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TYPES OF SOME AMERICAN SPECIES OF ELYMUS¹

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IN 1918 Professor K. M. Wiegand² greatly clarified our understanding of *Elymus* by pointing out more substantial specific characters than had been generally recognized; and every student of grasses is indebted to him for his elucidation of the differential characters. In some cases, however, the exact identities of species were left by him in an unsatisfactory state or were unfortunately assumed, without knowledge of the types involved. This is notably so in regard to *E. canadensis* L. Wiegand identifies as *E. canadensis* L. Sp. Pl. i. 83 (1753) a plant of alluvial soil, from "Gaspé County, Quebec, to the interior of Maine, New Hampshire, Vermont, western Massachusetts, northern Connecticut, and northern and central New York," very distinct in its thin and broad (1.3–2.4 cm.) leaves, villous or pilose on the upper surfaces; in its extremely lax inflorescence, with remote joints; in its glumes mostly only 1.5–2 cm. long; and in its spikelets with 4–7 florets. Contrasted with the *E. canadensis* of Wiegand in the Atlantic states and adjacent Canada is *E. robustus* Scribn. & Sm., with the firmer and narrower leaves glabrous or at most scabrous above and thickened or inclined to inroll at the margins, with mostly crowded spikelets with usually 2–5 florets, and with glumes usually 2–2.5 cm. long. Typical *E. robustus*, as treated by Wiegand, has the backs of the lemmas glabrous or strigose-scabrous, while *E. robustus*, var. *vestitus* Wiegand, l. c. 90, has them villous-hirsute.

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² Wiegand, RHODORA, xx. 81–90 (1918).

In ascribing to the more northeastern plant with broad and thin leaves pilose above the name *Elymus canadensis*, Wiegand referred to the identification of Linnean types made by Hitchcock¹ ten years before the distinctive characters had been clarified by Wiegand. Wiegand says: Hitchcock has "shown that the types of *E. canadensis* and of *E. philadelphicus* [L. Amoen. Acad. iv. 266 (1759)] were essentially the same, and were a plant with very broad leaves and loose nodding spikes. In his description Linnaeus states that the leaves were very broad, and the spikelets six-flowered. Considering these statements and the fact that the plant came from Canada (*Kalm*) there is little doubt whether this or the next species [*E. robustus*] is the real *E. canadensis*."²

It is difficult to follow all of Wiegand's statements above quoted. So far as I am able to determine, Linnaeus, in the original description of *E. canadensis* (the only description cited by Wiegand), said nothing about the leaves being "broad" or the "spikelets six-flowered"; in fact, he did not even mention the leaves, but merely contrasted the spikes and spikelets of *E. canadensis* with those of *E. sibiricus*. His description follows:

3. ELYMUS spica flaccido-pendula, spiculis inferioribus ternatis; superioribus binatis. *Gen. nov.* 1094. *canadensis*
 Gramen secalinum majus altissimum virginianum. *Moris.*
hist. 3. p. 180. s. 8. t. 10. f. 2. *Raj. suppl.* 599.
Habitat in Canada. *Kalm.* 21.
Convenit in plurimis cum E. Sibirico, a quo tamen differt. 1. *Spiculis villosis, nec nudis.* 2. *Involueris in aristam exeuntibus longioribus ipsaspicula, demtis aristis; at in sibirica involucri minus subulatum, sed fere lanceolatum in aristam desinens, quae longe brevior sua spicula.* 3. *Spicae inferne ternae, quum Sibirica semper duas obtineat.* 4. *Spiculae, dum florent, dehiscunt ascapo patulo, in sibirica vero spiculae approximatae sunt scapo. Variat haec spicis incurvis & pendulis. Aristae corollinae cum maturescit fructus patenti-reflexae sunt contra ac in Sibirica.*

In his discussion of *E. philadelphicus* L. Amoen. Acad. iv. 266 (1759), Linnaeus made it clear that he conceived *E. canadensis* as having only 4-flowered spikelets. In his diagnosis of *E. philadelphicus* he explicitly characterized his new species "spiculis sexfloris"; he then described it more fully by comparing it with the already published *E. canadensis*, in the comparison referring to the new species as "this" (*hac*), the older *E. canadensis* as "that" (*illa*): "*Descr.* *Habitus & tota structura simillima E. canadensi, sed . . . Spicu-*

¹ Hitchcock, *Contrib. U. S. Nat. Herb.* xii. 123 (1908).

² Wiegand, *l. c.* 89 (1918).

lae in hac sexflorae [already given as the diagnostic character of *E. philadelphicus*], in illa quadriflorae.”

Although conceiving *Elymus canadensis* L. to be a plant with broad and thin-margined pilose leaves, Wiegand included in its synonymy *E. philadelphicus* L. and *E. glaucifolius* Muhlenberg, which the latter author described “Foliis . . . supra scabris, . . . margine osseis.”

From the above contradictions it became evident that the types needed further study in the light of Wiegand's redefinition of specific lines. Accordingly, in the summer of 1930 I took to England a full representation of the group and with the critical coöperation of Mr. Bayard Long compared the selected specimens carefully with the types in the Linnean herbarium of *Elymus canadensis* and of *E. philadelphicus*. To our minds the two Linnean species are essentially identical and in their comparatively firm leaves (pressed out very flat but with involute tips), with glabrous or merely scabrous upper surfaces, and in their “*Spiculis villosis, nec nudis*”¹ they are exactly *E. robustus*, var. *vestitus* Wiegand, RHODORA, xx. 90 (1918).

Wiegand gives the latter plant a range “New Brunswick (introduced) and Maine (introduced) to Delaware, westward to Oregon,” etc.; and he seems to have inferred that, since he had seen no indigenous material from Quebec (the Canada of Kalm), *E. canadensis* must be the northeastern plant (known to Wiegand from parts of Quebec) with thinner, broader and pilose leaves. Kalm's Canadian travels were through Lake Champlain, thence to Montreal and then down the St. Lawrence to Quebec and Bay St. Paul, then back to Montreal.² It is, therefore, reassuring to find among the specimens identified by Wiegand as his *E. robustus*, var. *vestitus* (i. e. true *E. canadensis*) one from slaty cliffs of Lake Champlain only a few miles from the Canadian border; and that the representation of this group in the Gray Herbarium (augmented since Wiegand saw the material) from the vicinity of Montreal includes three numbers³ of a plant like that collected by Kalm, true *E. canadensis* (*E. robustus*, var. *vestitus*) but none of the plant with thin and pilose leaves which Wiegand assumed that Kalm had collected. In fact, true glabrous- or scabrous-

¹ From original description of *E. canadensis*. The description of *E. philadelphicus* reads: “*Spiculae sunt patulae villosae.*”

² See Kalm, *Beschreibung der Reise*, iii. 269–626 (1764).

³ Île de Montréal, *Adrien*, no. 1562; Île Bigras, *Environs de Montréal*, *Victorin*, no. 28,598; Beauharnois, *Victorin*, no. 24,348. In the autumn of 1931 I noted this plant in abundance on the sands at Sorel.

leaved *E. canadensis* extends northeastward nearly to the limit of Kalm's travels, occurring in Comté de Portneuf (*Adrien*, no. 1897), only a few miles from Quebec. Whether Wiegand's *E. canadensis* (not *E. canadensis* L.) occurs on the shores of Lake Champlain, a region visited by Kalm en route to Montreal, I do not know. In the herbaria before me all specimens from Vermont are from the Connecticut drainage or from streams in central and southern Vermont, while all material of the group from the shores of Lake Champlain (North Hero, Colchester, Burlington, etc.) is of true *E. canadensis* L., not Wiegand; furthermore, all Quebec, Vermont and New York specimens cited by Wiegand of the plant he took to be *E. canadensis* are from outside the Champlain Valley. It is, then, quite clear that *E. canadensis* L. is the plant so identified by Hitchcock but called by Wiegand *E. robustus*, var. *vestitus*. Not only was Kalm's material this plant, but the species is well known in the area of Canada traversed by Kalm, while the species mistaken by Wiegand for *E. canadensis* is rare or unknown in most of the Canadian area visited by Kalm.

Elymus philadelphicus L. is not specifically nor varietally separable from *E. canadensis* L., the type specimens of the two being representatives of slightly differing status of one species.

Elymus glaucifolius Muhl. in Willd. Enum. Hort. Bot. Berol. 131 (1809) was very briefly described, the only points given by Willdenow to separate it from *E. philadelphicus* and *E. canadensis* being "spiculis . . . geminatis" (instead of "spiculis . . . inferioribus ternatis") and "foliis . . . subtus glaucis," the latter point emphasized in the name and by Willdenow's added comment, "*Folia* latissima subtus saturate glauca"; all three species said by Willdenow to have the spikelets 6-flowered. Muhlenberg himself, in his *Descriptio Uberior Graminum*, 177 (1817), gave a fuller account of the plant he called *E. glaucifolius* (said by him to have spikelets 2- or 3-flowered) and from his account, "Foliis . . . supra scabris, . . . marginis osseis" and from the "Habitat in siccis Pennsylvaniae" it is reasonably clear that *E. glaucifolius*, as he conceived it, was merely the glaucous extreme (such as occurs in most species) of *E. canadensis*. In fact, Muhlenberg himself said of his own *E. glaucifolius*, "Vix ab *E. Canadensi* diversus nisi colore glauco"; and Mr. Long, who has made a search in the Muhlenberg herbarium at the Academy of Natural Sciences of Philadelphia, concludes that *E. glaucifolius*,

at least as retained by Muhlenberg, is only the glaucous phase of *E. canadensis* (*E. robustus*), the form with scabrous or strigose rather than more loosely pubescent lemmas.

From the description by Willdenow it is not clear whether the original *E. glaucifolius* (published in Willd. Enum. Hort. Bot. Berol.) is the extreme with glabrous or merely scabrous lemmas, such as Muhlenberg retained, or whether it has the more villous lemmas of the typical *E. canadensis*. The question was referred to Professor L. Diels of Berlin and through his friendly interest I have from Dr. R. Pilger a detailed account of all the old American material of *Elymus* preserved at Berlin, with very clear photographs and in all cases fragments which fix the identities.

Dr. Pilger writes that there is no material of *Elymus glaucifolius* in the Willdenow Herbarium, but in the general herbarium are three sheets, of which I now have before me clear photographs and characteristic spikelets:

1. (no. 6 of Pilger's letter). From Herb. Nees. Quite like the type of *E. canadensis* L., except that the spikelets are not villous. Leaves stiffish, narrow, scabrous above and with obviously involute tips; spike erect, slightly flexuous; lemmas minutely strigose.

2. (no. 7 of Pilger's letter). Hort. Berol. 1806-12. Ex Herb. Kunth. Leaves firm, rather narrow, strongly infolded, the tips involute, upper surface scabrous; spike denser than in no. 1, arching; spikelets strongly strigose. This specimen being definitely from material in the Berlin Garden, 1806-12, is the most authentic known for *E. glaucifolius*, published in Enum. Hort. Bot. Berol. (1809). It is apparently quite inseparable from the material retained by Muhlenberg and should stand as the TYPE.

3. (no. 8 of Pilger's letter). Herb. Kurt Sprengel. "Amer. sept. Mühlenberg in Hb. C. Spr." Leaves broad and thin, pilose above; spike arching, lax; lemmas villous. This sheet, of which Dr. Pilger sends a portion of leaf as well as spikelets, is exactly what Wiegand took for *E. canadensis*. Although sent to Sprengel by Muhlenberg, it is so clearly not the plant which was in the Berlin Garden, as received from Muhlenberg, that it cannot be taken as in any way fixing the identity of *E. glaucifolius* Muhl. in Willd.

Briefly summarized the essential nomenclature is as follows:

ELYMUS CANADENSIS L. Sp. Pl. i. 83 (1753), TYPE in Linnean Herb., examined August, 1930. *E. philadelphicus* L. Amoen. Acad. iv. 266 (1759), TYPE in Linnean Herb., examined August, 1930. *E. robustus*, var. *vestitus* Wiegand, RHODORA, xx. 90 (1918). *E. canadensis*, var. *philadelphicus* (L.) Farwell, Rep. Mich. Acad. Sci. xxi. 357 (1920). *Terrellia canadensis* (L.) Lunell, Am. Midl. Nat. iv. 228 (1915).

Forma **glaucifolius** (Muhl.), comb. nov. *E. glaucifolius* Muhl. in Willd. Enum. Hort. Bot. Berol. 131 (1809), TYPE at Bot. Gard.

Berlin-Dahlem, authentic fragments in Gray Herb.; Muhl. Gram. 177 (1817). *E. canadensis*, var. *glaucifolius* (Muhl.) Torr. Fl. N. Mid. U. S. i. 137 (1824). *E. robustus* Scribn. & Sm. Bull. Div. Agrost. 4: 37 (1897), duplicate TYPE in Gray Herb. *E. canadensis*, var. *robustus* (Scribn. & Sm.) Mackenz. & Bush in Mackenz. Man. Fl. Jackson Co. Mo. 38 (1902). *E. glaucifolius*, var. *robustus* (Scribn. & Sm.) Bush, Am. Midl. Nat. x. 86 (1926). *E. philadelphicus*, var. *robustus* (Scribn. & Sm.) Farwell, Am. Midl. Nat. x. 314 (1927). *Terrellia canadensis glaucifolia* (Muhl.) Lunell, Am. Midl. Nat. iv. 228 (1915).

The northeastern plant differentiated by Wiegand but erroneously identified by him as *E. canadensis* is a well marked species. In view of his being the first to characterize the plant it is a pleasure to call the species

E. Wiegandii, sp. nov., 1–2 m. altus, plus minusve glaucus; foliis caulinis 10–18, laminis tenuibus plerumque 2–3.5 dm. longis 1.3–2.4 cm. latis (40–) 60–100-nerviis, supra plerumque villosis; spicis laxis flexuosis plerumque nutantibus 1–3.5 dm. longis rachi vix oblecto, segmentis racheos mediis 5–9 mm. longis; spiculis laxe adscendentibus 1.5–2.5 cm. longis 3–7-floris; glumis lineari-aristiformibus 1.5–3 cm. longis; lemmatibus villosis-hirsutis 3.5–4.5 cm. longis, aristis deinde curvatis; palea 9–15 mm. longa.—*E. canadensis* Wiegand, RHODORA, xx. 87 (1918), as to plant, not as to synonymy; not L. Sp. Pl. i. 83 (1753). *E. philadelphicus* var. *hirsutus* Farwell, Am. Midl. Nat. x. 214 (1927), not *E. hirsutus* Schreb. (1817) nor Presl (1825).—Alluvial soil, Gaspé County, Quebec to Lake St. John, west to central New York, south in the valleys of the larger rivers to southern New Brunswick, New England and eastern Pennsylvania. The following may stand as TYPE: low gravelly thicket by St. John River, St. Francis, Maine, August 5, 1893, *Fernald*, no. 197, in Gray Herb. (distributed as *E. canadensis*, var. *glaucifolius*).

E. WIEGANDII, forma **calvescens**, a forma typica recedit lemmatibus glabris vel scabro-hirtellis nec villosis-hirsutis.—Occasional through the range of the species. TYPE: river-intervale, Dead River, Maine, August 13, 1896, *Fernald & Strong* (Herb. N. E. Bot. Club).

Elymus Wiegandii is at once distinguished from *E. canadensis* by its very lax inflorescence, with shorter glumes, and its usually longer palea. Its foliage is quite different, thin, broad and flat, commonly with definite villosity or pilosity along the nerves on the upper surface. In *E. canadensis* the stiffer and narrower leaves are glabrous or only scabrous above, firm at the margin and strongly involute in drying. In *E. Wiegandii* the fertile culms have 10–18 leaves, these (when well developed) with 60–100 nerves (only in very small individuals with as

few as 40); but the stiff cauline leaves of *E. canadensis* are usually only 6–9 (even down to 4) in number, mostly 20–40 (in very large specimens rarely –70)-nerved. The spikelets of *E. Wiegandii* of river-alluvium are mostly ripe and dropped in western and southern New England at dates varying with different seasons from August 10 to September 5. In *E. canadensis* of dry upland soil in the same area the crowded inflorescence is usually quite intact through September.

As treated in recent American works, *Elymus striatus* Willd. Sp. Pl. i. 470 (1797) is defined as “More or less pubescent . . . leaves pubescent on the upper surface; . . . glumes awl-shaped, hispid or hirsute, 2 or 3 times the length of the hirsute floret”;¹ or, again, with “leaves . . . villous on the upper surface; sheaths . . . villous: . . . glumes . . . terete . . . villous: lemmas villous.”² The original description by Willdenow did not note any pubescence of leaf-blade and sheath, characters so conspicuous in the plant now passing as *E. striatus* as to be much emphasized. Willdenow placed his *E. striatus* between *E. virginicus* L. and *E. europaeus* L., the latter a species resembling *E. virginicus* but with narrower and less strongly ribbed glumes. Willdenow apparently was not personally familiar with the original *E. virginicus*, merely quoting or citing earlier accounts by others; and he named his new species *E. striatus* because it had the glumes narrower and more prominently striate than in his conception of *E. virginicus* (involucris *angustioribus elevato-striatis*). In his second account³ of *E. striatus*, in 1809, Willdenow gave a fuller description: “spiculis bifloris hispidis . . . calycibus linearibus nervosis . . . foliis planis, vaginisque glabris.” This account, with spikelets merely hispid, glumes linear, and leaf-blades and sheaths glabrous, is so contrary to the current American conception of *E. striatus* that it has seemed important to learn exactly what Willdenow had before him.

Again, just as in the case of *Elymus glaucifolius*, the notes, photographs and fragments sent by Dr. Pilger from the sheets preserved at Berlin lead to the solution of the dilemma. The only specimen definitely marked by Willdenow as *E. striatus* bears in Willdenow's hand a small label “308. *Elymus striatus* (W.) (*Mühlenberg mis it*).” This, as Schlechtendal had already noted, is a characteristic

¹ Hitchc. in Gray Man. ed. 7: 169 (1908).

² Wieg. RHODORA, xx. 86, 87 (1918).

³ Willd. Enum. Hort. Bot. Berol. 131 (1809).

small piece of *E. virginicus*: "Dieses Exemplar ist von Schlechtendal aus dem Umschlag mit *E. striatus* im Herb. Willdenow entfernt worden und zu *E. virginicus* gelegt worden" (Pilger *in lit.*). The spikelets of this plant are essentially glabrous except for the hispid awns; and in view of the facts that in all other points it matches Willdenow's accounts and that it is the plant which he had himself labeled and retained as *E. striatus* it must stand as the TYPE of that species.

Two other sheets preserved at Berlin in the cover of *E. striatus* (not in that of *E. virginicus*, where the type of *E. striatus* was placed by Schlechtendal and, consequently, overlooked by later visitors to Berlin) are significant. One is a characteristic sheet of *E. arkansanus* Scribn. & Ball, in the Willdenow Herbarium, without data; the other is a sheet of specimens from Kunth of a plant cultivated as *E. striatus* in the Berlin Garden from 1806-12. This is also thoroughly characteristic *E. arkansanus*, with spikelets essentially glabrous, glumes acicular, and the leaves positively pilose on the upper surface. Having been cultivated at Berlin from 1806-12 and having glabrous spikelets and pilose leaf-blades, this sheet from Kunth has no connection with the species described by Willdenow in 1797 (and again in 1809) as having hispid spikelets, linear glumes and glabrous leaves. It has, however, doubtless been erroneously taken for the type (since the real type of *E. striatus* had been rightly placed with *E. virginicus*); but it lacks the dense pilosity so characteristic of the plant usually passing as *E. striatus*.

Since, by resting our interpretation of the species upon the type, the plant we have been calling *Elymus striatus* can no longer retain that name, it is fortunate that another of the names based upon Muhlenberg material can be taken up for it. *E. villosus* Muhl. in Willd. Enum. Hort. Bot. Berol. 131 (1809), "spiculis . . . villosis, calycibus aristatis spiculas superantibus," is exactly the plant with villous spikelets and strongly pilose or villous leaf-blades and -sheaths. The photograph of the original sheet in the Willdenow Herbarium, for which I am, further, greatly indebted to Professor Diels and Dr. Pilger, shows it labeled in Willdenow's hand: "33. *Elymus villosus* (W.) (*Mühlenberg mis [it]*)." The photograph is unmistakable and the villous linear-acicular glumes and villous lemmas are perfectly characteristic. A second sheet of this plant contains specimens from the Berlin Garden; one group from Herb.

Kunth, the other (a single specimen) from Link. The leaf-blades and sheaths of these, as shown by the fragments supplied by Dr. Pilger, are strongly pilose, the acicular glumes and the lemmas copiously villous. *E. striatus* of recent American authors is, then, *E. villosus* Muhl., of which *E. arkansanus* Scribn. & Ball is only a form with the lemmas glabrous or merely minutely strigose.

Although the latter (*E. arkansanus*) has been assigned a more southern range, it actually reaches the northeastern limit of the species, while typical *E. villosus* grows as far west and south; there is no clear geographic segregation of the two and they are better treated as minor forms, quite parallel with those found in other species of the genus.

In the first six editions of the Manual, Asa Gray (or his successors), interpreting *Elymus striatus* from the material under that name in the cover of *E. striatus* at Berlin (the type having been transferred to the cover of *E. virginicus*), treated *E. villosus* as a variety of it with more hairy spikelets: "Var. *VILLOSUS* (*E. villosus*, Muhl.!) has a somewhat stouter spike and very hairy glumes."¹ Recent authors, however, have erroneously reversed the interpretation, treating *E. villosus* as true *E. striatus* and keeping the extreme of it with merely hirtellous to glabrous spikelets apart, either as a species, *E. arkansanus* Scribn. & Ball, Bull. Div. Agrost. 24: 45 (1901), or as a variety of the more hairy plant, *E. striatus*, var. *arkansanus* (Scribn. & Ball) Hitchc. RHODORA, viii. 212 (1906). But, as the preceding discussion indicates, the type of *E. striatus* is a small *E. virginicus*. The more slender plant with linear-acicular glumes should, therefore, be called *E. villosus* Muhl. Its essential bibliography follows.

ELYMUS VILLOSUS Muhl. in Willd. Enum. Hort. Bot. Berol. 131 (1809); Link, Hort. Bot. Berol. i. 16 (1827), ii. 178 (1833). *E. striatus*, var. *villosus* (Muhl.) Gray, Man. 603 (1848). *E. striatus* Hitchc. in Gray, Man. ed. 7: 169 (1908); Wiegand, RHODORA, xx. 86 (1918); not Willd. (1797).

Forma **arkansanus** (Scribn. & Ball), comb. nov. *E. arkansanus* Scribn. & Ball, U. S. Dept. Agric. Div. Agrost. Bull. no. 24: 45 (1901). *E. striatus*, var. *arkansanus* (Scribn. & Ball.) Hitchc. RHODORA, viii. 212 (1906); Wiegand, RHODORA, xx. 87 (1918).

Although Scribner & Ball cited this extreme only from Arkansas, Missouri and Iowa, Hitchcock gave its northeastern limit as Maryland, and Wiegand cited nothing from northeast of Virginia, forma *arkan-*

¹ Gray, Man. 603 (1848).

sanus actually reaches the extreme northeastern limit of the species (Grape Swamp, Plum Island, Essex Co., Massachusetts, August 29, 1896, *A. A. Eaton*; river-banks, Brattleboro, Vermont, August 2, 1898, *B. L. Robinson*, no. 85). Typical *E. villosus* is before me from Iowa, Missouri and Oklahoma. The two extremes are best treated as forms rather than as varieties or as separate species.

Elymus virginicus L. and plants clearly merging into it have recently been variously treated: as a series of species, *E. virginicus* L., *E. intermedius* Scribn. & Sm., *E. hirsutiglumis* Scribn., *E. halophilus* Bickn., *E. australis* Scribn. & Ball *E. jejunus* (Ramaley) Rydb., *E. curvatus* Piper and *E. glabriflorus* (Vasey) Scribner & Ball; or as two species, *E. virginicus* and *E. australis*, each with so-called varieties, with glabrous and with pubescent spikelets.

When they published *E. glabriflorus*, based on *E. canadensis*, var. *glabriflorus* Vasey, Scribner & Ball recognized its close similarity to *E. australis*, saying, "This species is more closely allied to *E. australis*, of which it is a glabrous-flowered counterpart, than to *E. canadensis*, from which it is distinguished," etc., etc.¹ No one has subsequently placed *E. glabriflorus* with *E. canadensis*; but had the authors of the former clearly pointed out morphological characters to separate it from *E. australis* we should all be grateful. After several days of intensive study of the group I am quite unable to find any difference between the two except the single unimportant one originally pointed out, *E. glabriflorus* being merely the "glabrous-flowered counterpart" of *E. australis*. The two have the same range and they are quite parallel with the cases discussed in previous paragraphs: *E. canadensis* and forma *glaucifolius*, *E. Wiegandii* and forma *calvescens*, *E. villosus* and forma *arkansanus*, in which each species exhibits more or less throughout its range a tendency to have either glabrous or merely hirtellous spikelets and, likewise, a tendency with more pilose or villous spikelets. Such tendencies, without geographic segregation, are much more rationally treated as forms than as varieties.

E. hirsutiglumis Scribn. was reduced by Hitchcock, RHODORA, x. 65 (1908), to varietal status, as *E. virginicus*, var. *hirsutiglumis*, differing only in having hirsute spikelets, its range included within that of typical *E. virginicus*. Others have been unable to point out any morphological differences between the two and I find myself unable to maintain them as more than formally different—unless one examines

¹ Scribn. & Ball, U. S. Dept. Agric. Div. Agrost. Bull. no. 24: 50 (1901).

the indument of the spikelets with a lens no differences are observable in the plants.

E. glabriflorus was published as "a glabrous-flowered counterpart" of *E. australis*. It is, therefore, significant to note in the original discussion, that *E. australis* "may be separated from *E. hirsutiglumis* Scribn., its nearest ally, by its more robust spikes and longer glumes and awns"; but when an attempt is made to state this difference of size we get the key-characters worked out by Wiegand:

- c. Glumes 1–2.7 cm. long: lemmas 1–3 cm. long.....*E. virginicus*.
 c. Glumes 2.7–4 cm. long: lemmas (2.8–) 3.5–4.5 cm. long: spikes
 exserted.....*E. australis*.¹

In other words, the measurements overlap, and the ranges certainly do, while certain exceptional collections northward of *E. virginicus* "have unusually large and coarse spikes." The strong tendency of typical *E. virginicus*, it is true, is to have the spikes hardly at all to barely exserted and for the essentially southern *E. australis* and var. *glabriflorus* (Vasey) Wiegand to have the spike clearly exserted; but enough interchanges of this tendency occur to destroy its significance as specific: *E. virginicus*, var. *jejunus* (Ramaley) Bush has the spikes exserted and *E. virginicus* var. *halophilus* (Bicknell) Wiegand has "more uniformly exserted . . . spikes." In the latter the spikelets are commonly glabrous, but in one colony from Yarmouth County, Nova Scotia, they are so hirsute that the involute-leaved and grayish plant of the sea-beach was at first placed (for want of a better place to put it) with the much coarser, flat-leaved and green var. *hirsutiglumis*.

As I find myself viewing the matter, it seems to me that, without any morphological characters but with differences only in size, texture and indument, the group including *E. virginicus*, *E. hirsutiglumis*, *E. glabriflorus*, *E. australis*, etc. is much better treated as one polymorphous species, as follows:

- a. Glumes 1–2.7 cm. long: lemmas 1–3 cm. long....*b*.
 b. Glumes and lemmas awned....*c*.
 c. Base of spike (0.4–2 dm. long) included in or barely exserted from the inflated upper sheath: glumes mostly 1.5–2 mm. wide: leaves flat, 5–13 mm. broad....*d*.
 d. Lemmas and glumes glabrous or merely scabrous-ciliate.....*Var. typicus*.
 d. Lemmas and glumes villous-hirsute.....*Forma hirsutiglumis*.
 c. Spike 3–12 cm. long, well exserted (mostly 3–15 cm.) above the hardly inflated sheath: glumes mostly 0.8–1.6 mm. wide: leaves flat or involute....*e*.

- e. Leaves of flowering culm 6-8, mostly flat, up to 13 mm. wide: spikes full-green: indurated bases of glumes green or stramineous. Var. *jejunus*.
- e. Leaves of flowering culm 4-6, firm, often involute, 3-8 mm. broad: spikes whitish-green: indurated bases of glumes white or very pale.
Lemmas and glumes glabrous or merely ciliate-scabrous. Var. *halophilus*.
Lemmas and glumes hirsute. . . Var. *halophilus*, forma *lasiolepis*.
- b. Glumes and lemmas muticous or merely subulate-tipped. . Var. *submuticus*.
- a. Glumes 2.7-4 cm. long: lemmas mostly 3.5-4.5 cm. long: spikes exserted, 0.4-2 dm. long.
Lemmas and glumes glabrous or merely scabrous-ciliate. Var. *glabriflorus*.
Lemmas and glumes hirsute. . . . Var. *glabriflorus*, forma *australis*.

E. VIRGINICUS L., var. **typicus**. *E. virginicus* L. Sp. Pl. 84 (1753); Wiegand, RHODORA, xx. 83 (1918). *E. striatus* Willd. Sp. Pl. i. 470 (1797), not most recent authors.

Forma **hirsutiglumis** (Scribn.), comb. nov. *E. intermedius* Scribn. & Sm. U. S. Dept. Agric. Div. Agrost. Bull. no. 4: 38 (1891), not Bieb. (1808). *E. hirsutiglumis* Scribn. U. S. Dept. Agric. Div. Agrost. Bull. no. 11: 58 (1898). *E. virginicus*, var. *hirsutiglumis* (Scribn.) Hitchc. RHODORA, x. 65 (1908).

Var. *JEJUNUS* (Ramaley) Bush, Am. Midl. Nat. x. 65 (1926). *E. virginicus*, forma *jejunus* Ramaley, Bull. Geol. Nat. Hist. Surv. Minn. ix. 114 (1894). *E. jejunus* (Ramaley) Rydb. Bull. Torr. Bot. Cl. xxxvi. 539 (1909).

Var. *HALOPHILUS* (Bickn.) Wiegand, RHODORA, xx. 83 (1918). *E. halophilus* Bickn. Bull. Torr. Bot. Cl. xxxv. 201 (1908).

Var. *HALOPHILUS*, f. **lasiolepis**, forma nov., lemmatibus pilosis.—NOVA SCOTIA: crest of cobbly barrier beach, Sand Beach, September 7, 1920, Fernald, Long & Linder, no. 20,113 (TYPE in Gray Herb.), distributed as *E. virginicus*, var. *hirsutiglumis*.

Var. *SUBMUTICUS* Hook. Fl. Bor.-Am. ii. 255 (1840). *E. curvatus* Piper, Bull. Torr. Bot. Cl. xxx. 233 (1903).

Var. *GLABRIFLORUS* (Vasey) Bush, Am. Midl. Nat. x. 62 (1926). *E. canadensis*, var. *glabriflorus* Vasey, Contrib. U. S. Nat. Herb. ii. 550 (1894). *E. glabriflorus* (Vasey) Scribn. & Ball, U. S. Dept. Agric. Div. Agrost. Bull. no. 24: 49 (1901). *E. australis*, var. *glabriflorus* (Vasey) Wiegand, RHODORA, xx. 84 (1918).

Var. *GLABRIFLORUS*, f. **australis** (Scribn. & Ball), comb. nov. *E. australis* Scribn. & Ball, U. S. Dept. Agric. Div. Agrost. Bull. no. 24: 46 (1901).



Fernald, Merritt Lyndon. 1933. "Types of some American species of *Elymus*." *Rhodora* 35, 187–198.

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