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.

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[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 involucel, 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 "involucel" 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.

Doell[1] 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.

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[1] In Mart. Fl. Bras. 2[3]: 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. Vratis. 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 strigosioribus. 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*.

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

Panicastrella Americana, major, annua, spica laxa, purpurascente. Michell, 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. Michell does not indicate which of his two species it is meant to show.

Panicastrella Americana, minor, annua, spica angustiori, densa, albicante. Michell, 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, *Anthcræ* 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.

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[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 work [3] 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 Lunell [6] proposed the name *Nastus* (giving Dioscorides as author) for "*Cenchrus frutescens* Linn." "Not *Cenchrus* Hippokrates." 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. 1327. 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."

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[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. Monaclinae." 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*.

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

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. palmeri.**

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, 1327. 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 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.

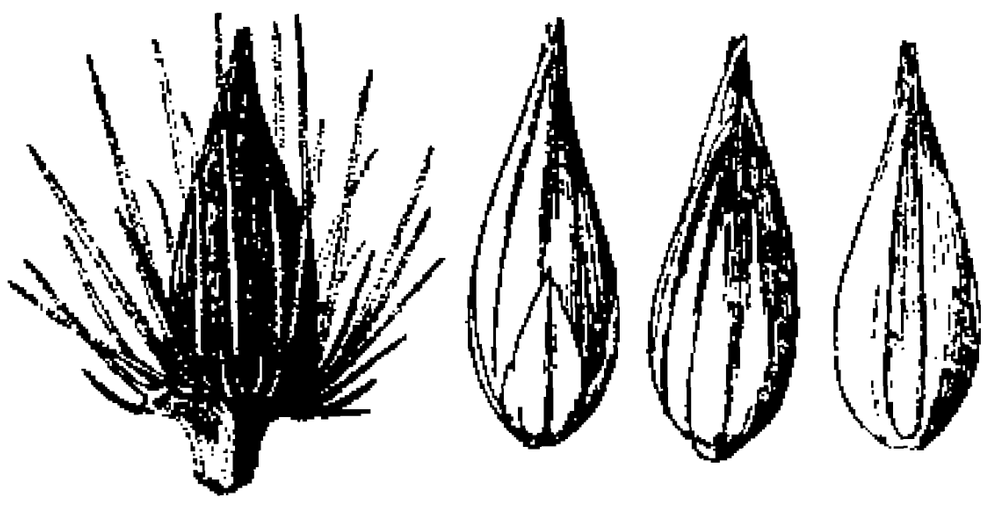

FIG. 7.—*Cenchrus myosuroides.* From *León & Voisard* 835, Cuba.

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: Jekyl Island, *Baldwin.*

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

LOUISIANA: Bayou Terre Bonne, *Wurzlow* 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, *Brandegee* 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* 868 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; *Barkelew* 171. Socorro, *Barkelew* 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: Farija, *Fries* 1103.

PERU: Callao, *Wilkes Expl. Exped.*

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

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 involucral 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

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 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 involucral 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.

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

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 involucral bristles are longer, more sharply pointed, and less rigid.

3. Cenchrus distichophyllus Griseb.

Cenchrus distichophyllus Griseb. Cat. Pl. Cub. 234. 1866. "Cuba occ. (Wr[ight] 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.

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.

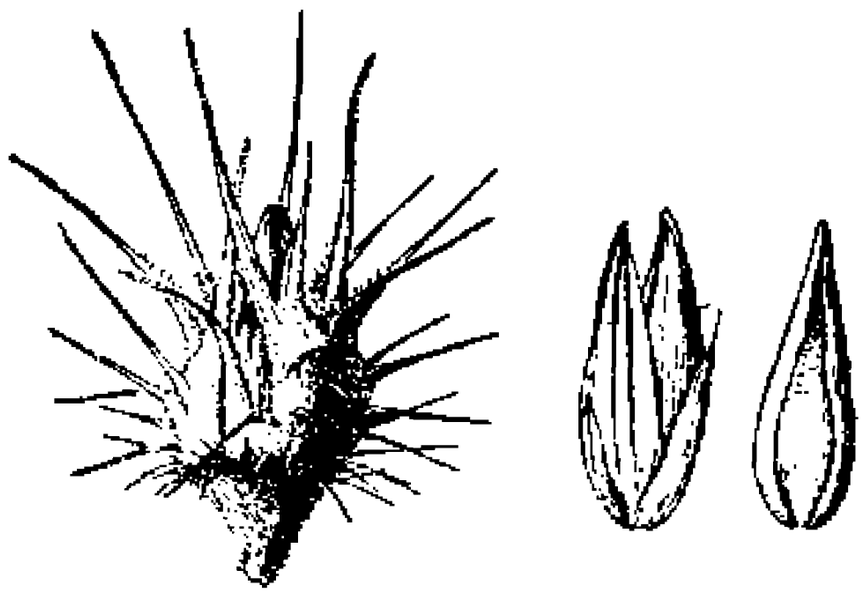

FIG. 9.—*Cenchrus distichophyllus.* From the type specimen.

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 Islands[1] some sterile specimens collected on Albemarle Island are doubtfully referred to *Cenchrus distichophyllus*. Stewart[2] 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 Novobarcellonensis (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.

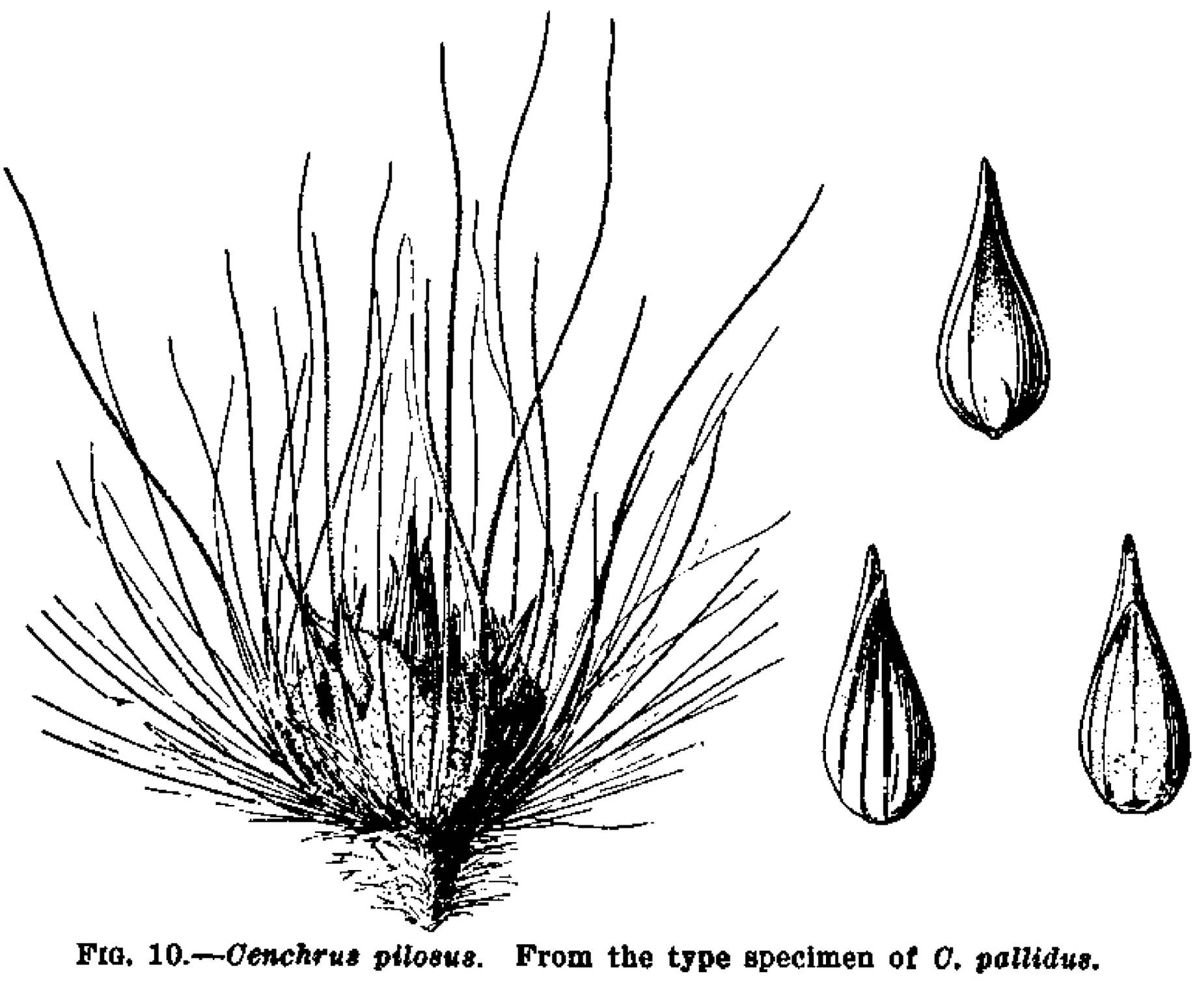

FIG. 10.—*Cenchrus pilosus*. From the type specimen of *C. pallidus*.

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.
CURAÇAO: Willemstad, *Britton & Shafer* 3156.

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. 2³: 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. 2³: 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.

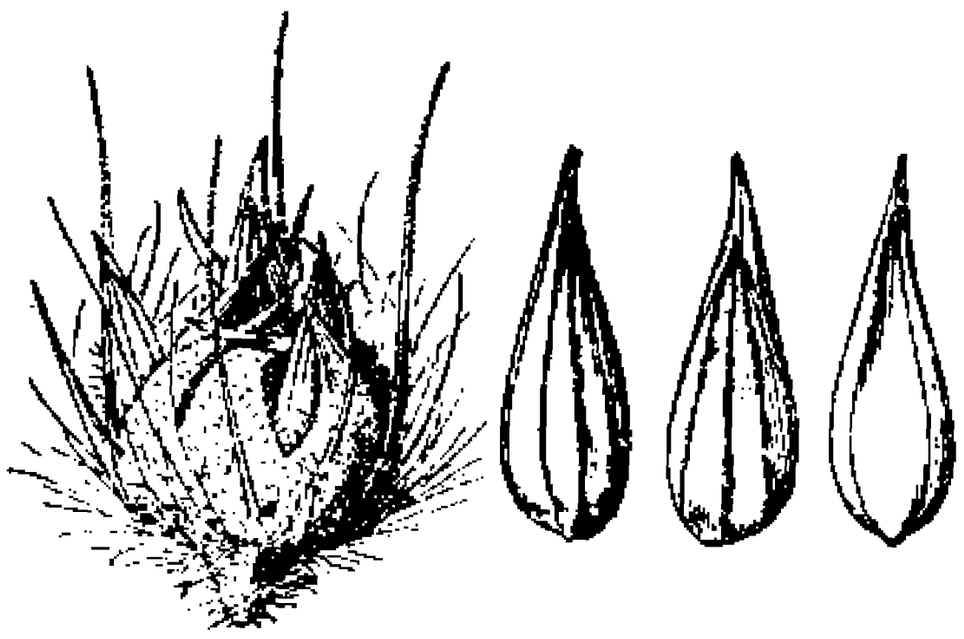

FIG. 11.—*Cenchrus viridis*. From the type specimen.

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, *Millspaugh* 1682. Mérida, *Schott* 498. Izamal, *Gaumer* 1084.
QUINTANA ROO: Chichankanab, *Gaumer* 2448.
GUATEMALA: Cerro Gordo, *Heyde & Lux* 4296. Escuintla, *Hitchcock* 9093. 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, *Millspaugh* 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, *Millspaugh* 1268.
PORTO RICO: Guanica Bay, *Chase* 6517. Juana Diaz, *Sintenis* 2904. Cayo Muertos, *Britton, Cowell & Brown* 4986. Vieques, *Shafer* 2653; *Chase* 6667. Culebra, *Britton & Wheeler* 122; *Millspaugh* 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

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, states[1] 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* (SCHAFFN[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 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*.

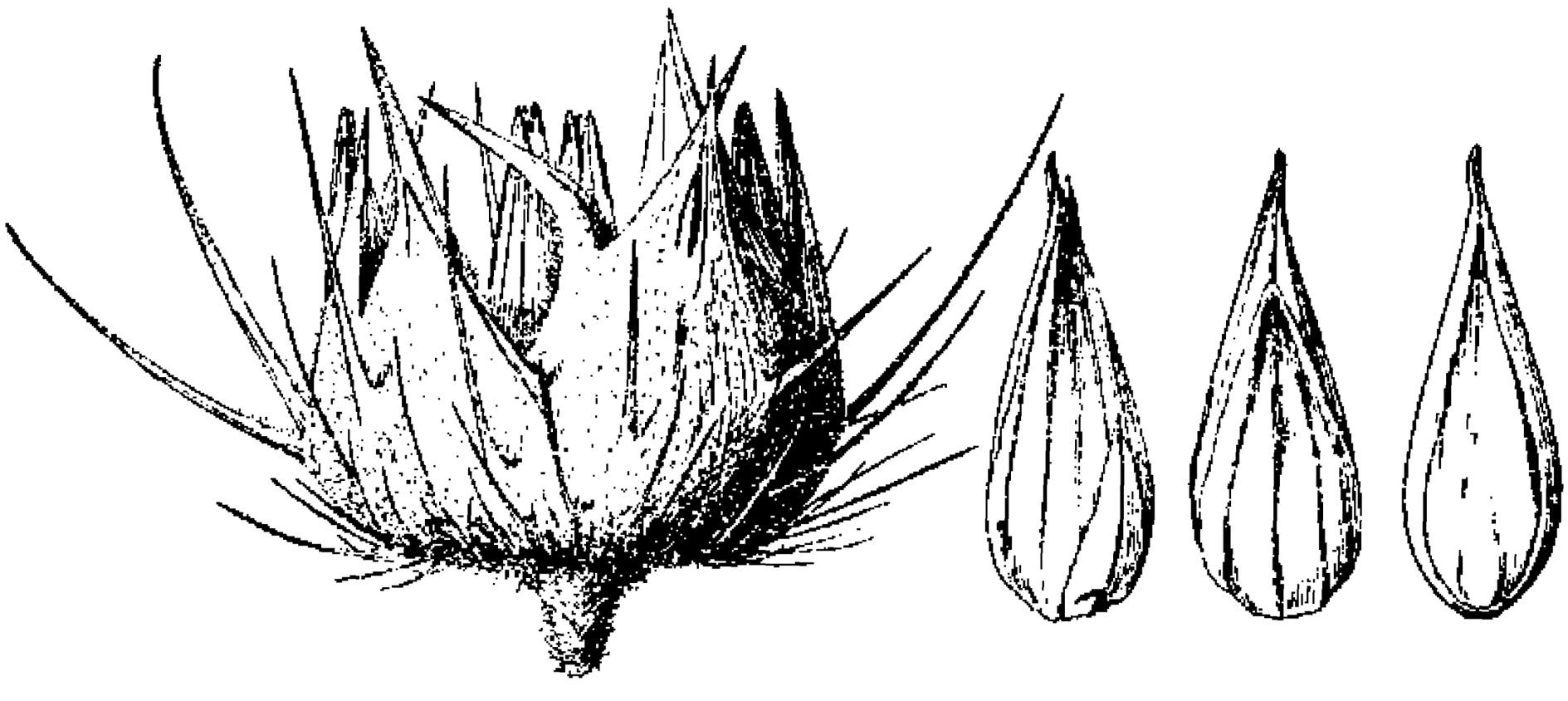

FIG. 12.—*Cenchrus echinatus*. From *Hitchcock* 9379, Jamaica.

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[2]: 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 spinelike, 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.

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[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: Techuacán, *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, *Millspaugh* 1698.

GUATEMALA: Mazatenango, *Kellerman* 5110. Lake Amatitlán, *Kellerman* 4780. Guatemala City, *Hitchcock* 9083; *Holway* 591. Secanquím, *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; *Millspaugh* 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, *Türckheim* 3228.
PORTO RICO: Santurce, *Heller* 1346. Catano, *Millspaugh* 163. Bayamon, *Chase* 6386. Rio 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, *Glaziou* 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

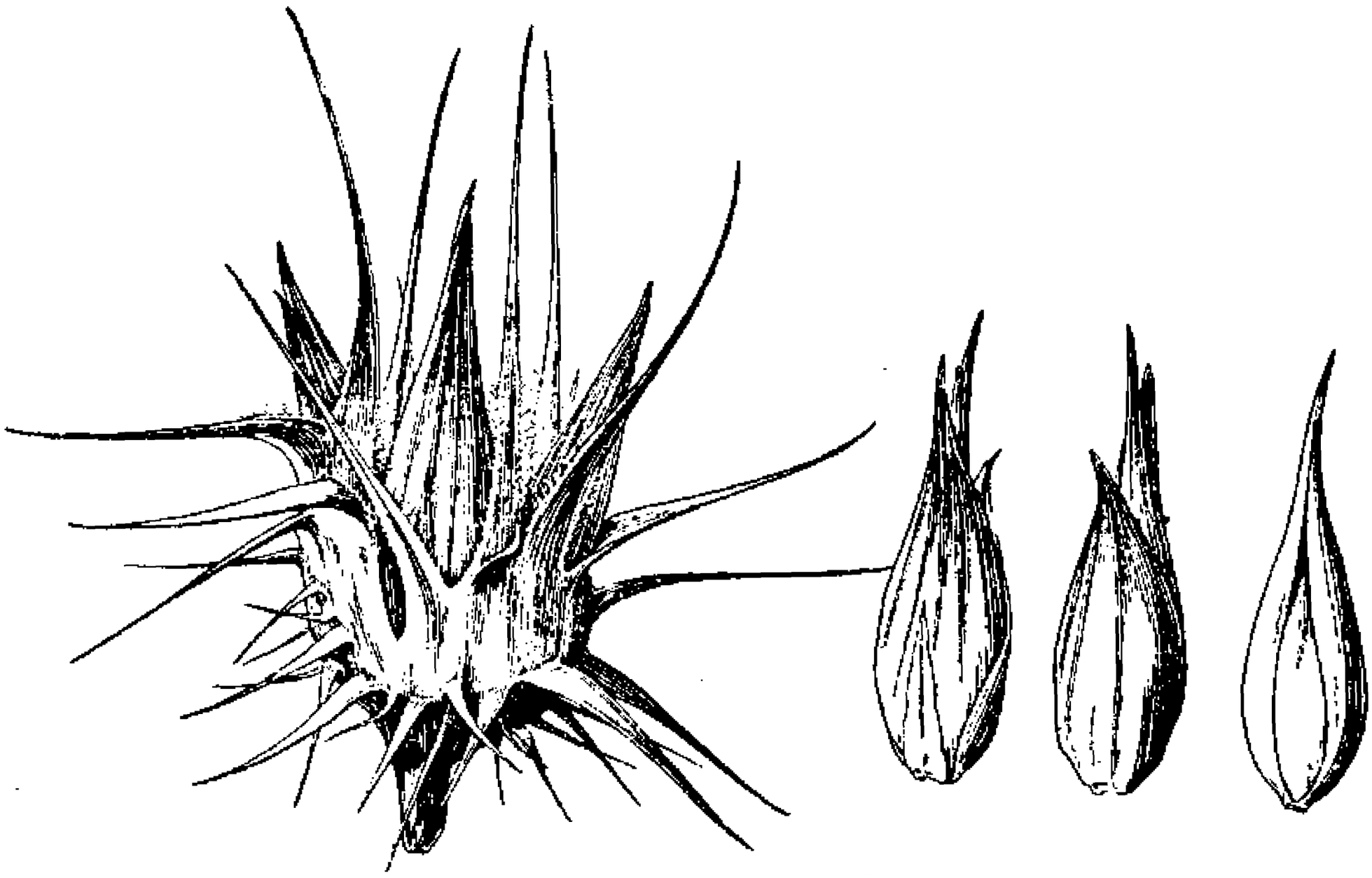

FIG. 14.—*Cenchrus gracillimus*. From the type specimen.

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

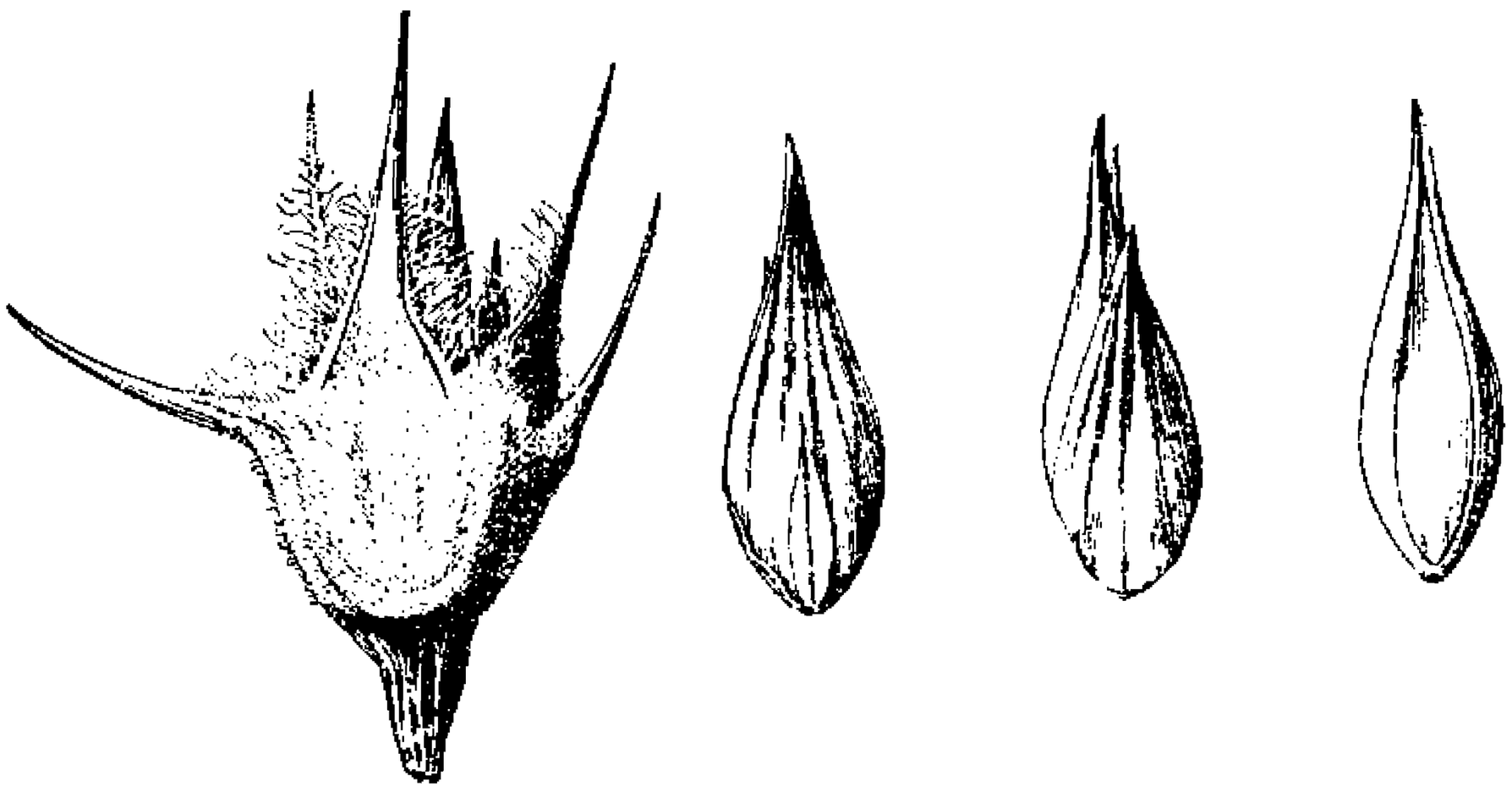

FIG. 15.—*Cenchrus incertus*. From the specimen sent by Curtis to Torrey.

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, *Curtiss* 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.

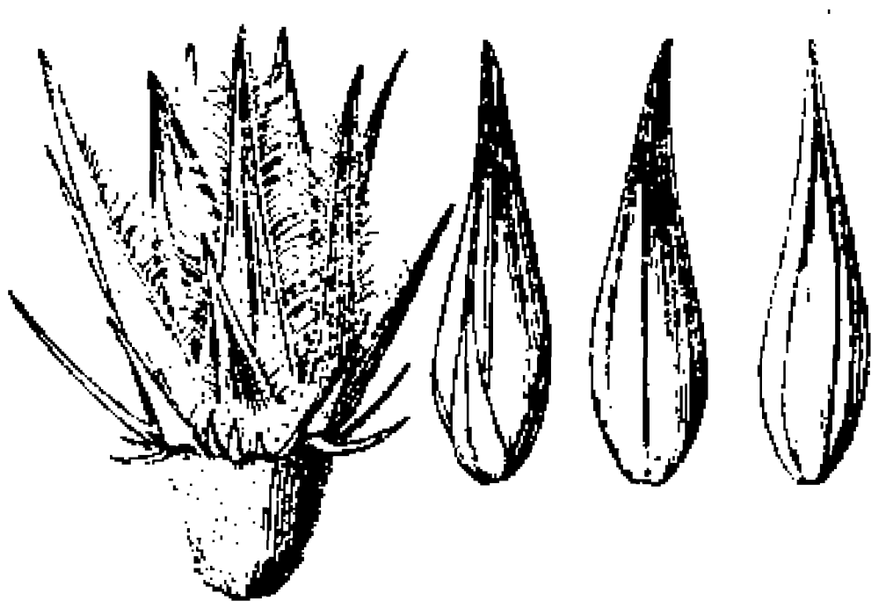

FIG. 16.—*Cenchrus microcephalus*. From the type specimen.

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 published[1] 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)

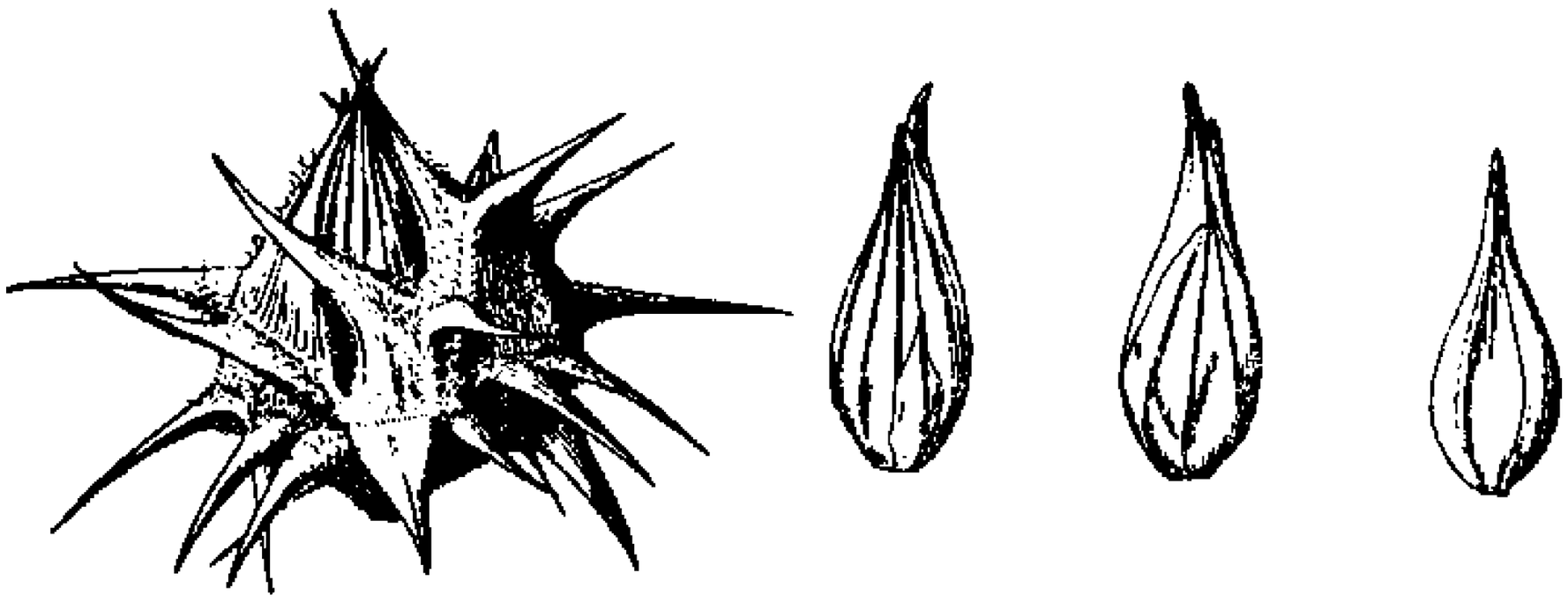

FIG. 17.—*Cenchrus pauciflorus*. From the type specimen.

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 spinelike; 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 weed[2] 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).

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 uncleft body, but the most superficial examination of *C. pauciflorus* would reveal the lobes. The crude illustration shows an uncleft body with thick spines. The relatively short, broad blades described and figured are not those of *C. pauciflorus*. In the National Herbarium 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 involucres. In any case Philippi's name is a homonym.

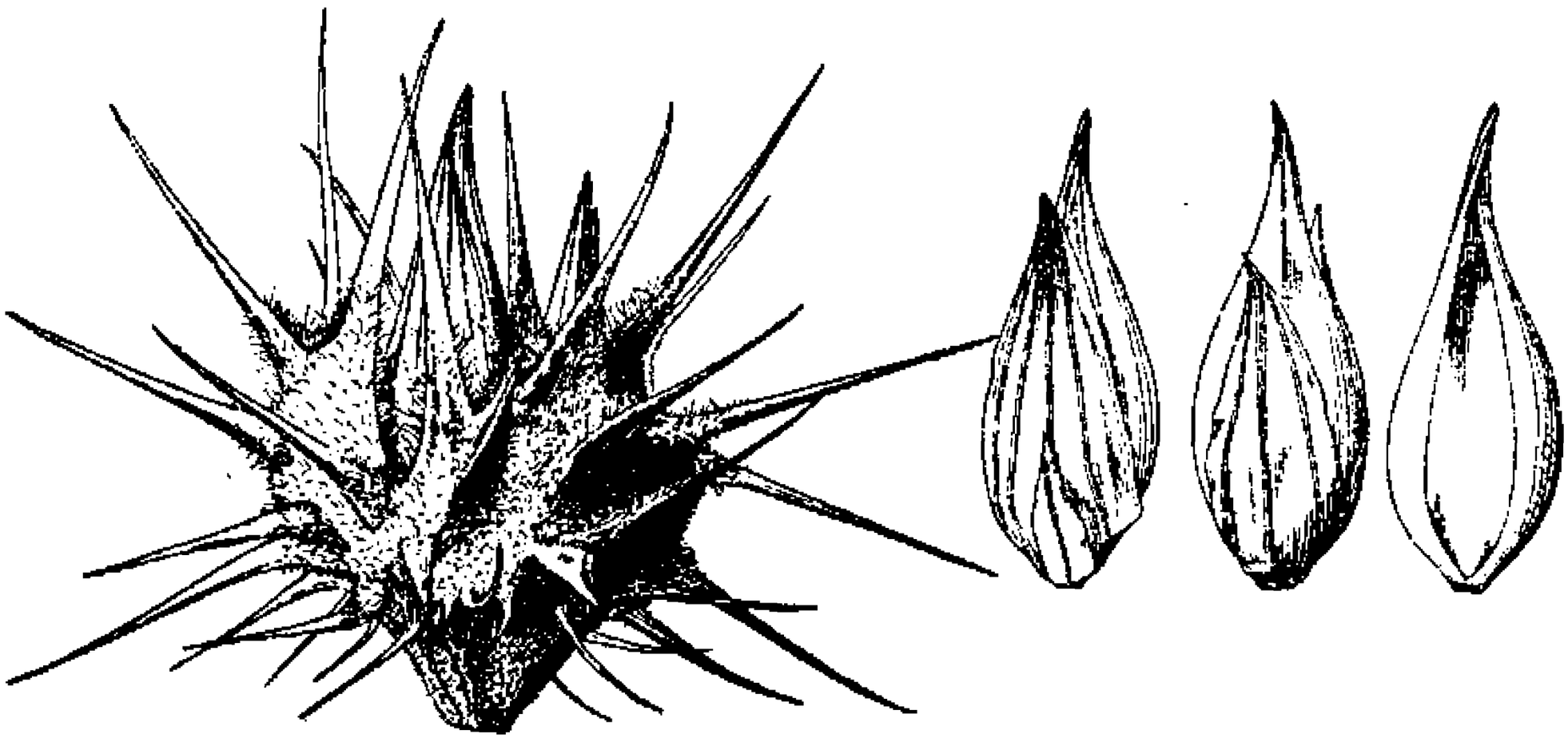

FIG. 18.—*Cenchrus pauciflorus*. From *Hitchcock* 13532; typical of the species.

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 Indes.

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.

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[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, *Skeels* 508. Forest, *Wilcox* 136. Champaign, *Gleason* 25. Wady Petra, *V. H. Chase* 1929. Mount Carmel, *Schneck* in 1904. Cahogia, *Eggert* in 1875.

MICHIGAN: St. Joseph, *Gannon* 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. De-Funiak 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, *Jermy* 174. New Braunfels, *Hitchcock* 5206. San Antonio, *Hitchcock* 5154, 5322, 5324. Fort Worth, *Ruth* 166. Rockport, *Chase* 6061. Galveston, *Hitchcock* in

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. Southwestern 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, *Metcalfe* 880. Black Range, *Metcalfe* 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, *Brandegee* 3 in 1889. San José del Cabo, *Brandegee* 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. Triscornia, *Hitchcock* 492. Playa de Cojimar, *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, *Wullschlaegel* 634.
BRAZIL: Rio Janeiro, *Wilkes Expl. Exped.*; *Warming* in 1863.
URUGUAY: Costa Platense, *Arechavaleta.*
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. 2³: 312. 1877. Described from a specimen in Martius's herbarium, "e Brasilia orlunda." 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.

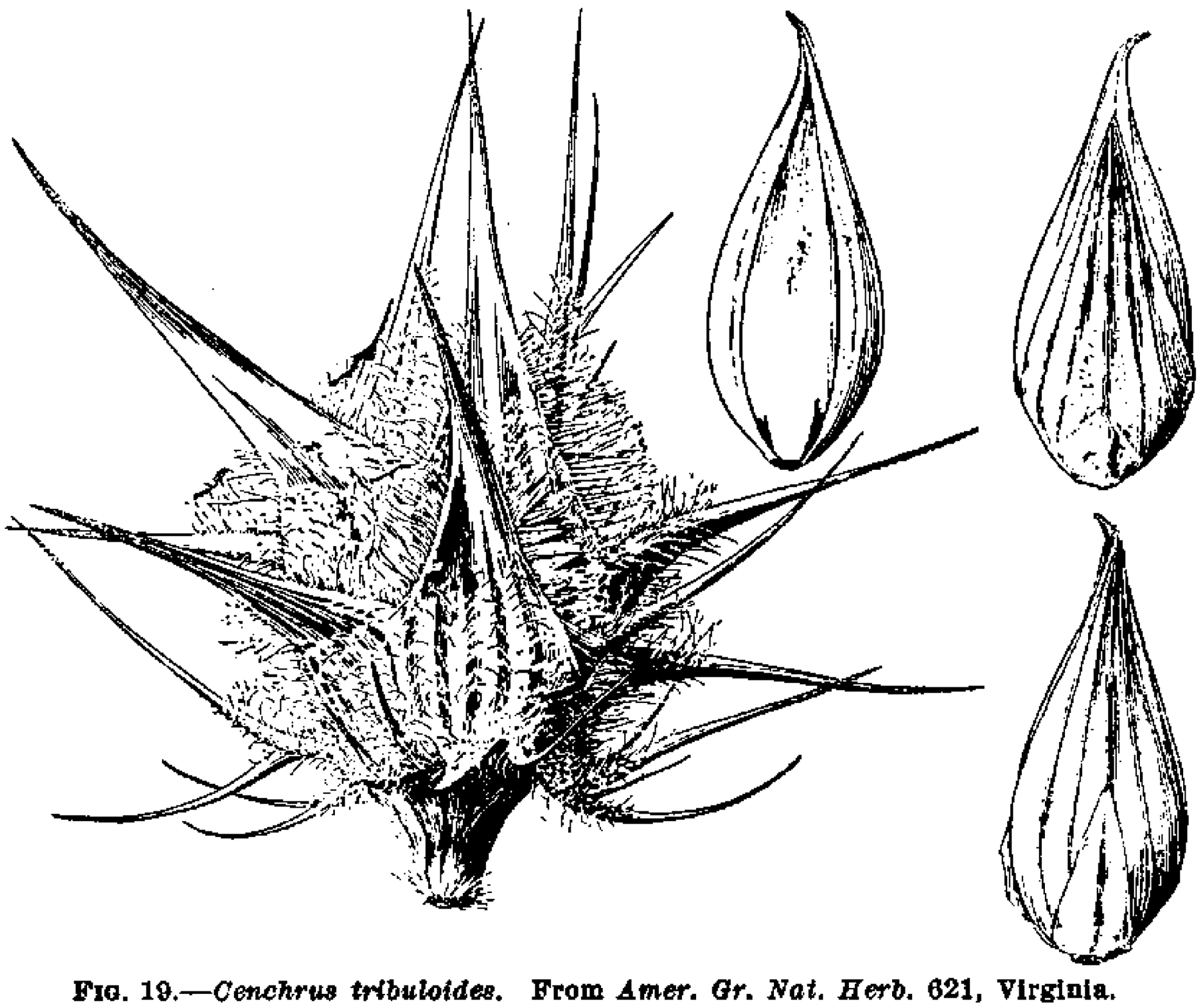

FIG. 19.—*Cenchrus tribuloides*. From *Amer. Gr. Nat. Herb.* 621, Virginia.

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, *Millspaugh* 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 Paredón Grande, *Shafer* 2737.

JAMAICA: Grand Cayman, *Millspaugh* 1249. Cayman Brac, *Millspaugh* 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;

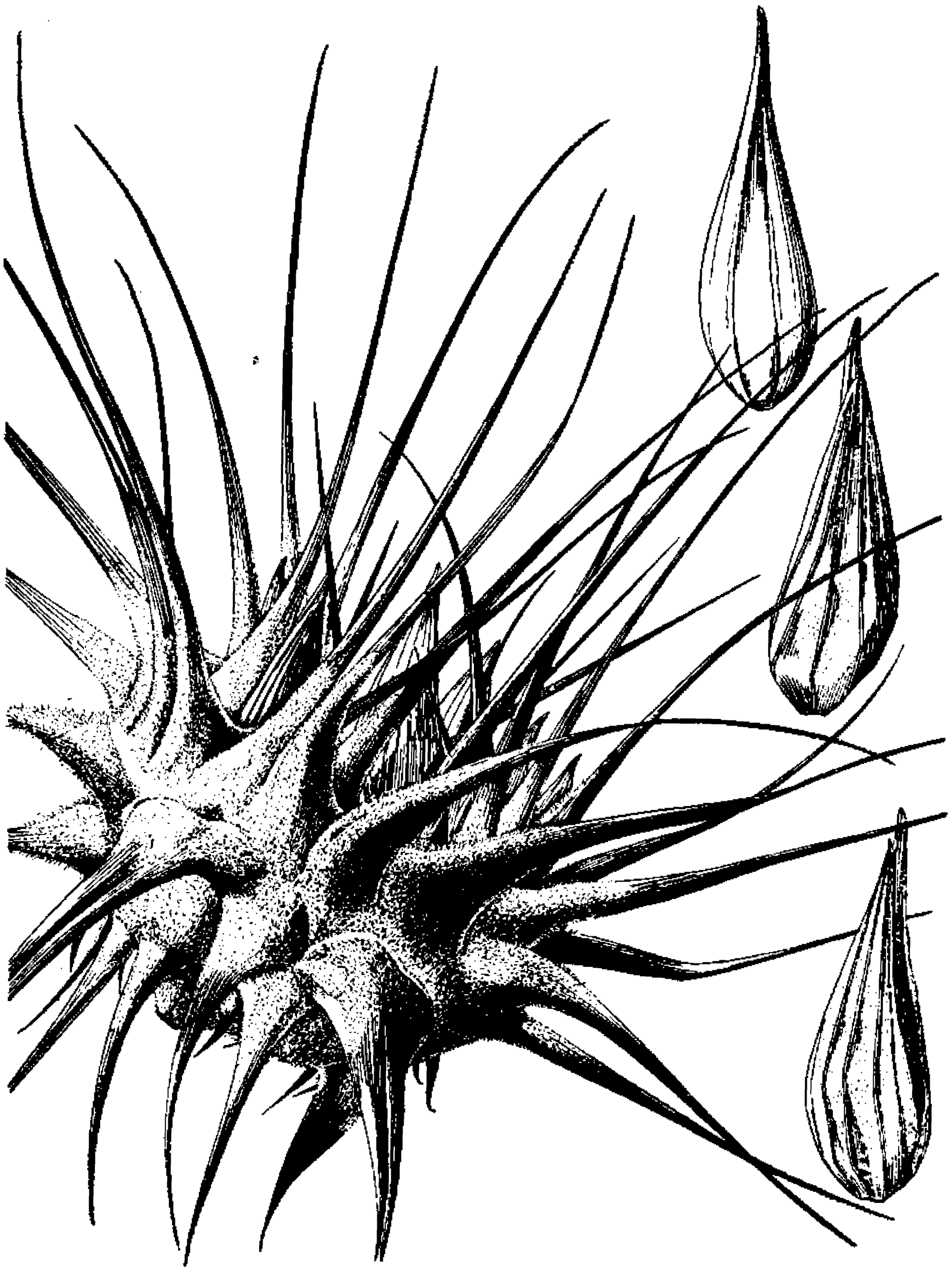

FIG. 20.—*Cenchrus palmeri.* From the type specimen.

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-canescent; spines numerous, spreading or reflexed, usually blackish purple above the villous-canescent, 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 Canal[1]. No specimen of *Cenchrus* was found in the Walter Herbarium, now in the British Museum[2]. 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 nonexistant, 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.

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[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.=*Rytilix granularis* (L.) Skeels.
Cenchrus hilarii Raspail=*Hilaria cenchroides* H. B. K.
Cenchrus inflexus Poir.=*Echinolaena inflexa* (Poir.) Chase.
Cenchrus laevigatus Trin.=*Anthephora 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=*Penniseturn 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.=*Anthephora hermaphrodita* (L). Kuntze.
Cenchrus tristachyus (H. B. K.) Kuntze=*Penniseturn tristachyum* (H. B. K.) Spreng.
Cenchrus villosus Spreng.=*Anthephora hermaphrodita* (L.) Kuntze.
Cenchrus villosus (R. Br.) Kuntze=*Pennisetum villosum* R. Br.