA: Jekyll Island, *Baldwin*.

FLORIDA: Indian Key, *Curtiss* 3620, 5643. Joe Kemps Key, *Eaton* 1345. Key Largo, *Chase* 3936. Homosassa, *Combs* 982.

LOUISIANA: Bayou Terre Bonne, *Wurzlou* in 1913. Cotes Blanches, *Langlois* in 1886.

TEXAS: Del Rio, *Dewey* in 1891. Western Texas, *Wright* 802; *Havard* in 1881. Eagle Pass, *Havard* 81.

LOWER CALIFORNIA: Comondú, *Brandege* in 1889.

SONORA: Hermosillo, *Hitchcock* 3611; *Rose, Standley & Russell* 12484. Guaymas, *Palmer* 327 in 1887. Yaqui River, *Palmer* 10 in 1869.

CHIHUAHUA: Chihuahua, *Pringle* 429; *Wilkinson* in 1885.

COAHUILA: Saltillo, *Hitchcock* 5647.

DURANGO: Torreón, *Hitchcock* 7560. Durango, *Hitchcock* 7614; *Palmer* 863 in 1896.

ZACATECAS: San Juan Capistrano, *Rose* 2453.

AGUASCALIENTES: Aguascalientes, *Hitchcock* 7450.

HIDALGO: Dublán, *Pringle* 9598.

QUERÉTARO: Querétaro, *Basile* 29; *Agniel* 10270.

GUANAJUATO: Irapuato, *Hitchcock* 7402.

JALISCO: Guadalajara, *Palmer* 765 in 1886.

PUEBLA: Tehuacán, *Amer. Gr. Nat. Herb.* 619.

OAXACA: Tomellín, *Hitchcock* 6199. Oaxaca, *Hitchcock* 6131.

REVILLAGIGEDO ISLANDS: San Benedicto, *Anthony* 370; *Barkelaw* 171. Socorro, *Barkelaw* 202; *Townsend* in 1889.

CUBA: Santiago de Cuba, *León & Voisard* 835.

PORTO RICO: Cabo Rojo, *Hess* 118. Mona Island, *Hess* 443; *Britton, Cowell & Hess* 1674.

PARAGUAY: Central Paraguay, *Morong* 214.

URUGUAY: Montevideo, *Arechavaleta*, without date.

BOLIVIA: Pajaja, *Fries* 1103.

PERU: Callao, *Wilkes Expl. Exped.*

ARGENTINA: Córdoba, *Stuckert* in *Kneucker Gram. Exs.* 428; *Stuckert* 45. Without locality, *Jorgensen* 1144; *Jameson*.

2 = *C. barbatus* Schum. 1827.
2. *Cenchrus catharticus* Delile.

Cenchrus catharticus Delile, Cat. Hort. Monsp. 1838; Schlecht. *Linnaea* 13: Litt. 103. 1839. Apparently described from specimens grown in the botanical garden at Montpellier from seeds sent from Nubia, Africa, by Dr. Lush. The description, though inadequate, mentions the characteristic tomentose-ciliate inner side of the inner involucreal bristles. We are unable to verify the reference to the Montpellier seed catalogue of 1838. The full title as given by Schlechtendal reads, "Index complectens semina in horto botanico regio Monspelienſi anno 1838 collecta, pro mutua commutatione oblata, additis caracteribus specificis plantarum quarundam, vel ex toto novarum, vel accuratius nuper observatarum. 8vo." This would seem to indicate that the species was described in the index. Delile's name does not appear, but he was director

1838: A.

9/ Jan.

of the Montpellier garden, and in the author index in *Linnaea Delile* is given for page 102, where the article on the *Index Monspeliensis* begins. Through the kindness of Dr. Granel, director of the *Jardin des Plantes*, Montpellier, we have received two specimens of *Cenchrus catharticus* from the *Delile Herbarium*. These are labeled, "In hort. Monspel. cult. anno 1842," hence are not part of the type material, which may not have been preserved, but serve to identify the species without doubt.

Cenchrus niloticus Fig. & DeNot. Mem. Accad. Sci. Torino 14: 380. pl. 33. 1852. Described from Nubia. The detailed description and the plate identify the species.

Cenchrus annularis Anderss. in Peters, Reise Mossamb. Bot. 553. 1864. Described from Mozambique. The description identifies the species.

DESCRIPTION.

Plants annual, glabrous as a whole, decumbent and rooting at the lower nodes, the ends and the branches ascending; culms 30 to 100 cm. long, not much compressed, scabrous below the inflorescence; sheaths loose, keeled, scabrous at the summit; ligule stiffly ciliate, about 1 mm. long; blades narrowly ascending, 10 to 20 cm. long, 5 to 6 mm. wide at the base, tapering thence to an attenuate involute tip, scabrous on the upper surface, smooth or nearly so beneath; spikes included at base or short-exserted, 8 to 10 cm. long, about



FIG. 8.—*Cenchrus catharticus*.
From specimen from the *Delile Herbarium*.

7 to 9 mm. wide. the axis slender, angled, scabrous; burs usually 2-flowered, nearly erect, 4 to 6 mm. long, scarcely as wide, the pedicel almost obsolete; bristles united at the base only, the outer row short, terete, spreading, unequal, the inner (7 to 10) flattened, subequal, rigid, erect, the scabrous tips slightly spreading, the outer surface sulcate down the middle, with 1 to 3 green nerves in the sulcus, densely villous along the margin on the inner surface except at

the summit; spikelets slightly shorter than the inner involucre lobes; first glume developed or obsolete, second glume and sterile lemma thin, faintly 3 to 7-nerved, two-thirds to three-fourths as long as the fruit, the sterile palea usually well developed; fruit 4 to 4.5 mm. long, about 1.5 mm. wide, acuminate.

Known in America only from ballast about Mobile, Alabama; several specimens collected in 1891 and 1892 by Dr. Charles Mohr. Our plants agree with the specimens from the *Delile Herbarium* and with Abyssinian specimens. In the plant described in Hooker's *Flora of British India*¹ under the name of *Cenchrus catharticus* the inner involucre bristles are longer, more sharply pointed, and less rigid.

3. *Cenchrus distichophyllus* Griseb.

Cenchrus distichophyllus Griseb. Cat. Pl. Cub. 234. 1866. "Cuba occ. (Wright 3475)." The type specimen, collected by Wright in 1863, is in the *Grisebach Herbarium*. It consists of a single fertile culm and a tuft of one fertile and several sterile culms.

DESCRIPTION.

Plants perennial; culms tufted, rigid, erect, or ascending from a curved, not geniculate base, simple or with a few appressed branches, the numerous inter-

¹ 7: 90. 1896.



In Berlin Herb is a specimen of *Cenchrus distichophyllus*! with label

Brown Univ. Herb
Providence RI

"Florida Blodgett

Labels
misplaced

Stamped Herb Th. v. Heldreich

"The only specimen of this species in the Herbarium was collected in Cuba by Wright in 1865, that is Wright's *Stenale Cibeuses* Wrightiana 3475. I suspect, as you intimate, the labels in the Berlin Herbarium may have become transposed or misplaced." - letter from J. Franklin Collins, Oct 14, 1930. Brown University

nodes very short, the long leafless upper part of the culm appressed-pubescent; sheaths overlapping, appressed-pubescent, often becoming glabrate in age; ligule ciliate, scarcely 1 mm. long; blades 1.5 to 2.5 cm. long, about 1.5 mm. wide, conspicuously distichous, stiffly spreading at a uniform angle and usually about 1 cm. apart, involute, sharp-pointed, glabrous on the outer surface, scabrous on the inner, sometimes with a few long hairs at the base; spike long-exserted, 2 to 3 cm. long, bearing usually 5 to 7 spreading yellow burs, the slender axis glabrous, its summit prolonged beyond the uppermost bur as a sharp point 2 to 4 mm. long; burs, including the spines, 5 to 6 mm. long, nearly as broad, the body of the bur about 3 mm. long and 2 mm. wide, puberulent, the outer spines subterete, swollen at the base, the lobes of the involucre about 10, prolonged into sharp, slender spines, pilose on the inner surface toward the base, retrorsely barbed toward the tip; spikelet solitary, terete or thicker than wide, about 3.3 mm. long and 1.3 mm. wide; first glume very narrow, often obsolete; second glume obtuse, shorter than the subequal pointed sterile and fertile lemmas; fruit turgid, the palea puberulent on the upper half.

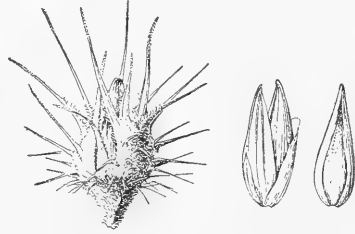


FIG. 9.—*Cenchrus distichophyllus*.
From the type specimen.

DISTRIBUTION.

Dry sandy pine barrens, Province of Pinar del Río, Cuba.

CUBA: Laguna Jovero, *Shafer* 10717. San Julián, *León* 6941; *Lamas* 7475.
"Western Cuba," *Wright* 3475.

In Robinson's Flora of the Galápagos Islands¹ some sterile specimens collected on Albemarle Island are doubtfully referred to *Cenchrus distichophyllus*. Stewart² also refers two of his collections to this species, one of which, his no. 1235, sent to the National Herbarium, is a sterile specimen of *Sporobolus virginicus* (L.) Kunth. The other specimens are doubtless the same species.

4. *Cenchrus pilosus* H. B. K.

Cenchrus pilosus H. B. K. Nov. Gen. & Sp. 1: 116. pl. 36. 1816. "Crescit in planitie herbida Provinciae Novobarcelonensis (Llanos de Nueva Barcellona), juxta Villa del Pao," Venezuela. The type specimen has not been examined, but the description and the plate identify it as a small, exceptionally pilose specimen of the species later described as *C. pallidus*.

Cenchrus pallidus Fourn. Mex. Pl. 2: 50. 1886. "In locis ruderalis, Hacienda de Santa Cruz pr. Tehuantepec in prov. Oajacensi, . . . (LIEBM. n. 465)." The type specimen, *Liebmann* 465, in the Copenhagen Herbarium, bears the name in Fournier's hand.

DESCRIPTION.

Plants annual; culms often rather stout, compressed, usually decumbent at base and rooting at the lower nodes, 20 to 100 cm. long, simple or sparingly branching below, scabrous below the inflorescence, otherwise glabrous; sheaths

¹ Proc. Amer. Acad. 38: 118. 1902.

² Botanical Survey of the Galapagos Islands, Proc. Cal. Acad. Sci. IV. 1: 31. 1911

keeled, loose, glabrous or toward the summit scabrous, or rarely ciliate; ligule ciliate, about 0.8 mm. long; blades 10 to 40 cm. long, or rarely longer, 6 to 12 mm. wide, rather thin and lax, flat or folded at the rounded base, scabrous on the upper surface and usually pilose, glabrous on the lower surface or scabrous toward the summit; spikes finally rather long-exserted, 5 to 14 cm. long, dense or loose at the base, the axis strongly angled, scabrous, a tuft of white hairs usually borne just below the burs, the summit prolonged beyond the uppermost bur into a slender point 2 to 3 mm. long; burs globose, the body about 5 mm. high, as broad or broader, densely villous, tawny, the numerous slender bristles antrorsely scabrous, commonly purplish, the inner more than twice as long as the body, the lobes of the body about 8, interlocking at maturity; spikelets usually 3, exceeding the body of the involucre, 4 to 4.5 mm.

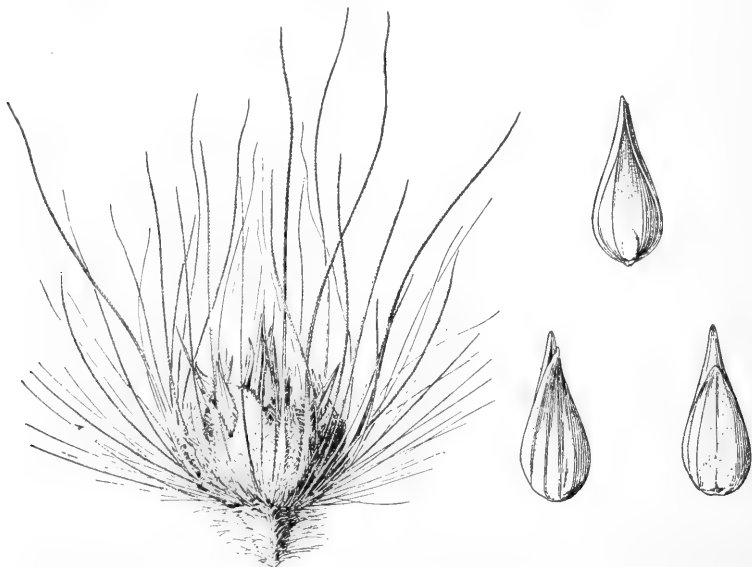


FIG. 10.—*Cenchrus pilosus*. From the type specimen of *C. pallidus*.

long, about 1.8 mm. wide, acuminate; first glume obsolete; second glume and sterile lemma shorter than the fruit, thin, very minutely puberulent; fruit turgid, the palea minutely puberulent between the nerves except toward the base.

DISTRIBUTION.

Moist open ground up to about 1,000 meters altitude, southern Mexico to northern South America.

MORELOS: Yautepec, *Pringle* 11219.

COLIMA: Jala, *Hitchcock* 7050.

GUERRERO: Balsas, *Amer. Gr. Nat. Herb.* 620. Iguala, *Pringle* 8394.

OAXACA: Tomellín, *Hitchcock* 6217. Tehuantepec, *Liebmann* 465.

YUCATÁN: Izamal, *Millspaugh* 70. Mérida, *Collins* 22.

SALVADOR: Acajutla, *Hitchcock* 8997. Sonsonate, *Hitchcock* 8978.

NICARAGUA: San Juan del Sur, *Hitchcock* 8596. Masaya, *Hitchcock* 8628, 8739.

Jinotepe, *Hitchcock* 8667. Corinto, *Hitchcock* 8619.

COLOMBIA: Santa Marta, *Smith* 153.

VENEZUELA: El Valle, *Miller & Johnston* 179.

CUBAÇAO: Willemstad, *Britton & Shafer* 3156.

enclosed: *Chalcid* *Spines* (perk. 100)
More pale on inner sides of bur than *My. C.*
specimen, smaller 10.7 0.217 from *Toullin*, *Ma.*

= *C. braconii* R+S

C. inflexus R. Br. 1810 not Poic 1804

5. *Cenchrus viridis* Spreng.

Cenchrus viridis Spreng. Syst. Veg. 1: 301. 1825. "Guadalupa." In the Krug and Urban Herbarium in the Berlin Botanical Museum is a specimen "ex herb. Sprengel," ticketed "*Cenchrus viridis* Spreng. Guadeloupe. Bertero legit." A second label bears the date "1817-19." This specimen, which is doubtless the type, consists of two flowering culms without the bases.

~~*Cenchrus dactylolepis* Steud. Syn. Pl. Glum. 1: 109. 1854. "*C. echinatus* Hochst. Hrbr. nr. 12. a. Surinam." Two burs from this specimen were kindly sent by the director of the herbarium of the Paris Museum.~~

Cenchrus echinatus var. *viridis* Spreng.; Griseb. Fl. Brit. W. Ind. 556. 1864. Presumably based on *C. viridis* Spreng.

?*Cenchrus viridis* var. *macrocephalus* Doell in Mart. Fl. Bras. 2^o: 310. 1877. "Humboldt extra Brasiliam legit." The type has not been examined. It would appear to be a specimen with bristles longer than usual, such a specimen as Hitchcock's no. 9910 from Cartagena, Colombia.

?*Cenchrus rigidus* Willd.; Doell in Mart. Fl. Bras. 2^o: 310. 1877. A herbarium name given as synonym of *C. viridis* var. *macrocephalus*.

DESCRIPTION.

Plants annual; culms often rather robust, 30 to 100 cm. tall or more, usually terete, erect from a more or less geniculate base, the lower internodes commonly short, sparingly branching from the base or lower nodes, glabrous, or scabrous below the spike only; sheaths mostly overlapping, loose, keeled, glabrous; ligule ciliate, scarcely 1 mm. long; blades thin, flat, lax, mostly 10 to 30 cm. long, 6 to 12 mm. wide, rounded at the base, scabrous on the upper surface, on the margins, and on the midnerve beneath; spike usually short-exserted, 4 to 10 cm. long, rarely longer, dense, the slender axis minutely pubescent, the naked tip 2 to 4 mm. long; burs depressed-globose, the body about 4 mm. high, as broad or broader, villous, tawny, the outer bristles numerous, very slender, crowded toward the base, the inner usually exceeding the body and the spikelets, erect or spreading, the lobes of the body usually 6 to 8, interlocking at maturity; spikelets usually 3, exceeding the body of the involucre, mostly 4 to 4.5 mm. long, about 1.4 mm. wide; first glume obsolete; second glume two-thirds to three-fourths as long as the subequal sterile lemma and fruit.



FIG. 11.—*Cenchrus viridis*. From the type specimen.

DISTRIBUTION.

Open ground, often a weed in cultivated fields and waste places, Florida Keys, Mexico, and the West Indies to Brazil; also in the Philippine Islands, Guam, Siam, and northern Australia, doubtless introduced from America.

FLORIDA: Key Largo, *Chase* 3931; *Hitchcock* in 1903. Upper Matecumbe Key, *Pollard, Collins & Morris* 145. Key West, *Rugel* 120.

TAMAULIPAS: Tampico, *Palmer* 155 in 1910.

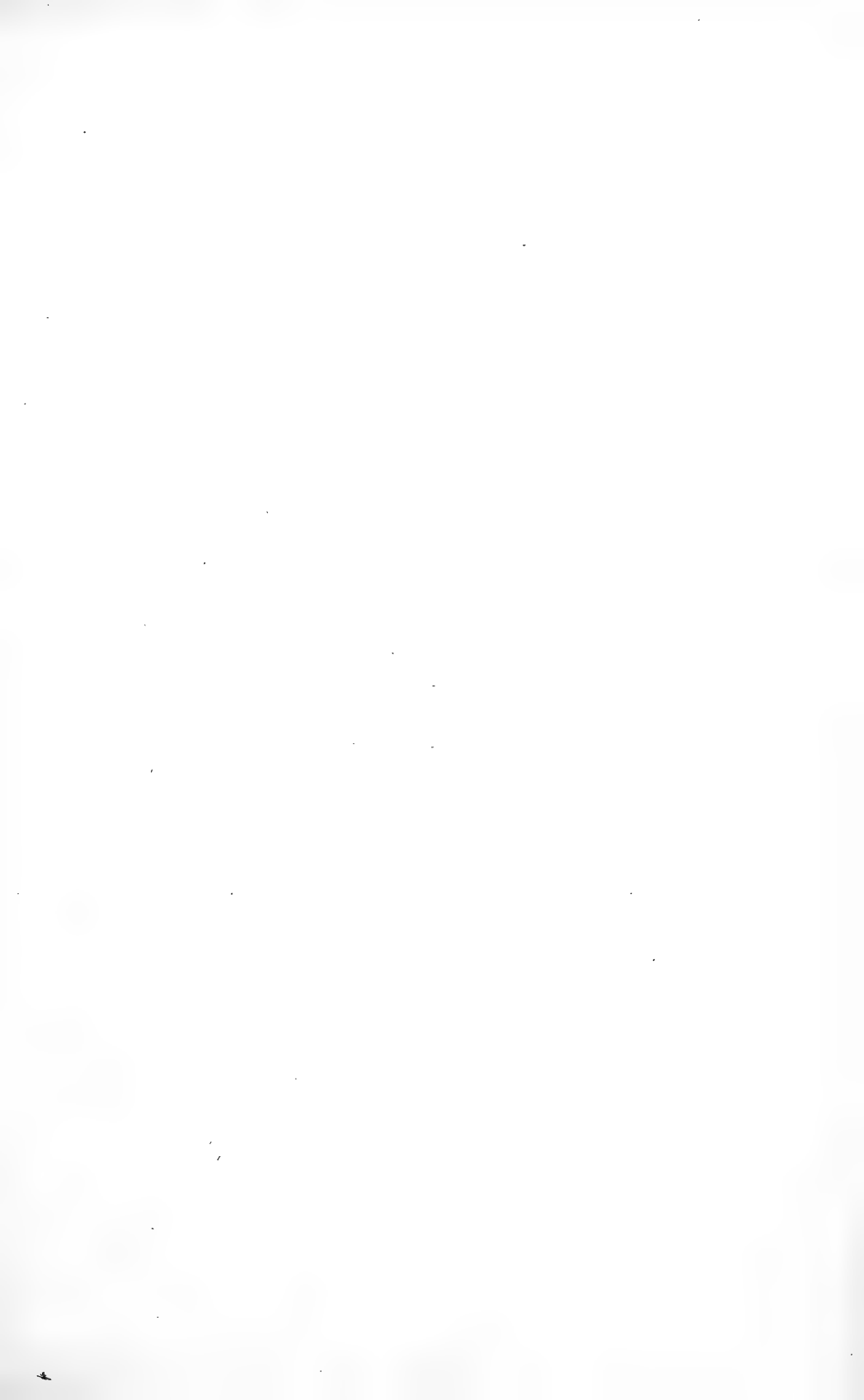
VERACRUZ: Sanborn, *Orcutt* 3074.

- PUEBLA: Without locality, *Nicolas* 26.
- COLIMA: Jala, *Hitchcock* 7008. Manzanillo, *Hitchcock* 7043; *Palmer* 1086 in 1890. Paso del Río, *Emrick* 6.
- YUCATÁN: Progreso, *Millsbaugh* 1682. Mérida, *Schott* 498. Izamal, *Gaumer* 1084.
- QUINTANA ROO: Chichankanab, *Gaumer* 2448.
- GUATEMALA: Cerro Gordo, *Heyde & Lux* 4296. Escuintla, *Hitchcock* 9003. Los Amates, *Kellerman* 5163. Alta Verapaz, *Pittier* 254.
- HONDURAS: San Pedro Sula, *Thieme* 5580.
- SALVADOR: La Unión, *Hitchcock* 8773.
- NICARAGUA: Corinto, *Hitchcock* 8610. Masaya, *Hitchcock* 8638. Jinotepe, *Hitchcock* 8668.
- COSTA RICA: LOS CONVENTILLOS, *Tonduz* 2857. Zent Farm, *Pittier* 16739; *Tonduz* 194. Talamanca, *Tonduz* 8741. Port Limón, *Hitchcock* 8436. Puntarenas, *Hitchcock* 8567.
- PANAMA: Matías Hernández, *Pittier* 6790. Taboga Island, *Hitchcock* 8064; *Killip* 4149. Toro Point, *Hitchcock* 8043. Culebra, *Amer. Gr. Nat. Herb.* 622; *Pittier* 2080. Empire, *Pittier* 3716. Ancón, *Killip* 4007.
- BAHAMAS: Andros, *Small & Carter* 8711.
- CUBA: SIERRA MENDOZA, *Shafer* 11152. Habana-Vedado, *León* 5618. Sancti Spiritus, *León* 837; *Clemente* 3442. Camaguey, *León* 3963. Cayo Ballenato Grande, *Shafer* 1022. Sierra Nipe, *Shafer* 3172. Santiago, *Pollard, Palmer & Palmer* 284. El Cuero, *Britton & Cowell* 12798. Manatí, *León* 5683, 6007. Isle of Pines, *Britton, Wilson & León* 15296. Without locality, *Wright* 3889.
- SANTO DOMINGO: Santo Domingo, *Millsbaugh* 808. Azua, *Rose, Fitch & Russell* 3948. Without locality, *Wright, Parry & Brummel* 621.
- JAMAICA: Hope Gardens, *Harris* 11237; *Hitchcock* 9314; *Maxon* 1640. Gordon Town (?), *Hart* 783. Spanish Town, *Harris* 12479; *Hitchcock* 9300. New Forest, *Hitchcock* 9841. Ewarton to Moneague, *Hitchcock* 9440. Ipswich, *Hitchcock* 9588. Grand Cayman, *Millsbaugh* 1268.
- PORTO RICO: Guanica Bay, *Chase* 6517. Juana Díaz, *Sintenís* 2904. Cayo Muertos, *Britton, Cowell & Brown* 4986. Vieques, *Shafer* 2653; *Chase* 6667. Culebra, *Britton & Wheeler* 122; *Millsbaugh* 619.
- LEEWARD ISLANDS: Guadeloupe, *Duss* 2718.
- WINDWARD ISLANDS: Martinique, *Duss* 790.
- TRINIDAD: Port of Spain, *Hitchcock* 9995. San Juan, *Broadway* 2609. Cedros, *Broadway* 4916.
- COLOMBIA: Cartagena, *Hitchcock* 9910. Santa Marta, *Smith* 160. Puerto Colombia, *Hitchcock* 9929. Palmira, *Pittier* 827.
- VENEZUELA: Margarita, *Miller & Johnston* 186. Bobures, *Jahn* 351.
- BRAZIL: Organ Mountains, *Gardner* 856. Amazonas, *Kuhlmann* 2949.
- BOLIVIA: Guanai, *Rusby* 190.

6. *Cenchrus echinatus* L.

Cenchrus echinatus L. Sp. Pl. 1050. 1753. "Habitat in Jamaica, Curassao." The type specimen in the Linnaean Herbarium was examined by A. S. Hitchcock in 1907. It is marked "echinatus" in Linnaeus's hand, but without indication as to its origin. One of the phrase names cited by Linnaeus is "Gramen echinatum maximum, spica rubra s. alba. Sloan. jam. 30. hist. 1. p. 108." The specimen so named in the Sloane Herbarium was also examined by Professor Hitchcock.

Cenchrus pungens H. B. K. Nov. Gen. & Sp. 1: 115. 1816. "Crescit . . . regni Peruviani prope Guayaquil." The type has not been examined. It is



C. ~~leucophaea~~ ~~Stem~~ ~~Berk.~~ ~~in~~ ~~medium~~ ~~medium~~
Lullum 1587 - Area (serbia)

said by the authors to be very closely related to *C. echinatus*. The description indicates a depauperate specimen of that species with short spikes, and with but two spikelets in a bur. Doell, who examined an authentic specimen, states¹ that it is a form of *C. echinatus* in which the spikelets are slightly longer than the involucre.

Cenchrus macrocarpus Ledeb.; Steud. Nom. Bot. ed. 2. 1: 317. 1840. A garden name given as a synonym of *C. echinatus* L.

Cenchrus brevisetus Fourn. Mex. Pl. 2: 50. 1886. "Valle de Orizaba (SCHAFFEN[ER] n. 198 in herb. FRANQ., BOURG[EAU] n. 3140 . . . BOTT[ERI] n. 133.)" Bourgeau's no. 3140 in the National Herbarium, bearing the name in Fournier's hand, and in the herbarium of the Botanical Garden of Petrograd is about the average form of *C. echinatus*. In his key to the species of *Cenchrus*, Fournier places *C. echinatus* with *C. myosuroides* and *C. multiflorus* Presl (a species of *Pennisetum*), as having the inner involucre cleft nearly to the base. Among the specimens cited under *C. echinatus* are Liebmann's nos. 468, 471, and 472. The specimens in the Copenhagen Herbarium are those studied by Fournier.² All three are ordinary *C. echinatus*. In this species and its allies the involucre is irregularly cleft; sometimes one of the clefts (besides that on the side



FIG. 12.—*Cenchrus echinatus*. From Hitchcock 9379, Jamaica.

toward the axis) reaches well toward the base. This is not constant in burs on the same spike. It seems probable that in his study of the specimens Fournier referred to *C. echinatus* those specimens in which he observed burs with a single deep cleft, while those in which a deep cleft was not noted he referred to *C. brevisetus*. The short bristles, which gave the specific name, are short in comparison to those of *C. pallidus* (*C. pilosus*), which in Fournier's arrangement is grouped with *C. brevisetus*.

Cenchrus echinatus brevisetus Scribn. in Millsp. Field Mus. Bot. 2: 26. 1900. Based on *Cenchrus brevisetus* Fourn.

DESCRIPTION.

Plants annual; culms ascending from a geniculate or decumbent base, often rooting at the lower nodes, branching from the base and usually from the lower nodes, commonly 25 to 60 cm. long, sometimes as much as 1 meter long, compressed, scabrous below the spike, otherwise glabrous; sheaths loose, mostly

¹ In Mart. Fl. Bras. 2^o: 310. 1877.

² See p. 45.

compressed, glabrous or hairy on the margin toward the summit, rarely sparsely pilose; ligule ciliate, about 1 mm. long; blades commonly 6 to 20 cm. long and 3 to 8 mm. wide (extremes larger or smaller), usually rather stiff, but sometimes lax, flat, tapering from the rounded base to a more or less involute or folded summit, glabrous beneath, scabrous and sparsely pilose on the upper surface, at least toward the base; spikes finally rather long-exserted, 3 to 10 cm. long (commonly not over 7 cm. long), not very dense, the axis strongly flexuous, scabrous; burs truncate at base, the body 4 to 7 mm. high, as broad or broader, pubescent, tawny or plumbeous, the outer slender bristles on the average less numerous and relatively shorter than in *C. viridis*, the inner stout, broadened at base, the longest of them usually about equaling the lobes of the body but sometimes longer or sometimes much reduced, ascending or spreading, the lobes of the body commonly 10, erect or bent inward or sometimes one or two lobes inflexed, often with one or two green lines down the back, the tips hard and spine-like, retrorsely barbed; spikelets 3 to 6, usually 4, about equaling the lobes or shorter, 4.5 to 6 mm. long, about one-third as wide; first glume narrow, 1-nerved; second glume two-thirds to three-fourths as long as the subequal sterile lemma and fruit, the summit of the fertile lemma submembranaceous, the 3 nerves usually obvious.

Throughout the range of this species the burs vary greatly in size; as Sloane,¹ writing of the grass in Jamaica, expresses it: "Of this there are of various bignesses." Mexican plants are on the average more robust than those of the United States and the West Indies, with blades often 10 to 12 mm. wide, and burs 6 to 7 mm. wide (excluding the bristles), but occasional United States and West Indian specimens are about as robust as any of the Mexican plants.

In a few West Indian specimens the burs are depauperate, only 2 or 3 mm. wide and with but one or two spikelets. In most of these specimens, however, normal or nearly normal burs are found on the same plant.

DISTRIBUTION.

Open ground and waste places, from South Carolina to New Mexico and south to Uruguay; a common weed throughout the warmer part of its range; sparingly introduced in Hawaii, the Philippines, and Samoa.

SOUTH CAROLINA: Aiken, *Ravenel* in 1869.

GEORGIA: Darien, *Smith* 2151.

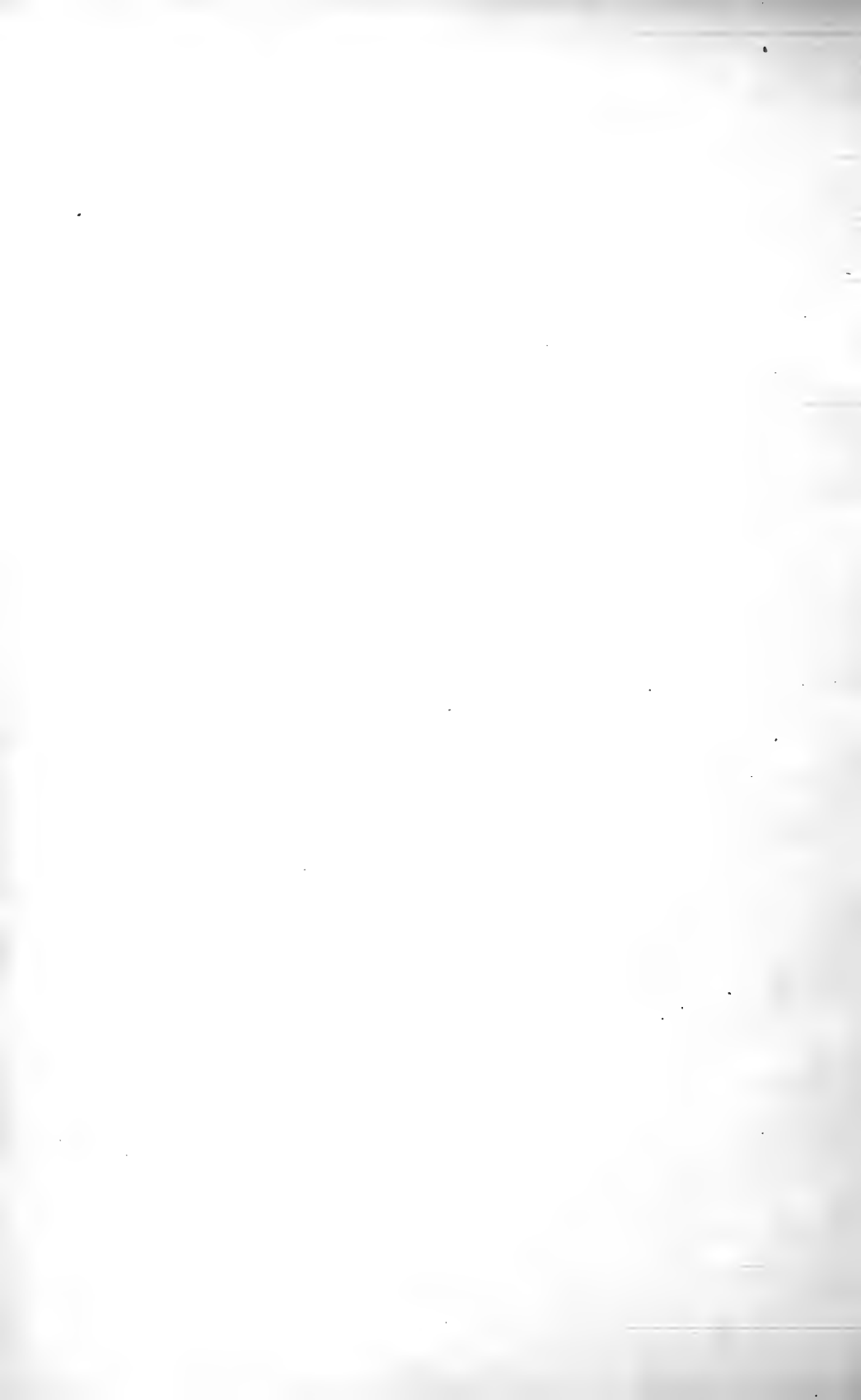
FLORIDA: Jacksonville, *Combs* 42; *Curtiss* 3619, 4042, 5152. Duval County, *Fredholm* 5236. Madison County, *Combs* 218; *Hitchcock* 2281. Monticello, *Combs* 339. Wewahitchka, *Biltmore Herb.* 1883a. Lake City, *Hitchcock* 2278; *Combs & Rolfs* 150; *Quaintance* 853; *Ricker* 877. Gainesville, *Chase* 4226. Archer, *Quaintance* 816. Eustis, *Hitchcock* 2279; *Nash* 189, 1134, 2100. Grasmere, *Combs & Baker* 1046. Ouasi, *Baker* 7. Jensen, *Hitchcock* 739. Miami, *Amer. Gr. Nat. Herb.* 615; *Eaton* 93; *Hitchcock* 663. Key Largo, *Pollard, Collins & Morris* 167. Lakeland, *Hitchcock* 830. Marco, *Standley* 12736. Fort Myers, *Standley* 12834; *J. P. Standley* 357; *Hitchcock* 448. Manavista, *Tracy* 7046. Newport, *Pollard, Collins & Morris* 167. Key West, *Hitchcock* in 1906. Fellsmere, *Tracy* 9387. Sneeds Island, *Tracy* 6512.

TEXAS: Del Rio, *Hitchcock* 13633. Without locality, *Nealley* in 1890 and 1893.

NEW MEXICO: Without locality, *Fendler* 983.

LOWER CALIFORNIA: Comondú, *Brandegee* 4. Santa Agueda, *Palmer* 220 in 1890. San José del Cabo, *Purpus* 320.

¹ Voy. Jam. 1: 108. 1707.



- SONORA: Yaqui River, *Palmer* 12 in 1869. Alamos, *Rose, Standley & Russell* 13019, 13029. Hermosillo, *Rose, Standley & Russell* 12495; *Hitchcock* 3602; *Chase* 5500. Guaymas, *Palmer* 190 in 1887.
- CHIHUAHUA: Southwestern Chihuahua, *Palmer* 22 in 1885.
- COAHUILA: Monclova, *Palmer* 1343 in 1880.
- NUEVO LEÓN: Monterrey, *Hitchcock* 5556.
- TAMAULIPAS: Victoria, *Palmer* 83 in 1907. Tampico, *Hitchcock* 5786.
- SAN LUIS POTOSÍ: Cárdenas, *Amer. Gr. Nat. Herb.* 616.
- DURANGO: Durango, *Hitchcock* 7607; *Palmer* 880 in 1896. Torreón, *Hitchcock* 7558.
- SINALOA: Mazatlán, *Rose, Standley & Russell* 13674. Fuerte, *Rose, Standley & Russell* 13561. Rosario, *Rose* 3110. Topolobampo, *Rose, Standley & Russell* 13280.
- AGUASCALIENTES: Aguascalientes, *Hitchcock* 7439, 7490.
- JALISCO: Guadalajara, *Hitchcock* 7293; *Safford* 1390. San Nicolás, *Hitchcock* 7219. Zapotlán, *Hitchcock* 7124. Chapala, *Rose & Painter* 7623. Colotlán, *Rose* 3603. La Junta, *Hitchcock* 7001.
- GUANAJUATO: Irapuato, *Hitchcock* 7405.
- QUERÉTARO: Querétaro, *Hitchcock* 5841½, 5861; *Agniel* 10261.
- MORELOS: Cuernavaca, *Hitchcock* 6852, 6876.
- PUEBLA: Tehuacán, *Hitchcock* 6076.
- VERACRUZ: Orizaba, *Hitchcock* 6339; *Bourgeau* 3140; *Seaton* 51. Mirador, *Ross* 644; *Liebmann* 468. Coatzacoalcos, *Ross* 1050. Jalapa, *Hitchcock* 6629. Veracruz, *Hitchcock* 6556, 6571, 6579.
- COLIMA: Alzada, *Hitchcock* 7100. Manzanillo, *Hitchcock* 7043½.
- MICHOACÁN: Uruápan, *Hitchcock* 6988.
- GUERRERO: Santa Fé, *Hitchcock* 6690. Balsas, *Hitchcock* 6787.
- OAXACA: Tomellín, *Hitchcock* 6198, 6247. Oaxaca, *Hitchcock* 6127; *Pringle* 5566. Santa Gertrudis, *Liebmann* 471. Cuicatlán, *Nelson* 1653.
- YUCATÁN: Progreso, *Millsbaugh* 1698.
- GUATEMALA: Mazatenango, *Kellerman* 5110. Lake Amatitlán, *Kellerman* 4780. Guatemala City, *Hitchcock* 9083; *Holway* 591. Secanquim, *Pittier* 254.
- HONDURAS: Puerto Sierra, *Wilson* 245.
- SALVADOR: San Salvador, *Velasco* 18. Without locality, *Renson* 169.
- NICARAGUA: San Juan del Sur, *Hitchcock* 8598. Masaya, *Hitchcock* 8637.
- COSTA RICA: Orotina, *Holway* 342. Boca Banana, *Tonduz* 9120. Puerto Limón, *Pittier* 4202. Atenas, *Hitchcock* 8519. Alajuela, *Jiménez* 132.
- PANAMA: Cristóbal, *Hitchcock* 7949. Balboa, *Hitchcock* 7994, 8001. Empire, *Pittier* 3715. Ancón, *Célestine* 27.
- BERMUDA: *Brown & Britton* 126; *Collins* 142.
- BAHAMAS: Fortune Island, *Eggers* 3980.
- CUBA: Guanajay, *Palmer & Riley* 665, 679, 781. Guane, *Shafer* 10374. Between Río Cayaguateje and Sierra Guane, *Shafer* 10445. Sierra de Anafe, *Wilson & León* 11489. Habana, *León* 188, 2604, 4753. Rincón, *Wilson* 1043. Santiago de las Vegas, *Baker & Wilson* 515; *Hitchcock* in 1906. Sancti Spiritus, *Shafer* 12074. La Gloria, *Shafer* 320. Santiago de Cuba, *León & Voisard* 838; *Millsbaugh* 1110. Guantánamo Bay, *Britton* 2124. Isle of Pines, *Taylor* 24; *Britton, Britton & Wilson* 15045.
- JAMAICA: Gordon Town, *Hitchcock* 9379; *Hart* 576. Hope Gardens, *Hitchcock* 9251, 9311; *Harris* 11239; *Maxon* 1644. Annatto Bay, *Maxon* 726. Port Antonio, *Fredholm* 3061. Ramble, *Hitchcock* 9514. Mount Hybla, *Harris* 11311. Ipswich, *Hitchcock* 9611. Ewarton to Linstead, *Hitchcock* 9434. New Forest, *Hitchcock* 9828. Lititz, *Harris* 12696.

- SANTO DOMINGO: Barahona, *Fuertes* 1263. Constanza, *Türkheim* 3228.
- PORTO RICO: Santurce, *Heller* 1346. Catano, *Millspaugh* 163. Bayamon, *Chase* 6386. Río Piedras, *Stevenson* 3498. Arecibo, *Chase* 6563. Cumuy, *Chase* 6566. Mayaguez, *Chase* 6281. Maricao, *Chase* 6242. Guanica, *Britton, Cowell & Brown* 4911; *Chase* 6522. Penuelas, *Britton, Britton & Marble* 1758; *Chase* 6491. Aguirre, *Underwood & Griggs* 406. Guayama, *Goll* 511. Cayo Muertos, *Britton, Cowell & Brown* 4981. Fajardo, *Chase* 6654. Vieques, *Chase* 6668; *Shafer* 2470. Culebra, *Britton & Wheeler* 207. Mona Island, *Hess* 441.
- VIRGIN ISLANDS: St. Thomas, *Britton, Britton & Shafer* 127; *Millspaugh* 438. St. Croix, *Ricksecker* 124, 443. St. Jan, *Eggers* 3299. Tortola, *Britton & Shafer* 913; *Fishlock* 110.
- LEEWARD ISLANDS: Antigua, *Rose, Fitch & Russell* 3412; *Wullschlaegel* 633. Guadeloupe, *Duss* 3173. Dominica, *Jones* 13.
- WINDWARD ISLANDS: Montserrat, *Shafer* 217. Martinique, *Duss* 791. St. Lucia, *Moore* 17. Grenada, *Broadway* 7015.
- TRINIDAD: Port of Spain, *Hitchcock* 9996. Cedros, *Hitchcock* 10155. Chacachacare, *Hitchcock* 10056, 10057.
- TOBAGO: Scarboro, *Broadway* 4726; *Hitchcock* 10209.
- CURAÇAO: Willemstad, *Britton & Shafer* 2916.
- COLOMBIA: Barranquilla, *Pittier* 1558.
- VENEZUELA: Dos Caminos, *Pittier* 6307. Without locality, *Fendler* 1736.
- BRITISH GUIANA: Upper Demerara River, *Jenman* 4011.
- BRAZIL: Campinos, *Campos Novaes* 1257. Minas Geraes, *Widgren* in 1845. São Paulo, *Löfgren & Edwald* 2646; *Gerdes* in 1890. Lagoa Santa, *Warming* in 1863. Paraná, *Dusén* 6652. Without locality, *Glaziov* 497, 1233, 6954; *Gardner* 1190.
- PARAGUAY: Central Paraguay, *Morong* 96.
- URUGUAY: El Salto, *Arechavaleta* in 1893.
- ARGENTINA: Misiones, *Ekman* 670.

7. *Cenchrus insularis* Scribn.

Cenchrus insularis Scribn. in Millsp. Field Mus. Bot. 2: 26. 1900. "Pajaros Island, Alacran Shoals (1759). Type in Field Col. Mus. Herb. no. 61759." Part of this specimen, collected by C. F. Millspaugh, is in the National Herbarium.

DESCRIPTION.

Plants annual, resembling a robust specimen of *C. echinatus*, the rather firm blades scabrous on the upper surface, not pilose; spikes 5 to 10 cm. long, not very dense, the axis as in *C. echinatus*; burs globose, the body 9 to 11 cm. high, minutely pubescent, the obconical base villous; bristles very numerous, ascending, the outermost very slender, short, the inner successively broader at base and longer, two rather well-defined series equaling or exceeding the lobes of the body, conspicuously long-ciliate at the broad base; lobes of the body 8 to 10, suberect, exceeding the spikelets, conspicuously long-ciliate except at the sharp spinelike summits; spikelets 2 or 3, 6 to 7 mm. long, 2 to 2.2 mm. wide; first glume narrow, usually obsolete; second glume very minutely puberulent down the center or glabrous, two-thirds to three-fourths as long as the equal sterile lemma and fruit, the base of the sterile lemma and upper part of the palea minutely puberulent, the summit of the fertile lemma submembranaceous, strongly nerved.

This apparently rare species differs from *C. echinatus* in the larger burs, more numerous and longer bristles, the more uniformly cleft body with more slender-pointed lobes, and the conspicuously ciliate bases of the inner broad-based bristles and involucre lobes, these minutely pubescent on the back. Some specimens of *C. echinatus*, with burs having exceptionally long and numerous bristles, resemble *C. insularis*.



FIG. 13.—*Cenchrus insularis*. From the type specimen.

DISTRIBUTION.

Sandy beaches, Alacrán Shoals, off the northern coast of Yucatán, northern Colombia, and in Brazil.

YUCATÁN: Pájaros Island, Alacrán Shoals, *Millspaugh* 1759.

COLOMBIA: Santa Marta, *Smith* 159. Puerto Colombia, *Hitchcock* 9938.

BRAZIL: Lagoa Santa, *Warming* in 1863.

8. *Cenchrus gracillimus* Nash.

Cenchrus gracillimus Nash, Bull. Torrey Club 22: 299, 1895. "Florida, occurring in the high pine land. . . . My nos. 188 and 288, collection of 1894." Nash's nos. 188 and 288 of 1894 were "collected in the vicinity of Eustis, Lake County." His no. 188 in the herbarium of the New York Botanical Garden is taken as the type.

DESCRIPTION.

Plants perennial, at length forming dense clumps, glabrous as a whole; culms 20 to 80 cm. tall, commonly branching from the lower nodes, but sometimes remaining simple, often scabrous toward the summit, compressed, slender, wiry, erect or ascending, the outer culms of large clumps geniculate at base; sheaths loose, keeled, the lower overlapping, sometimes sparsely pilose; ligule ciliate, about 0.5 mm. long; blades usually folded and stiffly flexuous, 5 to 20 cm. long, 2 to 5 mm. (usually 2 to 3 mm.) wide, scabrous on the upper surface and sometimes pilose at the base; spikes usually long-exserted, 2 to 6 cm. long, the burs not crowded, sometimes distant more than their own length, the

slender axis flexuous, scabrous; burs 3.5 to 5 mm. wide (excluding the spines), somewhat tapering to the base, glabrous; spines spreading or reflexed, all glabrous and flat, broadened at base, the lowest ones slender, shorter, some of the upper ones commonly 5 to 6 mm. long; body of the bur usually with 1 or 2 deep clefts, the lobes about 8, erect or spreading, 6 to 8 mm. long, ciliate at the

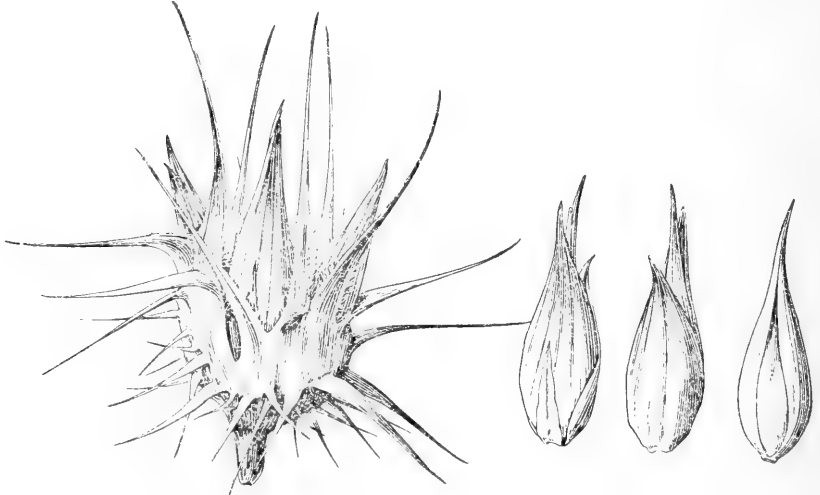


FIG. 14.—*Cenchrus gracillimus*. From the type specimen.

base, rigid and spinelike; spikelets 2 or 3, 5.5 to 7 mm. long, about 1.5 mm. wide; first glume narrow, usually present; second glume and sterile lemma attenuate-pointed, the tips often spreading, the glume about three-fourths the length of the attenuate-pointed fruit.

Cenchrus gracillimus, unlike our other species, begins blooming in the early spring. Two collections from the west coast of Florida, Tracy's nos. 6744 and 7178, represent more robust plants than is typical, with mostly flat blades and slightly larger burs. A specimen collected on Sanibel Island by A. S. Hitchcock in 1900 and the two collections from Jamaica (*Hitchcock* 9851 and *Harris* 12690) have burs very minutely puberulent.

DISTRIBUTION.

Sandy open ground and high pine land, Florida, southern Alabama, Cuba, and Jamaica.

FLORIDA: Suwanee County, *Hitchcock* 2290. Lake City, *Hitchcock* 2291. Sanford, *Hitchcock* 790. Tavares, *Hitchcock* 810. Eustis, *Curtiss* 6615; *Hitchcock* 2288, 2289; *Nash* 188, 288, 1766. Grasmere, *Combs & Baker* 1031, 1079. Zellwood, *Baker* 12. Brevard County, *Fredholm* 5826. Miami, *Amer. Gr. Nat. Herb.* 617; *Chase* 3847; *Curtiss* 5820; *Hitchcock* 629, 662; *Small & Carter* 2854. Lakeland, *Hitchcock* 829. Tampa, *Combs* 1363. Hillsborough County, *Fredholm* 6333, 6393. Dunedin, *Tracy* 6742. Cedar Key, *Tracy* 7178. Johns Pass, *Tracy* 7181. Palma Sola, *Tracy* 6744. Sanibel Island, *Hitchcock* in 1900.

ALABAMA: Mobile, *Mohr* 64.

CUBA: Isle of Pines, *Britton, Britton & Wilson* 14934.

JAMAICA: New Forest, *Hitchcock* 9851. Southern Manchester, *Harris* 12690.

9. *Cenchrus incertus* M. A. Curtis.

Cenchrus incertus M. A. Curtis, Bost. Journ. Nat. Hist. 1: 135. 1837. "Found at Smithville in cultivated fields," south of Wilmington, North Carolina. In the introduction to his enumeration of plants of Wilmington, Curtis states that his new species has been submitted to Dr. Torrey. In the Torrey Herbarium, in the herbarium of Columbia University, is a sheet on which are mounted a single specimen each of *C. incertus* and *C. tribuloides*, sent to Dr. Torrey by Curtis, together with the following note by Curtis: "The two plants which I send were collected near the mouth of Cape Fear river, N. C., where I observed them two seasons, and found them maintaining a uniform difference, as seen in these specimens. The one grows erect, except at the base, branching freely, and attaining the height of 12-18 inches. The other is decumbent, 4-6 inches long, and the spike of flowers never exceeding the sheaths in length, but escaping from it laterally. It is more spiny, with longer spines and more villose, with larger flowers which are more compact and fewer than the tall one. If I am not mistaken the one has two perfect flowers in the calyx and the other one. This small one appears to be *C. echinatus* var. *tribuloides*." The published description of *C. incertus* applies perfectly to the tall plant. The whereabouts of Curtis's own herbarium, if it was preserved, is not known to us.

Cenchrus strictus Chapm. Bot. Gaz. 3: 20. 1878. "West Coast of Florida, Apalachicola and southward." In the National Herbarium is a specimen from

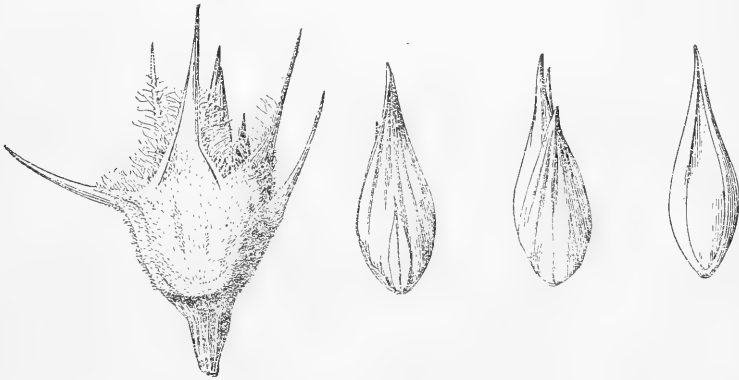


FIG. 15.—*Cenchrus incertus*. From the specimen sent by Curtis to Torrey.

Chapman's herbarium labeled in Chapman's hand, "*Cenchrus incertus*, M. A. Curtis, *C. strictus*, Chapm. in Bot. Gaz. Florida." This specimen agrees well with Chapman's description but, bearing no date, it is uncertain whether or not it is one of the plants from which Chapman drew up his description.

DESCRIPTION.

Plants perennial but apparently fruiting the first year, at length forming dense clumps, glabrous as a whole; culms 25 to 100 cm. tall, compressed, on the average stouter than those of *C. gracillimus*, scabrous (or rarely pubescent) at the summit, ascending or erect from a decumbent base, freely branching; sheaths loose and open, overlapping on the short lower internodes, often pilose near the margin toward the summit; ligule ciliate, about 0.5 mm. long; blades commonly folded, but sometimes flat, rarely stiffly flexuous as in *C. gracillimus*,

7 to 25 cm. long, 2 to 5 mm. (rarely 7 mm.) wide, scabrous on the upper surface and sparsely long-pilose, at least toward the base; spikes long-exserted or those of the branches short-exserted, 4 to 10 cm. long, the burs not crowded but on the average closer than in *C. gracillimus*, the slender axis flexuous, scabrous, sometimes pilose; burs 3 to 5 mm. wide, excluding the spines, the body finely and densely pubescent, the base glabrous; spines spreading, flat, broadened at base, the lower often obsolete on the outer face of the bur and represented by low knobs or ridges, the upper few, rarely more than 5 mm. long; body of the bur usually not deeply cleft on the outer face, the lobes commonly 5 to 7, erect to spreading, 4 to 6 mm. long, rigid and spinelike, long-ciliate at the broad base; spikelets 1 to 3, 5 to 6 mm. long, about 2 mm. wide; first glume narrow, pointed, usually present; second glume about three-fourths the length of the subequal sterile and fertile lemmas; fruit attenuate, the palea minutely puberulent toward the summit.

In this species the burs vary greatly in the development of the spines. In Curtis's specimen, from which the figure is drawn, the burs are less spiny than usual. Commonly there are one or two spines on the outer face, besides a ridge or one or two knobs at the base of the body. Occasionally the burs are as spiny as are some in *C. pauciflorus*, but the plants may be distinguished by their taller culms and erect or ascending habit, and by the glabrous, relatively long base of the bur. From *C. gracillimus* spiny specimens are distinguished by the pubescent burs.

DISTRIBUTION.

Open sandy soil, North Carolina to Florida and west to Texas.

NORTH CAROLINA: Wilmington, *Hitchcock* in 1905. Smithville, *Curtis*.

SOUTH CAROLINA: Orangeburg, *Amer. Gr. Nat. Herb.* 618.

GEORGIA: Augusta, *Kearney* 213. Leslie, *Harper* 1398. Dooly County, *Harper* 570. Brunswick, *Chase* 7093; *Ricker* 968.

FLORIDA: Jacksonville, *Curtis* 6019. Duval County, *Fredholm* 323. St. Augustine, *Ricker* 948. Lake City, *Chase* 4280. East Pass, *Tracy* 6448. River Junction, *Nash* 2580. Apalachicola, *Biltmore Herb.* 1884. Chipley, *Combs* 610. Palm Beach, *Hitchcock* 2283. Miami, *Chase* 3854. Key Largo, *Chase* 3937. Tampa, *Fredholm* 6420. Bartow, *Combs* 1224. Fort Myers, *Standley* 13040. Punta Rassa, *Hitchcock* 446; *Standley* 12672.

ALABAMA: Springhill, *Bush* 273. Mobile, *Kearney* 59. Eufaula, *McCarthy* in 1888.

MISSISSIPPI: Biloxi, *Kearney* 210; *Tracy* 3733. Ocean Springs, *Tracy* in 1889. Chevalier Island, *Tracy* 4525. Mississippi Sound, *Smith* in 1885.

LOUISIANA: Shreveport, *Ball* 105. Alexandria, *Ball* 533. Coushatta, *Ball* 116.

TEXAS: Kerrville, *Hitchcock* 5258. New Braunfels, *Hitchcock* 5236. Austin, *Hall* 842. San Antonio, *Jermy* 171; *Hitchcock* in 1903. Rockport, *Chase* 6017. Corpus Christi, *Hitchcock* in 1904. Chillicothe, *Ball* 974. Without locality, *Drummond* 347.

10. *Cenchrus microcephalus* Nash.

Cenchrus microcephalus Nash in *Hitchc. & Chase, Contr. U. S. Nat. Herb.* 18: 356. 1917. "Type specimen in the New York Botanical Garden, collected in saline meadows, Berry Island, Bahamas, by Britton & Millspaugh (no. 2249)." This specimen consists of a single culm about 70 cm. long, single below and repeatedly branched above.



DESCRIPTION.

Plants probably perennial, tufted, with numerous leafy sterile shoots at the base, glabrous as a whole; culms 30 to 70 cm. tall, compressed, slender, scabrous below the spike, ascending from a decumbent base, branching from the middle and upper nodes; sheaths, especially those of the sterile shoots, strongly keeled, pilose on the margin toward the summit and on the shoots, with a tuft of white hairs on each side at the apex, this inconspicuous on the old sheaths; ligule ciliate, about 0.5 mm. long; blades folded at base, often flat above, rather thin, mostly 10 to 20 cm. long, 2 to 3 mm. wide, pilose on the upper surface; spikes mostly short-exserted, 3 to 5 cm. long, the slender axis flexuous, scabrous; burs (including the bristles) about 6 mm. long and 5 mm. wide, the body scarcely wider than the thick base, minutely pubescent; spines flat, broadened at base, the lowermost short and spreading, the upper stout, ciliate at the base, shorter than the 5 or 6 lobes of the involucre, these erect or ascending, ciliate nearly to the summit, rigid but relatively blunt; spikelets usually 2, 4 to 4.5 mm. long, about 1 mm. wide; first glume nearly half the length of the equal sterile lemma and fruit.



FIG. 16.—*Cenchrus microcephalus*.
From the type specimen.

Known only from the Berry Islands, a second specimen having been collected on Frozen Cay (*Britton & Millspaugh 2211*).

11. *Cenchrus pauciflorus* Benth.

Cenchrus pauciflorus Benth. Bot. Voy. Sulph. 56. 1840. "Bay of Magdalena," Lower California. The type specimen, collected by Barclay, is in the Kew Herbarium. Doctor Stapf has kindly sent three burs from this collection. He writes that there are two sheets absolutely identical, both bearing, in Bentham's handwriting, the name and the locality as published. Two specimens from Lower California, Xantus's no. 115, from Cape San Lucas, and Brandegee's no. 3 in 1889, from Boca de las Animas, and one from Yaqui River, Sonora, Palmer's no. 11 in 1869, were sent to Doctor Stapf for comparison with plants collected by Barclay. Doctor Stapf writes: "There is no doubt that they are identical." These plants are slender, somewhat depauperate specimens with burs smaller than the average for the species. Unfortunately the type on which the name of this species is based is not typical of the species. Besides the illustration of the bur from the Barclay specimen a bur typical of the species is shown (figure 18).

Cenchrus roseus Fourn. Mex. Pl. 2: 50. 1886. "Vera Cruz (GOUIN n. 42 part et 43)." The Gouin specimens in the herbarium of the Paris Museum were examined for us through the kindness of the director. The plants are fragmentary, with very few burs. The notes furnished on the specimens place them with little doubt in *C. pauciflorus*.

Cenchrus echinatus forma *longispina* Hack. in Kneucker, Allg. Bot. Zeitschr. 9: 169. 1903. "Oxford in Connecticut . . . leg. E. B. Harger," no. 426 of Kneucker's "Gramineae exsiccatae." A specimen of this collection is in the National Herbarium.

This is the species to which the name *Cenchrus tribuloides* was commonly applied until 1908, when Professor Hitchcock published¹ the results of his study of the grasses in the Linnaean Herbarium, showing the Linnaean species

¹ Contr. U. S. Nat. Herb. 12: 127. 1908.

to be the large-burred coastal plant which had been distinguished as *C. macrocephalus*. The name *C. carolinianus* Walt. was then applied to this species, but Walter's diagnosis does not agree with its characters and it has not been found in Walter's region.¹

DESCRIPTION.

Plants annual, sometimes forming large mats; culms 20 to 90 cm. long, compressed, rather stout, scabrous or rarely pubescent at the summit, spreading, ascending or rarely suberect, from a decumbent base, usually freely branching; sheaths pubescent along the margin, rarely throughout, sometimes with a tuft of white hairs at the summit, loose, those below the spikes commonly inflated; ligule ciliate, nearly 1 mm. long; blades usually flat but sometimes subinvolute or folded, spreading, 3 to 15 cm. long, 2 to 7 mm. wide, tapering from base to apex, scabrous on the upper surface and sometimes on the lower, often pilose near the base above; spikes numerous, short-exserted or partly included, 1 to 10 cm. long (commonly 3 to 8 cm. long), the burs rather crowded, the slender axis flexuous, scabrous, sometimes pilose; burs (excluding the spines)

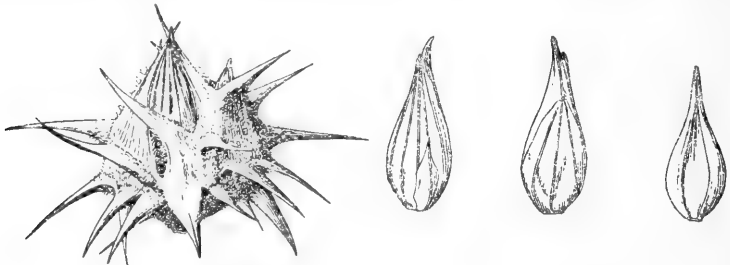


FIG. 17.—*Cenchrus pauciflorus*. From the type specimen.

3 to 7 mm. wide (commonly 4 to 6 mm.), pubescent, often densely so, rarely nearly glabrous; spines numerous, spreading or reflexed, flat, broadened at base, the lowermost shorter and relatively slender, some of the upper ones commonly 4 to 5 mm. long, usually villous at the base; body of the bur often with one deep cleft on the outer face, the lobes commonly about eight, erect or spreading or one or two inflexed, usually villous at the base, rigid and spine-like; spikelets commonly two, 5 to 7 mm. long, about 2 mm. wide; first glume usually not over one-third the length of the spikelet; second glume and sterile lemma subequal or the lemma nearly as long as the turgid acuminate-pointed fruit.

This species reaches its most characteristic development in the interior of the United States and on the Mexican plateau, where it is a coarse weed² in sandy ground, forming mats as much as 50 cm. in diameter. Eastward the species appears to be introduced, though it seems to be native in Florida. On the Atlantic coastal plain it is often more slender, with the blades sometimes folded, approaching *C. gracillimus* in habit. In the Colorado Desert it is sometimes dwarfed, forming mats only 3 to 5 cm. in diameter, the spikes reduced to one or two burs. In western Mexico and Central America specimens with smaller burs (about 3 mm. wide, excluding the spines) are found, besides the

¹ See discussion, p. 76.

² A study of the barbs on the spines of this species and a speculation as to the cause of the irritation produced by them when left in the flesh was published by Gayle (Bot. Gaz. 17: 126, 127. 1892).

Candarus called "spinifex" by Philiphi
in Hackel Herb = *echinatus* L.

relatively short-spined form represented by the type of *C. pauciflorus*. A single collection (*Hitchcock* in 1904) from Sarita, Texas, is this short-spined form. In the West Indies this species and *C. tribuloides* approach each other closely. Only specimens from the vicinity of Habana, possibly introduced, are like continental specimens. The one from the Bahamas and the one from Jamaica, particularly the latter, are like *C. tribuloides* in habit, but they have the smaller burs of *C. pauciflorus*.

Cenchrus spinifex Cav.,¹ described from Chile, has been referred to "*C. tribuloides*" as a synonym. The type has not been examined. Cavanilles's description of the "calix communis" [involucre] as "integerrimus" does not apply to any known species of *Cenchrus*. A species with interlocked lobes might, at first sight, give the impression of an unclleft body, but the most superficial examination of *C. pauciflorus* would reveal the lobes. The crude illustration shows an unclleft body with thick spines. The relatively short, broad blades described and figured are not those of *C. pauciflorus*. In the National Her-

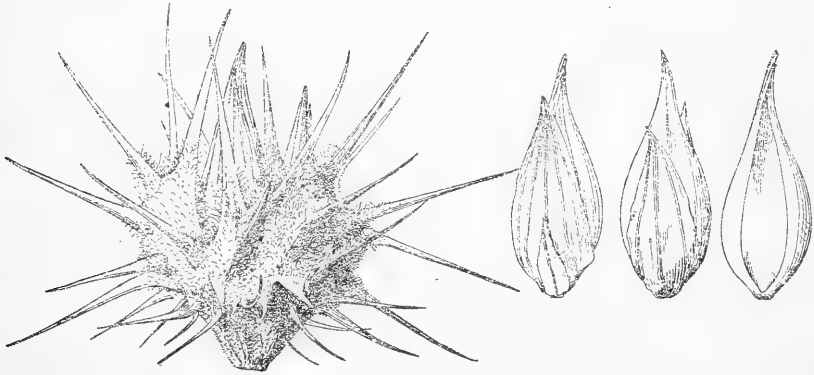


FIG. 18.—*Cenchrus pauciflorus*. From *Hitchcock* 13532; typical of the species.

barium there are four specimens of *C. pauciflorus* from southern South America (though none from Chile), but there is nothing that agrees with Cavanilles's description and plate. The grasses of that region are as yet but little known. The identity of *C. spinifex* has been carefully considered, and it seems certain that it can not be *C. pauciflorus*. Another species described from Chile which we are unable to identify is *C. muricatus* Phil.² (not Linnaeus, 1771). This also is described as having entire involucre. In any case Philippi's name is a homonym.

DISTRIBUTION.

Sandy open ground, and along railway embankments, Massachusetts to Florida, west to Oregon and California, ascending to 2,000 meters in the Rocky Mountains, south throughout Mexico, mostly on the plateau, rare in the tropical part of the continent, and appearing again from southern Brazil to Argentina; also in the West Indies.

ONTARIO: Leamington, *Macoun* 63.

MASSACHUSETTS: South Hadley, *Clark* in 1887.

CONNECTICUT: South Glastonbury, *Wilson* 28.

NEW YORK: Erastina, *Pollard* in 1894. Northville, *Young* in 1873.

¹ *Icon. Pl.* 5: 38. *pl.* 461. 1799.

² *Anal. Univ. Chile* 36: 202. 1870.

- NEW JERSEY: Camden, *Scribner* 122. Stockholm, *Van Sickle* in 1894. Stockton, *Fisher* in 1897.
- PENNSYLVANIA: Easton, *Porter* in 1868. Lancaster County, *Small* in 1889; *Heller* in 1901.
- OHIO: Toledo, *Sanford* 6780. Kipton, *Ricksecker* in 1894. Fernbank, *Kearney* in 1892.
- INDIANA: Lake Gage, *Deam* in 1903. Ontario, *Deam* 15054. Waterloo, *Deam* in 1904. Fort Wayne, *Deam* 1323. Bluffton, *Deam* in 1896. Miller, *Umbach* in 1897. Indiana Harbor, *Deam* 1397. Conrad, *Deam* 21525. Russellville, *Deam* 7443. Martinsville, *Deam* 2673. Brookville, *Deam* in 1903. Kinderhook Ferry, *Deam* 25576.
- ILLINOIS: Chicago, *Chase* 1167; *Lansing* 3990. Joliet, *Skcels* 508. Forest, *Wilcox* 136. Champaign, *Gleason* 25. Wady Petra, *V. H. Chase* 1929. Mount Carmel, *Schneck* in 1904. Cahokia, *Eggert* in 1875.
- MICHIGAN: St. Joseph, *Gamon* in 1897.
- WISCONSIN: Quincy, *Cheney* 3747. Oshkosh, *Random* in 1896.
- MINNESOTA: Fort Snelling, *Mearns* 5. Montevideo, *Moyer* 26. Minneapolis, *Ballard* in 1893. St. Anthony Park, *Oswald* in 1911.
- NORTH DAKOTA: Bismarck, *Lunell* in 1913.
- SOUTH DAKOTA: Pierre, *Griffiths* 30. "Island in the Missouri River," *Griffiths* 34. Bad Lands, *Williams* in 1891.
- IOWA: Fayette County, *Fink* 359. Ames, *Ball* 12; *Pammel*, *Amer. Weeds* 27. Des Moines, *Pammel* 657. Butlers Landing, *Somes* 3482.
- NEBRASKA: Central City, *Rydberg* 2015; *Shear* 257. Chelsea, *Clements* 2827. Mullen, *Rydberg* 1548.
- MISSOURI: Springfield, *Standley* 8996. Kansas City, *Bush* 6497. Frankford, *Davis* 1140.
- KANSAS: Fort Riley, *Gayle* 582. Syracuse, *Thompson* 82. Manhattan, *Hitchcock* 10411. Riley County, *Norton* 577. Hutchinson, *Smyth* 25. Osborne City, *Shear* 163.
- MARYLAND: Millstone, *Hitchcock* 7873.
- DISTRICT OF COLUMBIA: Deanwood, *Amer. Gr. Nat. Herb.* 614.
- NORTH CAROLINA: Wilmington, *Biltmore Herb.* 146b; *Hitchcock* in 1905.
- GEORGIA: Darien, *Smith* 2149.
- FLORIDA: Jacksonville, *Combs* 38; *Curtiss* 82, 3620, 5151, 5193, 6020. St. Augustine, *Chase* 7019. Lake-City, *Combs & Rolfs* 185; *Quaintance* 852. DeFuniak Springs, *Combs* 453. Apalachicola, *Kearney* 112. Madison, *Combs* 245. Tallahassee, *Combs* 364; *Kearney* 81. Pensacola, *Combs* 513. Old Town, *Combs* 891. Dunedin, *Tracy* 6743. Cedar Key, *Combs* 763. Seabreeze, *Webber* 489. Eustis, *Hitchcock* 2282, 2285; *Nash* 364, 2101. McDonald Station, *Baker* 59. Grasmere, *Combs & Baker* 1078. Palm Beach *Hitchcock* 2284, 2287; *Webber* 416. Miami, *Hitchcock* 722; *Small* 5464. Key Largo, *Chase* 3939. Upper Matecumbe Key, *Chase* 3919. Elliotts Key. *Pollard & Collins* 213. Key West, *Hitchcock* 612. Okeechobee, *Fredholm* 5826. Fort Myers, *Hitchcock* 447, 852. Palmetto, *Nash* 2444.
- KENTUCKY: Louisville, *Mohr* in 1854.
- TENNESSEE: "Bank of the Mississippi River," *Scribner*.
- ALABAMA: Mobile, *Hitchcock* in 1904. Tuskegee, *Carver* 80.
- MISSISSIPPI: Biloxi, *Tracy* in 1893.
- LOUISIANA: Cameron, *Tracy* 8595. Calhoun, *Ball* 50. Shreveport, *Hitchcock* in 1903. Lake Charles, *Chase* 6112.
- TEXAS: Texarkana, *Heller* 4211. Texline, *Griffiths* 5667. Cibolo, *Jerny* 174. New Braunfels, *Hitchcock* 5206. San Antonio, *Hitchcock* 5154, 5322, 5324. Fort Worth, *Ruth* 166. Rockport, *Chase* 6061. Galveston, *Hitchcock* in

La Noria, Arizona

1903. Corpus Christi, *Hitchcock* 5344; *Heller* 1492. Sarita, *Hitchcock* 5425, 5439, 5473, 5481. Del Rio, *Hitchcock* 13647, 13664. Laredo, *Hitchcock* 5501, 5502, 5509. La Noria, *Mearns* 1162. Fort Clark, *Mearns* 1217. Big Spring, *Hitchcock* 13352, 13398. El Paso, *Hitchcock* 13334. South-western Texas, *Palmer* 1242 in 1880.
- OKLAHOMA: Between Fort Cobb and Fort Arbuckle, *Palmer* 385 in 1868. Arkansas, *Bush* 745. Alva, *Stevens* 768.
- WYOMING: Uva, *Nelson* 8568.
- OREGON: Willows, *Dunn*, 181. Linnton, *Suksdorf* 1994.
- COLORADO: Fort Collins, *Brose* 530. Canon City, *Shear* 963. Rocky Ford, *Griffiths* 3315. Colorado Springs, *Williams* 2168.
- UTAH: Springdale, *Jones* 6079.
- NEW MEXICO: Artesia, *Hitchcock* 13451. Queen, *Hitchcock* 13532. Mesilla Park, *Hitchcock* 3823. Las Cruces, *Wooton* 1088. Sandia Mountains, *Ellis* 14. Shiprock Agency, *Standley* 7244. Farmington, *Standley* 7047. Nara Visa, *Fisher* 161. Gila Hot Springs, *Metcalf* 880. Black Range, *Metcalf* 1148. Pecos, *Standley* 4947. Socorro, *Vasey* in 1881. Albuquerque, *Jones* 4123. Without locality, *Fendler* 983.
- ARIZONA: Holbrook, *Rusby* 8. Prescott, *Hitchcock* 13187. Patagonia, *Hitchcock* 3705. Verde Valley, *MacDougal* 523. Clifton, *Davidson* 413a. Fort Lowell, *Griffiths* 1560.
- CALIFORNIA: Mecca, *Parish* in 1913. San Bernardino, *Parish* 2114 and in 1893; *Abrams* 1960.
- LOWER CALIFORNIA: Cape St. Lucas, *Xantus* 115. Boca de las Animas, *Brandege* 3 in 1889. San José del Cabo, *Brandege* 27 in 1890.
- SONORA: Yaqui River, *Palmer* 11 in 1869. Hermosillo, *Hitchcock* 3578. Alamos, *Rose, Standley & Russell* 12837. Guaymas, *Palmer* 168 and 349 in 1887; *Rose, Standley & Russell* 15019.
- CHIHUAHUA: Casas Grandes, *Nelson* 6327. Chihuahua, *Hitchcock* 7788.
- COAHUILA: Jaral, *Schumann* 1730. Saltillo, *Hitchcock* 5628.
- NUEVO LEÓN: Monterrey, *Hitchcock* 5523.
- TAMAULIPAS: Victoria, *Palmer* 396 in 1907; 156 in 1910. Tampico, *Hitchcock* 5792.
- SAN LUIS POTOSÍ: Cárdenas, *Hitchcock* 5733. San Luis Potosí, *Hitchcock* 5654, 5699; *Schaffner* 1046.
- DURANGO: Durango, *Hitchcock* 7575; *Palmer* 196 in 1896. Torreón, *Hitchcock* 7559.
- SINALOA: Mazatlán, *Rose, Standley & Russell* 13794.
- TEPIC: Acaponeta, *Rose, Standley & Russell* 14407.
- AGUASCALIENTES: Aguascalientes, *Hitchcock* 7440, 7470.
- JALISCO: Guadalajara, *Hitchcock* 7292. Tecomán, *Orcutt* 4446.
- HIDALGO: Tula, *Rose, Painter & Rose* 8361.
- QUERÉTARO: Querétaro, *Basile* 28; *Hitchcock* 5825, 5841; *Agniel* 10259.
- COLIMA: Manzanillo, *Hitchcock* 7049. Armeria, *Hitchcock* 7023, 7047.
- FEDERAL DISTRICT: Popo Park, *Hitchcock* 6025, 6688½.
- PUEBLA: Tehuacán, *Hitchcock* 6045, 6068½; *Seler* 7.
- VERACRUZ: Mata de San Juan, *Liebmann* 473. Veracruz, *Hitchcock* 6575.
- GUERRERO: Acapulco, *Palmer* 290 in 1895.
- OAXACA: Tomellín, *Hitchcock* 6204, 6218, 6249. Oaxaca, *Hitchcock* 6128; *Nelson* 1291. Santa Catarina Canyon, *Pringle & Conzatti* 274.
- YUCATÁN: Alacrán Shoal, *Millspaugh* 1756.
- QUINTANA ROO: Cozumel Island, *Millspaugh* 1607.
- NICARAGUA: Corinto, *Hitchcock* 8618.

COSTA RICA: Puntarenas, *Hitchcock* 8540.

PANAMA: Point Chamé, *Hitchcock* 8164.

CUBA: Habana, *León* 188½, 836, 2391, 3445, 3453; *Palmer & Riley* 1146. Tricornia, *Hitchcock* 492. Playa de Cojímar, *Hitchcock* 493. Without locality, *Wright* 3476.

JAMAICA: Black River, *Hitchcock* 9637.

PORTO RICO: Santurce, *Chase* 6345½.

VIRGIN ISLANDS: St. Thomas, *Raunkiaer* 634.

LEEWARD ISLANDS: Antigua, *Wulfschlaegel* 634.

BRAZIL: Rio Janeiro, *Wilkes Expl. Exped.*; *Warming* in 1863.

URUGUAY: Costa Platense, *Arecharaleta*.

ARGENTINA: Córdoba, *Stuckert* in *Kneucker Gram. Exs.* 427. Without locality, *Lorentz* 697; *Jorgensen* 1147.

12. *Cenchrus tribuloides* L.

Cenchrus tribuloides L. Sp. Pl. 1050. 1753. "Habitat in Virginiae maritimis." The type specimen in the Linnaean Herbarium,¹ marked "K," indicating that it was collected by Kalm, consists of two branching plants.

Cenchrus echinatus tribuloides Torr. Fl. North. & Mid. U. S. 1: 69. 1823. Based on *C. tribuloides* L.

Cenchrus vaginatus Steud. Syn. Pl. Glum. 1: 110. 1854. "Culta in horto Paris: sub. *Cenchrus tribuloides macrocarpus*." This specimen has not been examined, but the detailed description applies remarkably well to the true *C. tribuloides*.

Cenchrus tribuloides macrocarpus Steud. Syn. Pl. Glum. 1: 110. 1854. A garden name given as synonym of *C. vaginatus* Steud.

Cenchrus tribuloides var. *macrocephalus* Doell in Mart. Fl. Bras. 2^o: 312. 1877. Described from a specimen in Martius's herbarium, "e Brasilia oriunda." The type has not been examined, but the brief description can refer to nothing else known to us. The involucre, described as less villous than that of *C. tribuloides*, would indicate an exceptional specimen, such as Chase's no. 4531 from South Carolina and several of the West Indian specimens.

Cenchrus macrocephalus Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 17: 110. f. 406. 1899. Based on *C. tribuloides* var. *macrocephalus* Doell.

DESCRIPTION.

Plants annual, very leafy; culms stout, at first erect, soon branching and becoming radiate-decumbent, 15 to 60 cm. long, the ends ascending, rooting at the nodes and with numerous ascending branches 10 to 30 cm. tall, scabrous or pilose at the summit; sheaths usually much overlapping, sharply keeled, broad, those below the spikes inflated, pubescent at least along the margin and with a dense tuft of hairs on each side at the summit; ligule ciliate, 1 mm. long; blades flat or folded, the margins usually more or less involute, firm, spreading, 3 to 18 cm. long (seldom over 12 cm. long), 4 to 7 mm. wide, tapering from base to apex, scabrous on the upper surface; spikes numerous, usually exceeded by the subtending leaf, 3 to 9 cm. long, the burs crowded, the axis flexuous, scabrous or pilose; burs more oblique than in any other of our species, 5 to 6 mm. wide and 8 to 9 mm. high (excluding the spines), usually conspicuously villous, but sometimes short-pubescent only, the base puberulent, usually with a few long hairs at the very base; spines finally spreading, flat, the lowermost relatively short and slender, the upper ones broadened at the base, some-

¹ See p. 45.

times as much as 3 mm., broad, some of them 5 to 8 cm. long, long-villous on the inner face and margins of the broad base, the hairs of the margin rather stiffly spreading, the ends needle-like and retrorsely barbed; body of the bur with no deep cleft on the outer face, the tips of the spikelets usually not showing above the base of the clefts, the lobes six to eight, mostly about equal and simulating the larger spines, erect to spreading, villous on the inner face and on the margins at the base like the spines, the outer surface glabrous or nearly so above the base; spikelets usually two, 7 to 8 mm. long, about 3 mm. wide; first glume about one-third the length of the spikelet; second glume sometimes minutely puberulent on the lower part of the middle internerves, slightly shorter than the sterile lemma, this slightly shorter than the acuminate-pointed fruit.



FIG. 19.—*Cenchrus tribuloides*. From *Amer. Gr. Nat. Herb.* 621, Virginia.

Cenchrus tribuloides usually is readily recognizable by its short-jointed, leafy, decumbent culms and large woolly burs. In *Chase* 4531 from South Carolina and in most of the specimens from the West Indies, however, the burs are not conspicuously villous, the pubescence being scarcely or not at all longer or more copious than in *C. pauciflorus*. In the specimen from Costa Rica the burs are nearly glabrous. Because of the habit of the plants and because of their large burs, with bodies not deeply cleft and with hidden or nearly hidden spikelets, these specimens are referred to *C. tribuloides*. In *Shafer* 2737 from Cuba, *Millsbaugh* 1162 from Cayman Brac, and *Chase* 6561 from Porto Rico, the burs are scarcely larger than in extreme specimens of *C. pauciflorus*, and some of them are slightly cleft, showing the upper part of the spikelets. It is a puzzling fact that in the West Indies, at the eastern edge of the range of *C. tribuloides*, this species and *C. pauciflorus*, whose center of distribution is far to the west of that of *C. tribuloides*, approach each other, while in the Gulf States, where their ranges meet, they do not.

DISTRIBUTION.

In loose sands of the coast from Staten Island, New York, to Florida and Louisiana; on the Atlantic coast of Costa Rica, in the West Indies, and on the coast of Brazil.

NEW YORK: Staten Island, *Kearney* in 1894.

NEW JERSEY: Camden, *Smith* 64. Atlantic City, *Scribner* in 1895. Wildwood, *Chase* 3506. Cape May, *Parker* in 1871; *Martindale* in 1877.

DELAWARE: Rehoboth, *Commons* 144 in 1895. Cedar Neck, *Commons* 143 in 1875.

MARYLAND: Chesapeake Beach, *Hitchcock* in 1905; *Pennell* 2541 and in 1909. Millstone, *Hitchcock* 7871. Mount Vernon, *Tidestrom* 7464. Annapolis, *Bartlett* 1862.

VIRGINIA: Colonial Beach, *Hubbard* 398. Franklin, *Heller* 1170. Cape Charles, *Canby & Rose* 837. Cape Henry, *Amer. Gr. Nat. Herb.* 621; *Kearney* 1813, 1814. Virginia Beach, *Hitchcock* in 1902; *Williams* 3108. Fortress Monroe, *McCarthy* in 1884. Portsmouth, *Noyes* 24. Dismal Swamp, *Chase* 3665.

NORTH CAROLINA: Newbern, *Kearney* 1948. Greenville, *Chase* 4573; *Hitchcock* in 1905. Wilmington, *Kearney* 286. Eastern North Carolina, *McCarthy* in 1885.

SOUTH CAROLINA: Isle of Palms, *Chase* 4531; *Hitchcock* in 1905.

GEORGIA: Tybee Island, *Hitchcock* in 1902.

FLORIDA: Miami, *Westgate* in 1904. Elliotts Key, *Pollard & Collins* 213. Soldier Key, *Small, Carter & Small* 3300. Sanibel Island, *Tracy* 7172. St. Vincent Island, *McAtee* 1800.

ALABAMA: Mobile, *Mohr* in 1878. Navy Cove, *Mohr* in 1888. Point Clear, *Mohr* in 1879 and in 1885.

MISSISSIPPI: Horn Island, *Tracy* in 1897. Deer Island, *Tracy* 140. Ship Island, *Pollard* 1088. Ocean Springs, *Pollard* 1022. Biloxi, *Tracy* 4526.

LOUISIANA: Grande Isle, *Langlois* in 1879.

COSTA RICA: Boca Banana, *Tonduz* 9121.

BERMUDA: *Collins* 143. Paget, *Brown & Britton* 128. Middleton Bay, *Moore* 3073.

BAHAMAS: Andros, *Small & Carter* 8972. Water Key, *Wilson* 8151. Anguilla Isles, *Wilson* 7936.

CUBA: Playa de Marianao, *León* 5634. Punta Arenas, *Shafer* 700. Cayo Pare-dón Grande, *Shafer* 2737.

JAMAICA: Grand Cayman, *Millsbaugh* 1249. Cayman Brac, *Millsbaugh* 1162.

PORTO RICO: Arecibo, *Chase* 6561. Aguadilla, *Chase* 6604. Cabo Rojo, *Sintenis* 29 b. Mona Island, *Hess* 440. Cayo Muertos, *Britton, Cowell & Brown* 5046. Vieques, *Chase* 6696.

BRAZIL: Rio Janeiro, *Jard. Bot. Rio Janeiro* 132.

13. *Cenchrus palmeri* Vasey.

Cenchrus palmeri Vasey in T. S. Brandeg. Proc. Calif. Acad. II. 2: 211. 1889. "Collected by Dr. E. Palmer at Guaymas, Mex., in 1887." The type specimen, Palmer's no. 689, in the National Herbarium, is a single branching tuft, the culms 30 to 42 cm. tall, the burs 1 or 2 to each spike, their spines blackish purple.

DESCRIPTION.

Plants annual, leafy; culms rather slender, compressed, scabrous below the nodes, pubescent at the summit, at first erect, soon branching and spreading, 12 to 42 cm. tall; sheaths mostly overlapping, loose, retrorsely velvety-pubescent,

the hairs longer and denser at the summit; ligule ciliate, 2 to 2.5 mm. long; blades mostly flat, rather firm, ascending or spreading, 3 to 18 cm. long, 3 to 7 mm. wide, tapering from the base to an attenuate apex, very scabrous on both surfaces; spikes reduced to 1 to 4 burs, commonly 1 or 2, the terminal spikes mostly long-exserted, those of the branches overtopped by the subtending leaf;

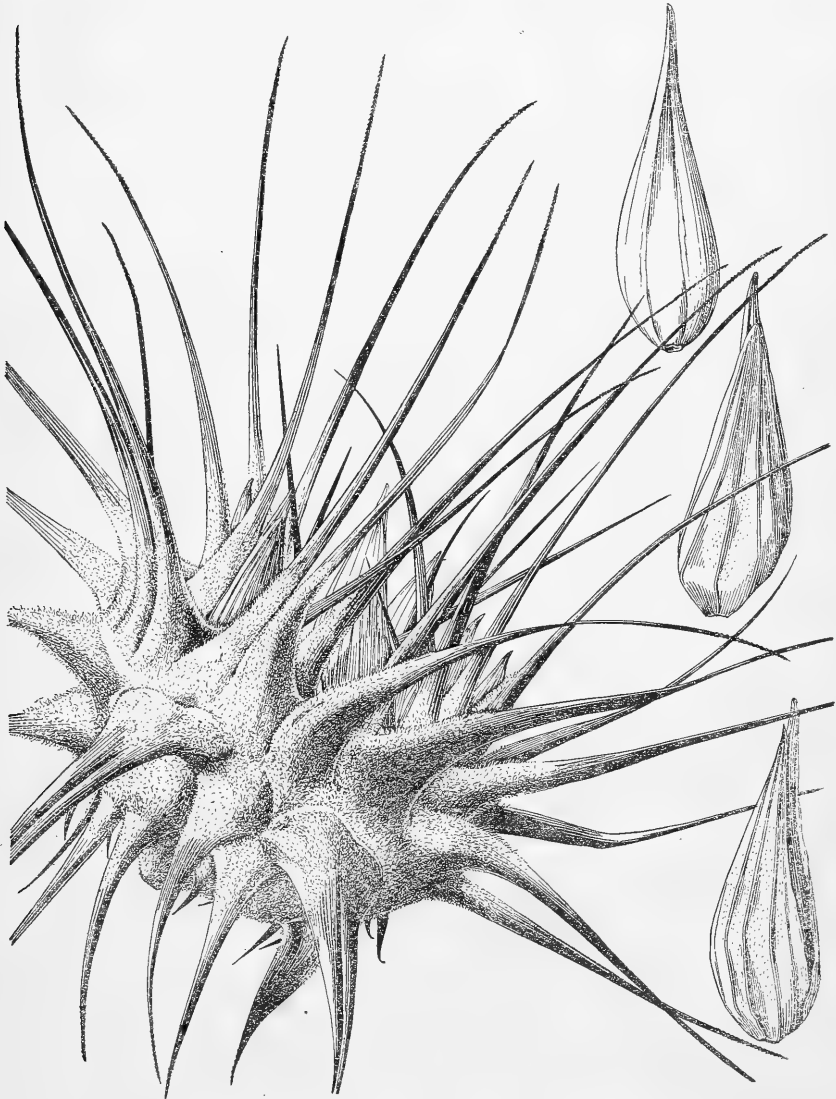


FIG. 20.—*Cenchrus palmeri*. From the type specimen.

burs (including the spines) 2 to 2.5 cm. high and 2.5 to 4 cm. broad, the body scarcely oblique, depressed-globose, truncate at base, about 10 mm. high and 12 mm. wide, pale tawny-canescens; spines numerous, spreading or reflexed, usually blackish purple above the villous-canescens, greatly thickened base, but sometimes yellow, the lowermost short, stout and thornlike, the others long-attenuate, retrorsely barbed and sometimes flexuous at the needle-like tips, commonly some

of them divided in two part way or to the base, and some 12 to 15 mm. long; body of the bur thick-walled, the lobes mostly 12 to 15, erect or spreading, similar to the spines; spikelets 4 to 7, more or less distorted by the pressure of the rigid involucre, 7 to 9 mm. long, 2 to 3 mm. wide; first glume very narrow, usually wanting; second glume and sterile lemma slightly shorter than the acuminate fruit, obscurely puberulent on the middle internerves.

The bur of *C. palmeri* is larger than that of any other known species of the genus. A second specimen of *Palmer* 689 with yellow-spined burs is mentioned by Vasey in the original description as a "yellow colored variety."

DISTRIBUTION.

In dry sands near the coast, Sonora and Lower California, Mexico.

LOWER CALIFORNIA: Carmen Island, *Palmer* 14 in 1870, 865 in 1890. Calmallí, *Orcutt* in 1899. Magdalena Bay, *Brandegee* in 1889. San José del Cabo, *Purpus* 519. San Felipe, *Goldman* 1161. Between Santo Domingo and Matancita, *Nelson & Goldman* 7276.

SONORA: Guaymas, *Palmer* 271 and 689 in 1887. Adair Bay, *Sykes* 58.

DOUBTFUL SPECIES.

The following names, based on North American plants, the writer has not been able to identify:

CENCHRUS CAROLINIANUS Walt. Fl. Carol. 79. 1788. No locality is given, but so far as known Walter's plants were collected in the vicinity of his home, which was on the south side of the Santee River, in the northern part of Berkeley County, South Carolina, to the east of Eutaw Springs, and near the mouth of the old Santee Canal¹. No specimen of *Cenchrus* was found in the Walter Herbarium, now in the British Museum². The brief diagnosis is as follows: "Involucrum echinatum biflorum, spica glomerata, glumis globosis muricato-spinosis laevibus." This was meant apparently to distinguish the species from Linnaeus's "glumis femineis globosis muricato-spinosis hirsutis," that is, *C. tribuloides*. Walter's diagnosis does not apply to any known species. Our only species with smooth burs is *C. gracillimus*, which is not found north of Florida. When the American grasses in the Linnaean Herbarium were examined by A. S. Hitchcock in 1907, it was found that *C. tribuloides* was the coast form currently called *C. macrocephalus*. The name *C. carolinianus* was then applied to the common inland species previously known as *C. tribuloides*. That species, however, is not known to occur in South Carolina. It has been found in North Carolina and Georgia but appears there to be an introduced weed. Two species of *Cenchrus* are known from South Carolina, *C. tribuloides*, confined to the coast, and *C. incertus* in the coastal plain. Of these two only *C. incertus* is known to occur in Walter's region. His statement "glumis [bur] laevibus" better applies to *C. incertus* with its finely pubescent burs than to *C. tribuloides* with conspicuously villous burs. Since the diagnosis is inadequate and the type specimen nonexistent, the name can not be applied with certainty and is therefore rejected.

CENCHRUS GRACILIS Beauv. Ess. Agrost. 57. 157. 1812. A name only for a specimen sent by Bosc, presumably from the Carolinas.

CENCHRUS HIRSUTUS Spreng. Neu. Entd. 3: 15. 1822. "Hispaniola." The description, which suggests a species of *Pennisetum* rather than *Cenchrus*, does not agree with any species known to us.

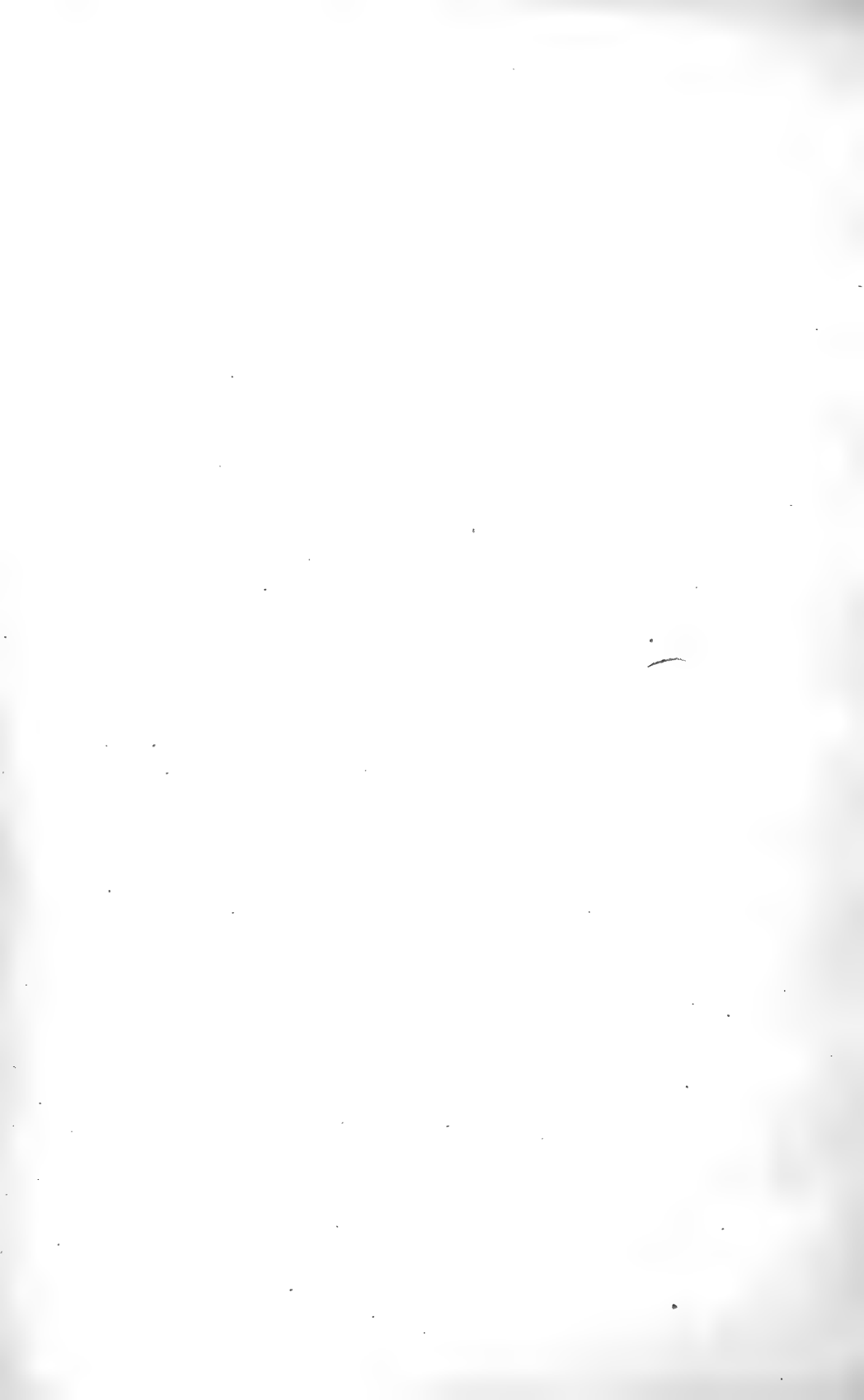
¹ See Brainerd, Bull. Charleston Mus. 3: 33. 1907.

² See Hitchcock, Ann. Rep. Mo. Bot. Gard. 16: 48. 1905.

EXCLUDED SPECIES.

The following names at some time included in *Cenchrus* comprise only those based on American material or those of species which occur in America:

- Cenchrus aegyptius* (L.) Beauv.=*Dactyloctenium aegyptium* (L.) Richt.
Cenchrus granularis L.=*Rytidix granularis* (L.) Skeels.
Cenchrus hilarii Raspail=*Hilaria cenchroides* H. B. K.
Cenchrus inflexus Poir.=*Echinolaena inflexa* (Poir.) Chase.
Cenchrus laevigatus Trin.=*Antheophora hermaphrodita* (L.) Kuntze.
Cenchrus marginalis Rudge=*Echinolaena inflexa* (Poir.) Chase.
Cenchrus multiflorus Presl=*Pennisetum* sp.
Cenchrus mutilatus (Hack.) Kuntze=*Pennisetum mutilatum* Hack.
Cenchrus nervosus (Nees) Kuntze=*Pennisetum nervosum* (Nees) Trin.
Cenchrus parviflorus Poir. is an unknown species, probably *Chaetochloa geniculata* (Lam.) Millsp. & Chase.
Cenchrus racemosus L.=*Nazia racemosa* (L.) Kuntze.
Cenchrus setosus Swartz=*Pennisetum setosum* (Swartz) L. Rich.
Cenchrus spicatus (L.) Kuntze=*Pennisetum glaucum* (L.) R. Br.
Cenchrus tripsacoides Cav.=*Antheophora hermaphrodita* (L.) Kuntze.
Cenchrus tristachyus (H. B. K.) Kuntze=*Pennisetum tristachyum* (H. B. K.) Spreng.
Cenchrus villosus Spreng.=*Antheophora hermaphrodita* (L.) Kuntze.
Cenchrus villosus (R. Br.) Kuntze=*Pennisetum villosum* R. Br.



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II

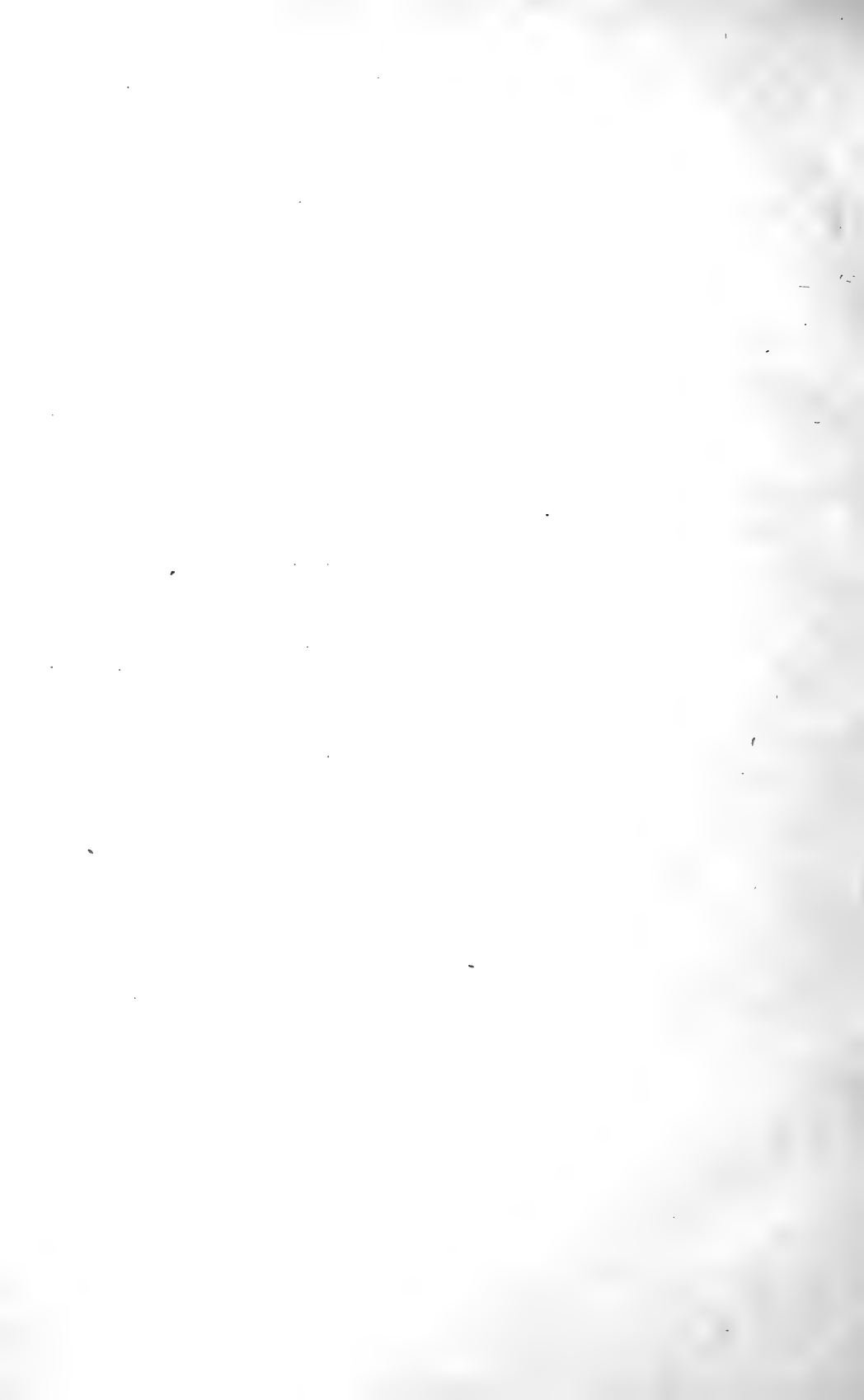
PREFACE.

The four accompanying papers by Prof. A. S. Hitchcock, systematic agrostologist of the United States Department of Agriculture, consist of revisions of four genera of the tribe Paniceae, a continuation of his studies of North American grasses.

The first two genera, *Isachne* and *Oplismenus*, are chiefly tropical, although one species of *Oplismenus* extends into the southern United States. The other two genera are widely distributed in tropical and temperate regions. The genus *Echinochloa* includes the cosmopolitan weed *E. crusgalli*, one form of which is cultivated in India for food and occasionally in the United States for forage. The genus *Chaetochloa* includes the common millet, of which there are many varieties, cultivated in the Old World as a grain and in the United States for forage.

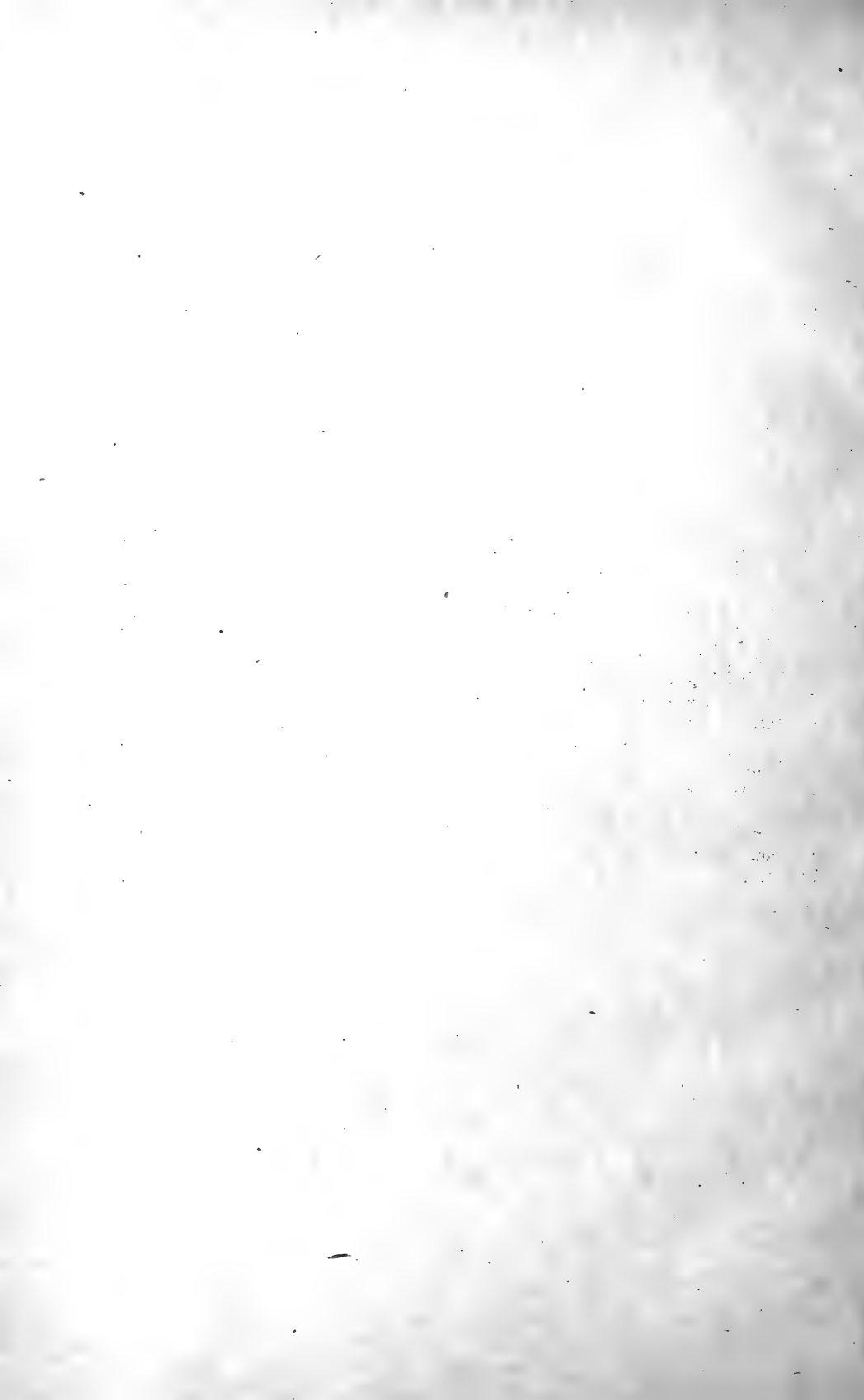
FREDERICK V. COVILLE,

Curator of the United States National Herbarium.



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THE NORTH AMERICAN SPECIES OF ISACHNE.

By A. S. НИТЧЕВСКІЙ.

INTRODUCTION.

This tropical genus of grasses is, in technical characters, anomalous in the tribe Paniceae, to which it belongs, in that the spikelet has two fertile florets instead of one. That is, throughout the tribe, with the exception of *Isachne*, the spikelet has one terminal fertile floret and one sterile floret, this consisting of a lemma only, of a lemma and palea, or of a lemma, palea, and a staminate flower. In *Isachne* the lateral floret contains a perfect flower and normally develops a seed.

There are seven species in North America, a few more in South America, and several in the tropics of the Old World.

DESCRIPTION OF THE GENUS AND SPECIES.

ISACHNE R. Br.

Isachne R. Br. Prodr. Fl. Nov. Holl. 196. 1810. A single Australian species, *I. australis*, is described.

DESCRIPTION.

Perennial or rarely annual grasses with simple or usually branching stems, flat, strongly nerved blades, and paniculate inflorescence. Spikelets obovoid to subglobose. Glumes membranaceous, about equal and as long as the fruits or at maturity exceeded by them. Lower floret perfect or staminate, its lemma and palea indurate and similar in form and texture to those of the upper floret. Both florets (or fruits) plano-convex, obtuse, equal in size or the upper shorter, the pair usually remaining attached by the minute rachilla joint between them.¹

Isachne polygonoides is exceptional in that the lower floret is unlike the upper. In all the species the lower floret of some of the spikelets may fail to perfect a grain. When sterile the floret is often longer and the lemma less convex than when fertile, the spikelets on the same panicle thus having a somewhat diverse appearance.

KEY TO THE SPECIES.

Florets appressed-pubescent.

Blades ovate-clasping..... 1. *I. polygonoides*.
Blades linear..... 2. *I. leersioides*.

¹ For further discussion see Chase, Genera Paniceae. IV. Proc. Biol. Soc. Washington 24: 149. 1911.

Florets glabrous, or the palea minutely hispidulous.

Panicle contracted, spikelike, not over 3 cm. long, the branches appressed or the lower sometimes ascending; plants low and spreading.....3. *I. pygmaea*.

Panicles open, the branches spreading or ascending.

Blades about 3 mm. wide, thick, rigid, pungent, with conspicuously thickened midrib.....4. *I. rigidifolia*.

Blades mostly 5 to 20 mm. wide, firm but not pungent nor with thickened midrib.

Plants trailing; blades rarely over 5 cm. long.....5. *I. rigens*.

Plants clambering; blades mostly more than 5 cm. long.

Glumes pubescent; blades firm, not over 12 cm. long and 1 cm. wide.

6. *I. angustifolia*.

Glumes glabrous (rarely obscurely pubescent at the tips); blades mostly over 15 cm. long and 1.5 cm. wide.

Spikelets aggregate toward the ends of the branches and branchlets.

7. *I. arundinacea*.

Spikelets not aggregate; panicle loosely flowered.....8. *I. disperma*.

1. *Isachne polygonoides* (Lam.) Doell.

Panicum polygonoides Lam. Encycl. 4: 742. 1798. "Cette plante croît à Cayenne, & m'a été communiquée par le citoyen Leblond." The type, in the Paris Herbarium, is an entire plant.

Panicum trachyspermum Nees, Agrost. Bras. 212. 1829. "Habitat in graminosis prope Pará provincia Paraensis." The type, collected by Martius, has been examined in the Munich Herbarium.

Isachne trachysperma Nees in Seem. Bot. Voy. Herald 224. 1857. Based on *Panicum trachyspermum* Nees.

Isachne polygonoides Doell in Mart. Fl. Bras. 2^o: 273. 1877. Based on *Panicum polygonoides* Lam.

DESCRIPTION.

Culms decumbent, branching and spreading, rooting at the lower nodes, the flowering branches ascending, 10 to 30 cm. tall, glabrous, the nodes glabrous but the base of the sheath hispid; sheaths mostly shorter than the internodes, papillose-hispid or glabrate; ligule a ring of stiff hairs about 2 mm. long; blades ovate or ovate-lanceolate, 2 to 5 cm. long, 7 to 17 mm. wide, cordate-clasping and ciliate at base, acute or somewhat acuminate at apex, scabrous on the upper surface, puberulent or pubescent beneath; panicles numerous, ovoid, partially inclosed in the sheaths or finally exserted, the branches and branchlets slender, spreading, stiff and more or less implicate, the pedicels 2 to 4 mm. long, enlarged at the summit; spikelets about 1.5 mm. long; first glume glabrous; second glume sparsely hispidulous; lower floret ovate, only slightly turgid, greenish, glabrous, cartilaginous rather than indurate, exceptional for the genus in resembling the glumes rather than the upper floret; upper floret pubescent, whitish, indurate, hemispherical.

This species appears to be an annual. It is distinguished from all our other species by the ovate clasping blades and by the dissimilarity of the two florets.

DISTRIBUTION.

Moist ground, often in the water, Guatemala to Brazil.

GUATEMALA: Chupadero, *Heyde & Lux* 3916.

COSTA RICA: Buenos Aires, *Tonduz* 4874. Boruca, *Tonduz* 4623. Turrialba, *Tonduz* 8233. San Ramón, *Tonduz* 17909.

PANAMA: Porto Bello, *Pittier* 2454. Dolega, *Hitchcock* 8333. Coclé, *Pittier* 4917. Chepo, *Pittier* 4531. Corozal, *Hitchcock* 9198. David, *Hitchcock* 8375. Gatún Lake, *Amer. Gr. Nat. Herb.* 599. Juan Diaz, *Killip* 4060.

TRINIDAD: Piarco Savanna, *Amer. Gr. Nat. Herb.* 598.

COLOMBIA: Corinto, *Pittier* 1005.

BRITISH GUIANA: Without locality, *Jenman* 5975.

FRENCH GUIANA: Without locality, *Leprieur* 69.

BRAZIL: Bahia, *Riedel* in 1831.

EXPLANATION OF PLATE 25.—*Isachne polygonoides*. Specimen from Panama, *Amer. Gr. Nat. Herb.* 599. Natural size.

2. *Isachne leersioides* Griseb.

Isachne leersioides Griseb. Mem. Amer. Acad. n. ser. 8: 533. 1862. This is in the second part of *Plantae Wrightianae*. The only specimen cited is Wright's no. 755. Grisebach's specimen of this number, which is the type, is without locality other than eastern Cuba. A specimen in the Gray Herbarium is labeled Monte Verde.

DESCRIPTION.

Culms slender, branched, trailing, glabrous, striate, 1 to 2 meters long; sheaths on the main culms much shorter than the elongate internodes, overlapping on the flowering branches, appressed papillose-hispid or nearly glabrous; ligule a very short membrane, ciliate with stiff hairs about 1 mm. long; blades linear, ascending, rather firm, 5 to 15 cm. long, 0.5 to 4 mm. wide, long-acuminate, cartilaginous-margined, scabrous or hispidulous on both surfaces; panicles terminating the branches, ovoid or oblong, 5 to 15 cm. long, as much as 7 cm. wide, the branches mostly single, rather stiffly ascending or spreading, bearing from near the base stiffly spreading branchlets, the spreading pedicels 2 to 3 mm. long; spikelets about 1 mm. long; glumes hispidulous; florets appressed-pubescent.

DISTRIBUTION.

Dry cliffs and pine barrens, Cuba.

CUBA: Sierra de las Yeguas, *Léon* 5078. Zaza del Sur, *Léon* 6730. Sierra del Caballote, *Léon* 6520. Cajalbana, *Léon* 4843. Woodfred, *Shafer* 3013. La Perla, *Shafer* 8561. Monte Verde, *Wright* 755.

EXPLANATION OF PLATE 26.—*Isachne leersioides*. Specimens from Cuba, *Léon* 4843 and 5078. Natural size.

3. *Isachne pygmaea* Griseb.

Isachne pygmaea Griseb. Fl. Brit. W. Ind. 553. 1864. "Hab. Jamaica!, Macf., probably an alpine grass, like the preceding [*I. rigens*]." The type, collected by Macfadyen but without exact locality, has been examined in the Grisebach Herbarium.

DESCRIPTION.

Plants low, the slender branches spreading, glabrous, the flowering shoots usually less than 15 cm. tall, rarely as much as 30 cm. long; sheaths glabrous, ciliate on the margins; ligule a very short hispidulous ring; blades narrowly oblong-lanceolate, 0.5 to 2 cm., or rarely 3 cm. long, rarely over 2 mm. wide, spreading, glabrous or puberulent, the white cartilaginous margin somewhat scabrous; panicles long-exserted, narrow, compact and spikelike, usually less than 2 cm. long, the lower branches short and somewhat distant, appressed or rarely ascending; spikelets about 1.3 mm. long, nearly sessile; glumes glabrous, about two-thirds as long as the spikelet; florets glabrous.

DISTRIBUTION.

Grassy banks. This rare grass has a very limited distribution, being known only from a small area in the Blue Mountains of Jamaica between Newcastle and Cinchona, at about 1,500 meters altitude.

JAMAICA: Cold Spring Gap, *Amer. Gr. Nat. Herb.* 419; *Harris* 11314, 12490. Moodys Gap, *Britton* 3375.

EXPLANATION OF PLATE 27.—*Isachne pygmaea*. Specimen from Jamaica, *Amer. Gr. Nat. Herb.* 419. Natural size.

4. *Isachne rigidifolia* (Poir.) Urban.

Agrostis rigidifolia Poir. in Lam. Encycl. Suppl. 1: 257. 1810. "Cette plante croît à l'île de Saint-Domingue. (V. s. in herb. Desfont.)" Poirlet gives as a synonym *Milium rigidum*. The type has been examined at the Florence Herbarium. It is now in the Webb Herbarium, which contains the Desfontaines Herbarium.

Milium rigidum Poir. in Lam. Encycl. Suppl. 1: 257. 1810, as synonym of *Agrostis rigidifolia* Poir.

Milium rigidifolium Roem. & Schult. Syst. Veg. 2: 319. 1817. Based on *Agrostis rigidifolia* Poir.

Panicum rigidifolium Kunth, Rév. Gram. 1: 37. 1829. Based on *Agrostis rigidifolia* Poir.

Isachne rigidifolia Urban, Symb. Antill. 4: 85. 1903. Based on *Agrostis rigidifolia* Poir. The specimen which Urban mentions, *Sintenis* 1359 from Sierra de Luquillo, Porto Rico, is *Isachne angustifolia*.

DESCRIPTION.

Culms spreading and branching, the flowering shoots firm and rigid, 15 to 40 cm. tall; sheaths glabrous, stiffly ciliate on the margin, overlapping on the flowering shoots; ligule a very short, lacerate or ciliate membrane; blades oblong, 2 to 4 cm. long, 2 to 4 mm. wide, firm, rigidly spreading, pungently pointed, glabrous, the cartilaginous margin and thick midrib whitish; panicles long-exserted, open, oblong, rather narrow, 2 to 5 cm. long, the branches ascending or spreading, bearing the branchlets mostly on the lower side, the pedicels rigid, 1 to 2 mm. long; spikelets about 2 mm. long, purplish, borne obliquely upon the pedicels; glumes glabrous or sparsely appressed-hispidulous near apex; florets smooth.

The species is easily recognized by its smooth, rigid, spreading, pungently pointed, conspicuously distichous blades.

DISTRIBUTION.

Mountain bogs, West Indies.

SANTO DOMINGO: Río Yaque, *Fuertes* 1729.

LEEWARD ISLANDS: Guadeloupe, *Duss* 3190.

WINDWARD ISLANDS: Martinique, *Duss* 1312; *Hahn* 1435.

EXPLANATION OF PLATE 28.—*Isachne rigidifolia*. Specimen from Martinique, *Hahn* 1435. Natural size.

5. *Isachne rigens* (Swartz) Trin.

Panicum rigens Swartz, Prodr. Veg. Ind. Occ. 23. 1788. "Jamaica." The type, in the Swartz Herbarium at Stockholm, is an ample specimen.

Isachne rigens Trin. Gram. Pan. 252. 1826. Based on *Panicum rigens* Swartz.

DESCRIPTION.

Culms tufted, glabrous, slender, wiry, trailing, 1 to 2 meters long, as much as 2 mm. thick, the numerous flowering shoots curving upward, 10 to 30 cm. long; sheaths glabrous or puberulent, ciliate on the margin; ligule a ring of stiff hairs about 0.5 mm. long; blades narrowly oblong-lanceolate, 2 to 5 cm. long, 2 to 5 mm. wide, spreading, moderately firm but not stiff and rigid, scabrous on both surfaces and on the cartilaginous margin; panicles ovoid or oblong, 2 to 5 cm. long, the branches and branchlets stiffly ascending or spreading, the pedicels 1 to 2 mm. long; spikelets 1.8 to 2 mm. long; glumes minutely hispidulous; rachilla between the two florets minutely villous; palea of upper floret sparsely appressed-hispidulous.

DISTRIBUTION.

Damp shady banks, Blue Mountains, Jamaica, at 1,000 to 2,000 meters altitude; also in northern South America.

Panicum arbusculum Sibth. ~~on~~ Griseb. as syn
of *P. rigidum*, but specimen is *P. rigidifolium*

JAMAICA: Cinchona, *Amer. Gr. Nat. Herb.* 420; *Harris* 11316, 11333, 11417, 11432, 12480. Abbey Green, *Hitchcock* 9362; *Harris* 11585. Catherines Peak, *Hitchcock* 9732. Clyde River, *Harris* 11445. Cold Spring Gap, *Harris* 11336, 12489. Hardware Gap, *Harris* 11543. Sir Johns Peak, *Harris* 11595.

COLOMBIA: Santa Marta, *Smith* 207.

VENEZUELA: Without locality, *Fendler* 1637, 2504.

EXPLANATION OF PLATE 29.—*Isachne rigens*. Specimen from Jamaica, *Harris* 12489. Natural size.

6. *Isachne angustifolia* Nash.

Isachne angustifolia Nash, Bull. Torrey Club 30: 377. 1903. "On the summit of El Yunque, Luquillo Mountains, Porto Rico, Wilson no. 160." The type, in the New York Botanical Garden Herbarium, is a long branched shoot with numerous leaves and several panicles.

DESCRIPTION.

Culms clambering, as much as 2 meters long and 2 mm. thick, hard and wiry, with a long naked base, branching from the upper nodes, the branches long, leafy, nearly parallel, bearing secondary branches toward the ends, the whole forming a wide, flabellate or loosely corymbose mass, in its most characteristic development pushing through the jungle of stream bank or trail side and hanging over bushes; sheaths appressed papillose-pilose or roughened with papillae, or glabrous, the margin ciliate; ligule a ring of very short stiff hairs less than 0.5 mm. long; blades narrowly lanceolate, 3 to 15 cm. long, but mostly more than 5 cm. long, 5 to 12 mm. wide, rather firm and stiffly spreading, scaberulous or glabrate, papillose-ciliate at base or papillose only; panicles ellipsoid or oblong, as much as 15 cm. long, the branches stiffly ascending or finally spreading, the branchlets and pedicels finally divaricate, these and the main axis scabrous; spikelets about 1.5 mm. long; glumes minutely hispidulous toward the tip; florets and rachilla glabrous.

DISTRIBUTION.

Rocky slopes among brush, Porto Rico (at higher altitudes) and Guadeloupe.

PORTO RICO: Utuado, *Sintenis* 6421. Rio Icaico, *Shafer* 3477. Adjuntas, *Sintenis* 4045. El Yunque, *Sintenis* 1355. Maricao, *Chase* 6222; *Britton & Cowell* 4271. Sierra Luquillo, *Hioram* 369. Cayey, *Chase* 6750. Monte Alegreillo, *Britton, Stevens & Hess* 2566. Monte Torrecilla, *Britton, Cowell & Brown* 5595.

LEEWARD ISLANDS: Guadeloupe, *Duss* 2705.

EXPLANATION OF PLATE 30.—*Isachne angustifolia*. Specimens from Porto Rico, *Chase* 6222 and 6750. Natural size.

7. *Isachne arundinacea* (Swartz) Griseb.

Panicum arundinaceum Swartz, Prodr. Veg. Ind. Occ. 24. 1788. "Jamaica." The type, in the Swartz Herbarium at Stockholm, consists of two shoots, one with a young unexpanded panicle, the other with a spreading panicle past maturity. The glumes of the former are hispid at the summit, of the latter glabrous.

Panicum glaucescens H. B. K. Nov. Gen. & Sp. 1: 104. 1816. "Crescit locis planis, propatulis Novae Andalusiae juxta Bordones et in excelsis, opacatis Andium prope Pasto." The type, in the Paris Herbarium, "in excelsis prope Pasto," is a shoot with several leaves and a small, rather dense panicle.

Isachne panicea Trin. Gram. Pan. 253. 1826. Trinius unites *Panicum arundinaceum* and *P. dispersum*, giving both names as synonyms, but his description applies better to the first ("Panicula densiuscula").

Isachne arundinacea Griseb. Fl. Brit. W. Ind. 553. 1864. Based on *Panicum arundinaceum* Swartz.

DESCRIPTION.

Culms climbing among shrubs or small trees to a height of as much as 6 meters, as much as 5 mm. thick at base, with strong canes and elongate branches; sheaths glabrous, or rarely slightly scabrous, ciliate on the margin, sometimes a little papillose near the summit, overlapping on the flowering shoots; ligule of stiff hairs as much as 5 mm. long; blades narrowly lanceolate, as much as 20 cm. long and 2 cm. wide, long-acuminate, scabrous, sometimes becoming smoothish, often papillose on the margin at base; panicles ovoid or ellipsoid, as much as 12 cm. long and 10 cm. wide, rounded at summit, the branches ascending or the lower finally spreading, branched from about the middle, the spikelets somewhat aggregate on the branchlets, the panicle thus rather compactly flowered at the periphery, the pedicels 0.5 to 2 mm. long; spikelets about 1.5 mm. long; glumes glabrous or with a few short stiff hairs at the summit; florets glabrous.

DISTRIBUTION.

Wooded hillsides, Jamaica, at an altitude of 1,000 to 2,000 meters; also southern Mexico to South America.

VERACRUZ: Consoquitla, *Liebmann* 331, 332. Mirador, *Liebmann* 333, 335. Orizaba Müller 78; *Pringle* 5570. Zacuapan, *Purpus* 2000. Jalapa, *Smith* 1804.

OAXACA: Without locality, *Galeotti* 5868.

CHIAPAS: Chicharras, *Nelson* 3764. Without locality, *Purpus* 7410.

GUATEMALA: Cobán, *Smith* 1854; *Türkheim* 87. Secanquim, *Pittier* 252.

COSTA RICA: Cañas Gordas, *Pittier* 11009. Los Palmares, *Pittier* 10651. Juan Viñas, *Cook & Doyle* 338. La Palma, *Tonduz* 12567. Tucurrique, *Tonduz* 12798, 12970. Chirripó, *Tonduz* 166. La Hondura, *Jiménez* 535.

PANAMA: El Boquete, *Hitchcock* 8277.

JAMAICA: Catherines Peak, *Amer. Gr. Nat. Herb.* 418; *Eggers* 3583. Gordon Town, *Hart* 708. Wallendorf, *Harris* 11551, 11567. Content Gap, *Harris* 11517. Abbey Green, *Hitchcock* 9386. Bryans Hill, *Harris* 11529. Cold Spring Gap, *Harris* 11337, 12491. Flamstead, *Harris* 11468, 11581. Whitfield Hall, *Harris* 11583, Mount Lebanon, *Harris* 12487.

COLOMBIA: Santa Marta, *Smith* 210.

VENEZUELA: Carayaca, *Jahn* 305.

BOLIVIA: Yungas, *Bang* 297; *Rusby* 6.

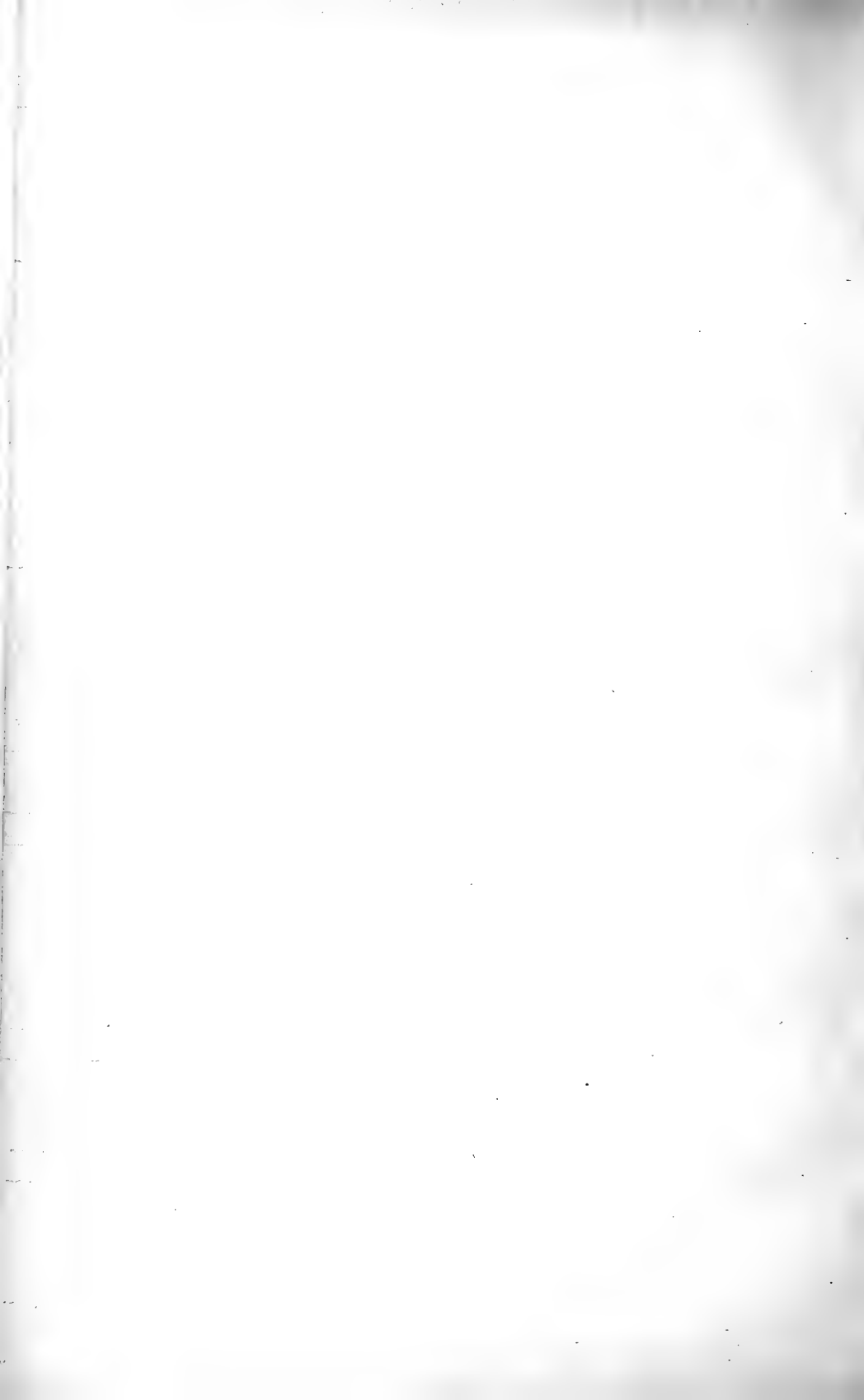
EXPLANATION OF PLATE 31.—*Isachne arundinacea*. Specimen from Jamaica, *Amer. Gr. Nat. Herb.* 418. Natural size.

8. *Isachne disperma* (Lam.) Doell.

Panicum dispernum Lam. Tabl. Encycl. 1: 173. 1791. "Ex Amer. Merid. Com. D. Richard." The type, in the Paris Herbarium, is a shoot with 5 leaves and a panicle from which most of the spikelets have fallen, the pedicels slender and spreading. The locality is not indicated on the label, only the name and "ex D. Richard."

Panicum multinerve Desv.; Poir. in Lam. Encycl. Suppl. 4: 279. 1816. "Cette plante croît aux Antilles. (V. s. in herb. Desv.)." The type, in the Paris Herbarium, is said to be from Porto Rico, "Habitat in Antillis (Portoricensis)," but the statement is probably erroneous as the species is otherwise unknown from that island. The label bears, besides the name *Panicum multinerve* Desv., the name *confertum* Desv. It would appear that this specimen is the type of the latter name also, especially as no other specimen could be found that appeared to be the type.

Panicum confertum Desv.; Poir. in Lam. Encycl. Suppl. 4: 279. 1816. "Cette plante croît aux Antilles (V. s. in herb. Desv.)." See remarks under *Panicum multinerve* in the preceding paragraph. Poirét describes both species in succeeding paragraphs, but the descriptions do not differ essentially. The blades in both are



described as glabrous, while in *Isachne arundinacea*, the only other species it could be, they are scabrous.

Isachne ? dubia Kunth, Rév. Gram. 1: 42. 1829. Based on *Panicum dispernum* Lam. The question mark inserted by Kunth is accounted for by his note, "In herbario Richardi non amplius suppetit."

Isachne disperma Doell in Mart. Fl. Bras. 2²: 274. 1877. Based on *Panicum dispernum* Lam.

DESCRIPTION.

Aspect of plant as in *I. arundinacea*; sheaths glabrous or rarely papillose-hispidulous; ligule hairs as much as 2 mm. long; blades on the average larger than in *I. arundinacea*, glabrous, scabrous toward the apex; panicles as much as 20 cm. long, the branches and branchlets spreading, the spikelets in twos or threes at the ends of the branchlets, the panicle thus more open and flowered more equally throughout than in *I. arundinacea*, the spikelets not strongly aggregate toward the periphery; spikelets slightly over 1 mm. long; glumes and florets glabrous.

DISTRIBUTION.

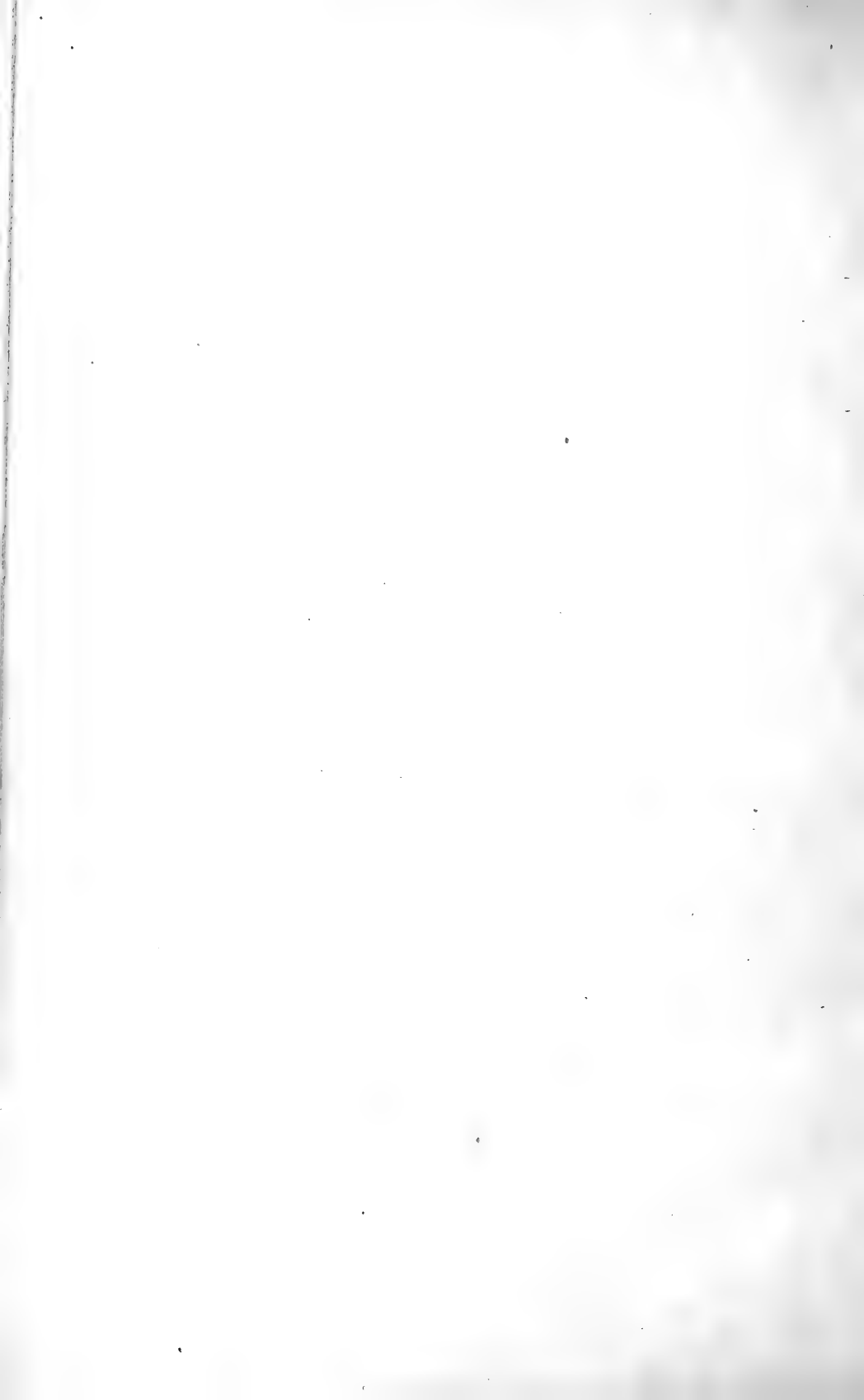
Mountain woods, Lesser Antilles.

LEEWARD ISLANDS: St. Kitts, *Britton & Cowell* 395. Guadeloupe, *Duss* 3189. Dominica, *Eggers* 1056; *Jones* 38.

WINDWARD ISLANDS: Martinique, *Duss* 1311. Grenada, *Broadway* 76.

TOBAGO: *Amer. Gr. Nat. Herb.* 597.

EXPLANATION OF PLATE 32.—*Isachne disperma*. Specimen from St. Kitts, *Britton & Cowell* 395. Natural size.





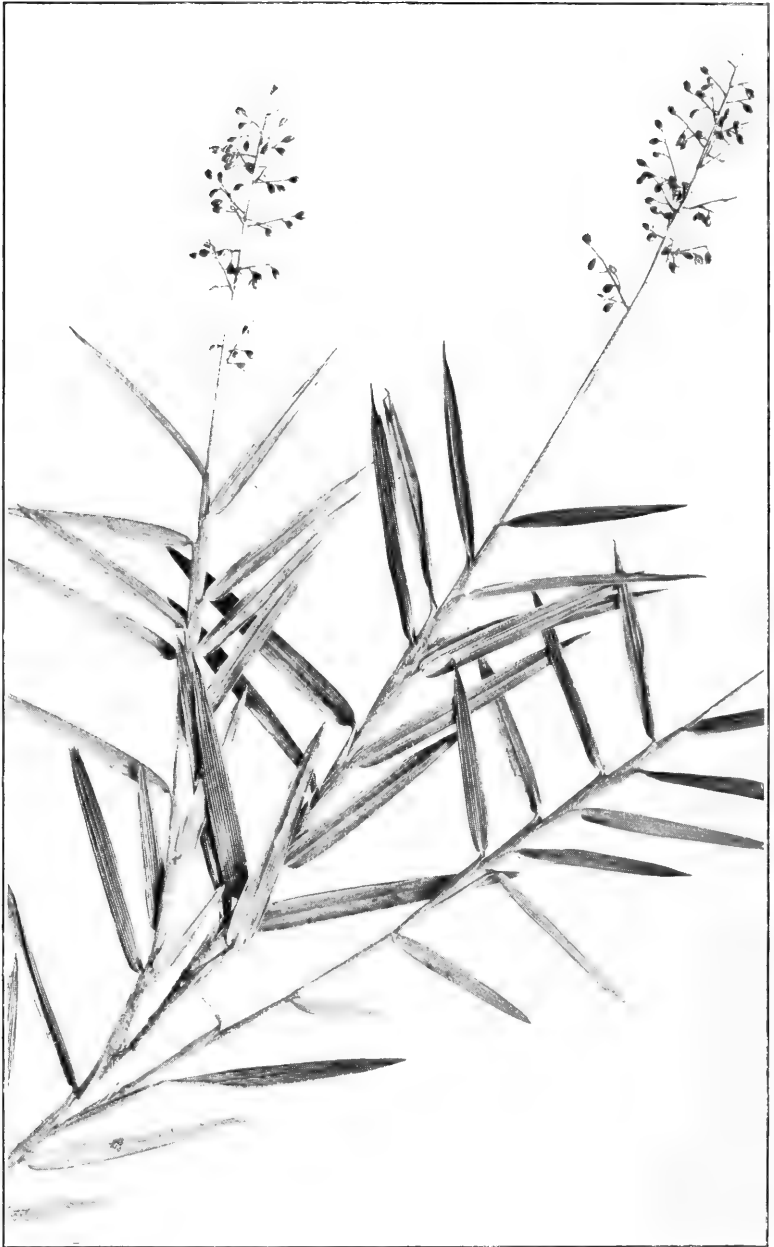
ISACHNE POLYGONOIDES (LAM. DOELL.)



ISACHNE LEERSIOIDES GRISEB.



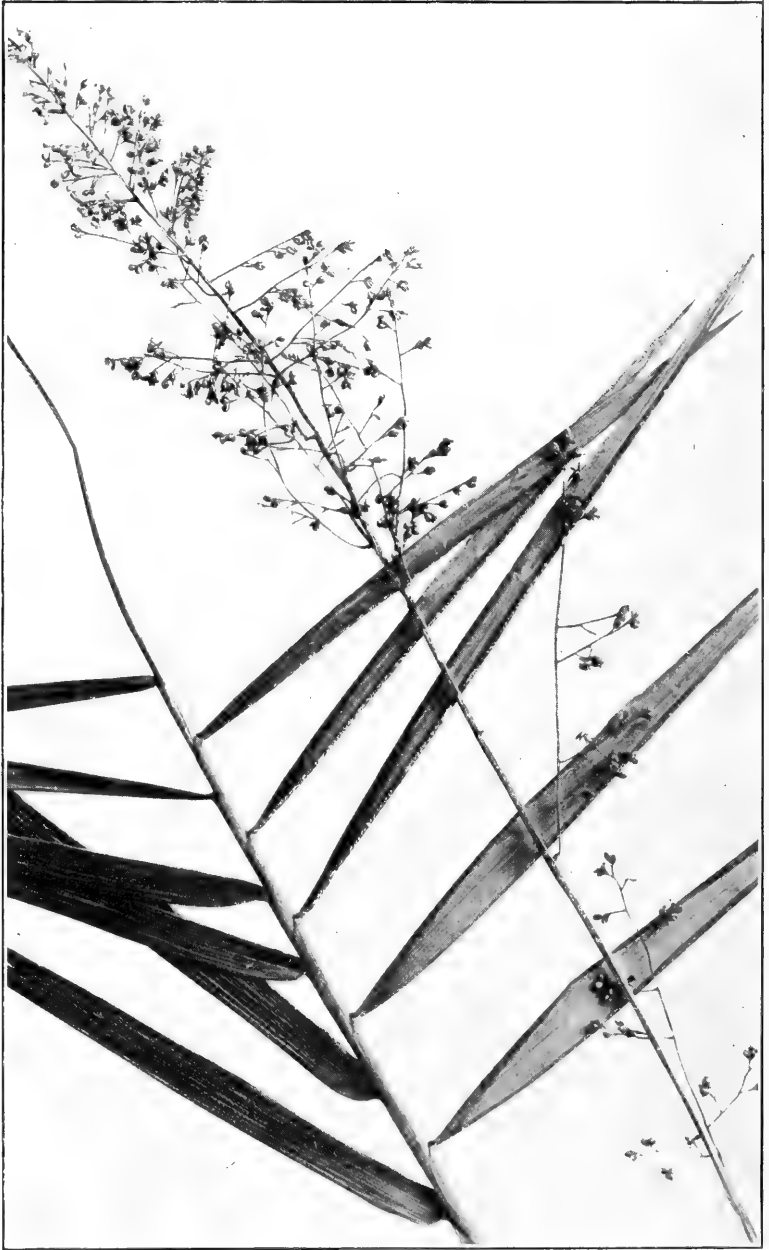
ISACHNE PYGMAEA GRISEB.



ISACHNE RIGIDIFOLIA (POIR.) URBAN.



ISACHNE RIGENS (SWARTZ) TRIN.



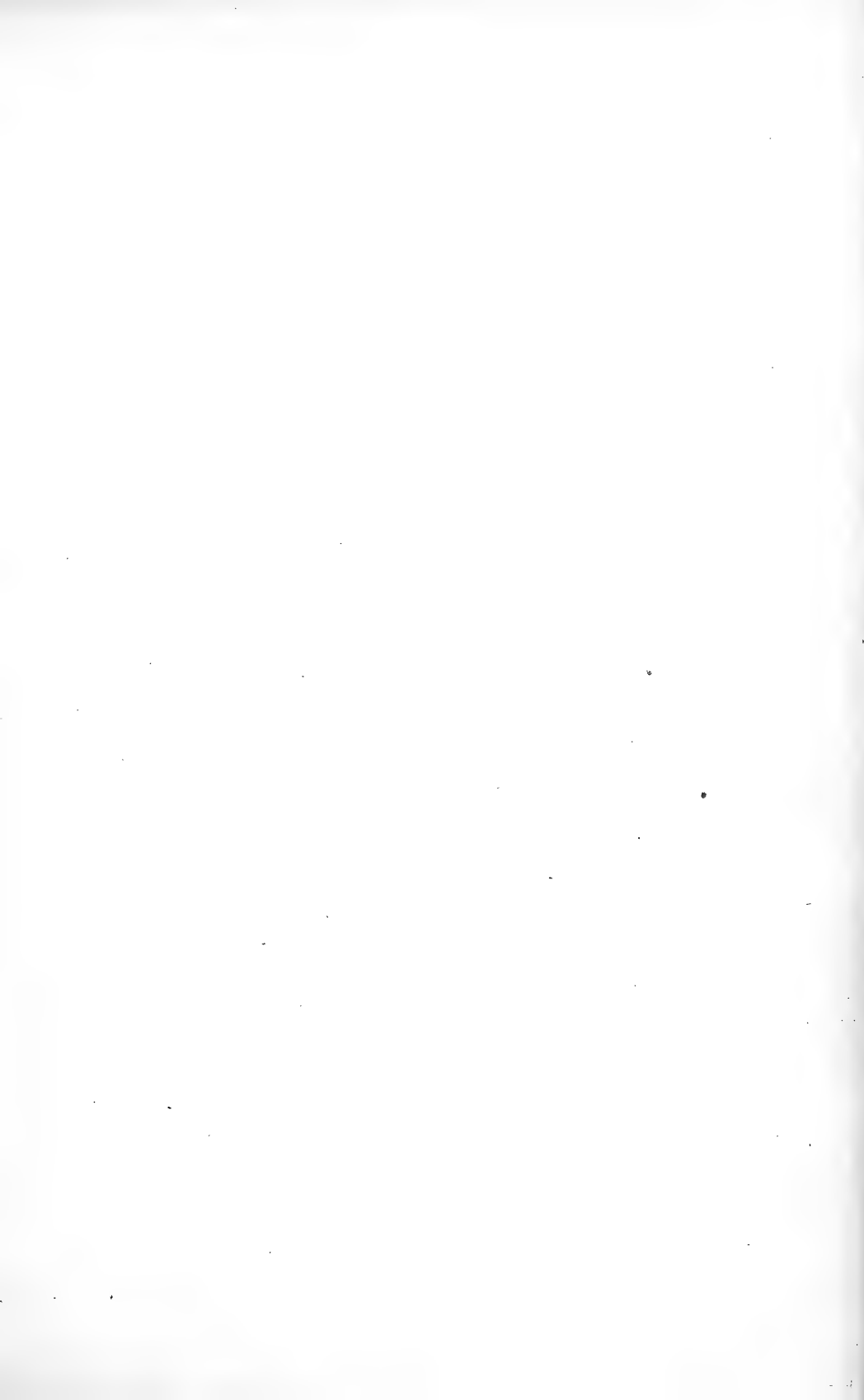
ISACHNE ANGUSTIFOLIA NASH.

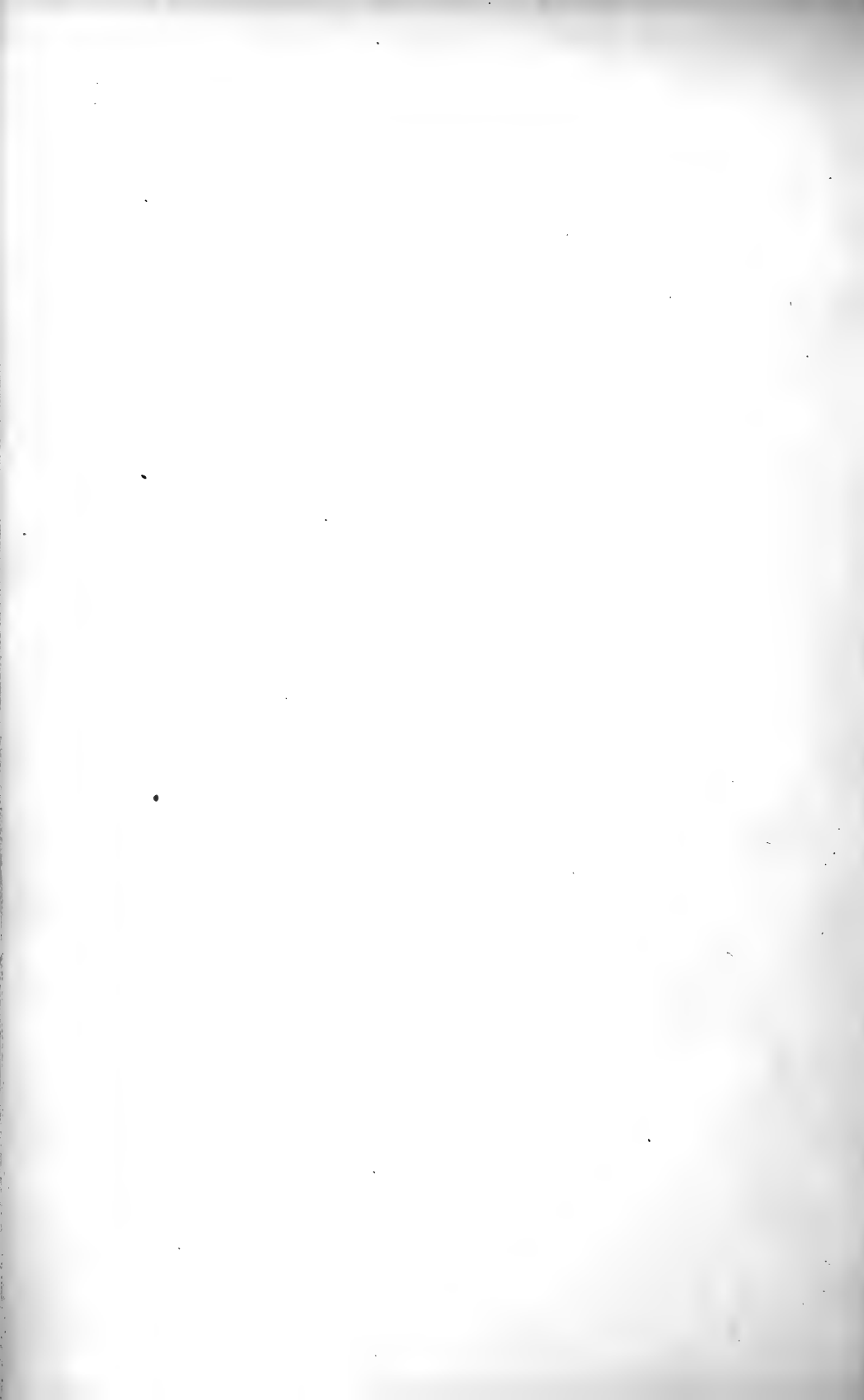


ISACHNE ARUNDINACEA (SWARTZ) GRISEB.



ISACHNE DISPERMA (LAM.) DOELL.





THE NORTH AMERICAN SPECIES OF OPLISMENUS.

By A. S. НИГНСОСК.

INTRODUCTION.

This genus of grasses comprises four species in the American tropics and about as many in the tropics of the Old World. All are shade plants with broad flat blades and strongly dorsiventral, creeping sterile shoots. Nearly all the species have been referred to the four genera *Panicum*, *Oplismenus*, *Orthopogon*, and *Echinochloa*, which fact accounts for much of the extended synonymy. One species is found in the United States along the coast from North Carolina to Florida and Texas.

The text figures are natural size.

DESCRIPTION OF THE GENUS AND SPECIES.

OPLISMENUS Beauv.

Oplismenus Beauv. Fl. Owar. 2: 14. pl. 68. f. 1. 1809. A single species, *O. africanus*, is described and figured. The name is occasionally spelled *Hoplismenus*.

Orthopogon R. Br. Prodr. Fl. Nov. Holl. 194. 1810. Four species are described and two, *Panicum hirtellum* and *P. burmanni*, are mentioned in a note as belonging to the genus. The first, *O. compositus*, is accepted as the type because it is based on a Linnaean species (*Panicum compositum* L.), while the other three species are described as new.

Hekaterosachne Steud. Syn. Pl. Glum. 1: 118. 1854. A single species, *H. elatior*, from New Zealand is described. Cheeseman¹ refers this to *Oplismenus*.

Hippagrostis Kuntze, Rev. Gen. Pl. 2: 776 1891. Kuntze accepts *Hippagrostis Rumpf*.² The type is *Panicum burmanni* Retz.

DESCRIPTION.

Usually weak, freely branching, creeping annuals or perennials with erect or ascending flowering shoots, flat, thin, ovate or lanceolate, asymmetric blades, and one-sided spikelike racemes along a main axis. Spikelets terete or somewhat compressed laterally, subsessile, in pairs or solitary in two rows on one side of a narrow, scabrous or hairy rachis. Glumes subequal, emarginate or entire, the midnerve extending into an awn, that of the first longer. Sterile lemma exceeding the glumes and fruit, notched or entire, mucronate or short-awned, inclosing a hyaline palea. Fruit elliptic, acute, the lemma very convex or boat-shaped, the firm margins clasping the palea, inrolled.

The genus consists of four species in the American tropics and about as many more in the tropics of the Old World. One of the American species has been introduced.

The species are shade-loving, growing on the forest floor or in shade of orchards and groves, often forming a carpet.

¹ Man. New Zeal. Fl. 849. 1906.

² Herb. Amboin. 6: 14. pl. 5. f. 3. 1750.

KEY TO THE SPECIES.

- Awns antrorsely scabrous; plants annual..... 1. *O. burmanni*
 Awns smooth or obscurely roughened; plants perennial.
 Rachis of racemes mostly 2 to 3 mm. long, bearing usually not more than 5 spikelets;
 blades 1 to 3 cm. long, 4 to 10 mm. wide..... 2. *O. setarius*.
 Rachis of lower racemes more than 1 cm. long, bearing usually more than 8 spike-
 lets; blades mostly more than 4 cm. long, 1 to 2 cm. wide.
 Racemes closely flowered, the lower 1 to 2 cm. long..... 3. *O. hirtellus*.
 Racemes loosely flowered, the lower 2 to 5 cm. long, the lower pairs of spikelets
 as much as 1 cm. apart..... 4. *O. rariflorus*.

1. *Oplismenus burmanni* (Retz.) Beauv.

Panicum hirtellum Burm. Fl. Ind. 24. pl. 12. f. 1. 1768. Not *Panicum hirtellum* L. 1759. "Habitat in Indiis utrisque." The plate is rather crude but evidently represents the species now called *Oplismenus burmanni*.

Panicum burmanni Retz. Obs. Bot. 3: 10. 1783. The name is based on *Panicum hirtellum* Burm., but the species is briefly described and a specimen is said to have been sent by Koenig.

Panicum bromoides Lam. Tabl. Encycl. 1: 170. 1791. "Ex. ins. Franciae. Commers." The type has not been examined, but the reference in the description to hirsute spikes and short blades appears to identify the species with *Oplismenus burmanni*, to which species the name is referred by most authors.

Oplismenus africanus Beauv. Fl. Owar. 2: 15. 1809. The localities given with the description are "Chama, Koto, Oware & Benin," on the coast of Guinea. The plate identifies the species.

Oplismenus bromoides Beauv. Ess. Agrost. 54. 1812. Presumably based on *Panicum bromoides* Lam., though no direct reference to that species is given. Beauvois merely says that *Oplismenus* includes "Panici spec. Lin., etc.," and makes several combinations under *Oplismenus*, one of which is *O. bromoides*.

Oplismenus burmanni Beauv. Ess. Agrost. 54. 1812. Based on *Panicum burmanni* Retz.

Panicum album Poir. in Lam. Encycl. Suppl. 4: 274. 1816. "Cette plant croît à l'île de Java. (V. S. in herb. Desfont.)" The type has not been examined, but the description appears satisfactory for the reference of the name to *Oplismenus burmanni*.

Panicum africanum Poir. in Lam. Encycl. Suppl. 4: 275. 1816. Based on *Oplismenus africanus* Beauv.

Oplismenus albus Roem. & Schult. Syst. Veg. 2: 890. 1817. Based on *Panicum album* Poir.

Orthopogon burmanni Trin. Fund. Agrost. 181. 1820. Based on *Panicum burmanni* Retz.

Oplismenus brasiliensis Raddi, Agrost. Bras. 40. 1823. "Invenitur in montanis prope Tejucco, necnon in Monte nuncupato Corcovado." This is referred by Doell¹ to *Panicum compositum*, but the description applies well to *Oplismenus burmanni* (*Panicum burmanni* of Doell).

Oplismenus affinis Schult. Mant. 2: 273. 1824. "In St. Martha [Colombia]. Bertero." The ample description applies well to *Oplismenus burmanni*.

Panicum lappaceum Willd.; Spreng. Syst. Veg. 1: 306. 1825. Mentioned as a synonym of *Orthopogon burmanni*. The type, collected by Humboldt in "America merid.," has been examined in the Willdenow Herbarium at Berlin.

Orthopogon africanus Sweet, Hort. Brit. 448. 1826. Based on *Oplismenus africanus* "R. S."

Oplismenus humboldtianus Nees, Agrost. Bras. 264. 1829. "Habitat in Brasilia variis locis (Mart.)." Nees considers the Brazilian plant different from the East Indian species and bases the name upon *Oplismenus burmanni* as described by Humboldt, Bonpland, and Kunth.

¹Mart Fl. Bras. 2³: 146. 1877.

— all ...

—

= On ...

—

Ophi. We die Kiechhaed an
Orthopogon burmanni

survived by Train
1820

Orthopogon burmanni Beurl. Sv. Vet.-Akad.
Handl. Stockholm 1854 : 113. 1856

-hirtellus

Oplismenus cristatus Presl, Rel. Haenk. 1: 323. 1830. "Hab. in Mexico." The type, in the German University at Prague, is labeled as coming from Luzón.

Oplismenus affinis Presl, Rel. Haenk. 1: 323. 1830. "Hab. in Panama." The name is independent of *O. affinis* Schult. The type has been examined at the German University in Prague. Presl states that it is probably only a variety of *O. cristatus*.

Orthopogon bromoides Loud. Hort. Brit. 25. 1830. Presumably based on *Panicum bromoides* Lam., though no synonymy is cited.

Panicum francoi Steud. Syn. Pl. Glum. 1: 44. 1854. "Franco legit in Oaxaca." The type has not been examined, but the description applies to *Oplismenus burmanni*.

Panicum raddianum Steud. Syn. Pl. Glum. 1: 45. 1854. Based on *Oplismenus brasiliensis* Raddi.

Panicum sanctae-marthae Steud. Syn. Pl. Glum. 1: 45. 1854. "Hrbr. Funck nr. 437. Sancta Martha Venezuelae." The type has not been examined, but the description applies to *Oplismenus burmanni*.

Panicum schultesii Steud. Syn. Pl. Glum. 1: 46. 1854. Based on *Oplismenus affinis* Schult.

Oplismenus humboldtianus β *muticus* Fourn. Mex. Pl. 2: 37. 1886. "Cuernavaca (BOURG. n. 1301)." This collection, as well as Müller 2016 and 2019 cited by Fournier, is represented in the U. S. National Herbarium.

There are several other synonyms in works on Old World floras.

DESCRIPTION.

Plants annual; culms slender, glabrous or pubescent in lines or sometimes pubescent all over, the flowering shoots as much as 40 cm. long, usually 10 to 20 cm. long, ascending or nearly prostrate; sheaths glabrous or papillose-hispid, striate, ciliate on the margin, villous on the collar; ligule a very short membrane, ciliate with hairs about 1 mm. long; blades ovate to ovate-lanceolate, mostly 2 to 5 cm. long, sometimes longer, 1 to 1.5 cm. wide, thin, more or less pubescent or hispid on both surfaces, especially toward the base, usually undulate on the margin; panicle ovoid to linear mostly long-exserted, usually compact, 2 to 5 cm. long, sometimes as much as 10 cm. long, and the spikes more distant, mostly nodding, the main axis villous; racemes 3 to several, appressed or ascending, rather short and thick, white and silky, mostly 8 to 15 mm. long, the spikelets closely set and nearly sessile on the rachis, this softly villous and also beset, especially at the base of the spikelets, with stiff papillose hairs 2 to 3 mm. long; spikelets compressed, whitish, several to many on each rachis; first glume 3-nerved, half as long as the sterile lemma, rather sparsely appressed-villous, notched at the apex, the midnerve extending as a slender, straight, antrorsely scabrous awn 10 to 15 mm. long; second glume similar to the first, a little longer, 5-nerved, the awn shorter; sterile lemma similar to the glumes, about 3 mm. long, compressed above, nearly terete below, about 7-nerved, the lower half often copiously villous, the awn shorter than those of the glumes, commonly 1 to 3 mm. long; fruit smooth and shining, about as thick as wide, pale or brownish, about 2 mm. long.



FIG. 21.—*Oplismenus burmanni*. From Reko 3473 Mexico.

DISTRIBUTION.

- Tropics of both hemispheres, introduced in America; common in waste places, along roads, especially in partially shaded places, southern Mexico to northern South America; also in Santo Domingo.
- LOWER CALIFORNIA: Sierra de la Laguna, *Brandegee* 5 in 1890. Miraflores, *Brandegee* 22 in 1890.
- SINALOA: Lodiago, *Palmer* 1666 in 1891.
- TEPIC: Tepic, *Palmer* 1930 in 1892.
- JALISCO: Guadalajara, *Palmer* 463 in 1886; *Hitchcock* 7279. Zapotlán, *Hitchcock* 7250.
- COLIMA: Colima, *Palmer* 1258 in 1891; *Orcutt* 4529.
- MICHOACÁN: La Correa, *Langlássé* 440. Morelia, *Arsène* in 1909.
- VERACRUZ: Zacuapan, *Purpus* 2893. Orizaba, *Müller* 2016.
- MORELOS: Cuernavaca, *Pringle* 6209; *Bourgeau* 1301. Yautepec, *Pringle* 11920.
- GUERRERO: Acapulco, *Palmer* 35 in 1895.
- OAXACA: Cuicatlán, *Nelson* 1649. Guatulco, *Liebmann* 375. Cafetal Concordia, *Reko* 3473.
- CHIAPAS: Sierra de Tonalá, *Purpus* 7412.
- YUCATÁN: Izamal, *Gaumer* 1038. Calotmul, *Gaumer* 2429. Without locality, *Schott* 55.
- GUATEMALA: Amatitlán, *Türckheim* 8787; *Popenoe* 702. Totonicapam, *Seler* 2360. Volcán Pacaya, *Kellerman* 6235. Retalhuleu, *Kellerman* 6266. Ciudad Vieja, *Tejada* 115. Cobán, *Türckheim* 1363. Volcán Chingo, *Shannon* 3672. San Juan Arana, *Heyde & Lux* 6276. Santa Rosa, *Heyde & Lux* 4297. Santa Ana, *Türckheim* 473. Guatemala City, *Hitchcock* 9044, 9052. Without locality, *Heyde* 648.
- SALVADOR: La Unión, *Hitchcock* 8790. Volcán San Salvador, *Hitchcock* 8949. San Salvador, *Velasco* 14.
- HONDURAS: Amapala, *Hitchcock* 8765. San Pedro Sula, *Thieme* 5581.
- NICARAGUA: Masaya, *Hitchcock* 8634, 8660. Ometepe Island, *Smith* 1075. Jinotepe, *Hitchcock* 8725.
- COSTA RICA: San José, *Jiménez* 7, 8, 9, 156, 157, 158; *Tonduz* 1811, 3120, 7190, 7233, 7276, 8458, 9841; *Pittier* 3124; *Hitchcock* 8450, 8484. Alajuelita, *Jiménez* 898. La Palma, *Pittier* 731. Santo Domingo, *Tonduz* 7194, 9939. Santa Bárbara, *Pittier* 1678. Surubres, *Biolley* 7002, 17381. Boruca, *Pittier* 4466. Rodeo, *Pittier* 1612. Boca de Zhorquin, *Tonduz* 8637. Zent Farm, *Pittier* 16738. Nicoya, *Tonduz* 13758; *Cooper* 10378. Desamparados, *Tonduz* 1481. Piedra del Convento, *Tonduz* 3653. Turrialba, *Tonduz* 8229. Rodeo de Pacaca, *Pittier* 3330. Carrillo, *Biolley* 3113. Puntarenas, *Hitchcock* 8541, 8542. Atenas, *Hitchcock* 8520. Alajuela, *Jiménez* 704. Río Bebedero, *Jiménez* 738, 741. Hacienda La Colombiana, *Tonduz* 224. Río Blanco, *Lehmann* 1781.
- PANAMA: El Boquete, *Hitchcock* 8304. Ancón, *Celestine* 83. Masambí, *Maxon* 4688. Culebra, *Amer. Gr. Nat. Herb.* 421; *Pittier* 2086. Chagres, *Fendler* 363. Bocas del Toro, *Hart* 74. San Felix, *Pittier* 5205. Coclé, *Pittier* 4887. Empire, *Hitchcock* 7951. Matías Hernández, *Pittier* 6822. Balboa, *Killip* 4180.
- SANTO DOMINGO: Constanza, *Türckheim* 2883. Maniel de Ocoa, *Türckheim* 3610.
- COLOMBIA: Santa Marta, *Smith* 157, 2573. Popayán, *Lehmann* 5936. Cauca, *Lehmann* 2106. Cuesta de Tocotá, *Pittier* 699. Huila, *Pittier* 1272, 1526. Without locality, *Linden* 1559.
- VENEZUELA: Caracas, *Rose* 21962. Without locality, *Fendler* 1705.
- BRAZIL: Cuyabá, *Malme* 3128.

2. *Oplismenus setarius* (Lam.) Roem. & Schult.

Panicum setarium Lam. Tabl. Encycl. 1: 170. 1791. "Ex Amer. merid.—Commun. a D. Richard." The type, in the Lamarck Herbarium at Paris, is a single culm with several leaves and three racemes.

11330



Oplismenus setarius Roem. & Schult. Syst. Veg. 2: 481. 1817. Based on *Panicum setarium* Lam.

Orthopogon parvifolium Nutt. Gen. Pl. 1: 55, errata. 1818. Nuttall at first referred this to *O. hirtellum* (*Panicum hirtellum* L.), giving the range as Florida to South Carolina. In the errata he changes the name to *O. parvifolium* and gives a new description.

Orthopogon setarius Spreng. Syst. Veg. 1: 306. 1825. Based on *Panicum setarium* Lam.

Oplismenus parvifolius Kunth, Rév. Gram 1: 45. 1829. Based on *Orthopogon parvifolius* Nutt.; placed by Kunth among species dubiae.

Panicum nuttallianum Steud. Nom. Bot. ed. 2. 2: 260. 1841. Based on *Orthopogon parvifolius*.

DESCRIPTION.

Culms slender and lax, the flowering branches ascending or nearly prostrate, usually not more than 10 to 20 cm. long, sometimes as much as 30 cm., glabrous or pubescent in lines; sheaths glabrous, villous on the margin, pubescent about the collar; ligule a very short ciliate membrane; blades ovate to ovate-lanceolate, thin, mostly 1 to 3 cm. long, 4 to 10 mm. wide, sparsely pilose on both surfaces or glabrate; panicle long-exserted, usually not over 5 cm. long, rarely as much as 8 cm., the axis scabrous or puberulent; racemes usually 3 to 5, rarely as many as 8, short and subglobose, distant or the upper approximate, the lower internode sometimes as much as 2 cm. long, the rachis usually 2 to 3 mm. long, rarely as much as 5 mm. long (or a little longer in some United States specimens), puberulent, pubescent, or villous at base; spikelets rarely as many as 8 on a rachis, usually not more than 5, the lowermost sometimes reduced to awns; glumes more than half as long as the sterile lemma, appressed-hispidulous, often more or less pilose along the margin, more or less notched at apex, the first 3-nerved, the awn mostly 4 to 8 mm. long, smooth, the second 5-nerved, the awn much shorter, usually 2 to 3 mm. long; sterile lemma 2 to 3 mm. long, 7-nerved, appressed-pilose above, the awn short or wanting; fruit about 2.5 mm. long.

DISTRIBUTION.

Shaded places along the coast, North Carolina to Florida and Texas; southern Mexico to Guatemala; West Indies; Trinidad to Paraguay.

NORTH CAROLINA: Ocracoke Island, *Kearney* 2321.

GEORGIA: Lumpkin, *Latimer* in 1885. Bainbridge, *Harper* 1235. Brunswick, *Chase* 7086. Union, *Harper* 1084. Georgetown, *Harper* 1746.

FLORIDA: Jupiter, *Curtiss* 5553. Orange County, *Baker* 30. Tampa, *Combs* 1402. Tallahassee, *Nash* 2524. Mouth St. Johns River, *Curtiss* 3595. Old Town, *Combs* 864. Fort Myers, *Hitchcock* 467. Manatee, *Rugel* 379. Miami, *Hitchcock* 672. Eustis, *Chase* 4044. Fellsmere, *Tracy* 9307. Key West, *Blodgett*. Jacksonville, *Curtiss* 4037, 5301. Brevard County, *Fredholm* 5504, 6139. Orange Glade, *Eaton* 593. Sebastian, *Fredholm* 5504. Bartow, *Combs* 1239. Homosassa, *Combs* 968. Grasmere, *Combs* 1044. Palm Beach, *Hitchcock* 2337. Gainesville, *Chase* 4243.

ALABAMA: Mobile, *Mohr* in 1878. Tuscaloosa, *Smith*.

MISSISSIPPI: Ocean Springs, *Tracy* 4533. Biloxi, *Chase* 4361. Nicholson, *Kearney* 366.

ARKANSAS: Fulton, *Bush* 982.

LOUISIANA: Plaquemines County, *Langlois* 53. Houma, *Wurzlów* in 1913. Burnside, *Combs* 1415.

TEXAS: Houston, *Fisher* 1805; *Hall* 837. Terrell, *Tyler* in 1904. Columbia, *Bush* 299, 1428. Hockley, *Thurow*. Georgetown, *Palmer* 1339 in 1880. Beckville, *Reverchon* in 1902. San Antonio, *Hitchcock* 5249; *Plank* 57, 95; *Bush* 1218. New Braunfels, *Lindheimer* 1263.

VERACRUZ: Orizaba, *Seaton* 63; *Botteri* 136; *Müller* 2021. Córdoba, *Hitchcock* 6445.

CHIAPAS: Ocuilapa, *Nelson* 3025.

QUINTANA ROO: Cozumel Island, *Millsbaugh* 1483.

GUATEMALA: Guatemala City, *Hitchcock* 9110. La Vega, *Heyde & Lux* 6275. Pansamalá, *Türkheim* 1331.

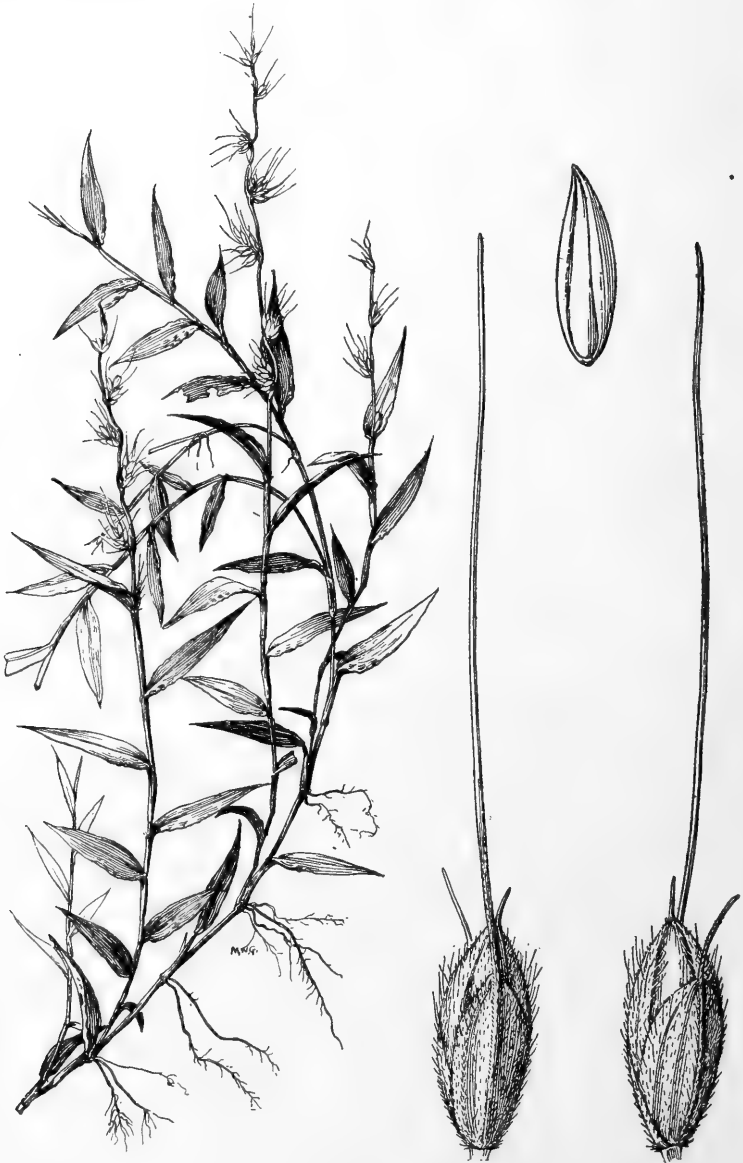


FIG. 22.—*Oplismenus setarius*. From *Hitchcock* 9415, Jamaica.

BERMUDA: *Brown & Britton* 13; *Harris* 424; *Collins* 150.

BAHAMAS: New Providence, *Britton* 3200.

CUBA: Hanábana, *Wright* 1543. Campo Florido, *León* 4139. Cojimar River, on 4720.

← Léon & Hiram 4720

? *Oplismenus hirtellus* Balbis Hb. Bertoni Sts. Dongu
Echinochloa hirtella Schult. based on above
=?

Oplismenus brasiliensis Raddi see type

Oplismenus velutinus Schult. based on Pan
~~velutinus~~
Panicum Raddianum Steud.

JAMAICA: Mount Hybla, *Harris* 11307. Clyde River, *Harris* 11446. Stony Hill, *Harris* 11339. Hardware Gap, *Harris* 11843. Bryans Hill, *Harris* 6826. Castle-ton, *Harris* 11342; *Amer. Gr. Nat. Herb.* 600. Blue Hole, *Fredholm* 3196. Gordon Town, *Hart* 578. Kingston, *Hitchcock* 9468. Ramble, *Hitchcock* 9521. Abbey Green, *Hitchcock* 9358. Savanna-la-Mar, *Hitchcock* 9871. Barican, *Hitchcock* 9568. Montego Bay, *Hitchcock* 9681. Ipswich, *Hitchcock* 9621. Newcastle, *Hitchcock* 9337. Ewarton, *Hitchcock* 9415. Catherines Peak, *Hitchcock* 9731, 9737. Troy, *Hitchcock* 9783; *Maxon* 2951. Content Gap, *Harris* 11364.

SANTO DOMINGO: *Poiteau* in 1807.

PORTO RICO: Arecibo, *Chase* 6556. Vega Baja, *Chase* 6413. Sierra de Luquillo, *Chase* 6721. Cayey, *Sinten* 2225, 2286. Mayaguez, *Sinten* 72b; *Holm* 124. Vieques, *Shafer* 2626; *Chase* 6682. Culebra, *Britton & Wheeler* 106.

VIRGIN ISLANDS: St. Croix, *Rose* 3625; *Ricksecker* 250. Antigua, *Rose* 3485; *Wullschlaegel* 626. St. Thomas, *Eggers*.

LEEWARD ISLANDS: Guadeloupe, *Duss* 2714.

WINDWARD ISLANDS: Martinique, *Duss* 778b.

TRINIDAD: Tabaquite, *Hitchcock* 10126.

ECUADOR: Galápagos Islands, *Stewart* 1283.

BRAZIL: Campinas, *Campo Novaes* 1255, 1290. Bahia, *Riedel*. Novo Niagara, *Edwall* 3864. Curityba, *Dusén* 7906. Rio Grande do Sul, *Lindman* 977, 1569.

PARAGUAY: Pilcomayo, *Rojas* 74. Without locality, *Page* (Paraguay Exped.) in 1854.

3. *Oplismenus hirtellus* (L.) Beauv.

Panicum hirtellum L. *Syst. Nat.* ed. 10. 2: 870. 1759. No locality given. The type, in the Linnaean Herbarium, is from Jamaica, having been sent to Linnaeus by Browne. The specimen is the upper part of a flowering culm with seven racemes and two leaves, with glabrous sheaths.

Milium undulatifolium Moench, *Meth. Pl.* 202. 1794. A garden specimen is described and *Panicum hirtellum* L. is given as synonym. *Panicum undulatifolium* Ard.¹ is not mentioned. Moench's name is evidently independent of that, which has been applied to an Old World species.

Oplismenus hirtellus Beauv. *Ess. Agrost.* 54, 168. 1812. Based on *Panicum hirtellum* L.

Orthopogon hirtellus Nutt. *Gen. Pl.* 1: 55. 1818. The name is based on *Panicum hirtellum* L., but the plant described by Nuttall is *Oplismenus setarius*. In the errata Nuttall changes the specific name to *parvifolium* (see a preceding paragraph under *Oplismenus setarius*).

Panicum velutinum Meyer, *Prim. Fl. Esseq.* 51. 1818. "In nemorosis plantationis Sophienburg," Essequibo. A duplicate type has been examined in the Trinius Herbarium, having been sent to Trinius by Meyer. The sheaths are pubescent.

Oplismenus velutinus Schult. *Mant.* 2: 271. 1824. Based on *Panicum velutinum* Meyer.

Echinochloa cubensis Schult. *Mant.* 2: 596. 1824. ^{3 (add 1): 596. 1827. based on *Orthopogon cubensis* Spreng.} This citation has not been verified.

Orthopogon cubensis Spreng. *Syst. Veg.* 1: 367. 1825. "Cuba." The type of this has not been examined.

Oplismenus cubensis Kunth, *Rév. Gram.* 1: 45. 1829. Based on *Orthopogon cubensis* Spreng.

Panicum cubense Steud. *Nom. Bot.* ed. 2. 2: 255. 1841. Based on *Orthopogon cubensis* Spreng.

Oplismenus chondrosioides Fourn. *Mex. Pl.* 2: 39. 1886. "Absque loco (LIEBM. n. 367); Cordova (BOURG. n. 1668, SCHAFFN. n. 281 b.)." The first specimen cited may be taken as the type. This has been examined in the Copenhagen Herbarium. It has hispid sheaths. The name is on the label in Fournier's hand.

¹ *Animad. Spec. Alt.* 14. pl. 4. 1764.

DESCRIPTION.

Plants perennial; culms widely creeping and branching, the flowering culms usually erect from an ascending base, as much as 70 cm. tall but usually about 30 cm., glabrous or somewhat pubescent; sheaths glabrous or densely papillose-hispid; ligule membranous, about 0.5 mm. long, short-ciliate; blades lanceolate or oblong-lanceolate, mostly 5 to 10 cm. long, 1 to 2 cm. wide, rather abruptly narrowed above into an acuminate apex, glabrous or pubescent, papillose-ciliate at base; panicle long-exserted, 5 to 10 cm. long, the main axis pubescent, or the lower part nearly glabrous, the lowest internode commonly about 2 cm. long; racemes mostly 3 to 7, ascending or spreading, rather distant, compact or sometimes rather loose, the lowermost 1 to 2 cm. long, the rachis pubescent and also papillose-hispid; spikelets in pairs, the pairs alternating on two sides of the triangular rachis, appressed-villous or hispid or nearly glabrous, green or, especially the awns, purple; glumes nearly equal, a little more than half as long as the sterile lemma, more or less notched at apex or tapering into the rather stout smooth awn, the first 5-nerved, with an awn 5 to 10 mm. long, the second 7-nerved, the awn once or twice as long as the glume, sometimes shorter; the sterile lemma 2.5 to 3 mm. long, 7-nerved, usually notched at apex, the awn mostly 1 to 2 mm. long, sometimes wanting; fruit 2 to 2.5 mm. long.



FIG. 23.—*Oplismenus hirtellus*.
From *Amer. Gr. Nat. Herb.* 602,
Trinidad.

There are two forms of this species, one with glabrous sheaths and one with hispid sheaths, which appear, when growing, rather distinct. The forms differ in no other way, however, and are found growing together under the same conditions, but all the shoots originating from a given plant are of one form.

A form of *Oplismenus* with variegated foliage, found in the West Indies, appears to belong to *O. compositus* (L.) Beauv., an allied Asiatic species (Guadeloupe, *Duss* 3155; Dominica, *Jones* 37; Martinique, *Duss* 1325; Grenada, *Hitchcock* 17674).

DISTRIBUTION.

Moist woods and shady banks, southern Mexico and throughout the West Indies to South America.

MICHOACÁN: Morelia, *Arsène* in 1909.

VERACRUZ: Minatitlán, *Smith* 575. Sanborn, *Orcutt* 3067. Jalapa, *Hitchcock* 6636, 6637, 6681. Orizaba, *Botteri* 724; *Purpus* in 1903; *Smith* 578. Colipa, *Liebmann* 363, 364. Mirador, *Nelson* 109. Córdoba, *Amer. Gr. Nat. Herb.* 422; *Karwinsky* 965. San Sebastián, *Liebmann*, 371. Jicaltepec, *Liebmann* 366.

MORELOS: Cuernavaca, *Pringle* 6203¹; *Amer. Gr. Nat. Herb.* 423; *Bourgeau* 1302.

TABASCO: San Juan Bautista, *Rovirosa* 67, 83.

MEXICO (Republic of): Without locality, *Liebmann* 366, 367.

GUATEMALA: Laguna de Ayarza, *Heyde & Lux* 3922. Secanquím, *Maxon & Hay* 3154.

Guatemala City, *Hitchcock* 9054. Sepacuité, *Cook & Griggs* 225. Trece Aguas, *Goll* 96. Cobán, *Türckheim* 438. Cubilquitz, *Türckheim* 8802.

SALVADOR: Volcán San Salvador, *Hitchcock* 8930. San Salvador, *Renson* 63.

HONDURAS: San Pedro Sula, *Thieme* 323, 5581 in part. Ruatán Island, *Gaumer* 136. Puerto Sierra, *Wilson* 208.



- COSTA RICA: Las Mesas, *Pittier* 3115. Rodeo, *Pittier* 1618. Santa Rosa, *Tonduz* 12272. Mano de Tigre, *Pittier* 4632. Río Unión, *Pittier* 3652. San José, *Hitchcock* 8481, 8500; *Jiménez* 129, 170; *Cooper* 5994. Cartago, *Cooper* 168. Buenos Aires, *Tonduz* 4877. Boruca, *Tonduz* 4465.
- PANAMA: Chiriquí Volcano, *Hitchcock* 8194. Gatún, *Amer. Gr. Nat. Herb.* 424. Bocas del Toro, *Hart* 83. El Boquete, *Hitchcock* 8309, 8312.
- CUBA: Monte Verde, *Wright* 751. Sierra de Anafe, *Wilson* 11332. Río San Miguel, *Wilson* 9280. Río Cayaguaje, *Shafer* 10444. Woodfred, *Shafer* 3011. Matanzas, *Rugel* 189; *Britton & Wilson* 14016; *Palmer & Riley* 12. Cienfuegos, *Pringle* 76. El Guama, *Palmer & Riley* 146. Vento, *Léon* 556; *Curtiss* 593. San Antonio, *Hitchcock* 489. Santiago de las Vegas, *Hitchcock* 488. Bagamesa, *Eggers* 4655. Guanajay, *Baker* 3461. Isle of Pines, *Curtiss* 268; *Britton & Wilson* 14616.
- JAMAICA: Ferry River, *Harris* 11784, 11787; *Hitchcock* 9748. Temple Hall, *Harris* 11359. Flamstead, *Harris* 11465. Castleton, *Harris* 11607. Hope Gardens, *Harris* 11253. Appleton, *Hitchcock* 9660. Port Antonio, *Millsbaugh* 924.
- SANTO DOMINGO: Without locality, *Wright, Parry & Brummel* 613. Rincón, *Fuertes* 1282.
- PORTO RICO: Aibonito, *Sintenis* 2870. Ponce, *Heller* 6303. Coamo, *Goll* 623. Cayey, *Chase* 6743. Adjuntas, *Chase* 6476. Maricao, *Chase* 6189, 6229; *Sintenis* 72.
- LEEWARD ISLANDS: Guadeloupe, *Duss* 3826, 4056. Dominica, *Jones* 50.
- WINDWARD ISLANDS: Martinique, *Duss* 778. Grenada, *Broadway* 1104, 2918, 4670.
- TRINIDAD: Manzanillo, *Hitchcock* 10368. Port of Spain, *Hitchcock* 9964, 10010, 10197, 10198; *Amer. Gr. Nat. Herb.* 601, 602. Icacos, *Broadway* 4958. Caparo Woods, *Broadway* 4928. Tabaquite, *Hitchcock* 10123. Without locality, *Bot. Gard. Herb.* 1328, 2258, 2259, 3224.
- TOBAGO: *Hitchcock* 10222, 10241, 10252, 10266, 10271; *Broadway* 3996, 4564, 4817.
- COLOMBIA: Huila, *Pittier* 1263. Santa Marta, *Smith* 212, 2168, 2169.
- VENEZUELA: Siquire Valley, *Pittier* 5976. Caracas, *Rose* 21775.
- DUTCH GUIANA: Without locality, *Hostman*.
- BRAZIL: São Paulo, *Edwall* 3865. Blumenau, *Ule* 882. Minas Geraes, *Regnell* 1373, 1375. Bahia, *Salzmann; Riedel* in 1831. Campinas, *Campos Novas* 1289. Rio Grande do Sul, *Malme* 1419. Cuyabá, *Malme* in 1902. Without locality, *Capanema* 740.
- PERU: San Miguel, *Cook & Gilbert* 938.
- BOLIVIA: Yungas, *Bang* 2079; *Rusby* 41.
- PARAGUAY: Central Paraguay, *Morong* 315.
- URUGUAY: Montevideo, *Archaveleta*.
- ARGENTINA: Misiones, *Ekman* 657.

4. *Oplismenus rariflorus* Presl.

Oplismenus rariflorus Presl, Rel. Haenk. 1: 320. 1830. "Acapulco." The type has been examined at the German University of Prague. It consists of a complete flowering shoot.

Oplismenus latifolius Haenke; Steud. Nom. Bot. ed. 2: 220. 1841. A herbarium name mentioned as a synonym of *Panicum loliceum*. The type, from Peru, is *O. rariflorus*.

Panicum parviflorum Steud. Syn. Pl. Glum. 1: 45. 1854. "Acapulco." This is based on *Oplismenus rariflorus* Presl, the name changed and the description slightly altered. The synonym cited, *Oplismenus hirtiflorus* Presl, is a slip of the pen, as Presl mentions no species by that name.

Oplismenus liebmanni Fourn. Mex. Pl. 2: 38. 1886. "Absque loco (LIEBM. n. 374); Zacuapan (LIEBM. n. 373); in savanis inter La Galera et Pochutla, in declivitate occidentali Cordilliarum (LIEBM. n. 372)." The third specimen cited, *Liebmann* 372, has been examined in the Copenhagen Herbarium.

Oplismenus thiebauti Fourn. Mex. Pl. 2: 39. 1886. "Secus rivulum prope Acapulco (THIÉBAUT n. 1074)." This specimen has not been examined. The description, especially "spiculis remote binatis," and the locality indicate *O. rariflorus*.

DESCRIPTION.

Culms sparingly branched, ascending from a decumbent base, as much as 50 cm. tall but mostly less, glabrous or sometimes pubescent; sheaths glabrous or pubescent, densely ciliate on the margin, villous on the collar; ligule a short ciliate membrane; blades lanceolate or elliptic-lanceolate, mostly about 4 to 7 cm. long, rarely as much as 13 cm., 1 to 2 cm. wide, thin, glabrous, scabrous, or sparsely pilose; panicle long-exserted, the main axis 5 to 15 cm. long, scabrous; racemes several, the lower distant, 2 to 5 cm. long or even 7 cm., ascending, loosely flowered, the rachis scabrous, often villous at base and pilose at the insertion of the spikelets; spikelets scattered, appressed to the rachis, the lower pairs as much as 1 cm. apart; glumes more than half as long as the sterile lemma, glabrous or hispidulous, rarely pilose, tapering into a smooth awn, the first 3-nerved, the awn 3 to 8 mm. long, rarely longer, the second 5-nerved, the awn very short or wanting; sterile lemma 3 mm. long, mostly awnless; fruit 2.5 mm. long.

This species is well distinguished by its long loose racemes.

DISTRIBUTION.

Moist shady places, Mexico and Guatemala; Ecuador and Peru.



FIG. 24.—*Oplismenus rariflorus*. From Hitchcock 9046, Guatemala.

SINALOA: Lodiogo, *Palmer* 1656 in 1891.

TEPIC: Tepic, *Palmer* 1931 in 1892.

JALISCO: Zapotlán, *Hitchcock* 7237.

COLIMA: Manzanillo, *Palmer* 1090 in 1890.

MICHOACÁN: La Correa, *Langlassé* 444. Morelia, *Arsène* in 1909.

OAXACA: Pochutla, *Liebmann* 372. Reyes, *Nelson* 1772. Sierra de San Felipe, *Pringle* 4944.

GUATEMALA: Guatemala City, *Hitchcock* 9046.

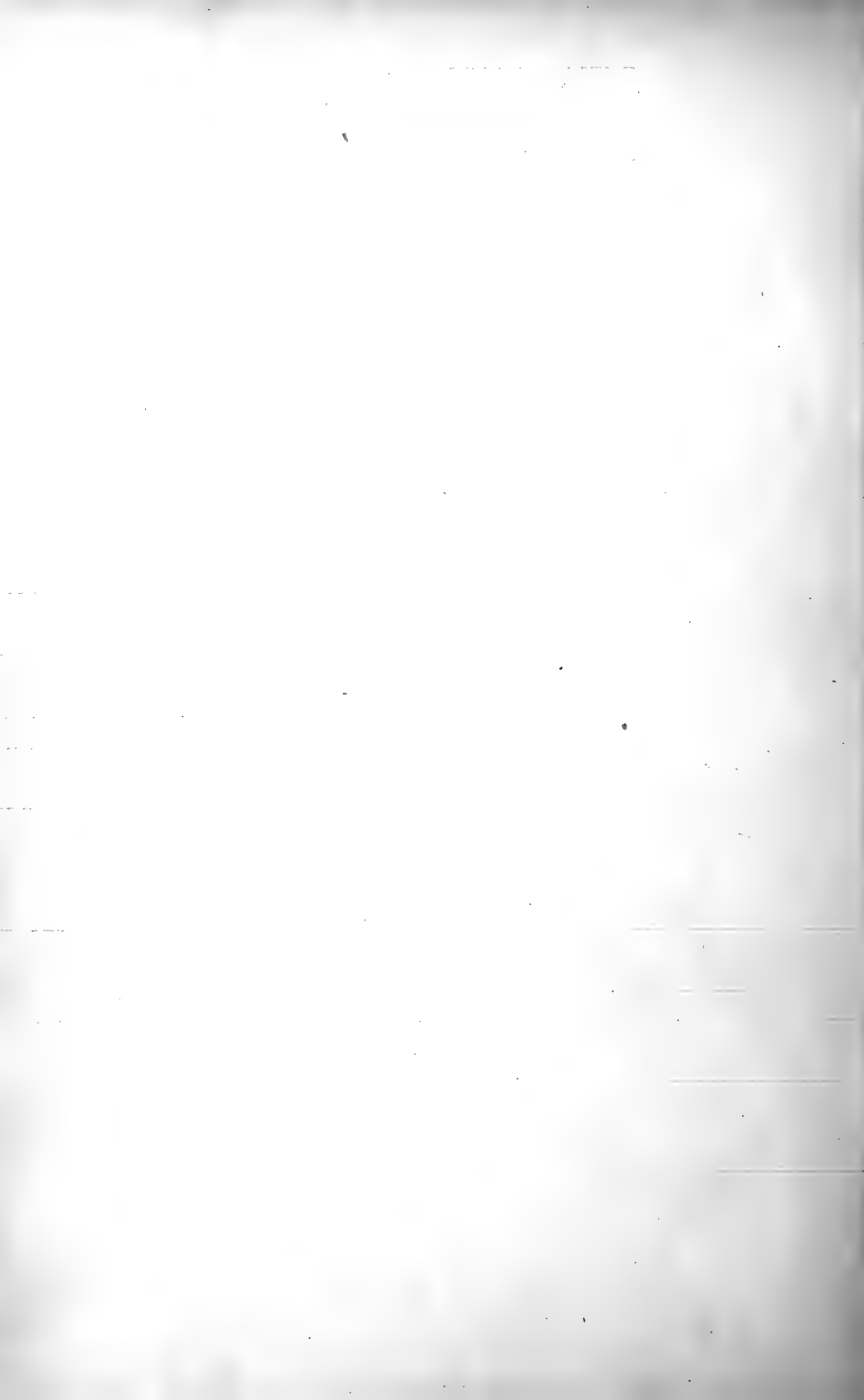
ECUADOR: El Recreo, *Eggers* 14897.

PERU: Mountains of Huanuco, *Haenke* (described as *O. loliaceus* Beauv. by Presl).¹

DOUBTFUL SPECIES.

OPLISMENUS DEPAUPERATUS Fourn. Mex. Pl. 2: 38. 1886. "Orizaba (F. MÜLL. n. 2019 in meo herbario, SCHAFFN. n. 207 in herb. FRANQ.); in Cordillera Oajacensi (GAL. n. 5847)."

¹ Rel. Haenk. 1: 320. 1830.



THE NORTH AMERICAN SPECIES OF ECHINOCHLOA.

By A. S. НИГНСОСК.

INTRODUCTION.

In earlier works this group of grasses was usually included as a section in the great genus *Panicum*. The species form a compact group which according to the modern concept is assigned to generic rank.

There are seven species of *Echinochloa* in North America, two of them introduced from the Old World and a third introduced as well as native. Besides these species there are at least three in the Old World. Although the genus itself is well marked, some of the species are exceedingly variable and not easily distinguished from each other.

A variety of one species, *Echinochloa crusgalli edulis*, is occasionally cultivated in the United States for forage under the name of Japanese barnyard millet, and at one time was advertised by seedsmen as billion dollar grass.

The text figures are natural size.

DESCRIPTION OF THE GENUS AND SPECIES.

ECHINOCHLOA Beauv.

Echinochloa Beauv. Ess. Agrost. 53. pl. 11. f. 11. 1812. The type species is *Panicum crusgalli*, the one figured. Beauvois mentions several species in the text under *Panicum* and lists them under *Echinochloa* in the index.

DESCRIPTION.

Annual or perennial, coarse, often succulent grasses with linear flat blades and usually narrow panicles consisting of several spikelike racemes along a main axis. Spikelets plano-convex, often spiny-hispid, subsessile, in pairs or in irregular clusters crowded on one side of the panicle branches. First glume about half as long as the spikelet, pointed. Second glume and sterile lemma equal, stiffly hispidulous on the nerves, usually scabrous on the internerves, pointed, mucronate, or the glume short-awned, the lemma mucronate or awned, sometimes conspicuously so, inclosing a membranaceous palea and sometimes a staminate flower. Fruit plano-convex, the lemma and palea smooth and shining, abruptly acuminate-pointed, the lemma margins inrolled below, flat above, the apex of the palea not inclosed.

The genus differs from *Panicum* in the awned glumes (the first awnless in some species) and sterile lemma and the pointed fertile lemma. The awns are reduced to mucros or points in *E. colonum*, but the habit of the plant and the structure of the inflorescence show the species to be closely allied to the others.

KEY TO THE SPECIES.

Ligule a dense line of stiff yellowish hairs; plants perennial.

Fruit about 2.5 mm. long. Awn of sterile lemma less than 2 mm. long.

1. *E. pyramidalis*.

Fruit about 4 mm. long.

Awn of sterile lemma generally 5 to 10 mm. long; sterile floret staminate.

2. *E. polystachya*.

Awn of sterile lemma generally 4 to 5 cm. long; sterile floret neuter.

4. *E. holciformis*.

Ligule wanting, the ligular area sometimes pubescent; plants annual.

Racemes simple, rather distant, 1 to 2 cm. long; spikelets crowded in about 4 rows, the awn of the sterile lemma reduced to a short point; blades 3 to 6 mm. wide.

7. *E. colonum*.

Racemes more or less branched, usually more than 2 cm. long; spikelets irregularly crowded and fascicled, usually not arranged in rows, the awn of the sterile lemma variable; blades usually more than 5 mm. wide.

Fruit about 4 mm. long.....3. *E. oplismenoides*.

Fruit 2.5 to 3 mm. long.

Sheaths smooth; awns variable, but the panicle not a dense mass of long-awned spikelets.....6. *E. crusgalli*.

Sheaths, at least the lower, hispid or scabrous; panicle dense, the spikelets long-awned.....5. *E. walteri*.

1. *Echinochloa pyramidalis* (Lam.) Hitchc. & Chase.

Panicum pyramidale Lam. Tabl. Encycl. 1: 171. 1791. "E Senegal. D. Rousillon."



FIG. 25.—*Echinochloa pyramidalis*. From Duss 3175, Guadeloupe.

Panicum spectabile var. *guadeloupense* Hack. Notizbl. Bot. Gart. Berlin 1: 328. 1897. "Habitat in Guadeloupe in fossis et locis aquaticis prope faubourgs de la Pointe à Pitre: Duss n. 3176."

Echinochloa pyramidalis Hitchc & Chase, Contr. U. S. Nat. Herb. 18: 345. 1917. Based on *Panicum pyramidale* Lam.

DESCRIPTION.

Plants perennial; stems erect, rather fleshy, 1.5 to 2.5 meters tall, glabrous; sheaths glabrous; ligule a dense row of stiff yellowish hairs 1 to 2 mm. long; blades 40 to 60 cm. long, 5 to 10 mm. wide, glabrous above, scabrous on the margins and on the nerves beneath; panicle 20 to 40 cm. long, the axis scabrous; racemes numerous, ascending, 2 to 7 cm. long, single or somewhat fascicled, distant below but overlapping, stiffly pilose at base and sparsely so along the scabrous or hispidulous rachis; spikelets about 3 mm. long, rather loosely arranged along the rachis, scabrous or slightly hispidulous on the

— Sterile floret staminate - - - E. paludigena
Sterile floret neuter
Fruit etc

E. grand. infusiss. Nilg. ...
Loughness Brook

Panicum spectabile Nees in Trin. Gram. Pan.
138. 1826.

See *Monocotylis* in the *Index*
E. of the *Monocotylis* noted for a *specimen*
See *Monocotylis*

nerves, glabrous or nearly so on the internerves; sterile lemma mucronate or with an awn 1 to 2 mm. long; fruit about 2.5 cm. long, mucronate.

DISTRIBUTION.

In ditches, Guadeloupe, introduced from Africa.

LEeward ISLANDS: Guadeloupe, *Duss* 3175, 3176, 3920; *Hitchcock* 16412.

2. *Echinochloa polystachya* (H. B. K.) Hitchc.

Oplismenus polystachyus H. B. K. Nov. Gen. & Sp. 1: 107. 1816. "Crescit in sylvis opacatis Orinocensibus prope Maypure et in radicibus montis Cumadamenari." The Humboldt collections have not been examined. The description applies well to glabrous specimens of *Echinochloa polystachya*. The ligule is described as "margo pilosus." This leaves little doubt as to the identity of the species.

Panicum spectabile Nees, Agrost. Bras. 262. 1829. "Habitat, uti videtur, in regno Angola Africae, a Lusitanis ob eximium, quod praebet, pabulum inde in Brasiliam allatum, et variis per omne imperium locis cultum, e. g. ad Sebastianopolin, Soteropolin, Maragnanum, Pará." Nees further states, in regard to its introduction from Angola, "Capim de Angola, incolis, de cujus cultura conferatur: Observações á cerca do Capim de Angola, ultimamente trazido e cultivado aqui. Rio de Janeiro. 1818." A specimen in the Munich Herbarium marked, "Capim de Angola. Martius. Iter Brasiliensis," is taken as the type. Dr. Otto Stapf informs me that he has no evidence that this species grows in Africa and that the statement by Nees that it was introduced from Angola appears to be an error.

Echinochloa spectabilis Link, Hort. Berol. 2: 209. 1833. Based on *Panicum spectabile* Nees.

Orthopogon hirsutus Spreng.; Steud. Nom. Bot. ed. 2. 2: 234. 1841. A name only, given as synonym of *Panicum spectabile*.

Panicum phyllanthum Steud. Syn. Pl. Glum. 1: 47. 1854. "Ex. hrbo. Deloche, lectum in Montevideo." The type has not been examined.

Panicum bonplandionum Steud. Syn. Pl. Glum. 1: 48. 1854. Based on "*Oplismenus polystachyus* H. B."

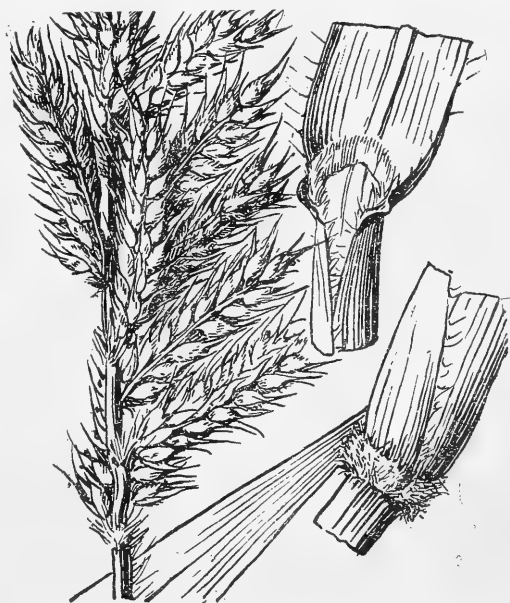


FIG. 26.—*Echinochloa polystachya*. From Pittier 4383, Panama.

DESCRIPTION.

Plants perennial, usually in colonies; culms coarse, 1 to 2 meters tall, from a long creeping rooting base, glabrous, the nodes densely hispid with appressed yellowish hairs; sheaths glabrous or papillose-hispid; ligule a dense line of stiff yellowish hairs as much as 4 mm. long; blades as much as 2.5 cm. wide, scabrous on the margins and upper surface; panicle 10 to 30 cm. long, rather dense, the axis angled, very scabrous; racemes ascending, the lower mostly 3 to 6 cm. long, densely hispid at base, the rachis very scabrous and more or less papillose-hispid; spikelets rather closely set, nearly sessile, about 5 mm. long; sterile floret staminate, the awn 2 to 10 mm. long; fruit rather soft, about 4 mm. long, extending into a point about 0.5 mm. long.

DISTRIBUTION.

Swamps and ditches near the coast, Mexico and the West Indies to Argentina.

SAN LUIS POTOSÍ: Cárdenas, *Hitchcock* 5737.

TABASCO: Laguna de Peralta, *Rovirosa* 315, González, *Rovirosa* 703.

PANAMA: Ormila, *Pittier* 4383.

CUBA: Habana, *Léon* 4168.

JAMAICA: Savanna-la-Mar, *Hitchcock* 9868.

SANTO DOMINGO: Sánchez, *Taylor* 66. Rincón, *Fuertes* 1419.

PORTO RICO: Mayaguez, *Chase* 6290, 6319. Caguas, *Sintenis* 2543. Bayamon, *Hioram* 324 in part. Lares, *Chase* 6583.

LEEWARD ISLANDS: Antigua, *Wullschlaegel* 635.

WINDWARD ISLANDS: Martinique, *Duss* 542.

TOBAGO: *Hitchcock* 10284; *Broadway* 4896.

COLOMBIA: Santa Marta, *Smith* 108.

DUTCH GUIANA: Paramaribo, *Kuyper* in 1913.

BRAZIL: Paraná, *Dusen* 11461. Without locality, *Capanema* 5398.

PARAGUAY: Pilcomayo River, *Rojas* 76; *Morong* 1070.

URUGUAY: San José, *Arechavaleta* 227.

ARGENTINA: Buenos Aires, *Venturi* 6419.

3. *Echinochloa oplismenoides* (Fourn.) Hitchc.

Berchtoldia oplismenoides Fourn. Mex. Pl. 2: 41. 1886. "Toluca, Lerma (BERL. n. 1140)." Berlandier's no. 1140 from Toluca, in the Paris Herbarium, is the type. Fournier has written the name upon the sheet. The specimen consists of three fragmentary culms with a few racemes of characteristic spikelets.



FIG. 27.—*Echinochloa oplismenoides*. From *Hitchcock* 7527 Mexico.

DESCRIPTION.

Plants annual; culms erect, as much as 1 meter tall, glabrous, the nodes glabrous or rarely appressed-hispidulous; sheaths glabrous; ligule wanting, or rarely a line of short hairs; blades mostly less than 1 cm. wide, scaberulous on the margins and upper surface; panicles narrow, usually not over 15 cm. long, the axis angled, scabrous; racemes appressed, the lower mostly 3 to 6 cm. long, the rachis angled, scabrous and more or less stiffly pilose, not hispid at base; spikelets rather densely set, 4 to 5 mm. long; first glume acutish, glabrous; second glume hispidulous on the nerves, acuminate; sterile lemma empty or with palea only, the awn usually about 1 cm. long, rarely as much as 3 cm. long; fruit about 4 mm. long, mucronate.

DISTRIBUTION.

Moist places, central Mexico.

SONORA: Cananea, *Ricketts* 2.

CHIHUAHUA: Sierra Madre, *Pringle* 1404. Sánchez, *Hitchcock* 7696. Miñaca, *Hitchcock* 7758.

DURANGO: Durango, *Palmer* 253 in 1896; *Hitchcock* 7616. Otinapa, *Palmer* 333 in 1906.

Pringle 8480 cited also under *crus-pauonis*
in *E. crus-galli* ad int = ?

ZACATECAS: Zacatecas, *Hitchcock* 7527.

AGUASCALIENTES: Aguascalientes, *Hitchcock* 7441, 7489.

MEXICO: Toluca, *Hitchcock* 6914.

MICHOACÁN: *Zamora*, *Pringle* 8480. Morelia, *Nicolás* in 1909.

PUEBLA: Puebla, *Arsène* 5444.

4. *Echinochloa holciformis* (H. B. K.) Chase.

Oplismenus holciformis H. B. K. Nov. Gen. & Sp. 1: 107. 1816. "Crescit in humidis montanis prope Cidlapecuaro, alt. 970 hexap. (Regno Mexicano.)" A specimen from the type collection has been examined in the Willdenow Herbarium at Berlin. The label reads, "*Panicum holciforme*. Amer. merid. Humboldt."

Orthopogon holciformis Spreng. Syst. Veg. 1: 307. 1825. Based on *Oplismenus holciformis* H. B. K.

Panicum holciforme Steud. Syn. Pl. Glum. 1: 48. 1854. Based on *Oplismenus holciformis* H. B. K.

Bercholdia holciformis Fourn. Mex. Pl. 2: 41. 1886. Based on *Oplismenus holciformis* H. B. K.

Echinochloa holciformis Chase, Proc. Biol. Soc. Washington 24: 155. 1911. Based on *Oplismenus holciformis* H. B. K.

DESCRIPTION.

Plants perennial; culms erect, sometimes with a decumbent rooting base, stout, succulent, as much as 2 meters tall and 1.5 cm. thick at base, glabrous; sheaths glabrous; ligule a dense line of stiff hairs, long on the lower leaves, short on the upper leaves; blades mostly 8 to 15 mm. wide, scabrous on the margins and upper surface; panicle dense, or interrupted below, nodding, as much as 40 cm. long, the axis scabrous, densely hispid around the base of the branches; racemes appressed, single or fascicled, the lower as much as 10 cm. long, the rachis scabrous and hispid; spikelets rather closely arranged, nearly sessile, about 5 mm. long, fusiform, green or purple, only slightly convex on the rounded side; first glume acute or obtuse; second glume short-awned; sterile lemma empty, the awn as much as 5 cm. long; fruit elliptic, about 5 mm. long including the point, this about 1 mm. long.



FIG. 28.—*Echinochloa holciformis*. From *Arsène* in 1909, Mexico.

DISTRIBUTION.

Moist places, often covering large areas in shallow water, central Mexico to Guatemala.

DURANGO: Durango, *Hitchcock* 7611; *Palmer* 253 in 1896.

JALISCO: Orosco, *Hitchcock* 7375.

GUANAJUATO: Acámbaro, *Hitchcock* 6946. Irapuato, *Hitchcock* 7393.

MICHOACÁN: Morelia, *Arsène* in 1909.

MEXICO: Valley of Mexico, *Pringle* 8622; *Berlandier* 730; *Karwinsky* in 1807. Tulu, *Holway* 9.

GUATEMALA: Estanzuela, *Heyde & Lux* 3911.

5. *Echinochloa walteri* (Pursh) Heller.

Panicum hirtellum Walt. Fl. Carol. 72. 1788. Not *Panicum hirtellum* L. 1759. Type locality, South Carolina, no definite station given. There are three specimens in Walter's herbarium at the British Museum.¹ One of these is the species described below under *Echinochloa walteri*. This specimen may be taken as the type, as this preserves the name in its usual application.

Panicum walteri Pursh, Fl. Amer. Sept. 66. 1814. The range is given as "Near the salt-water: Canada and New York." The species is described as having hispid sheaths. The name is founded on *P. hirtellum* Walt.

Panicum crugalli var. *hispidum* Ell. Bot. S. C. & Ga. 1: 114. 1816. Based on *P. hispidum* Muhl., in manuscript.

Panicum hispidum Muhl. Descr. Gram. 107. 1817. Not *Panicum hispidum* Forst. 1786. "Habitat in Carolina, Delaware, et Nov. Ebor." *Panicum hirtellum* Walt. is cited as a synonym.

Panicum longisetum Torr. Amer. Journ. Sci. 4: 58. 1822. Not *Panicum longisetum* Poir. 1816. "On the banks of the Fox River," Wisconsin. The type, labeled "Cass's Exped. Capt. Douglass," is in the Torrey Herbarium. The sheaths are glabrous, but only the upper part of the plant is shown.

Orthopogon hispidus Spreng. Syst. Veg. 1: 307. 1825. Based on *Panicum hispidum* Muhl.

Oplismenus longisetus Kunth, Rév. Gram. 1: 45. 1829. Based on "*Panicum longisetum* Torrey."

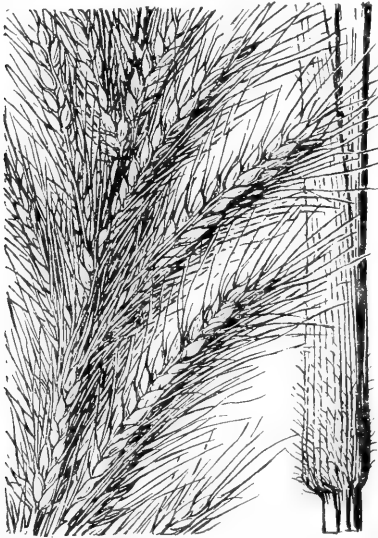


FIG. 29.—*Echinochloa walteri*. From Chase 1426, Illinois.

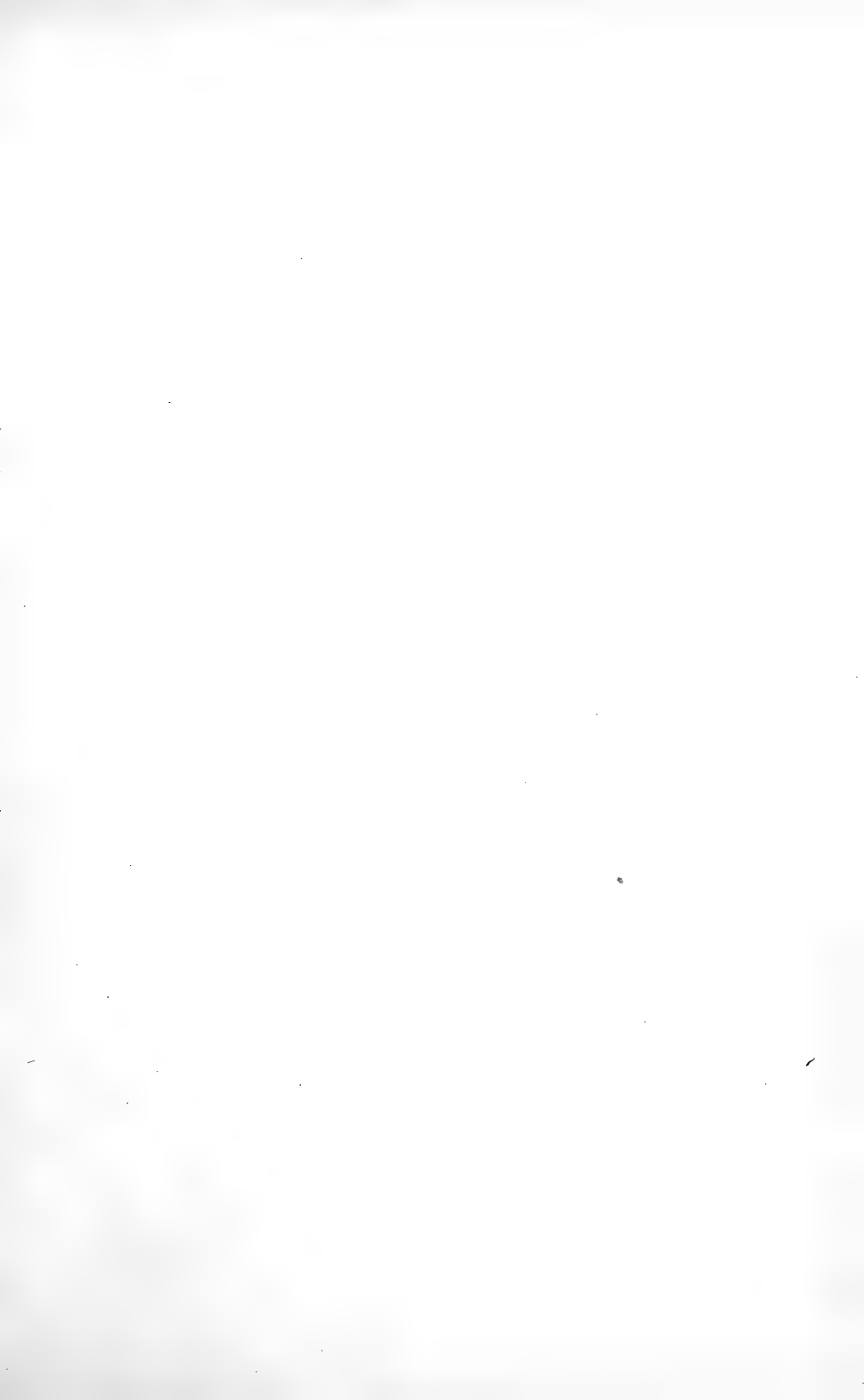
Echinochloa walteri Heller, Cat. N. Amer. Pl. ed. 2. 21. 1900. Based on *Panicum walteri* Pursh.

Echinochloa longiaristata Nash in Small, Fl. Southeast. U. S. 84. 1903. "In wet ground, South Carolina to Louisiana." The type in the Torrey Herbarium was collected in Louisiana by Hale. The sheaths are glabrous, but only the upper part of the plant is shown.

DESCRIPTION.

Plants annual; stems erect, often succulent, often rooting at the lower nodes when growing in mud or water, 1 to 2 meters high, as much as 2.5 cm. thick at base, glabrous; sheaths papillose-hispid, or papillose only, sometimes only the lower sheaths hispid or the hairs confined to the marginal region, or sometimes scabrous only, or rarely glabrous, the collar more or less pubescent; ligule wanting, the ligular area often pubescent; blades usually 10 to 15 mm. wide, sometimes as much as 3 cm. wide, mostly scabrous on both surfaces: panicle large and dense, as much as 30 cm. long,

¹ See Hitchcock, The Identification of Walter's grasses. Rep. Mo. Bot. Gard. 16: 34. 1905.



erect or nodding, the axis very scabrous, more or less papillose-hispid on the angles; racemes appressed or ascending, single or, in the larger plants, usually fasciated, approximate or the lower somewhat distant, sometimes branched, as much as 10 cm. long, the rachis hispidulous and more or less papillose-hispid, especially at base; spikelets closely arranged, several on short branches of the raceme, mostly long-awned, often purple, about 3 mm. long; sterile floret with a palea, neuter, the awn usually 1 to 2 cm. long, sometimes longer, more rarely reduced to a short point; fruit about 3 mm. long, fusiform, about 1 mm. wide, narrower and more fusiform than in *E. crusgalli*.

DISTRIBUTION.

Coastal Plain, Massachusetts to Florida and Texas; also Michigan to Illinois; Cuba.
 MASSACHUSETTS: West Barnstable, *Knowlton* in 1911.
 NEW JERSEY: Point Pleasant, *Pollard* in 1897. Little Silver, *Scribner* in 1891.
 Atlantic City, *Scribner* in 1895. Clifton, *Nash* in 1889. Port Norris, *Holmes* 399.
 PENNSYLVANIA: Philadelphia, *Smith*.
 OHIO: St. Marys, *Wetzstein* 6905; *Kneuck. Gram. Exs.* 75. Sandusky, *Moseley* in 1898.
 INDIANA: Little Chapman Lake, *Deam* 21975. Blue Lake, *Deam* 21700. Wilson, *Hill* in 1898.
 ILLINOIS: Peoria, *Brendel*. St. Clair County, *Eggert* 232. Chicago, *Chase* 1426.
 MICHIGAN: Port Huron, *Dodge* 145. Detroit, *Farwell* in 1901.
 WISCONSIN: Sauk City, *Luders* in 1884.
 DELAWARE: Collins Beach, *Commons* in 1865. Wilmington, *Commons* in 1897.
 MARYLAND: Chesapeake Beach, *Hitchcock* 2388. Little Gunpowder River, *Shull* 308.
 VIRGINIA: Virginia Beach, *Williams* 3101; *Hitchcock* in 1902.
 NORTH CAROLINA: Wilmington, *Amer. Gr. Nat. Herb.* 431. Elizabeth City, *Boettcher* 290.
 SOUTH CAROLINA: Aiken, *Ravenel* in 1869. Georgetown, *Alexander* 167. Orangeburg, *Hitchcock* in 1905.
 GEORGIA: Americus, *Harper* 539.
 FLORIDA: Orange County, *Fredholm* 5420, 5455. Cedar Key, *Combs* 787, 797. Tallahassee, *Kearney* 72. Duval County, *Fredholm* 245. Jacksonville, *Hitchcock* in 1900; *Combs* 21; *Curtiss* 5023, 5091. Gainesville, *Combs* 747; *Chase* 4233. Sanibel Island, *Hitchcock* in 1900. Hillsborough County, *Fredholm* 6342. Pablo Beach, *Combs* 48. Homosassa, *Combs* 962. Bartow, *Combs* 1199. Apalachicola, *Kearney* 100; *Biltmore Herb.* 809b. Lake City, *Combs* 143; *Hitchcock* 2550. Grasmere, *Combs* 1060. Citrus County, *Hitchcock* 2549. Marion County, *Hitchcock* 2548. Miami, *Hitchcock* in 1903. St. Vincent Island, *McAtee* 1689B. Palma Sola, *Tracy* 7036. Monticello, *Combs* 311.
 KENTUCKY: Reelfoot Lake, *Alexander* 307.
 MISSISSIPPI: Cat Island, *Tracy & Lloyd* 442.
 LOUISIANA: Alexandria, *Hale* in 1840. Houma, *Wurzlów* in 1913. Marksville, *McAtee* 2210. Pointe a la Hache, *Langlois* in 1885. New Orleans, *Waite* in 1885. Lake Charles, *Allison* 101.
 TEXAS: Houston, *Thurrow* in 1898. Galveston, *Hitchcock* in 1903. Western Texas, *Wright* 795. Uvalde, *Palmer* 1340 in 1880.
 CUBA: Hanábana, *Wright* 3879 in part.

6. *Echinochloa crusgalli* (L.) Beauv.

Panicum crusgalli L. Sp. Pl. 56. 1753. "Habitat in Europae, Virginiae cultis." The type of *Panicum crusgalli* was discussed in an earlier paper.¹ The only specimen in the Linnaean Herbarium upon which Linnaeus has written the name is a sheet

¹ Hitchcock, Types of American grasses. Contr. U. S. Nat. Herb. 12: 117. 1908.

from Kalm collected in Canada. This specimen was, in the paper mentioned, considered to be the type. A reconsideration of the subject leads me to the conclusion that the name was applied to a concept rather than to a specimen or specimens and that the basis of this concept was the species as generally known in Europe. The Kalm specimen is about the same form as the type of *Panicum muricatum* Michx. The application of the name *crusgalli* is not altered by the elimination of this Kalm specimen as a type. In the first edition of the Species Plantarum Linnaeus describes *Panicum crusgalli* and also a variety β , and gives as the habitat "in Europae, Virginiae cultis." This treatment is followed in the second edition, where he states that "Varietas β . aristis decies glumis longioribus manifeste a communi planta cui vix sesquilingiores aristae, differt." In my remarks on types of American grasses,¹ I showed that the basis of variety β was a specimen of *Echinochloa walteri* from Gronovius (*Clayton* 579). From Linnaeus's note concerning variety β , quoted above, it would appear that the common form, as understood by Linnaeus, had awns about 5 mm. long.

Panicum cruscervi L. Syst. Nat. ed. 10. 2: 870. 1759. No locality is given. In a later work² the habitat is given as "in Indiis." This is usually referred to *Panicum crusgalli*, in works on the Asiatic flora.

Milium crusgalli Moench, Meth. Pl. 202. 1794. Based on *Panicum crusgalli* L.

Panicum grossum Salisb. Prodr. Stirp. 18. 1796. Based on *Panicum crusgalli* L. The text of the Prodomus is a mere list. This species appears as follows: "Grossum. 6. P. [Panicum] Crus Galli Linn. Sp. Pl. ed. 2. p. 83."

Panicum muricatum Michx. Fl. Bor. Amer. 1: 47. 1803. Not *Panicum muricatum* Retz. 1786. "Hab. in Canada ad ripas lacus Champlain et ad lacum Ontario." The type, labeled "Lac. Champlain," was examined at the Paris Herbarium.³ This form is maintained as a distinct species by Fernald, as indicated below under *Echinochloa muricata*. The trichomes on the second glume and sterile lemma are coarse and arise from large papillae.

Echinochloa crusgalli Beauv. Ess. Agrost. 53, 161. 1812. Based on *Panicum crusgalli* L.

Panicum crusgalli var. *aristatum* Pursh, Fl. Amer. Sept. 66. 1814. No locality given, but probably from eastern United States. The long awned form.

Panicum pungens Poir. in Lam. Encycl. Suppl. 4: 273. 1816. Based on *Panicum muricatum* Michx. "non Lam. Dict."

Setaria muricata Roem. & Schult. Syst. Veg. 2: 495. 1817. Based on *Panicum muricatum* Michx.

Echinochloa crusgalli var. *aristata* S. F. Gray, Nat. Arr. Brit. Pl. 2: 158. 1821. Described from Great Britain, no definite locality given. The long-awned form.

Oplismenus crusgalli Dum. Obs. Gram. Belg. 138. 1823. Based on *Panicum crusgalli* L.

Orthopogon crusgalli Spreng. Syst. Veg. 1: 307. 1825. Based on *Panicum crusgalli* L.

Oplismenus muricatus Kunth, Rév. Gram. 1: 44. 1829. Based on "*Panicum muricatum* Michx."

Echinochloa muricata Fernald, Rhodora 17: 106. 1915. Based on *Panicum muricatum* Michx. Fernald distinguishes *Echinochloa muricata* from *E. crusgalli* by the stiff hairs arising from papillae upon the spikelets and maintains that the former is a native of the United States while the latter, in which the hairs lack the papillose base, is introduced in this country. I have been unable to distinguish *E. muricata* on this basis, as both forms occur in Europe and the two appear to me to intergrade.

There are other synonyms in works on the floras of the Old World.

¹ Contr. U. S. Nat. Herb. 12: 117. 1908.

² Sp. Pl. ed. 2. 84. 1762.

Contr. U. S. Nat. Herb. 12: 146. 1908.

? *Panicum cruegalii* L. f. *argyroseum* Ktze
N. d. Colorado

Panicum cruegalii L. var. *vulgare* Swell; Mart
Fl. Bras. atq. Tam. Di. p. 161

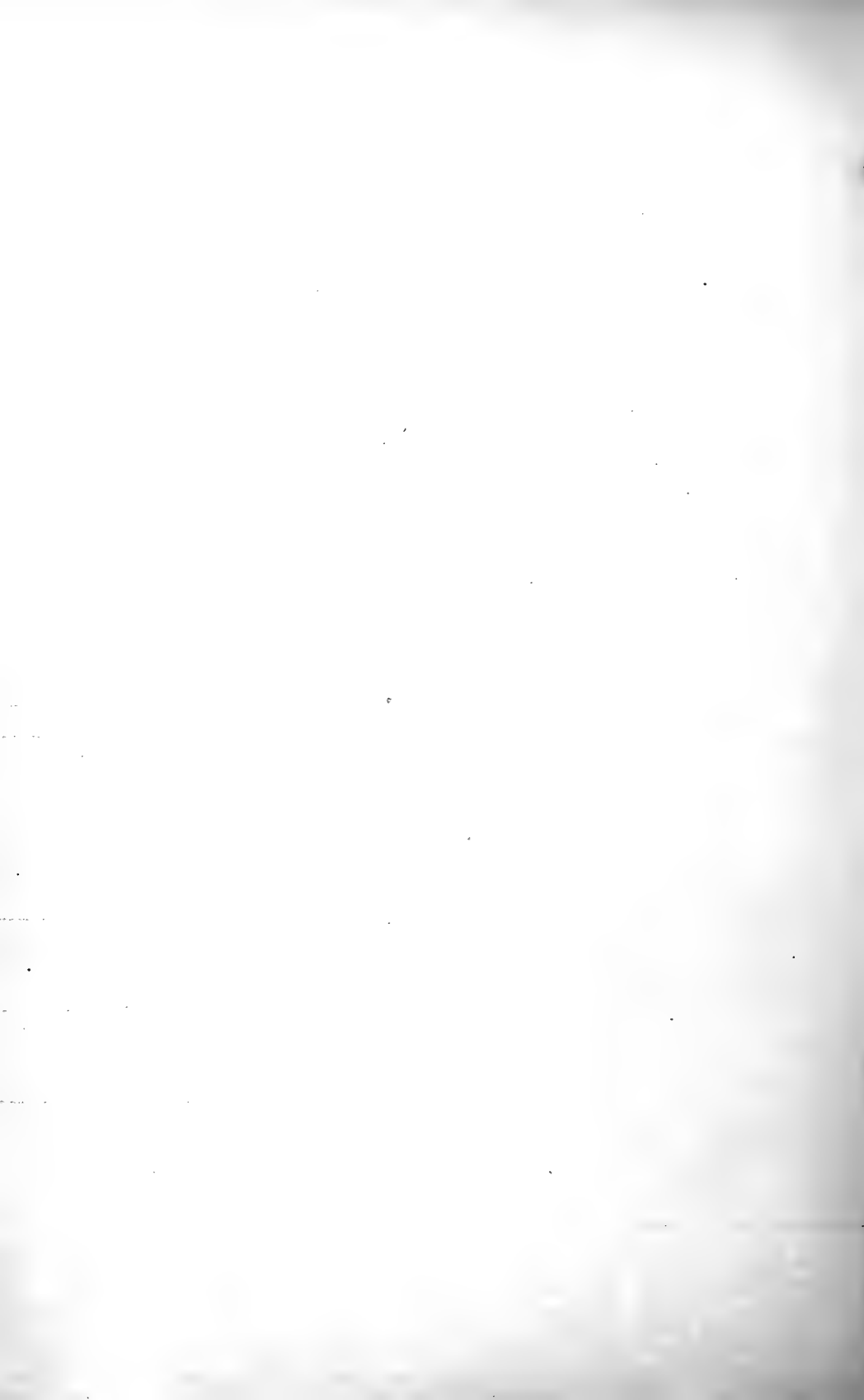




FIG. 30.—*Echinochloa crusgalli*. From *Somes 3725*, Iowa.

DESCRIPTION.

Plants annual; culms erect or sometimes decumbent at base, as much as 1 meter or even 1.5 meters tall, glabrous; sheaths glabrous; ligule wanting, the ligular area sometimes slightly pubescent; blades 5 to 15 mm. wide, scabrous on the margins, sometimes on the upper surface; panicles erect (or nodding), 10 to 20 cm. long, the axis scabrous; racemes spreading, ascending, or appressed, the lower somewhat distant, as much as 10 cm. long, sometimes branched, the upper approximate, shorter, the rachis scabrous, hispid, especially at the base; spikelets crowded, about 3 mm. long, excluding the awns, strongly hispid or papillose-hispid on the nerves, hispidulous on the internerves; sterile lemma with a well-developed palea, neuter, the awn variable in length, mostly 5 to 10 mm. long on at least a part of the spikelets, sometimes as much as 3 cm. long; fruit elliptic, turgid, narrowed into a cusp or point, 2.5 to 3 mm. long, whitish or brownish.

In America the species may be divided into three geographical races. These are fairly distinct over a certain range, but overlap and intergrade to such an extent that they can not be recognized as distinct species. The three races were originally described as *Panicum crusgalli* L., *Oplismenus crus-pavonis* H. B. K., and *O. zelayensis* H. B. K., respectively. The first is a native of the Old World and also of the eastern United States. The second is found in Brazil and extends north into Mexico and the West Indies. The third has its center of distribution on the Mexican plateau and extends into the southwestern United States. However, there are many specimens in our herbaria that can not be definitely assigned to any one of these forms. Hence in the distribution given under each race the placing of some of the specimens under a given subspecies is arbitrary.

European botanists generally distinguish two forms of the first race, *Panicum crusgalli*, a long-awned and a short-awned, and recent works generally apply the varietal names, *longiaristata* to the first, and *breviaristata* to the second. Ascherson and Graebner,¹ whose recent work is representative for Europe, include the two forms under *Panicum* as *P. crusgalli longiaristatum* Doell² and *P. crusgalli breviaristatum* Doell.²

Pursh³ first distinguished the forms in America as *Panicum crusgalli* var. *aristatum* and *P. crusgalli* var. *mitis*.

The robust form with large compound panicle of short-awned or merely pointed spikelets may look very distinct, but the intergrades are so numerous that it can scarcely receive recognition as a variety. For the sake of convenience it is here segregated as a variety and the specimens of *Echinochloa crusgalli* are more or less arbitrarily assigned to the two forms, the awned under *Echinochloa crusgalli*, the nearly awnless under *E. crusgalli mitis*.

A third form of the first race, originally described as *Panicum frumentaceum* Roxb., is rather more distinct because, being cultivated, the slight differences are perpetuated.

DISTRIBUTION.

Moist open ground, ditches, cultivated fields, and waste places, New Brunswick to Washington, south to Florida and California; warmer parts of the Eastern Hemisphere. The following specimens are referred to the typical or awned form; some of them, however, approach variety *mitis*, but at least a part of the spikelets have awns as much as 3 mm. long. Commonly known as barnyard grass.

NEW BRUNSWICK: Shediac Cape, *Hubbard* 755, 763.

QUEBEC: Oka, *Victorin* 3022.

ONTARIO: Amherstburgh, *Macoun* 26319. Kingston, *Fowler* in 1897 and 1905. Galt, *Herriot* in 1908. ~~Larrea~~, *Dodge* 129.

MANITOBA: Branchon, *Macoun* 13226.

¹ Syn. Mitteleur. Fl. 2: 69. 1898.

³ Fl. Amer. Sept. 66. 1814.

² Fl. Bad. 1: 232. 1857.

Sarnia

Fidestron 7210 is E. Walteri

- MAINE: Orono, *Briggs* 6; *Harvey* 1200. Manchester, *Scribner* in 1873. Cumberland, *Chamberlain* 153. Westbrook, *Ricker* 679.
- NEW HAMPSHIRE: Shelburne, *Deane* in 1915.
- VERMONT: Manchester, *Day* 272. Rutland, *Kirk* 1024. *via m. r.*
- MASSACHUSETTS: Nantucket, *F. N. Vasey* in 1897. Winchendon, *Pollard* in 1895. Stoughton, *Blake* 4639. Dennis, *Weatherby* 3827.
- CONNECTICUT: Stratford, *Eames* in 1894. South Glastonbury, *Wilson* 1259.
- RHODE ISLAND: Providence, *Battley*.
- NEW YORK: Oxford, *Coville* in 1884. Clove, *Standley & Bollman* 12166, 12189. Oneida Lake, *Haberer* 1259a. Greenport, *Latham* 318.
- NEW JERSEY: New Durham, *Kearney* in 1894. Camden, *Parker*. Califon, *Fisher* in 1901. Atlantic City, *Scribner* in 1895.
- PENNSYLVANIA: Easton, *Porter* in 1895. Harrisburg, *Small* in 1888.
- OHIO: Olena, *Jennings* 6759. Albion, *Ashcroft* in 1897.
- INDIANA: Lafayette, *Dorner* 51. Pennville, *Deam* 23815. Middlebury, *Deam* 23967. Spencer, *Deam* 23878. Pimento, *Deam* 22195.
- ILLINOIS: Chicago, *Nelson* in 1898; *Umbach* in 1898. Emington, *Wilcox* 120. Wady Petra, *V. H. Chase* 95, 1163.
- MICHIGAN: Alma, *Davis* in 1895. Detroit, *Farwell* in 1902. Port Huron, *Dodge* 110.
- WISCONSIN: Camp Douglas, *Mearns* 772. Madison, *Churchill* in 1893. Milwaukee, *Chase* 1954.
- MINNESOTA: Duluth, *Hitchcock* 5087.
- NORTH DAKOTA: Fargo, *Waldron & Manns* in 1901. Churchs Ferry, *Brannon* 56. Leeds, *Lunell* in 1901.
- SOUTH DAKOTA: Grindstone Buttes, *Griffiths* 750. Frankfort, *Griffiths* 58b. Deep Creek, *Griffiths* 315.
- IOWA: MOSCOW, *Somes* 3471. Manchester, *Ball* 1006. Ledyard, *Pammel* 886. Mid River, *Somes* 3725. Ames, *Ball* 31. Mount Pleasant, *Ball* 19. Fayette County, *Fink* 327.
- NEBRASKA: Rat Lake, *Thomson* 60. Weeping Water, *Williams* 3011, 3012. Ewing, *Bates* 1124, 1125.
- MISSOURI: Clarksville, *Davis* 1119. Aberdeen, *Davis* 945. La Grange, *Davis* 1060. Hannibal, *Davis* 1043. Springfield, *Standley* 8485. St. Louis, *Eggert* 231.
- KANSAS: Osborne City, *Shear* 229. Riley County, *Norton* 574, 884, 884b; *Kellerman* 51.
- DELAWARE: Mount Cuba, *Commons* 221.
- MARYLAND: Mattawoman Creek, *Tidestrom* 7210. Chesapeake Beach, *Chase* 6995. Patuxent River, *Shull* 277. Takoma Park, *Chase* 7532.
- DISTRICT OF COLUMBIA: *Pollard* 520, 683; *Topping* in 1895; *Ward* in 1876; *Steele* in 1896.
- VIRGINIA: Four-mile Run, *Chase* 2670. Marion, *Small* in 1892. Princess Anne County, *Kearney* 2187. Portsmouth, *Noyes* 71. Glen Carlyn, *Dewey* 322. Arlington, *Amer. Gr. Nat. Herb.* 427.
- WEST VIRGINIA: Sweet Springs, *Steele* 210.
- NORTH CAROLINA: Biltmore, *Biltmore Herb.* 809a. Waynesville, *Standley* 5593. Swayney, *Mooney* in 1913.
- SOUTH CAROLINA: Oconee County, *Anderson* 1533. Jacksonboro, *Metcalf* in 1905.
- GEORGIA: Lafayette, *Harper* 343.
- FLORIDA: Fort Myers, *J. P. Standley* 357a; *Standley* 12960; *Hitchcock* 476. Manatee, *Tracy* 7754. Orange County, *Fredholm* 5455. Lake City, *Bitting* 15, 804, 1031, 1036. Eustis, *Nash* 979. Miami, *Hitchcock* 638, 698, 716; *Pollard & Collins* 249. Jensen, *Hitchcock* 746. New Smyrna, *Curtiss* 5823. Bartow, *Combs* 1236. Homosassa, *Combs* 923. Grasmere, *Combs* 1167. Dunnellon, *Combs* 913. Palm Beach, *Hitchcock* 2561. Hillsborough County, *Fredholm* 6342, 6390. Orange County, *Fredholm* 5455.

- TENNESSEE: Knoxville, *Ruth* 62. Wolf Creek Station, *Kearney* in 1897.
- MISSISSIPPI: Starkville, *Tracy* in 1889. Waynesboro, *Kearney* 197.
- LOUISIANA: Houma, *Wurzlow*. Crowley, *Webb* in 1913. Breton Island, *Tracy & Lloyd* 480. Calhoun, *Ball* 72. Cameron, *McAtee* 1902.
- TEXAS: Guadalupe River, *Groth* 179. Houston, *Fisher* 199. Del Rio, *Hitchcock* 13632. Big Spring, *Hitchcock* 13399. Madison County, *Dixon* 443. Clarksville, *Plank* 12. El Paso, *Hitchcock* 13340. San Antonio, *Amer. Gr. Nat. Herb.* 428. Brownsville, *Hitchcock* in 1904. Western Texas, *Wright* 274.
- OKLAHOMA: False Ouachita, *Palmer* 378, 379a. Lincoln County, *Blankinship* in 1895.
- MONTANA: Ulm, *Williams* 591.
- WYOMING: Little Missouri Buttes, *Griffiths* 599. Newcastle, *Griffiths* 679.
- IDAHO: Boise, *Clark* 308. St. Anthony, *Merrill* 55. Pocatello, *Hitchcock* 1841. New Plymouth, *Macbride* 713. Salmon, *Henderson* 3937. Forest, *Brown* 20.
- WASHINGTON: Waitsburg, *Horner* 527. Alma, *Elmer* 530. Prosser, *Cotton* 641, 892. Klickitat County, *Suksdorf* 2329. Bingen, *Suksdorf* 2639.
- OREGON: Portland, *Suksdorf* 1742. Paisley, *Elder* 22. Wasco County, *Leiberg* 866. Clarks Creek, *Sheldon* 8863. Klamath Falls, *Hitchcock* 2961. Hood River, *Hitchcock* in 1903. Southeastern Oregon, *Griffiths & Morris* 867, 892, 894.
- COLORADO: Grand Junction, *Hitchcock* 2197. Canon City, *Shear* 962. Meadow Park, *Shear* 602. Durango, *Tweedy* 377. Alamosa, *Shear* 863.
- UTAH: Ephraim, *Tidestrom* 2483.
- NEVADA: Battle Mountain, *Hitchcock* 10598. Leonard Creek Ranch, *Griffiths & Morris* 352. Wadsworth, *Griffiths & Hunter* 549. Big Creek, *Griffiths & Morris*, 186.
- NEW MEXICO: Cedar Hill, *Standley* 7937. Without locality, *Wright* 2089.
- ARIZONA: Winslow, *Griffiths* 5018. Walnut Canyon, *MacDougal* 353. Prescott, *Hitchcock* 13192, 13193; *Amer. Gr. Nat. Herb.* 429.
- CALIFORNIA: Biggs, *Johnson* 149. Van Sickle Island, *Kennedy* in 1914. Wrights, *Elmer* 5008. Oroville, *Brown* 114. Visalia, *Coville & Funston* 1277. Sutler Creek, *Braunton* 1130. Stockton, *Davy* 1180. Guerneville, *Davy* in 1896. Napa County, *Bolander* 2419. Amador, *Hansen* 820. Stuarts, *Yates* 515. Yreka, *Butler* 865. Eureka, *Tracy* 4634.
- URUGUAY: Montevideo, *Archavaleta*.

***Echinochloa crusgalli mitis* (Pursh) Peterm.**

Panicum crusgalli var. *mite* Pursh, Fl. Amer. Sept. 66. 1814. Described from eastern United States, no definite locality given. The short-awned or awnless form.

Panicum crusgalli var. *purpureum* Pursh, Fl. Amer. Sept. 66. 1814. A form of the last with purple spikelets.

Panicum crusgalli var. *muticum* Ell. Bot. S. C. & Ga. 1: 114. 1816. Described from South Carolina or Georgia, but no definite locality given. Spikelets acuminate. The awnless form common in the eastern states.

Echinochloa crusgalli var. *mitis* Peterm. Fl. Lips. 82. 1838. Based on *Panicum crusgalli* var. *mite* Pursh.

Panicum scindens Nees; Steud. Syn. Pl. Glum. 1: 47. 1854. "St. Louis." The type, in the Berlin Herbarium, was collected by Drummond in 1831. It is the nearly awnless form with rather small panicles, the lower racemes spreading.

DESCRIPTION.

Differs from the typical form in having the spikelets awnless or nearly so, the awns being less than 3 mm. long. In the Southwest this form passes into *E. crusgalli zelayensis*. A specimen from San Antonio, Texas, has scabrous sheaths (*Hitchcock* 5141).

Wright 794

Ex. 100. 1/2 m. north of ...
1/2 m. north of ...
1/2 m. north of ...

For Delaware and N. Carolina
see *E. crugalli* covers.

DISTRIBUTION.

Moist places, Massachusetts to British Columbia, south to Florida, California, and northern Mexico.

ONTARIO: Toronto, *Macoun* 26318. Galt, *Herriot* 73, 82.

BRITISH COLUMBIA: Agassiz, *Macoun* 4.

MASSACHUSETTS: Pittsfield, *Harrison* 21.

NEW YORK: South Bay, *Haberer* 3303. Staten Island, *Kearney* in 1894.

PENNSYLVANIA: Philadelphia, *Smith*.

OHIO: Oberlin, *Ricksecker* in 1894.

MICHIGAN: Detroit, *Farwell* in 1902. Marquette, *Farwell* in 1902.

MINNESOTA: Fort Snelling, *Mearns* 39.

NORTH DAKOTA: Fargo, *Wright* 1864. Leeds, *Lunell* in 1915.

SOUTH DAKOTA: Huron, *Griffiths* 14, 771, 773. Bellefourche, *Griffiths* 373. Frankfort, *Griffiths* 58a. Aberdeen, *Griffiths* 108. Pierre, *Griffiths* 763. Jamesville, *Bruce* 5. Sonoma, *Griffiths* 351. Hot Springs, *Rydberg* 1101.

IOWA: Kossuth County, *Pammel & Cratty* 791.

NEBRASKA: Whitman, *Rydberg* 1643. Rat Lake, *Thomson* 159. Blue Lake, *Thomson* 310. South Cody Lake, *Thomson* 249. Chelsea, *Clements* 2984. Mullen, *Rydberg* 1590. Forest Station, *Hitchcock* 11067.

MISSOURI: Springfield, *Standley* 1557, 9047, 9764.

KANSAS: Hutchinson, *Smyth* 8. Riley County, *Norton* 884a. Osborne, *Shear* 169. Grant County, *Hitchcock* 573. Syracuse, *Thompson* 131.

DELAWARE: Slaughter Beach, *Commons* 222.

DISTRICT OF COLUMBIA: *Sudworth* in 1890.

NORTH CAROLINA: Magnetic City, *Wetherby* 20.

GEORGIA: Macon, *McCarthy* in 1888.

FLORIDA: Palm Beach, *Hitchcock* 2562.

MISSISSIPPI: Woodville, *Phares* in 1878. Starkville, *Kearney* 7. Panola County, *Eggers* 124.

LOUISIANA: Burnside, *Combs* 1418. Alexandria, *Ball* 176; *Hale*. Marksville, *McAtee* 2186.

TEXAS: San Antonio, *Hitchcock* 5323. El Paso, *Hitchcock* 13331; *Barlow* in 1911. Del Rio, *Hitchcock* 13644. Brownsville, *Hitchcock* 5422. Bastrop, *Plank* 36. Rio-grande, *Griffiths* 6470. College Station, *Hitchcock* in 1903. Western Texas, *Wright* 796.

WYOMING: Ten Sleep, *Williams* 2816. Cumins, *Nelson* 1500. Newcastle, *Griffiths* 679. Platte Canyon, *Nelson* 2748. Buffalo, *Chase* 5266. Devils Tower, *Griffiths* 520. Uva, *Nelson* 8567.

WASHINGTON: Bingen, *Suksdorf* 2639, 2826.

OREGON: John Day Ferry, *Leiberg* 872. Portland, *Suksdorf* 1682. Southeastern Oregon, *Griffiths & Morris* 657.

COLORADO: Rocky Ford, *Griffiths* 3310. Golden, *Rydberg* 2503. Durango, *Shear* 1255. Dry Creek, *Nelson* 8207.



FIG. 31.—*Echinochloa crusgalli mitis*. From *Pammel & Cratty* 791, Iowa.

UTAH: Ephraim, *Hitchcock* 10968. Provo, *Tidestrom* 1740. Cainville, *Jones* 5696. Vermilion, *Jones* 5845. Gunnison, *Tidestrom* 2952; *Ward* 678.

NEVADA: Truckee Valley, *Barley* 1351.

NEW MEXICO: Dog Spring, *Mearns* 2409. Strauss, *Stearns* 402. Roswell, *Griffiths* 5729. Shiprock Agency, *Standley* 7218. Mesilla, *Wooton* 36; *Standley* 422; *Hitchcock* 3817. White Mountains, *Wooton & Standley* 3578. Mangas Springs, *Metcalf* 728. Albuquerque, *Harward* 2, 3. Artesia, *Hitchcock* 13440. Kingston, *Metcalf* 1351. Deming, *Hitchcock* 3759. Carlsbad, *Hitchcock* 13491.

ARIZONA: Fort Huachuca, *Wilcox* 2547. Moki Reservation, *Hough* 108. Prescott, *Fernow* in 1896. Chiricahua Mountains, *Blumer* 1782. Horseshoe Bend, *Palmer* 749. Tucson, *Toumey* 780. Patagonia, *Hitchcock* 3666.

CALIFORNIA: Oro Fino, *Butler* 490. Piedmont, *Davy* in 1897. Pine Grove, *Hansen* 601. Redding, *Smith* 745. San Bernardino, *Parish* in 1890.

SONORA: Hermosillo, *Hitchcock* 3599.

CHIHUAHUA: Pacheco, *Nelson* 6244. Southwestern Chihuahua, *Palmer* 18 in 1885.

DURANGO: Durango, *Palmer* 466 in 1896.

COAHUILA: Saltillo, *Hitchcock* 5606.

Echinochloa crusgalli edulis
Hitche.

Panicum frumentaceum Roxb. Fl Ind. 1: 307. 1820. Not *Panicum frumentaceum* Salisb. 1796. "This I have only found in a state of cultivation." Described from India, but no definite locality given.

Echinochloa frumentacea Link, Hort. Berol. 1: 204. 1827. Based on *Panicum frumentaceum* Roxb.

Oplismenus frumentaceus Kunth, Rév. Gram. 1: 415. 1829. Based on *Panicum frumentaceum* Roxb.

Echinochloa crusgalli frumentacea W. F. Wight, Suppl. Cent. Dict. 810.

1909. Without description, but presumably based on *Panicum frumentaceum* Roxb. *Echinochloa crusgalli edulis* Hitche., U. S. Dept. Agr. Bull. 772: 238. 1920.



FIG. 32.—*Echinochloa crusgalli edulis*. From *Piper* in 1912 Texas.

DESCRIPTION.

Differs from the typical form in having dense panicles, the racemes thick, appressed, incurved; spikelets awnless, mostly purple; fruits pale, usually exposed before maturity, contrasting with the purple glumes.

In the United States this is sometimes cultivated as a forage grass under the name Japanese barnyard millet. For a time it was exploited under the name billion-dollar grass. In India the seed is used for human food.

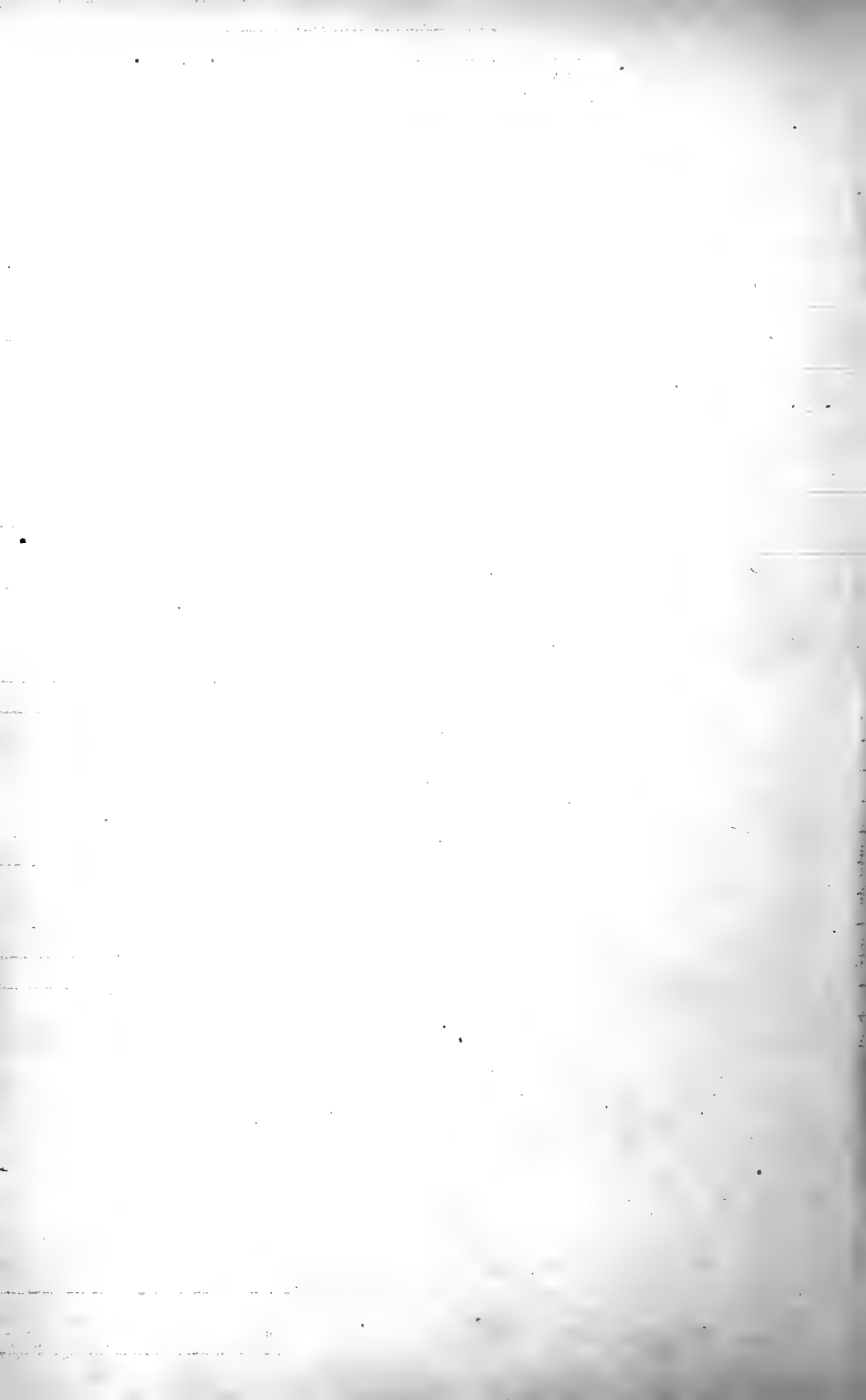
DISTRIBUTION.

Escaped from cultivation in several localities in the eastern United States.

NEW HAMPSHIRE: Shelburne, *Amer. Gr. Nat. Herb.* 430.

VERMONT: Burlington, *Hitchcock* 16028.

"grown for forage along Oregon coast - "does
exceedingly well" - Brossman, letter. July 24, 1929.
Agr. Coll. Corvallis, Oreg



CONNECTICUT: Salisbury, *Bissell* in 1906.

NEW JERSEY: Califon, *Fisher* in 1901.

ILLINOIS: Catlin, *Lansing* 3507.

MICHIGAN: Cass County, *Darlington* in 1917.

DISTRICT OF COLUMBIA: *Ball* in 1900.

NORTH CAROLINA: West Raleigh, *Coit* 1294.

ALABAMA: Tuskegee, *Hitchcock* in 1904.

TEXAS: Eastern Texas, *Piper* in 1910.

***Echinochloa crusgalli zelayensis* (H. B. K.) Hitchc.**

Oplismenus zelayensis H. B. K. Nov. Gen. & Sp. 1: 108. 1816. "Crescit in alta planitie montana regni Mexicani, prope Zelaya, Queretaro et Patzcuaro, in humidis." The specimen from Patzcuaro is in the Paris Herbarium. This is the form, common in Mexico and southwestern United States, in which the panicle is erect and simple, the racemes short and appressed, and the spikelets nearly awnless.

Echinochloa zelayensis Schult. Mant. 2: 269. 1824. Based on *Oplismenus zelayensis* H. B. K.

Panicum zelayense Steud. Nom. Bot. ed. 2. 2: 265. 1841. Based on *Oplismenus zelayensis* H. B. K.

Panicum crus-pici Willd.; Doell in Mart. Fl. Bras. 2²: 143. 1877. A herbarium name mentioned as a form of *Panicum crusgalli*. There are two sheets so named in the Willdenow Herbarium, one with short-awned and one with long-awned spikelets. The former is the specimen referred to by Doell.

Echinochloa crusgalli zelayensis Hitchc. U. S. Dept. Agr. Bull. 772: 238. 1920.

DESCRIPTION.

Differs from *E. crusgalli mitis* in having mostly simple, more or less appressed racemes, the spikelets less strongly hispid, not papillose, usually green.

DISTRIBUTION.

Moist, often alkaline places, Oklahoma to Oregon, south through Mexico to Colombia and Argentina.

TEXAS: El Paso, *Chase* 5888; *Havard* in 1882;

Hitchcock 13329, 13330. Big Spring, *Tracy* 8291. Houston, *Hall* 836. Hockley, *Thurow* in 1898. Cypress, *Thurow* in 1898. Bastrop, *Plank* 38. Richmond, *Plank* 9. Chillicothe, *Ball* 973. Seguin, *Plank* 98. Eagle Pass, *Havard* 82.

OKLAHOMA: Without locality, *Stevens* 1178.

OREGON: Southeastern Oregon, *Griffiths & Morris* 893. Portland, *Sheldon* 10929.

COLORADO: Golden, *Shear* 753, 2502.

UTAH: Ogden, *Hitchcock* 10879. Salt Lake City, *Jones* in 1879. Green River, *Tracy* in 1887.

NEW MEXICO: Mesilla, *Hitchcock* 3828. Cloudcroft, *Hitchcock* 13298. Carlsbad, *Hitchcock* 13492. Grant County, *Blumer* 132. Pecos, *Standley* 5016. Ojo Caliente, *Wooton* 2968. Las Cruces, *Wooton* 1072; *Hitchcock* in 1903. Albuquerque, *Jones* 4125. Farmington, *Standley* 7030. Cimarron Canyon, *Griffiths* 5552. Cedar Hill, *Standley* 7936. Without locality, *Wright* 2088.



FIG. 33.—*Echinochloa crusgalli zelayensis*.
From Mearns 744, Mexico.

- ARIZONA: San Bernardino Ranch, *Mearns* 744. San Pedro River, *Mearns* 1120. Carizo Mountains, *Standley* 7494. Winslow, *Griffiths* 5035. Fort Verde, *MacDougal* 614. Opposite Black Point (California), *Jepson* in 1912. Prescott, *Hitchcock* 13180. Benson, *Griffiths* 1993. Papago Reservation, *Griffiths* 1651. Fairbank, *Griffiths* 1970. Tucson, *Griffiths* 1616.
- CALIFORNIA: Ione, *Braunton* 1241. Lake Tahoe, *Hitchcock* in 1901. Threerivers, *Jepson* 4717. Rockwood, *Parish* 8340. Fort Yuma, *Parish* 8233. Imperial Valley, *Parish* 8085; *Wales* 13. Kern County, *Hilgard* in 1895. Merced, *Hitchcock* 3212. Death Valley, *Coville & Funston* 242.
- SONORA: Colorado River, *Palmer* 950 and 951 in 1889.
- CHIHUAHUA: Casas Grandes, *Townsend & Barber* 353.
- DURANGO: Torreón, *Hitchcock* 7725. Durango, *Hitchcock* 7565, 7566; *Palmer* 252 in 1896.
- COAHUILA: Saltillo, *Palmer* 380 in 1898; *Hitchcock* 5600, 5607, 5612.
- ZACATECAS: Zacatecas, *Hitchcock* 7526.
- AGUASCALIENTES: Aguascalientes, *Hitchcock* 7442, 7486.
- SAN LUIS POTOSÍ: San Luis Potosí, *Hitchcock* 5655.
- JALISCO: Orosco, *Hitchcock* 7385. Guadalajara, *Hitchcock* 7310, 7314; *Palmer* 430 in 1886. Colotlán, *Rose* 3606.
- GUANAJUATO: Acámbaro, *Hitchcock* 6935. Irapuato, *Hitchcock* 7387, 7398, 7399, 7421. Guanajuato, *Duges* in 1897.
- QUERÉTARO: Querétaro, *Hitchcock* 5820, 5835, 5850, 5851, 5867; *Arsène* 10264; *Basile* 36, 54.
- MICHOACÁN: Morelia, *Arsène* in 1910.
- MEXICO: Mexico, *Bourgeau* 236, 680; *Pringle* 9585; *Orcutt* 4105; *Hitchcock* 5894.
- PUEBLA: Cholula, *Nicolás* in 1910. Tehuacán, *Hitchcock* 6061.
- VERACRUZ: Orizaba, *Hitchcock* 6326; *Müller* 2049. Pital, *Liebmann* 377.
- OAXACA: Oaxaca, *Hitchcock* 6175, 6181.
- MEXICO (Republic of): Without locality, *Liebmann* 386.
- GUATEMALA: Guatemala City, *Hitchcock* 9098.
- COSTA RICA: San José, *Jiménez* 926; *Cooper* 5992; *Tonduz* 3016; *Pittier* 229. Cartago, *Cooper* 144; *Tonduz* 10754. San Marcos, *Tonduz* 7530. Alajuelita, *Tonduz* 8825.
- COLOMBIA: Palmira, *Pittier* 817.
- * BOLIVIA: Coripati, *Bang* 2108.
- ARGENTINA: General Roca, *Fischer* 274.

***Echinochloa crusgalli crus-pavonis* (H. B. K.) Hitchc.**

Oplismenus crus pavonis H. B. K. Nov. Gen. & Sp. 1: 108. 1816. "Crescit in apricis calidissimis Provinciae Cumanensis prope Bordones." The type, in the Paris Herbarium, has awns mostly 5 to 10 mm. long. The specific name is written as two words.

Panicum sabulicolum Nees, Agrost. Bras. 258. 1829. "Habitat in arenosis Parae (Sieber). Vidi in Herb. Willd.—In Monte Video, et in confinibus Regni Paraguayan legiti Sellow. (Herb. Reg. Berol.)." The Sieber specimen (the name in a slightly different form) has been examined in the Willdenow Herbarium. The Sellow specimen has been examined at the Berlin Herbarium. This is the same form as *Oplismenus crus-pavonis*.

Panicum crus-pavonis Nees, Agrost. Bras. 259. 1829. Based on *Oplismenus crus-pavonis* H. B. K. Nees describes a variety α with short awns as in *Oplismenus crus-pavonis*, and a variety β , with long awns. The type of the latter, from the Rio Negro, has awns 15 to 20 mm. long.

Echinochloa composita Presl, Agrost. Bras. 259. 1829, as synonym of *Panicum crus-pavonis*. It was not published by Presl. The specimen, in the German University at Prague, was collected at Acapulco by Haenke. It is about the same form

* Bang 2108 is *crus-pavonis* and is
cited under that variety

Leaves of ...

... ..

... ..

Opilismenus sabulicola (Nes) Kenneth
Rev. Gram 1: Suppl XI. 1830

as the type of *Oplismenus crus-pavonis*, but the racemes are not so compact; the awns are 2 to 5 mm. long.

Panicum aristatum Macfad. Bot. Misc. Hook. 2: 115. 1831. This was described in a footnote to an article entitled, "Sketch of a short botanical excursion in Jamaica." The grass was found in the vicinity of Spanish Town. The type specimen, in the Kew Herbarium, is the form described under *Oplismenus crus-pavonis*.

Oplismenus jamaicensis Kunth, Enum. Pl. 1: 147. 1833. Based upon *Panicum aristatum* Macfad. and referred to *Oplismenus* with a query.

Panicum jamaicense Steud. Nom. Bot. ed. 2. 2: 257. 1841. Based upon *Oplismenus jamaicensis* Kunth.

Panicum horridum Salzm.; Steud. Syn. Pl. Glum. 1: 47. 1854. A herbarium name of a Salzmann specimen from Bahia, Brazil, given as synonym of *Panicum crusgalli* L. Since *Echinochloa crusgalli* itself is rare in South America and the subspecies *crus-pavonis* is common, the plant is probably the subspecies.

Panicum crusgalli var. *sabulicola* Doell in Mart. Fl. Bras. 2²: 142. 1877. Based on *Panicum sabulicola* Nees.

Oplismenus angustifolius Fourn. Mex. Pl. 2: 40. 1886. "Vera Cruz (GOUIN n. 54)." The type specimen, in the Paris Herbarium, is the form with awns 1 to 2 cm. long.

Echinochloa sabulicola Hitchc. Contr. U. S. Nat. Herb. 17: 257. 1913. Based on *Panicum sabulicola* Nees.

DESCRIPTION.

Differs from the typical form in having nodding, rather soft panicles, the spikelets averaging smaller, less strongly hispid, the awn variable in length, but usually not over 1 cm. long.

DISTRIBUTION.

Marshes and wet places, often in the water, Texas and the West Indies south to Bolivia and Argentina. Apparently native in tropical America.

TEXAS: Pierce, Tracy 7743.

LOWER CALIFORNIA: La Paz, Palmer 130 in 1890.

CHIHUAHUA: Casas Grandes, Nelson 6355a.

SINALOA: Culiacán, Palmer 1790 in 1891.

DURANGO: Durango, Palmer 730 in 1896.

COAHUILA: Jaral, Schumann 1738. Saltillo, Palmer 418 in 1898.

JALISCO: Guadaluajara, Palmer 430 and 430a in 1886; Hitchcock 7351. Orosco, Hitchcock 7373.

GUANAJUATO: Acámbaro, Hitchcock 6949. Irapuato, Hitchcock 7420.

QUERÉTARO: Querétaro, Basile 30, 31; Arsène 10280; Hitchcock 5810, 5852, 5866.



FIG. 34.—*Echinochloa crusgalli crus-pavonis*. From Sintenis 1889, Porto Rico.

- MICHOACÁN: Zamora, *Pringle* 8480. Morelia, *Holway* 3591. Maravalio, *Hitchcock* 6923.
- MEXICO: Valley of Mexico, *Pringle* 8572, 9606; *Hitchcock* 5879; *Bourgeau* 530.
- VERACRUZ: Córdoba, *Hitchcock* 6452. Monte Pacha, *Liebmann* 385. Veracruz, *Smith* 1329. Orizaba, *Botteri* 161, 718; *Hitchcock* 6344.
- MORELOS: Cuernavaca, *Hitchcock* 6849.
- GUATEMALA: Cobán, *Türckheim* 1287, 3827.
- COSTA RICA: Nuestro Amo, *Jiménez* 527. San José, *Hitchcock* 8453; *Pittier* 382.
- PANAMA: Chagres, *Fendler* 365. Ancón, *Celestine* 18. Balboa, *Hitchcock* 7999. Pedro Miguel, *Hitchcock* 7958; *Pittier* 2508.
- BERMUDA: *Brown, Britton & Russell* 1961; *Collins* 343.
- CUBA: Yumurí Mountains, *Rugel* 884. Habana, *Léon* 747, 2785. Without locality, *Wright* in 1865; *Rugel* 889; *Liebmann* 378.
- JAMAICA: Savanna-la-Mar, *Hitchcock* 9862. Black River, *Hitchcock* 9650. Grosmond Marsh, *Harris* 11751. Meylersfield, *Harris* 11824.
- PORTO RICO: Lares, *Chase* 6596. Humacao, *Sintenís* 1889. San Juan, *Chase* 6352, 6396. Canovanas, *Stevenson* 5388. Rio Piedras, *Stevenson & Rose* 6428. Without locality, *Eggers* 685.
- LEEWARD ISLANDS: Guadeloupe, *Duss* 3161.
- TRINIDAD: *Bot. Gard. Herb.* 1678.
- BRITISH GUIANA: Without locality, *Jenman* 5991; *Schomburgk* 151.
- BRAZIL: Minas Geraes, *Regnell* 1374. Campinas, *Campos Novas* 1250, 1251. São Paulo, *Löfgren* 1539, 2787. Paraná, *Dusen* 7910. Without locality, *Capanema* 5398½; *Jard. Bot.* 145; *Glaziou* 16616.
- PARAGUAY: Pilcomayo River, *Morong* 963; *Rojas* 55, 55a. Central Paraguay, *Morong* 539, 743.
- URUGUAY: Without locality, *Arechavaleta*.
- BOLIVIA: Tarija, *Fries* 1102. Coripati, *Bang* 2108.
- ARGENTINA: Misiones, *Ekman* 606, 606a, 607. Catamarca, *Jorgensen* 1399, 1651. Without locality, *Stuckert* 13872.

7. *Echinochloa colonum* (L.) Link.

Panicum colonum L. Syst. Nat. ed. 10. 2: 870. 1759. No locality is mentioned. In a later work¹ the locality is given as, "Habitat in Indiae cultis." The type specimen in the Linnaean Herbarium² was sent from Jamaica by Patrick Browne. The word "colonum" appears to be a genitive plural.³

Milium colonum Moench, Meth. Pl. 202. 1794. Based on *Panicum colonum* L.

Oplismenus colonus H. B. K. Nov. Gen. & Sp. 1: 108. 1816. Based on *Panicum colonum* L.

Panicum zonale Guss. Fl. Sic. Prodr. 1: 62. 1827. This citation has not been verified. The description refers to the form of *Echinochloa colonum* with zonate leaves.

Oplismenus repens Presl, Rel. Haenk. 1: 321. 1830. "Hab. in Mexico." A part of the type, sent to Trinius from Prague, has been examined in the Trinius Herbarium at Petrograd.

Echinochloa colona Link, Hort. Berol. 2: 209. 1833. Based on *Panicum colonum* L.

Panicum incertum Bosc; Steud. Nom. Bot. ed. 2. 2: 258. 1841. A name only, as synonym of *Panicum colonum* L.

Panicum prorepens Steud. Syn. Pl. Glum. 1: 46. 1854. Based on *Oplismenus repens* Presl.

¹ Sp. Pl. ed. 2. 84. 1762.

² See Hitchcock, Contr. U. S. Nat. Herb. 12: 119. 1908.

³ See Hitchcock, Contr. U. S. Nat. Herb. 17: 256. 1913.

Pringle 8480 is *E. crugalli*
cited under *opliamenooides* also

< *E. crugalli* >

Selma

Panicum colonum zonale L. H. Dewey, Contr. U. S. Nat. Herb. 2: 502. 1894. Based on *Panicum zonale* Guss.

Echinochloa colona zonalis Woot. & Standl. N. Mex. Coll. Agr. Bull. 81: 45. 1912. Presumably based on *Panicum zonale* Guss., though no synonym is cited.

Several other synonyms are given in works on European floras.

DESCRIPTION.

Plants annual, the larger ones usually much branched at base; culms prostrate-spreading, ascending, or erect, usually 20 to 40 cm. long, glabrous, compressed; sheaths glabrous, compressed; ligule wanting; blades rather lax, 5 to 10 cm. long, rarely longer, 3 to 6 mm. or rarely as much as 1 cm. wide, somewhat scabrous on the margins, occasionally bearing transverse purple bands (zonate); panicles 5 to 10 or even 15 cm. long, the axis smooth or slightly scabrous; racemes several, 1 to 2 cm. long or rarely longer, appressed or ascending, single or occasionally two approximate, the lower usually distant as much as 1 cm., the rachis triangular-flattened, scabrous; spikelets about 3 mm. long, crowded, nearly sessile, in about 4 rows; second glume and sterile lemma short-pointed but not awned; fruit about 2.5 mm. long, short-pointed.

In this species the spikelets are merely pointed and not awned, but in all other respects it agrees with the concept of the genus.

DISTRIBUTION.

Ditches and moist places in the warmer parts of both hemispheres; introduced in America, where it is a common weed.

NEW JERSEY: On ballast, Camden, *Martindale* in 1879.

PENNSYLVANIA: On ballast, Girard Point, Philadelphia, *Martindale* in 1879.

MISSOURI: Carruthersville, *Hitchcock* in 1904.

VIRGINIA: Virginia Beach, *Kearney* 2049.

NORTH CAROLINA: Eastern North Carolina, *McCarthy* in 1885.

SOUTH CAROLINA: Santee Canal, *Curtiss* 3611. Aiken, *Ravenel* in 1869. Orangeburg, *Amer. Gr. Nat. Herb.* 425.

GEORGIA: Athens, *Harper* 113. Camilla, *Tracy* 4571. Stone Mountain, *Hitchcock* in 1905.

FLORIDA: Marco, *Hitchcock* 475. Alachua County, *Combs* 691, 729. Little River, *Eaton* 472. Monticello, *Combs* 315. Tallahassee, *Kearney* 84; *Nash* 2337; *Combs* 389. Quincy, *Combs* 410. Chipley, *Combs* 539c. Apalachicola, *Biltmore Herb.* 794b. Chattahoochee, *Curtiss* 5999. Milton, *Chase* 4315. Hillsborough County, *Fredholm* 6358.

TENNESSEE: La Vergne, *Eggert* 73. Knoxville, *Ru'h* in 1895; *Scribner* in 1889. Nashville, *Gattinger* in 1878; in *Curtiss N. Amer. Pl.* 3583*.

ALABAMA: Birmingham, *Hitchcock* in 1898. Mobile, *Mohr* in 1879; *Kearney* 66. Tuskegee, *Carver* 85. Selma, *McCarthy* in 1888.



FIG. 35.—*Echinochloa colonum*. From *Bentley* in 1899, Texas.

- MISSISSIPPI: Starkville, *Kearney* 17. Agricultural College, *Pollard* 1281.
- ARKANSAS: Pine Bluff, *Eggert* 111. Texarkana, *Heller* in 1898. Northwest Arkansas, *Harvey* 20.
- LOUISIANA: New Orleans, *Waite* in 1885. Shreveport, *Ball* 106. Rayville, *Ball* 6. Alexandria, *Ball* 178. Mount Lebanon, *Ball* 87. Pointe a la Hache, *Langlois* in 1885.
- TEXAS: Corpus Christi, *Heller* 1501; *Hitchcock* 5354. Ennis, *Smith* 18. Kerrville, *Heller* 1923; *Hitchcock* 5319. Laredo, *Sauvignet* in 1892; *Hitchcock* 5511. Fort Worth, *Ruth* 164. San Antonio, *Ball* 950; *Amer. Gr. Nat. Herb.* 426. Brownsville, *Hitchcock* 5423. New Braunfels, *Hitchcock* 5200, 5199. El Paso, *Hitchcock* 7808. Rio Grande, *Griffiths* 6465. Pierce, *Tracy* 7393. Texarkana, *Letterman* in 1894. Comal County, *Groth* 97. Houston, *Hall* 826. Barstow, *Tracy* 8285. Beaumont, *Plank* 21. Abilene, *Bentley* in 1899. Without locality, *Reverchon* 1091.
- WASHINGTON: On ballast, Linnton, *Suksdorf* 7401.
- NEW MEXICO: Organ Mountains, *Wooton & Standley* in 1906. Deming, *Hitchcock* 3755. Las Cruces, *Vasey* in 1881.
- ARIZONA: Tucson, *Thorner* 283; *Griffiths* 1518, 1534, 3344. Paradise, *Blumer* 1764, 2268. Patagonia, *Hitchcock* 3683. Santa Rita Mountains, *Griffiths* 7007, 7291. Papago Reservation, *Griffiths* 1655. San Bernardino Ranch, *Mearns* 719, 795. La Noria, *Mearns* 1207.
- CALIFORNIA: Mecca, *Parish* 8101. Imperial, *Parish* 824.
- LOWER CALIFORNIA: 80 miles southeast of San Diego, California, *Palmer* 419 in 1875. Mulejé, *Palmer* 202 in 1887. Santa Agueda, *Palmer* 223 in 1890. San José del Cabo, *Brandege* 26, 38.
- SONORA: La Colorada, *Clokey* 1916, 1917. Guaymas, *Palmer* 51 in 1887, 202 in 1887; *Hitchcock* 3560. Hermosillo, *Hitchcock* 3580, 3620. Alamos, *Rose* 12984. Yaqui River, *Palmer* 13 and 14 in 1869. Cocospora Ranch, *Griffiths* 6832. Oputo, *Hartman* 189.
- CHIHUAHUA: Santa Eulalia, *Wilkinson* in 1885. Chihuahua, *Hitchcock* 7780. Sánchez, *Hitchcock* 7690.
- SINALOA: Mazatlán, *Rose* 14039. Topolobampo, *Rose* 13265. Rosario, *Rose* 1544, 14574. Culiacán, *Palmer* 1542 in 1891. San Blas, *Rose* 13424.
- DURANGO: Tlahualilo, *Pittier* 478. Durango, *Hitchcock* 7655. Torreón, *Hitchcock* 7552.
- COAHUILA: Saltillo, *Hitchcock* 5592, 5599.
- NUEVO LEÓN: Monterrey, *Hitchcock* 5548.
- TEPIC: Acajoneta, *Rose* 1923, 14250.
- SAN LUIS POTOSÍ: Cárdenas, *Hitchcock* 5750.
- JALISCO: San Nicolás, *Hitchcock* 7224. Río Blanco, *Palmer* 193 in 1886.
- GUANAJUATO: Acámbaro, *Hitchcock* 6941. Irapuato, *Hitchcock* 7413.
- QUERÉTARO: Querétaro, *Hitchcock* 5831.
- COLIMA: Caldras, *Hitchcock* 7020. Colima, *Palmer* 169 in 1897.
- MICHOACÁN: Morelia, *Arsène* in 1909.
- PUEBLA: Tehuacán, *Hitchcock* 6052.
- VERACRUZ: Orizaba, *Bourgeau* 2593; *Hitchcock* 6325. Guitepec, *Liebmann* 383. Veracruz, *Hitchcock* 6569.
- MORELOS: Cuernavaca, *Hitchcock* 6836.
- GUERRERO: Balsas, *Hitchcock* 6802. Iguala, *Rose* 9386.
- OAXACA: Oaxaca, *Hitchcock* 6125. Tomellín, *Hitchcock* 6228; *Rose* 10048.
- YUCATÁN: Izamal, *Gaumer* 2484.
- GUATEMALA: Gualán, *Deam* 6322.
- SALVADOR: La Unión, *Hitchcock* 8793.
- NICARAGUA: Corinto, *Hitchcock* 8741.



- COSTA RICA: Puntarenas, *Hitchcock* 8531. Salinas, *Pittier* 2704. Alajuelita, *Tonduz* 8827. San José, *Pittier* 2830; *Jiménez* 928.
- PANAMA: Corozal, *Pittier* 2184, 6770. New Frijoles, *Pittier* 6837. Empire, *Pittier* 3720, 3723. Culebra, *Hitchcock* 7922. Balboa, *Celestine* 14. Miraflores, *Pittier* 2505.
- BERMUDA: *Brown, Britton & Bisset* 2147; *Collins* 154.
- CUBA: Cienfuegos, *Pringle* 45. Cabañas, *Palmer & Riley* 756. Habana, *Palmer & Riley* 1137; *Léon* 752, 844. Santa María, *Linden* 1814. Manacas, *Léon* 5904. Regla, *Liebmann* 376. Buenaventura, *Wilson* 9320. Guane, *Shafer* 10392. Paso Estancia, *Shafer* 1561. Sierra Guayaba, *Shafer* 13852. Sancti Spiritus, *Shafer* 12152. Santiago de las Vegas, *Baker* 502, 4765; *Hitchcock* 490. Isle of Pines, *Curtiss* 427. Guines, *Léon* 425. Arroyo Apolo, *Léon* 303. Without locality, *Wright* 752.
- JAMAICA: Savoy, *Harris* 11612. Hope Grounds, *Harris* 11241. Halls Delight, *Harris* 11419. Gordon Town, *Hart* 825. Ipswich, *Hitchcock* 9594. Bog Walk, *Hitchcock* 9288. Savanna-la-Mar, *Hitchcock* 9867. Montpellier, *Harris* 11806.
- SANTO DOMINGO: Rincón, *Fuertes* 1274. San Pedro de Macoris, *Rose* 4438. Azua, *Rose* 3950, 4421.
- PORTO RICO: Rio Piedras, *Barrett* 64; *Cowgill* 694. Guanica, *Millspaugh* 732; *Chase* 6530. Mayaguez, *Heller* 4409; *Chase* 6252. Puente Fluco, *Goll* 878. San Antonio, *Goll* 186. Caguas, *Millspaugh* 214. Catano, *Heller* 108. Coamo Springs *Goll* 660. Cabo Rojo, *Sintenis* 845. San Juan, *Chase* 6381. Vieques, *Chase* 6689; *Shafer* 2483. Culebra, *Britton & Wheeler* 145; *Millspaugh* 569.
- VIRGIN ISLANDS: St. Thomas, *Eggers* 291; *Millspaugh* 335. Tortola, *Fishlock* 65, 108. St. Croix, *Ricksecker* 31, 106.
- LEEWARD ISLANDS: St. Kitts, *Britton & Cowell* 282. Antigua, *Wulfschlaegel* 612. Montserrat, *Shafer* 704. Guadeloupe, *Duss* 2684. Dominica, *Jones* 32.
- WINDWARD ISLANDS: Martinique, *Duss* 1322. Barbados, *Bot. Sta. Herb.* 240.
- TRINIDAD: *Broadway* 4936; *Bot. Gard. Herb.* 2285; *Hitchcock* 10026.
- TOBAGO: *Broadway* 4648; *Hitchcock* 10211.
- COLOMBIA: Cartagena, *Hitchcock* 9904. Santa Marta, *Smith* 150.
- BRAZIL: Bahia, *Löfgren* 3766. Without locality, *Capanema* 5393.
- PARAGUAY: Sierra de Amambay, *Rojas* 10785, 10785a. Apa River, *Hussler* 11929.
- ECUADOR: Without locality, *Jameson* 346. Galápagos Islands, *Stewart* 1300.
- URUGUAY: Without locality, *Arechavaleta*.
- ARGENTINA: Estancia San Teodoro, *Kneucker Gram. Exs.* 185.
- CHILE: Santiago, *Philippi* in 1888.

DOUBTFUL SPECIES.

Panicum echinatum Willd. Enum. Pl. 1032. 1809. "*Panicum muricatum* Hornem. Cat. hort. haf. p. 28 * * * Non est *P. muricatum* Retzii." "Habitat in America meridionali." (The type has not been examined, and the brief diagnosis is insufficient for identification. In Hornemann's catalogue the name is ascribed to Retzius, and there is no description.)

OPILISMENUS ECHINATUS Kunth, Rév. Gram. 1: 45. 1829. Based on "*Panicum echinatum* Willd."

THE NORTH AMERICAN SPECIES OF CHAETOCHLOA.

By A. S. НИГНСОСК.

INTRODUCTION.

The genus *Chaetochloa* is closely allied to *Panicum*, from which it is separated technically by the presence of bristle-like sterile branchlets below the spikelets. Two species, introduced from Europe, are common weeds in the eastern states. One, *C. lutescens* (*Setaria glauca* of authors), with a dense cylindric spikelike panicle or head, and yellow bristles, is called yellow foxtail or pigeon grass. The other, green foxtail (*C. viridis*), has green heads. The bristly head or narrow panicle is characteristic of most of the species of the genus. One species, *C. italica* (*Setaria italica*), is cultivated under the name of millet or foxtail millet. Of this there are many varieties, such as Hungarian grass, German millet, and Golden Wonder. To these the general term millet is applied, a name which should not be confused with the common millet of Europe (*Panicum miliaceum*), cultivated occasionally in the United States for forage under the name of broom-corn millet, proso millet, and hog millet. The North American species of *Chaetochloa* were revised in 1900 by Scribner and Merrill.¹

The allies of *Panicum palmifolium* are here included under *Chaetochloa* as a subgenus (*Ptychophyllum*). They are tropical species with broad plaited blades. Some are cultivated in greenhouses under the name of palm grass, because of the leaves which resemble those of a young palm.

In a small group of species of *Panicum* (forming the subgenus *Paurochaetium*²) the ultimate branchlets are produced beyond the few to several spikelets as minute bristles. In *Chaetochloa* proper each spikelet is subtended by one or more bristles. In the subgenus *Ptychophyllum* usually only the terminal of the one to few spikelets on a branchlet is subtended by the bristle. *Panicum* and *Chaetochloa* thus closely approach each other. The species of the subgenera *Paurochaetium* and *Ptychophyllum* are included respectively in *Panicum* and *Chaetochloa* because, all their characters taken into consideration, they show closer relationship to other species in *Panicum* and *Chaetochloa*, respectively, than they do to each other.

¹ U. S. Dept. Agr. Div. Agrost. Bull. 21. 1900.

² Contr. U. S. Nat. Herb. 15: 22. 1910.

The name *Setaria*, applied to this genus by many authors, has been replaced by *Chaetochloa* because the former name was applied to a genus of lichens by Acharius and by Michaux at a date earlier than that of its application to the grass genus (see synonymy in the technical description).

There are about 60 species of *Chaetochloa*, 26 in North America, about 15 more in South America, the remainder in the warmer parts of the Eastern Hemisphere.

The text figures are natural size.

DESCRIPTION OF THE GENUS AND SPECIES.

CHAETOCHLOA Scribn.

Setaria Beauv. Ess. Agrost. 51. pl. 13. f. 3. 1812. Not *Setaria* Ach. 1798,¹ nor Michx., 1803. Fourteen species are listed, *S. viridis* being illustrated. *Panicum viride* L., upon which the illustrated species is based, is taken as the type.

Panicum subgenus *Ptychophyllum* A. Br. Ind. Sem. Hort. Berol. App. 1855. The author mentions the plicate-leaved species of *Panicum* that had been long cultivated in botanic gardens under the name of *P. plicatum* Auct. He describes *Ptychophyllum* as a subgenus of *Panicum* and notes its close affinity to the subgenus *Setaria*. Ten species are described, the first of which is *Panicum plicatum* Lam. This species may be taken as the type.

Chaetochloa Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 38. 1897. Scribner substitutes the name *Chaetochloa* for *Setaria* Beauv., not Ach. The type is the same as for *Setaria*, namely *Panicum viride* L.

Some of our species of *Chaetochloa* have been referred to *Ixophorus* Schlecht. and to *Chamaeraphis* R. Br., but the types of those genera are not congeneric with the type of *Chaetochloa*.

DESCRIPTION.

Annual or perennial grasses with flat or rarely involute blades, and narrow, usually spikelike, or rarely open panicles. Culms simple or usually branched at the base and sometimes at the middle nodes, the branches from the latter appressed or ascending, bearing secondary panicles, these usually smaller than those of the primary culms. Spikelets lanceolate or elliptic, usually turgid, rarely globose, sessile or short-pedicelled, single or in clusters, some or all subtended by one to several bristles (sterile branchlets), deciduous, falling free from the bristles, awnless, the main branches of the panicle usually short, rarely elongate. First glume broad, usually less than half the length of the spikelet, 3 to 5 nerved. Second glume and sterile lemma equal or the former shorter, several-nerved. Fertile lemma coriaceous or indurate, smooth or rugose.

KEY TO THE SPECIES.

Blades narrowly elliptic, plaited; bristles below only a part of the spikelets, rarely below all. Subgenus **PTYCHOPHYLLUM**.

Plants annual; blades usually less than 2 cm. wide.....1. **C. barbata**.

Plants perennial; blades usually more than 3 cm. wide.

Panicle of numerous approximate, more or less 1-sided racemes, spikelet-bearing to the base, 2 to 5 cm. long, rarely the lower much longer. 2. **C. poiretiana**.

Panicle of more or less fascicled branches, not or scarcely 1-sided, some of them elongate and naked at base.

Branches of panicle as much as 10 cm. long; bristles usually not over twice as long as the spikelets, inconspicuous; blades as much as 6 cm. wide.

3. **C. palmifolia**.

Branches of panicle slender, finally spreading, as much as 20 cm. long; bristles as much as 15 mm. long; blades as much as 10 cm. wide. 4. **C. sulcata**.

¹ See note at bottom of p. 208.



- Blades linear-lanceolate to linear, narrow; bristles below all the spikelets.
CHAETOCHELOA proper.
- Bristles below each spikelet numerous, at least more than 5. Panicle dense, cylindrical, spikeletlike.
- Plants annual; spikelets 3 mm. long.....5. *C. lutescens*.
 Plants perennial; spikelets mostly 2 to 2.5 mm. long.....6. *C. geniculata*.
- Bristles below each spikelet 1, or, by the abortion of the spikelets, 2 or 3.
 Bristles more or less retrorsely scabrous.
- Plants perennial; spikelets globose or nearly so.....7. *C. tenax*.
 Plants annual; spikelets not globose.
- Spikelets about 2 mm. long.....8. *C. verticillata*.
 Spikelets about 1.5 mm. long.
 Panicles usually green, rarely as much as 8 cm. long, less than 5 mm. thick, the bristles 2 to 3 mm. long.....9. *C. scandens*.
 Panicles usually purple, as much as 15 cm. long and 1 cm. thick, the bristles about 1 cm. long.....10. *C. tenacissima*.
- Bristles antrorsely scabrous only.
 Plants annual.
- Fertile lemma at maturity finely cross-lined or nearly smooth.
 Panicle loosely flowered, tapering above.....11. *C. grisebachii*.
 Panicle compactly flowered, sometimes interrupted at base.
 Plants as much as 3 meters tall. Bristles 1 to 2 cm. long; fertile lemma smooth or nearly so.....12. *C. magna*.
 Plants mostly less than 1 meter tall.
 Axis of panicle scabrous but not villous.....13. *C. ambigua*.
 Axis of panicle villous.
 Panicle cylindrical, tapering above, green; spikelet falling entire.
 14. *C. viridis*.
 Panicle lobed or interrupted, often large and heavy, purple or yellow; fruit deciduous from glumes and sterile lemma.
 15. *C. italica*.
- Fertile lemma coarsely transversely rugose.
 Axis of panicle thickly clothed with white stiff hairs 2 mm. long.
 16. *C. longipila*.
 Axis of panicle villous, the hairs about 1 mm. long.
 Panicle densely flowered, cylindrical. Sheaths scabrous.
 17. *C. corrugata*.
 Panicle loosely flowered.
 Blades scabrous but not hispid.....18. *C. liebmanni*.
 Blades sparsely hispid.....19. *C. latifolia*.
- Plants perennial.
- Spikelets 3 mm. long.
 Blades scabrous.....20. *C. macrosperma*.
 Blades villous.....21. *C. villosissima*.
- Spikelets 2 to 2.5 mm. long.
 Panicle attenuate at apex.
 Blades linear-lanceolate, more than 5 mm. broad; panicle interrupted or branched, the branches 1 to 3 cm. long.....22. *C. setosa*.
 Blades slender, mostly less than 5 mm. broad; panicle slender, very narrow.....23. *C. rariflora*.
 Panicle often narrowed toward the summit but not attenuate.
 Branches of primary panicle stiffly ascending, of about equal length except toward the summit; panicle yellowish or brownish, the bristles 1 to 2 cm. long.....24. *C. vulpiseta*.

Branches of panicle short or only the lower as much as 2 to 3 cm. long; panicle pale or greenish, the bristles irregular in length, the longer sometimes 1 to 1.5 cm. long.

Blades mostly less than 1 cm. wide, often folded; panicle usually loosely or interruptedly spikeletlike, the branches usually not over 1 cm. long.....25. *C. macrostachya*.

Blades flat, as much as 1.5 cm. wide; panicle tapering from near the base, the lower branches as much as 3 cm. long.

26. *C. scheelei*.

Subgenus **PTYCHOPHYLLUM** (A. Br.) Hitchc.

Mostly robust perennials (one species annual) with large flat plicate blades. Bristles single below only the terminal spikelet of the ultimate branchlets, or rarely below all the spikelets. Panicles simple or the secondary branchlets very short, the spikelets or branchlets more or less secund. Spikelets mostly narrower and less turgid than in *Chaetochloa* proper. Fertile lemma acute or apiculate, rugose or only obscurely cross-wrinkled. Confined to tropical regions of both hemispheres.

1. *Chaetochloa barbata* (Lam.) Hitchc. & Chase.

Panicum barbatum Lam. Tabl. Encycl. 1: 171. 1791. "Ex Insula Franciae [Mauritius]." The type has not been examined.

Panicum costatum Roxb. Fl. Ind. ed. Carey 1: 314. 1820. "Introduced into the Botanic Garden from Mauritius, by Captain Tennant, in 1802." The type has not been examined.

Panicum viaticum Salzm.; Doell in Mart. Fl. Bras. 2^o: 155. 1877. "Habitat in sepibus et ad vias prope Bahia (Salzmann n. 706)." A duplicate type is in the National Herbarium. Doell states that he has seen an authentic specimen of *Panicum barbatum* Lam., which he cites as a synonym under *P. viaticum*.

Chamaeraphis viatica Kuntze, Rev. Gen. Pl. 2: 770. 1891. Based on *Panicum viaticum* Salzm.

Chamaeraphis costata Kuntze, Rev. Gen. Pl. 2: 771. 1891. Based on *Panicum costatum* Roxb.

Chaetochloa barbata Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 348. 1917. Based on *Panicum barbatum* Lam.

Chaetochloa barbata is described by Grisebach¹ and Hooker² under *Panicum flavescens* Swartz.

DESCRIPTION.

Plants annual; culms decumbent, spreading, often rooting at the lower nodes, branching, glabrous, scabrous or villous near the pubescent nodes, as much as 2 meters long, but often much less; sheaths compressed, ciliate, glabrous or papillose-hispid; ligule about 1 mm. long, densely ciliate; blades narrowly elliptic, flat and rather thin, the upper narrowed to a somewhat truncate base, the lower gradually narrowed to a petiole, as much as 30 cm. long and 2.5 cm. wide, distinctly plicate in large specimens, obscurely so in dwarf ones; panicles long-exserted, green, as much as 20 cm. long, the rachis scabrous and villous, the branches ascending or spreading, as much as 4 cm. long; spikelets oblong-elliptic, glabrous, about 2.5 mm. long, tending to be in two rows along the branches, at least along the upper part, often clustered on branchlets on the lower part of the branches, the pedicels very short, the bristles flexuous, 5 to 10 mm. long, usually rather numerous; first glume circular, one-third the length of the spikelet, 3-nerved; second glume about two-thirds as long as the spikelet, ovate, acute, 7-nerved; sterile lemma as long as the fertile, acute, 7-nerved, the palea about as long and wide as the lemma; fertile lemma elliptic, acute, a little over 2 mm. long, strongly transverse-rugose, the palea inclosed to the tip.

¹ Griseb. Fl. Brit. W. Ind. 547. 1864.

² Hook. f. Fl. Brit. Ind. 7: 56. 1896.



As usual with annuals, this species varies greatly in the size of the plants. Vigorous plants may have numerous culms as much as 2 meters long, with correspondingly large blades and panicles; dwarf plants may be only 10 cm. tall, with obscurely plicate blades and few-flowered spikelike panicles.

DISTRIBUTION.

A weed in cultivated ground and waste places from the West Indies to Brazil; a waif in Florida; introduced from tropical Asia.

FLORIDA: Apalachicola, *Biltmore Herb.* 8374 (in ballast). Miami, spontaneous on grounds of Subtropical Station.

JAMAICA: Constant Spring, *Hitchcock* 9270, 9277. Castleton Gardens, *Amer. Gr. Nat. Herb.* 603. Kingston, *Hitchcock* 9473; *Cockerell* in 1892. Bog Walk, *Hitchcock* 9308. Ewarton, *Hitchcock* 9412. Ramble, *Hitchcock* 9515. Gordon Town, *Harris* 11511. Ferry River, *Harris* 11782. Temple Hall, *Harris* 11360. Mavis Bank, *Harris* 11602. Montego Bay, *Hitchcock* 9694. Buff Bay, *Hitchcock* 9768. New Forest, *Hitchcock* 9834. Troy, *Hitchcock* 9793. Ipswich, *Hitchcock* 9604.

PORTO RICO: Mayaguez, *Chase* 6159; *Holm* in 1915; *Heller* 4373, 4488.

LEEWARD ISLANDS: Antigua, *Rose* 3391; *Wullschlaegel* 618; Guadeloupe, *Duss* 3175. Dominica, *Jones* 43.

WINDWARD ISLANDS: Martinique, *Duss* 544. Barbados, *Eggers* 7128. St. Lucia, *Glaspow* 10. Grenada, *Broadway* in 1904.

TRINIDAD: Port of Spain, *Hitchcock* 9965.

TOBAGO: *Broadway* 4335, 4737; *Hitchcock* 10225, 10251.

BRAZIL: Bahia, *Salzmann*.



FIG. 36.—*Chaetochloa barbata*. From *Amer. Gr. Nat. Herb.* 603, Jamaica.

2. *Chaetochloa poiretiana* (Schult.) Hitchc.

Panicum elongatum Poir. in Lam. *Encycl. Suppl.* 4: 278. 1816. Not *Panicum elongatum* Salisb. 1796, nor Pursh, 1814. "Cette plante croît au Brésil (V. s. in herb. Desfont.)." The type, in the Desfontaines Herbarium at Florence, consists of a portion of a blade and a nearly complete panicle.

Panicum sulcatum Bertol. *Excerpt.* 14. 1820. Not *Panicum sulcatum* Aubl. This citation has not been verified. The species is said to be from Brazil and apparently is described independently of *P. sulcatum* Aubl.

Setaria sulcata Raddi, *Agrost.* Bras. 50. 1823. Based on *Panicum sulcatum* Bertol.

Panicum poiretianum Schult. Mant. 2: 229. 1824. Based on *P. elongatum* Poir. not Pursh.

*Trin. Gram. Par. 169. 1826. **

Panicum speciosum Nees, Agrost. Bras. 252. 1829. "Habitat in campis ad Almeirim provinciae Paraensis." The type, collected in Pará by Martius, is in the Munich Herbarium. The branches of the panicle are spreading and the spikelets are 4 to 5 mm. long.

Panicum crus ardeae Willd.; Nees, Agrost. Bras. 253. 1829. "Habitat in America meridionali." The type is in the Willdenow Herbarium at Berlin.

Setaria poiretiana Kunth, Rév. Gram. 1: 47. 1829. Based on *Panicum poiretianum* Schult.

Setaria crus ardeae Kunth, Rév. Gram. 1: Suppl. xii. 1830. Based on *Panicum crus ardeae* Willd.

Panicum flabellatum Steud. Syn. Pl. Glum. 1: 53. 1854. "Bahia." The type was collected in Bahia by Salzmann. A duplicate type, distributed as *Agrostis*

flabellata Salzm., is in the National Herbarium.

Agrostis flabellata Salzm.; Steud. Syn. Pl. Glum. 1: 53. 1854, as synonym under *Panicum flabellatum* Steud.

Setaria jurgensii Fourn. Mex. Pl. 2: 42. 1886. "(Jurg. n. 692)" is cited, the locality other than Mexico being unknown. The type has not been examined but the description applies to *C. poiretiana*.

Chamaeraphis crus ardeae Kuntze, Rev. Gen. Pl. 2: 770. 1891. Based on *Panicum crus ardeae* Willd.

Chamaeraphis speciosa Kuntze, Rev. Gen. Pl. 2: 770. 1891. Based on *Panicum speciosum* Nees. Kuntze merely lists "*Chamaeraphis speciosa* (A. Br.)." This probably

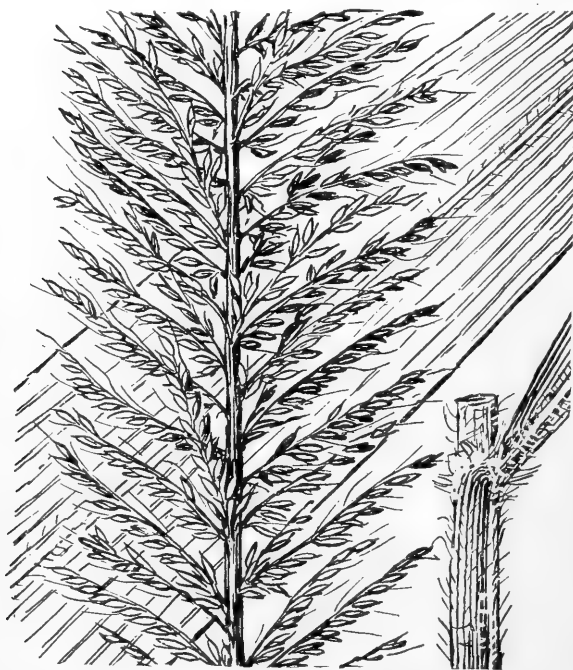


FIG. 37.—*Chaetochloa poiretiana*. From Pringle 3921, Mexico.

refers to *Panicum speciosum* Nees, which Braun placed in the subgenus *Ptychophyllum*.

Chamaeraphis juergensii [jurgensii] Kuntze, Rev. Gen. Pl. 2: 770. 1891. Based on *Setaria jurgensii* Fourn.

Panicum jurgensii Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 40. 1900. Based on *Setaria jurgensii* Fourn.

In previous papers¹ the name *C. sulcatu* was applied to this species. See note on the type of *Panicum sulcatum* p. 162.

DESCRIPTION.

Plants perennial, caespitose; culms erect, 1 to 1.5 meters tall, glabrous, or villous in the vicinity of the nodes; sheaths papillose-hispid, mostly longer than the inter-

¹ Contr. U. S. Nat. Herb. 17: 260. 1913, and op. cit. 18: 348. 1917.

To
you
New York
of
dull
So
are

* Brazil (at least)



nodes, the uppermost elongate, scabrous; ligule ciliate, about 2 mm. long; blades strongly plicate, scaberulous, sometimes sparsely hispid, flat, as much as 1 meter long and 10 cm. wide, narrowed toward each end, the base resembling a petiole; panicles erect, densely flowered, commonly purple, long-exserted, as much as 60 cm. long, and 10 cm. wide, the axis puberulent, the branches ascending, irregularly clustered, approximate, usually somewhat falcate, the lower usually 3 to 5 cm. but sometimes as much as 10 cm. or the distant lowermost even longer; spikelets secund on the branches, narrowly ellipsoidal, about 3 mm. long, the pedicels puberulent, usually very short, some or all on each branch subtended by somewhat flexuous bristles 5 to 10 mm. long; first glume half as long as the spikelet, oval, obtuse, 5-nerved; second glume similar to the first, two-thirds the length of the spikelet, 5-nerved; sterile lemma oblong-ovate, acutish, equaling the fertile one, obscurely 5-nerved, the palea wanting; fertile lemma somewhat coriaceous, ellipsoid, apiculate, very obscurely cross-wrinkled; palea similar to the lemma in texture and marking, the apex free.

DISTRIBUTION.

- Moist woods, Mexico to Brazil. Called gamalote in Trinidad.
 SAN LUIS POTOSÍ: Las Canoas, *Pringle* 3921. Tamasopo Canyon, *Pringle* 3452.
 VERACRUZ: Mirador, *Liebmann* 459, 460, 461. Jalapa, *Hitchcock* 6685.
 OAXACA: Oaxaca, *Galeotti* 5856.
 CHIAPAS: Turubula, *Nelson* 3359.
 TRINIDAD: Port of Spain, *Hitchcock* 9978, 10171; *Amer. Gr. Nat. Herb.* 604. Cedros, *Hitchcock* 10150.
 TOBAGO: *Hitchcock* 10282.
 COLOMBIA: Icononzo, *Pennell* 2841 (N. Y. Bot. Gard. Herb.).
 VENEZUELA: Río Macareo, *Eggers* 13259. Paparo, *Pittier* 6335.
 BRAZIL: Minas Geraes, *Regnell* 459. Descanço, *Widgren* 926. Goyaz, *Gardner* 3519. Organ Mountains, *Wilkes Expl. Exped.* 15. Rio de Janeiro, *Glaziou* 17396. Campinas, *Campos Novaes* 1244. Bahia, *Rose* 19655; *Riedel*. Pará, *Martius* 562. Paraná, *Dusén* 11606.
 PARAGUAY: Central Paraguay, *Morong* 444. Pilcomayo River, *Morong* 1572; *Lindman* 1899.
 PERU: Santa Ana, *Cook & Gilbert* 1429, 1523. Peruvian Andes, *Poeppig* 968.
 BOLIVIA: Ixiamas, *Williams* 991 (N. Y. Bot. Gard. Herb.).
 ARGENTINA: Misiones, *Ekman* 608.

3. *Chaetochloa palmifolia* (Willd.) Hitchc. & Chase.

Panicum plicatum Willd. Enum. Pl. 1033. 1809. Not *Panicum plicatum* Lam. 1791. "Habitat in India orientali." A specimen in the Willdenow Herbarium in Berlin, cultivated in Calcutta by Roxburgh and sent by him to Willdenow, is probably the type.

Panicum palmifolium Willd.; Poir. in Lam. Encycl. Suppl. 4: 282. 1816. Poiret states that the native place of this is not known. He cites *Panicum plicatum* Willd. Enum. Pl. 2: 1033. 1809, not Lam. Encycl., and quotes the description, adding a description of his own. The locality given by Willdenow is "in India orientali." Poiret says that he saw a specimen in the Desfontaines Herbarium. This specimen was examined in Florence. *Panicum palmaefolium* Koen.¹ may be the same as *P. palmifolium* or it may be *P. plicatum* Lam., but it is a nomen nudum, being mentioned in a running account of travels.

Panicum plicatum haitiense Kunth; Griseb. Fl. Brit. W. Ind. 547. 1864, as synonym of *P. palmifolium* Poir. This name is credited to Kunth, but the latter appears not to have published it.

¹ Naturforsch. 23: 208. 1788.

Chamaeraphis palmifolia Kuntze, Rev. Gen. Pl. 2: 771. 1891. Based on *Panicum palmifolium* Willd.

Setaria palmifolia Stapf, Journ. Linn. Soc. Bot. 42: 186. 1914. Based on *Panicum palmaefolium* Koen.

DESCRIPTION.

Plants perennial; culms 1 to 1.5 meters tall, glabrous or sparsely villous, the nodes puberulent; sheaths papillose-hispid or glabrate, hispid on the collar; ligule densely ciliate, about 2 mm. long; blades strongly plicate, flat, pubescent or glabrate, elliptic, narrowed to a petiole-like base, as much as 50 cm. long and 6 cm. wide; panicles



FIG. 38.—*Chaetochloa palmifolia*. From Hitchcock 9727, Jamaica.

rather loose and open, green, long-exserted, as much as 40 cm. long, the rachis scabrous, the branches ascending or spreading, scattered, somewhat distant, especially below, 5 to 10 cm. long, compound; spikelets lanceolate, acute, about 3 mm. long, closely arranged on short branchlets appressed along the main branches, forming interrupted compound racemes, the bristles inconspicuous, usually not over twice as long as the spikelets, often short and imperfectly developed; first glume one-third the length of the spikelet, obtuse, 5-nerved; second glume acutish, half the length of the spikelet, 7-nerved, the outer nerves obscure; sterile lemma 5-nerved, acute, exceeding the fertile lemma, the palea narrow, about half as long as the lemma; fertile lemma lanceolate, acute, somewhat apiculate, 2.5 mm. long, obscurely cross-wrinkled, the palea entirely included in the margins of the lemma.

DISTRIBUTION.

Rocky woods and shady banks, often growing in large colonies, a native of south-eastern Asia; introduced in Jamaica.

JAMAICA: Gordon Town, *Amer. Gr. Nat. Herb.* 605; Hart 815. Cinchona, Hitchcock 9719; Harris & Lawrence 15232. Buff Bay, Hitchcock 9762. Mount Hybla, Harris 11535. Catherine's Peak, Hitchcock 9727. Hardware Gap, Harris 10911. Castleton, Harris 11286. Morces Gap, Nichols 37.

4. *Chaetochloa sulcata* (Aubl.) Hitchc.

Panicum sulcatum Aubl. Pl. Guian. 1: 50. 1775. In this work, the flora of French Guiana, Aublet states that this grows along rivers but gives no definite locality. The type has not been examined. Aublet's short diagnosis "*Panicum (sulcatum) latifolium foliis liratis*" is taken directly from Plumier's Catalogue.¹ "*Milium lati-*

¹ Plum. Cat. Pl. Amer. 10. 1703.

Accountancy of ... of ...
to 57/12/...
402. f 1-... 193... Tanager P. A. and ...

Setaria setosa A. Camus 1924

not Radde 1823

see *S. paniculata* (Blend.) Forster

folium foliis liratis" which Aublet cites as a synonym. Aublet further cites *Milium latifolium sulcatum* Plum. mss. 4. t. 105. Lamarck¹ gives a more complete description, citing Plumier's Catalogue and the manuscript plate (105), and *P. sulcatum* Aubl. He states that the plant grows in Martinique where it was observed by Plumier, and that he has seen the specimen in Vaillant's herbarium. Urban² states that the species agrees with "Codex Boerh. II. tab. 641," a manuscript work. Urban unites with *Panicum sulcatum* the specimens which in this article are referred to *Chaetochloa palmifolia*.

Panicum paniculiferum Steud. Syn. Pl. Glum. 1: 54. 1854. "Oaxaca." The type specimen has not been definitely located. Galeotti's no. 5858 from Oaxaca, the only collection cited by Fournier under *Setaria paniculifera*, is in the Paris Herbarium. This specimen, which may be the type of *Panicum paniculiferum*, consists only of the inflorescence and a fragment of the culm; the lower panicle branches are as much as 20 cm. long, and the branchlets are appressed or ascending.

Setaria effusa Fourn. Mex. Pl. 2: 42. 1886. Several specimens from Veracruz and Oaxaca are cited, the first being *Bourgeau* 2599, from Orizaba. This specimen has spreading branches and branchlets, with less crowded spikelets and rather fewer bristles. Hitchcock's no. 6380 from Orizaba has a like panicle. These represent only an extreme form, connected by intergrades with the less open, more bristly form represented by Galeotti's no. 5858.

Setaria paniculifera Fourn. Mex. Pl. 2: 42. 1886. Based on *Panicum paniculiferum* Steud.

Chamaeraphis effusa Kuntze, Rev. Gen. Pl. 2: 770. 1891. Based on *Setaria effusa* Fourn.

Chamaeraphis paniculifera Kuntze, Rev. Gen. Pl. 2: 770. 1891. Based on *Panicum paniculiferum* Steud.

Chamaeraphis sulcata Kuntze, Rev. Gen. Pl. 2: 770. 1891. Based on *Panicum sulcatum* Aubl.

Panicum mexicanum Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 40. 1900. Based on *Setaria effusa* Fourn.

Chaetochloa sulcata Hitchc. Contr. U. S. Nat. Herb. 17: 260. 1913. Based on *Panicum sulcatum* Aubl.

DESCRIPTION.

Plants perennial; culms robust, as much as 4 meters tall, glabrous, the nodes glabrous; sheaths papillose-hispid all over or only at the margin, hispid on the collar; ligule a ciliate membrane 1 to 2 mm. long; blades flat, strongly plicate, somewhat scabrous, as much as 1 meter long and 10 cm. wide at the middle, tapering toward each end, the lower into a long petiole-like base; panicles green or purplish, often very large, as much as 70 cm. long, the branches ascending, finally spreading, as much as 20 cm. long, these branching and rebranching, the panicle often becoming loose and open, the axis somewhat scabrous, the branches strongly scabrous-pubescent; spikelets usually loosely arranged, elliptic-lanceolate, about 3 mm. long, obscurely nerved, scabrous-pubescent, the flexuous bristles as much as 15 mm. long; first glume nearly half as long as the spikelet, obtuse, 3 to 5-nerved; second glume about two-thirds as long as spikelet, acutish, 5 to 7-nerved; sterile lemma about as long as the fertile, acute, 5-nerved, the palea narrow, shorter than the lemma; fertile lemma acute, slightly apiculate, closely but distinctly transverse-rugose, the palea inclosed to the tip.

¹ Encyl. 4: 746 bis. 1798.

² Rept. Nov. Sp. Fedde 16: 148. 1919.

DISTRIBUTION.

Moist ground and shady banks, southern Mexico to northern South America and north in the Windward Islands to Guadeloupe. Called gamalote in Tobago.

VERACRUZ: Hacienda de Jovó, *Liebmann* 452. Zacuapan, *Purpus* 2904, 2907. Mirador, *Liebmann* 455, 456; *Mohr* in 1857. Córdoba, *Hitchcock* 6395; *Kerber* 110; *Ross* 551; *Bourgeau* 1457. Orizaba, *Hitchcock* 6380; *Botteri* 105, 1986.

OAXACA: Tonaguia, *Liebmann* 454. Comaltepeque, *Galeotti* 5858.

TABASCO: Tamulté, *Rovirosa* 616.

CHIAPAS: Ocuilapa, *Nelson* 3059.

GUATEMALA: Puerto Barrios, *Hitchcock* 9155. Sepacuité, *Collins & Goll* 09. Cubilquitz, *Türkheim* 8030.

HONDURAS: San Pedro Sula, *Thieme* 5589.



FIG. 39.—*Chaetochloa sulcata*. From *Collins & Goll* 09, Guatemala.

CHAETOCCHLOA PROPER.

Annual or perennial, low or moderately tall grasses with narrow blades (usually not over 2 cm. wide). Bristles usually below all the spikelets. Spikelets clustered on the short branches of the narrow or spikelike, rarely open panicle, the lower branches appressed or ascending, rarely more than 1 to 2 cm. long (the lower branches spreading and as much as 5 cm. long in some specimens of *C. setosa*). Fertile lemma obtuse or acutish, sometimes very turgid, cross-wrinkled or rugose, rarely smooth. Warm and temperate regions of both hemispheres.

Several annual species have been introduced from Europe and are now common weeds in fields and waste places through the cooler parts of the United States, and one (*C. verticillata*) extends well into the tropics. The perennial *C. geniculata*, a native of tropical America, is also a widely distributed weed in the same area and extends well into the southern states.

COSTA RICA: Alajuelita, *Jiménez* 402. Turrialba, *Tonduz* 9009. Río Tuís, *Tonduz* 11394. Limón, *Hitchcock* 8412. Alajuela, *Jiménez* 133. Río Segundo, *Jiménez* 410. Puntarenas, *Pittier* 470. Puerto Viejo, *Biolley* 7468.

PANAMA: Culebra, *Hitchcock* 7935, 8122. Bohío, *Hitchcock* 8391. Gamboa, *Pittier* 6800.

LEEWARD ISLANDS: Guadeloupe, *Duss* 3185. Dominica, *Jones* 3.

WINDWARD ISLANDS: Martinique, *Duss* 4656. Grenada, *Broadway* in 1905.

TOBAGO: *Hitchcock* 10276, *Eggers* 5682.

COLOMBIA: Santa Marta, *Smith* 115.

VENEZUELA: La Guaira, *Rose* 21696. Carayaca, *Jahn* 308, 330.

[to Ecuador from G. Andes]

Excursion Staff. 1. 6. 3. 11/11 120



5. *Chaetochloa lutescens* (Weigel) Stuntz.

Panicum lutescens Weigel, Obs. Bot. 20. 1772. Described from Pommerania, Germany.

Panicum glaucum var. *flavescens* Ell. Bot. S. C. & Ga. 1: 113. 1816. "Everywhere except in inundated lands," probably in the vicinity of Charleston, South Carolina. Merrill,¹ who examined the specimen in the Elliott Herbarium, states that this is a yellow-awned form of *Chaetochloa glauca* [*C. lutescens*].

Panicum compressum Balb.; Steud. Nom. Bot. ed. 2. 2: 254. 1841, as synonym of *Panicum glaucum*. The type, from Santo Domingo, collected by Bertero, is *Chaetochloa lutescens*. In the Krug and Urban Herbarium there is a piece of the type, sent by Balbis to Sprengel.

Chaetochloa lutescens Stuntz, U. S. Dept. Agr. Bur. Pl. Ind. Inv. Seeds 31: 83-1912. 36, 86. 1914.
Based on *Panicum lutescens* Weigel.

Setaria lutescens Hubbard, Rhodora 18: 232. 1916. Based on *Panicum lutescens* Weigel.

This species has been commonly known as *Panicum glaucum*, *Setaria glauca*, and *Chaetochloa glauca*. Stuntz pointed out² that the name *Panicum glaucum* L. should apply to the species usually known as *Pennisetum americanum* (L.) Schum., *Pennisetum typhoideum* L. Rich., or *Penicillaria spicata* Willd., commonly called in the United States pearl millet. *Panicum glaucum* L.³ is based on a description taken from Linnaeus's Flora Zeylanica, which refers to the species of *Pennisetum* mentioned. Linnaeus, in the Species Plantarum, describes two varieties, β and γ . Variety β is later separated under the name *Panicum viride* L.⁴ Variety γ , as shown in a previous paper,⁵ is based on Clayton's no. 579 from Virginia, which is the same as *Panicum lutescens* Weigel, that is, what has usually been called *Panicum glaucum*. In the Systema⁴ Linnaeus describes *P. glaucum*, using the words found in the description taken from the Flora Zeylanica, but adding "Seminibus undulato-rugosis", and cites "Sp. pl. n. 2 γ ." He has here apparently attached the name *glaucum* to what he had previously called *glaucum* var. γ , that is, to *P. glaucum* in the subsequent sense. In the second edition of the Species Plantarum, Linnaeus uses the emended diagnosis from the Systema, citing "Fl. zeyl. 44," and adds the citation from Gronovius, giving the habitat as "Indiis & Italia." The descriptive note appended includes the statement "Setae in spica longitudine flosculorum," which applies to pearl millet, and "semina striis undulatis notata," which applies to *Panicum lutescens*, thus indicating that he confused the two species, which are very unlike in appearance. Probably Linnaeus was not familiar with either species and was attempting to reconcile descriptions.

The following synonyms are based on *Panicum glaucum* L. as to name but refer to *Chaetochloa lutescens* as to plant. No attempt has been made to include synonymy from floras of the Old World.

Pennisetum glaucum R. Br. Prod. Fl. Nov. Holl. 1: 195. 1810.

Setaria glauca Beauv. Ess. Agrost. 51, 178. 1812.

Chamaeraphis glauca Kuntze, Rev. Gen. Pl. 2: 767. 1891.

Isophorus glaucus Nash, Bull. Torrey Club 22: 423. 1895.

Chaetochloa glauca Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 39. 1897.

¹ U. S. Dept. Agr. Div. Agrost. Circ. 29: 3. 1901.

² Loc. cit.

³ Sp. Pl. 56. 1753.

⁴ Syst. Nat. ed. 10. 2: 870. 1759.

⁵ Hitchcock, Types of American Grasses, Contr. U. S. Nat. Herb. 12: 117. 1908.

DESCRIPTION.

Plant annual, erect, often much branched at base, the culms becoming geniculate below, or in open ground spreading or even prostrate-spreading; culms rather succulent below, as much as 1 meter tall or in rich soil even taller, compressed below, smooth, scabrous just below the panicle; sheaths smooth, compressed-keeled; ligule a ciliate membrane about 1 mm. long; blades as much as 25 cm. long and 1 cm. wide, flat, twisted in a loose spiral, the upper surface along the upper half facing downward, acuminate-pointed, often glaucous, scabrous on the upper surface, toward the base beset with long lax hairs, glabrous beneath; panicle dense, evenly cylindrical, spike-like, yellow at maturity, mostly 5 to 10 cm. long, sometimes longer, about 1 cm. thick, rounded at the summit, sometimes slightly interrupted at the base, the axis densely pubescent; branches very short, mostly less than 1 mm. long, pubescent like the axis, each branch bearing one developed spikelet and below this a cluster of short branchlets ending in bristles, sometimes a second small and undeveloped spikelet borne in one of these secondary clusters; branchlets irregular in length, mostly less than 1 mm. long, bearing 1 to several bristles, the whole cluster on each branch being usually more than 5 and sometimes more than 20; bristles antrorsely scabrous, yellow, irregular in length, the longer ones 2 to 3 times as long as the spikelet; spikelets about 3 mm. long, flat on one side, strongly convex on the other, oval in outline but slightly narrowed toward the apex; first glume ovate, about half as long as spikelet, pale, with 3 strong green nerves and an outer inconspicuous pair; second glume about two-thirds as long as the spikelet, with 5 strong nerves and 1 or 2 additional weaker pairs; sterile lemma about as long as the spikelet, 5-nerved, the base embracing the edges of the fertile lemma for about half way, containing a well-developed palea but no stamens; fertile floret strongly marked with numerous transverse ridges.

This species can be distinguished from *Chaetochloa geniculata*, its closest relative, by its annual duration, and by the thicker, more succulent base of the stem; and from *C. viridis*, a common accompanying weedy species, by the color and shape of the mature panicle, and by the twisted blades.

Commonly known as yellow foxtail, sometimes as pigeon grass.

DISTRIBUTION.

A common weed in cultivated soil and waste places in the eastern states; introduced from Europe; now widely distributed in temperate regions, rare in the Tropics.

ONTARIO: Galt, *Herriot* 71. Kingston, *Fowler* in 1897.

NEW BRUNSWICK: Shediac Cape, *Hubbard* 759.

BRITISH COLUMBIA: Sicamous, *Macoun* 7.

MAINE: Westbrook, *Ricker* 579. East Auburn, *Merrill* 14. Bangor, *Knight* 20, 22.

Orono, *Harvey* 1251. Augusta, *Scribner* in 1869.

NEW HAMPSHIRE: Jaffrey, *Robinson* 284.

VERMONT: Manchester, *Day* 208. Rutland, *Kirk* 1026.

MASSACHUSETTS: South Hadley, *Clark* in 1887. Townsend, *Fletcher*. Boston, *Hitchcock* in 1903. Barrington, *Pollard* in 1894.

CONNECTICUT: South Glastonbury, *Wilson* 1263.

NEW YORK: North Hannibal, *Pearce* in 1883. Shushan, *Dobbin* 6. Oxford, *Coville* in 1884.

NEW JERSEY: Weehawken, *Kearney* in 1894; *Van Sickle* in 1895. Camden, *Parker* in 1863.

PENNSYLVANIA: Easton, *Porter* in 1896. Conewago, *Small* in 1888. Philadelphia, *Scribner* in 1878. Lancaster, *Heller* 4818. Chester County, *Wynde* in 1901.

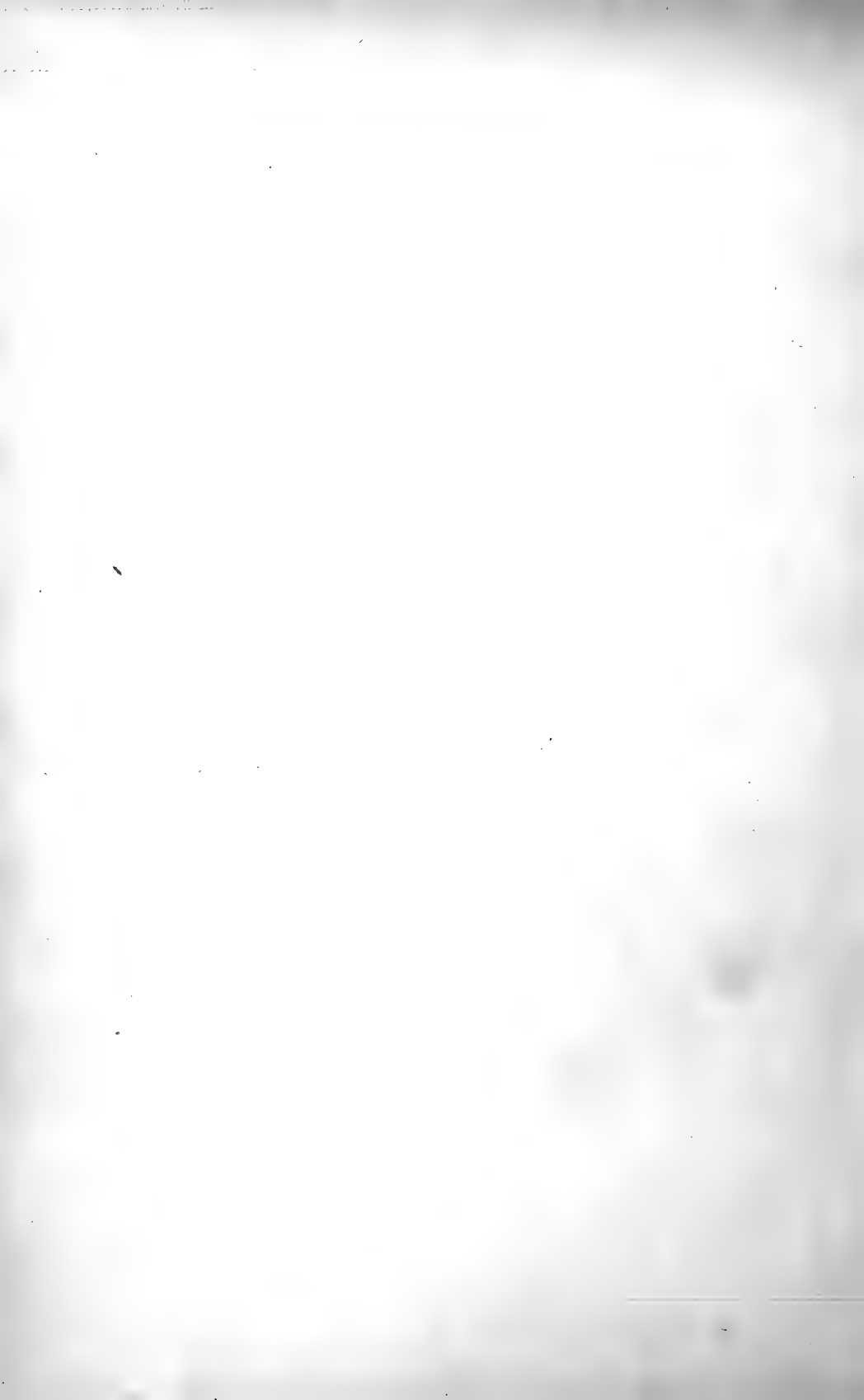
OHIO: Cincinnati, *Lloyd* 3614. Sandusky, *Morris* A140. Oberlin, *Ricksecker* in 1894.

INDIANA: Lafayette, *Dorner* 73.

ILLINOIS: Glasford, *Wilcox* 176. Jackson County, *French* in 1905. Naperville, *Umbach* in 1895. Chicago, *Gates* in 1905. Wady Petra, *V. H. Chase* 76.

Great Barrington

Windle



WISCONSIN: Oshkosh, *Random* in 1896.

MINNESOTA: Duluth, *Hitchcock* 5090.

SOUTH DAKOTA: Highmore, *Carter* 6. Yankton, *Bruce* 11. Redfield, *Griffiths* 221.
Frankfort, *Griffiths* 54. Bellefourche, *Griffiths* 366.



FIG. 40.—*Chactochloa lutescens*. From Chase 2986, District of Columbia.

IOWA: Ames, *Pammel Amer. Weeds* 50; *Ball* 180. Keokuk, *Shimek* 52. Fayette County, *Fink* 274.

MISSOURI: St. Louis, *Eggert* 266. Aberdeen, *Davis* 934. Courtney, *Bush* 818, 1670. Springfield, *Standley* 8331.

KANSAS: Riley County, *Norton* 575.

DELAWARE: Stanton, *Commons* 146.

- MARYLAND: Garrett County, *Smith* in 1879. Hyattsville, *Scribner* in 1888.
 DISTRICT OF COLUMBIA: *Merrill* 172; *Vasey* in 1885; *Chase* 2986.
 VIRGINIA: Princess Anne County, *Kearney* 2158.
 NORTH CAROLINA: Magnetic City, *Wetherby* 8.
 SOUTH CAROLINA: Orangeburg, *Hitchcock* in 1905.
 FLORIDA: Quincy, *Combs* 396.
 TENNESSEE: Knoxville, *Scribner*.
 ALABAMA: Selma, *McCarthy* in 1888. Eufaula, *McCarthy* in 1888.
 LOUISIANA: Baton Rouge, *Hitchcock* in 1904. Alexandria, *Ball* 487. Burnside, *Combs* 1409. Shreveport, *Ball* 97. Rayville, *Ball* 23a. Calhoun, *Ball* 44.
 TEXAS: Big Spring, *Hitchcock* 13406. Abilene, *Bentley* in 1899.
 OKLAHOMA: Verdigris, *Bush* 743.
 OREGON: Ontario, *Griffiths & Morris* 937. Albina, *Suksdorf* 2885. Linnton, *Suksdorf* 1684.
 NEW MEXICO: Mesilla Park, *Standley* in 1906.
 CALIFORNIA: Threerivers, *Jepson* 4718.
 JAMAICA: Cinchona, *Hitchcock* 9702; *Harris* 11272, 11457; *Hart* 740.

6. *Chaetochloa geniculata* (Lam.) Millsp. & Chase.

Panicum geniculatum Lam. Encycl. 4: 727 (err. typ. 737). 1798. "Je l'ai vue depuis dans un herbier fait aux Antilles, & particulièrement à la Guadeloupe." Lamarck distinguishes this from *Panicum glaucum* by the short bristles and glabrous leaves. The type has not been examined.

Cenchrus parviflorus Poir. in Lam. Encyl. 6: 52. 1804. "Cette plante croît à Porto Ricco. Elle a été communiquée à M. Lamarck par M. Ventenat." See remarks under *Setaria ventenatii*.

Setaria geniculata Beauv. Ess. Agrost. 51, 178. 1812. Based on *Panicum geniculatum*. Beauvois includes the latter name among the species of *Panicum* referred to *Setaria*. In the index, under *Setaria*, the name *geniculata* appears with a question.

Pennisetum geniculatum Jacq. Eclog. Gram. 3: pl. 26. 1815-1820. Based on *Panicum geniculatum* Hornem. Cat. Hort. Hafn. 28; Willd. Enum. Pl. 2: 1031. 1809. The name is not published as new by Hornemann or Willdenow.

Setaria gracilis H. B. K. Nov. Gen. & Sp. 1: 109. 1816. "Crescit locis alsis, opacatis inter Fusagasuga et Pandi inter 520 et 920 hexap. (Regno Novogranatensi)." The type has not been examined, but the description identifies it as a slender-panicled form of *C. geniculata*.

Setaria purpurascens H. B. K. Nov. Gen. & Sp. 1: 110. 1816. "Quitensis prope Chillo, in radicibus montis Turubamba." In the text this species is placed next to *S. glauca* [*lutescens*], but it is stated that it is allied to *S. viridis*. The description states that the bristles are "fusciscentes." A portion of the type has been examined at the Trinius Herbarium. It was marked "Ex herb. Humb."

Panicum imberbe Poir. in Lam. Encycl. Suppl. 4: 272. 1816. "In America septentrionali & Brasilia." The species is distinguished from "*P. glaucum*" [*lutescens*] by the absence of hairs on the leaves and at the mouth of the sheath. The type has not been examined.

? *Panicum pumilum* Poir. in Lam. Encycl. Suppl. 4: 273. 1816. The origin of the specimen, seen by Poiret in the Desfontaines Herbarium, is stated to be unknown. The type has not been examined by the writer and the name is referred to *Chaetochloa geniculata* without doubt.

Panicum laevigatum Muhl.; Ell. Bot. S. C. & Ga. 1: 112. 1816. "Grows on sea islands (on Edings' plentifully), along margins of the salt water." The type is in Muhlenberg's herbarium at the Philadelphia Academy.¹ Elliott's specimen, labeled

¹ U. S. Dept. Agr. Div. Agrost. Circ. 27: 2. 1900.

Chaetochloa geniculata Hartl

For discussion of *Setaria geniculata* Beauv.
see Hills + Chase *Bibl. Beauv.* (Contrib. U.S. N.H. 24:172,
Strictly speaking the name would be *1925*)
S. geniculata (Willd.) Beauv. But apparently
Pan. *geniculata* Willd. and *D. geniculata* Beauv.
are the same. It thus seems best to take *S.*
geniculata (Willd.) Beauv. - otherwise *geniculata*
must be discarded and *paniculata* taken up.

Panicum lutescens Weig. var. *flava* Backer
1928 on Pāncūm flāvūm Ness

"*Panicum glaberrimum*. Hab. juxta littor. maritima," is a long-awned form without base.

Panicum glaucum var. *purpurascens* Ell. Bot. S. C. & Ga. 1: 113. 1816. This is stated by Merrill¹ to be a short-awned form of *Chaetochloa imberbis* [*C. geniculata*].

Setaria imberbis Roem. & Schult. Syst. Veg. 2: 891. 1817. Based on *Panicum imberbe* Poir.

Pennisetum laevigatum Nutt. Gen. Pl. 1: 55. 1818. Based on *Panicum laevigatum* Ell.

Setaria laevigata Schult. Mant. 2: 275. 1824. Based on *Panicum laevigatum* Muhl.

Setaria affinis Schult. Mant. 2: 276. 1824. Based on "Panicum n. 4. (sine nomine). Muhlenb. Descr. uber. p. 101." "Habitat in Georgia et Pennsylvania." The type is in the Muhlenberg Herbarium.

Setaria berteroniana Schult. Mant. 2: 276. 1824. The specimen was collected in Santo Domingo by Bertero. Schultes describes it in a note under *Setaria corrugata*. The type has not been examined but the description, "setis 9-12," together with the locality, leaves no doubt as to the identity of the species.

Panicum flavum Nees, Agrost. Bras. 238. 1829. "Habitat in campis graminosis provinciae Piauihensis, tum in campis ad Joazeiro provinciae Pernambucensis et Bahiensis." The Pernambuco specimen has been examined in the Munich Herbarium.

Panicum imberbe β *pumilum* Nees, Agrost. Bras. 240. 1829. Based on *Panicum pumilum* Poir., which is uncertain, but the plant described by Nees appears to be *Chaetochloa geniculata*.

Panicum fuscescens Willd.; Nees, Agrost. Bras. 241. 1829, as synonym under *P. purpurascens*. The type has been examined in the Willdenow Herbarium.

Panicum dasyurum Nees, Agrost. Bras. 241. 1829. "Habitat in Brasilia. (Comes a Hoffmannsegg) (Vidi in Herb. Willd.)—Ad Monte Video legit Sellow (Vidi in Herb. Reg. Berol.)" The first specimen has been examined in the Willdenow Herbarium. A specimen of the Sellow collection is in the National Herbarium.

Panicum penicillatum Willd.; Nees, Agrost. Bras. 242. 1829. Not *Panicum penicillatum* Nees, op. cit. 145. "In Brasilia, ad Rio de Janeiro (Raddi); in Monte Video (Sellow.) (Vidi in Herb. Willd.)" The bristles are described as being 4 times as long as the spikelets. A duplicate of the Sellow collection cited is in the National Herbarium. The label reads "*Panicum penicillatum* W. herb. N. v. E. Bras."

Panicum tejucense Nees, Agrost. Bras. 243. 1829. "Habitat in districtu Adamantum prope Tejuco et aliis in locis provinciae Minarum generalium." The type has been examined at the Munich Herbarium.

Setaria flava Kunth, R v. Gram. 1: 46. 1829. Based on *Panicum flavum* Nees.

Setaria ventenatii Kunth, R v. Gram. 1: 251. pl. 37. 1830. "Crescit in Portorico et ? Hispaniola." Kunth gives as synonym *Cenchrus parviflorus* Poir., and states that he has not seen the original specimen of this, but as Poiret says he saw the specimen in the herbarium of Ventenat, "ou je n'ai trouv  parmi les *Cenchrus* qu'une seule plante originaire de Portorico, qui-est mon *Setaria ventenatii*," it seems probable to him that the two names refer to the same specimen. The nodes are described by Kunth as pubescent, but in the plate they are glabrous. The bristles are described as long (5 times as long as the spikelets) and purple. The type specimen has been examined in the Berlin Herbarium. It is a narrow-leaved form with several rather small panicles.

Setaria tejucensis Kunth, R v. Gram. 1: Suppl. xi. 1830. Based on *Panicum tejucense* Nees.

Setaria penicillata Presl, Rel. Haenk. 1: 314. 1830. Based on *Panicum penicillatum* Willd.

Panicum ventenatii Steud. Nom. Bot. ed. 2: 265. 1841. Based on *Setaria ventenatii* Kunth.

¹ U. S. Dept. Agr. Div. Agrost. Circ. 29: 3. 1901.

Panicum berteronianum Steud. Syn. Pl. Glum. 1: 50. 1854. Based on *Setaria berteroniana* Schult.

Panicum psilocaulum Steud. Syn. Pl. Glum. 1: 50. 1854. "*P. glaucum* var. Trin. Ic. t. 196 A. *P. imberbe* Poir sec. Trin. *Setaria gracilis* H.B. * * * Am. austr." It is probable that the description is based on the Brazilian specimen which was the plant from which Trinius's plate is drawn. Trinius says that figure A is *Setaria gracilis* Kunth. The name is changed, doubtless, because of the earlier *Panicum gracile* R. Br.

Setaria glauca var. *laevigata* Chapm. Fl. South. U. S. 578. 1860. Based on *Panicum laevigatum* Ell.

Setaria glauca β *imberbis* Griseb. Fl. Brit. W. Ind. 554. 1864. Based on *Panicum imberbe* Poir.

Setaria glauca γ *penicillata* Griseb. Fl. Brit. W. Ind. 554. 1864. Based on *Panicum penicillatum* "W., Tr.," which is *P. penicillatum* Willd.

Panicum imberbe β *purpurascens* Doell in Mart. Fl. Bras. 2^o: 157. 1877. Based on *Panicum purpurascens* H. B. K.

Panicum imberbe γ *latifolium* Doell in Mart. Fl. Bras. 2^o: 157. 1877. Several specimens are cited, the first of which is Gardner 3516. One of the cited specimens (Regnell III. 1372) is in the National Herbarium.

Panicum virescens Salzm.; Doell in Mart. Fl. Bras. 2^o: 157. 1877, as synonym of *P. imberbe* γ *latifolium*.

Panicum glaucescens Salzm.; Doell in Mart. Fl. Bras. 2^o: 157. 1877, as synonym of *P. imberbe* γ *latifolium*.

Panicum imberbe δ *dasyurum* Doell in Mart. Fl. Bras. 2^o: 157. 1877. Based on *Panicum dasyurum* Nees.

Setaria streptobotrys Fourn. Mex. Pl. 2: 47. 1886. Several specimens are cited, the first being Galeotti 5832 from Real del Monte. This specimen has not been examined, but two of the others have been seen (Bourgeau 231, Liebmann 345).

Chamaeraphis glauca var. *penicillata* "Gris. (W.);" Kuntze, Rev. Gen. Pl. 2: 767. 1891. Based on *Panicum penicillatum* Willd.

Chamaeraphis glauca var. *imberbis* "Trin. (Poir.);" Kuntze, Rev. Gen. Pl. 2: 767. 1891. Based on *Panicum imberbe* Poir.

Setaria perennis Hall; Smyth, Check List Pl. Kans. 26. 1892; Trans. Kans. Acad. 13: 102. 1893. "Frequent in damp alkaline and saline bottoms in central and southwestern Kansas." The relation of Hall to this species is not clear. The name does not appear in E. Hall's *Plantae Texanae* (1873). The type specimen, now in the National Herbarium, was collected at Hutchinson, Kansas, by B. B. Smyth in 1890.

Setaria gracilis β *purpurascens* Arech. Anal. Mus. Nac. Montevideo 1: 164. 1894. Based on *Panicum purpurascens* H. B. K.

Setaria gracilis γ *latifolia* Arech. Anal. Mus. Nac. Montevideo 1: 165. 1894. Based on *Panicum imberbe* γ *latifolium* Doell, inasmuch as *Panicum virescens* and *P. glaucescens* Salzm. are given as synonyms (see notes on these names).

Setaria gracilis ϵ *dasyura* Arech. Anal. Mus. Nac. Montevideo 1: 165. 1894. Based on *Panicum dasyurum* Nees.

Chamaeraphis ventenatii Beal, Grasses N. Amer. 2: 153. 1896. Based on *Setaria ventenatii* Kunth.

Chamaeraphis glauca var. *laevigata* Beal, Grasses N. Amer. 2: 155. 1896. Based on *Panicum laevigatum* Muhl.

Chamaeraphis glauca var. *perennis* Beal, Grasses N. Amer. 2: 156. 1896. "Florida, Curtiss 3614*." Curtiss is given in parenthesis as author of the varietal name. Curtiss 3614* bears a printed label with the name "*Setaria glauca* Beauv. var. *perennis*." No date is given. There is nothing to connect this with *S. perennis* Hall.

Chamaeraphis glauca var. *geniculata* Beal, Grasses N. Amer. 2: 156. 1896. Based on *Panicum geniculatum* Lam.

— incidental mention

C. parviflora (Poir) Scribn & Muhlspangh Field Mus Bot
2:26. 1900 on *Leuchinus parviflorus* Poir

S. purpurascens Torr. Fl. North
1825. 1824. Based on *S. purpurascens*
H. & B.

S. purpurascens (Torr) Hitchc. in S.
1825. 1824.

Chaetochloa imberbis Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 39. 1897. Based on *Panicum imberbe* Poir.

Chaetochloa penicillata Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 39. 1897. Based on *Panicum penicillatum* Willd.

Chaetochloa flava Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 39. 1897. Based on *Panicum flavum* Nees.

Chaetochloa versicolor Bicknell, Bull. Torrey Club 25: 105. pl. 329. 1898. "Borders of salt and brackish marshes, Van Cortlandt Park and Kingsbridge, New York City." The type specimen, in the New York Botanical Garden Herbarium, was collected by Bicknell at Kingsbridge.

Chaetochloa perennis Bicknell, Bull. Torrey Club 25: 107. 1898. Based on "*C. glauca* var. *perennis* Curtiss in Beal's Grasses of North America 2: 156. 1896."

Chaetochloa laevigata Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 21: 10. 1900, as synonym of *Chaetochloa imberbis* Scribn.

Chaetochloa imberbis perennis Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 12. 1900. Based on *Setaria perennis* Hall.

Chaetochloa imberbis geniculata Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 12. 1900. Based on *Panicum geniculatum* Lam.

Chaetochloa imberbis streptobotrys Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 13. 1900. Based on *Setaria streptobotrys* Fourn.

Chaetochloa purpurascens Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 13. 1900. Based on *Setaria purpurascens* H. B. K.

Chaetochloa gracilis Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 15. 1900. Based on *Setaria gracilis* H. B. K.

Chaetochloa corrugata parviflora Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 24. 1900. The name is based upon *Cenchrus parviflorus* Poir. (*Chaetochloa geniculata*). The plants cited all belong to *Chaetochloa corrugata*.

Panicum glaberrimum Ell.; Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Circ. 29: 3. 1901, as synonym of *Chaetochloa imberbis*.

Chaetochloa ventenatii Nash in Kearney, Contr. U. S. Nat. Herb. 5: 515. 1901. Based on *Setaria ventenatii* Kunth.

Chaetochloa occidentalis Nash in Britton, Man. 90. 1901. "In meadows, Kans. and Ind. Terr." The type is a different specimen of the same collection as the type of *Setaria perennis* Hall. The specimen is in the herbarium of the New York Botanical Garden.

Setaria glauca γ *geniculata* Urban, Symb. Antill. 4: 96. 1903. Based on *Panicum geniculatum* Lam.

Setaria glauca δ *purpurascens* Urban, Symb. Antill. 4: 96. 1903. Based on *Setaria purpurascens* H. B. K.

Chaetochloa geniculata Millsp. & Chase, Field Mus. Bot. 3: 37. 1903. Based on *Panicum geniculatum* Lam.

Chamaeraphis imberbis Kuntze; Stuck. Anal. Mus. Nac. Buenos Aires 11: 76. 1904, footnote. Based on *Panicum imberbe* Poir. Stuckert says that Kuntze and Post affirm that the name *Chamaeraphis* has priority over *Setaria*. On the authority of those authors he lists his Argentine species under *Chamaeraphis*, giving Kuntze as author of the combination.

Chamaeraphis gracilis Kuntze; Stuck. Anal. Mus. Nac. Buenos Aires 11: 76. 1904, in footnote. Based on *Setaria gracilis* H. B. K.

Chamaeraphis penicillata Presl; Stuck. Anal. Mus. Nac. Buenos Aires 11: 76. 1904. Presumably based on *Setaria penicillata* Presl, though no synonym is cited.

Panicum versicolor Nieuwl. Amer. Midl. Nat. 2: 64. 1911. Not *Panicum versicolor* Doell, 1877. Based on *Chaetochloa versicolor* Bicknell.

Panicum occidentale Nieuwl. Amer. Midl. Nat. 2: 64. 1911. Not *Panicum occidentale* Scribn. 1899. Based on *Chaetochloa occidentalis* Nash.

DESCRIPTION.

Plants perennial, producing short knotty branching rhizomes as much as 4 cm. long; culms erect, spreading, or prostrate, tufted or solitary, as much as 1 meter tall, sometimes dwarfed, glabrous, usually scabrous below the panicle, the base usually hard and wiry, often more slender than the upper part; sheaths compressed-keeled, glabrous, sometimes scabrous toward the summit; ligule very short, densely ciliate; blades flat, scabrous, often glaucous, and often more or less villous toward the base on the upper surface, glabrous or somewhat scabrous beneath, mainly straight (not twisted as in *C. lutescens*), as much as 20 cm. long and 8 mm. wide, usually narrower and shorter than this; panicle long-exserted, erect, evenly cylindrical, densely flowered, rounded or truncate (not narrowed) at summit, 1 to 10 cm. long or in robust specimens longer, 4 to 8



FIG. 41.—*Chaetochloa geniculata*. From Chase 2981, Maryland.

mm. thick (excluding the bristles), yellow, purple, tawny, or greenish; the axis densely and softly pubescent; branches pubescent like the axis, very short, about 1 mm. long to the single spikelet, bearing about the middle a fascicle of irregular branchlets, almost immediately dividing into bristles; bristles several, mostly 8 to 12, yellow or purple, 1 to 3 times or even as much as 6 times as long as the spikelets, antrorsely scabrous; spikelets 2 to 2.5 or even 3 mm. long, ovoid, plano-convex; first glume about one-third as long as spikelet, 3-nerved; second glume half to two-thirds as long as spikelet, 5-nerved; sterile lemma staminate or neuter, as long as the spikelet, 5 to 7-nerved, the palea well developed; fertile lemma transversely rugose with close narrow ridges.

This species is exceedingly variable, but after study of a great amount of material and much field work it is impossible to segregate coherent groups. The culms are sometimes single, slender, and weak, sometimes cespitose, sometimes stout, much branched at base, spreading or prostrate; the blades vary in width, and the panicles in length. Much of the difference in general appearance is due to the color and length of the bristles. The bristles are long early in the season and in cultivated soil. The differences appear not to be coordinated. In occasional specimens the sterile lemma is indurate and rugose like the fertile lemma (Fort Myers, Florida, *Hitchcock* 512; Virginia Beach, Virginia, *Hitchcock* 78).

Sometimes the blades are very narrow, only 2 to 3 mm. wide, but otherwise the form is not distinct (CALIFORNIA: Fresno, *Griffiths* 4717. Pomona, *Hitchcock* in 1903. Riverside, *Reed* 1186. MEXICO: Monterrey, *Hitchcock* 55603). This has been called *C. gracilis*.¹

In *Funk & Schlim* 722 from Colombia (N. Y. Bot Gard. Herb.) the blades are densely pilose on the upper surface and sparsely so beneath.

¹ U. S. Dept. Agr. Div. Agrost. Bull. 21: 15. 1900; Hitchcock, Mexican Grasses. Contr. U. S. Nat. Herb. 17: 263. 1913.



DISTRIBUTION.

Open ground, pastures, cultivated soil, salt marshes, and moist ground along the coast, Connecticut to Florida and Texas, in the interior north to Kansas, south through tropical America to Argentina and Chile.

CONNECTICUT: Groton, *Bissell* in 1905. Green Farms, *Bicknell* in 1897.

NEW YORK: Orient, *Dobbin* 9.

NEW JERSEY: Lambertville, *Fisher* in 1901 and 1904. Califon, *Fisher* in 1901.

PENNSYLVANIA: Chester County, *Windle* in 1901. Philadelphia, *Smith* 64.

MISSOURI: Alba, *Bush* 6071. Campbell, *Bush* 6294, 6294A, 6294C. Monteer, *Bush* 6090. Smithfield, *Bush* 6016, 6016A, 6016B. Webb City, *Bush* 6044, 6044A.

KANSAS: Comanche County, *Hitchcock* 885, 1544. Hutchinson, *Smyth* in 1890.

MARYLAND: West Chevy Chase, *Hitchcock* in 1905; *Chase* 2981. Riverdale, *Maxon & Norton* 14. Owings, *Hitchcock* 1620. Millstone, *Hitchcock* 7880. Bay Ridge, *Scribner* in 1897. Chesapeake Junction, *Hitchcock* 1645.

DISTRICT OF COLUMBIA: *Steele* in 1898; *Ball* 60, 63; *Chase* 2990.

VIRGINIA: Lynnhaven, *Chase* 2943. Dismal Swamp, *Chase* 3681; *McCarthy* in 1883. Alexandria, *House* 412. Jackson City, *Steele* in 1898. Virginia Beach, *Hitchcock* in 1905; *Kearney* 2035. Suffolk, *Kearney* 1735.

WEST VIRGINIA: Aurora, *Steele* in 1898.

NORTH CAROLINA: Ocracoke Island, *Kearney* 2277. Wilmington, *Chase* 7199. Biltmore, *Norton* 332; *Biltmore Herb.* 6026a. West Raleigh, *Stanton* 1290.

SOUTH CAROLINA: Orangeburg, *Hitchcock* 162. Beaufort, *Chase* 7118. Florence, *Ball* 685. Aiken, *Ravenel* in 1869.

GEORGIA: Brunswick, *Chase* 7090. Augusta, *Kearney* 200, 227. St. Simons Island, *Ricker* 961. Savannah, *Kearney* 186.

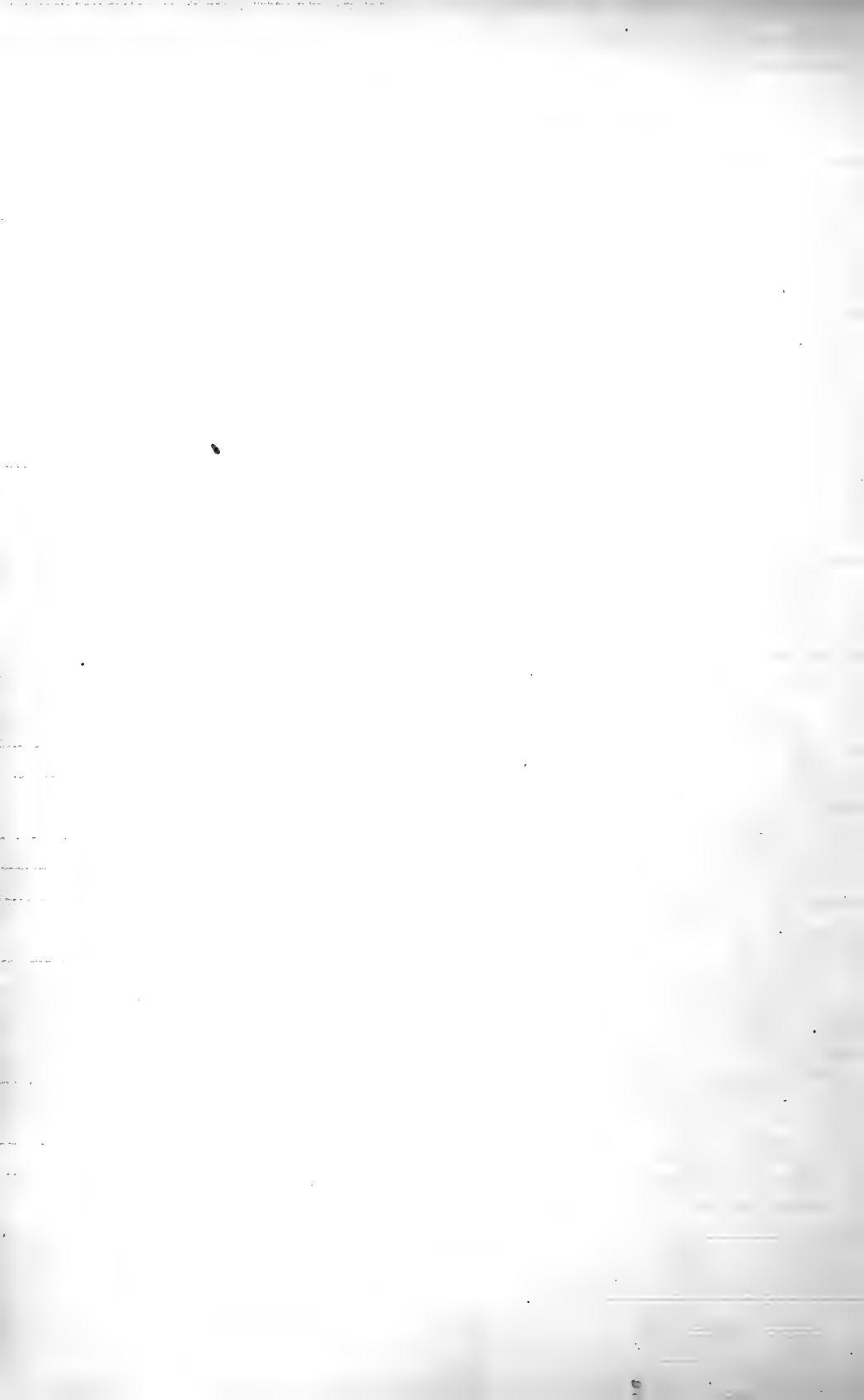
FLORIDA: Jacksonville, *Curtiss* 4745, 5411, 6646; *Combs* 13, 19. Bartow, *Combs* 1232. Madison, *Combs* 237, 264. Ellzey, *Combs* 826. Homosassa, *Combs* 924, 935½, 969. Manatee, *Biltmore Herb.* 6027. Fort Myers, *Hitchcock* 511, 512, 513, 514, 516, 901; *J. P. Standley* 147, 241; *Standley* 12860. Miami, *Hitchcock* 485, 498, 651, 709; *Chase* 3888. De Soto County, *Fredholm* 6225. Lake City, *Hitchcock* 2348; *Combs* 79, 179; *Rolfs* 862; *Bitting* 779. Hernando County, *Hitchcock* 2349. Jefferson County, *Hitchcock*, 2344, 2350. Levy County, *Hitchcock* 2346. Alachua County, *Hitchcock* 2347; *Combs* 702. Eustis, *Nash* 566; *Hitchcock* 2345. Washington County, *Combs* 659. Sanibel Island, *Hitchcock* 515. Pine Island, *Tracy* 7206. Manavista, *Tracy* 6696. Perico Island, *Tracy* 6707. Orange County, *Fredholm* 5440. Duval County, *Curtiss* 3614*. Monticello, *Combs* 346. Old Town, *Combs* 877. Flamingo, *Eaton* 1324. Quincy, *Combs* 396. Hillsborough County, *Fredholm* 6398. Brevard County, *Fredholm* 6152. Marco, *Hitchcock* in 1900. St. Vincent Island, *McAtee* 1693, 1761, 1848A. Key Largo, *Chase* 3933. Apalachicola, *Kearney* 116. Cedar Key, *Combs* 775, 794; *Tracy* 7179. Archer, *Quaintance* 824. Orange Glade, *Eaton* 568. Punta Rassa, *Hitchcock* in 1900. Dade County, *Small, Mosier & Small* 6426, 6871, 6876. Pablo Beach, *Chase* 7045. St. Marks, *Harper* 214. Key West, *Hitchcock* 610. Fellsmere, *Tracy* 9256. Without locality, *Rugel* 293, 437.

TENNESSEE: Bluff City, *Hitchcock* in 1905. Bristol, *Hitchcock* in 1905. Vances Station, *Hitchcock* 96.

ALABAMA: Mobile, *Mohr* in 1881. Cullman County, *Eggert* 18. Mobile, *Kearney* 19, 42, 58; *Mohr* in 1885 and 1891. Sylacauga, *Pollard & Maxon* 217. Talladega Springs, *Pollard & Maxon* 245.

MISSISSIPPI: Chandelier Island, *Tracy* in 1897. Biloxi, *Tracy* 4532, 6467, 6468; *Kearney* 217. Petit Bois Island, *Tracy* in 1898. Starkville, *Chase* 4448; *Kearney* 22. Agricultural College, *Kearney* 34; *Ricker* 848. Ocean Springs, *Pollard* 1105. Morton, *Holt* 49.

- LOUISIANA: Alexandria, *Ball* 185. Calhoun, *Ball* 41. Coushatta, *Ball* 132. Houma, *Wurzlów* in 1914. Isle au Pied, *Tracy & Lloyd* 456. Lake Charles, *Allison* 259; *Chase* 6092. New Orleans, *Kearney* 343. Oberlin, *Ball* 218. Pointe a la Hache, *Langlois* 54, 147. Port Eads, *Tracy & Lloyd* 458.
- TEXAS: Terrell, *Warburton* in 1904. Houston, *Fisher* 1721. Bexar County, *Jermy* 23, 207, 227. Clarksville, *Plank* 13. Galveston, *Bebb* 1098; *Hitchcock* in 1903; *Plank* 84. San Antonio, *Ball* 938; *Hitchcock* 5131, 5155. Dallas, *Reverchon* 1098. Columbia, *Bush* 926. Del Rio, *Hitchcock* 13624, 13656; *Plank* 61. Cold Creek, *Bigelow*, (Whipple's Expl.). Guadalupe Mountains, *Havard* in 1881. Brownsville, *Hitchcock* 5411. New Braunfels, *Hitchcock* 5232. Taylor, *Ball* in 1901. Corpus Christi, *Hitchcock* 5374; *Nealley* 27. Ennis, *Smith* in 1897. Huntsville, *Plank* 64. Hempsted, *Hall* 840 in part. Home Canyon, *Carleton* 423. Kingsville, *Tracy* 8883. Kerrville, *Heller* 1889. Pinto Creek, *Hill* 82.
- OKLAHOMA: Choctaw Agency, *Bigelow* (Whipple's Expl.). Fort Cobb, *Palmer* 374.
- NEW MEXICO: Kingston, *Metcalf* 1195.
- CALIFORNIA: Chico, *Ball* 1948. Fresno, *Griffiths* 4717. Los Angeles, *Davidson* 3260, 3261. Pomona, *Hitchcock* in 1903. Riverside, *Reed* 1186; *Wilder* 1043, 1127.
- LOWER CALIFORNIA: San José del Cabo, *Brandegge* 15 in 1890; *Purpus* 325.
- SONORA: Hermosillo, *Hitchcock* 3586, 3587, 3618, 3625; *Maltby* 241; *Rose* 12496.
- CHIHUAHUA: Chihuahua, *Palmer* in 1885. Sánchez, *Hitchcock* 7691.
- COAHUILA: Jimulco Springs, *Pringle* 431. Saltillo, *Hitchcock* 5583, 5610, 5650; *Palmer* 383 and 384 in 1898.
- NUEVO LEÓN: Monterrey, *Hitchcock* 5560, 5570.
- TAMAULIPAS: Tampico, *Hitchcock* 5797; *Palmer* 149 in 1910. Victoria, *Palmer* 393 and 556 in 1907.
- SAN LUIS POTOSÍ: Cárdenas, *Hitchcock* 5720, 5722. Las Canoas, *Hitchcock* 5761. San Luis Potosí, *Hitchcock* 5669; *Schaffner* 171, 1041.
- DURANGO: Durango, *Hitchcock* 7593; *Palmer* 378, 381 and 539 in 1896. Tejamén, *Palmer* 499 and 539 in 1906. Tepehuanes, *Palmer* 263 in 1906.
- SINALOA: Lodiago, *Palmer* 1648 in 1891.
- TEPIC: Santa Teresa, *Rose* 3417.
- JALISCO: Colotlán, *Rose* 3607. Guadalajara, *Palmer* 293 in 1886. Río Blanco, *Palmer* 246 in 1886. San Nicolás, *Hitchcock* 7184. Zapotlán, *Hitchcock* 7128, 7142, 7239.
- AGUASCALIENTES: Aguascalientes, *Hitchcock* 7455.
- GUANAJUATO: Acámbaro, *Hitchcock* 6945, 6953. Irapuato, *Hitchcock* 7401.
- QUERÉTARO: Querétaro, *Arsène* 10271; *Basile* 45, 46; *Hitchcock* 5821, 5849.
- HIDALGO: Ixmiquilpan, *Rose* 9056. Pachuca, *Hitchcock* 6712, 6726; *Rose* 8723.
- VERACRUZ: Córdoba, *Finck* 5; *Hitchcock* 6398. Colipa, *Karwinsky* 959; *Liebmann* 360. Jalapa, *Hitchcock* 6593, 6594, 6623; *Smith* 1547. Mirador, *Liebmann* 354. Orizaba, *Botteri* 157, 631, 673; *Hitchcock* 6320, 6327, 6349, 6365, 6370; *Nelson* 33. Potrero de San Sebastián, *Liebmann* 352. Sanborn, *Orcutt* 3237. Veracruz, *Hitchcock* 6550, 6573; *Purpus* 6210. Morro de Boquilla, *Liebmann* 353.
- PUEBLA: Acatzingo, *Nicolás* in 1909. Chalchicomula, *Hitchcock* 6278. Puebla, *Arsène* 331; *Nicolás* in 1909. San Marcos, *Hitchcock* 6511. Tehuacán, *Hitchcock* 6042. Tochimilco, *Nelson* in 1893.
- FEDERAL DISTRICT: Bourgeau 231; *Hitchcock* 5883, 5923, 5944; *Holway* 7, 3126, 3556; *Orcutt* 3534, 3613; *Pringle* 6419, 7171, 11220. Toluca, *Hitchcock* 6898. Popo Park, *Hitchcock* 6016.
- MORELOS: Cuernavaca, *Hitchcock* 6832; *Pringle* 7172, 7173. Cuantla, *Pringle* 9587. El Parque, *Orcutt* 3861.
- MICHOACÁN: Morelia, *Arsène* in 1909. Uruapan, *Hitchcock* 6959, 6986.
- COLIMA: Alzada, *Hitchcock* 7076; *Orcutt* 4624. Colima, *Palmer* 17 in 1897.
- GUERRERO: Iguala, *Rose* 9388.
- OAXACA: Cuicatlán, *Nelson* 1652, 1907. Las Sedas, *Smith* 935. Oaxaca, *Conzatti & González* 342; *Hitchcock* 6147, 6157, 6176. Plunía, *Nelson* 2482. Sierra, *Galeotti*



5883. Tomellín, *Hitchcock* 6210, 6223; *Rose* 10063. Totontepec, *Nelson* 710. Chinantla, *Liebmann* 350, 351.
- CHIAPAS: Ocuilapa, *Nelson* 3023a. Turubula, *Nelson* 3336.
- YUCATÁN: Izamal, *Gaumer* 756.
- QUINTANA ROO: Chichankanab, *Gaumer* 1938.
- MEXICO (Republic of): Without locality, *Liebmann* 349 and 355.
- GUATEMALA: Copán, *Pittier* 1795, 1806a. Cubilquitz, *Türckheim* 7695. Escuintla, *Hitchcock* 9004. Finca Sepacuité, *Cook & Griggs* 659; *Collins & Goll* 04. Fiscal, *Deam* 6168. Gualán, *Deam* 422. Guatemala City, *Hitchcock* 9025; *Popenoe* 668. Patalul, *Kellerman* 5699. Puerto Barrios, *Kellerman* 4787. San Rafael, *Holway* 24. Santa Rosa, *Heyde & Lux* 3909.
- HONDURAS: Point Triunfo, *Wilson* 340. Ruatán Island, *Gaumer* 115. San Pedro Sula, *Thieme* 311, 341.
- SALVADOR: San Salvador, *Velasco* 6, 13.
- NICARAGUA: Corinto, *Hitchcock* 8756½. Masaya, *Hitchcock* 8644.
- COSTA RICA: Alajuela, *Jiménez* 523. Alajuelita, *Pittier* 2997; *Tonduz* 8817. Cañas Gordas, *Pittier* 11016. Cartago, *Cooper* 156; *Pittier* 6985. Zent, *Tonduz* 213. Guanacaste, *Jiménez* 737; *Pittier* 2700. Machuca, *Pittier* 2606. Poás, *Tonduz* 10752. Port Limón, *Hitchcock* 8423. Puntarenas, *Hitchcock* 8568. Río Tuís, *Tonduz* 11400. San José, *Cooper* 5993; *Hitchcock* 8463; *Pittier* 461, 646; *Tonduz* 765, 3008. San Pedro de la Calabaza, *Pittier* 2966. Siquires, *Pittier* 4205. Surubres, *Biolley* 17380. Talamanca, *Tonduz* 9215. Tucurrique, *Tonduz* 13326. Turrialba, *Tonduz* 4093.
- PANAMA: Ancón, *Killip* 4016, 4021. Cerro Vaca, *Pittier* 5344. Corozal, *Killip* 4104. Cuiebra, *Hitchcock* 7921; *Pittier* 4444. El Boquete, *Pittier* 3042; *Hitchcock* 8171, 8285. Empire, *Pittier* 3719. Gamboa, *Pittier* 4792. Gatún, *Hitchcock* 9173. Matías Hernández, *Pittier* 6759. New Frijoles, *Pittier* 6840. Panama, *Gervais* 166. Taboga Island, *Hitchcock* 8062.
- BERMUDA: *Brown & Britton* 5; *Millsbaugh* 45, 50.
- BAHAMAS: Anguilla Isles, *Wilson* 7975, 8061.
- CUBA: Chirigote, *Wright* 3472. Guanabacoa, *Hitchcock* in 1906. Guines, *Léon* 428. Habana, *Curtiss* 749; *Léon* 269, 832, 1964, 4182, 5212; *Tracy* 9112. Herradura, *Hitchcock* in 1906. Laguna Jovero, *Shafer* 10730. Los Palacios, *Shafer* 11795. Manacas, *Léon* 5835. Matanzas, *Wright* 3888. Punta Brava, *Baker* 4063. Sancti-Spiritus Mountains, *Léon* 6539. Guantánamo Bay, *Britton* 2172. San Diego de los Baños, *Palmer & Riley* 546. Santiago, *Léon* 833, 834. Santiago de las Vegas, *Baker* 522, 561; *Hitchcock* in 1906. Sumidero, *Shafer* 13681. Triscornia, *Hitchcock* in 1906. Woodfred, *Shafer* 3009. Isle of Pines, *Britton & Wilson* 15378; *Taylor* 45. Without locality, *Wright* in 1865, 3473 in part.
- JAMAICA: Bath, *Maxon* 2368. Bog Walk, *Hitchcock* 9299. Bull Head Mountain, *Hitchcock* 9526. Castleton, *Harris* 11282. Castleton Gardens, *Hitchcock* 9399. Ewarton, *Hitchcock* 9431. Gordon Town, *Hart* 683, 684, 747. Hardware Gap, *Harris* 10902. Ipswich, *Hitchcock* 9612. Kellits, *Harris* 11156. Kingston, *Hitchcock* 9265. Lititz, *Harris* 11743, 12683. Mount Faraway, *Harris* 11382. New Forest, *Hitchcock* 9849. Port Antonio, *Maxon* 2003; *Fredholm* 3315. Ramble, *Hitchcock* 9490, 9491. Savoy, *Harris* 11617. Without locality, *March* 631.
- SANTO DOMINGO: Rincón, *Fuertes* 1280. Azua, *Fuertes* 1876.
- PORTO RICO: Adjuntas, *Sintenis* 4457. Aibonito, *Chase* 6342. Atola-teja, *Goll* 236. Cayo Muertos, *Britton, Cowell & Brown* 4989. Dorado, *Johnston* 893. Lares, *Chase* 6590. Lecheria, *Goll* 28. Maricao, *Britton, Cowell & Brown* 4532; *Chase* 6195, 6231½; *Sintenis* 208. Mayaguez, *Chase* 6166, 6304; *Sintenis* 6861. Mona Island, *Hess* 448. Ponce, *Chase* 6479; *Heller* 6240. San Juan, *Chase* 6374, 6377. Santurce, *Heller* 329. Sierra de Luquillo, *Chase* 6709, 6720. Without locality, *Eggers* 1327.

- VIRGIN ISLANDS: St. Croix, *Ricksecker* 243, 383. St. Kitts, *Britton & Cowell* 744.
- LEEWARD ISLANDS: Antigua, *Wullschlaegel*. Guadeloupe, *Duss* 2694. Dominica, *Jones* 6.
- WINDWARD ISLANDS: Barbados, *Bot. Sta. Herb.* 453. St. Lucia, *Glasgow*, 5. Grenada, *Broadway* 145, 1126, and in 1904; *Smith* 829.
- TRINIDAD: *Bot. Gard. Herb.* 1380, 1679, 3208. St. Joseph, *Hitchcock* 10018.
- TOBAGO: *Broadway* 4686; *Hitchcock* 10260.
- COLOMBIA: Cauca, *Lehmann* 3284. Corinto, *Pittier* 1001. Huila, *Pittier* 1265. Palmira, *Pittier* 844, 848. Río Frío, *Pittier* 1585. Santa Marta, *Smith* 2186, 2187, 2189. Toribío, *Pittier* 1464.
- VENEZUELA: Alto-Apure, *Jahn* 196. Caracas, *Pittier* 6165. Carayaca, *Jahn* 310. Dos Caminos, *Pittier* 6306. Island of Margarita, *Miller & Johnston* 181.
- BRITISH GUIANA: Without locality, *Jenman* 4377; *Schomburgk* 552.
- DUTCH GUIANA: Paramaribo, *Kuyper* in 1913.
- BRAZIL: Bocaina, *Löfgren* 2367. Caldas, *Henschen* 1372; *Regnell* 1372. Campinas, *Campos Novaes* 1243. Franca, *Löfgren & Edwall* 2110. Goyaz, *Gardner* 3516. Jaguarihyva, *Dusén* 10965. Joazeiro, *Löfgren* 3740. Minas Geraes, *Widgren* 899 and in 1845. Monte Alegre, *Löfgren* 1167. Petropolis, *Binot* 24. Pratenhas, *Dorsett & Popenoe* 187b. Rio de Janeiro, *Wilkes Expl. Expd.* São João d'el Rey, *Dorsett & Popenoe* 285b. São João (São Paulo), *Löfgren* 3846; *Rabello & Barbosa* 736. Tamandúá, *Dusén* 7682. Without locality, *Gardner* 211, *Riedel* 1402.
- PARAGUAY: Central Paraguay, *Morong* 540. Pilcomayo River, *Rojas* 54, 54a, 116, 134, 134a, 134b, 430. Sierra de Amambay, *Rojas* 9778, 10353.
- URUGUAY: Montevideo, *Arechavaleta*; *Sellow* 247, 1918. Soriana, *Aplin* in 1892-93.
- ECUADOR: Quito, *Hartweg* 1448; *Lehmann* 467. Without locality, *Jameson*.
- BOLIVIA: Yungas, *Bang* 218, 273. Sorata, *Rusby* 222. Tarija, *Fries* 1116a.
- ARGENTINA: Andalgala, *Jorgensen* 1110. Córdoba, *Stuckert* 486, 5380, 12667, 12840, 12927. Posadas, *Ekman* 658. San Teodoro, *Stuckert* 188, 558.
- CHILE: Valdivia, *Philippi*.

7. *Chaetochloa tenax* (L. Rich.) Hitchc.

Panicum tenax L. Rich. Act. Soc. Hist. Nat. Paris 1: 106. 1792. "A Cayenna missarum a Domino Le Blond." The type is in the Florence Herbarium.

Panicum impressum Nees, Agrost. Bras. 247. 1829. "Habitat in sylvis ad Villam do Rio de Contas provinciae Bahiensis." The type, collected by Martius, is in the Munich Herbarium.

Setaria impressa Kunth, Rév. Gram. 1: Suppl. xii. 1830. Based on *Panicum impressum* Nees.

Setaria tenax Desv. Opusc. 78. 1831. Based on *Panicum tenax* L. Rich.

Panicum sphaerocarpum Salzm.; Steud. Syn. Pl. Glum. 1: 51. 1854. Not *Panicum sphaerocarpon* Ell. 1816. "Bahia, Paraguay." The type collection was by Salzmann in Bahia. Duplicates are in several herbaria.

Panicum amphibolum Steud. Syn. Pl. Glum. 1: 51. 1854. "*P. intermedium* Salzm. hrbr. Bahia."

Panicum intermedium Salzm.; Steud. Syn. Pl. Glum. 1: 51. 1854, as synonym of *P. amphibolum*. Not *Panicum intermedium* Vahl, 1813. The type was collected in Bahia by Salzmann. A duplicate has been examined in the Trinius Herbarium.

Setaria biconvexa Griseb. Fl. Brit. W. Ind. 555. 1864. "Hab. Trinidad, Cr., at S. Anne." The type, collected by Cruieger, is in the Kew Herbarium, a fragment being in the National Herbarium.

Chaetochloa salzmanniana Hitchc. Contr. U. S. Nat. Herb. 17: 265. 1913. Based on *Panicum sphaerocarpum* Salzm., not Ell. 1816.

Lehmann 3484

Answer 11.11.62:

Chaetochloa impressa Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 350. 1917. Based on *Panicum impressum* Nees.

Setaria sphaerocarpa Hubbard, Contr. Gray Herb. n. ser. 52: 60. 1917. Based on *Panicum sphaerocarpum* Salzm.

This was described by Grisebach¹ as *Setaria onurus* and by Hitchcock and Chase² as *Chaetochloa onurus*, but a reconsideration of the type leads to the conclusion that the original *Panicum onurus* Willd. from Montevideo (as described by Trinius)³ is a different species, later described as *Setaria caespitosa* Hack. & Arech.⁴ *Panicum onurus* was earlier mentioned as a synonym by Nees (see note under *Chaetochloa macrostachya*). The first valid publication of the name, however, was by Trinius (loc. cit.), his type collected at Montevideo by Sello.

DESCRIPTION.

Plants perennial; culms glabrous, scabrous below the panicle, 1 to 1.5 meters tall, often geniculate at base; sheaths glabrous or usually scabrous toward the summit, villous on the margin, densely hispid on the collar; ligule densely pilose, 2 to 3 mm. long; blades flat, more or less scabrous, narrowed at base, acuminate at apex, as much as 35 cm. long and 2 cm. wide; panicles rather densely flowered, narrowed toward summit but not attenuate, somewhat interrupted or lobed below, 15 to 30 cm. long, 2 to 3 cm. wide, the branches ascending, the lower about 2 cm. long, the axis villous with hairs 1 to 2 mm. long; bristles 1 or 2 below each spikelet, 1 to 2 cm. long, flexuous, retrorsely scabrous and often also antrorsely toward the base, sometimes barbels directed both ways intermixed, pale or tawny, becoming implicate and somewhat one-sided with age; spikelets subspheric, about 2 mm. long, very turgid on one side and somewhat convex on the other; first glume about 1 mm. long or a little less, 5-nerved; second glume about two-thirds as long as the spikelet but at maturity pushed aside, exposing nearly half the fertile lemma, 7 to 9-nerved; sterile lemma as long as the fertile, 5 to 7-nerved, the nerves less distinct than those of the glumes, the palea well developed; fertile lemma very turgid, yellowish brown at maturity, rather indistinctly cross-wrinkled, the palea convex.



FIG. 42.—*Chaetochloa tenax*. From Tracy 9090, Cuba.

This species resembles *C. vulpiseta*, but is less robust and has retrorsely scabrous bristles and subspheric spikelets.

Hitchcock's no. 9926, from Puerto Colombia, has pubescent sheaths and blades.

¹ Fl. Brit. W. Ind. 555. 1864.

² Contr. U. S. Nat. Herb. 18: 349. 1917.

³ Mém. Acad. St. Pétersb. VI. Sci. Nat. 1: 226. 1834. See also Nees, Agrost. Bras. 251. 1829.

⁴ Anal. Mus. Nac. Montevideo 1: 166. 1894.

DISTRIBUTION.

- Brushy slopes, southern Mexico and West Indies to Brazil.
 VERACRUZ: Córdoba, *Hitchcock* 6424.
 PANAMA: Taboga Island, *Hitchcock* 8085; *Celestine* 87.
 CUBA: Sancti Spiritus, *Léon* 828. Matanzas, *Rugel* 880. Madruga, *Léon* 3456. Campo Florido, *Léon* 4145, Manatí, *Léon* 5684. Zaza del Sur, *Sergius* 2712. Tricornia, *Tracy* 9090. Woodfred, *Shafe*, 3020. Bahia Honda, *Wilson* 9411. Guanavaca, *Wright* 3474. Without locality, *Wright* 3887.
 JAMAICA: Two-mile Wood Pen, *Harris* 12065. New Forest, *Amer. Gr. Nat. Herb.* 608. Lititz, *Harris* 11657. Yardley Chase, *Harris* 9673.
 WINDWARD ISLANDS: Barbados, *Dash* 603.
 TRINIDAD: St. Joseph, *Hitchcock* 10180. Port of Spain, *Hitchcock* 9991; *Amer. Gr. Nat. Herb.* 609.
 COLOMBIA: Santa Marta, *Smith* 2499. Puerto Colombia, *Hitchcock* 9926.
 BRITISH GUIANA: Without locality, *Schomburgk* 414.
 DUTCH GUIANA: Zandery, *Samuels* in 1916.
 BRAZIL: Bahia, *Salzmann*.
 PARAGUAY: Central Paraguay, *Morong* 658.

8. *Chaetochloa verticillata* (L.) Scribn.

Panicum verticillatum L. Sp. Pl. ed. 2. 1: 82. 1762. "Habitat in Europa australi & Oriente."

Pennisetum verticillatum R. Br.; Roem. & Schult. Syst. Veg. 2: 488. 1817, as synonym of *Setaria verticillata*. Brown says¹ in a note, "Huc [*Pennisetum*] pertinent *Panicum viride, verticillatum, helvolum*," but he does not make the combination.

Setaria verticillata Beauv. Ess. Agrost. 51, 178. 1812. Based on *Panicum verticillatum* L.

(*Setaria pseudoverticillata* Fourn. Mex. Pl. 2: 43. 1886. "San Luis de Potosi (VIRL. n. 1335 bis in herb. Mus. Paris).") This specimen has not been examined. The description appears to apply to *Chaetochloa verticillata*.

Chamaeraphis italica var. *verticillata* Kuntze, Rev. Gen. Pl. 2: 768. 1891. Based on *Panicum verticillatum* L.

Chamaeraphis verticillata Porter, Bull. Torrey Club 20: 196. 1893. Based on *Panicum verticillatum* L.

Isophorus verticillatus Nash, Bull. Torrey Club 22: 422. 1895. Based on *Panicum verticillatum* L.

Chaetochloa verticillata Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 39. 1897. Based on *Panicum verticillatum* L.

Several other synonyms are given in European works.

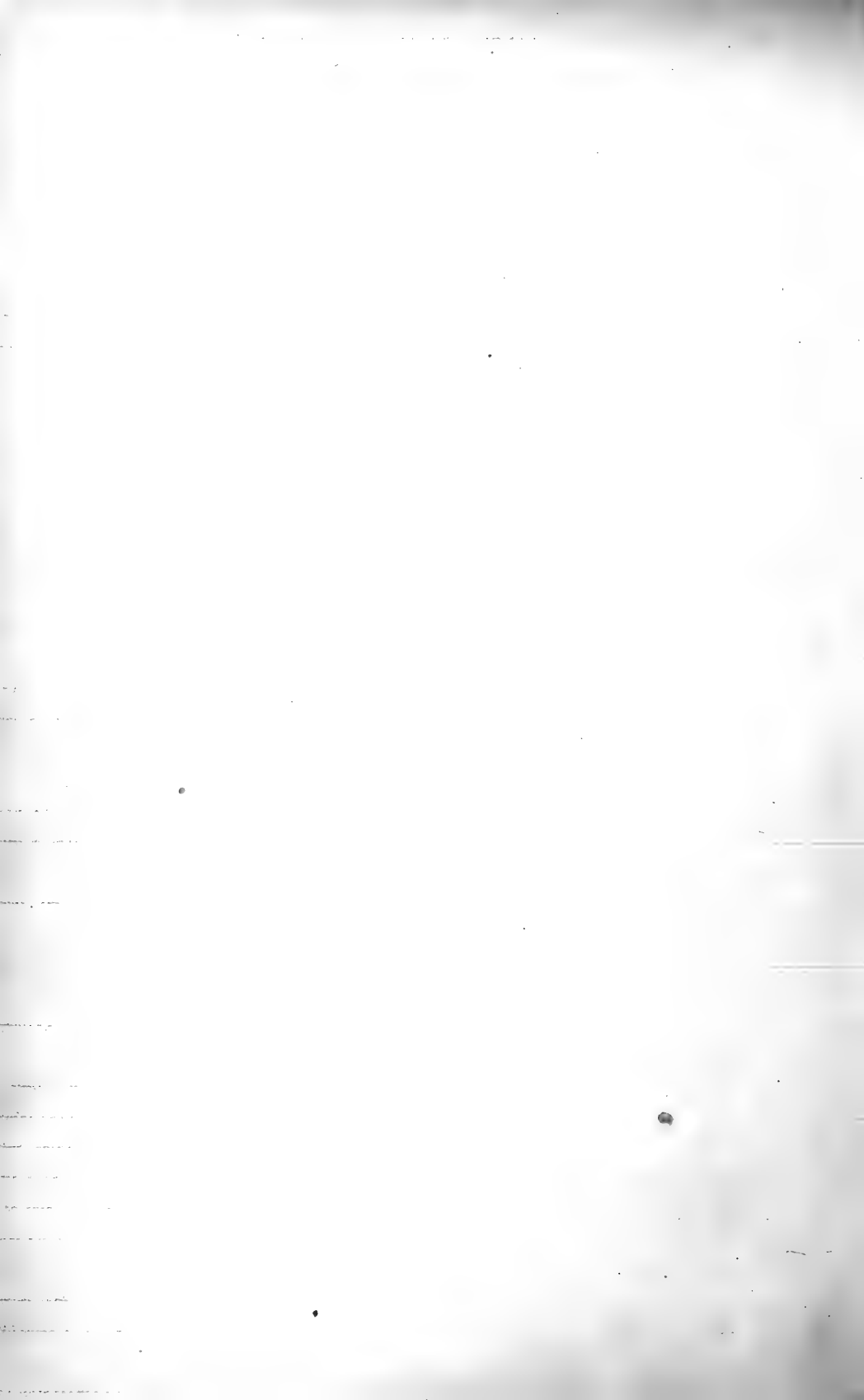
Schinz and Thellung² have applied the name *Setaria panicea*, based on *Cynosurus panicus* L. Sp. Pl. 73. 1753, to this species. The description given by Linnaeus is as follows:

8. CYNOSURUS panicula subspicata, flosculis simplicibus biaristatis. *panicus*
Panicum floribus conglomerato-spicatis laevibus arista dimidio brevioribus. Fl. suec. 54.
Panicum spica composita, aristas spica longioribus. Virid. cliff. 7.
Roy. lugdb. 55.
Panicum spiculis spicatis scabritie adhaerentibus. Hor. cl. 27.
 Gramen panicum, spica aspera. *Bauh. pin.* 8. *Scheuch. gram.* 47.
Habitat in Europae agris cultis. [Sign for annual.]

¹ Prodr. Fl. Nov. Holl. 1: 195. 1810.

² Vierteljahrs. Naturf. Ges. Zurich 53: 519. 1908.

not verticillata



European botanists generally refer this to *Polypogon monspeliensis* (L.) Desf.¹ The synonym from the Flora Suecica refers to *Panicum viride* as stated by Schinz and Thellung and as is determined by the common name (Hund-hirs) given in the Flora Suecica.² Schinz and Thellung look upon *Cynosurus paniceus* as a composite species consisting of two elements of which Linnaeus himself separated one as *P. viride*³ in 1759, and the other as *P. verticillatum*⁴ in 1762. Following the International Code, which requires that the original name be retained for one of the elements of a composite species, the authors hold that the name must apply to the residue after *P. viride* had been segregated. They therefore replace *Setaria verticillata* by *Setaria panicea* (L.) Schinz & Thell.

The present author rejects this disposition of the name because Linnaeus's own description given at the beginning of the paragraph above quoted from the Species Plantarum, does not apply to either *Panicum viride* or *P. verticillatum*, the phrase "flosculus simplicibus biaristatus" appearing to apply to *Polypogon monspeliensis*. This version is strengthened by the fact that Linnaeus later⁵ transfers the name to *Alopecurus* and alters the description to read "Alopecurus panicula subspicata glumis villosis, corollis aristatus." Hence the name is to be referred as a synonym to *Polypogon monspeliensis*, based upon *Alopecurus monspeliensis* L.⁶ There is no specimen in the Linnaean Herbarium to support *Cynosurus* (or *Alopecurus*) *paniceus*.

The plants described under *Chaetochloa brevispica* Scribn. & Merr.⁷ are *C. verticillata*. The name is based on *Panicum verticillatum parviflorum* Doell⁸ (not *Cenchrus parviflorus* Poir.) from Brazil. The type of this has not been examined.

DESCRIPTION.

Plants annual, often much branched at base and geniculate-spreading; culms smooth, scabrous below the panicle, as much as 1 meter tall, usually less; sheaths glabrous, or rarely scabrous toward the summit, ciliate, keeled; ligule very short, densely ciliate; blades flat, rather thin, scabrous on both surfaces, often more or less pilose on one or both surfaces with short scattered hairs, usually 10 to 20 cm. long and 5 to 10 mm. wide; panicles erect but not stiff, cylindric or somewhat tapering upward, more or less lobate or interrupted, especially toward base, mostly 5 to 15 cm. long, 7 to 15 mm. wide, or in robust specimens as much as .2 cm., the axis scabrous



FIG. 43.—*Chaetochloa verticillata*. From Steele in 1898, District of Columbia.

¹ Richt. Pl. Europ. 1: 40. 1890; Aschers. & Graebn. Syn. Mitteleur. Fl. 2: 161-1899. (*Alopecurus paniceus*).

² Hartm. Handb. Skand. Fl. ed. 10. 1: 275. 1870. *Cynosurus paniceus* is given as a synonym of *Setaria viridis*. Nathorst. Svenska Växtnamn. Ark. Bot. 2¹: 79. 1904. Hundhirs is given as a common name of *Setaria viridis*.

³ Syst. Nat. ed. 10. 2: 870. 1759.

⁴ Sp. Pl. ed. 2. 1: 82. 1762.

⁵ Sp. Pl. ed. 2. 1: 90. 1762.

⁶ L. Sp. Pl. 61. 1753.

⁷ U. S. Dept. Agr. Div. Agrost. Bull. 21: 15. f. 5. 1900.

⁸ In Mart. Fl. Bras. 2²: 172. 1877.

or scabrous-hispid on the angles, more or less retrorsely so; branches closely many-flowered, scabrous-hispid on the angles like the axis, the cluster oblong, 3 to 10 mm. long, the branchlets very short, bearing 1 to 4 spikelets, a bristle below each spikelet; bristles 1 to 3 times as long as the spikelets, somewhat flexuous, retrorsely scabrous to base, this often flattened; spikelets about 2 mm. long, oblong-elliptic, not very turgid on the convex side; first glume about one-third as long as the spikelet, 3-nerved; second glume and sterile lemma as long as the spikelet, 5-nerved, the sterile palea usually partially developed; fertile lemma finely cross-wrinkled.

DISTRIBUTION.

A weed in cultivated soil and waste places, here and there throughout the United States, especially in the eastern states, south to Guatemala and Cuba. Introduced from Europe; said by Stapf¹ to be native in "Africa and India to Malaya, elsewhere (Europe, Australia, America) only as a weed."

ONTARIO: Galt, *Herriot* in 1908.

MASSACHUSETTS: Boston, *Boott* in 1861; *Morong* in 1877. Salem, *Conant* in 1879.

CONNECTICUT: Hartford, *Bissell* in 1903.

NEW JERSEY: Woodport, *Fisher* in 1898. Camden, *Scribner* 117; *Martindale* in 1877.

PENNSYLVANIA: Philadelphia, *Burk*. Harrisburg, *Hitchcock* in 1902. Easton, *Porter* in 1895.

INDIANA: Bluffton, *Williamson* 20841. Lafayette, *Dorner* 75.

ILLINOIS: Oquawka, *Patterson* in 1874. Wady Petra, *V. H. Chase* 77.

MICHIGAN: Saugatuck, *Umbach* in 1898.

WISCONSIN: Oshkosh, *Random* in 1896.

SOUTH DAKOTA: Vermillion, *Over* 5093.

IOWA: Mount Pleasant, *Mills* 773. Mount Ayr, *Beard* 929. Iowa City, *Hitchcock* in 1887; *Somes* 3699.

MISSOURI: St. Louis, *Eggert* 267. Independence, *Bush* 776.

DELAWARE: Wilmington, *Commons* 145 in 1897.

DISTRICT OF COLUMBIA: *Ward* in 1882; *Steele* in 1898; *Merrill* 177; *Vasey* in 1878.

ALABAMA: Mobile, *Mohr* in 1891.

UTAH: Salt Lake City, *Hitchcock* in 1901.

NEW MEXICO: Mesilla Valley, *Wootton & Standley* in 1907.

CALIFORNIA: Upland, *Johnston* 1639.

COAHUILA: Saltillo, *Hitchcock* 5640. Parrás, *Palmer* 453 in 1898.

JALISCO: Tequila, *Palmer* 404 in 1886. Guadalajara, *Palmer* 484 in 1886.

GUANAJUATO: Irapuato, *Hitchcock* 7438.

QUERÉTARO: Querétaro, *Hitchcock* 5806, 5807; *Arsène* 10279, 10381; *Basile* 49, 50.

PUEBLA: Tehuacán, *Hitchcock* 6054, 6064, 6084½.

OAXACA: Oaxaca, *Pringle* 4920; *Hitchcock* 6118.

GUATEMALA: Antigua, *Kellerman* 4814. Ciudad Vieja, *Tejada* 311.

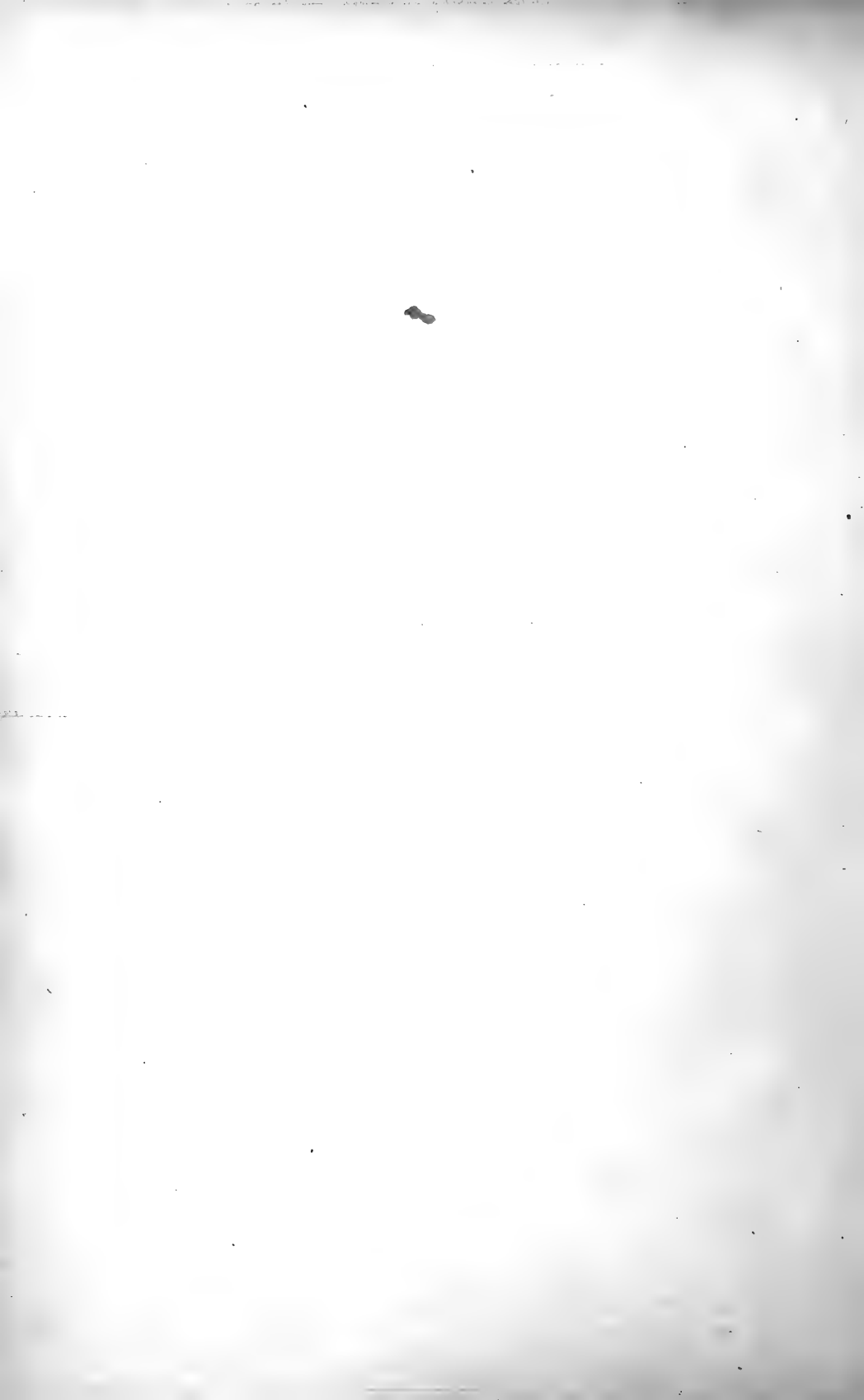
BERMUDA: *Collins* 161; *Brown & Britton* 116, 302; *Harshberger* in 1905; *Millspaugh* 99, 127.

CUBA: Habana, *Curtiss* 693; *Hitchcock* 491; *Léon* 555; *Liebmann* 348. Bejucal, *Liebmann* 347. Guanabato, *Liebmann* 346.

9. *Chaetochloa scandens* (Schrad.) Scribn.

Setaria scandens Schrad.; Schult. Mant. 2: 279. 1824. The locality is not indicated. In the Trinius Herbarium is a specimen of "*Setaria scandens* Schrad. H. Gotting.," which is probably a part of the type material. "*Penniset. scandens* Jacq. fil. Cat. Sem. Hort. Vind. 1801" is cited as a synonym. This reference to a seed catalogue of the Vienna Garden has not been verified. The name there is doubtless a nomen nudum.

¹ In *Thiselt.-Dyer*, Fl. Cap. 7: 430. 1899.



Panicum scandens Trin. Gram. Pan. 166. 1826. Based on *Setaria scandens* Schrad.

Panicum trinitii Kunth, Enum. Pl. 1: 151. 1833. Based on *Panicum scandens* Trin.

Panicum scandens α *vulgare* Doell in Mart. Fl. Bras. 2²: 171. 1877. Based on *Panicum scandens* Trin.

Panicum scandens γ *longisetum* Doell in Mart. Fl. Bras. 2²: 171. 1877. One of the four collections cited, Burchell 4510, from São Paulo, is in the National Herbarium.

Chaetochloa scandens Scribn. in Donn. Smith, Enum. Pl. Guat. 5: 91. 1899. Based on *Setaria scandens* Schrad.

DESCRIPTION.

Plants annual, much branched below, erect or soon geniculate-spreading; culms slender, sometimes rooting at the lower nodes, as much as 80 cm. long, glabrous, sometimes appressed-pilose at the nodes, especially below the margin of the sheath; sheaths glabrous or sparsely appressed-pilose, or the lowermost densely pilose, the margin and collar densely pilose; ligule densely ciliate, less than 1 mm. long; blades flat, linear-lanceolate, as much as 10 cm. long and 1 cm. wide, scabrous, especially on upper surface, usually sparsely, sometimes densely pilose on both surfaces; panicles slender, erect, cylindrical, densely flowered, sometimes slightly lobate or interrupted especially at base, often purplish, as much as 8 cm. long, mostly less than 5 mm. thick, the axis softly pubescent and also long-villous, the scattered hairs often longer than the spikelets; branches very short, pubescent and sparsely villous like the axis; clusters of bristles nearly sessile, divided into 3 to 5 short branchlets, each supporting a spikelet and 1 to 3 bristles; bristles somewhat flexuous but not becoming implicate, 1 to 2 times as long

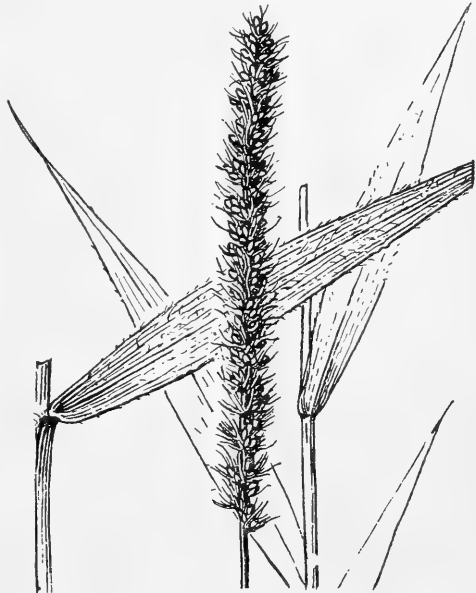


FIG. 44.—*Chaetochloa scandens*. From Hitchcock 9723, Jamaica.

as the spikelets, antrorsely scabrous except near the tip, there more or less retrorsely scabrous; spikelets about 1.5 mm. long, ovoid, turgid on the convex side; first glume about half as long as the spikelet, very broad, enveloping the base of the spikelet, 3-nerved; second glume nearly as long as the spikelet, 5-nerved; sterile lemma as long as the spikelet or slightly exceeding the fertile lemma, 5-nerved, partly enveloping the fertile lemma, the first pair of nerves at the edges of the spikelet, the outer pair on the convex side of the spikelet; fertile lemma transversely striate or weakly rugose.

DISTRIBUTION.

Open ground, Guatemala to Paraguay; also Jamaica and Haiti. Often a weed in cultivated soil.

GUATEMALA: Finca Tres Aguas, Goll 80.

COSTA RICA: San José, Tonduz 765. San Juan, Tonduz 1755⁵.

PANAMA: Alhajuela, Pittier 3463.

JAMAICA: Gordon Town, *Hart* 796, 1487. Kellits, *Harris* 11157. Mount Hybla, *Harris* 11380. Malvern, *Harris* 9739. Troy, *Hitchcock* 9812. Ewarton, *Hitchcock* 9408. Cinchona, *Hitchcock* 9718, 9723.

HAITI: Port au Prince, *Cook, Scofield & Doyle* 62, 67. Marmelade, *Nash* 693.

COLOMBIA: La Trinidad, Libano, *Pennell* 3359 (N. Y. Bot. Gard. Herb.).

BRAZIL: Goyaz, *Gardner* 3515. Campinas, *Campos Novas* 1240. Province Minas Geraes, *Widgren* 900. Rio de Janeiro, *Mertens*. Santarem, *Spruce*. Amazonas, *Capanema* 5441½. Without locality, *Burchell* 4356-2, 4510; *Riedel* (N. Y. Bot. Gard. Herb., ex Herb. Hort. Petrop., det. Trinius).

PARAGUAY: Sierra de Amambay, *Rojas* 10141. River Apa, *Hassler* 11901.

10. *Chaetochloa tenacissima* (Schrad.) Hitchc. & Chase.

Setaria tenacissima Schrad.; Schult. Mant. 2: 279. 1824. "In Brasilia." The type has not been examined.

Panicum tenacissimum Nees, Agrost. Bras. 238. 1829. Based on *Setaria tenacissima* Schrad.

Chaetochloa tenacissima Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 352. 1917. Based on *Setaria tenacissima* Schrad.

This was included with *Chaetochloa scandens* by Scribner and Merrill.¹ Schrader's descriptions of the two species are much alike, but the blades of *S. scandens* are described as subpilose, and those of *S. tenacissima* as scabrous. The bristles of *S. scandens* are said to be twice as long as the spikelets, and those of *S. tenacissima* much longer. These differences agree with the characters of the species as here segregated.

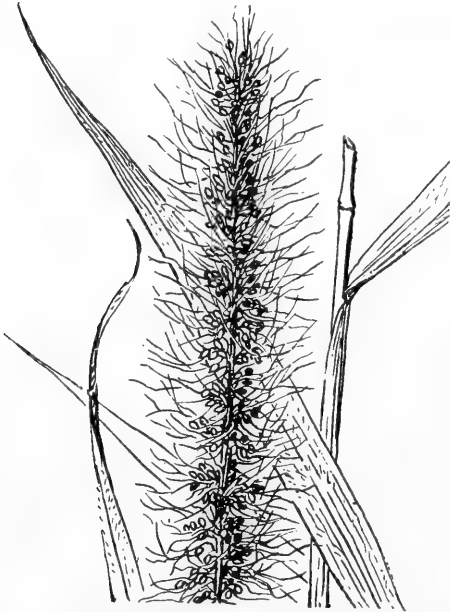


FIG. 45.—*Chaetochloa tenacissima*. From *Amer. Gr. Nat. Herb.* 610, Trinidad.

DESCRIPTION.

Plants annual, mostly simple or little branched; culms erect, slender, glabrous, scabrous below the panicle, 1 to 2 meters tall, leaning on or clambering over other vegetation; sheaths glabrous, antrorsely scabrous toward the summit, short-hispid on the margin and sparsely so on the surface above, more or less hispid on the collar; ligule very short, densely ciliate; blades flat, very scabrous on both surfaces and more or less pubescent especially beneath, mostly 10 to 15 cm., sometimes as much as 20 cm. long, mostly not over 8 mm. wide, gradually tapering from about the middle to the long-acuminate apex, rather abruptly narrowed at base; panicles somewhat nodding or flexuous, rather densely flowered above, somewhat interrupted toward the base, a little tapering toward the summit, as much as 15 cm. long and 1 cm. thick (excluding bristles), the axis densely pubescent and sparsely villous with long weak hairs; clusters of branchlets rather loose, 3 to 5 mm. long, dividing 2 or 3 times,

¹ U. S. Dept. Agr. Div. Agrost. Bull. 21: 17. 1900.

= 10 (...)

Seti mentama perum
S. peceka neri ulala Farone

F.S. Giuschiach

each ultimate branchlet or pedicel bearing a bristle, the corresponding spikelet sometimes suppressed, the cluster bearing, therefore, usually not more than 8 spikelets and 8 bristles, the branchlet pubescent but not villous; bristle flexuous, becoming implicate, about 1 cm. long, scabrous, antrorsely below, retrorsely above; spikelets about 1.5 mm. long, often dark purple; first glume about half as long as the spikelet, 3-nerved; second glume and sterile lemma about as long as the fertile lemma, 5-nerved, the sterile palea wanting; fertile lemma transversely rugose with numerous fine ridges.

On account of the retrorsely scabrous bristles, the panicles of this species readily become attached to the clothing.

DISTRIBUTION.

- Brushy hillsides, Guatemala to Brazil; also in Porto Rico.
 GUATEMALA: Buena Vista, *Heyde & Lux* 4295.
 HONDURAS: San Pedro Sula, *Thieme* 842, 5582 B.
 COSTA RICA: San José, *Tonduz* 3122. Cañas Gordas, *Pittier* 7346, 11006.
 PANAMA: El Boquete, *Hitchcock* 8291.
 PORTO RICO: Utuado, *Sintenis* 6498.
 TRINIDAD: Port of Spain, *Amer. Gr. Nat. Herb.* 610.
 VENEZUELA: Tovar, *Fendler* 1644.
 BRAZIL: Without locality, *Glaziou* 22614.

11. *Chaetochloa grisebachii* (Fourn.) Scribn.

Setaria grisebachii Fourn. Mex. Pl. 2: 45. 1886. Fournier cites as synonym, "*S. setosa* Beauv. var. *caudata* Griseb. in sched." Grisebach's idea of *S. setosa* var. *caudata* is based on a specimen collected in Antigua by Wullschlaegel (no. 629). This name, published in the Flora of the British West Indian Islands,¹ is based on *Panicum caudatum* Lam., but Fournier's conception of Grisebach's idea is evidently based on two specimens in the Grisebach Herbarium which he considers to be conspecific, the one, *Wullschlaegel* 629, collected in Antigua and labeled by Grisebach with the varietal name and cited under the variety, the other *Schaffner* 36, collected at Orizaba and labeled by Grisebach "*Setaria setosa*." This second specimen, one of several cited by Fournier, is taken as the type of *S. grisebachii*.

Setaria laevis Fourn. Mex. Pl. 2: 45. 1886. "Bernal (Karw. n. 961)." The type collection has been examined at the herbarium of the Botanical Garden at Petrograd.

Chaetochloa grisebachii Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 39. 1897. Based on *Setaria grisebachii* Fourn.

Chaetochloa grisebachii ampla Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 36. f. 21. 1900. The range is given as "New Mexico; Mexico." No type is designated, but in the National Herbarium is the specimen from which the figure was drawn. This is *Pringle* 6470, from Federal District, Mexico. It is marked "Type" in Merrill's hand.

Chaetochloa grisebachii mexicana Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 37. 1900. "*Setaria mexicana* Schaffner in Herb." The two specimens cited are "San Luis Potosi, 1044 *Schaffner*, 1876; *Schaffner*, Sept., 1877." The type is in the Gray Herbarium. A duplicate type has been examined in the herbarium of the New York Botanical Garden. It bears two numbers, 193 and 1044. There are three plants, all depauperate, with narrow few-flowered panicles mostly not exceeding the leaves. One plant has two larger panicles. This form appears to differ only in being depauperate.

Setaria mexicana Schaffn.; Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 37. 1900, as synonym.

¹ 555. 1864.

DESCRIPTION.

Plants annual, branched at base, erect or spreading; culms as much as 1 meter tall but usually less, smooth, or scaberulous below the pubescent nodes and below the



FIG. 46.—*Chaetochloa grisebachii*. From *Metcalfe* 1262, New Mexico.

panicle; sheaths smooth, scabrous, or sparingly hispidulous, often papillose, densely-ciliate, pubescent or hispid on the collar; ligule a short, densely ciliate membrane scarcely 1 mm. long, blades flat, mostly rather lax, erect or ascending, straight, puberulent, and scabrous, as much as 25 cm. long and 1.5 cm. wide, usually less than 15 cm. long and 1 cm. wide; panicle loosely flowered, narrow, tapering toward apex, mostly less than 15 cm. long, the axis scabrous and, except the lower part, also villous; branches rather densely flowered, the lower somewhat distant, sometimes as much as 2 or 2.5 cm. long, spreading, usually 5 to 10 mm. long, and, except the lower, approximate; ultimate branchlets about 0.5 mm. long, bearing a single spikelet and a single bristle below, the spikelet sometimes rudimentary, thus bringing the bristles in pairs; bristles 5 to 15 mm. long, sometimes shorter, flexuous, antrorsely scabrous, green or purplish; spikelets about 2 mm. long, moderately turgid on the convex side; first glume one-fourth to one-third the length of the spikelet, 3-nerved; second glume a little shorter than the spikelet, 5-nerved; sterile lemma as long as the fertile lemma, 5-nerved, the palea small; fertile lemma acute, finely cross-wrinkled.

DISTRIBUTION.

Open ground, often a weed in fields, Texas to Arizona, south to Oaxaca.

TEXAS: Kerrville, *Heller* 1897. Limpia Canyon, *Nealley* 130. Austin, *Hall* 841. New Braunfels, *Biltmore Herb.* 14922.

NEW MEXICO: Organ Mountains, *Hitchcock* 3786; *Wooton & Standley* in 1906. Mangas, *Smith* in 1897. Queen, *Hitchcock* 13520. Hillsboro, *Metcalfe* 1262. Without locality, *Wright* 2096.

ARIZONA: Santa Rita Mountains, *Griffiths & Thornber* 141, 266; *Griffiths* 3428, 6075; *Wooton* in 1914. Beaver Creek, *MacDougal* 606. Bowie, *Jones* 4288. Southern Arizona, *Rothrock* 676. Gardiners Spring, *Pringle* in 1882. Tucson, *Hitchcock* 3514. Patagonia, *Hitchcock* 3662, 3679, 3681. Paradise, *Blumer* 1660, 1724. Sulphur Spring Valley, *Griffiths* 1901. Bisbee, *Goodding* 983. Clear Creek, *Toumey* 78 in 1891. San Bernardino Ranch, *Mearns* 2000.

CHIHUAHUA: Chihuahua, *Hitchcock* 7774; *Pringle* 381. Sierra Madre, *Nelson* 6299.

COAHUILA: San Lorenzo Canyon, *Palmer* 397 in 1904. Saltillo, *Palmer* 385 in 1898; *Hitchcock* 5626, 5641. Chojo Grande, *Palmer* 336 and 337 in 1904.

SAN LUIS POTOSÍ: San Luis Potosí, *Parry & Palmer* 957.

DURANGO: Torreón: *Hitchcock* 7546. Durango, *Hitchcock* 7573; *Palmer* 716 and 728 in 1896.

JALISCO: Guadalajara, *Hitchcock* 7338, 7369.

AGUASCALIENTES: Aguascalientes, *Hitchcock* 7461.



GUANAJUATO: Irapuato, *Hitchcock* 7427.

QUERÉTARO: Querétaro, *Arsène* 10275, 10346; *Basile* 47, 48.

VERACRUZ: Orizaba, *Schaffner* 36.

PUEBLA: Tehuacán, *Liebmann* 361; *Hitchcock* 6095. Puebla, *Nicolas* 314 and in 1909. San Marcos, *Hitchcock* 6512. Atlixco, *Nelson* in 1893.

MEXICO: Río Hondo, *Pringle* 7533; *Holway* 11, 3153.

FEDERAL DISTRICT: *Pringle* 6470, 9578, 9579; *Orcutt* 3697, 4342; *Holway* 3040, 3554; *Hitchcock* 5911, 5925, 7836; *Bourgeau* 441.

MICHOACÁN: Punguato, *Arsène* in 1912. Morelia, *Arsène* in 1909.

OAXACA: El Parián, *Pringle* 4937. Oaxaca, *Hitchcock* 6178, 6184; *Smith* 939; *Conzatti & González* 344.

12. *Chaetochloa magna* (Griseb.) Scribn.

Setaria magna Griseb. Fl. Brit. W. Ind. 554. 1864. "Jamaica!, *Pd.* [Purdie], along the lagoons behind the ferry." In the Grisebach Herbarium are some fragments of the type, the original being probably at Kew.

Chamaeraphis magna Beal, Grasses N. Amer. 2: 152. 1896. Based on *Setaria magna* Griseb.

Chaetochloa magna Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 39. 1897. Based on *Setaria magna* Griseb.

Chaetochloa magna was included by Elliott¹ under *Panicum italicum*.

DESCRIPTION.

Plants annual, robust, erect, usually not branched at base, sparingly branched above, the branches erect; culms as much as 4 meters tall, rarely taller, and 2 cm. thick at base, smooth, scabrous below the panicle; sheaths smooth or scabrous at summit, hispid-ciliate on the margins; ligule a densely and stiffly hispid membrane, 1 to 2 mm. long; blades flat, scabrous, as much as 0.5 meter long and 3.5 cm. wide; panicles densely flowered, nodding, often interrupted at base, tapering at each end, as much as 40 cm. long and 3 cm. thick, those of the branches much smaller, the axis densely pubescent and also villous with ascending hairs about 1 mm. long; branches as much as 1.5 cm. long, many-flowered; bristles somewhat flexuous, 1 or 2 below each spikelet, 1 to 2 cm. long; spikelets about 2 mm. long, not very turgid on the convex side; first glume about one-third as long as the spikelet, 3-nerved; second glume about as long as the spikelet, 5-nerved; sterile lemma as long as the spikelet, 7-nerved, the sterile palea well developed; fertile lemma smooth.

Nash's no. 1279, from Eustis, Florida, is noted by the collector as being 8 to 20 feet tall.

DISTRIBUTION.

Marshes and wet places along the coast, Delaware to Florida and Texas; also in the West Indies and Panama, *Costa Rica*.

DELAWARE: Woodland Beach, *Commons* in 1892. Collins Beach, *Commons* in 1897
MARYLAND: Millstone, *Hitchcock* 7890; *Tidestrom* 5321.



FIG. 47.—*Chaetochloa magna*. From Nash 1279, Florida.

¹ Bot. S. C. & Ga. 1: 113. 1816.

- VIRGINIA: Virginia Beach, *Bradford* in 1900. Smiths Island, *Palmer* in 1897.
 NORTH CAROLINA: Wilmington, *Hitchcock* in 1905.
 SOUTH CAROLINA: Bluffton, *Mellichamp* in 1883.
 GEORGIA: Experiment, *Redding* in 1895.
 FLORIDA: Alachua, *Combs* 748. Grasmere, *Combs* 1054. Homosassa, *Combs* 964. Merritts Island, *Curtiss* 3618. Okeechöbee region, *Fredholm* 6178. Palm Beach, *Curtiss* 5410. Eustis, *Nash* 1279. Clarcona, *Meislahn* 76. Manatee, *Rugel* 365. St. Vincent Island, *Pierce* in 1911; *McAtee* 1713A. Dania, *Eaton* 828. Apopka, *Baker* in 1897 and 1898. Bartow, *Combs* 1219. Deland, *Hill* in 1899.
 ALABAMA: Mobile, *Mohr* in 1869.
 LOUISIANA: Lake Charles, *Allison* 110. Pointe a la Hache, *Langlois* 56. Burton Island, *Tracy & Lloyd* 463. New Orleans, *Fisher* 133; *Biltmore Herb.* 3459a. Houma, *Wurzlöw* in 1913.
 TEXAS: Galveston, *Tracy* 7747. "Western Texas to El Paso," *Wright* 801. Eagle Lake, *Plank* in 1891.
 COSTA RICA: Boca Zacate, *Pittier* 6825. Punta Mala, *Tonduz* 6825.
 BERMUDA: *Munro* in 1864. (This locality is doubtful as the species is not known to grow in Bermuda now.)
 JAMAICA: Black River, *Hitchcock* 9646. Ferry River, *Purdie* (in Grisebach Herb.).
 PORTO RICO: Campo Alegre, *Chase* 6800. Without locality, *Eggers* 709.
 LEEWARD ISLANDS: Guadeloupe, *Duss* 3918.

13. *Chaetochloa ambigua* (Guss.) Scribn. & Merr.

- Panicum verticillatum* β *ambiguum* Guss. Fl. Sic. Prodr. 80. 1827. Sicily.
Setaria ambigua Guss. Fl. Sic. Syn. 1: 114. 1842. Based on *Panicum verticillatum* β *ambiguum* Guss.
Setaria verticillata var. *ambigua* Parl. Fl. Palerm. 1: 36. 1845. Based on *Panicum verticillatum* β *ambiguum* Guss.
Panicum ambiguum Hausskn. Oesterr. Bot. Zeitschr. 25: 345. 1875. Based on *Setaria ambigua* Guss.
Chamaeraphis italica var. *ambigua* Kuntze, Rev. Gen. Pl. 2: 768. 1891. Based on "*Panicum ambiguum* Guss."
Chaetochloa ambigua Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 18. f. 7. 1900. Based on *Setaria verticillata* var. *ambigua* Guss.
 A complete synonymy is given by Hubbard.¹

DESCRIPTION.

Plants with the aspect of *Chaetochloa verticillata*, differing in the longer ligule, scabrous but not pilose blades, and the antrorsely scabrous bristles. The bristles are mostly 2 to 3 times as long as the spikelets and at maturity are spreading and more or less implicate.

This may be only a variety of *Chaetochloa verticillata* or of *C. viridis*, between which it seems to be intermediate. It is retained as a species because it can not be definitely referred to either of the two species mentioned.

DISTRIBUTION.

- Central and southern Europe; sparingly introduced in the United States.
 PENNSYLVANIA: Ballast ground near Philadelphia, *Scribner* in 1884.
 DISTRICT OF COLUMBIA: A weed in the grass garden, *Merrill*, Sept. 20, 1900; *Merrill* 175, July 30, 1900.
 ALABAMA: Waste places, Mobile, *Mohr* in 1884.

¹ Amer. Journ. Bot. 2: 179. 1915.

Barnhart says
OK, is at NY, but back

14. *Chaetochloa viridis* (L.) Scribn.

Panicum viride L. Syst. Nat. ed. 10. 2: 870. 1759. No locality is given. A reference is made to "Spec. pl. n. 2. β ." *Panicum* number 2 in the Species Plantarum is *P. glaucum*. No locality is given for variety β , but this is based on a citation from Scheuchzer,¹ describing a plant from Europe.

Setaria viridis Beauv. Ess. Agrost. 51, 178. 1812. *Panicum viride* is included as a species of *Setaria*, and *Setaria viridis* is given in the index.

Pennisetum viride R. Br.; Roem. & Schult. Syst. Veg. 2: 489. 1817, as synonym of *Setaria viridis*.²

Setaria weinmanni Roem. & Schult. Syst. Veg. 2: 490. 1817. Bohemia.

Panicum viride β *brevisetum* Doell, Rhein. Fl. 128. 1843. A form with bristles only a little longer than the spikelets.

Panicum italicum var. *viride* Koern. in Koern. & Wern. Handb. Getreid. 1: 277. 1885. Based on *Panicum viride* L.

Chamaeraphis italica var. *viridis* Kuntze, Rev. Gen. Pl. 2: 767. 1891. Based on *Panicum viride* L.

Chamaeraphis viridis Millsp. W. Va. Agr. Exp. Sta. Bull. [Fl. W. Va.] 2: 466. 1892. Based on *Panicum viride* L.

Ixophorus viridis Nash, Bull. Torrey Club 22: 423. 1895. Based on *Panicum viride* L.

Chaetochloa viridis Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 39. 1897. Based on *Panicum viride* L.

Setaria viridis var. *weinmanni* Borbás, Math. Termesz. Közlem. 15: 310. 1878, an unverified citation; Brand in Koch, Syn. Deutsch. Schweiz. Fl. ed. 3. 3: 2690. 1905. Based on *Setaria weinmanni* Roem. & Schult.

Setaria viridis var. *breviseta* Hitchc. in A. Gray, Man. ed. 7. 119. 1908. Based on *Panicum viride* var. *brevisetum* Doell.

Several other synonyms are given in European botanies. Hubbard has given an extensive bibliography.³

DESCRIPTION.

Plants annual, usually branched at base, sometimes geniculate-spreading; culms smooth, scabrous below the panicle, usually 20 to 40 cm. tall, sometimes as much as 1 meter; sheaths smooth, or scabrous toward the summit, ciliate on the margin and sometimes a little on the collar; ligule very short, densely ciliate; blades flat, linear-lanceolate, straight (not twisted), scabrous especially on the upper surface, usually less than 15 cm. long, commonly less than 1 cm. wide, sometimes as much as 15 mm. wide; panicle erect or somewhat nodding, densely flowered, green or purple, cylindrical but tapering a little at the summit (the smaller ones ovate), rarely as much as 10 cm. long, usually less than 7 cm., commonly 5 to 8 mm. thick (excluding bristles),



FIG. 48.—*Chaetochloa viridis*. From Thompson 129, Kansas.

~~Rhodora 8: 210. 1906.~~

¹ Scheuchz. Agrost. Hist. 46. 1719.

² See note on *Pennisetum verticillatum*, p. 178.

³ Amer. Journ. Bot. 2: 175. 1915.

the axis densely pubescent and also villous with numerous hairs about 1 mm. long; branches very short, bearing several (mostly 5 or 6) spikelets, the rachis pubescent; bristles 1 to 3 below each spikelet, mostly 3 to 4 times as long as the spikelet, antrorsely scabrous, greenish or rarely purplish; spikelets 2 to 2.5 mm. long, elliptic, not much turgid on the convex side; first glume one-third to one-fourth as long as the spikelet, 3-nerved; second glume and sterile lemma about as long as the spikelet or the former a little shorter, 5-nerved, the sterile palea not fully developed; fertile lemma finely transversely wrinkled or ridged.

Commonly known as green foxtail. In abnormal specimens the panicle may be forked or variously branched.

DISTRIBUTION.

A weed in cultivated soil and waste ground, common throughout the cooler parts of the United States; rare in Mexico; introduced from Europe; widely distributed in Asia and northern Africa.

NEWFOUNDLAND: *Waghorne* in 1892.

NEW BRUNSWICK: Shediac Cape, *Hubbard* 761, 762. Campbellton, *Fowler* in 1905.

QUEBEC: Montreal, *Mohr* in 1882. Rivière du Loup Falls, *Eggleston* 3145. Cap-à-L'Aigle, *Eggleston* 2996.

ONTARIO: Hen Island, *Morris* 79. Ottawa, *Rolland* 56; *Fletcher* in 1891. Toronto, *Biltmore Herb.* 3453a. Kingston, *Fowler* in 1895.

BRITISH COLUMBIA: Lillooet, *Macoun* 91571. Sicamous, *Macoun* 8.

MAINE: Bangor, *Knight* 21, 23. Augusta, *Scribner* in 1869. Boundary Lake, *Eggleston & Fernald* in 1902.

NEW HAMPSHIRE: Peterboro, *Robinson* 236. Shelburne, *Deane* in 1915.

VERMONT: Manchester, *Day* 207. Rutland, *Kirk* 1015.

MASSACHUSETTS: Medford, *Boott* in 1866. Marthas Vineyard, *Harrison* in 1888. Melrose, *Morong* in 1876.

CONNECTICUT: South Glastonbury, *Wilson* 1264.

NEW YORK: Oxford, *Coville* in 1884. North Hannibal, *Pearce* in 1883. Union Springs, *Dudley* 37.

NEW JERSEY: Weehawken, *Kearney* in 1894.

PENNSYLVANIA: Harrisburg, *Small* in 1888; *Hitchcock* in 1903. Lancaster, *Heller* 4817. Easton, *Porter* in 1887. Philadelphia, *Scribner* in 1878. Binkleys Ridge, *Heller* 4823.

OHIO: Kipton, *Ricksecker* in 1894. Columbus, *Kellerman* 6336.

INDIANA: Lafayette, *Dorner* 72. Lake Gage, *Deam* in 1903.

ILLINOIS: Naperville, *Umbach* in 1895. Glasford, *Wilcox* 162. Wady Petra, *V. H. Chase* 74. Chicago, *Chase* 1611. East Mount Carmel, *Schneck* in 1904. Urbana, *Gates* 1962.

MICHIGAN: Keweenaw County, *Farwell* 629. Marquette County, *Barlow* in 1901.

WISCONSIN: Oshkosh, *Random* in 1896. Newbold, *Cheney* 1701.

MINNESOTA: Camp Douglas, *Mearns* 63. Fort Snelling, *Mearns* 62. Root River Valley, *Mearns* 64. Duluth, *Hitchcock* 5089.

NORTH DAKOTA: Leeds, *Lunell* in 1904 and 1909. Fargo, *Wright* 934.

SOUTH DAKOTA: Jamesville, *Bruce* 12. Bellefourche, *Griffiths* 365. Minnekahta, *Rydberg* 1102. Redfield, *Griffiths* 208. Hot Springs, *Hitchcock* 11167. Aberdeen, *Griffiths* 123. Brookings, *Griffiths* in 1892.

IOWA: Ames, *Pammel*, *Amer. Weeds* 16. Des Moines, *Ball* 28. Manchester, *Ball* 1007. Clinton, *Ball* 267, 268. Battle Creek, *Preston* 956. Fayette County, *Fink* 273. Iowa City, *Somes* 3637.

NEBRASKA: Kearney, *Holms* in 1889. Forest Station, *Hitchcock* 11032, 11033. Mullen, *Rydberg* 1568. Central City, *Rydberg* 2009; *Shear* 262. Wiegand, *Clements* 2684.

- MISSOURI: St. Louis, *Eggert* 268. Clarksville, *Davis* 1132, 1165, 1224, 1236. Courtney, *Bush* 1671. Springfield, *Standley* 8677.
- KANSAS: Riley County, *Norton* 576. Tribune, *Reed* in 1892. Syracuse, *Thompson* 129.
- DELAWARE: Stanton, *Commons* 147 in 1897.
- MARYLAND: Great Falls, *Painter* 470. Garrett County, *Smith* in 1879.
- DISTRICT OF COLUMBIA: *Hitchcock* 97; *Topping* in 1895; *Pollard* 532.
- NORTH CAROLINA: Magnetic City, *Wetherby* 9.
- FLORIDA: St. Vincent Island, *McAtee* 1720B.
- TENNESSEE: Knoxville, *Scribner*.
- ALABAMA: Mobile, *Mohr* in 1868. Tuskegee, *Carver* 15.
- MISSISSIPPI: Ocean Springs, *Forkert* in 1898.
- LOUISIANA: Alexandria, *Ball* 446.
- TEXAS: Paloduro, *Gardner* 19. Kerrville; *Heller* 1889; *Hitchcock* 5263. Chillicothe, *Ball* 967. Big Spring, *Hitchcock* 13362.
- OKLAHOMA: Cora, *Stevens* 762. Alva, *Stevens* 1606. Canton, *Stevens* 854. Tonkawa, *Stevens* 1898.
- MONTANA: Selish, *Griffiths & Lange* 14. Bozeman, *Blankinship* in 1898. Columbia Falls, *Hitchcock* 4934.
- WYOMING: Sundance, *Griffiths* 489. Sheridan, *Nelson* 305.
- IDAHO: Coeur d'Alene, *Rust* 370. St. Anthony, *Merrill* 47, 51; *Merrill & Wilcox* 432. New Plymouth, *Macbride* 286. Moscow, *Henderson* 2849.
- WASHINGTON: North Yakima, *Hunter* 593.
- OREGON: Portland, *Suksdorf* 1713. Milton, *Brown* 33.
- COLORADO: Fort Collins, *Cowen* 3381. Minnehaha (Pikes Peak), *Hitchcock* 2369. Colorado Springs, *Williams* 2158. Idaho Springs, *Shear* 746. Rocky Ford, *Griffiths* 3306. Glenwood Springs, *Shear & Bessey* 1304.
- UTAH: Cainville, *Jones* 5696. Elk Ranch, *Jones* 6034. Gunnison, *Ward* 688. Ogden, *Hitchcock* 10888.
- NEW MEXICO: South end of Black Range, *Metcalf* 1139, 1499. Cloudcroft, *Hitchcock* 13297. Farmington, *Standley* 6935. Pecos, *Standley* 5017. White Mountains, *Wooton & Standley* 3579. Sabinal, *Wooton* 1079. Deming, *Hitchcock* 3754. Las Vegas Hot Springs, *Cockerell* 11. Cedar Hill, *Standley* 7933. Shiprock Agency, *Standley* 7236. Mesilla, *Wooton* 89.
- ARIZONA: Verde Valley, *MacDougal* 532. Barfoot Park, *Blumer* 1588. Strawberry Creek, *MacDougal* 706. Tucson, *Griffiths* 1526. Tanner Canyon, *Goodding* 819. White Mountains, *Griffiths* 5375.
- CALIFORNIA: Rialto, *Parish* 2112. Los Angeles, *Davidson* 3257. Stanford Campus, *Abrams* 7333.
- SAN LUIS POTOSÍ: San Luis Potosí, *Hitchcock* 5664.
- VERACRUZ: Córdoba, *Hitchcock* 6450.
- MEXICO (Republic of): Without locality, *Liebmann* 349.
- COSTA RICA: Cartago, *Pittier* 9037.
- BERMUDA: *Collins* 159, 160.

15. *Chaetochloa italica* (L.) Scribn.

Panicum italicum L. Sp. Pl. 56. 1753. "Habitat in Indiis."

Panicum germanicum Mill. Gard. Dict. ed. 8. *Panicum* no. 1. 1768. No locality is given. Miller takes the specific name from Bauhin, whose phrase name he cites, "*Panicum germanicum*, sive panicula minore C. B. P. 27." [Caspar Bauhin, Pinax.] The type specimen, at the British Museum of Natural History, is the upper part of a culm with a panicle and two leaves. The panicle is 10 cm. long, 2 cm. wide, dense, the bristles not much exceeding the spikelets; the blades are 1.5 cm. wide.

Panicum italicum var. *germanicum* Koel. Descr. Gram. 17. 1802. Based indirectly on *Panicum germanicum* Mill. Bauhin's name (see above) is cited.

Pennisetum italicum R. Br. Prodr. Fl. Nov. Holl. 1: 195. 1810. Based on *Panicum italicum* L.

Setaria italica. Beauv. Ess. Agrost. 51, 170, 178. 1812. Based on "*Panicum italicum* Willd." [*P. italicum* L.].

Setaria californica Kellogg, Proc. Calif. Acad. 1: ed. 2. 26. 1873.¹ "From the head valley of the Sacramento River," California. Described as 10 to 12 feet high and "quite similar to *Setaria italica*." It was supposed to be native but the description points conclusively to *C. italica*.

Chamaeraphis italica Kuntze, Rev. Gen. Pl. 2: 767. 1891. Based on *Panicum italicum* L.

Isophorus italicus Nash, Bull. Torrey Club 22: 423. 1895. Based on *Panicum italicum* L.

Chaetochloa italica Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 39. 1897. Based on *Panicum italicum* L.

For complete synonymy see Hubbard's paper on *Setaria italica* and its allies.²

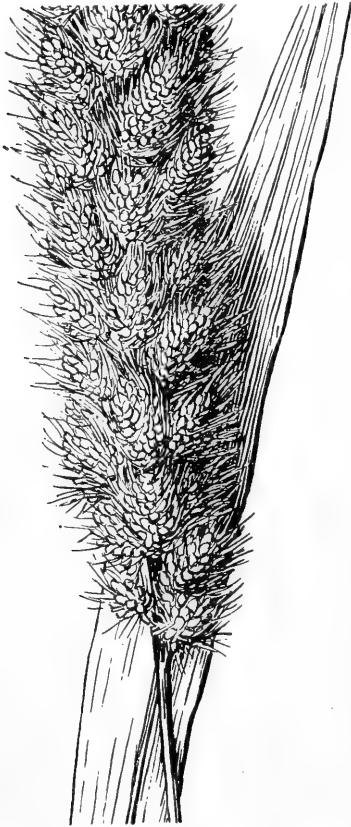


FIG. 49.—*Chaetochloa italica*. From Williams 82, District of Columbia.

DESCRIPTION.

A cultivated form of *C. viridis*, differing in being more robust, with broader blades, and larger lobate panicles, the fruit (fertile lemma and palea) at maturity falling away from the remainder of the spikelet.

Commonly known as millet, foxtail millet, and Hungarian grass. There are many varieties in cultivation, differing in the length and color of the bristles, the color of the fruit, and the size and degree of lobing of the panicle or head. The varieties are discussed by Koernicke³ and by Hubbard.⁴ The culm may be as much as 1 cm. thick, the blades as much as 3 cm. wide, and the heads as much as 30 cm. long. At maturity the fruit becomes very turgid and spreads apart the glumes and sterile lemma, and is distinctly longer than these. The head, in some forms, becomes heavy and nodding, and distinctly lobate. The color of the fruit varies from tawny to red, brown, and black. The

bristles are 1 to 3 times as long as the spikelet, and green, purple, or brown. The fruit is smooth or obscurely cross-wrinkled and may be as much as 3 mm. long.

In the cultivated forms the rachilla disarticulates above the sterile lemma, so that the fruit at maturity readily falls from the spikelet and hence shells out when the heads are threshed. The plants propagate themselves in fields and waste places and then tend to revert to a more primitive form. These uncultivated plants are often difficult to distinguish from forms of *Chaetochloa viridis*. This is especially true in immature specimens, as the disarticulation of the fruit is evident only at maturity and even then, in the uncultivated plants, is often less marked.

¹ The Proceedings were first published in a newspaper, "The Pacific," in 1854. Edition 2 is an exact reprint in book form.

² Amer. Journ. Bot. 2: 169. 1915.

³ Koern. & Wern. Handb. Getreid. 1: 270-279. 1885.

⁴ Amer. Journ. Bot. 2: 169. 1915.

Practical. Acad. 1:27. 1877.



Setaria corrugata Schult. Mant. 2: 276. 1824. Based on *Panicum corrugatum* Ell. *Chamaeraphis corrugata* Kuntze, Rev. Gen. Pl. 2: 770. 1891. Based on *Panicum corrugatum* Ell.

Chaetochloa corrugata Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 39. 1897. Based on *Setaria corrugata* Ell., an error for *Panicum corrugatum* Ell.

Chaetochloa hispida Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 25. f. 13. 1900. "In sandy pine woods. Type specimen in the Gray Herbarium, collected [at La Grifa, Pinar del Río, Cuba] by C. Wright in January, 1865, no number." This specimen agrees with *Chaetochloa corrugata*, except that the blades are somewhat hispidulous, as are also the sheaths. The sheaths are not infrequently appressed-pilose in Florida specimens. Hitchcock's no. 519 from Marco, Florida, with hispid sheaths, was identified by Merrill as *C. hispida*.

Setaria hispida Schum. Just's Bot. Jahresh. 28¹: 417. 1902. Based on *Chaetochloa hispida* Scribn. & Merr.

The plants described by Scribner and Merrill¹ under *Chaetochloa corrugata pa. viflora* are here included under *C. corrugata*, but the name is a synonym of *C. geniculata*.

DESCRIPTION.

Plants annual, branched at base, erect or geniculate-spreading; culms scabrous, or the lower part smooth, more or less appressed-hispid at the nodes, as much as 1 meter tall; sheaths compressed-keeled, scabrous at least toward the summit, villous on the margin or sometimes appressed-pilose all over; ligule a densely ciliate membrane about 1 mm. long; blades flat, gradually narrowed to the base and to the acuminate apex, scabrous on both surfaces, as much as 30 cm. long and 1 cm. wide, the middle culm blades commonly 15 to 25 cm.



FIG. 51.—*Chaetochloa corrugata*. From Pollard & Collins 253, Florida.

long and less than 5 mm. wide, rarely sparsely pilose; panicles densely flowered, cylindrical, in larger specimens sometimes interrupted at base, as much as 15 cm. long, usually less than 10 cm., the axis densely hispid-scabrous, and also rather densely villous with ascending hairs about 1 mm. long; branches 1 to 3 mm. long, hairy, bearing several spikelets (mostly 5 or 6), and 1 to 3 bristles below each spikelet; bristles somewhat flexuous, antorsely scabrous, mostly about 3 times as long as the spikelets, or as much as 2 cm. long, green, tawny, or purple spikelets about 2 mm. long, turgid on the convex side; first glume about half as long; as the spikelet, 3-nerved; second glume a little shorter than the spikelet, 5-nerved; sterile lemma as long as the spikelet, 5-nerved; fertile lemma coarsely transversely rugose.

DISTRIBUTION.

Sandy woods, along the coast and also a weed in cultivated fields and waste places, North Carolina to Florida and Mississippi; also in Cuba.

NORTH CAROLINA: Wilmington, Hitchcock 201. Newbern, Kearney 2221.

FLORIDA: Hillsborough County, Fredholm 6401. Eustis, Biltmore Herb. 10340; Nash 640, 1382; Hitchcock 2352. Jacksonville, Curtiss 3616, 4041, 5124. Miami, Pollard & Collins 253; Hitchcock 645; Eaton 337; Chase 3909, 3952. Lake City,

¹ U. S. Dept. Agr. Div. Agrost. Bull. 21: 24. f. 12. 1900.

~~Setana parvula Vasey, Bull Torr Cl.~~
~~13/230. 1888. S.W. Chapuahuatl, Palmar, 1885.~~
We are assuming that this Vasey paper is
earlier than Fowler's paper. ~~S. parvula~~
has priority. ~~Setana~~ (see type)

Combs 83, 140; *Rolfs* 712, 760, 829, 845. Sneeds Island, *Tracy* 6704. Grasmere, *Combs* 1047. Cedar Key, *Combs* 795; *Tracy* 7179. Levy County, *Hitchcock* 2354. Titusville, *Chase* 3972. Palm Beach, *Hitchcock* 2351. Fort Myers, *Standley* 13055. Manivista, *Tracy* 6697. Gainesville, *Combs* 721, 723. East Pass, *Tracy* 6449. Homosassa, *Combs* 944, 945. Palmetto, *Tracy* 7040. Bartow, *Combs* 1177. Manatee, *Rugel* 366, 369. Alva, *Hitchcock* 517. Anastasia Island, *Kearney* 175. Apalachicola, *Kearney* 108. Jensen, *Hitchcock* 740. Old Town, *Combs* 865. Braidentown, *Combs* 1287, 1292. Dunnellon, *Combs* 914a. New River, *Hitchcock* 2353. Marco, *Hitchcock* 519. Duval County, *Fredholm* 187, 328.

ALABAMA: Mobile, *Hitchcock* in 1904.

MISSISSIPPI: Cat Island, *Tracy* 436.

CUBA: Isle of Pines, *Britton & Wilson* 14817. La Grifa, Pinar del Río, *Wright* (Gray Herb.).

18. *Chaetochloa liebmanni* (Fourn.) Scribn. & Merr.

Setaria rariflora Presl, Rel. Haenk. 1: 313. 1830. Not *Setaria rariflora* Mikan, 1821. "Hab. ad Acapulco." The type, in the herbarium of the German University at Prague, is the small form like the variety *pauciflora*. It is labeled "Mexico. H."

Panicum rariflorum Presl; Steud. Syn. Pl. Glum. 1: 51. 1854. Based on *Setaria rariflora* Presl.

Panicum dissitiflorum Steud. Syn. Pl. Glum. 1: 51. 1854, as synonym of *P. rariflorum* Presl.

Setaria liebmanni Fourn. Mex. Pl. 2: 44. 1886. "Manantial, agosto (LIEBM. n. 389)." The type specimen, in the Copenhagen Herbarium, consists of a culm with several broad blades and a panicle about 20 cm. long from which most of the spikelets have fallen. The label reads, "Pl. Mexic. Liebm. Gramineae n. 389. S. Liebmanni (scripsit Fournier) Manantial. 8/41." The locality is uncertain, but it must be in Veracruz since Liebmann did not go outside of that state during 1841.

Chamaeraphis caudata pauciflora Vasey; Beal, Grasses N. Amer. 2: 158. 1896. "California, Palmer 191." Palmer's no. 191 was not

collected in California, but at Guaymas, Sonora. The type specimen is in the herbarium of the Michigan Agricultural College. This, like the duplicates of this collection, is a small form, with blades 5 to 7 mm. wide, and panicles 5 to 9 cm. long, narrow, few-flowered, the branches mostly not over 5 mm. long, a few as much as 1 cm. long.

Chaetochloa liebmanni Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 31. 1900. Based on *Setaria liebmanni* Fourn.

Chaetochloa liebmanni pauciflora Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 33. 1900. Based on *Chamaeraphis caudata pauciflora* Vasey.



FIG. 52.—*Chaetochloa liebmanni*. From Palmer 52 in 1885, Mexico.

DESCRIPTION.

Plants annual, often branched at base; culms as much as 1 meter tall, usually less than 50 cm., glabrous, scabrous just below the panicle, the nodes glabrous or puberulent; sheaths glabrous, the margin ciliate, the collar a more or less hispidulous ridge; ligule a short, densely ciliate membrane; blades flat, rather thin, as much as 20 cm. long and 2 cm. wide, usually about 1 cm. wide, narrowed toward both ends, scabrous, especially beneath; panicles loosely flowered, cylindrical, tapering at each end, often nodding or flexuous, as much as 30 cm. long, usually 10 to 20 cm., the axis angled or channeled, scabrous or scabrous-hispidulous; branches ascending, loosely arranged, scabrous like the axis, as much as 2.5 cm. long; branchlets less than 1 mm. long, bearing one bristle below each spikelet; bristles slender, flexuous, antrorsely scabrous, 7 to 15 mm. long; spikelets ovate, about 2 mm. long, rather turgid on the convex side, rather prominently nerved; first glume one-third or one-fourth as long as the spikelet, 3-nerved; second glume about four-fifths as long as the fertile lemma, 5-nerved, with an additional accessory pair on the outside; sterile lemma as long as the fertile, 5-nerved, with an accessory pair like the second glume, the palea wanting; fertile lemma somewhat pointed, gibbous, coarsely and strongly transversely rugose.

DISTRIBUTION.

Open sandy or rocky soil, Arizona to Oaxaca.
 ARIZONA: Tucson, *Thorner* 171 (N. Y. Bot. Gard. Herb.).
 LOWER CALIFORNIA: Arroyo San Lazaro, *Brandegee* in 1902. San José del Cabo, *Brandegee* 12 in 1890.
 SONORA: Alamos, *Palmer* 686 in 1890. Guaymas, *Hitchcock* 3548; *Palmer* 191 in 1887. Hermosillo, *Hitchcock* 3607.
 CHIHUAHUA: Batopilas, *Palmer* 52 and 110D in 1885.
 SINALOA: Rosario, *Rose* 1840. Culiacán, *Palmer* 1541 in 1891; *Brandegee* in 1904. Topolobampo, *Palmer* 233 in 1897.
 TEPIC: Acaponeta, *Rose* 3303.
 VERACRUZ: Baños del Carrizal, *Purpus* 6211.
 COLIMA: Colima, *Palmer* 8 and 142 in 1897. Manzanillo, *Hitchcock* 7026; *Orcutt* 4481.
 GUERRERO: Balsas, *Hitchcock* 6774, 6786; *Orcutt* 4194.
 OAXACA: Tomellín, *Hitchcock* 6191. Between San Gerónimo and La Venta, *Nelson* 2788.
 NICARAGUA: Masaya, *Hitchcock* 8661. San Juan del Sur, *Hitchcock* 8599.

19. *Chaetochloa latifolia* Scribn.

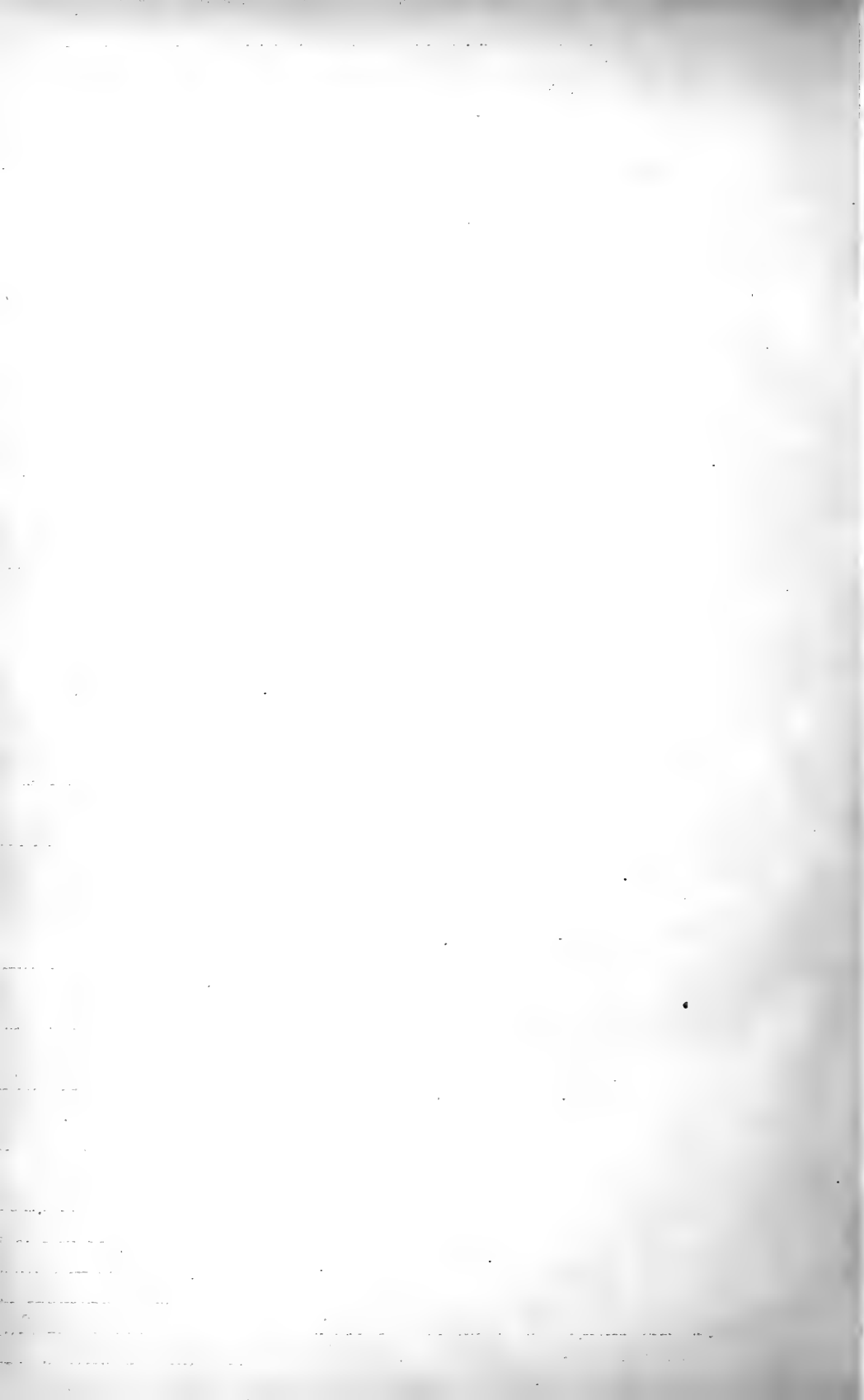
Chaetochloa latifolia Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 11: 44. pl. 3. 1898. "Growing under bushes in deep ravines, Durango, Mexico (No. 879, E. Palmer, 1896)." The type specimen, in the National Herbarium, is shown in plate 3, which, however, exaggerates the nerving and hispidity of the leaves. The type sheet includes two other specimens.

Chaetochloa latifolia breviseta Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 31. 1900. The first specimen cited, "Mexico: Oaxaca, 347 *Conzatti & Gonzalez*, 1897," in the National Herbarium, is marked "type" in Merrill's hand. This form has shorter and fewer bristles but is otherwise the same as the typical form.

Setaria latifolia Herrm. Beitr. Biol. Pflanz. 10: 55. 1910. Presumably based on *Chaetochloa latifolia* Scribn. No synonym is cited, but Scribner's name is given in parentheses.

DESCRIPTION.

Plants annual, branching at the base; culms erect or geniculate-spreading, 20 to 40 cm. tall, more or less scabrous, especially below the hispidulous or pubescent nodes and below the panicle; sheaths papillose-hispid, papillose only, or glabrate, densely



ciliate; ligule a densely ciliate membrane less than 1 mm. long; blades flat, mostly less than 10 cm. long, as much as 1.5 cm. wide, rounded or somewhat cordate at base, rather abruptly narrowed at the apex, scabrous and also sparsely papillose-hispid; panicles loosely cylindric, tapering above, more or less interrupted or lobed, mostly 5 to 8 cm. long, the axis scabrous or pubescent and also villous, the hairs weak and spreading, 1 mm. long; branches short, ascending, the longer as much as 5 mm. long; branchlets about 1 mm. long, bearing a single bristle below the spikelets; bristles flexuous, angled, antrorsely scabrous, 5 to 10 mm. long; spikelets about 2 mm. long or a little longer, moderately turgid on the convex side; first glume one-third the length of the spikelet, 3-nerved; second glume a little shorter than the fertile lemma, 5-nerved; sterile lemma as long as the fertile, 5-nerved, the palea well developed; fertile lemma strongly and coarsely transversely rugose.

DISTRIBUTION.

Rocky hills and shady places, Durango to Oaxaca; also in Brazil.

DURANGO: Durango, *Palmer* 470 and 879 in 1896; *Hitchcock* 7643.

OAXACA: Oaxaca, *Conzatti & González* 343; *Hitchcock* 6105.

BRAZIL: Piauh, *Gardner* 2354.



FIG. 53.—*Chaetochloa latifolia*. From type specimen.

20. *Chaetochloa macrosperma* Scribn. & Merr.

Chaetochloa macrosperma Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 33. f. 18. 1900. "*Setaria composita* of Chapman's Fl. So. U. S. and of Bul. 7: 85. fig. 67, U. S. Dept. Agr., Div. Agros., not of H. B. K." No type is designated. In the National Herbarium is a specimen bearing the name and marked "type" and bearing also detailed drawings of the spikelet and a statement that the drawing (figure 18) was made from this plant. This specimen, *Curtiss* 3617, collected on "Shell mounds at the mouth of St. Johns River, Florida," is the first one cited by Scribner and Merrill and may be accepted as the type. If one looks upon the publication of *C. macrosperma* as a change of name only, it would be based upon *Setaria composita* of Chapman's Flora as cited above. In the National Herbarium is a specimen from Chapman without locality, marked *Setaria composita* S. Fl.!, which represents the latter species as understood by Chapman.

Setaria macrosperma Schum. Just's Bot. Jahresb. 28¹: 417. 1902. Based on *Chaetochloa macrosperma* Scribn. & Merr.

DESCRIPTION.

Plants perennial, often in large tufts; culms usually more or less geniculate at base, and often rooting at the lower nodes, smooth, scabrous below the panicle, rather stout, mostly 1 to 1.5 meters tall, the nodes glabrous; sheaths keeled, glabrous, villous

on the margin, usually hispidulous on the collar; ligule a ciliate membrane, 1 to 3 mm. long; blades flat, very scabrous on the upper surface, smooth or scaberulous beneath, narrowed at the base, as much as 50 cm. long and 2 cm. wide; panicles rather loose, tapering above, as much as 25 cm. long, the secondary panicles often much smaller and more compact, the branches ascending, as much as 2 cm. long, about equally distributed, the panicle thus not being interrupted or lobed, the axis scabrous-pubescent and also loosely or sparsely villous with hairs 1 to 2 mm. long, the hairs rarely wanting; bristles single below each spikelet but often seemingly in pairs because of the abortion of spikelets, straight or obscurely flexuous, antrorsely scabrous, 1.5 to 3 cm. long, greenish or yellowish; spikelets about 3 mm. long, lanceolate-ovate, not strongly turgid on the convex side, pale or greenish; first glume about one-third the length of the spikelet, 3-nerved; second glume two-thirds to three-fourths as long as the fertile lemma, mostly 5-nerved, sometimes 6 or 7-nerved; sterile lemma

as long as the fertile, 5-nerved, concave or sulcate, the palea narrow, about half as long as its lemma; fertile lemma pale, acute or somewhat pointed, finely and not very distinctly cross-wrinkled, the surface appearing cellular.

The wider-leaved specimens of this species resemble *Chaetochloa vulpiseta*, but differ from that species in the larger spikelets. The latter character and the scabrous blades distinguish it from *C. scheelei* of Texas. From *C. villosissima* of Texas, with equally large spikelets, it is distinguished by the scabrous instead of villous blades.

DISTRIBUTION.

Open ground, mostly on coral rock or coral sand, Florida and the Bahamas.

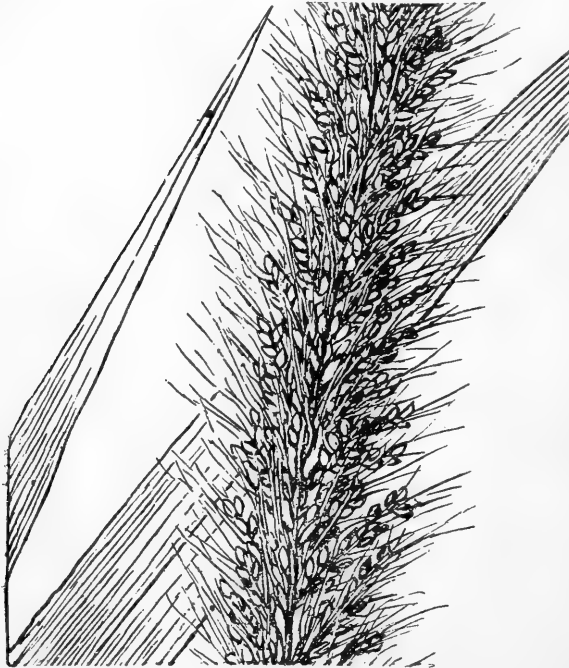
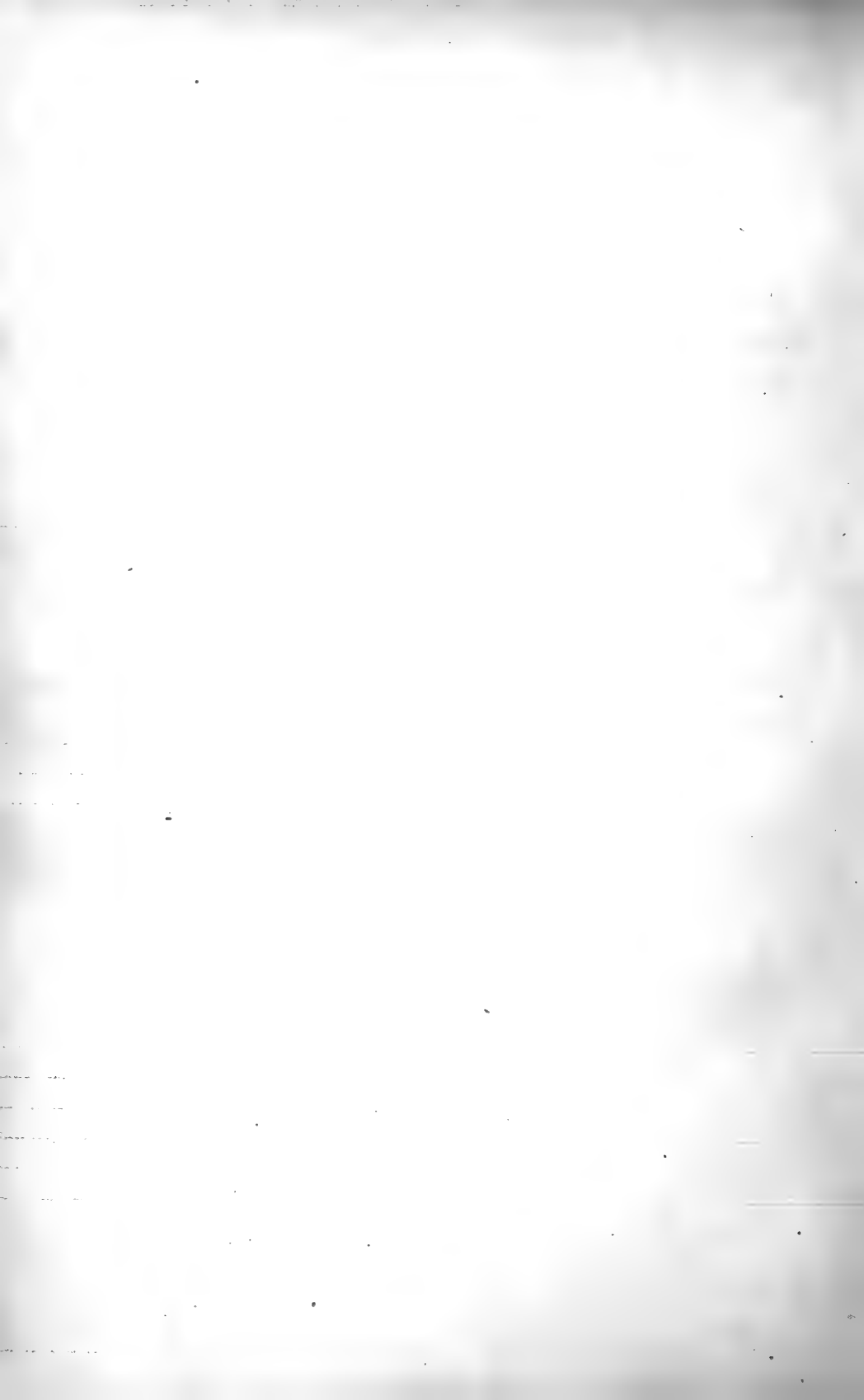


FIG. 54.—*Chaetochloa macrosperma*. From Curtiss 3617, Florida.

FLORIDA: Homosassa, *Combs* 977. Orange, *Baker* in 1899. Apalachicola, *Chapman* in 1896. Mouth of St. Johns River, *Curtiss* 3617. Grasmere, *Combs* 1150. Brevard County, *Fredholm* 5559. Sneeds Island, *Tracy* 6462. Captiva, *Orrok* in 1915. Caloosa River, *Garber* 41 in 1878. Eustis, *Chase* 4123. Miami, *Tracy* 9053; *Chase* 3848; *Eaton* 337; *Hitchcock* in 1903. East Pass, *Tracy* 6459. Crystal, *Combs* 979½. Fort Myers, *Hitchcock* 518. Snapper Creek, *Small & Nash* 103. Ragged Keys, *Small & Carter* 2879. Howes Key, *Simpson* 263. Key Largo, *Curtiss* 5502. Key West, *Blodgett*.

BAHAMAS: Frozen Cay, Berry Islands, *Britton & Millspaugh* 2203 (N. Y. Bot. Gard. Herb.).



21. *Chaetochloa villosissima* Scribn. & Merr.

Chaetochloa villosissima Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 34. f. 19. 1900. "Type specimen collected by J. G. Smith at San Diego, Tex., May, 1897. Limpia Canyon, Presidio Co., 115 (in part) Nealley 1892, a smaller undeveloped specimen, with much less pubescent leaves, otherwise as in the type." The type specimen, the original of the illustration, is in the National Herbarium.

Setaria villosissima Schum. Just's Bot. Jahresb. 28¹: 417. 1902. Based on *Chaetochloa villosissima* Scribn. & Merr.

DESCRIPTION.

Plants perennial; culms erect or decumbent at base, glabrous, as much as a meter tall, the nodes more or less pubescent; sheaths glabrous or somewhat hispidulous, often scabrous toward the summit, compressed-keeled, especially the lower, hispid on the collar, villous on the margin; ligule densely pilose, 2 to 3 mm. long; blades flat, scabrous and villous, or scabrous only, 15 to 30 cm. long, 5 to 8 mm. wide; panicles rather loose, more or less interrupted, tapering at the summit, as much as 23 cm. long, the branches ascending, the lower as much as 2 cm. long, the axis angled, scabrous, villous; bristles single below each spikelet, flexuous, antrorsely scabrous, 1.5 to 2.5 cm. long; spikelets lanceolate-ovate, acutish, not strongly turgid on the convex side, about 3 mm. long, pale or greenish; first glume one-third as long as the spikelet, 3-nerved; second glume nearly as long as the fertile lemma, 5-nerved (rarely 7-nerved); sterile lemma as long as the fertile, 5-nerved, convex or sulcate, the palea narrow, less than 1 mm. long; fertile lemma lanceolate, the tip rather pointed, incurved, the surface finely but sharply cross-wrinkled.



FIG. 55.—*Chaetochloa villosissima*. From type specimen.

This species is little known. The description is drawn chiefly from the type, in which the blades are villous on both surfaces. Nealley's no. 115 (Limpia Canyon, Presidio County, Texas), with only sparingly short-pilose blades, appears to be this species, though the plant is only 40 cm. tall and the panicle 10 cm. long and few-flowered, the branches very short. Two specimens from Arizona (no definite locality), *Emersley* 19 and 21 in 1890, may also belong to this species. The blades are scabrous but not villous, and only 3 to 5 mm. wide. The first glume is almost half as long as the spikelet and pubescent near the margins. A sterile specimen from Big Spring, Texas (open woods along stream, 8 miles west of Sterling, *Hitchcock* 13401), with pubescent blades 1.5 cm. wide, may also belong to this species.

22. *Chaetochloa setosa* (Swartz) Scribn.

Panicum setosum Swartz, Prodr. Veg. Ind. Occ. 22. 1788. "Jamaica." The type specimen in the Swartz Herbarium at Stockholm, has a narrow, rather close panicle.

Panicum caudatum Lam. Tabl. Encycl. 1: 171. 1791. "E Brasilio. Commers. & Cayenna. D. Richard." The species is more fully described in the Encyclopedia.¹ It is said here, concerning the locality, "Cette espèce croît à Cayenne, & m'a été communiquée par le citoyen Richard. Comerson l'a trouvée au Brésil. Elle y forme une variété à grappe très-grêle, à peine barbue sur le rachis." The Richard specimen, in the Lamarck Herbarium at Paris, taken as the type, is a culm with several leaves and a panicle 20 cm. long, the lower branches 2 cm. long. It is labeled "ex D. Richard" and comes from Cayenne. The identification of this specimen is somewhat uncertain. It resembles specimens of *Chaetochloa setosa* from the West Indies, rather than the specimens from Brazil that have been referred to *C. caudata* and which in this paper are placed under *C. rariflora*. As noted above, Lamarck states that his Brazilian specimen has a more slender panicle and is less bristly. In the National Herbarium there are no specimens of *C. setosa* from southeast of Trinidad. There may be an error as to the origin of Richard's specimen, said to come from Cayenne. It may have come from the West Indies.

Setaria setosa Beauv. Ess. Agrost. 51, 178. 1812. Based on *Panicum setosum* Swartz.

Panicum brachiatum Poir. in Lam. Encycl. Suppl. 4: 282. 1816. "Cette plante croît aux Antilles (V. s. in herb. Desfont.)." The type specimen, in the Desfontaines Herbarium at Florence, consists of a panicle and a fragment of a culm bearing a single leaf. The specimen is similar to Chase 6519, from Ensenada, Guanica Bay, Porto Rico, bearing the note "plant woody, main culm erect, branches divaricate, arid cleared limestone hillside." The plant is decumbent, sending up erect branches. The panicles are very open, bearing spreading or reflexed, distant branches, the lower as much as 4 cm. long. This specimen agrees with the type in having the axis of the panicle scabrous but not villous. Hitchcock's no. 9315, from dry woods along the coast east of Kingston, Jamaica, agrees with this in habit and shape of the panicle, but the axis is villous, as is usual in *C. setosa*. It was noted in both cases that other specimens in the vicinity showed gradations to the usual form of *C. setosa*. The open-panicled form, like the type of *Panicum brachiatum*, is found here and there, on dry brushy hillsides, but always associated with the more usual form. It is discussed further at the end of the description of *Chaetochloa setosa*.

Setaria caudata Roem. & Schult. Syst. Veg. 2: 495. 1817. Based on *Panicum caudatum* Lam.

Setaria elongata Spreng.; Schult. Mant. 2: 280. 1824. "In S. Domingo." Schultes states, "*Setaria elongata* Spreng. in litt. ad D. Balbis in Herb. Berteron." In the Berlin Herbarium is a specimen labeled "Hb. Sprengel. S. Domingo. Bertero lgt. Balbis ad Spr." (Herbarium Krug et Urban). This specimen, the type, is a somewhat open-panicled, short-bristled form of *Chaetochloa setosa*, intermediate between *Panicum brachiatum*, mentioned above, and the usual form of *Chaetochloa setosa*.

Setaria brachiata Kunth, Rév. Gram. 1: 47. 1829. Based on *Panicum brachiatum* Poir.

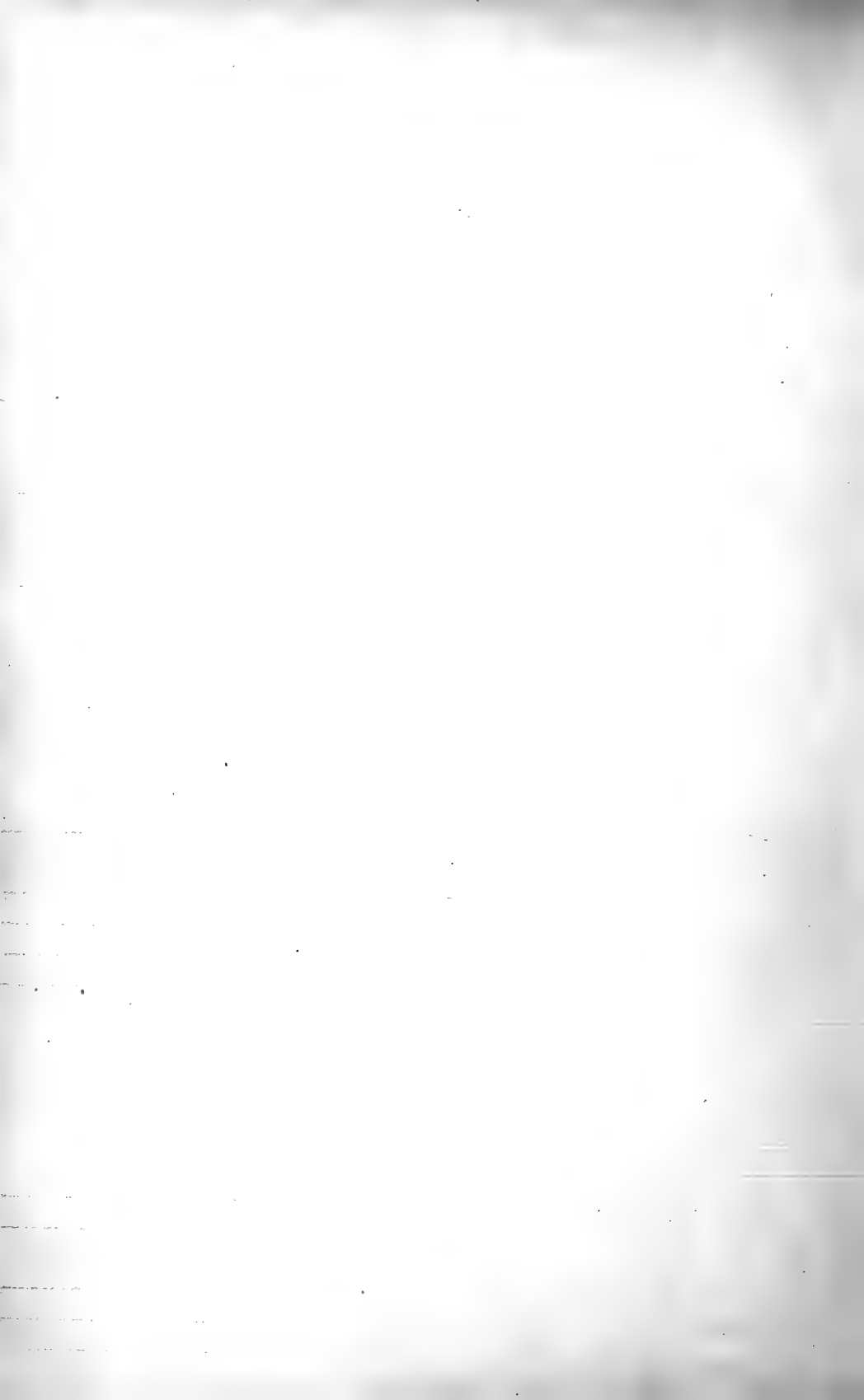
Panicum paractaenoides Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 1: 219. 1834. "V. sp. e Krabbeneiland." The type specimen, collected in Crab Island (now called Vieques, near Porto Rico) by Hornemann, is in the Trinius Herbarium. It is a loose-panicled form much like the type of *Setaria elongata*, mentioned above, and similar to Britton & Wheeler 233, from Culebra.

Panicum dumetorum A. Rich.; Steud. Syn. Pl. Glum. 1: 49. 1854. "Ins. Antillae." The type specimen, from St. Croix, is the open-panicled form like the types of *Setaria elongata* and *Panicum paractaenoides*.

Panicum restitutum Steud. Syn. Pl. Glum. 1: 53. 1854. Based on *Setaria elongata* Spreng. (not *Panicum elongatum* Pursh, described by Steudel on page 71).

¹ Lam. Encycl. 4: 736. 1798.

D. Frank the King of the ...



Setaria setosa β *caudata* Griseb. Fl. Brit. W. Ind. 555. 1864. Based on *Panicum egudatum* Lam.

Pennisetum swartzii F. Muell. Fragm. Phyt. Austr. 8: 110. 1873. Based on *Panicum setosum* Swartz (not *Pennisetum setosum* L. Rich.).

Chamaeraphis setosa Kuntze, Rev. Gen. Pl. 2: 768. 1891. Based on *Panicum setosum* Swartz.

Chamaeraphis setosa α *caudata* Kuntze, Rev. Gen. Pl. 2: 769. 1891. Based on *Panicum caudatum* Lam.

Chamaeraphis caudata Britton, Ann. N. Y. Acad. 7: 264. 1893. Based on *Panicum caudatum* Lam.



FIG. 56.—*Chaetochloa setosa*. From Hitchcock 9846, Jamaica; typical form.



FIG. 57.—*Chaetochloa setosa*. From Chase 6519, Porto Rico; open-panicled form (*Panicum brachiatum*).

Chaetochloa setosa Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 39. 1897. Based on *Panicum setosum* Swartz.

Chaetochloa caudata Scribn. Rep. Mo. Bot. Gard. 10: 52. 1899. Based on *Panicum caudatum* Lam.

Setaria paractaenoides Urban, Repert. Nov. Sp. Fedde 15: 98. 1917. Based on *Panicum paractaenoides* Trin.

DESCRIPTION.

Plants perennial; culms erect, spreading, or decumbent at base, often wiry, sometimes prostrate and woody at base, with upright branches, glabrous, scabrous below the panicle, sometimes hispidulous about the nodes, mostly not over 1 meter tall; sheaths glabrous or rarely pubescent, the lower often keeled, often overlapping, ciliate, hispidulous or rarely glabrous on the collar; ligule densely ciliate, about 1 mm. long; blades flat or folded, usually rather firm and stiffly spreading, glabrous beneath, scabrous on upper surface, or often pubescent on both surfaces, usually 15 to 20 cm. long, sometimes as much as 30 cm. long, mostly 5 to 10 mm. wide, sometimes wider;

panicles mostly narrow, sometimes loosely spike-like, sometimes rather open, attenuate at summit, usually 10 to 20 cm. long, rarely as much as 40 cm., the branches short and crowded or ascending and 1 to 2 cm. long, approximate or, especially the lower, 1 to 3 cm. distant, these rarely spreading or somewhat reflexed, the axis villous with hairs as much as 1 mm. long; bristles mostly one below each spikelet, flexuous, antrorsely scabrous, mostly 5 to 10 mm. long, sometimes scarcely exceeding the spikelets; spikelets about 2 mm. long, rather strongly turgid on the convex side; first glume nearly half as long as the spikelet, 3-nerved; second glume about two-thirds as long as the fertile lemma, 5-nerved; sterile lemma about as long as the fertile, 5-nerved, the palea well developed; fertile lemma acutish, finely but strongly cross-ridged.

In habit this species is rather variable, the differences being due chiefly to the length of the bristles, the length and distance of the branches of the panicle, and the relative amount of foliage. The usual form has rather densely flowered panicles with short, ascending, approximate branches, and bristles 5 to 10 mm. long. An extreme form (*Panicum brachiatum* Poir.), growing on dry brushy hillsides, has wiry, often woody, sometimes decumbent and rooting stems, rather few and distant leaves, and loose panicles with distant, spreading, sometimes reflexed branches as much as 5 cm. long, and short bristles. However, there are all gradations to connect this with the usual form. This open-panicled form is represented by: JAMAICA, *Hitchcock* 9315; PORTO RICO, *Chase* 6519, 6536, *Britton, Cowell & Hess* 1604, *Britton & Wheeler* 233.

DISTRIBUTION.

- Dry woods and rocky hills at low altitudes, West Indies to Colombia.
- NEW JERSEY: On ballast, Camden, *Parker* in 1879.
- BAHAMAS: Water Cay, *Geogr. Soc. Baltimore* 522.
- CUBA: Cayo Paloma, *Shaffer* 2565. Nuevo Gerona, *Palmer & Riley* 1000. Guantánamo, *Léon* 3775, 3776; *Britton* 1930, 2105. Santiago de Cuba, *Léon* 829, 830, 831, 3946.
- JAMAICA: Spanish Town Road, *Harris* 9297, 12477. Kingston, *Hitchcock* 9315, 9745; *Amer. Gr. Nat. Herb.* 606; *Alexander* in 1855. Gordon Town, *Hart* 826, 829; *Hitchcock* 9325; *Harris* 11348, 11458. New Forest, *Hitchcock* 9346. Hope, *Harris* 11292. Long Mountain Road, *Harris* 11303, 11307. St. Andrew, *Harris* 11479. Without locality, *Martí*.
- SANTO DOMINGO: Rincón, *Fuertes* 1378. Santiago, *Eggers* 2378.
- PORTO RICO: Coamo, *Sintenis* 2987, 3197; *Chase* 6541. Cabo Rojo, *Sintenis* 853. Santa Rita, *Chase* 6536; *Johnston* 1027. Guanica, *Britton & Shaffer* 1901. Desecheo, *Hess* 424, (426); *Britton, Cowell & Hess* 1604. Mona, *Hess* 447. Culebra, *Britton & Wheeler* 18, 233. Ensenada, *Amer. Gr. Nat. Herb.* 607; (*Chase* 6519). Boqueron, *Chase* 6505. (*Ponce, Chase* 6488.)
- VIRGIN ISLANDS: St. Croix, *Ricksecker* 407. St. Thomas, *Eggers* in 1882. St. Jan, *Britton & Shaffer* 631.
- LEEWARD ISLANDS: Guadeloupe, *Duss* 2698, 3188. Dominica, *Jones* 34.
- TRINIDAD: Chacachacare, *Hitchcock* 10059.
- COLOMBIA: Santa Marta, *Smith* 154, 2188.

23. *Chaetochloa rariflora* (Mikan) Hitchc. & Chase.

Setaria rariflora Mikan; Trin. in Spreng. Neu. Entd. 2: 78. 1821. "Hab. in Brasilia." Trinius adds, "(Ich bin ungewiss, ob dieses Gras nicht vielleicht das *Panicum caudatum* Lam. sey.)". The type, in the Trinius Herbarium, has a spike-like few-flowered panicle. Trinius himself changed the name on the label to *Panicum caudatum* Lam.

Setaria vaginata Spreng. Syst. Veg. 4: Cur. Post. 33. 1827. "Rio grande Sello." A duplicate type has been examined in the Vienna Herbarium.

Hess 426, Chase 488, 6519 = *S. leiophylla* (Nes) Kth

Panicum triquetrum Willd.; Doell. in Mart. Fl. Bras. 2^o: 161. 1877, as synonym of *Panicum caudatum* Lam. The type is no. 18809 in the Willdenow Herbarium, sent by Vahl from "America" (probably Brazil).

Chaetochloa rariflora Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 349. 1917. Based on *Setaria rariflora* Mikan.

DESCRIPTION.

Plants perennial, tufted; culms erect, or decumbent at base, glabrous, mostly 30 to 60 cm. tall; sheaths pubescent with short ascending hairs or glabrate, keeled, mostly overlapping; ligule densely ciliate, less than 1 mm. long; blades elongate and narrow, pubescent on both surfaces, narrowed at base, usually 2 to 3 mm. wide, rarely over 5 mm.; panicles narrow, tapering above, 10 to 15 cm. long, often less, the axis loosely villous, the hairs mostly less than 1 mm. long; branches ascending, the lower 5 to 10 mm. long, or often shorter, rarely longer, the panicle then being loosely or interruptedly spikelike; bristles usually one below each spikelet, flexuous, antrorsely scabrous, 4 to 7 mm. long, or often scarcely exceeding the spikelets; spikelets about 2 mm. long, turgid on the convex side; first glume a little less than half the length of the spikelet, 3-nerved; second glume about two-thirds as long as the spikelet, 7-nerved; sterile lemma as long as the fertile, 5 to 7-nerved, the palea well developed; fertile lemma acutish, finely and sharply cross-ridged.

This species differs from *C. setosa* chiefly in the long narrow blades and the usually narrower and less bristly panicle. The second glume is shorter and usually 7-nerved. The two forms are given specific rank because the specimens from Brazil agree in having slender, rather lax blades and narrow, few-flowered, interruptedly spikelike panicles like the type of *C. rariflora*.

Chaetochloa setosa is confined to the West Indies and adjacent parts of South America. There are no specimens known from Brazil. In Trinidad it is found only on the outlying islet Chacachacare. Because of the slightly different aspect and the different geographical range it seems better to recognize the two forms as species rather than varieties, though they are closely related.



FIG. 58.—*Chaetochloa rariflora*. From Ricksecker 67, St. Croix.

DISTRIBUTION.

Dry hills, Porto Rico to Brazil.

ALABAMA: On ballast, Mobile, *Mohr* in 1892.

PORTO RICO: "Under cactus on cliff facing sea," *Boqueron*, *Chase* 6502.

VIRGIN ISLANDS: St. Croix, *Ricksecker* 67.

LEEWARD ISLANDS: Antigua, *Wullschlaegel* 629.

BRAZIL: Bahia, *Dorsett & Popenoe* 433b. Rio de Janeiro, *Langsdorff*; *Widgren* in 1844; *Wilkes Expl. Exped.*; *Rose* 20188, 20214. Without locality, *Burchell* 1251; *Glaziou* 16574; *Gardner* 139; *Riedel*.

24. *Chaetochloa vulpiseta* (Lam.) Hitchc. & Chase.

Panicum vulpisetum Lam. Encycl. 4: 735 (err. typ. 745). 1798. "Ce beau panic croît à Saint-Domingue, où il a été recueilli par le citoyen Dutrone. (V. s. in herb. D. Desfontaines.)" The type, in the Desfontaines Herbarium at Florence, is labeled "*Panicum vulpisetum* Lam. Dict." A second label bears the note "Bosc. Am. Sept." The type is said to have been collected in Santo Domingo by Dutrone. There is, consequently, some uncertainty as to the origin of the specimen, but the label first quoted above is similar in form to those generally accompanying Lamarek's types: the other is in a different hand.

Setaria composita H. B. K. Nov. Gen. & Sp. 1: 111. 1816. ⁵ "Crescit regione calidissima prope Cumana et Bordones, in Nova Andalusia," (Venezuela). The type has not been examined but the description, especially that of the panicle as nearly a foot long, the apex nodding, and the branches spreading, applies perfectly to *Jahn* 462 from Venezuela, as well as to the other specimens of *C. vulpiseta* from northern South America. The statement that the species is related to *Panicum italicum* strengthens this identification, for the large thick panicle and broad blades might easily suggest the cultivated millet. The description does not apply to the species of the southwestern states and Mexico which has been going under the name of *C. composita*. Neither is that species known from south of Mexico.



FIG. 59.—*Chaetochloa vulpiseta*. From Stevenson 3024, Porto Rico.

Setaria vulpiseta Roem. & Schult. Syst. Veg. 2: 495. 1817. Based on *Panicum vulpisetum* Lam.

Setaria polystachya Schrad.; Schult. Mant. 2: 277. 1824.

"In Brasilia. Sereniss. Princeps Maximil. Neowidensis." The type has not been examined, but the detailed description can apply only to this one of the known species of Brazil.

Panicum compositum Nees, Agrost. Bras. 244. 1829. Not *Panicum compositum* L. 1753. Based on *Setaria composita* H. B. K.

Panicum macrourum Trin. Mém. Acad. St. Pétersb. VI. 3²: 227. 1834. "V. spp. Bras." The type, in the Trinius Herbarium at the Academy of Sciences, Petrograd, was collected in Brazil by Sellow. This specimen is labeled also *Panicum macrostachyum*. Trinius indicated by his synonymy that he was applying the name *macrourum* to what had been called *macrostachyum*. A second specimen (Bahia, Riedel 183) bears Trinius's label "*Panicum macrourum* m.", but no synonymy is given.

Setaria alopecurus "hort. Gor.;" Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 1: 227. 1834, as synonym of *Panicum macrourum*. The type, in the Trinius Herbarium, is from the garden at Gorenki.



Panicum amplifolium Steud. Syn. Pl. Glum. 1: 53. 1854. "*Setaria macrostachya* Hochst. in Hrbr. Kappleri nr. 1411. Surinam." A fragment of this collection is in the National Herbarium.

Panicum subsphaerocarpum Salzm.; Schlecht. Linnaea 31: 483. 1862. "Salzm. pl. exsicc. 'Bahia in fruticetis.'" Schlechtendal compares this with the preceding species (*P. macrostachyum*), pointing out slight differences in the size of the blades.

Chamaeraphis setosa var. *vulpiseta* Kuntze, Rev. Gen. Pl. 2: 769. 1891. Based on *Panicum vulpisetum* Lam.

Chamaeraphis composita Kuntze; Beal, Grasses N. Amer. 2: 154. 1896. Based on *Setaria composita* H. B. K.

Chaetochloa composita Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 39. 1897. Based on *Setaria composita* H. B. K.

Chaetochloa vulpisetata Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 350. 1917. Based on *Panicum vulpisetum* Lam.

DESCRIPTION.

Plants perennial, branching at base, often in large tufts; culms glabrous, stout, often decumbent at base, as much as 2 meters tall; sheaths keeled, glabrous, or scaberulous or hispidulous toward the summit or rarely all over, hispid on the margin and densely hispid on the well-marked ridge of the collar, the hairs yellowish, as much as 4 mm. long; ligule densely hispid like the collar, 2 mm. long; blades flat, gradually narrowed from the middle toward both ends, the larger somewhat plaited, scabrous, especially beneath, as much as 50 cm. long and 3 cm. wide; panicles rather densely and evenly flowered, tapering toward the apex and often somewhat tapering at base, as much as 30 cm. long and 4 or 5 cm. wide (secondary panicles much smaller, sometimes only 5 cm. long), the branches stiffly ascending or spreading, as much as 2 or 3 cm. long and of about equal length except toward the summit, the axis densely villous; bristles 1 or 2 at the base of each spikelet, slightly flexuous, brownish, antrorsely scabrous, mostly 1 to 2 cm. long, appearing secund on the branches after the fall of the spikelets; spikelets ovoid, 2 to 2.5 mm. long, pale, moderately turgid on the convex side; first glume about half as long as the spikelet, 3-nerved; second glume two-thirds to three-fourths as long as the fertile lemma, 7-nerved; sterile lemma as long as the fertile, 5-nerved, the palea well developed; fertile lemma lanceolate, acutish, strongly and rather coarsely cross-wrinkled.

The panicles sometimes resemble those of *C. magna* but are less densely flowered; the fertile lemma is cross-wrinkled instead of nearly smooth. From *C. macrosperma* it is distinguished by the smaller spikelets.

DISTRIBUTION.

Open ground and brushy slopes, West Indies and southern Mexico to Argentina.

TABASCO: San Antonio, *Rovirosa* 254 (N. Y. Bot. Gard. Herb.).

GUATEMALA: Nenton, *Seler* 2716.

HONDURAS: San Pedro Sula, *Thieme* 5582, 5582B. Without locality, *Thieme* 5574.

SALVADOR: San Salvador, *Renson* 296.

NICARAGUA: Jinotepe, *Hitchcock* 8683.

COSTA RICA: Colonia Carmona, *Jiménez* 368. Las Delicias del Reventazón, *Pittier* 16171.

PANAMA: Puerto Obaldía, *Pittier* 4332. Culebra, *Pittier* 2121; *Hitchcock* 7898, 7906, 8026. Gorgona, *Maxon* 4734. Las Cascadas, *Pittier* 3744. Taboga Island, *Hitchcock* 8093. Toro Point, *Hitchcock* 8046. Gatún Lake, *Pittier* 6850.

PORTO RICO: Jayuya, *Sintenis* 6335. San Juan, *Chase* 6371. Río Piedras, *Stevenson* 3024.

TRINIDAD: *Bot. Gard. Herb.* 3304; *Crueger*.

TOBAGO: *Broadway* 4898.

COLOMBIA: Santa Marta, *Smith* 501. Without locality, *Lehmann* 7688.

VENEZUELA: El Limón, *Jahn* 462.

DUTCH GUIANA: Paramaribo, *Samuels* in 1916.

BRAZIL: Tijuca, *Ball* in 1882. Rio de Janeiro, *Graham*; *Wilkes Expl. Expt.*; Corumbá, *Malme* 3077; *Anderson* in 1851. Bahia, *Löfgren* 3737. Goyaz, *Gardner* 3518. Campinas, *Campos Novas* 1241. Espirito Santo, *Capanema* 5399. Tubarão, *Ule* 1367. Without locality, *Burchell* 1629; *Bot. Gard. Rio Jan.* 135, 993; *Capanema* 5405.

PARAGUAY: Central Paraguay, *Morong* 546, 658, 673. Pilcomayo River, *Morong* 1574; *Rojas* 84, 459.

PERU: Santa Ana, *Cook & Gilbert* 1548.

ARGENTINA: Misiones, *Ekman* 668.

25. *Chaetochloa macrostachya* (H. B. K.) Scribn. & Merr.

Setaria macrostachya H. B. K. Nov. Gen. & Sp. 1: 110. 1816. "Crescit in planitie montana Mexicana inter Salamanca et Zelaya [State of Guanajuato]." *Panicum setosum* is cited as a synonym. The type has not been examined, but from the highlands of central Mexico there is no species other than the one described below that corresponds to the original description of *Setaria macrostachya*.

Panicum macrostachyum Nees, Agrost. Bras. 245. 1829. Based on *Setaria macrostachya* H. B. K. Nees¹ based his concept of *Setaria macrostachya* on a specimen from Humboldt in the Willdenow Herbarium from "America merid." which is *Chaetochloa vulpiseta*. Nees's description applies to this species. Doell² follows Nees in this concept.

Panicum onurus Willd.; Nees, Agrost. Bras. 251. 1829. This is mentioned as a synonym under *Panicum caudatum* var. β , "culmo ramoso, racemis angustioribus depauperatis (P. Onurus, Willd. Herb.—ex Humboldtianis)." In the paragraph on distribution Nees says, " β in regno Mexicano (ab Humb.—Vidi in Herb. Willd.)." The type specimen, no. 18813 in Willdenow Herbarium, was kindly sent to me for examination by Dr. Urban.

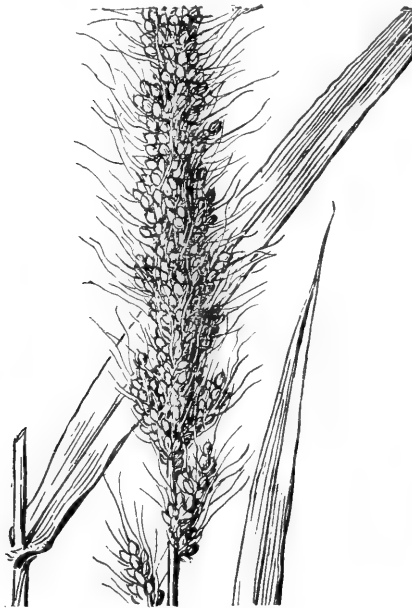


FIG. 63.—*Chaetochloa macrostachya*. From Hitchcock 5808, Mexico; typical form.

The specimen is in an unsatisfactory condition, as the panicles are immature. The foliage resembles that of *Chaetochloa setosa*, a West Indian species, to which the specimen was previously referred.³ On reconsideration, this specimen is referred to *C. macrostachya*, a Mexican species. It is not *Setaria onurus* as described by Grisebach (see under *Chaetochloa tenax*, page 177).

Chamaeraphis setosa var. *macrostachya* Kuntze, Rev. Gen. Pl. 2: 769. 1891. Based on *Setaria macrostachya* H. B. K.

Chaetochloa gibbosa Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 24. 1900. "Type specimen in Gray Herbarium, Cambridge, No. 528 (828?) 'Herbarium Ber-

¹ Agrost. Bras. 245. 1829.

² In Mart. Fl. Bras. 2²: 166. 1877.

³ Contr. U. S. Nat. Herb. 18: 349. 1917.

Setaria rigida Schum 1902 not Stapf.
based on *Chaetochloa rigida* S.M. 1879

Actinosa corniculata Nees based
on sp. descr. by S.M. as *S. canaliculata*

landierianum Texano Mexicanum,' no locality or date." The type specimen bears 3 panicles, all past maturity and containing only a few spikelets. It resembles *Pringle* 1968 in the pilose blades but the panicles are shorter and more compact. The label bears the following, "de Santander a Victoria" (probably in Tamaulipas).

Chaetochloa leucopila Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 26. f. 14. 1900. "Type specimen collected at Parras, state of Coahuila, Mexico, 1363 E. Palmer, June 1880." The type specimen, in the National Herbarium, in habit resembles the narrow-leaved form of *C. macrostachya*, with narrow slender panicles, a form common in Texas. It differs, however, in the pilose upper surface of the narrow folded blades.

Chaetochloa macrostachya Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 29. f. 16. 1900. Based on *Setaria macrostachya* H. B. K.

Chaetochloa rigida Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 30. 1900. "Lower California: La Paz, 125 E. Palmer 1890 (type)." Two other specimens are cited, Carmen Island, *Palmer* 857 in 1890 and San José del Cabo, *Brandege* 28 in 1890. See further notes at the end of the description of *C. macrostachya*.

Setaria leucopila Schum. Just's Bot. Jahresb. 28¹: 417. 1902. Based on *Chaetochloa leucopila* Scribn. & Merr.

Chamaeraphis macrostachya Kuntze; Stuck. Anal. Mus. Nac. Buenos Aires 11: 76. 1904, in a footnote. Based on *Setaria macrostachya* H. B. K.

DESCRIPTION.

Plants perennial, tufted, usually pale or glaucous, more or less hirsute around the base; culms erect or geniculate at base, scabrous below the panicle and usually below the glabrous or hispidulous nodes, 40 to 120 cm. tall; sheaths more or less compressed-keeled, glabrous or usually scaberulous toward the summit, rarely pubescent, ciliate on the margin, the collar hispidulous or glabrous; ligule densely ciliate, 1 to 3 mm. long; blades flat or folded, scabrous on the upper surface, smooth or scabrous beneath, rarely pubescent on both surfaces, 15 to 40 cm. long, 3 to 5 mm. wide; panicles spikelike, 10 to 25 cm. long, or sometimes shorter, somewhat tapering above but not attenuate, more or less interrupted or lobed, sometimes rather open below, the branches usually short, the axis pubescent and often also villous with hairs 1 to 2 mm. long; bristles mostly single below each spikelet, 10 to 15 mm. long with shorter ones intermixed, flexuous, antrorsely scabrous; spikelets pale (the nerves usually pale), 2 to 2.5 mm. long, turgid on the convex side, sometimes strongly so at maturity; first glume about half as long as the spikelet, 3-nerved; second glume two-thirds to three-fourths as long as the spikelet, 5 to 7-nerved; sterile lemma as long as the fertile, 5-nerved, the palea narrow, a little shorter than the lemma; fertile lemma rather sharply but finely marked with cross-wrinkles.

The species is somewhat variable in habit and includes what Scribner and Merrill ¹ and Hitchcock ² referred to *Chaetochloa composita*. The typical form is rather robust



FIG. 61.—*Chaetochloa macrostachya*. From Hitchcock 13605, Texas; slender-panicked form.

¹ U. S. Dept. Agr. Div. Agrost. Bull. 21: 27. f. 15. 1900.

² Contr. U. S. Nat. Herb. 17: 263. 1913.

with flat blades 5 to 10 mm. wide, and large panicles 15 to 25 cm. long, the branches ascending, about 1 cm. long, or even as much as 2 cm. The commoner form of Texas and northern Mexico is less robust, the blades narrower, 3 to 4 mm. wide, often folded, the panicles more compactly flowered and spikelike. There are so many intermediate specimens that it seems impracticable to draw specific lines between the forms.

Certain specimens approach *C. rariflora* in habit (such as, TEXAS: *Bush* 1252, *Rose* 18051, *Hitchcock* 5178, *Chandler* 7085), but differ in the glabrous (but scabrous) blades, pubescent but not pilose rachis, and pale spikelets (in *C. rariflora* the green nerves are prominent).

The following specimens have pubescent sheaths and blades: TEXAS: *Hitchcock* 5337, *Ball* 1527, *Groth* 123, *Jermy* 38. SONORA: *Rose* 13004. SAN LUIS POTOSÍ: *Hitchcock* 5729. NUEVO LEÓN: *Hitchcock* 5542, *Pringle* 1968.¹ The first glume is 5-nerved in *Rose* 10116.

A few specimens from Lower California have the aspect of typical *Chaetochloa macrostachya* but have slender spikelike panicles and glabrous sheath margins. The specimens, which are in a fragmentary condition, were described by Scribner and Merrill as *Chaetochloa rigida*, but the differences mentioned do not appear sufficient to indicate a distinct species. The specimens are: *Palmer* 125, 857; *Brandege* in 1890; *Purpus* 227.

Chaetochloa macrostachya is closely related to *C. setosa*, but differs in having a more compact and much less tapering panicle. In *C. setosa* the panicle is attenuate at the summit.

DISTRIBUTION.

Open dry ground and dry woods, southwestern United States to Oaxaca.

TEXAS: Estelline, *Reverchon* 4262. Kingsville, *Piper* in 1906; *Tracy* 8882. Kinney County, *Hill* 83; *Mearns* 1216. San Antonio, *Hitchcock* 5132, 5162, 5178; *Bush* 1179, 1252; *Tweedy* in 1880. El Paso, *Hitchcock* 5337, 7825, 13320, 13126; *Chase* 5894, 5903; *Stearns* 179; *Rose* 17886. Chisos Mountains, *Bailey* 392. Corpus Christi, *Hitchcock* 5363; *Heller* 1480. New Braunfels, *Hitchcock* 5226. Laredo, *Hitchcock* 5508; *Mackenzie* 107; *Rose* 18051; *Havard* in 1884. Maravillas, *Havard* in 1883. Kent, *Tracy & Earle* 378. Del Rio, *Plank* 87; *Hitchcock* 13631. Big Spring, *Hitchcock* 13376, 13397. Robstown, *Hitchcock* 5388. Sarita, *Hitchcock* 5478. Rio Hondo, *Chandler* 7085. Bexar County, *Jermy* 38, 214. Bracken, *Groth* 123. Alpine, *Hitchcock* 13605. Uvalde, *Ball* 1527; *Reverchon* 1097 in 1885. Baylor County, *Reverchon* 1097 in 1879. Valverde County, *Nealley* 115. Western Texas, *Wright* 799, 800; *Havard* in 1881. Olmito, *Tracy* 8907. Bears Mountain, *Jermy* 783.

COLORADO: Canon City, *Eastwood* in 1892; *Jones* 780; *Shear* 979.

NEW MEXICO: Mangas Canyon, *Smith* in 1896. Mangas Springs, *Metcalf* 154. Doña Ana Mountains, *Standley* in 1906. Organ Mountains, *Hitchcock* 3796. Mesilla Valley, *Standley* 407; *Hitchcock* 3818; *Wooton* 60. Las Cruces, *Vasey* in 1881; *Wooton* 1081. Deming, *Hitchcock* 3757. Rincon, *Jones* 4163. Grant County, *Rusby* 455. Roswell, *Griffiths* 5738. Cimarron Canyon, *Griffiths* 5554. Jarilla Junction, *Cockerell* 19. Aden, *Wooton* in 1906. Albuquerque, *Tracy* 85 in 1887. White Water, *Mearns* 2313. Carlsbad, *Hitchcock* 13489. Tortugas Mountain, *Standley* 6418. Black Range, *Metcalf* 1147. Organ Mountains, *Vasey* in 1881; *Wooton* 438. Without locality, *Wright* 2094.

ARIZONA: Tucson, *Toumey* 805 and in 1894; *Griffiths* 1511, 3349, 3352; *Hitchcock* 3491; *Pringle* in 1884. Patagonia, *Hitchcock* 3659, 3660, 3678. Santa Rita

¹ This was referred to *Chaetochloa setosa* by Scribner and is the original of the figure so named (U. S. Dept. Agr. Div. Agrost. Bull. 21: 39. f. 24. 1900).

Palmer

505 cited sub *S. Berlandieri* Herzm.

Haiti: Leonard 4155

Set. schrebii Hitchc. Pr. B. Soc. Lond 91: 163, 1927

Setaria yucatanensis Herzm. = ? = *gambeliana*

- Mountains, *Griffiths & Thornber* 194; *Griffiths* 3925, 5910, 5993. Oracle, *Hitchcock* 13266. Bisbee, *Mearns* 858, 926. St. Johns, *Griffiths* 5196. Beaver Creek, *Purpus* 8271. Pantano, *Pringle* in 1881. Benson, *Griffiths* 2003. San Bernardino Ranch, *Mearns* 746, 771, 781. Grand Canyon, *Leiberg* 5938. Fort Verde, *MacDougal* 539. Gila Valley, *Rothrock* 334. Fort Huachuca, *Wilcox* in 1894. Pearse, *Griffiths* 1944. Without locality, *Palmer* in 1869.
- LOWER CALIFORNIA: Ensenada, *Orcutt* in 1889. San Pablo Canyon, *Purpus* 227. Carmen Island, *Palmer* 857 in 1890. La Paz, *Palmer* 125 in 1890. San José del Cabo, *Brandege* in 1890. Magdalena Bay, *Brandege* ~~in~~ in 1889.
- SONORA: Hermosillo, *Hitchcock* 3590. Alamos, *Rose* 13004. Guaymas, *Palmer* 53 and 340 in 1887.
- CHIHUAHUA: San Luis Mountains, *Mearns* 2101. Casas Grandes, *Nelson* 6368. Chihuahua, *Hitchcock* 7775; *Pringle* 488.
- COAHUILA: Saltillo, *Palmer* 378 in 1898; *Hitchcock* 5589, 5604, 5634. Sabinas, *Nelson* — 6820. Torreón, *Palmer* 505 in 1898. —
- NUEVO LEÓN: Monterrey, *Hitchcock* 5534, 5542; *Pringle* 1968.
- SAN LUIS POTOSÍ: San Luis Potosí, *Hitchcock* 5665. Cárdenas, *Hitchcock* 5729.
- ZACATECAS: Concepción del Oro, *Palmer* 261 in 1904. Zacatecas, *Hitchcock* 7521.
- DURANGO: Tlahualilo, *Pittier* 471. Torreón, *Hitchcock* 7728. Durango, *Hitchcock* 7623; *Palmer* 378 and 872 in 1896.
- TEPIC: San Blas, *Nelson* 4341.
- QUERÉTARO: Querétaro, *Hitchcock* 5808.
- HIDALGO: Ixmiquilpan, *Rose* 8993.
- VERACRUZ: Mirador, *Liebmann* 362.
- PUEBLA: Tehuacán, *Rose* 10116; *Hitchcock* 6047.
- OAXACA: Oaxaca, *Hitchcock* 6068. Tomellín, *Hitchcock* 6241.

26. *Chaetochloa scheelei* (Steud.) Hitchc.

Setaria polystachya Scheele, *Linnaea* **22**: 339. 1849. Not *Setaria polystachya* Schrad. 1824. "Auf felsigen Boden nördlich von Neubraunfels: Lindheimer." The type collection is Lindheimer's no. 564 of fascicle III, *Flora Texana Exsiccata*,¹ collected in 1846. A specimen of this collection is in the National Herbarium. The culm is 1.2 meters tall, the sheaths minutely scaberulous, the blades flat, scabrous, 10 to 13 mm. wide; the panicle is rather loose, 22 cm. long, the axis villous.

Panicum scheelei Steud. *Syn. Pl. Glum.* **1**: 51. 1854. Based on *Setaria polystachya* Scheele, not *Panicum polystachyum* Presl. Steudel spells the name "scheelii."

Chaetochloa polystachya Scribn. & Merr. *U. S. Dept. Agr. Div. Agrost. Bull.* **21**: 37. f. 22. 1900. Based on *Setaria polystachya* Scheele.

DESCRIPTION.

Plants perennial; culms 60 to 120 cm. tall, erect or geniculate at base, compressed below, glabrous, the nodes often appressed-pilose; sheaths compressed-keeled, glabrous, or scabrous near summit or on the keel, or sometimes more or less hispid on the surface, the collar hispid; ligule densely hispid, 1 to 2 mm. long; blades flat, scabrous or more or less pubescent, 15 to 25 cm. long, as much as 1.5 cm. wide; panicle rather loose, 15 to 20 cm. long, tapering from near the base, the lower branches as much as 3 cm. long, ascending, the axis scabrous-pubescent and rather sparsely villous; bristles mostly 1 to 1.5 cm. long, rather numerous, flexuous, antrorsely scabrous; spikelets a little more than 2 mm. long, pale; first glume about one-third as long as the spikelet, 3-nerved; second glume a little shorter than the fertile lemma, 5-nerved; sterile lemma as long as the fertile, 5-nerved, the palea small and narrow; fertile lemma finely cross-wrinkled.

¹ See *Rep. Mo. Bot. Gard.* **18**: 151. 1907.

This species is allied to *C. macrostachya*, from which it differs in the looser panicle with longer ascending lower branches. The broad flat blades distinguish it from the common form of *C. macrostachya* in Texas. A specimen (Müller 2051, in N. Y. Bot. Gard. Herb.) from Orizaba, Mexico, appears to be this species.



FIG. 62.—*Chaetochloa scheelei*. From Bush 1244, Texas.

DISTRIBUTION.

Open or rocky woods, southern Texas.

TEXAS: Burnet, *Plank* 4. Kerrville, *Smith* in 1897; *Hitchcock* 5299. San Antonio, *Bush* 1200, 1244; *Hitchcock* in 1903; *Hitchcock* 5245. Mouth of Pecos River, *Havard* 34 in 1883. Austin, *McAllister & Tharp* in 1914; *Biltmore Herb* 14922b. Brownsville, *Hitchcock* in 1904. Kingsville, *Piper* in 1906. Abilene, *Bentley* in 1899. New Braunfels, *Lindheimer* 564; *Hitchcock* 5203, 5237. Comanche Spring, *Lindheimer* 1251. On the San Marcos, *Wright*. Sabinal Canyon, *Reverchon* 1623. Bexar County, *Jermy* 783. Without locality, *Nealley* in 1888.

DOUBTFUL SPECIES.

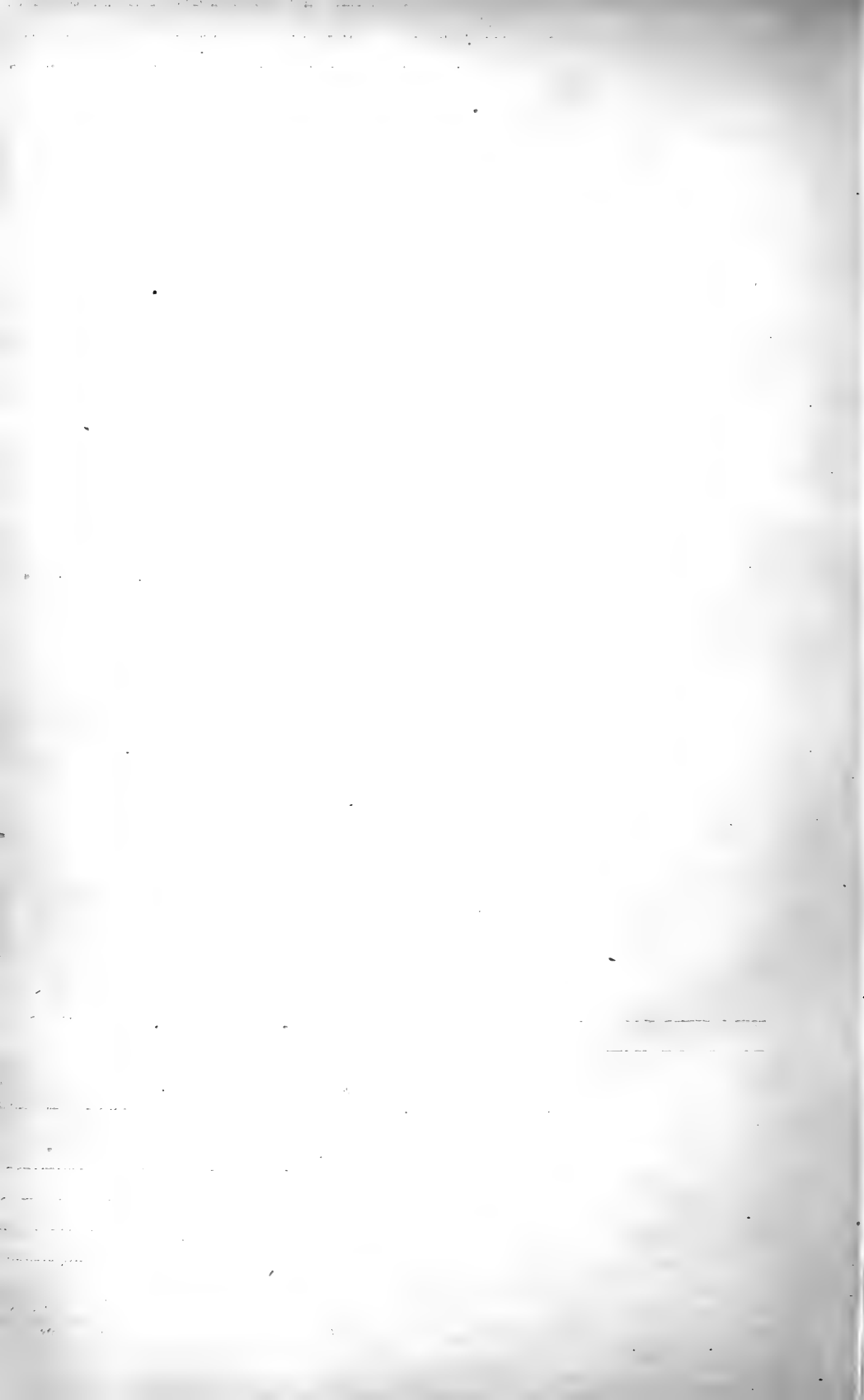
SETARIA FALCIFORMIS Fourn. Mex. Pl. 2: 44. 1886. "Culmo recto, stramineo, oliato, e radice fibrosa orto; foliis longis, falciformibus, angustis, plicatis, acutis, cum vaginis villosis, ligula laciniato-pilosa; thyrso lineari, fasciculis remotis, paucifloris: chaetocladis scabrioribus parvis, paucis versus basim fasciculi; gluma inferiore minore quam dimidia spicula; superiore 2/3 floris aequante; flore hermaphrodito tenuiter striato. Absque loco (Jurg. n. 622)."

NOTE ON SETARIA ACH.—Stapf¹ discusses the validity of the names *Setaria* Ach. and *Chaetochloa* Scribn. He shows that *Setaria* was used by Acharius as a subdivision of the genus *Lichen* and not as a distinct genus. The author of the present revision of *Chaetochloa* regards the genus *Setaria* as effectively published by Michaux, since it was based on the section or tribe of Acharius, therefore invalidating *Setaria* Beauv. Stapf rejects *Setaria* Ach. because it has not come into general use, and accepts *Setaria* Beauv. as valid.

¹ Kew Bull. Misc. Inf. 1920: 124. 1920.

Hermann's species not accounted for





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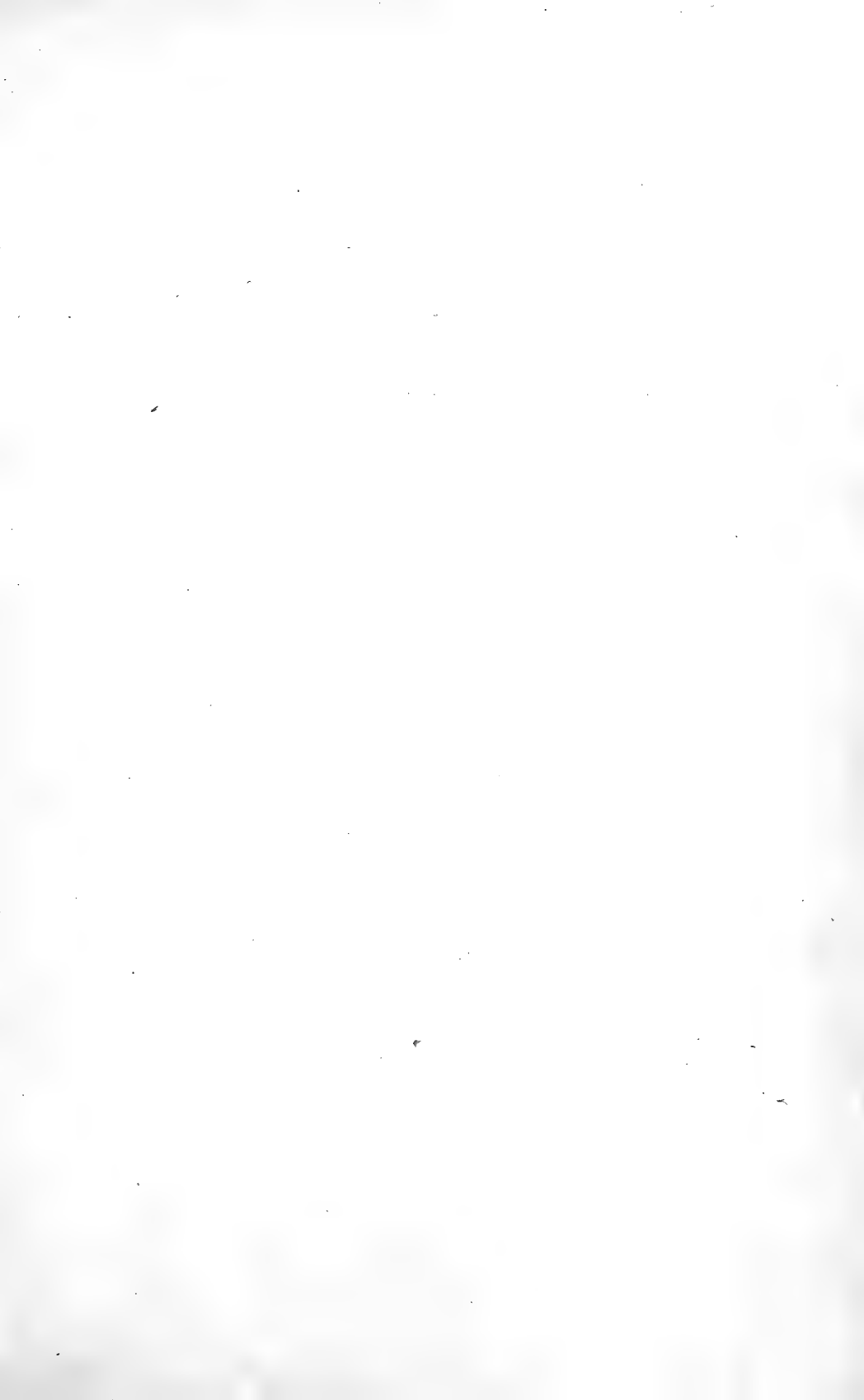
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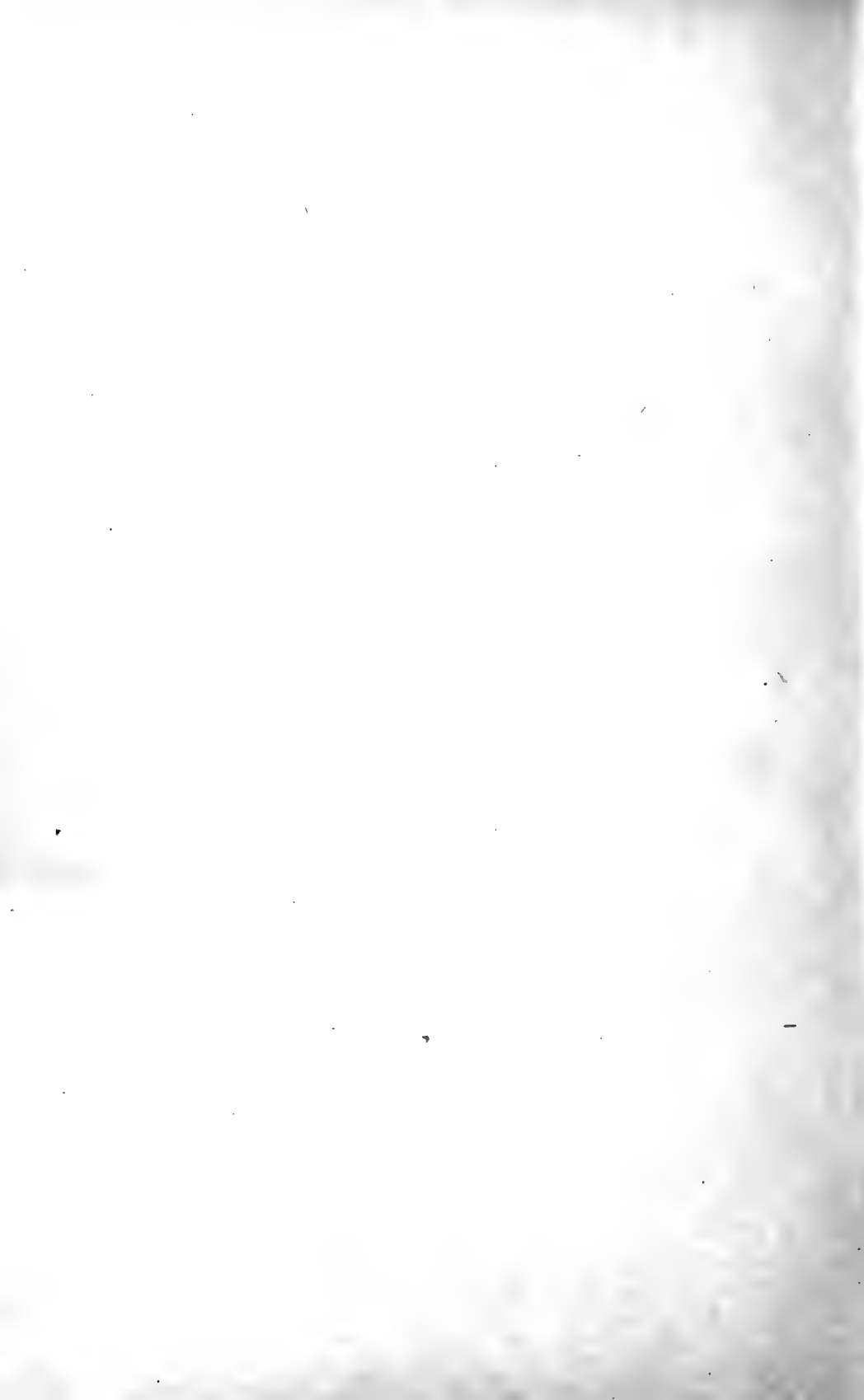
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THE NORTH AMERICAN SPECIES OF PENNISETUM

By AGNES CHASE



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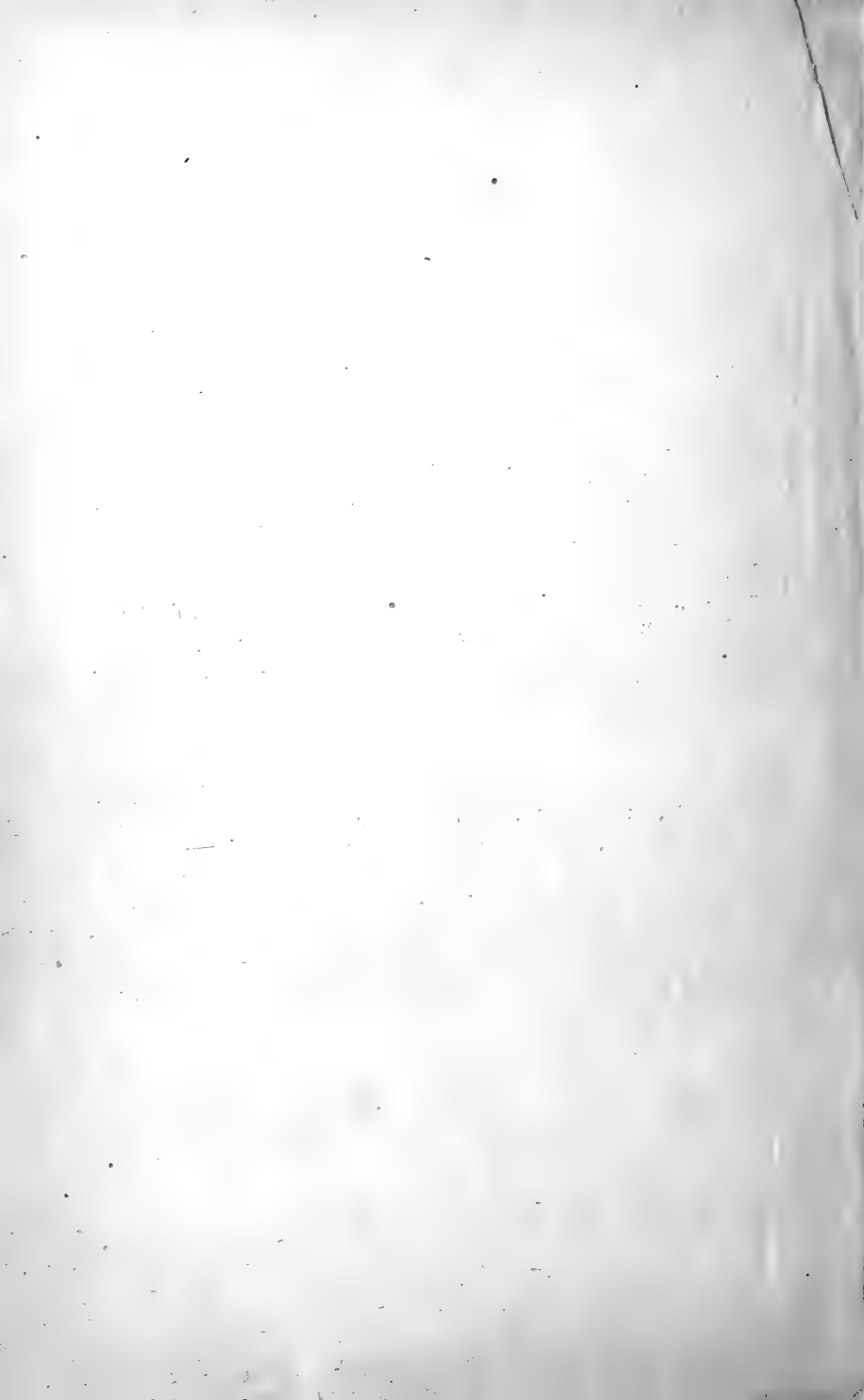
PREFACE

The paper presented herewith, by Mrs. Agnes Chase, assistant agrostologist of the United States Department of Agriculture, is a revision of one of the important genera of grasses. The method of study and presentation is the same as that followed in earlier papers on North American grasses, which have been published in the Contributions.

The genus *Pennisetum* belongs chiefly to the Old World, Africa being especially rich in number of species. In North America we have 10 species which are native and 4, including the well-known pearl millet, which are now established from earlier introductions, besides a few species cultivated for ornament, and one promising forage grass which is now being introduced into the Southern States.

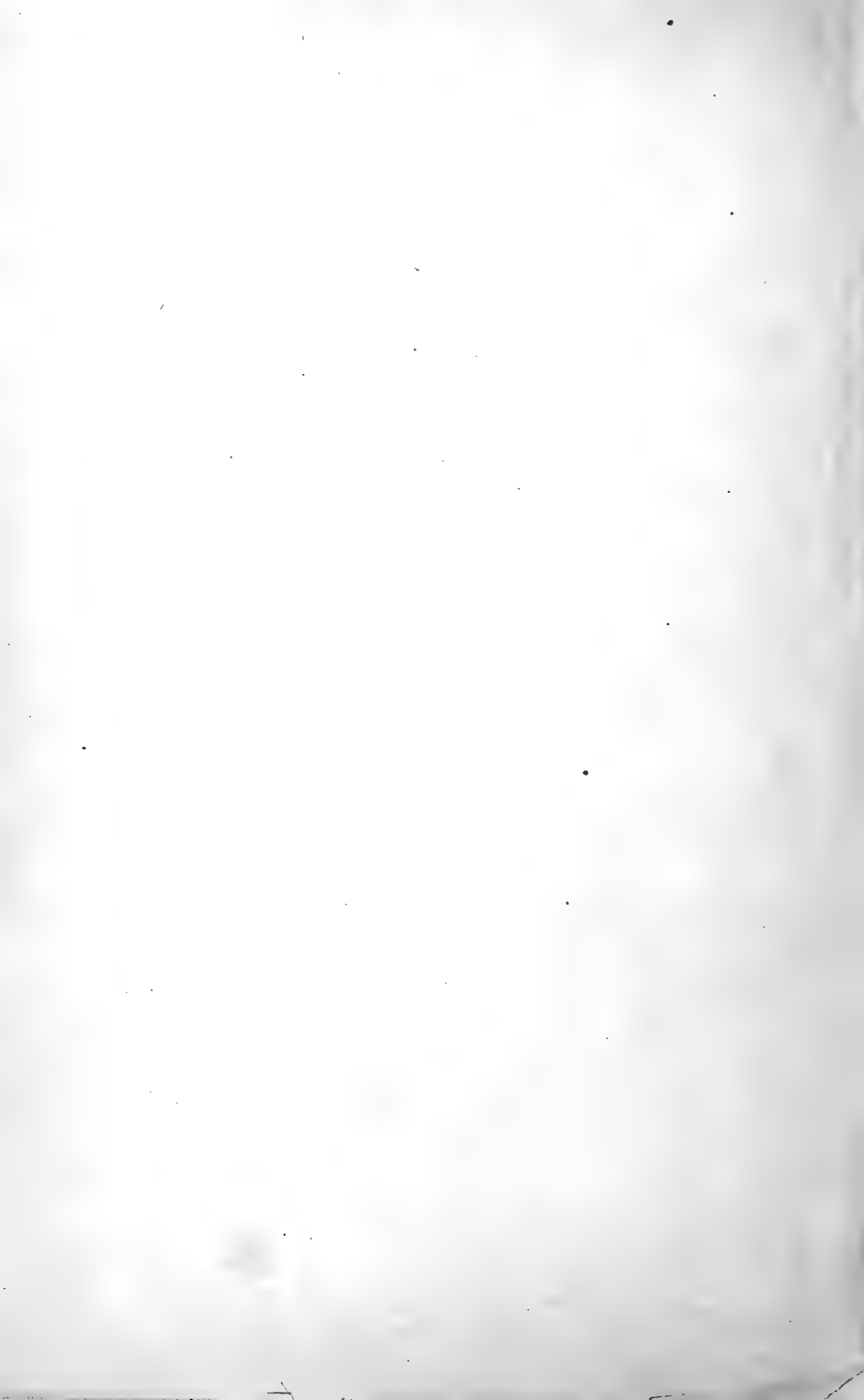
The native North American species have been much confused with each other and with closely related South American species. They are confined chiefly to the tropics and subtropics, only one native species extending into the southern United States.

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.



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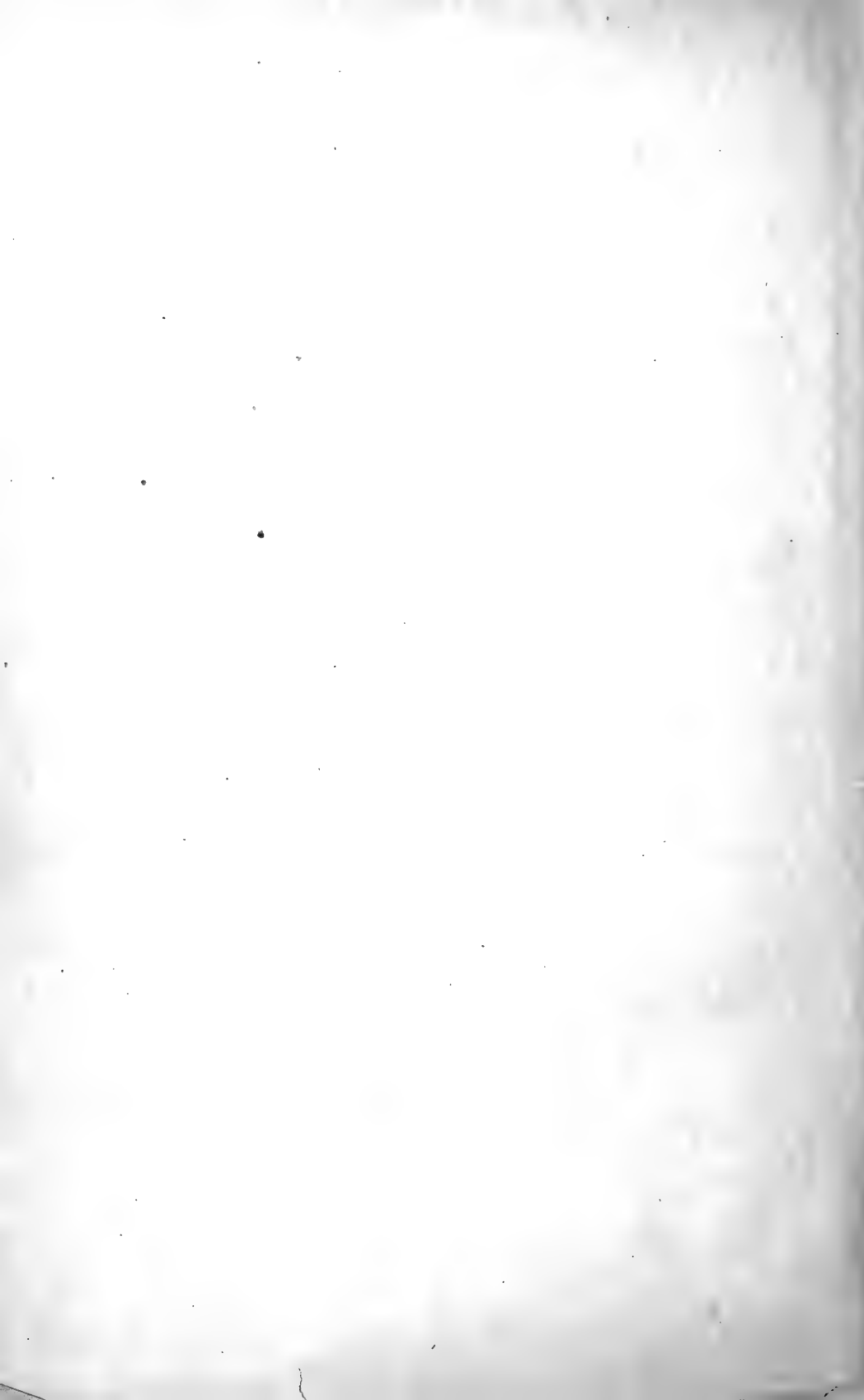
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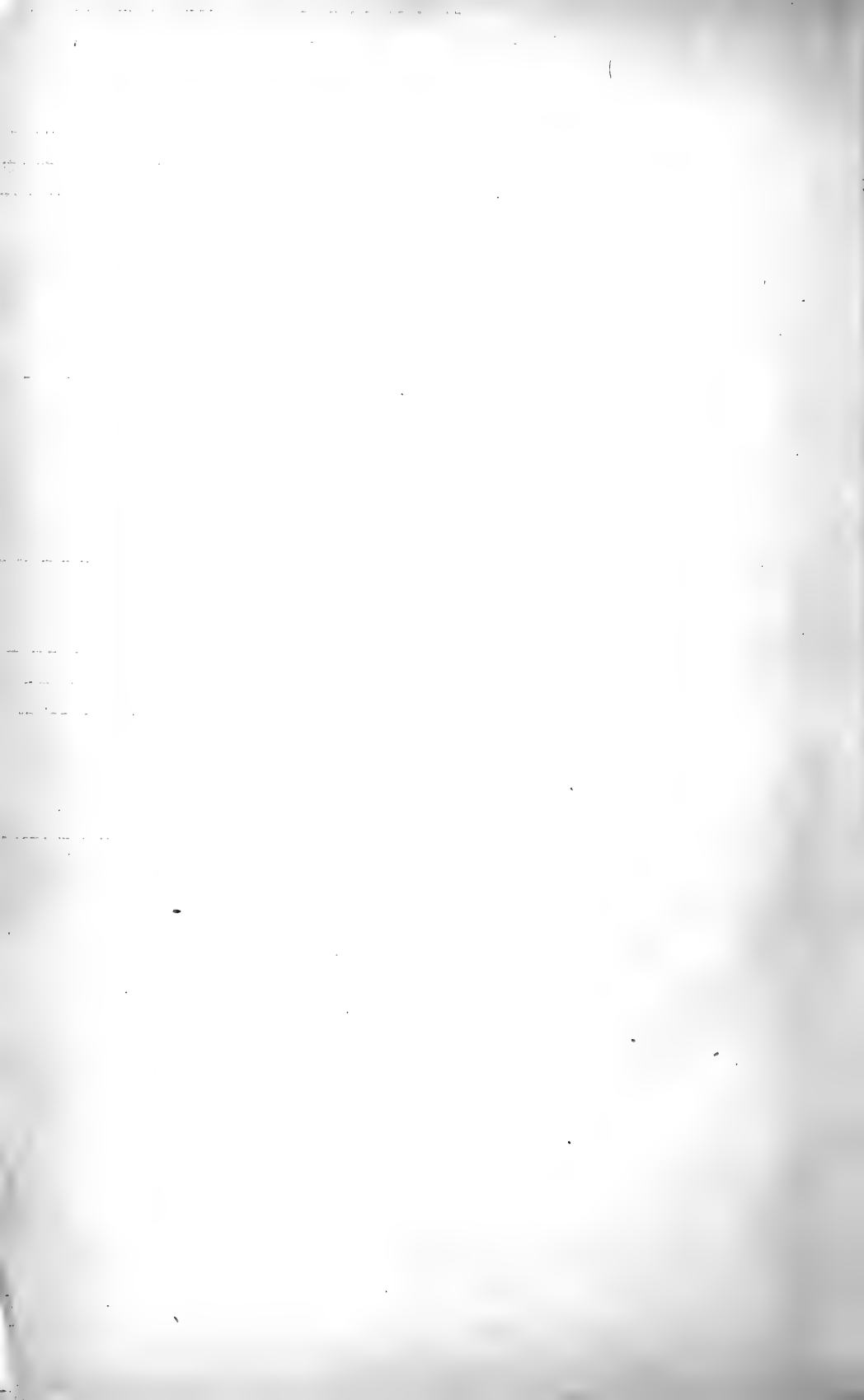


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THE NORTH AMERICAN SPECIES OF PENNISETUM.

By AGNES CHASE.

INTRODUCTION.

The genus *Pennisetum* is one of that series of *Panicaceae* in which sterile branches of the inflorescence are modified into an involucre subtending or surrounding the spikelets. This series falls into two groups, one in which these reduced branches or bristles remain on the common axis, the spikelets falling alone, the other in which the one or more free or coalesced bristles fall with the spikelets inclosed and aid more or less in the dispersal of the seed. The first group contains *Chaetochloa* and its allies, the second *Chamaeraphis*, *Paratheria*, *Pennisetum*, *Plagiosetum*, *Odontolytrum*, and *Cenchrus*. The second group is but poorly represented in the Western Hemisphere. Only the monotypic genus *Paratheria* Griseb., about 20 species of *Pennisetum*, and 15 of *Cenchrus* are native to America.

One species of the genus, *Pennisetum glaucum*, pearl millet, has been cultivated since before the dawn of history and is unknown in the wild state. Its grain forms an important article of food in Africa and to a less extent in India. In our Southern States pearl millet is grown for forage. Another African species, *Pennisetum purpureum* Schumach., is being introduced as a fodder plant in the South under the name Napier grass. *Pennisetum ruppelii* Steud. and *P. macrostachyum* (Brongn.) Trin., with beautiful feathery panicles, are cultivated for ornament.

The American species of *Pennisetum* have been much confused. A recent work on the derivation of pearl millet,¹ by Paul Leeke, is devoted in part to the other species of the genus. A key to all the species is given and the numerous synonyms are referred to the species and varieties recognized. Except in the series *Penicillaria*, which includes "Negerhirse" (*Pennisetum glaucum*), no descriptions are given, save in new species and new varieties, and in a few other instances, and no specimens are cited. The American species were not well understood by Dr. Leeke, as shown by his referring the American *P. setosum* and the very different *P. multiflorum* Fourn., both perennials, to the East Indian annual, which he calls *P. indicum* [*P. polystachyum* (L.) Schult.].

¹ Untersuchungen über Abstammung und Heimat der Negerhirse [*Pennisetum americanum* (L.) Schum.] von Dr. Paul Leeke. Zeitschr. Naturw. 79: 1-108, with plates. 1907.

Pennisetum has been divided into various subgenera which appear to be fairly natural groups. Among our few species, however, are some that are intermediate or exceptional. *Pennisetum setosum*, with its densely plumose bristles, comes under subgenus *Eriocharta*, but the obviously related *P. antillarum* has bristles not at all plumose. The introduced species belong in *Pennisetum* proper, with ciliate bristles and more than one spikelet in a fascicle. *Pennisetum karwinskyi* falls in this group, though in this the bristles are sometimes scarcely ciliate. The rest of our species, with bristles scabrous only, belong in subgenus *Gymnothrix*. The section *Beckeropsis* of the subgenus *Gymnothrix* is not represented in America, though the South American *P. exaltatum* and *P. mutilatum*, with few and reduced bristles, approach it. *Pennisetum glaucum* is placed in section *Penicillaria* by Stapf² and by Leeke. The name *Penicillaria* refers to the minute brush of hairs at the tips of the anthers in this species.

An adequate revision of *Pennisetum* as a whole can be prepared only by someone having access to abundant material from Africa, its center of distribution. The present paper deals only with the species found in North America, 10 native and 4 introduced.

The text figures illustrate part of the inflorescence, two-thirds natural size.

DESCRIPTION OF THE GENUS AND SPECIES.

PENNISETUM L. Rich.

Pennisetum L. Rich. in Pers. Syn. Pl. 1: 72. 1805. Five species, *P. typhoideum*, *P. setosum*, *P. cenchroides*, *P. orientale*, and *P. violaceum* are included. All belong to the genus as at present limited. The first (which is the same as *P. glaucum*), agreeing with the generic characters given and being an important economic species, is taken as the type. The generic name refers to the plumose bristles, a character more pronounced in the other species included than in the type.

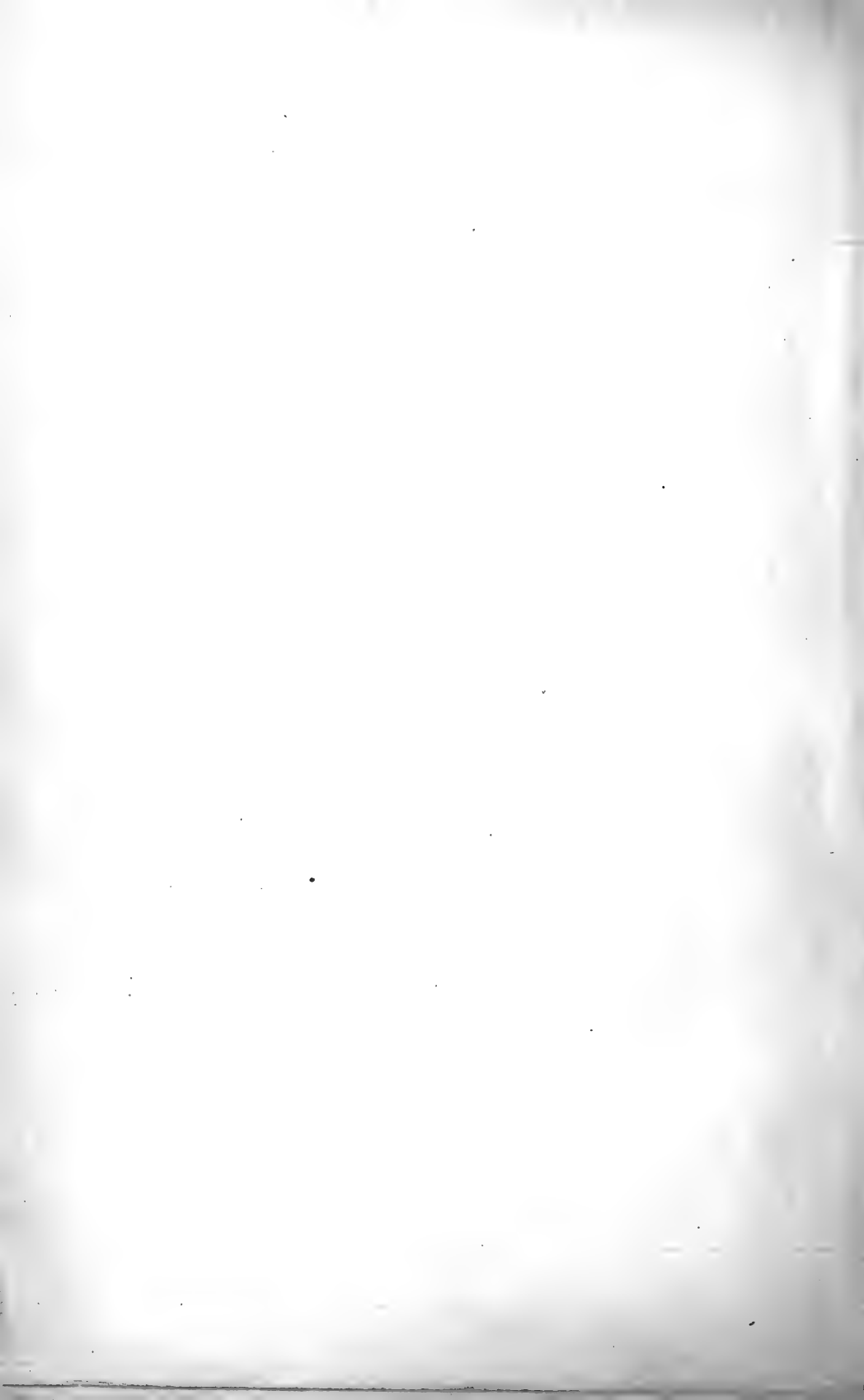
Penicillaria Willd. Enum. Pl. 1036. 1809. *Penicillaria spicata* Willd., based on *Holcus spicatus* L. (which is the same as *Pennisetum glaucum*), is taken as the type. In a footnote Willdenow explains that the genus was characterized by Swartz in Schrader's Neues Journal. The article referred to is one in which Swartz³ discusses the genus *Holcus* and shows that *H. spicatus* L. does not belong in that genus, but rather in *Cenchrus* or in a distinct genus. He then gives a detailed description from a specimen grown in his garden, but does not propose a generic name. A second species, *P. ciliata*, based on *Alopecurus indicus* (*Pennisetum indicum* (Murray) Kuntze) is added. The name doubtless refers to the penicillate tips of the anthers, but neither Swartz nor Willdenow mentions this character.

Gymnothrix Beauv. Ess. Agrost. 59. pl. 13. f. 6. 1812. A single species, *G. thuarii* Beauv., from Ile-de-France [Mauritius] is included. The figure shows a fascicle with bristles not plumose. Beauvois divides *Pennisetum* into three genera: *Penicillaria*, containing the species with penicillate anthers ("apici villosis"); *Pennisetum*,

² In Thiselt. Dyer, Fl. Cap. 7: 431. 1898.

³ Neu. Journ. Bot. Schrad. 2: 39-49. 1807.





containing the species with plumose bristles and 3 to 5 spikelets in a fascicle (among the species listed is *P. setosum* with solitary spikelets); and *Gymnatrix*, with glabrous bristles and solitary spikelets.

Catatherophora Steud. Flora 12: 465. 1829. A single species, *C. hordeiformis*, based on *Panicum hordeiforme* Thunb., is included. Steudel segregates it from *Gymnatrix* because the lower florets are undeveloped, that is, the sterile palea is wanting. *Panicum hordeiforme* Thunb. is composed of three varieties, α and β being from the Cape of Good Hope, and γ from Japan. Steudel cites Ecklon's no. 973 from South Africa, showing that it is the African form upon which he bases his genus. This is *Pennisetum hordeiforme* (Thunb.) Spreng. In Steudel's Nomenclator⁴ the name is spelled *Cataterophora*.

Pentastachya Hochst.; Steud. Nom. Bot. ed. 2. 2: 299. 1841. No description is given. A single species, *P. abyssinica* Hochst., nom. nud., is mentioned, this based on *Pennisetum pentastachyum* Hochst., not described until 1851. Here Richard⁵ states that Hochstetter wished to propose the genus *Pentastachya* for this species, but that it could not be distinguished generically from other species having several spikelets in a fascicle.

Beckeropsis Fig. & DeNot. Agrost. Aegypt. Frag. 2: 49. pl. 28. 1853. (Mem. Accad. Sci. Torino 14: 365. 1854). Two species, *B. nubica*, based on *Beckera nubica* Hochst., and *B. petiolaris*, based on *Beckera petiolaris* Hochst., are included. The first is illustrated and is taken as the type. In this species the fascicle is reduced to a single long bristle below the solitary spikelet.

Eriochaeta Fig. & DeNot. Agrost. Aegypt. Frag. 2: 58. pl. 30, 31, 32. 1853. (Mem. Accad. Sci. Torino 14: 374. 1854). Three species, *E. secundiflora*, *E. densiflora*, and *E. reversa* are included. Each is illustrated. In these species the bristles are conspicuously plumose, and the spikelets are on plumose pedicels.

Sericura Hassk. in Steud. Syn. Pl. Glum. 1: 404. 1854. A single species, *S. elegans* Hassk., from Java, is included. Leeke⁶ refers this to *Pennisetum macrostachyum* (Brongn.) Trin. The description well applies to that species. The name *Sericura* was listed, with a few words of misleading description, in 1842.⁷ Steudel obviously misunderstood this genus. Though the generic description applies perfectly to *Pennisetum*, he places it in *Andropogoneae* next to *Imperata*.

Macrochaeta Steud. in Zoll. Syst. Verz. Ind. Arch. Pfl. 60. 1854. The name *Macrochaeta sacchariformis* is mentioned without description in a note appended to *Sericura*. Steudel (see paragraph above) says that he had formerly used the name in letters.

Amphochaeta Anderss. Svensk. Vet. Akad. Handl. 1853: 136. 1855. A single species, *A. exaltata* Anderss., from the Galápagos Islands, is included. In this the bristles are reduced to 2 to 6, mostly shorter than the spikelet and more or less clustered at each side of it. Andersson emphasizes this character (hence the name).

DESCRIPTION.

Spikelets sessile or short-pedicel, one to several together, surrounded or subtended by an involucre, composed of a fascicle of reduced sterile branchlets, the fascicles sessile or short-peduncled and usually crowded on a common axis forming spike-like panicles, the fascicles falling entire with the spikelet inclosed; fascicles with few to numerous slender, antrorsely scabrous bristles, distinct throughout or, in two species, united at the very base into a minute disk, the outermost short, the inner longer, mostly unequal, the innermost (that is, the branchlet at the base of which the spikelet or the uppermost spikelet is borne) often stouter and longer than the others, sometimes conspicuously so; spikelets lanceolate, mostly acute; glumes unequal, 1 to 5-nerved,

⁴Nom. Bot. ed. 2. 1: 311. 1840.

⁶Zeitschr. Naturw. 79: 41. 1907.

⁵Tent. Fl. Abyss. 2: 387. 1851.

⁷Hassk. Flora 25²: Beibl. 2. 1842.

the first usually minute, rarely obsolete; sterile lemma few to several-nerved, inclosing a palea and often a staminate flower or empty; fruit subindurate, smooth, the lemma acuminate, mostly nerved toward the summit, its margins thin and usually flat; the palea of similar texture or a little thinner, its tip sometimes acuminate and free from the clasping lemma; stamens 3; stigmas plumose; grain usually oblong, dorsally compressed, with a punctiform hilum, free within the lemma and palea.

Annuals or perennials, mostly tall and robust, confined to the tropics and subtropics. There are probably 80 species or more, over half of them confined to Africa.

The spikelet of *Pennisetum glaucum*, presumably developed under cultivation, has assumed a form somewhat analogous to that of Indian corn. The fascicles are persistent on the axis, the glumes are much reduced, and the enlarged grain at maturity protrudes from the lemma and palea.

The simplest form of *Pennisetum* is found in the African species of the section *Beckeropsis*, in which there is a single bristle below the spikelet. In the South American *P. mutilatum* (Kuntze) Hack. the single bristle is usually shorter than the spikelet, or is sometimes obsolete. *Pennisetum exaltatum* (Anders.) Leeke, of the Galápagos, connects these one-bristled forms with such few-bristled species as the North American *Pennisetum durum*. In *Hymenachne montana* Griseb., of Argentina, is found what suggests an approach to *Pennisetum*. In that the lower spikelets of the panicle are sometimes subtended by a bristle. The uppermost spikelet also is often thus subtended; that is, the spikelet-bearing branchlet is prolonged into a scabrous bristle. The subindurate fertile lemma and palea and the lanceolate spikelets of *Pennisetum* also suggest relationship to *Hymenachne*. At the other extreme, such species of *Pennisetum* as *P. karwinskyi* and *P. ciliare*, with bristles united at the very base and with several spikelets in a fascicle, approach such species of *Cenchrus* as *C. myosuroides*.

KEY TO THE SPECIES.

Bristles about 4 cm. long; panicles oval, feathery; spikelets 10 to 12 mm. long.

1. *P. villosum*.

Bristles rarely over 2 cm. long, most of them much shorter; panicles cylindrical or nearly so; spikelets not over 7 mm. long.

Grain at maturity subglobose, bursting through the lemma and palea; panicle solidly dense, 2 cm. or more thick; plants annual. 4. *P. glaucum*.

Grain permanently inclosed in the lemma and palea; panicles less than 2 cm. thick, not solid; plants perennial.

Fascicles, or most of them, with 2 or more spikelets.

Bristles free throughout, some of them plumose. Fascicles pedunculate; spikelets pedicellate. 2. *P. orientale triflorum*.

Bristles united at the base into a minute disk.

Inner bristles conspicuously plumose, much exceeding the spikelets.

3. *P. ciliare*.

Inner bristles sparsely (rarely not at all) ciliate, only the innermost much exceeding the spikelets. 5. *P. karwinskyi*.

Fascicles with but one spikelet.

Bristles conspicuously plumose. 6. *P. setosum*.

Bristles not plumose.

Panicles terminal on the primary culm and leafy branches only.

Blades involute, not over 5 cm. long. 10. *P. domingense*.

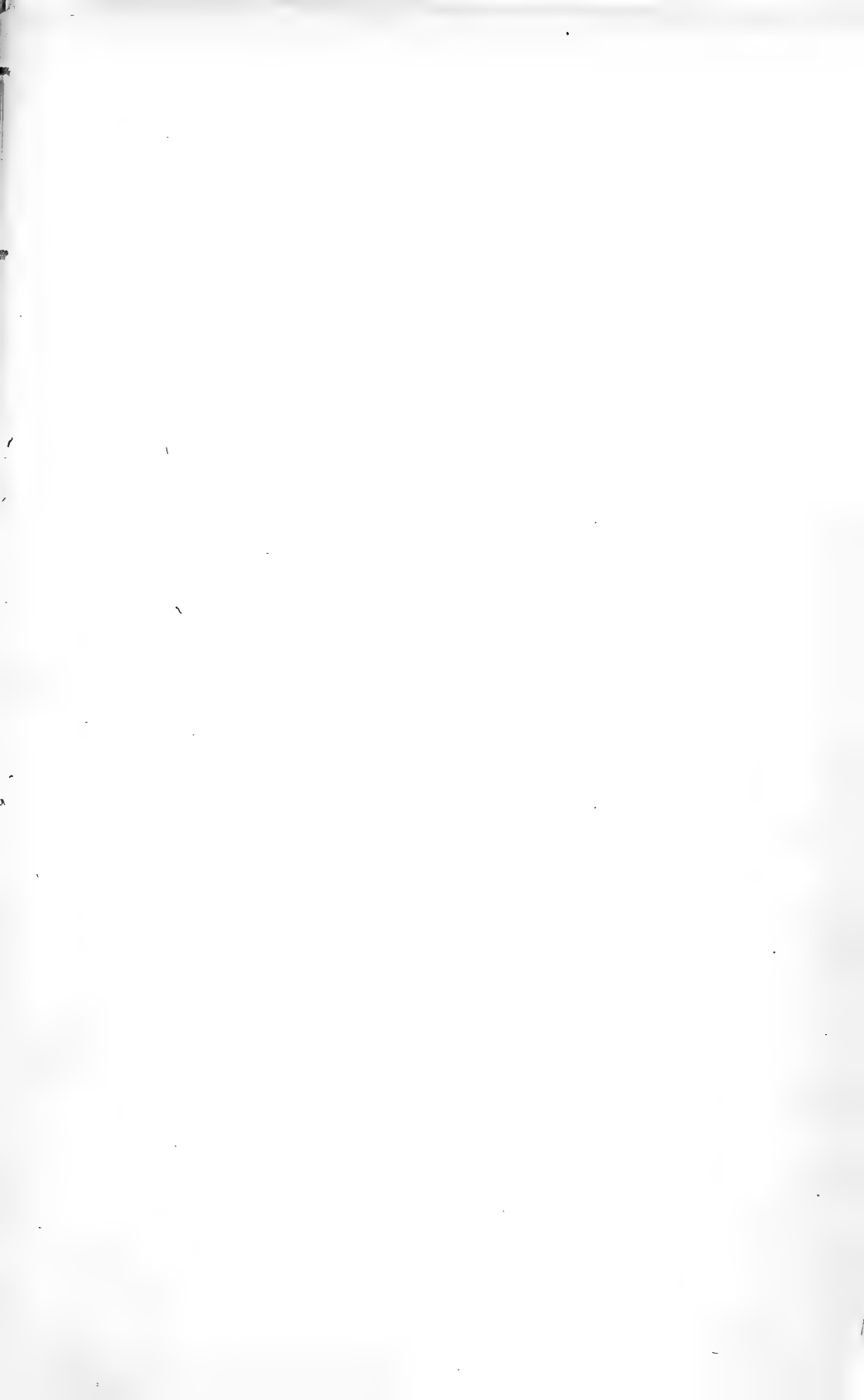
Blades flat or involute-pointed only, 10 cm. or more long.

Spikelets 2 to 2.5 mm. long; axis about 0.5 mm. thick. 7. *P. antillarum*.

Spikelets 4.5 mm. or more long; axis 1 to 3 mm. thick.

Bristles scant, most of them scarcely exceeding the spikelets or shorter; panicle stiff, densely flowered. 8. *P. crinitum*.

P. glaucum



Bristles numerous, most of them about twice the length of the spikelet; panicle less dense.....9. *P. complanatum*.
Panicles terminal and axillary, the latter on slender naked peduncles, 1 to several from a sheath.

Blades elongate, rarely over 12 mm. wide, tapering into a long setaceous-involute tip; spikelets 6 to 7 mm. long, the bristles mostly shorter.

11. *P. durum*.

Blades 15 to 40 mm. wide, if narrower not elongate, not setaceous-tipped; spikelets 4.5 to 6 mm. long, some of the bristles always longer.

Sterile lemma inclosing a well-developed palea and usually a staminate flower; panicles loosely flowered; most of the bristles about twice the length of the spikelet.....14. *P. bambusiforme*.

Sterile lemma empty; panicles rather densely flowered; most of the bristles not more than once and a half the length of the spikelets.

Panicles dull green; bristles scant, most of them not exceeding the spikelet, the innermost about twice as long.12. *P. distachyum*.

Panicles tawny; bristles numerous, most of them exceeding the spikelet, the innermost not conspicuously longer than the others.

13. *P. prolificum*.

1. *Pennisetum villosum* R. Br.

Pennisetum villosum R. Br. in Salt, Voy. Abyss. App. 62. 1814, nom. nud.; in Fres. Mus. Senckenb. Abh. 2: 134. 1837. Described from specimens collected in Abyssinia during the years 1805 to 1810 by Henry Salt. The type has not been examined.

Pennisetum villosum var. *humile* Hochst.; A. Rich. Tent. Fl. Abyss. 2: 387. 1851. "Prope Adoua [Abyssinia] (Schimper)." A specimen of Schimper's no. 316, collected at Adoua, Abyssinia, in September, 1837, in the National Herbarium, is a dwarfed plant like Chase's no. 5600 from Santa Barbara, California.

Cenchrus villosus Kuntze, Rev. Gen. Pl. 3²: 347. 1898. Based on *Pennisetum villosum* R. Br.

DESCRIPTION.

Plants perennial, rather pale, at length forming dense clumps from a knotted crown; culms ascending, 15 to 50 cm. tall, rarely 1 meter or more tall, commonly branching from the lower nodes, mostly flattened or angled in drying, the uppermost joint villous, at least below the inflorescence, otherwise glabrous; sheaths loose, mostly overlapping, pilose along the scarious margin and at the summit or glabrous; ligule a ring of fine hairs 1.5 to 2 mm. long; blades ascending or spreading, 3 to 6 mm. wide, mostly elongate, the upper often exceeding the inflorescence, but in dwarf plants sometimes only 8 to 10 cm. long, flat or folded, sparsely pilose on the upper surface or glabrous, the margins and sometimes the under surface scabrous; panicle grayish tawny, very dense, oval, 3 to 15 cm. long, 3 to 5 cm. wide including the bristles; fascicles short-peduncled, with a tuft of white hairs at the base of the peduncles; bristles slender, spreading, the longest 4 to 5 cm. long, the inner plumose below, the innermost not differentiated from the others; spikelets 1 to 4 in a fascicle, sessile, 10 to 12 mm. long, 1.7 to 2 mm. wide; glumes unequal, the first about 1 mm. long, one-nerved or nerveless, subacute, the second about one-third the length of the spikelet, one-nerved, acuminate; sterile lemma slightly shorter than the fertile one, long-acuminate, finely many-nerved, scabrous

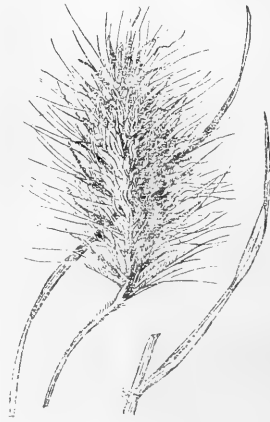


FIG. 63.—*Pennisetum villosum*.
From Eastwood 172, California.

except at the base, inclosing a well-developed palea and often a staminate flower; fruit but little indurate, long-acuminate, the lemma finely nerved and scabrous on the upper half, the margins thin and flat, the long brownish styles more or less persistent or caught in the feathery bristles.

This species is cultivated for ornament. In the trade it is commonly called *Pennisetum longistylum*. According to Hackel⁸ and Lecke⁹ this is not *P. longistylum* Hochst.¹⁰ A specimen of the type collection of the latter, Schimper's no. 65, from Adoa, Abyssinia, in the National Herbarium, is very immature. It is much like dwarfed plants of *P. villosum*. The bristles are less plumose than are those of that species. It is clearly allied to *P. villosum* and does not belong in the section *Gymnothrix*, as stated by Hackel. Lecke places it next to *P. villosum*, differentiating it by the greater number of nerves in the sterile lemma.

DISTRIBUTION.

Arid open ground, East Africa; sparingly escaped from cultivation in the United States, Mexico, and Jamaica.

MICHIGAN: Port Huron, *Dodge* 126.

TEXAS: Texarkana, *Plank* 23.

CALIFORNIA: Santa Barbara, *Eastwood* 172; *Chase* 5600; *Somes* C17. Ventura, *Parish* 11049.

SINALOA: Topolobampo, *Palmer* 231 in 1897.

JAMAICA: St. Andrew, *Harris* 12402.

Pennisetum ruppelii Steud.,¹¹ commonly called fountain-grass, is cultivated in parks and borders. It is a tufted perennial about 1 meter tall, with simple culms, narrow elongate scabrous blades, and beautiful feathery, purple or pinkish, nodding panicles, 15 to 35 cm. long, the fascicles pedunculate, not crowded, with one to three short-pedicelated spikelets, the bristles plumose toward the base, the longest 3 to 4 cm. long. *Pennisetum macrostachyum* (Brongn.) Trin.,¹² with broad blades and larger panicles with longer, more silky, not plumose bristles, is cultivated sparingly. A purple strain of this has been called "*P. macrophyllum atropurpureum*"¹³ by seedsmen.

2. *Pennisetum orientale triflorum* (Nees) Stapf.

Pennisetum triflorum Nees in Steud. Syn. Pl. Glum. 1: 107. 1854. "(* * * Royle Hrb. nr. 59.) Nepal." The type has not been examined, but the description well applies to the East Indian plants identified as *P. orientale* var. *triflorum* by Stapf.

Pennisetum orientale var. *triflorum* Stapf in Hook. f. Fl. Brit. Ind. 7: 86. 1896. Based on *Pennisetum triflorum* Nees.

DESCRIPTION.

Plants perennial, forming tough clumps from knotted crowns; culms erect from an ascending base, usually 1 meter or more tall, rather robust, simple or sparingly branching, pubescent or scabrous below the panicle, otherwise glabrous; nodes

⁸ In Engl. & Prantl, Pflanzenfam. 2²: 38. 1887.

⁹ Zeitschr. Naturw. 79: 23. 1907.

¹⁰ A. Rich. Tent. Fl. Abyss. 2: 338. 1851.

¹¹ Nom. Bot. ed. 2. 2: 298. 1841, nom. nud.; Syn. Pl. Glum. 1: 107. 1854. "*P. macrostachyum* Fresen. Hochst. hrb. un. it. Abyss. no. 72." Described from Abyssinia.

¹² Mém. Acad. St. Pétersb. VI. 3²: 177. 1834. Originally described from the Moluccas.

¹³ Henkel in Möllers Deutsch. Gärt. Zeit. 1906: 9. 1906.





appressed-pubescent, leaves numerous, the sheaths loose, mostly overlapping, ciliate on the margin, otherwise glabrous; ligule lacerate-ciliate, scarcely 1 mm. long; blades flat, lax, 5 to 10 mm. wide, elongate, sparsely hispid on the upper surface, scabrous beneath and sometimes with a few scattered hairs; panicles 12 to 20 cm. long, about 15 to 20 mm. thick, purplish, rather loose at least toward the base, nodding, the axis angled, densely pubescent; fascicles peduncled, spreading or reflexed; bristles slender, flexuous, unequal, the outer short, scabrous only, the inner mostly 1 to 1.5 cm. long, plumose below, the innermost one a little stronger and 2 to 2.5 cm. long; spikelets 1 to several in a fascicle, pedicellate, 5 to 7 mm. long, about 1.5 mm. wide, glabrous or scabrous; glumes acuminate-pointed, 1 to 3-nerved, the first one-fourth to one-third and the second about three-fourths the length of the spikelet; sterile and fertile lemmas subequal, acuminate-pointed, the tips usually spreading, 5-nerved, the sterile lemma inclosing a palea of equal length and a staminate flower, the fruit but slightly indurate, the tip of the palea free.



FIG. 64.—*Pennisetum orientale triflorum*.
From *Amer. Gr. Nat. Herb.* 613, Jamaica.

DISTRIBUTION.

Native of India, introduced in the West Indies, where it is called Himalaya grass and is said to be a good forage grass; escaped from cultivation and found along trails and in open grassland (only American specimens are cited below).

JAMAICA: Cinchona, *Amer. Gr. Nat. Herb.* 613; *Hitchcock* 9700; *Harris* 11300, 11433.

TRINIDAD: Port of Spain, *Hitchcock* 10169.

3. *Pennisetum ciliare* (L.) Link.

Cenchrus ciliaris L. Mant. Pl. 302. 1771. "Habitat ad Cap. b. spei [Cape of Good Hope, Africa] * * * Koenig." The description indicates the dwarfed form found in arid situations.

Pennisetum ciliare Link, Hort. Berol. 1: 213. 1827. Based on *Cenchrus ciliaris* L. The habitat is given as "Caribaeis, Cumana."

Pennisetum cenchrroides L. Rich. in Pers. Syn. Pl. 1: 72. 1805. Based on *Cenchrus ciliaris* L.

DESCRIPTION.

Plants perennial, tufted from a knotted crown; culms geniculate, slender, 10 to 50 cm. tall, sometimes taller, sparingly branching, scabrous at least on the uppermost joint; sheaths minutely scabrous and usually pilose along the margin; ligule ciliate, about 1 mm. long, sometimes minute; blades flat or folded, 2 to 10 cm. long (longer in plants in moist situations), 3 to 5 mm. wide, scabrous on the upper surface and long-pilose toward the base, glabrous or nearly so beneath; panicle 1.5 to 10 cm. long, not dense, purplish, mostly flexuous, the axis slender, angled, scabrous; fascicles subsessile, spreading; bristles united at the very base, flexuous, unequal, the outer short, slender, scabrous only, the inner thicker, flattened, about twice the length of the spikelet, ciliate, the innermost one a little longer than the rest; spikelets 1 to 5 in a fascicle, sessile, 4 to 5.5 mm. long, about 1.5 mm. wide, scaberulous; glumes thin, 1 to 3-nerved, acute or abruptly mucronate, the first one-fourth to more than one-third, the second two-thirds to three-fourths, the length of the spikelet; sterile lemma shorter than the



FIG. 65.—*Pennisetum ciliare*. From *Drummond*, Punjab, India.

fruit, thin, 5 to 7-nerved, with a slender mucronate tip, inclosing a palea of equal length and a staminate flower; fruit but little indurate, the lemma 5-nerved, with an attenuate spreading tip.

Sometimes cultivated for ornament in the Southern States. An allied species, *Pennisetum holcoides* (Roxb.) Schult.,¹⁴ has been cultivated under the name "*P. ciliare*," while true *P. ciliare* has been more generally known as "*P. cenchrroides*." In *P. holcoides* the bristles are very plumose, making the panicles soft and downy.

DISTRIBUTION.

Arid open ground, tropics and subtropics of the Eastern Hemisphere; sparingly introduced in the American tropics (only American specimens cited below).

GUATEMALA: Zacapa, Pittier 1751.

PORTO RICO: Ponce, Britton, Cowell & Brown 5389.

4. *Pennisetum glaucum* (L.) R. Br.

Panicum glaucum L. Sp. Pl. 56. 1753. "Habitat in Indiis." The first phrase name cited is "Panicum spica tereti, involucellis bifloris fasciculato-pilosis. Fl. zeyl. 44." The Flora Zeylanica is Linnaeus's own work, and the exceptionally detailed description given¹⁵ seems to show that it was drawn up from the plant which is still preserved in the British Museum.¹⁶ The description given in the Species Plantarum, "Setae in spica longitudine flosculorum. Foliorum vaginae oris pilosae, Dum spica recens prodiit flosculi in series dispositi observantur," also applies wholly to the Ceylon specimen, as does the name "*glaucum*" itself. But Linnaeus confused the matter by citing four phrase names, besides that from Flora Zeylanica. One refers to a Plukenet figure that probably represents *Elytrophorus articulatus*, one is a Tournefort phrase that is unidentifiable, and two, given as β and γ , are identifiable as green foxtail, *Chaetochloa viridis* (L.) Scribn., and yellow foxtail, *C. lutescens* (Weigel) Stuntz, respectively. The variety γ was taken by subsequent authors as the basis of *P. glaucum* L. and the names *Setaria glauca* and *Chaetochloa glauca* have been applied to yellow foxtail.

Holcus spicatus L. Syst. Nat. ed. 10. 2: 1305. 1759. A brief diagnosis, which applies to *P. glaucum* and fails to agree with the generic diagnosis of *Holcus* immediately above, is given, and "Pluk. t. 32. f. 4." is cited. Plukenet's figure¹⁷ represents *P. glaucum*. No locality is mentioned, but Linnaeus later¹⁸ gives "Habitat in India" for this species.

Cenchrus spicatus Cav. Deser. Pl. 304. 1802. Based on *Holcus spicatus* L. Kuntze (Rev. Gen. Pl. 3: 346. 1898) published this combination anew, based on "*Penicillaria spicata* Willd."

Pennisetum typhoideum L. Rich. in Pers. Syn. Pl. 1: 72. 1805. *Holcus spicatus* L. and Plukenet's figure, pl. 32, f. 4, are cited.

Penicillaria spicata Willd. Enum. Pl. 1037. 1809. Based on *Holcus spicatus* L.

Pennisetum glaucum R. Br. Prodr. Fl. Nov. Holl. 1: 195. 1810. The name is based on *Panicum glaucum* L., though the plant to which Brown applied it was evidently a species of *Chaetochloa*.

¹⁴ Mant. 2: 148. 1824.

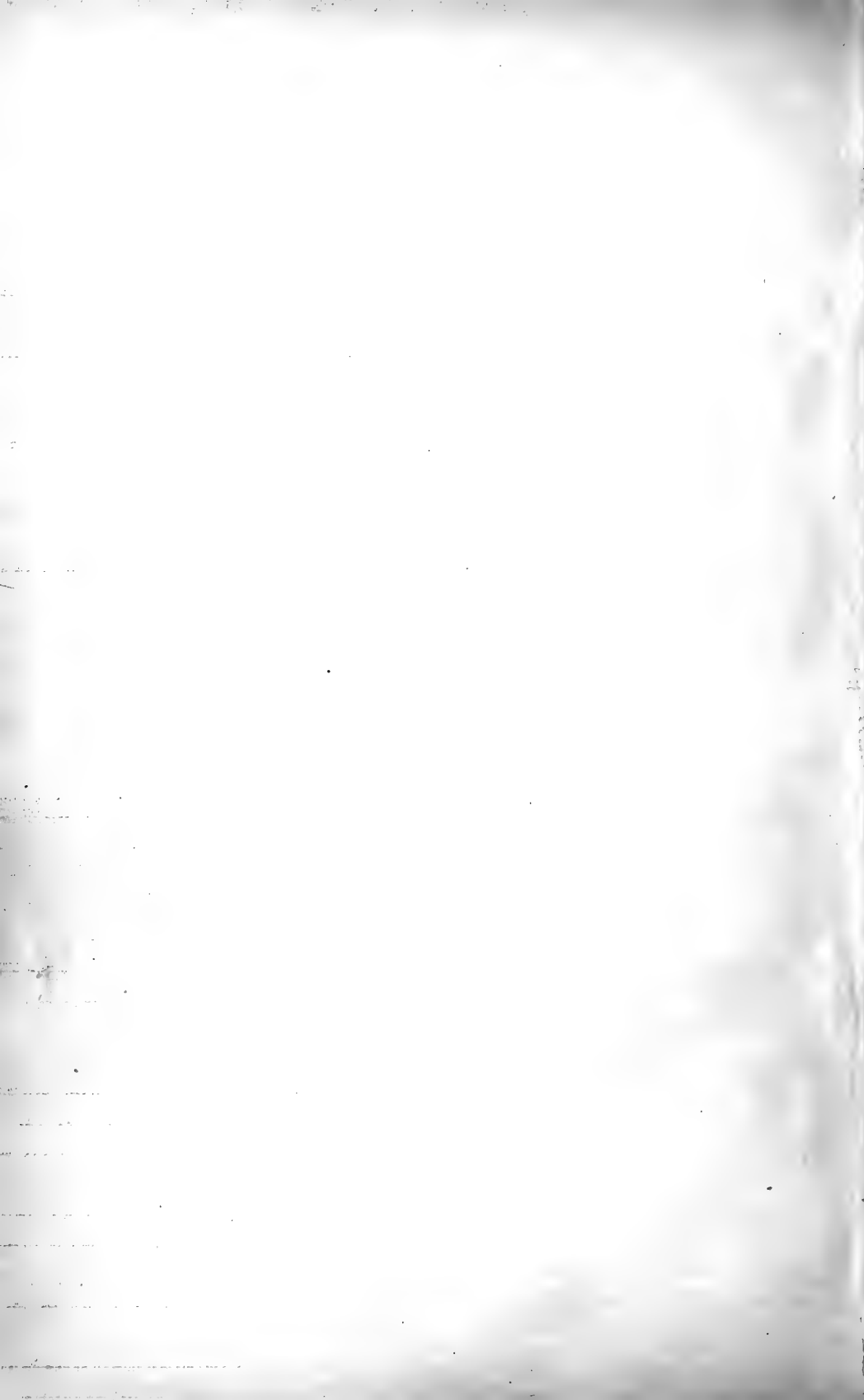
¹⁵ Fl. Zeyl. 18. 1847. (The number 44 refers to the species, which is no. 44.)

¹⁶ For the identity of this specimen see Trimen (Journ. Linn. Soc. Bot. 24: 136. 1896), and for the reasons for restoring this name to pearl millet see Stuntz, U. S. Dept. Agr. Bur. Pl. Ind. Inv. Seeds 31: 84. 1914; Hitchcock, Amer. Journ. Bot. 2: 299, 300. 1915. An analysis of the various Linnaean names that have been applied to pearl millet will appear in an early number of the American Journal of Botany.

¹⁷ Phytogr. 1: pl. 32, f. 4. 1691.

¹⁸ Sp. Pl. ed. 2. 2: 1483. 1763.

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Setaria glauca Beauv. Ess. Agrost. 51, 178. 1812. The name is based on *Panicum glaucum* L., though Beauvois applied it to a species of *Chaetochloa*.

Pennisetum spicatum Roem. & Schult. Syst. Veg. 2: 499. 1817, as synonym of *Penicillaria spicata* Willd.; Koern. in Koern. & Wern. Handb. Getreid. 1: 284. 1885. Based on *Holcus spicatus* L.

Panicum spicatum Roxb. Fl. Ind. 1: 286. 1820. Based on *Holcus spicatus* L.

Penicillaria plukeneti Link, Hort. Berol. 1: 221. 1827. "P. Plukenetti Hort. Plukenet Alm. t. 32. f. 4. W[ilddenow] E[numeratio] 1037." Both references are identifiable as *P. glaucum*.

Chamaeraphis glauca Kuntze, Rev. Gen. Pl. 2: 767. 1891. Based on "*Setaria glauca* Beauv.," that being based on *Panicum glaucum* L. Kuntze applied the name to a species of *Chaetochloa*.

Ixophorus glaucus Nash, Bull. Torrey Club 22: 423. 1895. Based on *Panicum glaucum* L., but the name applied to *Chaetochloa lutescens* (Weigel) Stuntz.

Chaetochloa glauca Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 39. 1897. Based on *Panicum glaucum* L., but the name applied to *Chaetochloa lutescens* (Weigel) Stuntz.

There has been great confusion as to the names referable to this

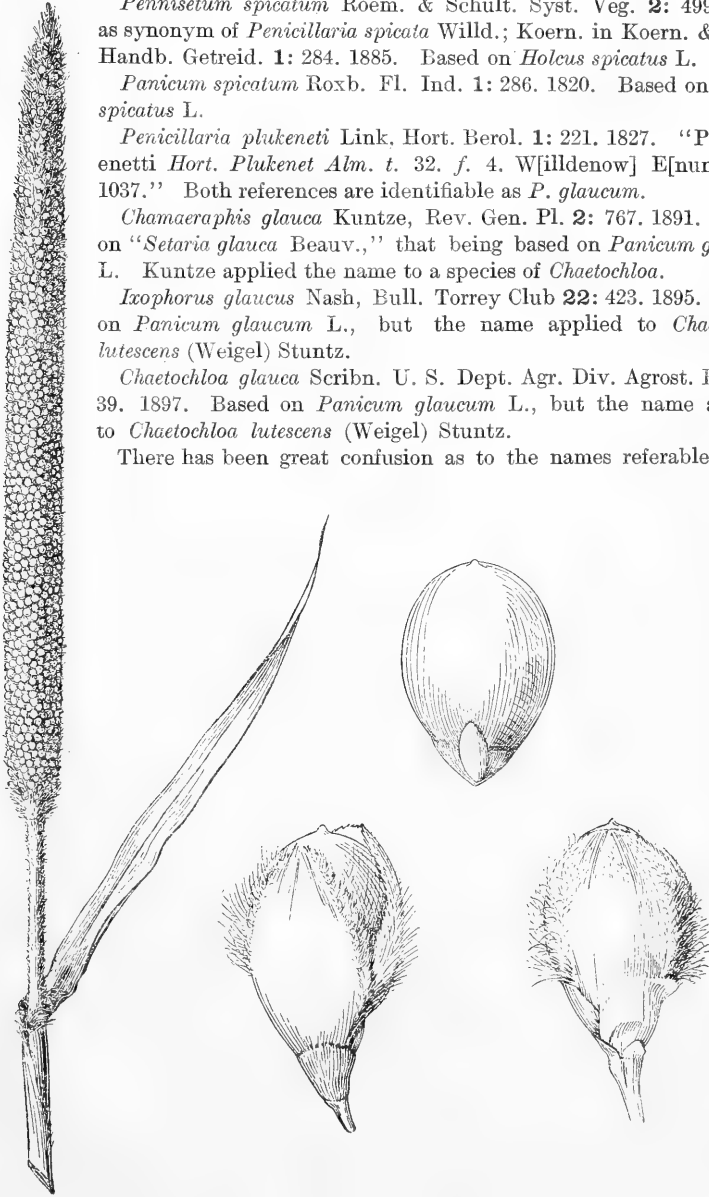


FIG. 66.—*Pennisetum glaucum*. From McCarthy, North Carolina.

species. As Hooker says, "The synonymy of the species is almost inextricable." The synonymy here given includes only those names that are based on Linnaean names.

Schumann¹⁹ published the name *Pennisetum americanum*, based on *Panicum americanum* L., applying it to pearl millet. *Panicum americanum* L. is based on "Panicum americanum Clus. hist. 2, p. 215." Clusius's figure does not represent pearl millet, nor does his description apply to it. It is more like common millet (*Chae-tochloa italica*) but was probably based on a confusion of two or more species. Schumann's name was accepted by Leeke.²⁰

DESCRIPTION.

Plants annual, branching at the base, robust, as much as 2 meters tall; culms simple or rarely branching, densely villous below the panicle, often minutely so below the nodes, otherwise glabrous; nodes usually appressed-pubescent; sheaths loose, mostly overlapping, commonly scabrous and usually densely hairy on the margins toward the summit and on the collar; ligule densely hairy, about 3 mm. long; blades flat, cordate at base, sometimes as much as 1 meter long and 5 cm. wide, scabrous on both surfaces, the midnerve prominent; panicles cylindrical, stiff, very dense, as much as 40 to 50 cm. long and 2 to 2.5 cm. thick, pale, bluish tinged, or sometimes tawny, the stout axis densely villous; fascicles on slender villous peduncles 2 to 5 cm. long, spreading; bristles unequal, the inner coarser, sparsely plumose below, about equaling the mature fruit; spikelets mostly 2 in a fascicle, short-pedicellate, at maturity 3.5 to 4.5 mm. long, obovate, turgid; glumes unequal, the first minute, the second one-fourth to half the length of the spikelet, ciliolate, sterile lemma slightly shorter than the fertile one, firm, obscurely nerved, ciliate at the broad summit, inclosing a villous palea and sometimes a staminate flower; fertile lemma indurate, abruptly pointed, long-ciliate on the margins, except at the base and apex, the palea broad, thinner, villous on the margins and toward the summit, the subglobose or pyriform ripe caryopsis forcing open the lemma and palea and equaling them, bluish lead color or whitish; anthers with a minute tuft of hairs at the tips.

DISTRIBUTION.

Known only in cultivation. Leeke²¹ considers it a composite species having a polyphyletic origin, arising in cultivation from *Pennisetum gymnothrix* (A. Br.) Schum., *P. perottetii* (Klotzsch) Schum., *P. mollissimum* Hochst., *P. violaceum* (Lam.) L. Rich, and *P. versicolor* Schrad. These species are all natives of Africa. *Pennisetum glaucum* has numerous varieties and forms. It is an important food plant in Africa²² and is also cultivated for its grain in India, Arabia, and southern Europe. In our Southern States it is grown to a limited extent for forage. It is sometimes called Indian millet, African millet, and cat-tail millet.

Pennisetum purpureum Schumach.,²³ a tropical African species, is being introduced as a fodder plant in the Southern States under the name Napier grass. In Africa it is also called elephant grass. It is a robust leafy tufted branching perennial, 2 to 4 meters tall, with elongate blades 2 to 3 cm. wide, and dense, stiff, tawny or purplish panicles, the fascicles sessile, the sparsely plumose bristles exceeding the two or three unequal pediceled spikelets.

¹⁹ In Engl. Pflanzenw. Ost-Afr. 5^B: 51. 1895.

²⁰ Zeitschr. Naturw. 79: 52-96. 1907.

²¹ Zeitschr. Naturw. 79: 55. 1907.

²² For a full treatment of the varieties and their history see Koern. & Wern. Handb. Getreid. 1: 284. 1885; Schum. in Engl. Pflanzenw. Ost-Afr. 5^B: 51-58. 1895; and Leeke, Zeitschr. Naturw. 79: 52-108. pl. 2, 3. 1907.

²³ Schumach. & Thonn. Beskr. Guin. Pl. 64. 1827. Described from Guinea, Africa.



5. *Pennisetum karwinskyi* Schrad.

Pennisetum karwinskyi Schrad. *Linnaea* 12: 431. 1838. "Habit. in Mexico (Karwinsky)." In the Schrader Herbarium, which is preserved in the herbarium of the Botanical Garden at Petrograd, there are two sheets bearing this name, but no data. On one sheet are leaves only; on the other is a culm with a single purplish panicle about 5 cm. long. The fascicles of this panicle are smaller than usual for the species and the inner bristles are only sparsely short-ciliate. The description and the specimen represent a rather dwarfed plant such as Rose, Standley & Russell's no. 12866, from Alamos, Sonora.

Cenchrus multiflorus Presl, *Rel. Haenk.* 1: 318. 1830. "Hab. in Mexico." The type specimen was examined by Professor Hitchcock in the herbarium of the German University at Prag. The fascicles are much like those of Pringle's no. 3849. Most of the bristles only slightly exceed the spikelets, the inner are more pilose than usual for the species, and one bristle is about twice as long as the rest, thicker, and stiffly flexuous.

Pennisetum multiflorum Fourn. *Mex. Pl.* 2: 49. 1886. No locality or specimen is cited. The description is as follows: "Spica imbricata, spiculis quinque in eodem involucre, quarum 1-2 abortientes; gluma inferiore tertiam partem spiculae aequante superiore inferiorem duplam aequante; involucri setis exterioribus brevibus scabris; interioribus crassioribus in dimidia tantum inferiore parte ciliatis, spiculas duplo superantibus, seta una multo longiore." In the Copenhagen Herbarium is a specimen of Liebmann's no. 463 which bears the name "*Pennisetum multiflorum* Fourn." in Fournier's handwriting. This consists of a single naked elongate terminal joint and, in an envelope, a fragment, 5 cm. long, of a panicle, the fascicles with exceptionally slender bristles, scarcely at all ciliate, the innermost one as much as 3.5 cm. long (as in Nelson's no. 3965); three fascicles with short subequal bristles, the inner sparsely ciliate (as in Pringle's no. 2044); and a single bur of *Cenchrus pilosus* H. B. K. (the only American species of *Cenchrus* known in which the bristles are antrorsely scabrous). Since only the inflorescence is described, it seems certain that Fournier's description was based on this fragmentary specimen. The allusion to the ciliate lower part of the thickened inner bristles must have been made from observation of the bur of the *Cenchrus*. Fournier does not base the name on *Cenchrus multiflorus* Presl, though he is naming the same species. He includes *Cenchrus multiflorus* Presl in *Cenchrus*. Liebmann's nos. 341 and 464, which he cites under it, are in the Copenhagen Herbarium; no. 464 bears the name *Cenchrus multiflorus* in Fournier's hand, the other is marked "determ: Fournier." Both are *Pennisetum karwinskyi*.

DESCRIPTION.

Plants perennial, in loose clumps from hard knotted crowns. the culms produced from hard scaly bulblike buds bursting through the basal and underground sheaths; culms erect or ascending, simple or with leafy shoots from the lower nodes, mostly 1 to 1.5 meters tall, rarely only about 0.5 meter, very scabrous below the panicle, otherwise glabrous, the lower internodes compressed; sheaths keeled, mostly overlapping, pilose along the margin at least toward the summit, sometimes sparsely papillose-pilose, or rarely the lower densely pilose, throughout; ligule 1.5 to 2 mm. long, membranaceous-ciliate; blades usually rather firm, ascending or spreading, flat, 10 to 40 cm. long, 5 to 15 mm. wide, broadest at the base, tapering to a long, attenuate, very scabrous, usually involute tip, the upper surface scabrous and usually sparsely papillose-pilose, rarely densely so, sometimes scabrous only, the lower surface usually scabrous, sometimes smooth, the margins very scabrous; panicle rather stiff or slightly flexuous, 5 to 17 cm. long, mostly 10 to 12 mm wide, excluding the longest bristles, tawny or purplish or sometimes greenish, mostly dense except at the base, but sometimes the fascicles rather loosely arranged, the axis strongly angled, pubescent;

fascicles subsessile, ascending or spreading; bristles united at the very base, unequal, the outer short and slender, the inner stout, flattened and sparsely ciliate below (sometimes scabrous only but with some ciliate in the same fascicle, rarely none ciliate), commonly erect or appressed with ascending tips, 5 to 8 mm. long, the innermost sometimes 15 to 25 cm. long, rarely longer, flexuous (this innermost bristle commonly elongate in the lower fascicles and not in the upper in the same panicle, but sometimes elongate in all and sometimes not in any); spikelets 1 to 5 in each fascicle, sessile, 5 to 6 mm. long, about 1.3 mm. wide, glabrous or scaberulous; glumes thin, acute, the first 1-nerved, one-third to half the length of the spikelet, the second 5 to 7-nerved, two-thirds to three-fourths the length of the spikelet, or the attenuate tip elongate; sterile lemma slightly shorter than the fertile one, 5 to 7-nerved, acuminate, inclosing a palea of about equal length and usually a staminate flower; fruit subindurate, the apex attenuate and spreading.

In this species the fascicles vary greatly in size. Specimens with few-flowered fascicles and short bristles appear distinct from those with fascicles of 4 or 5 spikelets and elongate innermost bristles, but in several specimens almost the entire range of variation in fascicles is found from base to summit of a single panicle. The type specimen of *Cenchrus multiflorus* and that of *Pennisetum multiflorum* represent about the extremes of inflorescence, the first with short, relatively thick, bristles, plentifully ciliate, the second with long, very slender bristles, very sparingly or not at all ciliate. Jiménez's no. 522 has an exceptionally large panicle, the innermost bristles of all fascicles elongate, a few of them 5 cm. long.

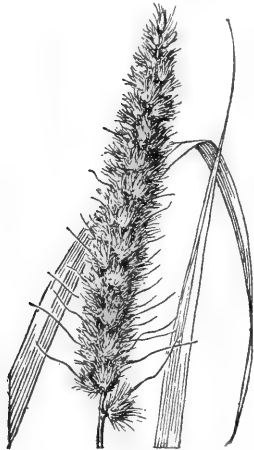


FIG. 67.—*Pennisetum karwinskyi*. From Pringle 3849, Mexico.

DISTRIBUTION.

Rocky, open, dry or moist slopes, mostly in the uplands, from Mexico to Costa Rica.

SONORA: Alamos, *Rose, Standley & Russell* 12866.

JALISCO: Guadalajara, *Hitchcock* 7342, 7364; *Holway* 3; *Pringle* 2044, 3849, 11327.

GUERRERO: Balsas, *Hitchcock* 6791. Acapulco, *Palmer* 75 in 1895.

OAXACA: San Agustín, *Liebmann* 341. Oaxaca, *Galeotti* 5880.

CHIAPAS: Between San Ricardo and Ocozocuantla, *Nelson* 2895. Ocuilapa, *Nelson* 3065.

(COSTA RICA: Nuestro Amo, *Jiménez* 522.

2985

6. *Pennisetum setosum* (Swartz) L. Rich.

Cenchrus setosus Swartz, Prodr. Veg. Ind. Occ. 26. 1788. "India occidentalis." The type specimen in the Swartz Herbarium at Stockholm was examined by A. S. Hitchcock.

Panicum cenchroides L. Rich. Act. Soc. Hist. Nat Paris 1: 106. 1792. "E Cayenna missarum a Domino Le Blond." The type has not been examined. The description is insufficient for identification. The name is referred here on the authority of Doell.²⁵

Pennisetum setosum L. Rich. in Pers. Syn. Pl. 1: 72. 1805. Based on *Cenchrus setosus* Swartz.

²⁵ In Mart. Fl. Bras. 2²: 306. 1877.

5½ P. *vulcanicum* Chase, Journ. Wash. Acad.
Sci. 13:363, 1923. "Crater of the volcano Cerro de
la Olla near Chalchuapa, Salvador, in 1922, by Dr.
Salvador Calderón (no. 1049.)

vulcanicum Jimenez, 522, Costa Rica

Pennisetum ... Wild Grass. Hard
... ..
... ..

Pennisetum rubescens Link based on above
same as " " Desv.

Pennisetum purpurascens H. B. K. Nov. Gen. & Sp. 1: 113. 1816. "Mexicani, Volcan de Jorullo." The type has not been examined, but the description applies well to the robust plants of Mexico. The blades are described as scabrous on the upper surface and on the margin and glabrous beneath, and the sterile floret as having a palea.

Pennisetum uniflorum H. B. K. Nov. Gen. & Sp. 1: 114. *pl. 34*. 1816. "Prov. Novae Andalusiae, juxta Cumanacoa," [Venezuela]. The description and plate identify the species. The sheaths are described as pubescent, the blades scabrous on the upper surface and margin, and glabrous beneath; the sterile lemma empty.

Panicum densispica Poir. in Lam. Encycl. Suppl. 4: 273. 1816. Based on "*Panicum cenchroides* Rich. non Lam."

Panicum triticoides Poir. in Lam. Encycl. Suppl. 4: 274. 1816. Described from a specimen in Desfontaines's herbarium, its source unknown. The type has not been examined. The description applies well to *Pennisetum setosum*, to which Doell²⁶ refers it. The sheaths are described as glabrous but pilose at the mouth, the blades as rough and sparsely pilose on both surfaces.

Setaria cenchroides Roem. & Schult. Syst. Veg. 2: 495. 1817. Based on *Panicum cenchroides* L. Rich.

Pennisetum triticoides Roem. & Schult. Syst. Veg. 2: 877. 1817. Based on *Panicum triticoides* Poir.

Gymnothrix geniculata Schult. Mant. 2: 284. 1824. "Setaria geniculata Sieb. Fl. Martin. * * In Martinica." The detailed description identifies the species. The sheaths are described as glabrous and the blades as scabrous on both surfaces.

Pennisetum alopecuroides Desv.; Hamilt. Prodr. Pl. Ind. Occ. 11. 1825. "India occidentali." The type has not been examined. The description of the "involucre" as pilose identifies the species. The sheaths are described as glabrous and the blades as subscabrous.

?*Pennisetum erubescens* Desv.; Hamilt. Prodr. Pl. Ind. Occ. 11. 1825. "St. Thomas." The brief diagnosis is insufficient for identification, but the species is probably *P. setosum*. The leaves are not described.

Pennisetum richardi Kunth, Rév. Gram. 1: 49. 1829. Based on *Panicum cenchroides* L. Rich.

Pennisetum sieberi Kunth, Rév. Gram. 1: 50. 1829. Based on "Gymnothrix geniculata Schult.—*Setaria geniculata* Sieb, herb. Mart."

Pennisetum hirsutum Nees, Agrost. Bras. 284. 1829. "In ripa fluminis S. Francisci ad Joazeiro provinciae Bahiensis et Pernambucensis; nec non in * * * provinciae Piauhensis." The specimen collected by Martius in Bahia, which was examined by A. S. Hitchcock in the Munich Herbarium, is probably the type. The sheaths are described as tuberculate-pilose toward the summit and the lower blades as tuberculate-pilose on both surfaces, the upper blades as sparsely pilose.

Pennisetum pallidum Nees, Agrost. Bras. 285. 1829. "Habitat. * * * ad latera montium de Mentanha et Itambé, districtus adamantini, provinciae Minarum." The type specimen, collected by Martius, was examined by A. S. Hitchcock in the Munich Herbarium. The sheaths and blades are described as tuberculate-hirsute.

Pennisetum flavescens Presl, Rel. Haenk. 1: 316. 1830. "Hab. in Mexico." The type specimen was examined by A. S. Hitchcock in the herbarium of the German University at Prag. The sheaths are described as smooth, the blades as nearly glabrous beneath and tuberculate-villous above.

Pennisetum dasistachyum Desv. Opusc. 76. 1831. "Habitat in Guyana." The type has not been examined. The description of the bristles identifies the species. Desvoux cites "*Panicum cenchroides* Rich. nec Lamk., densi-spica Poir." as synonyms. The sheaths and blades are described as glabrous, the sheaths bearded at the mouth.

²⁶ In Mart. Fl. Bras. 2²: 306. 1877.

Pennisetum hamiltonii Steud. Nom. Bot. ed. 2: 297. 1841. Based on "*P. alopecuroides* Hamilt. (non Spr. nec. Steud.)."

Pennisetum nicaraguense Fourn. Bull. Soc. Bot. France II. 27: 293. 1880. "Circa Granada (n. 1304)," Nicaragua, the specimen collected by Paul Lévy. The type has not been examined. The description applies well to the robust plants with hirsute blades collected by A. S. Hitchcock in Nicaragua (nos. 8708, 8738).

Pennisetum indicum var. *purpurascens* Kuntze, Rev. Gen. Pl. 2: 787. 1891. Based on *Pennisetum purpurascens* H. B. K.

In Leeke's²⁸ revision *Pennisetum setosum* is included under *P. indicum* (Murray) Kuntze, and the American plants as well as those of India and Africa are referred to var. *typica*. The plant of India is an annual, much more freely branching than is *P. setosum*, and has more slender, less dense panicles. It was described by Linnaeus as *Panicum polystachion*²⁹ and transferred by Schultes³⁰ to *Pennisetum*. Linnaeus, following a brief diagnosis, cites "*Rumph. amb. 6. t. 7. f. 2. B.*" Merrill³¹ identifies the Rumphian plant as *Setaria flava* (Nees) Kunth, and says that this "Rumphian reference is the whole basis" of *Panicum polystachion* L. Since Linnaeus gives a diagnosis of his own, however, (which does not agree with the Rumphian figure) I should take his own specimen as the basis of his species. Dr. Stapf states, in a letter, that in the Linnaean Herbarium there is a specimen of "the *Pennisetum setosum* of India" [that is, the species which has commonly been so called] "written up by Linnaeus himself *polystachyum*." If the name *Pennisetum indicum* (Murray) Kuntze³² were properly referable to this species it would be antedated by *P. polystachyum* (L.) Schult. Dr. Stapf holds that *Alopecurus indieus* Murray (Syst. Veg. ed. 13. 92. 1774), upon which *Pennisetum indicum* Kuntze is based, was based on *Panicum alopecuroides* of Linnaeus's Mantissa. Murray cites "*Panicum alopecuroides* Spec. plant. 82," but his description is copied verbatim from the Mantissa (p. 322, 1771) and not from the second edition of the Species Plantarum, the page reference to which he gives, nor from the first. In the Mantissa Linnaeus changes the application of the name. Following "*Panicum alopecuroides*. Excludatur et reformatum restitatur sequentibus" he gives a description that is based on some plant having pilose culm, sheaths, and blades, and apparently an inflorescence of pearl millet or of common millet. *Panicum alopecuroides*, "Habitat in China," of the first edition of the Species Plantarum (p. 55) was based on a plant undoubtedly sent to him by Osbeck.³³ In his Dagbok öfver Ostindsk resa, published in 1757, under date of September 27, 1751, Osbeck lists "*Panicum alopecuroides*" without description, among plants observed growing along hedgerows near Canton. Dr. Stapf, who at our request kindly examined the Chinese plant in the Linnaean Herbarium, identifies it with *Pennisetum compressum* R. Br., specimens of which from China agree perfectly with Linnaeus's description.

Leeke³⁴ refers *Panicum vulpisetum* Lam.,³⁵ described from Santo Domingo, to *P. indicum*. We have not seen Lamarck's specimen but the description (particularly that of the spike as repeatedly subdivided)³⁶ applies not to *P. setosum*, but to *Chaetochloa vulpisetata* (Lam.) Hitchc. & Chase, as described in the Grasses of the West Indies.³⁶ Lamarck mistakenly cited Sloane's plate 70, figure 1, thus giving an erroneous impression of his species, which he described from a specimen in the herbarium of

²⁸ Zeitschr. Naturw. 79: 17-19. 1907.

²⁹ Syst. Nat. ed. 10. 2: 870. 1759.

³⁰ Mant. 2: 146. 1824.

³¹ Rumphius's Herb. Amboinense 91. 1917.

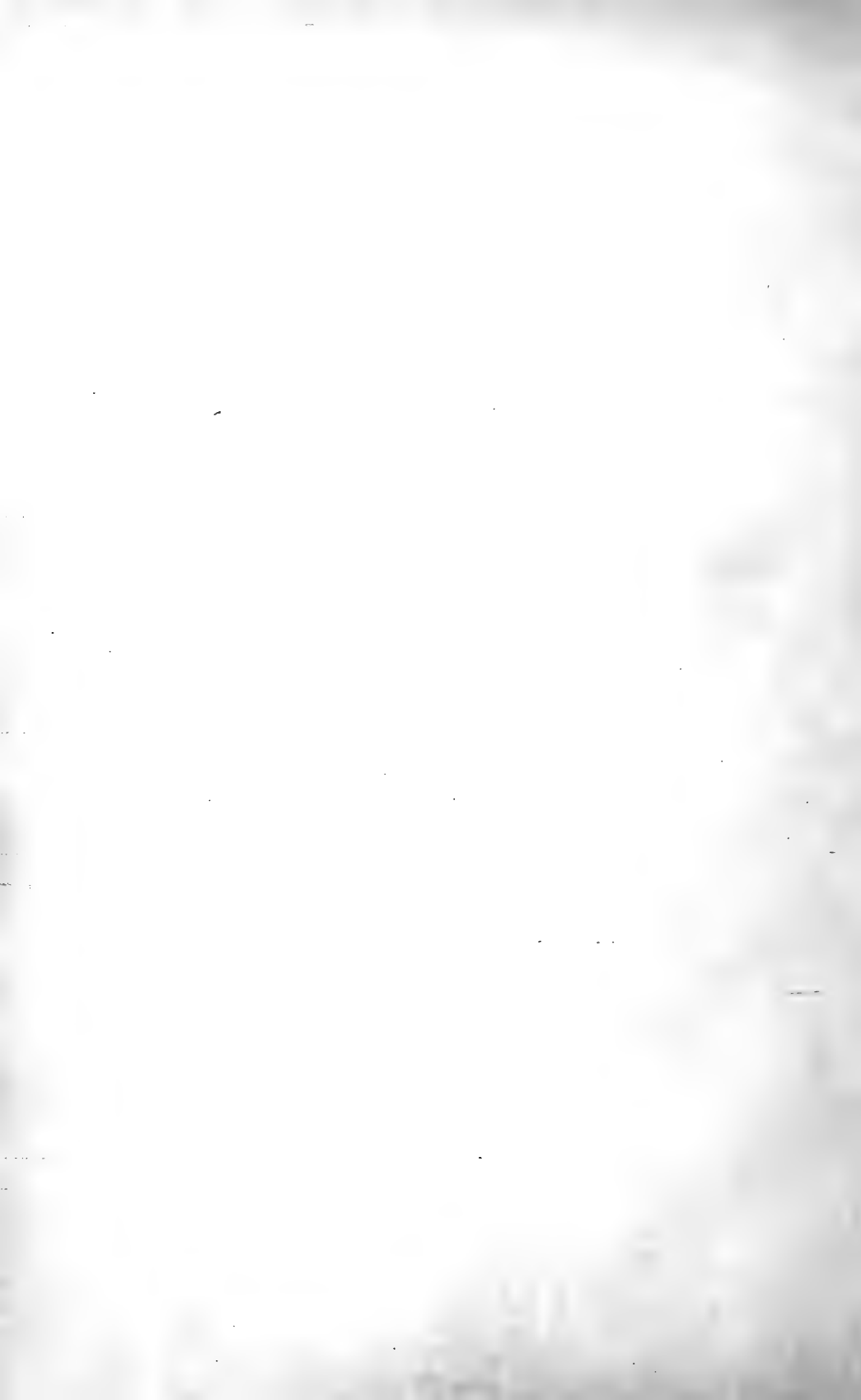
³² Rev. Gen. Pl. 2: 787. 1891.

³³ See Merrill on Osbeck's Dagbok in Amer. Journ. Bot. 3: 571. 1916.

³⁴ Zeitschr. Naturw. 79: 18. 1907.

³⁵ Encycl. 4: 735 (err. typ. 745). 1798.

³⁶ Contr. U. S. Nat. Herb. 18: 350. 1917.



Desfontaines. The specimen in the Sloane Herbarium from which the cited figure was drawn is *Imperata caudata*.³⁷

DESCRIPTION.

Plants perennial, in loose clumps, sometimes of 30 or more culms; culms usually 1 to 2 meters tall, slender to robust, subcompressed, ascending or suberect from the more or less geniculate, sometimes rooting lower nodes, bearing one to several flowering branches from the lower and middle nodes, scabrous below the panicle, otherwise glabrous; sheaths loose, from glabrous to rather densely papillose-hirsute, usually sparsely hirsute along the margin toward the summit, and otherwise glabrous; ligule membranaceous-ciliate, 2 to 3 mm. long; blades mostly rather firm, ascending or spreading, 10 to 40 cm. long, 4 to 18 mm. wide, tapering toward the base (or the reduced upper blades widest at base), acuminate into a long, slender, very scabrous tip, from scabrous on both surfaces (or rarely glabrous beneath) to rather densely papillose-hirsute on both surfaces, more commonly scabrous beneath and sparsely papillose-hirsute above, always stiffly hairy back of the ligule; panicles terminating the primary culm and branches, occasionally one or two axillary panicles borne in the upper sheaths, 10 to 25 cm. long, 8 to 10 mm. thick, excluding the elongate bristles, rather dense, usually somewhat nodding, from pale yellow to dusky purple or brown, the axis slender, scabrous; fascicles sessile, at first ascending, spreading or often reflexed in age; bristles unequal, the outer delicate, scabrous only, most of them shorter than the spikelet, the inner densely silky-plumose below, the hairs directed inward, those of the erect lower part of adjoining bristles matted and beautifully crimped, the bristles spreading above; spikelets solitary, sessile, 3.2 to 4 mm. long, 0.8 to 1 mm. wide, the glumes and sterile lemma very thin; first glume usually minute, often obsolete; second glume exceeding the sterile lemma and the fruit, 5-nerved, abruptly acuminate, ciliolate, sometimes obscurely erose or lobed; sterile lemma 5-nerved, ciliolate, minutely 3-lobed at the truncate apex, the palea sometimes and, less often, a staminate flower developed; fruit indurate, smooth and shining, 2 to 3 mm. long, 0.8 to 1 mm. wide, the narrowed apex of both lemma and palea stiffly ciliate-fringed.

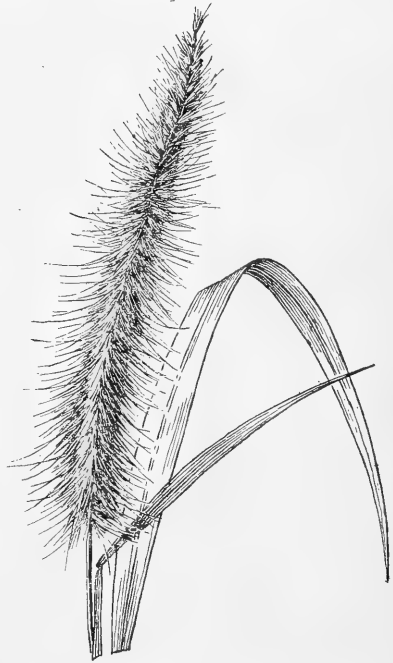


FIG. 68.—*Pennisetum setosum*. From Amer. Gr. Nat. Herb. 611, Trinidad.

In this species the pubescence of the foliage is exceedingly variable, but the floral characters are unusually constant.

³⁷ See Hitchcock, Contr. U. S. Nat. Herb. 12: 133. 1908. It is pertinent in this connection to quote Merrill's observation (Interpretation of Rumphius's Herbarium Amboinense, p. 27. 1917): "It is not at all certain that in quoting illustrations of various species as synonyms Linnaeus and his contemporaries and immediate successors intended them as exact synonyms; it would seem, in many cases at least, that the citation of illustrations as synonyms was intended to convey to other botanists some conception of what the species was like, and not necessarily to indicate that it was an exact equivalent of the species under which it was cited."

Pennisetum breve Nees³⁸ of Brazil is very closely related to *P. setosum*. Doell reduces it to a variety of that. The type of this, collected by Martius in Bahia, was examined by A. S. Hitchcock in the Munich Herbarium. It is not here included because the plants are much smaller and the fascicles and spikelets are larger. None of this form is found among North American collections; our few specimens are from near Rio de Janeiro. *Panicum alopecuroides* Lam.³⁹ (not *Pennisetum alopecuroides* (Nees) Steud. 1854), described from Brazil, the type of which, from Rio de Janeiro, was examined by A. S. Hitchcock, in the Lamarck Herbarium in Paris, belongs to this form.

DISTRIBUTION.

Open slopes and savannas, southern Florida and southern Mexico, through Central America and the West Indies to Brazil, reaching its greatest development on rocky slopes of Mexico and Central America. Specimens from Ashantee, Africa, appear to belong to this species, possibly introduced from America.

FLORIDA: Estero⁴⁰ Bay, *Garber* 28; *Sargent* in 1905.

JALISCO: Río Blanco, *Palmer* 677 in 1886. Guadalajara, *Pringle* 1740.

VERACRUZ: Jalapa, *Hitchcock* 6544. Zacuapan, *Purpus* 2154.

MORELOS: Cuernavaca, *Pringle* 11241.

COLIMA: Alzada, *Amer. Gr. Nat. Herb.* 433; *Hitchcock* 7094. Colima, *Palmer* 1269 in 1891.

GUERRERO: Between Petatlán and Chilapa, *Nelson* 2149. Acapulco, *Palmer* 433 in 1895.

OAXACA: Oaxaca, *Hitchcock* 6187. Trapiche de la Concepción, *Liebmann* 336, 337, 342.

CHIAPAS: Tuxtla, *Nelson* 3090.

GUATEMALA: Alta Verapaz, *Pittier* 217.

HONDURAS: San Pedro Sula, *Thieme* 636 (J. D. Smith no. 5582).

SALVADOR: Santa Ana, *Hitchcock* 8795. San Salvador, *Renson* 324.

NICARAGUA: Masaya, *Hitchcock* 8708, 8733, 8738. Jinotepe, *Hitchcock* 8702.

COSTA RICA: Between Boruca and Lagarto, *Tonduz* (or *Pittier*) 4457. Surubres, *Biolley* 17382. Nicoya, *Tonduz* 13751. Atenas, *Hitchcock* 8515. Guanacaste, *Jiménez* 698. Rodeo, *Pittier* 1614. Pacaca, *Pittier* 3287.

PANAMA: Taboga Island, *Hitchcock* 8095.

CUBA: San Juan de Buenavista, *Wright* 3471.

JAMAICA: Without locality, *Swartz*.

LEEWARD ISLANDS: St. Christopher, *Hitchcock* 16349. Guadeloupe, *Duss* 4152. Dominica, *Hitchcock* 16436; *Jones* 5.

WINDWARD ISLANDS: Martinique, *Duss* 1316, 4017; *Hahn* 1012. Barbados, *Dash* 346.

TRINIDAD: Icacos, *Amer. Gr. Nat. Herb.* 611; *Broadway* 4964. St. Joseph, *Amer. Gr. Nat. Herb.* 612.

TOBAGO: Plymouth, *Hitchcock* 10235. Adelphi, *Broadway* 4683.

COLOMBIA: Corinto, *Pittier* 989. Sabanas del Credo, *Pittier* 1487. Santa Marta, *Smith* 156, 2532. Without locality, *Linden* 1560; *Triana* 340.

VENEZUELA: Dos Caminos, *Pittier* 5756. Ocumare de la Costa, *Pittier* 6053. Valencia, *Carreño* 8237. Without locality, *Fendler* 1683.

BRAZIL: Ceara, *Gardner* 1885. Piauh, *Gardner*. Pará, *Goeldi* 81, 217.

BOLIVIA: Coripati, *Bang* 2168.

³⁸ *Agrost. Bras.* 281. 1829.

³⁹ *Tabl. Encycl.* 1: 169. 1791.

⁴⁰ Four specimens of this collection in the National Herbarium are all labeled "Lastero" or "Laster's" Bay. This is obviously an error in copying the name from Garber's original notes.

7. is not American, "Antilles" an error. See letter from E Hubbard in *Perminium hoodioides* (Lam) Sleed Africa in herb.

Possibly adventive in N.S., introduced with slaves from West Africa, but did not persist.

Not from W.I.
 7. *Pennisetum antillarum* (Poir.) Desv. *P. hardioides*
 (Lam.) Steud

Panicum antillarum Poir. in Lam. Encycl. Suppl. 4: 275. 1816. "Antilles (V. s. in herb. Desfont.)." The type specimen or a duplicate of it was examined by A. S. Hitchcock in the herbarium of the Botanical Garden at Florence and a fragment of inflorescence was given him for the National Herbarium. So far as known this is the only collection of this species in existence. The description given below, except that of the inflorescence, is translated from Poiret's description and that of Desvaux.

Saccharum? antillarum Roem. & Schult. Syst. Veg. 2: 877. 1817. Based on *Panicum antillarum* Poir.

Setaria antillarum Kunth, Rév. Gram. 1: 46. 1829. Based on *Panicum antillarum* Poir.

Pennisetum antillarum Desv. Opusc. 76. 1831. Based on *Panicum antillarum* Poir.

DESCRIPTION.

Plants probably perennial; culms erect, slender, terete, branching, scabrous below the panicle, otherwise glabrous; sheaths pilose, ciliate at the throat; blades narrowly linear, acuminate, pilose on the upper surface at least toward the base, glabrous beneath; panicle 8 to 15 cm. long, very slender, acuminate, rather dense, the slender angled axis minutely scaberulous; fascicles sessile, spreading; bristles scant, very slender, unequal, most of them about equaling the spikelet, the innermost conspicuously longer, 4 to 6 mm. long; spikelets solitary, sessile, 2 to 2.5 mm. long; glumes and sterile lemma thin, brownish, ciliate, the first minute, sometimes obsolete, the second exceeding the sterile lemma and the fruit, 5 to 7-nerved, minutely 3-lobed at the apex, the middle lobe acute, exceeding the lateral ones; sterile lemma 3 to 5-nerved, minutely 3-lobed, the middle lobe reduced to a mucro, the palea obsolete; fruit about 1.5 mm. long and 0.4 mm. wide, indurate, smooth and shining, the narrowed apex of both lemma and palea ciliate-fimbriate.

The spikelet and particularly the indurate, fimbriate-tipped fruit show relationship to *Pennisetum setosum*.

Known from a single collection from "Antilles."

8. *Pennisetum crinitum* (H. B. K.) Spreng.

Gymnothrix crinita H. B. K. Nov. Gen. & Sp. 1: 112. 1816. "Crescit in littore lacus Cuiseo [Lake Cuitzeo, Michoacán] prope La Puerta de Andaracuas, et juxta S. Rosa, * * * in regno Mexicano." The type specimen has not been examined, but the detailed description agrees perfectly with the numerous specimens from the region whence came the type.

Pennisetum crinitum Spreng. Syst. Veg. 1: 302. 1825. Based on *Gymnothrix crinita* H. B. K.

Pennisetum humboldtianum Hemsl. Biol. Centr. Amer. Bot. 3: 508. 1885. Based on *Gymnothrix crinita* H. B. K.

DESCRIPTION.

Plants perennial, glabrous as a whole; culms solitary or few together, erect from a curved or slightly geniculate base, robust, usually 2 meters or more tall, commonly bearing leafy flowering branches from all but the lower nodes, these often bearing sterile branches; internodes conspicuously channeled on the side toward the sheath, the lower mostly compressed, relatively short, the upper elongate; sheaths much shorter than the internodes, rather loose; ligule stiffly ciliate, about 0.5 mm. long; blades erect or ascending, rather thick, flat, those of the main culm 20 to 40 cm. long, 8 to 18 mm. wide, broadest at the base, those of the branches smaller; primary panicles usually



FIG. 69.—*Pennisetum antillarum*. From type specimen.

rather short-exserted, mostly stiffly erect, 12 to 25 cm. long, about 10 mm. thick, excluding the longer bristles, dense or sometimes loose at the base, stramineous or tawny or sometimes with pale bristles and greenish purple spikelets, the axis ridged, scabrous, toward the base often 2 mm. thick, the panicles of the branches commonly partly included, shorter, more slender, less densely flowered; fascicles sessile, ascending; bristles scant, unequal, most of them scarcely exceeding the spikelet, the outer shorter or two or three of them sometimes a little longer, the innermost stouter, 12 to 20 μ m. long; spikelets solitary, sessile, 5 to 6 mm. long, about 1.3 mm. wide, acuminate, often blotched with purple, scaberulous toward the summit; first glume one-fourth to half the length of the spikelet, 1-nerved, acute or subacute; second glume slightly shorter than the fruit, 5-nerved, subacute; sterile lemma equaling the fruit or slightly exceeding it, 5-nerved, acuminate, the palea obsolete; fruit indurate, 4.5 to 5 mm. long, about 1.3 mm. wide, acuminate, the tip often spreading, the tip of the palea free.

DISTRIBUTION.

Moist meadows or wet open ground, in the highlands of southern Mexico.

JALISCO: Río Blanco, *Palmer* 514 in 1886.

GUANAJUATO: Irapuato, *Hitchcock* 7397. Acámbaro, *Amer. Gr. Nat. Herb.* 432; *Pringle* 2608.

VERACRUZ: Río Blanco near Orizaba, *Hitchcock* 6343.

MEXICO: Lechería, *Pringle* 13251.

MICHOACAN: Morelia, *Holway*⁴¹ 3593; *Pringle* 4316; *Arsène* in 1909 and 1910. Pátzcuaro, *Holway* 3629.

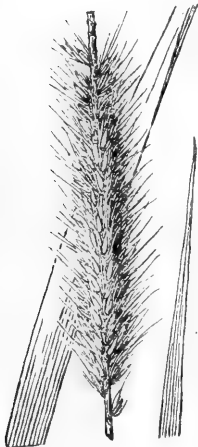


FIG. 70.—*Pennisetum crinitum*. From *Arsène* in 1910, Mexico.

9. *Pennisetum complanatum* (Nees) Hemsl.

Gymnothrix complanata Nees, *Bonplandia* 3: 83. 1855. "Seemann n. 1560. Panama." The description indicates an exceptionally small plant with decumbent base, such as Pittier's no. 1901a from Salvador. The type specimen is in the herbarium of the British Museum. Two fascicles from the panicle were kindly sent by Dr. Rendle for deposit in the National Herbarium.

Pennisetum complanatum Hemsl. *Biol. Centr. Amer. Bot.* 3: 507. 1885. Based on *Gymnothrix complanata* Nees.

Gymnothrix mexicana Fourn. *Mex. Pl.* 2: 48. 1886. "Orizaba * * * (BOURGEAU) n. 3139, SCHAFFNER n. 105, 174, THOMAS in herb. BUCHINGER, F. MÜLLER n. 2015, BOTTGERI n. 143, 1486); Papantla (LIEBMANN) n. 344)." The name was earlier listed without description by Hemsley.⁴² A specimen of Bourgeau's no. 3139 is in the National Herbarium. Liebmann's no. 344 in the Copenhagen Herbarium, bearing the name in Fournier's writing, has also been examined.

⁴¹ Dr. Holway's Mexican grasses collected in 1899 were sent to the agrostologist of the Department of Agriculture with labels bearing the name, locality, date, and collector's number, but without the name of the collector. By some mischance the collections were attributed to Dr. J. N. Rose, whose name was written by some clerk on the Department of Agriculture label. It was only after the publication of Hitchcock's Mexican Grasses (*Contr. U. S. Nat. Herb.* 17: 181-389. 1913) that the mistake was discovered. This and other specimens collected by Holway are there cited as Rose's.

⁴² *Biol. Centr. Amer. Bot.* 3: 508. 1885.

m/



Gymnothrix grisebachiana Fourn. Mex. Pl. 2: 48. 1886. "Mirador (SCHAFFN[ER] n. 185. pl. ed. Hohen.)." A specimen of Schaffner's no. 185 was examined by A. S. Hitchcock in the Grisebach Herbarium at Göttingen.

Pennisetum mexicanum Hemsl. Biol. Centr. Amer. Bot. 3: 508. 1885, nom. nud.; Ind. Kew. 2: 458. 1894. Based on *Gymnothrix mexicana* Fourn.

DESCRIPTION.

Plants perennial; culms solitary or few together, erect or ascending from a strong rhizome, 1 to 2 meters tall, sometimes dwarfed, scabrous below the panicle, otherwise glabrous, simple or, more commonly, with one or two, rarely with several, flowering branches, the lower nodes sometimes geniculate, the internodes terete (or the lower slightly compressed) slightly or not at all channeled, not elongate and naked; sheaths loose, commonly as long as the internodes or longer, pilose on the margin at the summit, sometimes pubescent on the collar; ligule ciliate, about 2 mm. long; blades thinner than in *P. crinitum*, mostly somewhat spreading, flat, or folded at base, 20 to 55 cm. long, 5 to 8 or rarely 10 mm. wide, glabrous beneath, very scabrous on the upper surface, often papillose-pilose toward the base and with stiff hairs just back of the ligule, attenuate into an elongate involute setaceous tip; panicles nodding or somewhat flexuous, 7 to 16 cm. long, about 10 to 12 mm. thick, excluding the longest bristles, not so dense as in *P. crinitum*, with tawny or purplish bristles and pale spikelets, the slender axis ridged and scabrous; fascicles on very minute bearded peduncles, ascending; bristles numerous, unequal, most of them exceeding the spikelet, several to many, 12 to 15 mm. long, the innermost 15 to 25 mm. long, but usually not conspicuous as in *P. crinitum*; spikelet solitary, sessile, 6 to 7 mm. long, about 1.8 mm. wide, rather abruptly pointed, minutely scaberulous; first glume one-fourth to one-third the length of the spikelet, thin, 1-nerved, acute to truncate; second glume two-thirds to three-fourths as long as the fruit, 5-nerved, acute or subacute; sterile lemma slightly shorter than the fruit, 5-nerved, acuminate, inclosing a palea of equal length and usually a staminate flower; fruit rather less indurate than in *P. crinitum*, acuminate-tipped, the tip of the palea free.

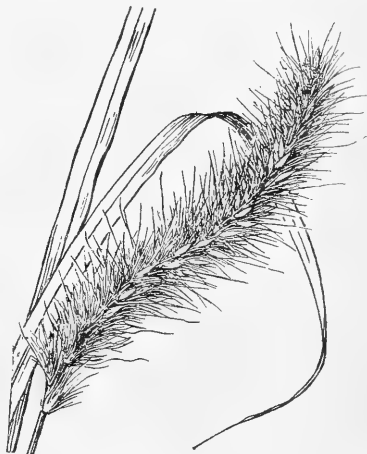


FIG. 71.—*Pennisetum complanatum*. From Türckheim 3835, Guatemala.

DISTRIBUTION.

Open, rather dry slopes and savannas from near sea level to 1,500 meters altitude from southern Mexico to Panama.

VERACRUZ: Orizaba, Bourgeau 3139; Hitchcock 6356; Mohr in 1857; Müller 2015, Smith 625. Papantla, Liebmann 344. Mirador, Schaffner 185.

GUATEMALA: Cobán, Türckheim 81, 445, 3835. Guatemala City, Hitchcock 9042, 9043, 9058; Popenoe 734. Eureka, Hitchcock 9077. Laguna de Ayarza, Heyde & Lux 3923. Salida de Izabel, Seler 2301. Antigua, Kellerman 5112. Lake Amatitlán, Kellerman 6248.

SALVADOR: Sonsonate, Hitchcock 8973. Izalco, Pittier 1901a. Volcano of San Salvador, Hitchcock 8943.

PANAMA: El Boquete, Hitchcock 8250.

10. *Pennisetum domingense* (Spreng.) Spreng.

Gymnothrix domingensis Spreng. in Schult. Mant. 2: 284. 1824. "In S. Domingo. Bertero." The type has not been examined. The description, especially that of the minute involute blades, leaves no doubt of the identity of the species.

Pennisetum domingense Spreng. Syst. Veg. 1: 302. 1825. "Hispaniol" [Santo Domingo]. The brief description is doubtless drawn from the same Bertero collection, though *Gymnothrix domingensis* is not mentioned. *Cenchrus parviflorus* Poir. is erroneously given as a synonym. That name, as shown by Hitchcock,⁴³ is a synonym of *Chaetochloa geniculata* (Lam.) Millsp. & Chase.

DESCRIPTION.

Plants glabrous, perennial: culms terete, solid, slender, rigid, glaucous, glabrous, as much as 7 meters tall, branching, the branches borne singly or in fascicles of 2 to 4, about equaling the main culm, stiffly spreading at an angle of about 30 degrees; nodes mostly swollen; sheaths 3 to 5 cm. long, much shorter than the elongate

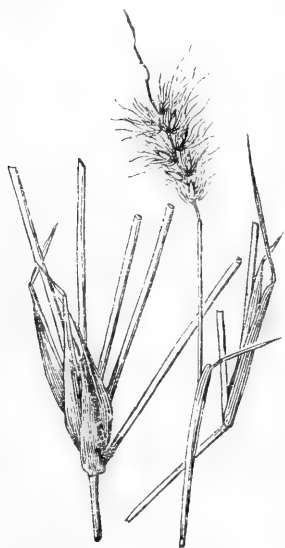


FIG. 72.—*Pennisetum domingense*.
From Türckheim 3669, Santo Domingo.

internodes, those subtending the fascicles loose and flat; ligule lacerate-ciliate, about 0.5 mm. long; blades 0.5 to 4 cm. long, 1 to 2 mm. wide, involute, divergent, firm, falling from the sheaths in age; panicles 3 to 5 cm. long, terminal only, erect, loosely flowered, the slender axis angled, scabrous; fascicles on minute pubescent pedicels, ascending or spreading, the scabrous bristles slender, flexuous, unequal, most of them 4 to 10 mm. long, the innermost less slender and 15 to 20 mm. long; spikelet 4.2 to 4.5 mm. long, about 1.4 mm. wide, obscurely strigose; first glume about one-third the length of the spikelet, faintly 3 to 5-nerved, erose; second glume two-thirds as long as the spikelet, 5-nerved, acute; sterile lemma nearly equaling the fertile lemma, 5-nerved, sulcate down the middle, abruptly and minutely mucronate, the palea equaling the lemma and inclosing a well-developed staminate flower; fruit brownish, 4 to 4.2 mm. long, about 1 mm. wide, acuminate, the lemma mucronate.

The above description is drawn from a single incomplete specimen, Türckheim's no. 3669. The following note is given by Türckheim on the specimen in the herbarium of the Berlin Botanic Garden [translated]: "Near Maniel de Ocoa, 300 meters altitude; dry ground among shrubs. Only one plant, 7 meters high. October, 1910." The species is apparently very rare.

DISTRIBUTION.

On dry shrubby hillsides, Santo Domingo and eastern Cuba.

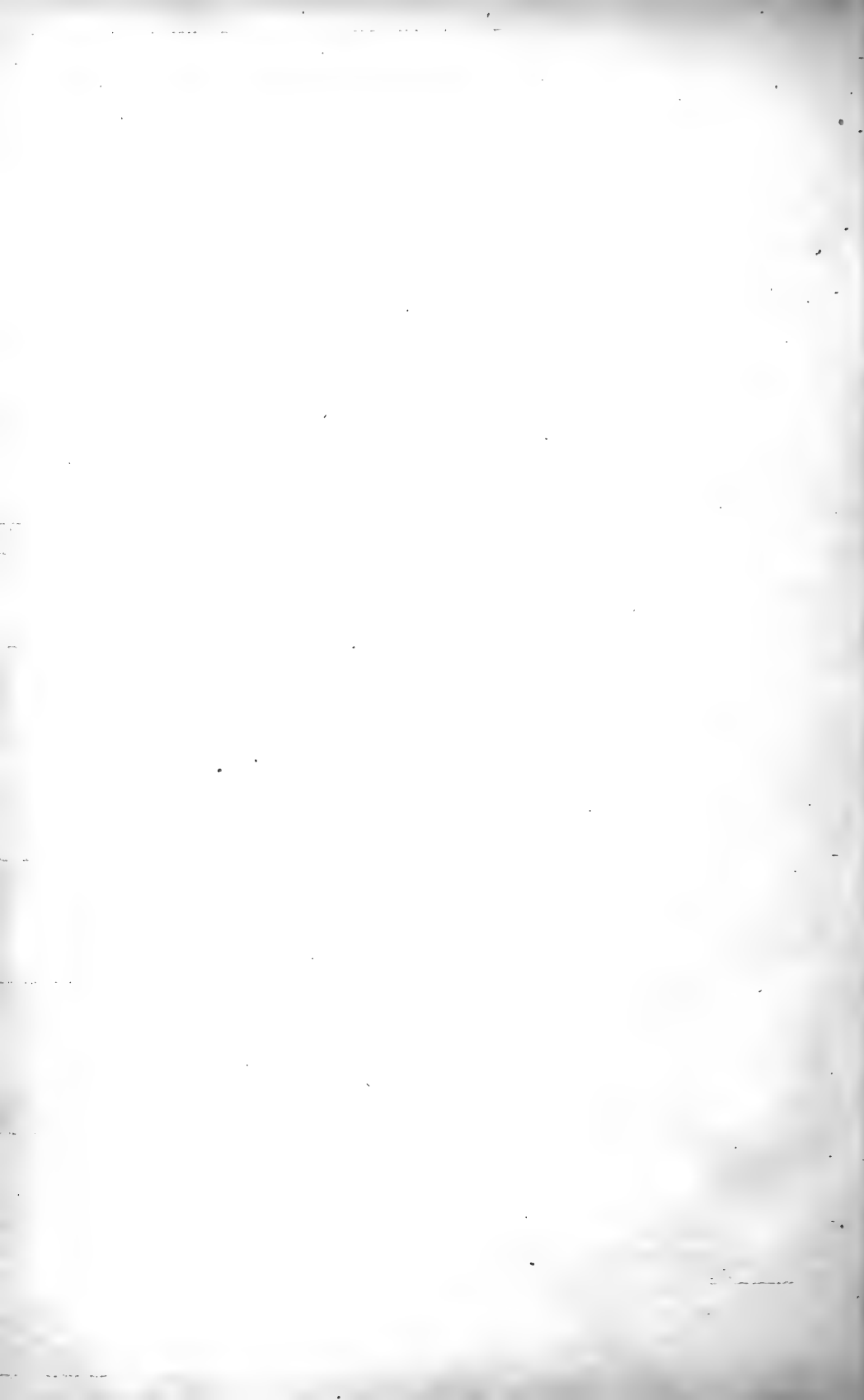
CUBA: Eastern Cuba, Wright 1547.

SANTO DOMINGO: Maniel de Ocoa, Türckheim 3669.

11. *Pennisetum durum* Beal.

Pennisetum durum Beal, Grasses N. Amer. 2: 163. 1896. "*P. crinitum* Scribn. ined * * * Mexico, Pringle 489, 817." Dr. Beal's work was based on the collections in the herbarium of the Michigan Agricultural College. In this herbarium are two specimens of "*Pennisetum crinitum* Scribn." which are marked "*durum* Beal" in Beal's handwriting. These are Pringle's nos. 498 and 817, both from the state of

⁴³Contr. U. S. Nat. Herb. 22: 168. 1920.



Chihuahua. Since no. 498 is erroneously cited as 489, the second specimen cited, Pringle's no. 817, is taken as the type. This is a single complete culm 1.5 meters tall.

Pennisetum crinitum Scribn.; Beal, Grasses N. Amer. 2: 163. 1896. Not *Pennisetum crinitum* Spreng. 1825. A herbarium name given as synonym of *P. durum*.

Pennisetum pringlei Lecke, Zeitschr. Naturw. 79: 33. 1907. "Mexiko." The detailed description identifies the species. No specimen is cited, but from the specific name it is to be supposed that the description was drawn from one of Pringle's three collections of this species, his numbers 498, 817, or 4962.

DESCRIPTION.

Plants perennial; culms few to several from a hard knotted crown, erect, mostly rather robust and rigid, 1.2 to 2 meters tall, usually glaucous, strigose or scabrous on the nodes and just below them, otherwise glabrous, slightly compressed, simple or rarely with a few leafy branches from the upper nodes; sheaths loose, mostly much shorter than the internodes, pubescent on the margin toward the summit and usually on the collar, otherwise glabrous or rarely scaberulous, the scarios margin (especially in the large lower leaves) sometimes produced into an erect auricle at the summit; ligule a ring of stiff hairs 1.5 to 2 mm. long; blades ascending or spreading, mostly rather firm, scabrous and sparsely pilose on both surfaces, or smooth or glabrous beneath, rarely also on the upper surface, 15 to 60 cm. long, 5 to 17 mm. wide, narrowed to the base (often in the lower leaves almost petiole-like) and tapering into a long involutesetaceous scabrous tip; panicles terminal and on slender naked peduncles exserted from the upper 2 to 4 sheaths, 1 to 4 peduncles from a sheath, the panicles nodding, 3 to 10 cm. (rarely 11 to 12 cm.) long, mostly 8 to 10 mm. thick, usually pale, the axis very slender, angled and scabrous; fascicles sessile, ascending; bristles rather scant, unequal, most of them shorter than the spikelet, the innermost longer, sometimes twice the length of the spikelet; spikelet solitary, sessile, 6 to 7 mm. long, about 1.5 mm. wide, acuminate, glabrous; glumes 1 to 3-nerved, acutish, the first about one-third and the second half the length of the spikelet; sterile lemma equaling the fruit or slightly shorter, 5-nerved, acute, its palea obsolete; fruit subindurate, acuminate.



FIG. 73.—*Pennisetum durum*.
From type collection.

DISTRIBUTION.

On dry rocky slopes in the highlands of Mexico; apparently rare.

CHIHUAHUA: Santa Eulalia Mountains, Pringle 498. Potrero Mountains, Pringle 817.
OAXACA: Sierra de San Felipe, Pringle 4962; Conzatti & González 491.

12. *Pennisetum distachyum* (Fourn.) Rupr.

Pennisetum distachyum Rupr. Bull. Acad. Sci. Brux. 9²: 242. 1842. "(Sectio Gymnothrix. Beauv.) (Coll. H. Gal[eotti]. no. 5680.) [Perennial].—Cette espèce remarquable et qui atteint la taille élevée de 15 à 16 pieds, croît par grosses touffes, comme les Bambusae, dans les ravins sombres et humides de la Barranca de San Martin, près de Zacuapan (État de Vera-Cruz), à 1,500 pieds de hauteur absolue." No further description is given. The name is given by Fournier as a synonym of *Gymnothrix distachya* Fourn.

Gymnothrix distachya Fourn. Mex. Pl. 2: 48. 1886. "*Pennisetum distachyum* Rupr. in Bull. Acad. roy. Brux. ix. n. 8. (nomen)." Fournier cites four specimens, among them that to which Ruprecht gave the name, Galeotti's no. 5680. This specimen, which, since Ruprecht's name is used, must be taken as the type, has not been examined. One of the other specimens cited, Botteri's no. 1214, is represented in the National Herbarium by three specimens, one being the scant-bristled, greenish-panicked form (to which the name *P. distachyum* is here applied) and two being the many bristled, tawny panicked form described below as *P. prolificum*. Botteri's numbers are known to be badly mixed. Little reliance can be placed on citations of his specimens. Fournier's description is unsatisfactory, being mostly a comparison with "*G. tristachya* H. B. K.," which he thinks is but 3 to 4 feet tall, and under which, as shown by the specimens cited, he confused two species, *P. distachyum* and the form with longer purplish bristles and spikelets with staminate lower floret which he described as *Gymnothrix bambusiformis*. But the description of the bristles as not numerous and but little exceeding the spikelet points to the scant-bristled form heretofore called *P. tristachyum* (H. B. K.) Spreng.⁴⁴ by American authors.

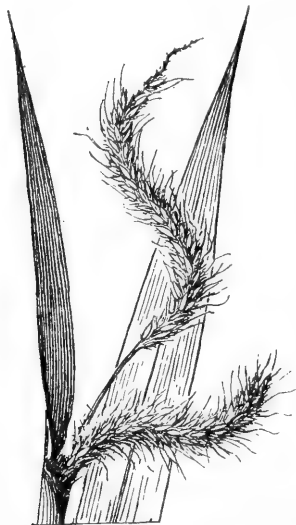


FIG. 74.—*Pennisetum distachyum*.
From Botteri 96, Mexico.

DESCRIPTION.

Plants perennial; culms 1 to 4 meters tall, robust, glabrous or scabrous below the nodes, mostly solitary, erect or ascending from a decumbent base, often rooting at the geniculate lower nodes, branching from the middle and upper nodes, the primary branches ascending, the secondary and ultimate branchlets spreading or nodding, with 1 to 4 slender-peduncled drooping panicles from each sheath, the whole forming a top-heavy leafy compound inflorescence; nodes appressed-hirsute; sheaths loose, mostly shorter

than the internodes, hirsute along the margin and at the summit or glabrate; ligule stiff, lacerate-ciliate, 2 to 3 mm. long; blades flat, mostly spreading, appressed-hirsute on both surfaces or glabrate beneath and sometimes nearly so above, those of the main culm 25 to 45 cm. long, 1.5 to 3.5 cm. wide, narrowed or attenuate at base, the attenuation sometimes elongate, the apex acuminate, but not setaceous-tipped, those of the branches smaller, lanceolate, rounded or slightly narrowed at base; panicles numerous, dull green, terminal and axillary, the slender flexuous scabrous peduncles unequal, the longest often as much as 15 to 20 cm. long, one of the cluster of panicles usually partly included, the panicles rather densely flowered, 3 to 8 cm. long, rarely 10 cm. long, about 1 cm. wide, excluding the longest bristles, usually tapering to the apex, the longer ones flexuous, the axis slender, angled,

⁴⁴ This species based on *Gymnothrix tristachya* H. B. K. (Nov. Gen. & Sp. 1: 113. 1816), described from Ecuador, has less freely branching culms, longer and narrower blades, longer panicles, longer bristles, and larger spikelets. The locality cited with the original description is "prope Puenbo * * * regni Quitensis." Mr. Gagnepain, of the Paris Herbarium, states that the Puenbo specimen is very poor, but that a specimen from Quito, a panicle and part of a branch of which were kindly sent to the National Herbarium, agrees perfectly with the type. Specimens from Ecuador and Peru agree exactly with this and with the original description and the illustration published later (H. B. K. Nov. Gen. & Sp. 7: pl. 679. 1825). Other specimens commonly referred to *P. tristachyum* belong to various allied species.



scabrous; fascicles on minute pubescent peduncles, ascending; bristles slender, scant (mostly less than 20), unequal, most of them shorter than the spikelet or but little exceeding it, the innermost about twice as long as the spikelet; spikelets 4.5 to 5.5 mm. long, 1 to 1.2 mm. wide, acuminate; glumes unequal, obscurely ciliate, the first minute, 1-nerved, acute or obtuse, the second about one-third to nearly half the length of the spikelet, 3-nerved, acute or subacute; sterile lemma slightly exceeding the fertile lemma. 5-nerved, depressed down the middle, scabrous, especially toward the summit, acuminate, the palea wanting; fruit acuminate, but little indurate, the lemma 5-nerved and scabrous toward the summit, the margins thin and flat.

This species is very closely related to *Pennisetum latifolium* Spreng. of the Atlantic slope of South America from Brazil to Uruguay. That, like *P. distachyum*, has been referred to *P. tristachyum*. The illustration given by Doell.⁴⁵ as *Gymnothrix tristachya* H. B. K. represents *P. latifolium*. In that species, described from Montevideo, the blades are on the average longer for their width than in *P. distachyum*, the panicles are mostly longer and yellowish, and the bristles longer, the innermost one three to four times the length of the spikelet.

DISTRIBUTION.

In moist ground, in ravines and along stream borders and irrigation ditches, in the uplands from southern Mexico to Costa Rica.

VERACRUZ: Zacuapan, *Purpus* 2894. Mirador, *Liebmann* 339. Orizaba, *Botteri* 96, 631, 1209, 1214 in part; *Bourgeau* 2543; *Müller* 2066; *Seaton* 291. Córdoba, *Bourgeau* 1664.

OAXACA: Cuicatlán, *Pringle* 5558, 5559.

GUATEMALA: Baja Verapaz, *Türkheim* 3880.

COSTA RICA: San Francisco de Guadalupe, *Jiménez* 2; *Tonduz* 8020, 14064. San José, *Hitchcock* 8448. San Ramón, *Tonduz* 17910.

13. *Pennisetum prolificum* Chase, sp. nov.

Plants perennial; culms 2 to 4 meters tall (probably taller, the base not seen), very robust, glabrous, branching from the upper nodes, the branches often in fascicles of 2 to several, relatively slender, repeatedly fasciculately branching, the ultimate branchlets very slender, nodding, their nodes often strongly geniculate, the very numerous panicles 2 to 5 together on very slender, flexuous, usually glabrous peduncles, mostly 2 to 10 cm. long, the terminal panicle often solitary, the whole system of branches forming a great drooping leafy compound tawny inflorescence often 1 meter or more long and probably nearly as wide; nodes glabrous or strigose; sheaths loose, glabrous or ciliate on the margin above, sometimes with a few long soft hairs at the summit; ligule stiff, lacerate-ciliate, about 2 mm. long; blades flat, mostly spreading, 15 to 50 cm. long, 2 to 4 cm. wide (on the average a little shorter and broader than those of *P. distachyum*), narrowed but not long-attenuate at base, glabrous on both surfaces or slightly scabrous above, those of the branches progressively smaller, the ultimate ones much more reduced than those of *P. distachyum*; peduncles unequal, one panicle of a fascicle partly included; panicles tawny, 3 to 5 cm. long, about 1 cm. wide,



FIG. 75.—*Pennisetum prolificum*. From type specimen.

⁴⁵ In Mart. Fl. Bras. 2^e: pl. 41. 1877.

denser than in *P. distachyum*, slightly tapering or obtuse at the apex, the slender angled axis minutely scabrous; fascicles nearly sessile, somewhat spreading; bristles slender, numerous, more spreading than in *P. distachyum*, most of them exceeding the spikelet, the innermost not conspicuously longer than the rest; spikelet similar to that of *P. distachyum*, but minutely scabrous only or glabrous, the glumes thinner, more obtuse, the first usually nerveless, often erose; sterile palea wanting; fruit scarcely indurate (thinner than in *P. distachyum*).

Type in the U. S. National Herbarium, no. 250836, collected on rocky slopes, barranca of Metlac, altitude about 900 meters, State of Veracruz, Mexico, January 29, 1895, by C. G. Pringle (no. 6075; distributed as *Pennisetum bambusiforme* Hemsl.)

None of the specimens seen shows the base of the plant. This species has been confused with *P. bambusiforme*, from which it differs in its smooth or nearly smooth blades, denser inflorescence, much shorter and more densely flowered, tawny panicles, somewhat shorter bristles, less unequal in length, and in the absence of the sterile palea.

DISTRIBUTION.

Rocky slopes, uplands of southern Mexico.

VERACRUZ: Orizaba, *Botteri* 1214; *Mohr & Botteri* in 1856. Barranca of Metlac, *Pringle* 6075.

GUERRERO: Sierra Madre, *Langlassé* 849.

OAXACA: Plunia, *Nelson* 2484.

14. *Pennisetum bambusiforme* (Fourn.) Hemsl.

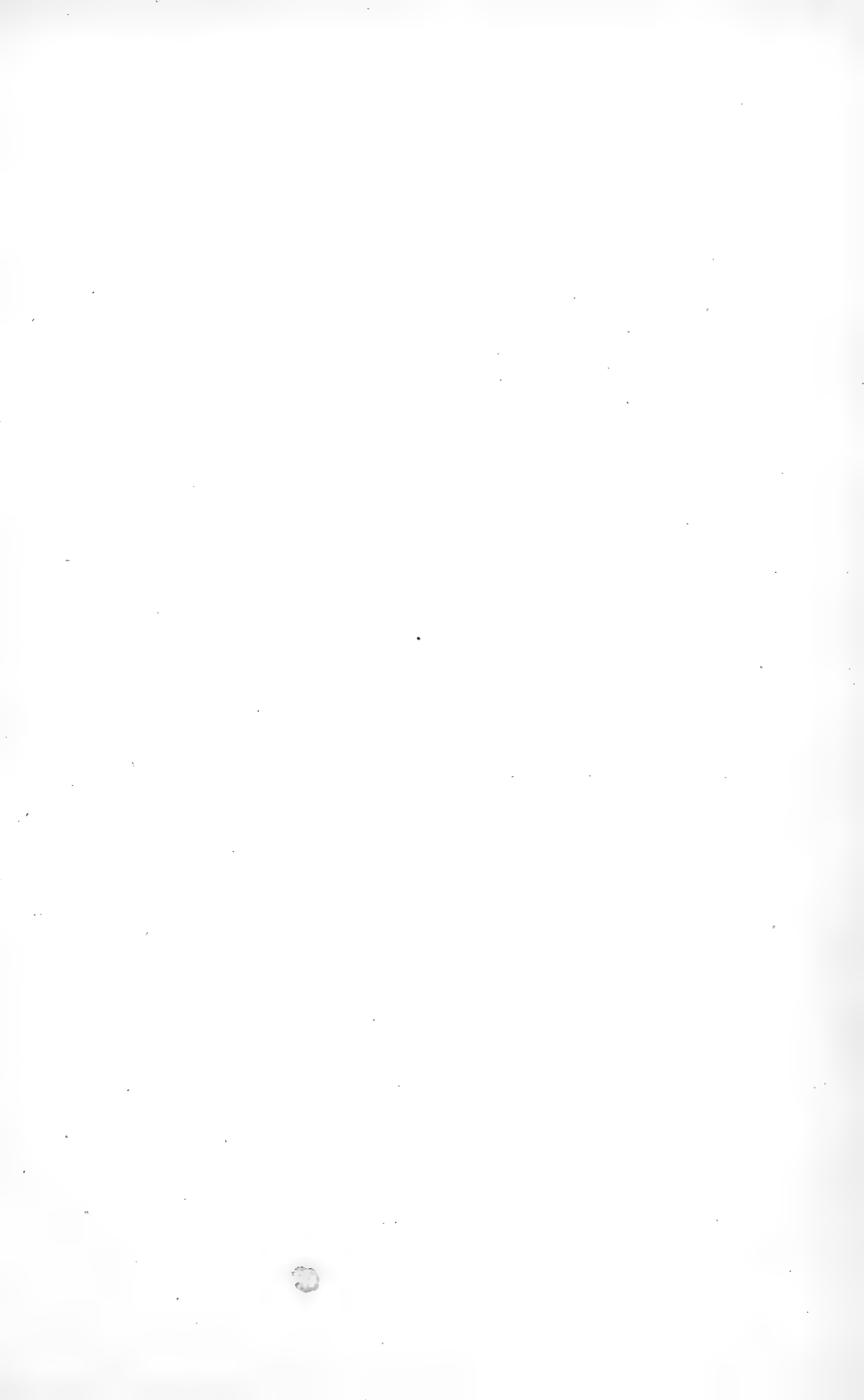
Gymnothrix bambusiformis Fourn. Mex. Pl. 2: 48. 1886. "Prope *Mirador* (SCHAFEN. n. 338)" is the only specimen cited. The name was earlier listed without description by Hemsley.⁴⁶ Schaffner's no. 338 has not been examined. It seems possible that "Schaffn." may be an error. Liebmann's no. 338 is from *Mirador*, and the specimens of this collection distributed from the Copenhagen Herbarium are labeled "*Gymnothrix bambusaeformis* Fourn. determ. Fournier," and agree perfectly with Fournier's description. Fournier, however, cites Liebmann's no. 338 under "*G. tristachya* H. B. K." As stated above (under *Pennisetum distachyum*), Fournier's idea of that species was confused. His description of *G. bambusiformis* is fairly detailed. The characters that point most certainly to the identification here made of *G. bambusiformis* are [translated]: "Bristles unequal, of which one is constantly longer, most of them twice the length of the spikelets," and "neuter floret 2-paleate." In the species described above as *Pennisetum prolificum*, which has been confused with *P. bambusiforme*, the bristles are not very unequal, the innermost one scarcely noticeably longer (most of them are about once and a half the length of the spikelet), and the lower floret is empty.

Pennisetum bambusiforme Hemsl. Biol. Centr. Amer. Bot. 3: 507. 1885, nom. nud.; Ind. Kew. 2: 458. 1894. Based on *Gymnothrix bambusiformis* Fourn.

Pennisetum tristachyon var. *bambusiforme* Leeke, Zeitschr. Naturw. 79: 33. 1907. Based on *Gymnothrix bambusiformis* Fourn.

Pennisetum tristachyum var. *galeottianum* Leeke, Zeitschr. Naturw. 79: 33. 1907. "Mexico." Leeke places the various allies of *P. tristachyum* under that species as varieties. His var. *bambusiforme* is based on *Gymnothrix bambusiformis*, hence the name is a synonym of *P. bambusiforme*; but it is uncertain to which of the forms Leeke applies the name. He includes *Gymnothrix distachya* Fourn. as a synonym, but in his brief diagnosis says "Culmi nodi glabri." In *P. distachyum* the nodes are appressed-hirsute; in *P. bambusiforme* and *P. prolificum* they are glabrous or strigose. The diagnosis of var. *galeottianum* is: "Culmi nodi pilosi: spiculae 4-4.5 mm. longae." In Galeotti's no. 5871 (*P. bambusiforme*) the lower nodes present are strigose but the

⁴⁶ Biol. Centr. Amer. Bot. 3: 507. 1885.



~~Parus weberbaueri~~ Mez, Notizbl. Berlin-Dahlem
7:58. 1922. Weberbauer 2393. Taruma, Peru!

spikelets are 5 mm. or more long. A specimen of that collection in the herbarium at Vienna is labeled "*Pennisetum tristachyum* var. *Galeottianum* I. e. n. var." and is probably the type. Galeotti's no 5871 differs from other specimens of *P. bambusiforme* in that the sterile floret is empty in about half the spikelets examined. Otherwise the specimen has the characters of this species.

DESCRIPTION.

Plants perennial, the culms very robust, probably as much as 6 meters tall (the base not seen), glabrous, branching from the upper nodes, the branches often in fascicles of 2 or 3 (on the average less numerous than in *P. prolificum*), slender, repeatedly branching, the whole forming a drooping compound leafy inflorescence, looser and less massive than in *P. prolificum*; nodes glabrous, rarely appressed-pubescent; sheaths loose, ciliate on the margin and with an erect tuft of white hairs at the summit (old sheaths commonly glabrescent), the sheaths of the inflorescence on the average longer than in *P. prolificum* and somewhat inflated; ligule lacerate-ciliate, about 2 mm. long; blades flat, rather firmer than in the two preceding species, ascending or spreading, those of the main culm 20 to 35 cm. long, 2 to 3.5 cm. wide, narrowed, sometimes somewhat attenuate at base, scabrous or appressed-pubescent on the upper surface, softly appressed-pubescent beneath, sometimes glabrescent, the blades of the ultimate branchlets narrow, much reduced; peduncles slender, scaberulous, flexuous, unequal, one panicle of the fascicle partly included; panicles purplish tawny, 5 to 12 cm. long (rarely longer), about 1 cm. wide, excluding the longest bristles, loose, flexuous, tapering at the apex, the slender angled axis scabrous or hispidulous; fascicles on minute pedicels, not crowded, ascending; bristles slender, flexuous, numerous, very unequal, most of them about twice the length of the spikelet, the innermost sometimes as much as 2 cm. long; spikelets 5 to 6 mm. long, 1 to 1.2 mm. wide, scabrous; glumes unequal, the first minute, usually nerveless, obtuse or erose, the second one-fourth to one-third the length of the spikelet, 1 to 3-nerved, acute or erose; sterile lemma exceeding the fertile lemma, 5 to 7-nerved, attenuate into a slender flexuous tip, inclosing a well-developed palea and usually a staminate flower; fruit 4.5 to 5 mm. long, the lemma scabrous toward the acuminate apex, but slightly indurate.



FIG. 76.—*Pennisetum bambusiforme*. From Jiménez 990, Costa Rica.

DISTRIBUTION.

On rocky slopes and cliffs, between 900 and 2,800 meters altitude, southern Mexico to Peru.

VERACRUZ: Mirador, Liebmann 338. Petlapa,⁴⁷ Liebmann 340.

OAXACA: Comaltepec, Galeotti 5871.

⁴⁷ We are unable to locate this station, but most of Liebmann's collections were made in Veracruz. It may be in Oaxaca.

GUATEMALA: Panzamalá, *J. D. Smith* 1853; *Türckheim* 34. Cobán, *Türckheim* 11. 2136, 11. 2183. El Palmar, *Kellerman* 6262. Volcán Atitlán, *Kellerman* 5781. Volcán del Fuego, *Seler* 2422.

COSTA RICA: Rancho Redondo (Goicoechea), *Jiménez* 990. "Cabeceras del Bkis," *Pittier* 10573.

COLOMBIA: Bogotá, *Apollinaire & Arthur* 12.

PERU: Santa Ana, *Cook & Gilbert* 1632.



EXCLUDED SPECIES.

The following names at some time included in *Pennisetum* comprise only those based on species found in America:

Pennisetum corrugatum (Ell.) Nutt. = *Chaetochloa corrugata* (Ell.) Scribn.

Pennisetum crusgalli (L.) Baumg. = *Echinochloa crusgalli* (L.) Beauv.

Pennisetum geniculatum (Lam.) Jacq. = *Chaetochloa geniculata* (Lam.) Millsp. & Chase.

Pennisetum germanicum (Beauv.) Baumg. = *Chaetochloa italica germanica* (Mill.) Scribn.

Pennisetum italicum (L.) R. Br. = *Chaetochloa italica* (L.) Scribn.

Pennisetum laevigatum (Muhl.) Nutt. = *Chaetochloa geniculata* (Lam.) Millsp. & Chase

Pennisetum montanum (Griseb.) Hack. = *Hymenachne montana* Griseb.

Pennisetum myosuroides (H. B. K.) Spreng. = *Cenchrus myosuroides* H. B. K.

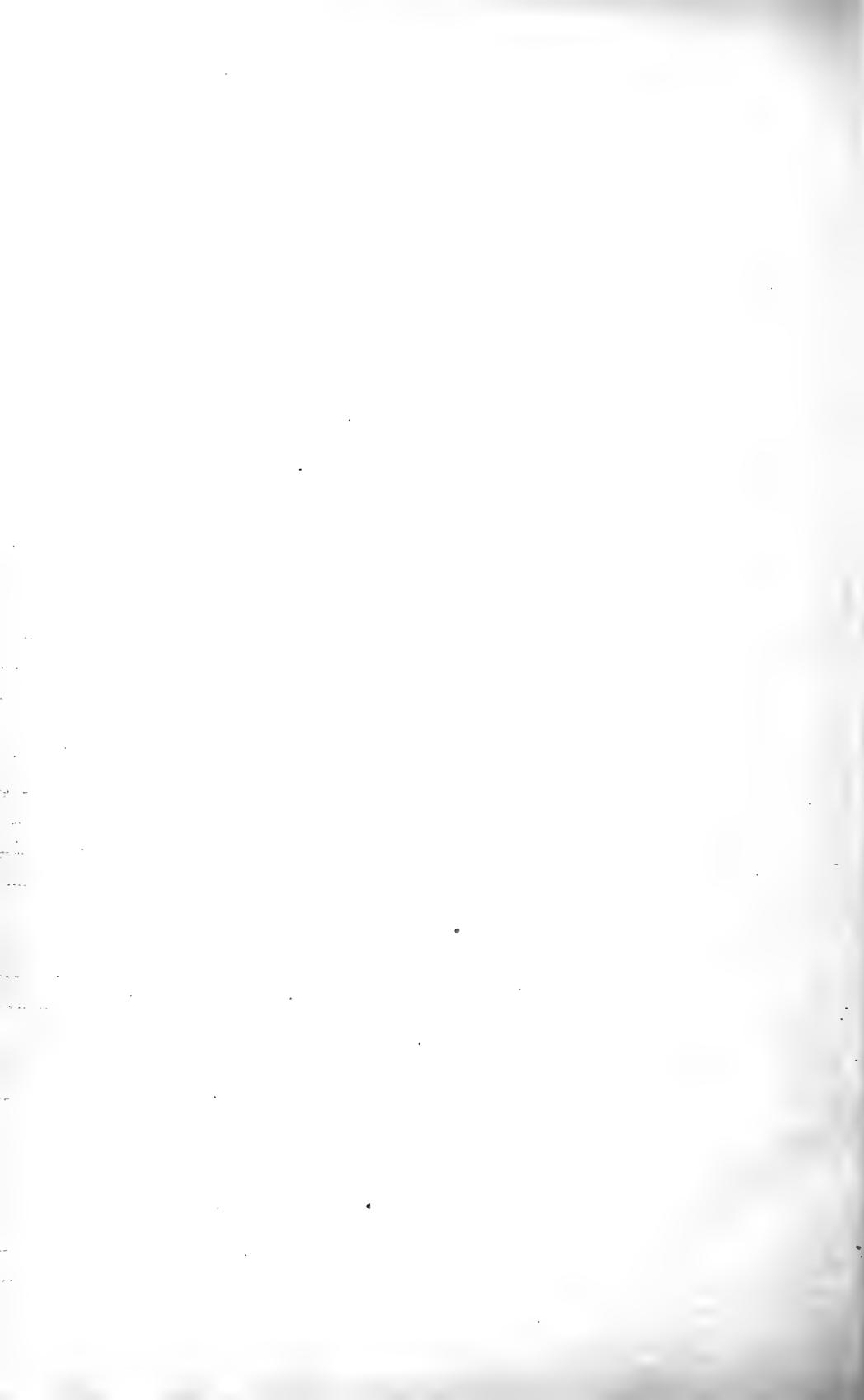
Pennisetum pungens Nutt. = *Cenchrus myosuroides* H. B. K.

Pennisetum scandens (Schrad.) Jacq. = *Chaetochloa scandens* (Schrad.) Scribn.

Pennisetum verticillatum (L.) R. Br. = *Chaetochloa verticillata* (L.) Scribn.

Pennisetum viride (L.) R. Br. = *Chaetochloa viridis* (L.) Scribn.

* *Pennisetum nervosum* (Nees) Trin.
3198 Ferris & Duncan, vicinity of
Brownsville, Texas



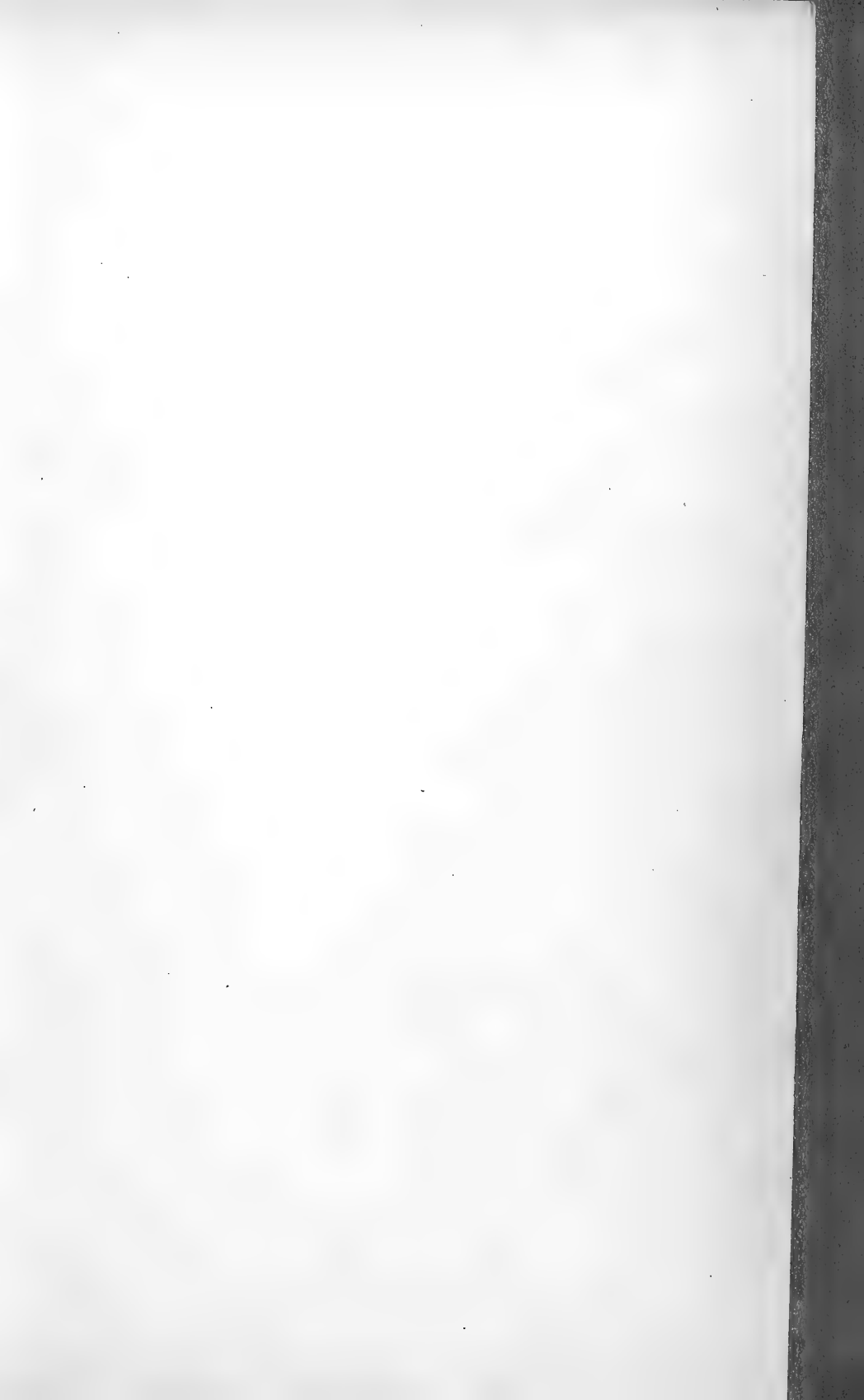
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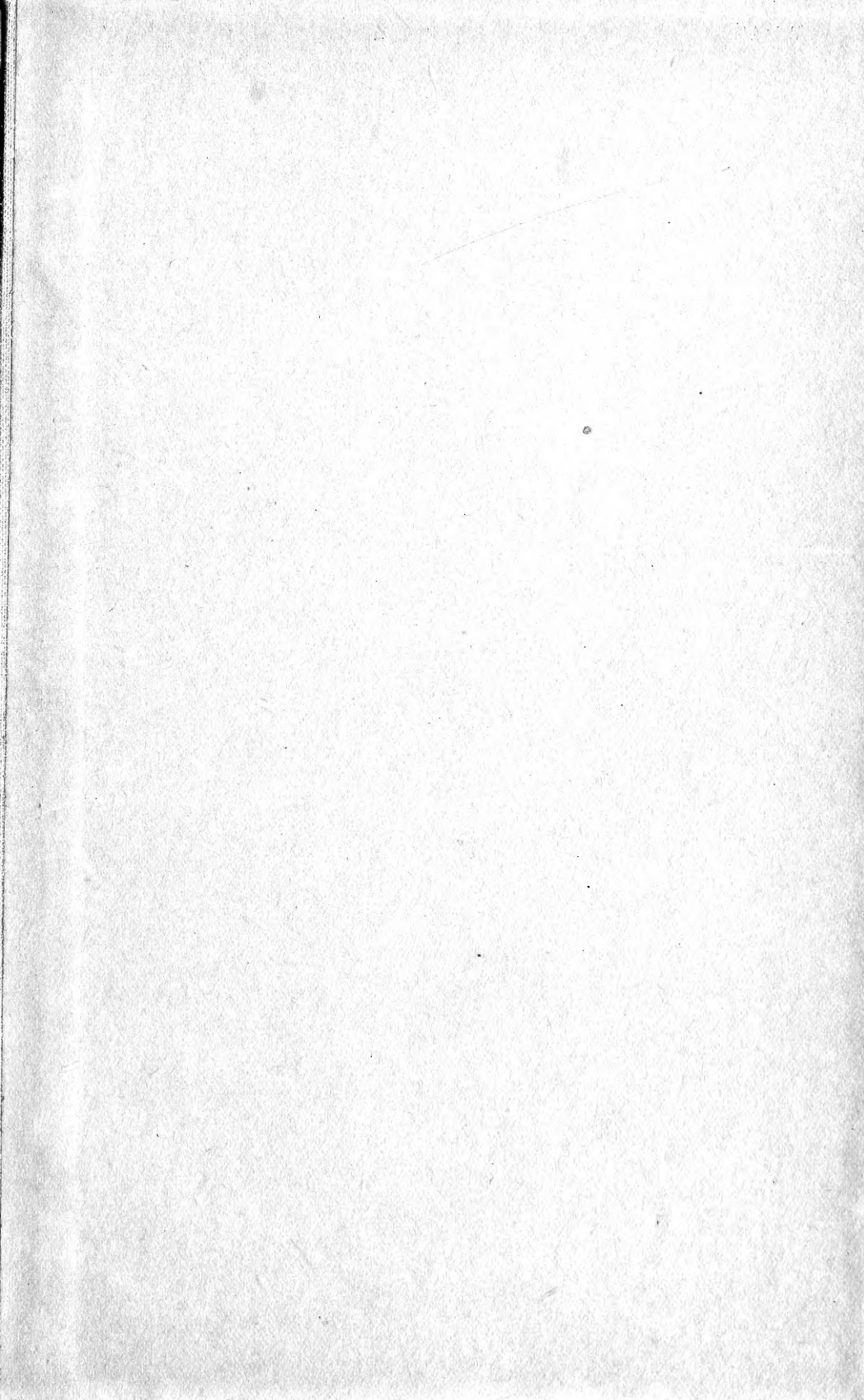
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