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Vegetative Key to Grasses of the Sand Hills Region of Nebraska

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VEGETATIVE KEY TO GRASSES OF THE SAND HILLS REGION OF NEBRASKA

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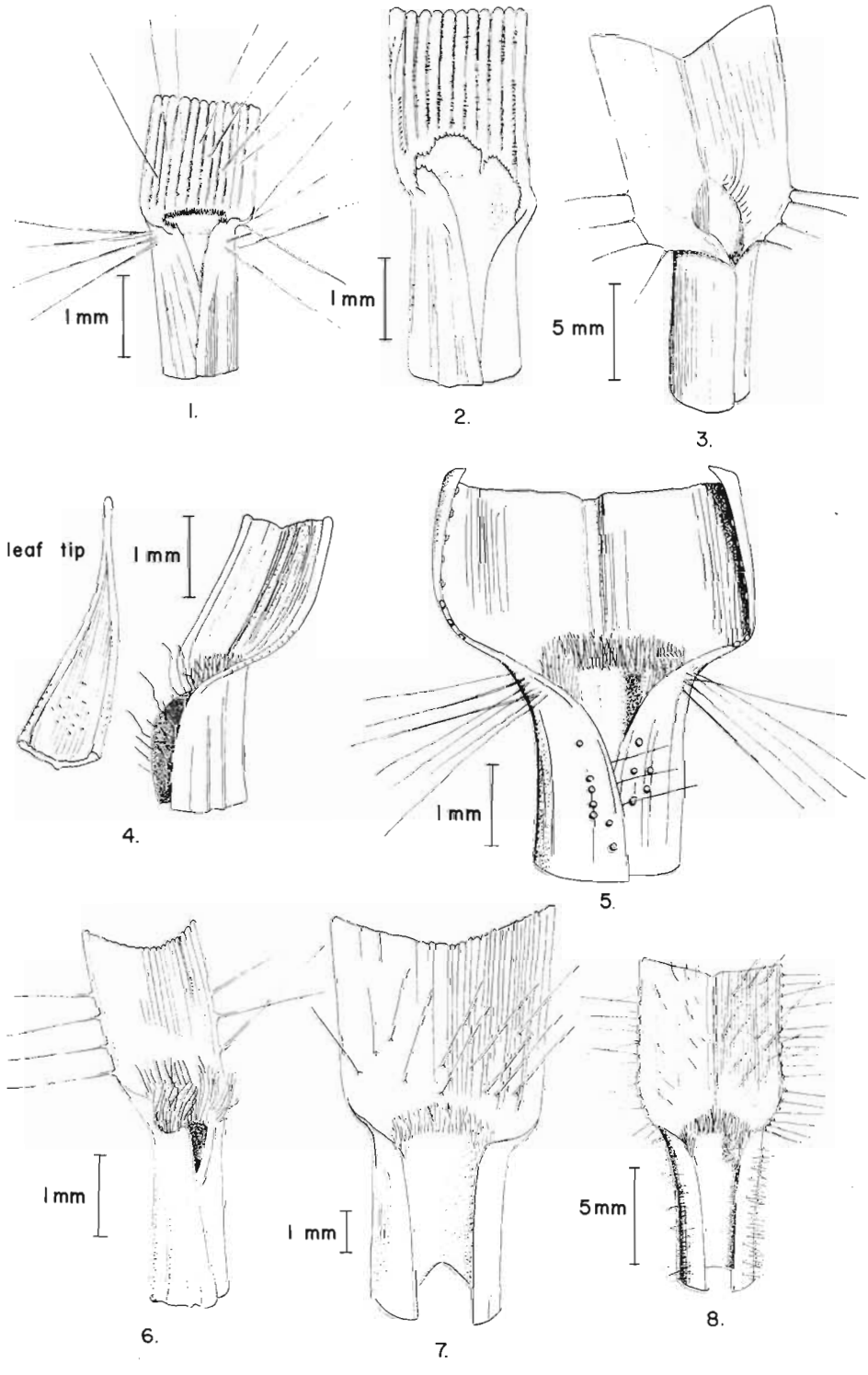
An illustrated key is provided that will facilitate identification of grasses in the vegetative condition in the Sand Hills region of Nebraska. The key separates 97 species, varieties, and species groups and discusses or partially separates 14 additional taxa. It emphasizes characteristics that may be observed in the field with a hand lens and is illustrated with 109 camera lucida drawings.

† † †

INTRODUCTION

This key evolved from an earlier key to Nebraska grasses based on vegetative features (Sutherland, 1975). That key utilized characters that required hand-sectioning to discern and was unillustrated. As such, it was of limited use to field biologists. It became obvious that a much more practical key for field use might be devised if the region to be covered were smaller and more coherent floristically and if illustrations were included for each species. This is an attempt to do that for the Sand Hills region of central and western Nebraska. The species list for this key was derived from herbarium records and from recent field observations. The figures were all drawn with a camera lucida, using various magnifications. All show adaxial views of the collar region of the leaf, unless otherwise labeled.



FIGURES 1–8. 1. *Distichlis spicata* var. *stricta*. 2. *Koeleria pyramidata*. 3. *Echinochloa crusgalli*. 4. *Munroa squarrosa*. 5. *Eragrostis cilianensis*. 6. *Triplasis purpurea*. 7. *Setaria glauca*. 8. *Panicum capillare*.

KEY

1 Ligule principally a fringe of hairs (Fig. 5) or absent (Fig. 3); auricles absent; sheaths open to the base.
  2 Plants annual, the remains of previous years' culms and leaves never present; plants never rhizomatous, but some species with decumbent culms which root at the nodes. . . . . .GROUP 1, p. 26
  2 Plants perennial, the remains of previous years' culms and leaves usually obvious; plants sometimes rhizomatous.
    3 Plants rhizomatous (Fig. 49) or stoloniferous (Fig. 44). . . . . .GROUP 2, p. 28
    3 Plants neither rhizomatous nor stoloniferous. . . . . .GROUP 3, p. 33
1 Ligule principally a membrane (Fig. 33), this sometimes very short; auricles absent or present; sheaths open to the base or closed.
  4 Sheaths entirely or partly closed (Fig. 33). . . . . .GROUP 4, p. 36
  4 Sheaths open to the base.
    5 Plants annual, the remains of previous years' culms and leaves never present; plants never rhizomatous, but some species with decumbent culms which root at the nodes. . . . . .GROUP 5, p. 40
    5 Plants perennial, the remains of previous years' culms and leaves usually obvious; plants sometimes rhizomatous.
      6 Culms solid (Fig. 48) or pith-filled (examine last year's culm bases if this year's are still young). . . . . .GROUP 6, p. 44
      6 Culms hollow (Fig. 85).
        7 Auricles present (Fig. 65) on at least some of the leaves (often broken off or absent from many leaves). . . . . .GROUP 7, p. 48
        7 Auricles lacking.
          8 Leaves folded in the bud (Fig. 85), the edges not overlapping (in this key young leaves that form a circle in cross-section, but which have the two edges approximate, are considered rolled in the bud).
            9 Plants strongly rhizomatous (Fig. 49).
              10 Ligules fringed with hairs; leaf tips narrow, not prow-shaped; edges of blade usually pilose with long hairs near the ligule. . . . . *Distichlis spicata* (L.) Greene var. *stricta* (Torr.) Beetle, Inland saltgrass (Fig. 1).
MOIST TO DRY AREAS, OFTEN WHERE ALKALINE; NOT UNCOMMON.
              10 Ligules sometimes ciliolate but not fringed; leaf tips prow-shaped (Fig. 46); edges of blade lacking long hairs near the ligule. . . . . *Poa*
Go to Group 4, lead 10.
            9 Plants not rhizomatous, leaf-blades thickish, finely striate on the back surface, but the upper surface with relatively few, broad ribs separated by deep narrow furrows; ligules short, not more than 2 mm long; sheaths and blades often pubescent. . . . . *Koeleria pyramidata* (Lam.) Beauv., Junegrass (Fig. 2).
DRY PRAIRIE; COMMON.
          8 Leaves rolled in the bud (Fig. 89); see note under contrasting lead.
            11 Plants rhizomatous (Fig. 49). . . . . .GROUP 8, p. 52
            11 Plants not rhizomatous. . . . . .GROUP 9, p. 57

GROUP 1

Annuals with the ligule principally a fringe of hairs or absent, auricles absent, and sheaths open to the base

1 Ligules absent. . . . . *Echinochloa crusgalli* (L.) Beauv., Common barnyardgrass.
Echinochloa muricata (Beauv.) Fern., Rough barnyardgrass (Fig. 3).
WASTE PLACES, DRY OR MOIST; NOT COMMON.

1 Ligules present.

2 Plants matted and spreading; leaves tufted at the nodes; many internodes exposed; blades usually folded, thick, whitish-margined. . . . . *Munroa squarrosa* (Nutt.) Torr., False buffalograss (Fig. 4).
DRY WASTE PLACES; NOT COMMON.

2 Plants either not matted and spreading or otherwise not as above.

3 Plants with disc-shaped glands on the blade margin and sheath; throat often bearing hairs up to 2 mm long; blades flat to folded, mostly 2–7 cm long; ligules up to about 1 mm long. . . . . *Eragrostis cilianensis* (All.) Mosher, Stinkgrass (Fig. 5).
MOIST OR DRY WASTE PLACES; COMMON.

3 Plants lacking disc-shaped glands on the blade-margin and sheath; pubescence, blades, and ligules various.

4 Conspicuous pustular-based hairs present, at least on the upper surface of the blade near the ligule or on the leaf margin.

5 Blades narrow, less than 2 mm wide; culms solid; ligules 0.5 mm long or longer; sheaths often purplish, generally with a whitish projection at the collar. . . . . *Triplasis purpurea* (Walt.) Chapm., Purple sandgrass (Fig. 6).
MOSTLY IN BLOWOUTS AND WASHES; NOT COMMON.

5 Blades mostly more than 2 mm wide; culms usually hollow.

6 Sheaths glabrous. . . . . *Setaria glauca* (L.) Beauv., Yellow bristlegrass (Fig. 7).
DRY WASTE PLACES; OCCASIONAL.

6 Sheaths pilose. . . . . *Panicum capillare* L., Witchgrass (Fig. 8).
DRY TO MOIST DISTURBED GROUND; RELATIVELY COMMON.

4 Conspicuous pustular-based hairs absent.

7 Sheaths strongly keeled, 4–6 mm wide, glabrous; blades flat or folded, 2–6 mm wide; collar region constricted and usually pubescent. . . . . *Cenchrus longispinus* (Hack.) Fern., Field sandbur (Fig. 9).
DRY WASTE PLACES; COMMON.

7 Sheaths not keeled or not strongly keeled, or plants otherwise not as above.

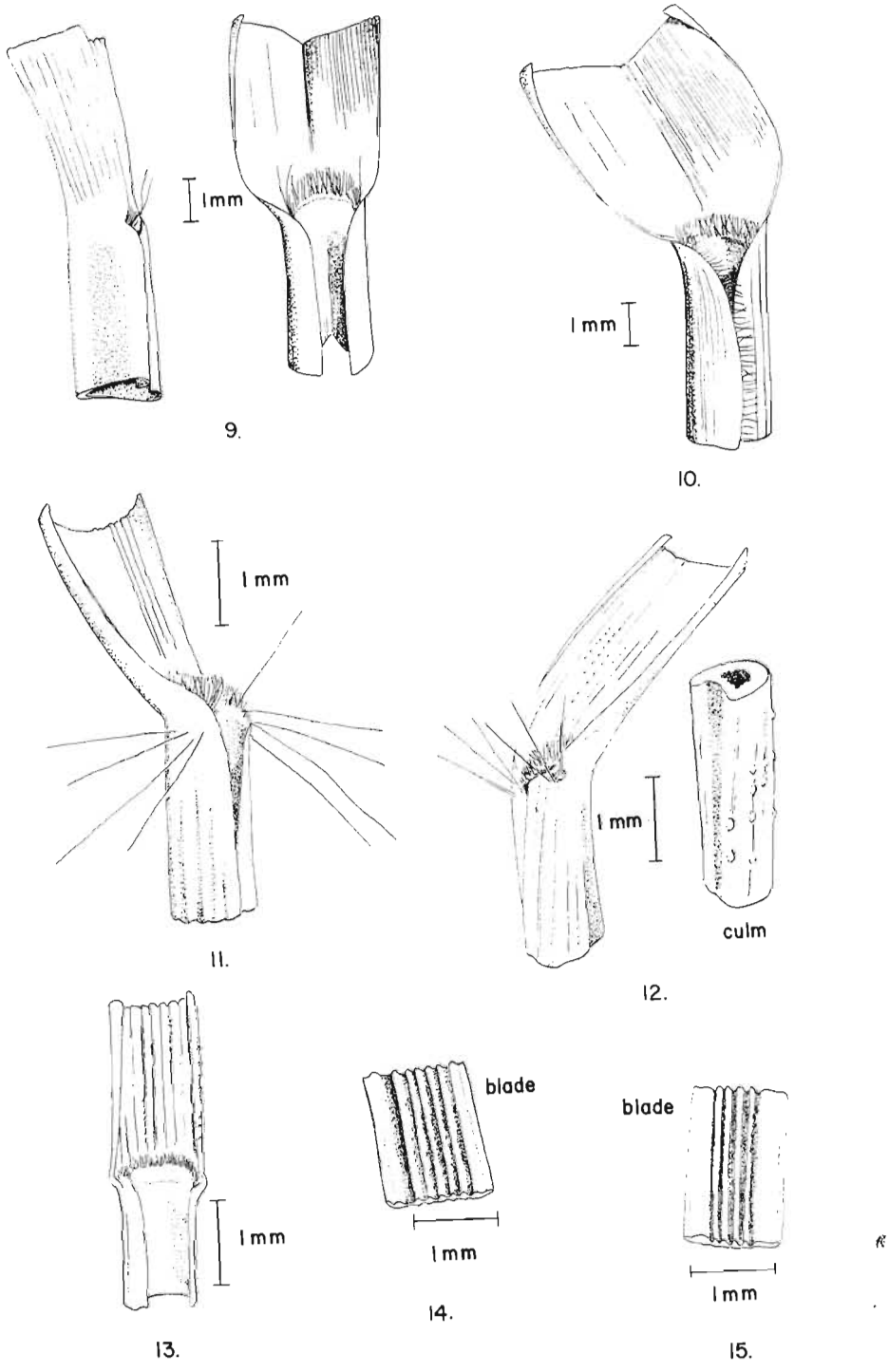
8 Blades mostly more than 2 mm wide, often with an obvious midvein, usually flat; sheath margins ciliate. . . . . *Setaria viridis* (L.) Beauv., Green bristlegrass (Fig. 10).
MOIST TO DRY PLACES; OCCASIONAL.

Note: *Setaria faberi* Herrm. (giant bristlegrass) and *S. verticillata* (L.) Beauv. (hooked bristlegrass) are of known occurrence in this region but are much less common than *S. viridis*. *S. verticillata* is not easily distinguished from *S. viridis* in vegetative condition, but *S. faberi* may be recognized by its pilose upper leaf surface (glabrous to scabrous in the other two).

8 Blades less than 2 mm wide and lacking a prominent midvein, often involute.

9 Blades not bordered in strong transmitted light.

10 Culms not glandular. . . . . *Eragrostis pectinacea* (Michx.) Nees, Carolina lovegrass (Fig. 11).
DRY WASTE GROUND; COMMON.



FIGURES 9–15. **9.** *Cenchrus longispinus.* **10.** *Setaria viridis.* **11.** *Eragrostis pectinacea.* **12.** *Eragrostis pilosa* var. *perplexa.* 13 and 14. *Aristida basiramea.* **15.** *Aristida oligantha.*

10 Culms with several to many scattered glandular depressions on the upper portions of many internodes. . . . . .*Eragrostis pilosa* (L.) Beauv. var. *perplexa* (Harvey) S. D. Koch, Lovegrass (Fig. 12).
BLOWOUTS OR WASHOUTS; VERY RARE.

9 Blades dark-bordered in strong transmitted light. . . . . .Annual *Aristida* spp., Threeawns (Figs. 13, 14, and 15).
DRY WASTE GROUND; NOT COMMON.

Note: The thickened margins of these species are associated with one or two zones of fibers on the lower surface of the blade. If that surface shows a single light band (under reflected light, using good optics) then the species is probably *A. basiramea* Engelm. ex Vasey (forktip threeawn) or *A. longespica* Poir. (slimspike threeawn). If it shows a double light band under the same conditions, then the plant is *A. oligantha* Michx. (prairie threeawn).

GROUP 2

Rhizomatous or stoloniferous perennials with the ligule principally a fringe of hairs, auricles absent, and sheaths open to the base

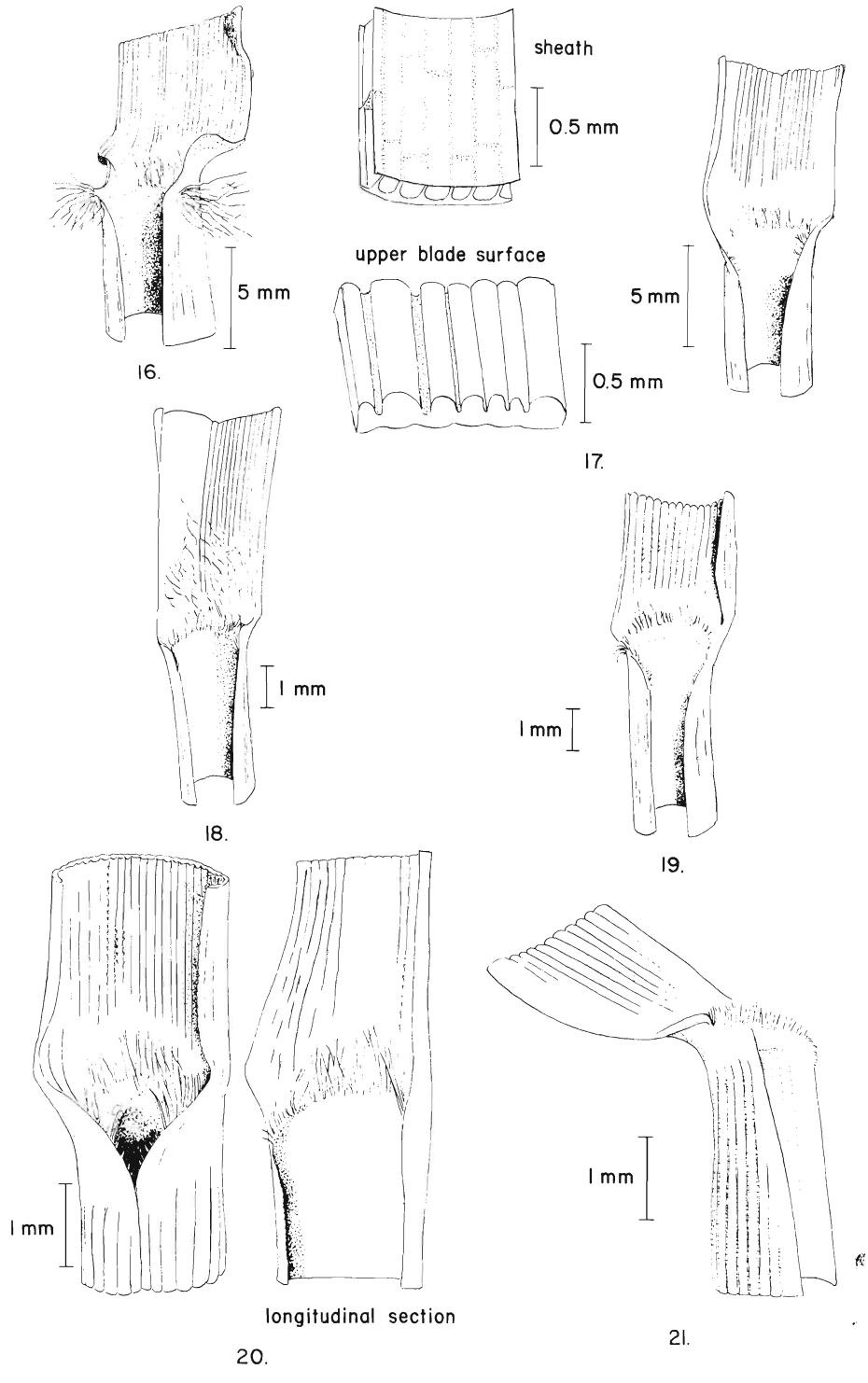
1 Plants robust, most blades more than 5 mm broad at base.
2 Culms usually solid; sheaths lacking air chambers. . . . . .*Calamovilfa longifolia* (Hook.) Scribn., Prairie sandreed (Fig. 16).
DRY SAND HILLS; ABUNDANT, OFTEN DOMINANT.

2 Culms often hollow, at least in the lower parts; at least the lower sheaths with air chambers between the major veins, these often traversed by cross-septae (best seen in strong transmitted light; Fig. 17).
3 Most ligules more than 1.5 mm in length; blades well over 5 mm broad at the base.
4 Rhizomes stout, usually more than 5 mm in diameter (including scales), often yellowish; ridges of the blade's upper surface of various sizes. . . . . .*Spartina pectinata* Link., Prairie cordgrass (Fig. 17).
MOIST HABITATS; RELATIVELY COMMON

4 Rhizomes more slender, usually 5 mm or less in diameter (including scales), not particularly yellowish; ridges of the blade's upper surface more uniform in size. . . . . *Panicum virgatum* L., Switchgrass (Fig. 18).
DRY TO MODERATELY MOIST HABITATS; VERY COMMON.

3 All ligules less than 1.5 mm in length; blades barely 5 mm broad at the base. . . . . *Spartina gracilis* Trin., Alkali cordgrass (Fig. 19).
MOIST ALKALINE AREAS; NOT COMMON

1 Plants smaller; blades mostly less than 5 mm broad at the base.
5 Leaves without long hairs in addition to those of the ligule in the collar region (check a number of leaves to be sure that these have not broken off).
6 Plants of moist areas and meadows, often where alkaline; culms usually hollow; sheaths with air chambers between the major veins, lacking narrow furrows between the veins on the outer surfaces. . . . . *Spartina gracilis* Trin., Alkali cordgrass (Fig. 19).
MOIST ALKALINE AREAS; NOT COMMON



FIGURES 16–21. **16.** *Calamovilfa longifolia.* **17.** *Spartina pectinata.* **18.** *Panicum virgatum.* **19.** *Spartina gracilis.* **20.** *Redfieldia flexuosa.* **21.** *Muhlenbergia pungens.*

6 Plants of dry sand; culms solid; sheaths lacking regularly arranged air chambers, bearing narrow furrows between the veins on the outer surfaces.

7 Blades well over 10 cm in length, flexuous, rolled in the bud; culms widely spaced along the deeply buried rhizomes; plants not matted. . . . . .*Redfieldia flexuosa* (Thurb.) Vasey, Blowoutgrass (Fig. 20).
LOOSE SAND, OFTEN IN BLOWOUTS; COMMON.

7 Blades less than 10 cm in length, straight, pungent-tipped, folded in the bud; culms crowded; plants forming extensive mats. . . . . *Muhlenbergia pungens* Thurb., Sandhill muhly (Fig. 21).
LOOSE SAND, OFTEN IN BLOWOUTS; COMMON.

5 Leaves bearing few to many long hairs in addition to those of the ligule in the collar region.

8 Sheaths more or less solid, lacking regularly arranged air chambers at maturity; culms solid or hollow; blades usually with the two margins overlapping in the bud, otherwise variable.

9 Ligules about 1 mm long; plants strongly rhizomatous; blades more than 10 cm in length. . . . . .*Calamovilfa longifolia* (Hook.) Scribn., Sand reedgrass (Fig. 16).
DRY SAND HILLS; ABUNDANT, OFTEN DOMINANT.

9 Ligules shorter or plants not otherwise as above.

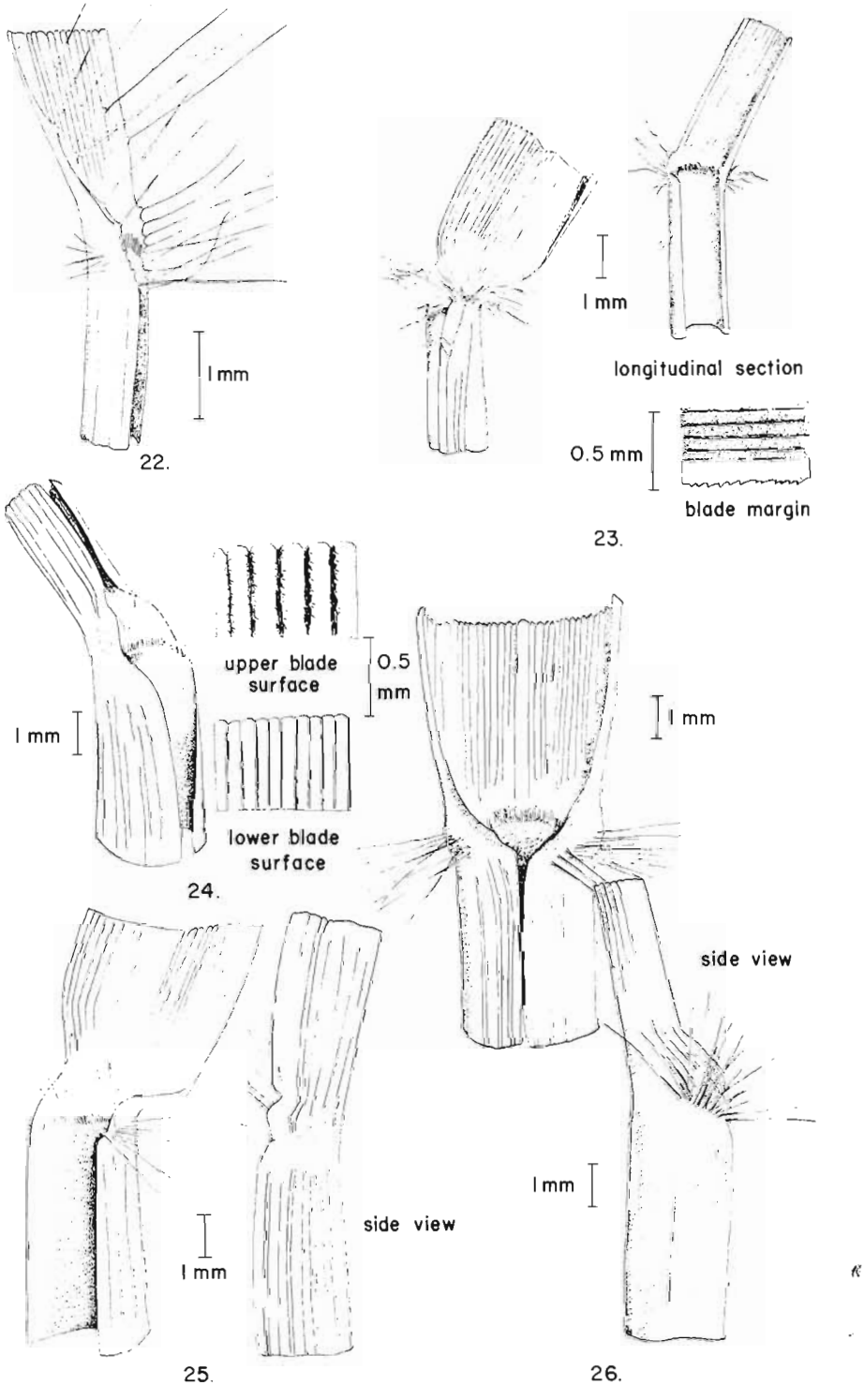
10 Blades mostly 2–5 mm wide; plants usually clumped. . . . . *Bouteloua curtipendula* (Michx.) Torr., Sideoats grama (Fig. 67).
DRY PRAIRIE; NOT ESPECIALLY COMMON.

10 Blades mostly 0.4–2.0 mm wide; plants often mat-forming, sometimes clumped.

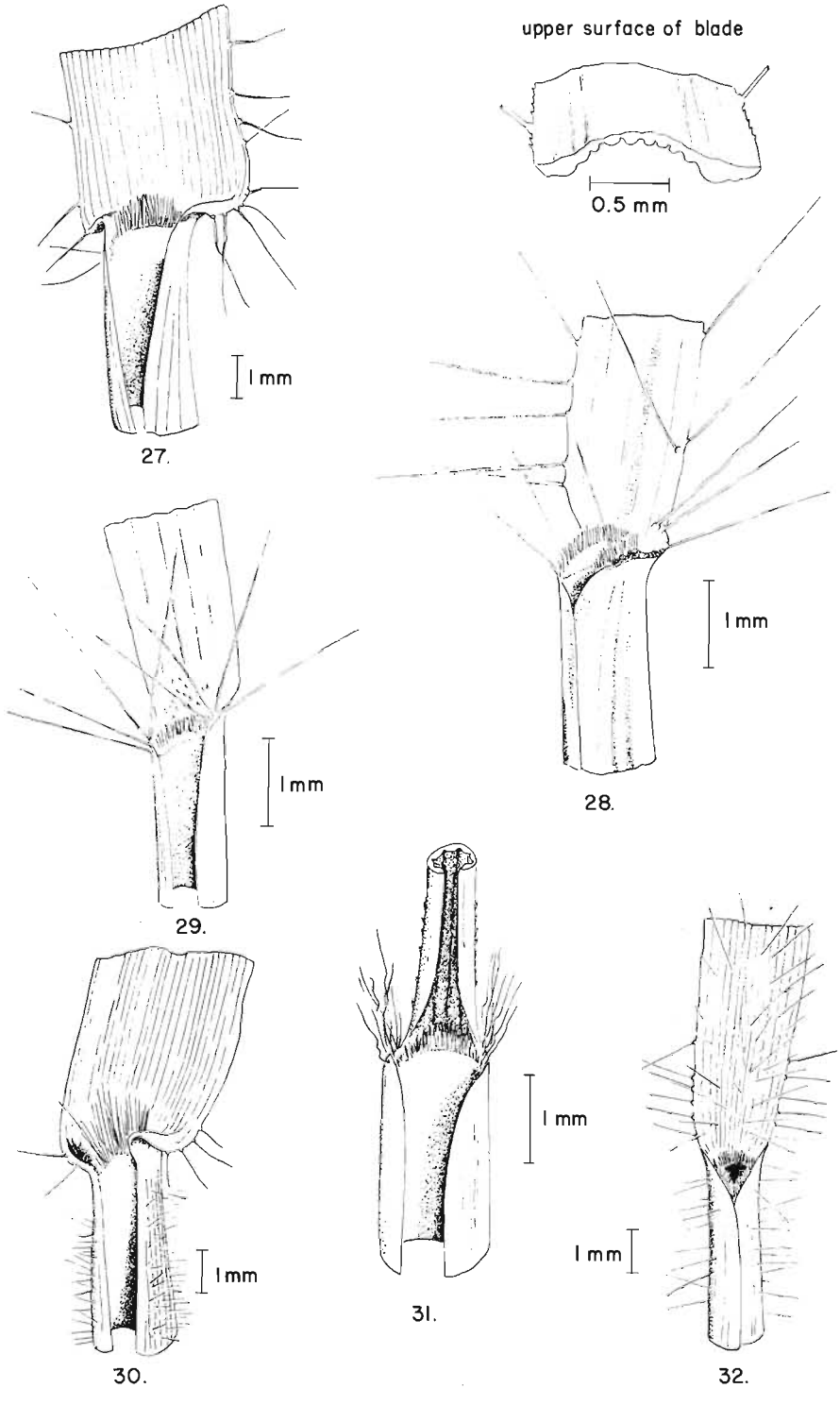
11 Plants extensively creeping by means of stolons, not rhizomatous; sheath and blades usually pilose. . . . . .*Buchloë dactyloides* (Nutt.) Engelm., Buffalograss (Fig. 22).
DRY PRAIRIE; UNCOMMON.

11 Plants spreading by means of short rhizomes, not stoloniferous; sheath and blade not usually pilose. . . . . .*Bouteloua gracilis* (H.B.K.) Griffiths, Blue grama (Fig. 29).
DRY PRAIRIE; RELATIVELY COMMON.

8 Sheaths with regularly arranged air chambers between the major veins at maturity; culms solid; blades with the two margins touching in the bud, stiff, sharp-pointed; plants forming mats in moist to moderately dry alkaline areas. . . . . *Distichlis spicata* (L.) Greene var. *stricta* (Torr.) Beetle, Inland saltgrass (Fig. 1).
MOIST TO DRY, OFTEN ALKALINE AREAS; NOT UNCOMMON.



FIGURES 22–26. **22.** *Buchloë dactyloides.* **23.** *Sporobolus cryptandrus.* **24.** *Sporobolus airoides.* **25.** *Eragrostis spectabilis.* **26.** *Eragrostis trichodes.*



FIGURES 27–32. 27. *Dichanthelium oligosanthes* var. *scribnerianum*. 28. *Bouteloua hirsuta*. 29. *Bouteloua gracilis*. 30. *Dichanthelium acuminatum*. 31. *Aristida purpurea*. 32. *Dichanthelium wilcoxianum*.

GROUP 3

Non-rhizomatous, non-stoloniferous perennials with the ligule principally a fringe of hairs, auricles absent, and sheaths open to the base

1 Leaves with a clearly marked zone or line of pubescence on the back surface in the collar region; ligule short, less than 0.3 mm long in many plants, sometimes as long as 0.8 mm.
  2 Culms solid; mature sheaths, particularly the lowest ones, with regularly arranged air chambers between the vascular bundles (Fig. 17).
    3 Blades with a prominent white margin wider than the adjacent ridges on the upper surface, the number of ridges roughly equal on upper and lower surfaces. . . . . *Sporobolus cryptandrus* (Torr.) Gray, Sand dropseed (Fig. 23).
    DRY SAND; VERY COMMON.
    3 Blades lacking white margins, the number of ridges greater on the lower than on the upper surface. . . . . *Sporobolus airoides* (Torr.) Torr., Alkali sacaton (Fig. 24).
    DRY TO MOIST SAND, TOLERANT OF ALKALINE CONDITIONS; NOT COMMON.
  2 Culms generally hollow, at least below; mature sheaths lacking regularly arranged air chambers between the vascular bundles.
    4 Midrib prominent throughout at least part of the blade, appearing as a broad, whitish band on the upper surface because of a zone of achlorophyllous parenchyma. . . . . *Eragrostis trichodes* (Nutt.) Wood., Sand lovegrass (Fig. 26).
    DRY PRAIRIE; COMMON LOCALLY.
    4 Midrib less prominent or absent, not appearing as a broad whitish band on the upper surface, except sometimes at the very base of the blade. . . . . *Eragrostis spectabilis* (Pursh) Steud., Purple lovegrass (Fig. 25).
    DRY WASTE GROUND; NOT ESPECIALLY COMMON.

1 Leaves lacking a clearly marked line or zone of pubescence on the back surface in the collar region, although general pubescence may be present, and the region of the ligule may have hairs backing it (on the upper blade surface) or flanking it (on the blade margin).
  5 Ligules collarlike, short, less than 0.6 mm in length.
    6 Mature blades flat, broad, averaging well over 5 mm broad; some parts of the blades or sheaths generally pilose with pustular-based hairs; culms hollow. . . . . *Dichanthelium oligosanthes* (Schult.) Gould var. *scribnerianum* (Nash) Gould, Scribner dichanthelium (Fig. 27).
    DRY TO MOIST PRAIRIE AND WASTE GROUND; COMMON.
    6 Mature blades involute to folded (flat), narrow, well under 5 mm broad except sometimes at the very base; pilosity various; culms solid.
      7 Blades relatively broad, although strongly involute, some more than 4 mm broad at the base; at least the lowest sheaths with regular air chambers. . . . . *Sporobolus airoides* (Torr.) Torr., Alkali sacaton (Fig. 24).
      DRY TO MOIST SAND, TOLERANT OF ALKALINE CONDITIONS; NOT COMMON.
      7 Blades mostly narrower; lowest sheaths lacking air chambers or with a few irregularly spaced ones.
        8 Blades with thickened margins, the three ridges at each edge fused and forming a margin thicker than the central part of the blade; blades narrow, usually 1–2 mm wide. . . . . *Bouteloua hirsuta* Lag., Hairy grama (Fig. 28).
        DRY PRAIRIE; RELATIVELY COMMON.
        8 Blade margins not differentiated as in the opposing choice.
          9 Ridges of blade more prominent on the lower surface than on the upper surface or of about equal prominence on each surface, the scabrosity or pubescence mostly confined to the margins and the midrib of the lower

side; plants mat-forming. . . . . *Bouteloua gracilis* (H.B.K.) Griffiths, Blue grama (Fig. 29).
DRY PRAIRIE; RELATIVELY COMMON

9 Ridges of the blade more prominent on the upper than on the lower surface, the upper surface usually scabrous or pubescent. . . . . *Aristida purpurea* Steud., Purple threeawn (Fig. 31).
DRY PRAIRIE; OCCASIONAL

Note: Plants with short, curly blades mostly less than 8 cm in length are probably *A. purpurea* var. *longiseta* (Steud.) Vasey (Fendler threeawn); those with longer, non-curly blades, *A. purpurea* var. *robusta* (Merr.) Holmgren and Holmgren (red threeawn).

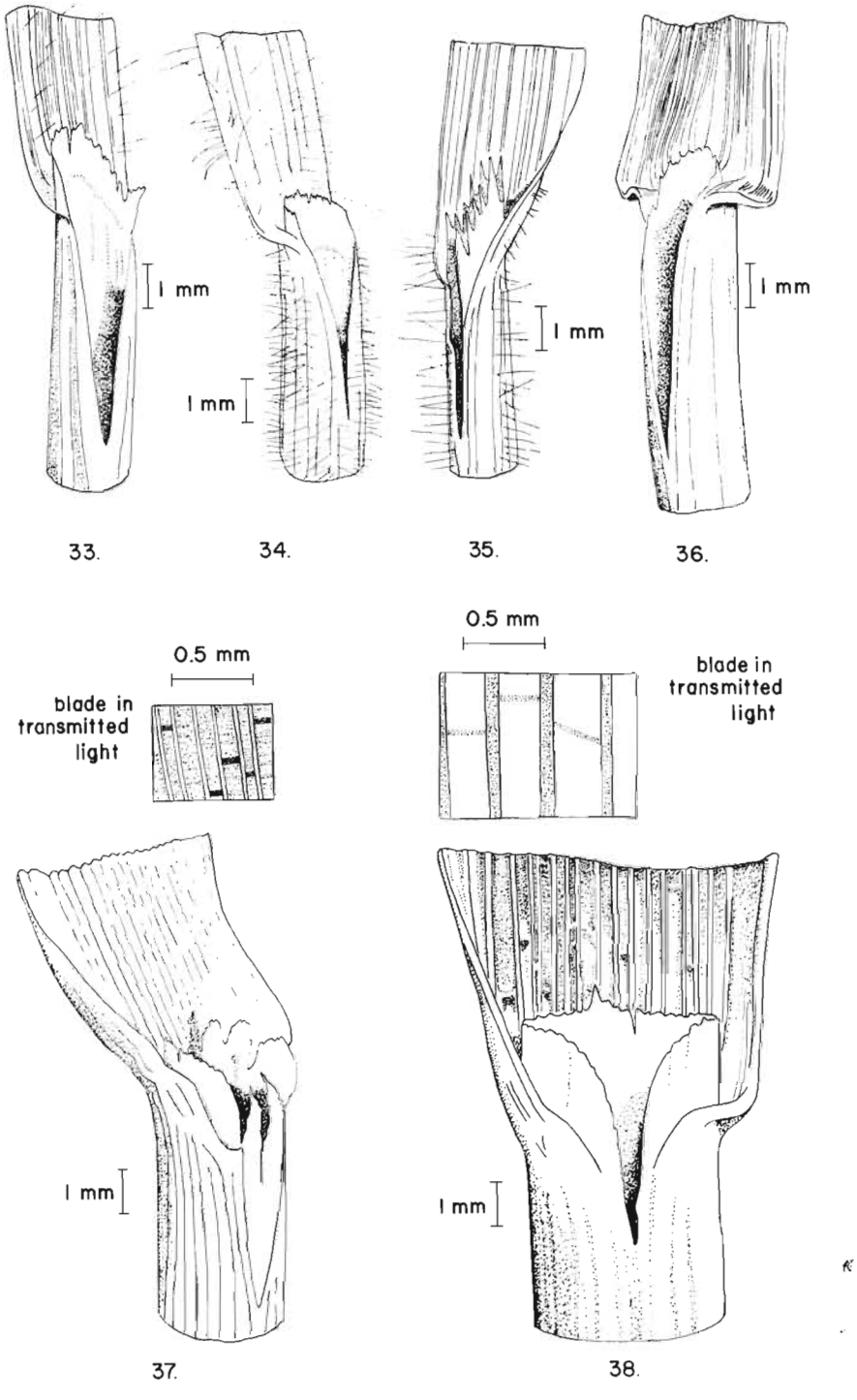
5 Ligules longer, more than 0.6 mm in length.

10 Ligules 2–6 mm in length. . . . . *Dichanthelium acuminatum* (Sw.) Gould and Clark var. *acuminatum*, Woolly dichanthelium, and var. *implicatum* (Scribn.) Gould and Clark, Tangled dichanthelium (Fig. 30).
DRY PRAIRIE; NOT COMMON.

10 Ligules mostly 0.6–2.0 mm in length.

11 Blades mostly more than 4 mm wide and usually less than 12 times as long as broad. . . . . *Dichanthelium oligosanthes* (Schult.) Gould var. *scribnerianum* (Nash) Gould, Scribner dichanthelium (Fig. 27).
DRY TO MOIST PRAIRIE AND WASTE GROUND; COMMON.

11 Blades mostly less than 4 mm wide and usually more than 12 times as long as broad. . . . . *Dichanthelium wilcoxianum* (Vasey) Freckmann Wilcox dichanthelium (Fig. 32).
DRY PRAIRIE; NOT COMMON.



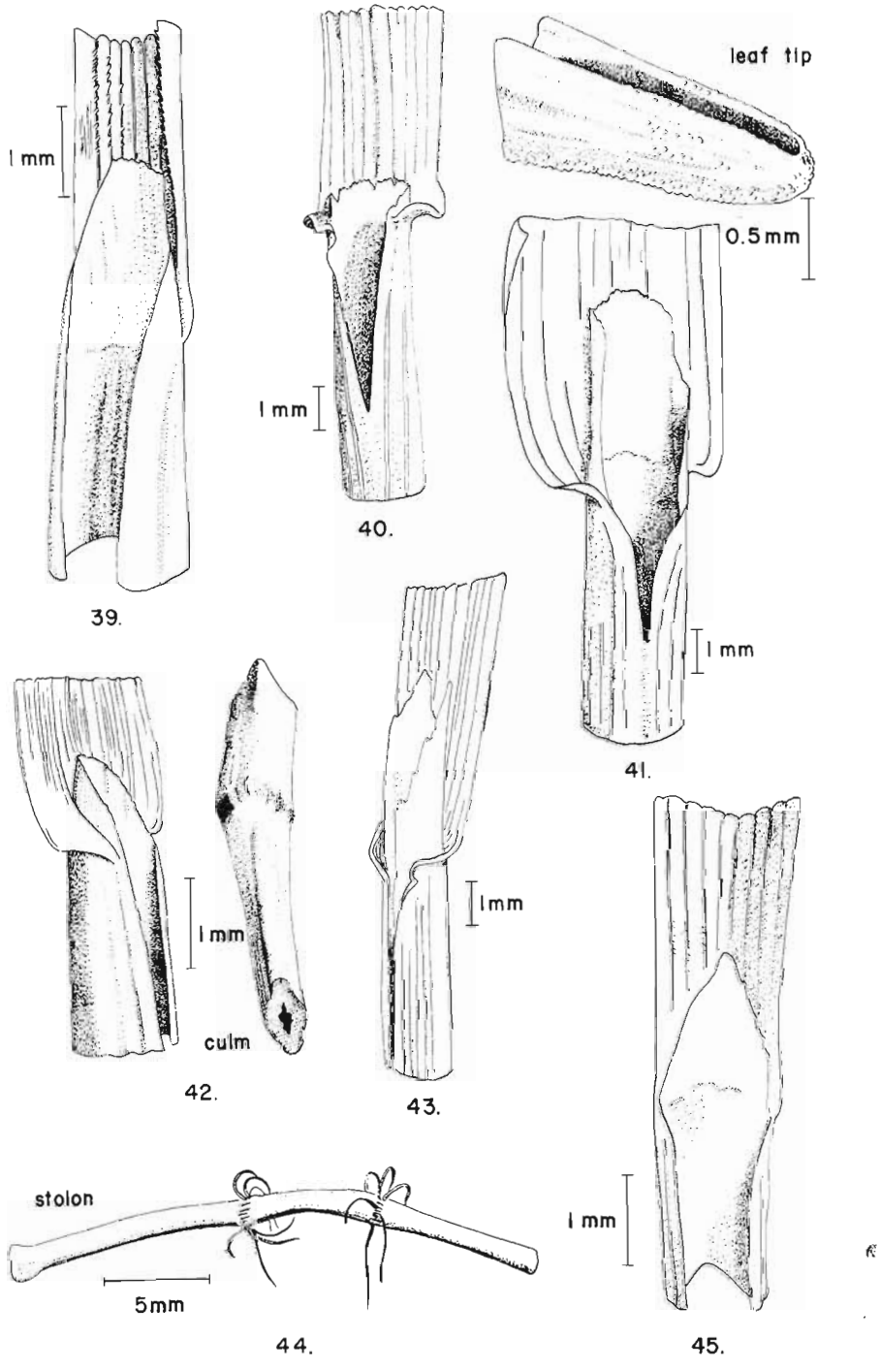
FIGURES 33–38. **33.** *Bromus secalinus.* **34.** *Bromus japonicus.* **35.** *Bromus tectorum.* **36.** *Bromus inermis.* **37.** *Glyceria striata.* **38.** *Glyceria grandis.*

GROUP 4

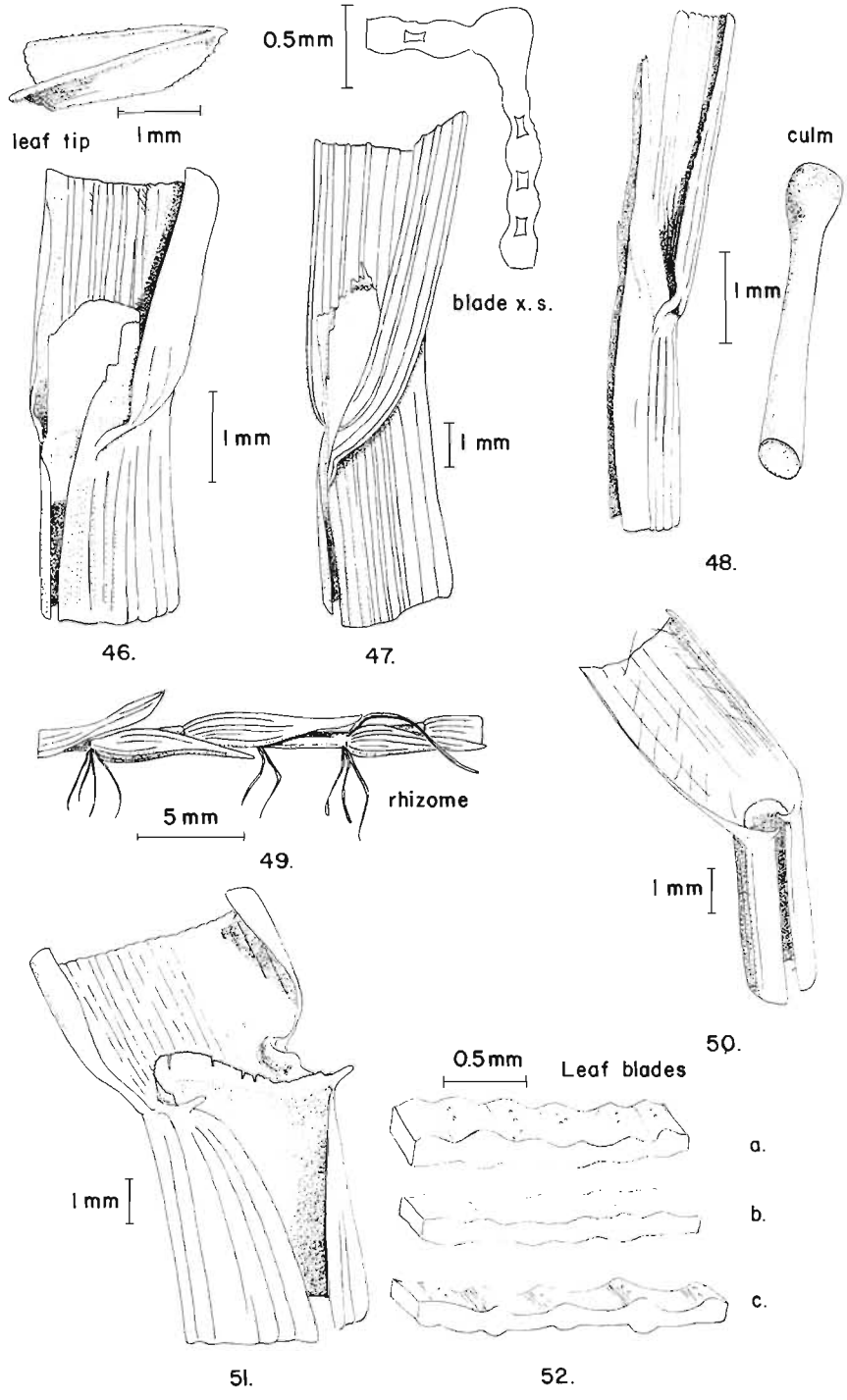
Grasses with the ligule principally a membrane and the sheaths partly or entirely closed

1 Leaves rolled in the bud, the tips not prow-shaped.
  2 Plants annual, the remains of previous years' culms and leaves not present, weedy.
    3 At least some of the upper sheaths glabrous; culms glabrous, except sometimes at the upper nodes; ligules mostly more than 1.5 mm long. . . . . *Bromus secalinus* L., Cheat (Fig. 33).
    WASTE GROUND; NOT COMMON.
    3 Sheaths strongly pubescent or culms pubescent or ligules shorter. . . . . Other annual *Bromus* spp (Figs. 34 and 35)
    WASTE GROUND; COMMON

    Note: The most likely annual bromes are *Bromus tectorum* L. (downy brome) and *B. japonicus* Thunb. (Japanese brome). *Bromus japonicus* can often be distinguished from *B. tectorum* by its shorter ligules (averaging under 1.5 mm long). *Bromus tectorum* blooms first, often producing pinkish masses in overgrazed pastures while *B. japonicus* is still green. *Bromus squarrosus* L. (squarrose brome) has been collected in this region but is extremely uncommon.
  2 Plants perennial, the remains of previous years' culms and leaves usually obvious.
    4 Plants rhizomatous.
      5 Plants growing in or near water; both blades and sheaths with abundant cross-septate air chambers (use strong transmitted light to see the septae); auricles absent.
        6 Ligules relatively short, mostly less than 3 mm long; blades mostly less than 5 mm wide. . . . . *Glyceria striata* (Lam.) Hitchc., Fowl mannagrass (Fig. 37).
        AQUATIC; RELATIVELY COMMON.
        6 Ligules usually more than 3 mm long; blades often wider than 5 mm. . . . . *Glyceria grandis* S. Wats. ex A. Gray, American mannagrass (Fig. 38)
        AQUATIC; RELATIVELY COMMON
      5 Plants of dry land; sheaths, but not blades, with air chambers and cross-septae; auricles occasionally present. . . . . *Bromus inermis* Leyss., Smooth brome (Fig. 36).
      DISTURBED AREAS, SOMETIMES INVADING PRAIRIE; VERY COMMON.
    4 Plants not rhizomatous.
      7 Sheaths closed only at the base; blades flat to involute, few-ribbed, not more than 3 mm wide. . . . . *Puccinellia nuttalliana* (Schult.) Hitchc., Nuttall alkaligrass (Fig. 39).
      MOIST GROUND, OFTEN WHERE ALKALINE; UNCOMMON.
      7 Sheaths closed more than half-way to the summit; blades usually flat, often more than 3 mm wide. . . . . *Bromus ciliatus* L., Fringed brome (Fig. 40).
      MOIST GROUND; UNCOMMON.



FIGURES 39–45. **39.** *Puccinellia nuttalliana.* **40.** *Bromus ciliatus.* **41.** *Catabrosa aquatica.* **42.** *Poa compressa.* **43** and **44.** *Poa palustris.* **45.** *Poa arida.*



FIGURES 46–52. **46.** *Poa pratensis.* **47.** *Dactylis glomerata.* **48.** *Muhlenbergia filiformis.* **49.** *Poa pratensis.* **50.** *Aegilops cylindrica.* **51.** *Secale cereale.* **52.** a. *Secale cereale,* b. *Triticum aestivum,* and c. *Hordeum vulgare.*

1 Leaves folded in the bud, the tips often prominently prow-shaped.
8 Plants rhizomatous or strongly stoloniferous.
9 Plants aquatic; blades flat; sheaths with regularly arranged air chambers; blades papillate under high magnification. . . . . .*Catabrosa aquatica* (L.) Beauv., Brookgrass (Fig. 41).
AQUATIC; NOT ESPECIALLY COMMON.

9 Plants not really aquatic, although sometimes growing in wet ground and sometimes where temporarily flooded; blades flat to folded; sheaths with or without air chambers; blades often scabrous, but not papillate.
10 Culms compressed (noticeable especially at the nodes) sheaths compressed. . . . . .*Poa compressa* L., Canada bluegrass (Fig. 42).
WASTE GROUND; NOT COMMON.

10 Culms not compressed; sheaths slightly, if at all, compressed.
11 Plants stoloniferous but lacking scaly rhizomes; plants growing in wet ground. . . . . *Poa palustris* L., Fowl bluegrass (Figs. 43 and 44).
WET GROUND; OCCASIONAL.

11 Plants rhizomatous; habitat variable.
12 Sheaths closed for about half their length; blades usually not very strongly ribbed when fresh; plants widely escaped from cultivation. . . . . *Poa pratensis* L., Kentucky bluegrass (Figs. 46 and 49).
WASTE GROUND, SOMETIMES INVADING PRAIRIE; NOT UNCOMMON.

12 Sheaths open nearly to the base; blades rather strongly ribbed on the upper surface; plants native. . . . . .*Poa arida* Vasey, Plains bluegrass (Fig. 45).
DRY TO SOMEWHAT MOIST PRAIRIE; NOT COMMON.

8 Plants neither rhizomatous nor strongly stoloniferous; blades broad (3–9 mm in mature leaves), not prow-shaped at the tip, when mature with cross-septate air chambers between major veins. . . . . *Dactylis glomerata* L., Orchardgrass (Fig. 47).
DRY OR MOIST GROUND; OCCASIONALLY ESCAPED FROM CULTIVATION.

GROUP 5

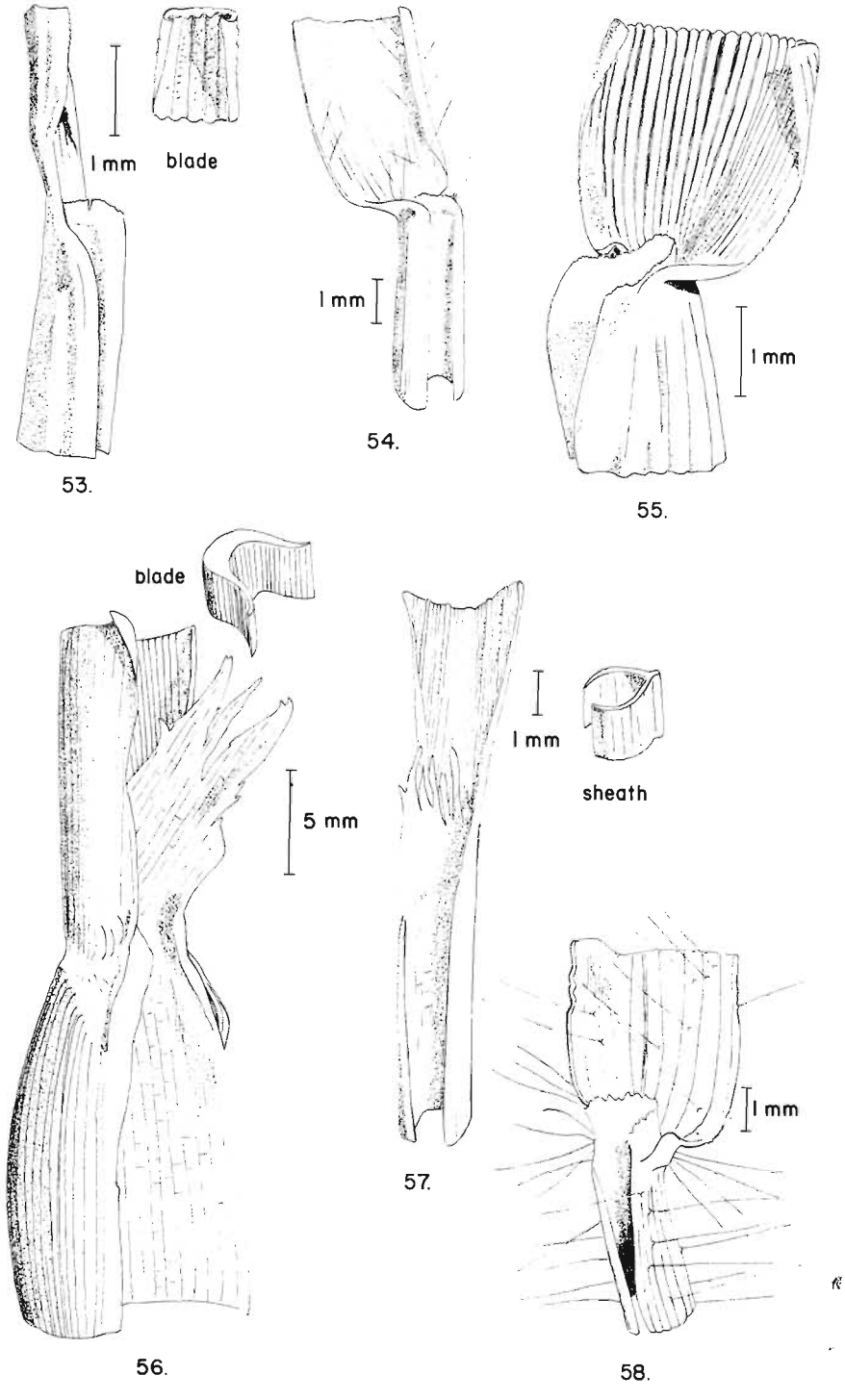
Annuals with the ligule principally a membrane and sheaths open to the base

1 Culms solid; plants small, the leaf blades less than 2 mm wide, mostly from sandy riverbanks. . . . . .*Muhlenbergia filiformis* (Thurb.) Rydb., Pullup muhly (Fig. 48).
MOIST AREAS; RARE.

1 Culms hollow.
2 Auricles present on at least some leaves.
3 Blades averaging less than 5 mm wide, often pilose. . . . . .*Aegilops cylindrica* Host, Jointed goatgrass (Fig. 50).
WASTE GROUND; UNREPORTED, BUT TO BE EXPECTED.
3 Blades wider, not pilose. . . . . *Secale cereale* L., Rye (Fig. 51).
PLANTED OR ESCAPED IN WASTE GROUND.

Note: *Hordeum vulgare* L. (field barley) and *Triticum aestivum* L. (wheat) are two additional cereal crops that would key here, but they do not persist as commonly as *Secale cereale* in this region. *T. aestivum* usually has its blades virtually unridged when fresh, in contrast to the other two. *Secale cereale* is more prominently ridged on the upper blade surface than on the lower, and *H. vulgare* tends to be about equally ridged on both surfaces (*see* Fig. 52).

2 Auricles absent on all leaves.
4 Ligules short, less than 1 mm in length.
5 Plants delicate, the blades filiform, with fewer than 10 ridges on the upper surface. . . . . .*Festuca octoflora* Walt., Sixweeks fescue (Fig. 53).
DRY PRAIRIE AND DISTURBED AREAS; VERY COMMON.
5 Plants coarser, most blades with more than 10 ridges.
6 Blades usually pilose with stiff spreading hairs on both surfaces, many hairs 0.5 mm long or longer. . . . . .*Aegilops cylindrica* Host, Jointed goatgrass (Fig. 54).
WASTE GROUND; UNREPORTED BUT TO BE EXPECTED.
6 Blades not pilose, the pubescence lacking or sparse and the hairs shorter. . . . . *Hordeum pusillum* Nutt., Little barley (Fig. 55).
WASTE GROUND; NOT UNCOMMON.
4 Ligules longer than 1 mm.



FIGURES 53–58. **53.** *Festuca octoflora.* **54.** *Aegilops cylindrica.* **55.** *Hordeum pusillum.* **56.** *Zizania aquatica.* **57.** *Leptochloa fascicularis.* **58.** *Digitaria sanguinalis.*

7 Leaves with a zone of appressed pubescence on the back surface at the collar region; plants stout aquatics often with at least some of the leaves floating and more than 1 cm broad; sheaths with prominent air spaces and stout cross-septae, these usually visible to the naked eye, even without transmitted light. . . . . *Zizania aquatica* L., Wild rice (Fig. 56).
AQUATIC; RARE.

7 Leaves lacking a zone of appressed pubescence in the collar region although sometimes with general appressed pubescence there; plants sometimes aquatic, but then often lacking floating leaves and with narrower blades; sheaths with or without air chambers, but cross-septae, if present, usually visible only under transmitted light.

8 Blades strongly keeled, the midrib unusually strong, appearing on the upper surface of the leaf as a white band more than 0.2 mm wide; sheath keeled. . . . . *Leptochloa fascicularis* (Lam.) A. Gray, Bearded sprangletop (Fig. 57).
DRY TO MOIST WASTE GROUND; LOCALLY COMMON.

8 Blades not strongly keeled, the midrib less prominent.

9 Leaves with few to many stiff hairs (more than 1 mm long) in or near the collar region; sheaths lacking air chambers.

10 Blades bearing numerous pustular-based hairs. . . . . *Digitaria sanguinalis* (L.) Scop., Hairy crabgrass (Fig. 58).
DRY TO MOIST WASTE GROUND; LOCALLY COMMON.

10 Blades nearly glabrous except near the ligule. . . . . *Digitaria ischaemum* (Schreb.) Schreb. ex Muhl., Smooth crabgrass (Fig. 59).
DRY TO MOIST WASTE GROUND; NOT COMMON.

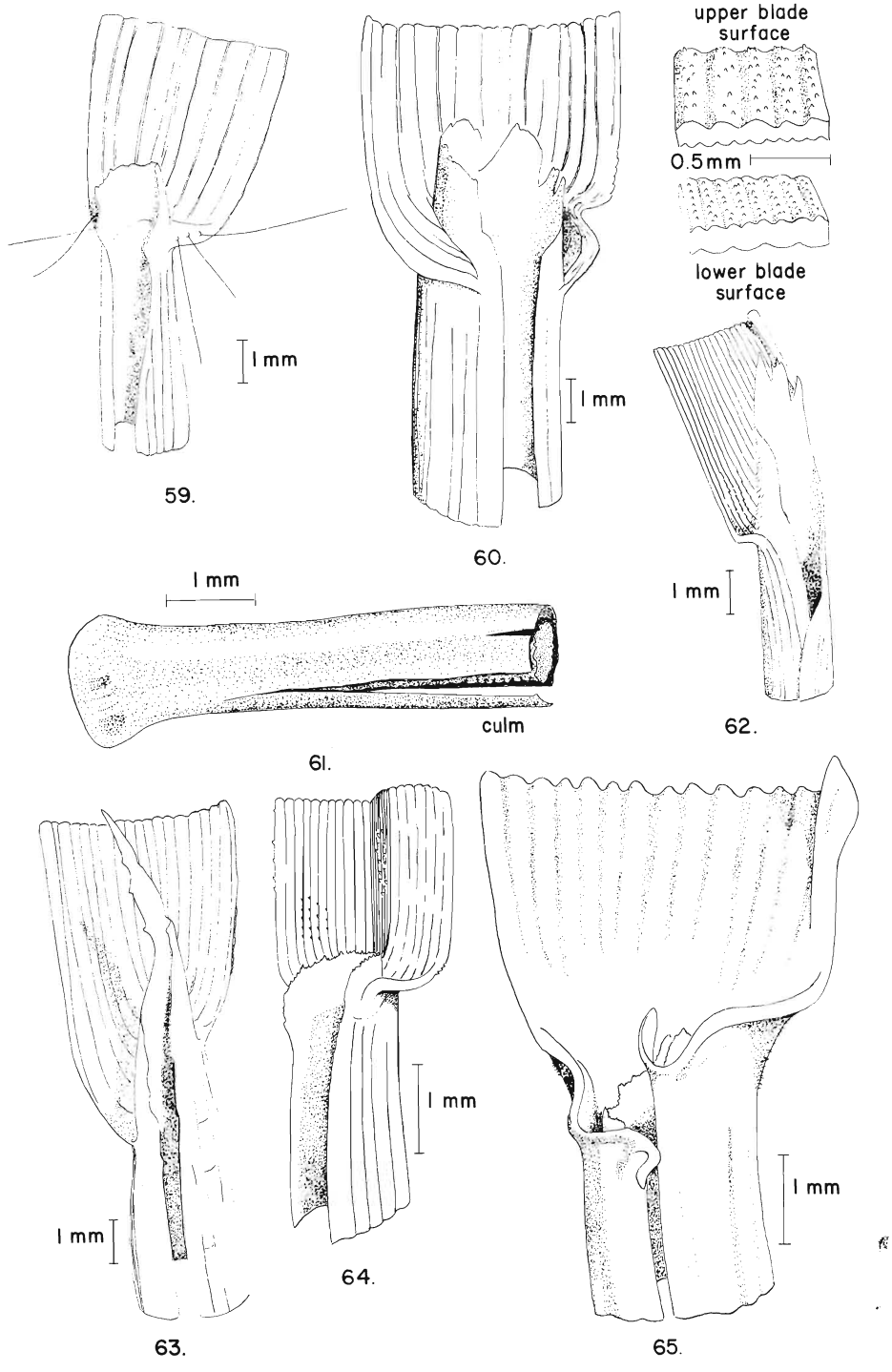
Note: *Digitaria ciliaris* (Retz.) Koel. (southern crabgrass) has not been reported from this region but is to be expected. It is vegetatively indistinguishable from *D. ischaemum.*

9 Leaves lacking long stiff hairs in the collar region; sheaths with air chambers when mature.

11 Blades more deeply ridged on the upper than on the lower surface and with additional lines of scabrosity below, so that the number of ridges on the lower surface greatly exceeds that of the upper surface. . . . . *Polypogon monspeliensis* (L.) Desf., Rabbitfootgrass (Fig. 62).
WET GROUND OR AQUATIC; COMMON.

11 Blades with ridges of the upper and lower surfaces about the same height or at least about equal in number.

12 Plants of wet areas, usually in standing water; cross-septae of sheath obvious in strong transmitted light; ligules usually more than 6 mm long. . . . . *Beckmannia syzigachne* (Steud.) Fern., American sloughgrass (Fig. 63).
AQUATIC; NOT COMMON.



FIGURES 59–65. **59.** *Digitaria ischaemum.* **60.** *Avena fatua* var. *sativa.* **61.** *Muhlenbergia asperifolia.* **62.** *Polypogon monspeliensis.* **63.** *Beckmannia syzigachne.* **64.** *Muhlenbergia asperifolia.* **65.** *Agropyron intermedium.*

12 Plants of dry areas; cross-septae not obvious in sheath in transmitted light; ligules usually less than 6 mm long. . . . . *Avena fatua* L., Oats (Fig. 60).
DRY WASTE GROUND; OCCASIONAL.

Note: The wild variety, *A. fatua* var. *fatua* (wild oats), has the herbage pilose, while the variety escaped from cultivation, *A. fatua* var. *sativa* (L.) Haussk. (common oats), is glabrous. Both may be found occasionally in this region.

GROUP 6

Perennials with sheaths open to the base, membranous ligules, and solid culms

1 Plants rhizomatous.
2 Auricles present on at least some leaves; rhizomes extensive. . . . . *Agropyron intermedium* (Host) Beauv., Intermediate wheatgrass (Fig. 65).
INTRODUCED IN DRY GROUND AND ESCAPING; NOT COMMON.

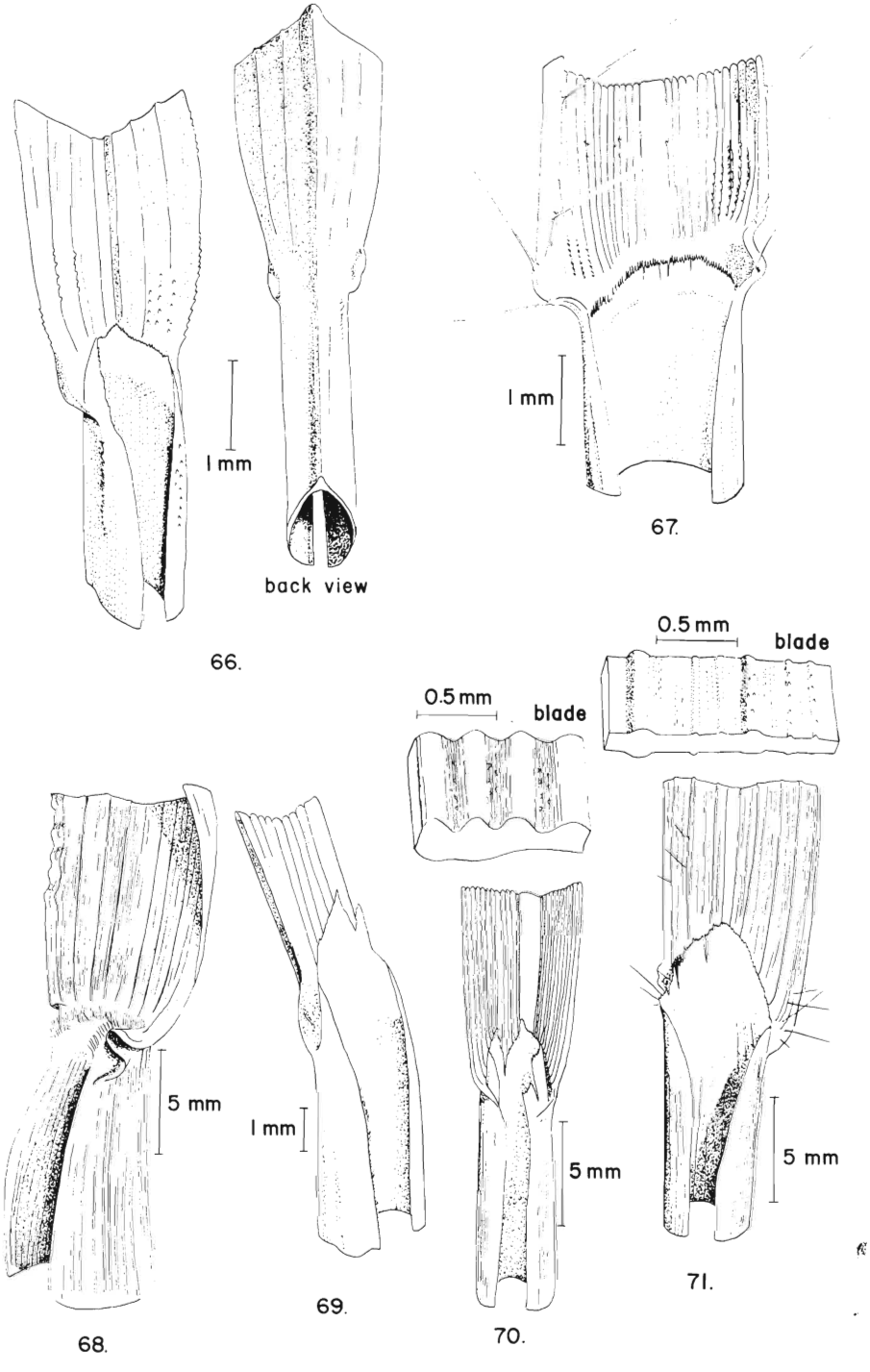
2 Auricles lacking.
3 Leaf blades less than 4 mm broad.
4 Plants with the ligule a very short (0.1–0.4 mm) fringed membrane, usually backed and flanked by hairs; blades stiff and sharp pointed; plants mat-forming. . . . . *Distichlis spicata* (L.) Greene var. *stricta* (Torr.) Beetle, Inland saltgrass (Fig. 1).
MOIST TO DRY, OFTEN ALKALINE, GROUND; NOT UNCOMMON.

4 Plants with the ligule not entirely as above or otherwise not as above.
5 Plants clumped, not very strongly rhizomatous; blades averaging more than 2 mm wide; culms not with a readily separable outer layer.
6 Leaf blades folded in the bud, keeled strongly, so that they would appear almost Y-shaped in cross-section; ligules often more than 1 mm long. . . . . *Andropogon scoparius* Michx., Little bluestem (Fig. 66).
DRY PRAIRIE; VERY COMMON.

6 Leaf blades rolled in the bud at maturity; ligules less than 1 mm long. . . . . *Bouteloua curtipendula* (Michx.) Torr., Sideoats grama (Fig. 67).
DRY PRAIRIE; NOT ESPECIALLY COMMON.

5 Plants more or less matted, very strongly rhizomatous; leaf blades folded and V-shaped in section at maturity, about 1–2 mm wide; culms with outer layer readily separating and peeling away at maturity. . . . . *Muhlenbergia asperifolia* (Nees and Mey.) Parodi, Alkali muhly (Figs. 61 and 64).
MOIST GROUND; NOT COMMON.

3 Leaf blade mostly more than 4 mm broad.
7 Ligule membranous at the base but plainly fringed in the upper part.



FIGURES 66–71. **66.** *Andropogon scoparius.* **67.** *Bouteloua curtipendula.* **68.** *Sorghum halepense.* **69.** *Oryzopsis hymenoides.* **70.** *Andropogon hallii.* **71.** *Andropogon gerardii.*

8 Culms stout; blades mostly more than 10 mm wide; plants escaped from cultivation. . . . . .*Sorghum halepense* (L.) Pers., Johnsongrass (Fig. 68).
WASTE GROUND; NOT COMMON

8 Culms slender; blades mostly less than 6 mm wide; plants native. . . . . *Bouteloua curtipendula* (Michx.) Torr., Sideoats grama (Fig. 67)
DRY PRAIRIE; NOT ESPECIALLY COMMON.

7 Ligule membranous throughout, at most slightly erose-ciliolate, but definitely not fringed.

9 Plants very strongly rhizomatous, usually growing on sand; blades glaucous and rather evenly ridged above (most ridges about the same size). . . . . .*Andropogon hallii* Hack., Sand bluestem (Fig. 70).
DRY PRAIRIE; COMMON.

9 Plants weakly rhizomatous, seldom found on pure sand; blades not usually glaucous and slightly ridged on both sides with ridges of more than one size (several larger ridges and a number of intervening smaller ones). . . . . .*Andropogon gerardii* Vitm., Big bluestem (Fig. 71).
DRY PRAIRIE; NOT ESPECIALLY COMMON

Note: *Andropogon gerardii* and *A. hallii* sometimes hybridize, and intermediate plants are not uncommon where the two grow in adjacent populations.

1 Plants not rhizomatous.

10 Dried blade strongly ribbed on the upper surface and veined but not ribbed or only weakly ribbed on the lower surface.

11 Major ridges of blade relatively few, usually fewer than 9; blades involute, the edges often approximate in the bud, usually less than 2 mm broad; auricles lacking.

12 Ligules mostly acute to acuminate. . . . . *Oryzopsis hymenoides* (Roem. and Schult.) Ricker, Indian ricegrass (Fig. 69)
DRY SAND; OCCASIONAL

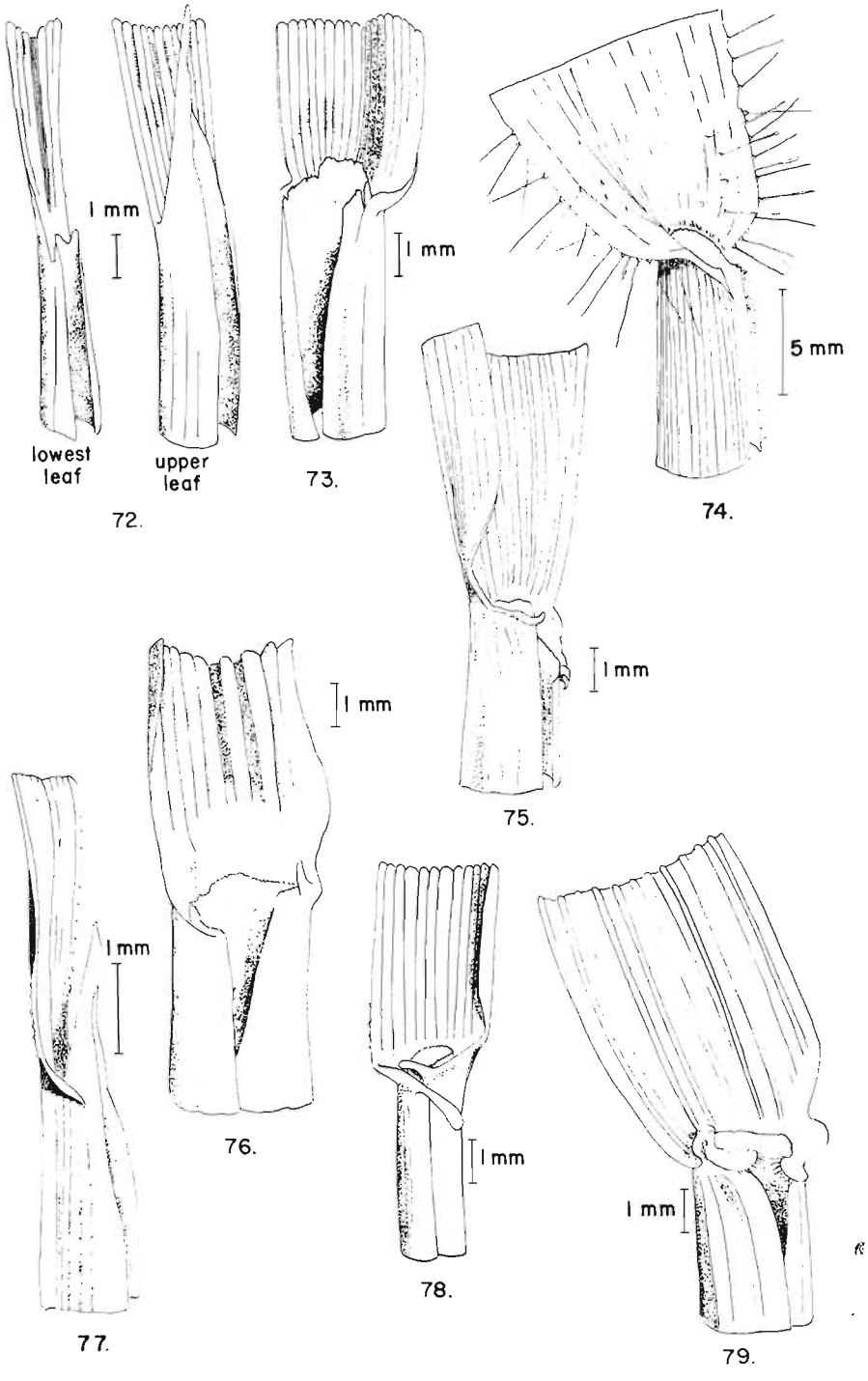
12 Ligules variable, those of the upper leaves acute to acuminate, those of the lowest leaves much shorter and truncate or highest on the sides. . . . . *Stipa comata* Trin. and Rupr., Needle-and-thread (Fig. 72).
DRY PRAIRIE; VERY COMMON.

11 Major ridges of the blade 9 or more, especially near the base; blades flat to involute, the margins overlapping in the bud, usually more than 2 mm broad; auricles often present on at least some leaves.

13 Some ridges of the upper blade very prominent, the ridges not equal in height; plants glaucous. . . . . .*Agropyron elongatum* (Host) Beauv., Tall wheatgrass (Fig. 76).
CULTIVATED AND ESCAPED IN DRY TO MOIST, OFTEN ALKALINE GROUND; NOT COMMON.

13 Ridges of the blade less prominent, all about equal in height; plants not usually glaucous. . . . . .*Agropyron cristatum* (L.) Gaertn., Crested wheatgrass (Fig. 86).
CULTIVATED, WIDELY ESCAPED IN DRY PRAIRIE; COMMON.

10 Dried blade obviously ribbed on both sides, sometimes even more heavily ribbed on the lower surface than on the upper.



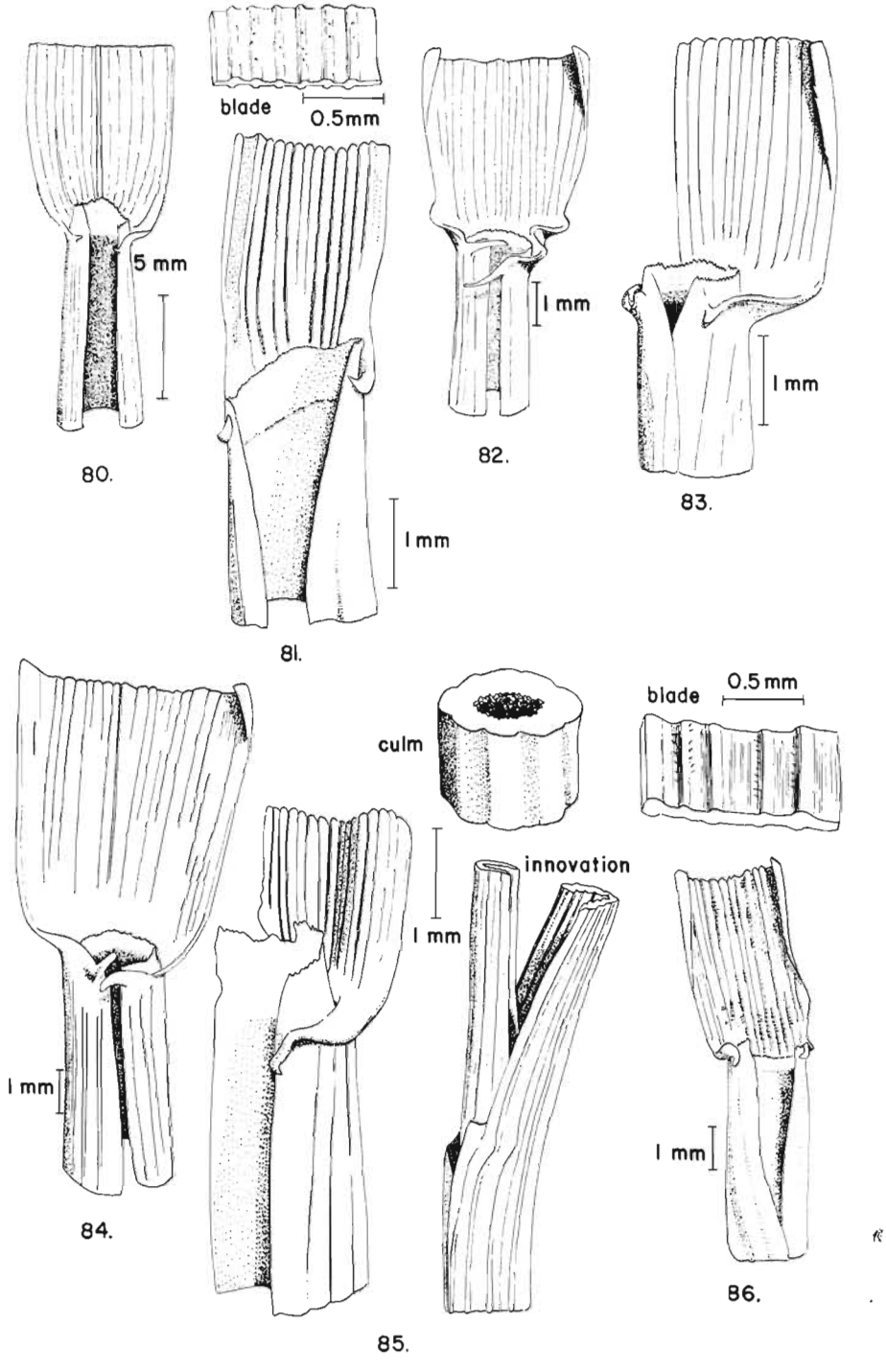
FIGURES 72–79. 72. *Stipa comata*. 73. *Muhlenbergia cuspidata*. 74. *Paspalum setaceum* var. *stramineum*. 75. *Agropyron repens*. 76. *Agropyron elongatum*. 77. *Schedonnardus paniculatus*. 78. *Agropyron smithii*. 79. *Festuca arundinacea*.

14 Blades clearly folded in the bud or obviously V-shaped or Y-shaped in cross-section at maturity.
15 Culms puberulent.
16 Ligules less than 1 mm long, truncate, ciliolate. . . . . .*Muhlenbergia cuspidata* (Torr.) Rydb., Plains muhly (Fig. 73).
DRY PRAIRIE; NOT COMMON.
16 Ligules longer, more than 1 mm long, not ciliolate. . . . . *Schedonnardus paniculatus* (Nutt.) Trel., Tumblegrass (Fig. 77).
DRY WASTE GROUND; OCCASIONAL.
15 Culms not puberulent.
17 Plants stout, at least some blades more than 4 mm broad; sheaths not keeled; blades sometimes folded in the bud but not strongly V-shaped or Y-shaped in cross-section at maturity. . . . . *Andropogon gerardii* Vitm., Big bluestem (Fig. 71)
DRY PRAIRIE; NOT ESPECIALLY COMMON.
17 Plants smaller, most blades less than 4 mm broad, or if approaching or exceeding 4 mm, the sheaths very clearly keeled and the blades V-shaped or Y-shaped in section.
18 Ligules usually less than 1.5 mm long, truncate, ciliolate; culms smooth; blades Y-shaped in cross-section. . . . . .*Andropogon scoparius* Michx., Little bluestem (Fig. 66).
DRY PRAIRIE; VERY COMMON.
18 Ligules often more than 1.5 mm long, acuminate, not cililate; culms scabrous; blades V-shaped in cross-section. . . . . .*Schedonnardus paniculatus* (Nutt.) Trel., Tumblegrass (Fig. 77)
DRY WASTE GROUND; OCCASIONAL.
14 Blades rolled in the bud and flat to somewhat involute at maturity.
19 Blades bearing large, pustular-based hairs, especially on the wavy margins; sheaths ciliate, plants forming low small bunches. . . . . .*Paspalum setaceum* Michx. var. *stramineum* (Nash) D. Banks, Sand paspalum (Fig. 74).
DRY PRAIRIE AND WASTE GROUND; NOT UNCOMMON.
19 Blades lacking pustular-based hairs or these confined to the region of the ligule, the margins straight; plants forming large clumps. . . . . *Andropogon gerardii* Vitm., Big bluestem (Fig. 71).
DRY PRAIRIE; NOT ESPECIALLY COMMON.

GROUP 7

Perennials with the ligule principally a membrane, sheaths open to the base, culms hollow, and auricles present

1 Plants rhizomatous.
2 Blades flat, with upper and lower surfaces unridged or about equally slightly ridged, mostly more than 5 mm broad. . . . . .*Agropyron repens* (L.) Beauv., Quackgrass (Fig. 75).
MOIST TO DRY WASTE GROUND; NOT COMMON.
2 Blades flat to involute, the upper surface more obviously ridged than the lower, sometimes less than 5 mm broad.
3 Blades involute, the ridges of the upper surface of varying sizes, some of them broader than the furrows in the dried leaf; plants glaucous. . . . . *Agropyron smithii* Rydb., Western wheatgrass (Fig. 78).
DRY PRAIRIE OR WASTE GROUND; VERY COMMON.



FIGURES 80–86. **80.** *Phleum pratense.* **81.** *Hordeum jubatum.* **82.** *Elymus virginicus.* **83.** *XAgrohordeum macounii.* **84.** *Elymus canadensis.* **85.** *Lolium perenne* var. *perenne.* **86.** *Agropyron cristatum.*

3 Blades flat or partly involute, the ridges of the upper surface relatively uniform in size and often appearing narrower than the furrows between them in the dried leaf; plants not usually glaucous. . . . . *Festuca arundinacea* Schreb., Tall fescue (Fig. 79).
CULTIVATED AND ESCAPED IN WASTE GROUND; NOT COMMON.

Note: *Festuca pratensis* Huds. (meadow fescue) has also been introduced and might be expected in this region. *Festuca arundinacea* has ciliate-margined auricles and very strong rhizomes; *F. pratensis* has the auricles not ciliate and weak rhizomes.

1 Plants not rhizomatous.

4 Ligules more than 2 mm long; blades flat, less than 10 mm wide; auricles small, seldom developed on all leaves; culms often bulbous-based. . . . . *Phleum pratense* L., Timothy (Figs. 80 and 107).
CULTIVATED AND ESCAPED IN MOIST PLACES; COMMON.

4 Ligules not more than 2 mm long except on rare robust individuals which have blades more than 10 mm wide; culms not bulbous-based.

5 Blades relatively unridged, especially when fresh, or with the ridges of the upper and lower surfaces about equally prominent or those of the lower surface more prominent than those of the upper.

6 Blades yellowish green, 1.5–4.5 mm broad; plants growing in clumps in waste ground. . . . . *Hordeum jubatum* L., Foxtail barley (Fig. 81).
WASTE GROUND; VERY COMMON.

Note: Occasional sterile hybrids between this species and species of the genera *Agropyron* and *Elymus* may key here. The most common of these, X*Agrohordeum macounii* (Vasey) LePage (Fig. 83), is thought to represent a hybrid between *H. jubatum* and *Agropyron caninum* L.

6 Blades dark green or glaucous, often more than 5 mm broad; plants in clumps or scattered. . . . . *Elymus virginicus* L., Virginia wildrye (Fig. 82).
Elymus canadensis L., Canada wildrye (Fig. 84).
IN VARIED HABITATS; NOT UNCOMMON.

Note: Both of these species are extremely variable and are distinguished with difficulty from vegetative material. *Elymus canadensis* is much more common in this region and, typically, is found in the open, while *E. virginicus* is more likely to be found in woodland.

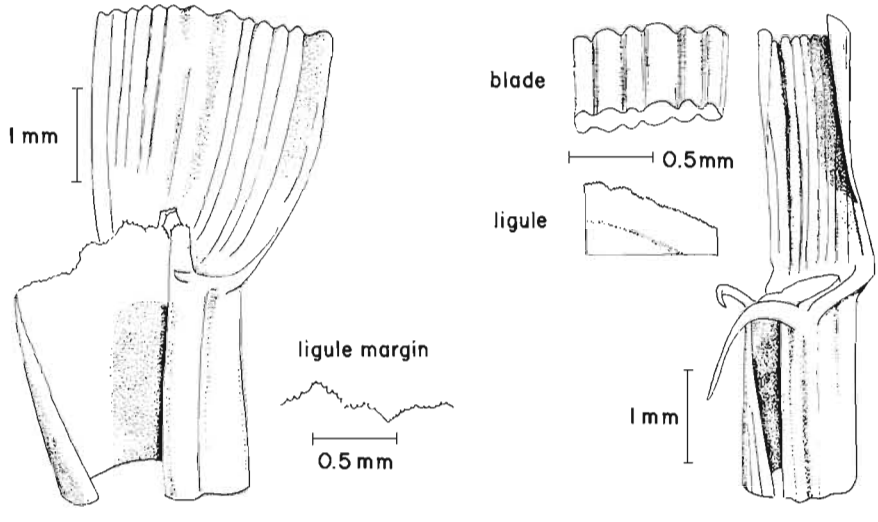
5 Blades prominently ridged on the upper surface, the dorsal ridges much less prominent.

7 Blades folded in the bud; culms slightly flattened. . . . . *Lolium perenne* L. var. *perenne*, Perennial ryegrass (Fig. 85).
CULTIVATED AND ESCAPED IN WASTE GROUND; RARE.

7 Blades rolled in the bud; culms not flattened.

8 Plants not characteristic of disturbance, growing in moist to moderately dry habitats; ligules weakly erose-ciliolate under 30X magnification; culms hollow; blades relatively large, averaging more than 3 mm wide and 10 cm long. . . . . *Agropyron caninum* (L.) Beauv. ssp. *majus* (Vasey) C. L. Hitchc., Slender wheatgrass (Fig. 87).
MOIST TO DRY PRAIRIE; NOT COMMON.

8 Plants usually in waste ground or where cultivated; ligules either strongly erose-ciliolate under 30X magnification or plants otherwise not as above.



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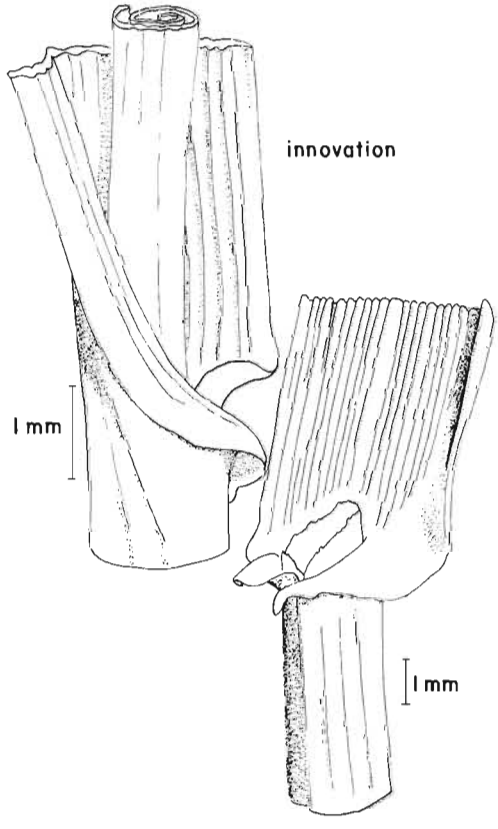

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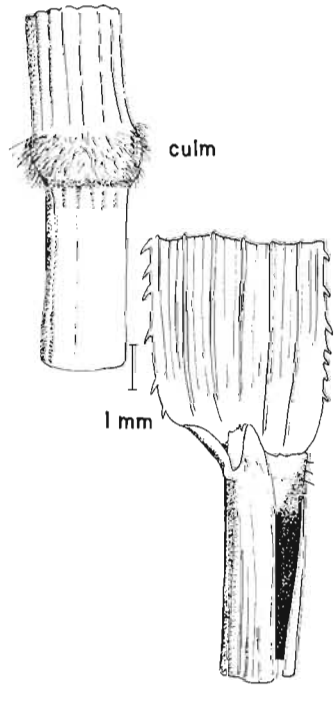

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FIGURES 87–90. 87. *Agropyron caninum* ssp. *majus*. 88. *Sitanion hystrix* var. *brevifolium*. 89. *Lolium perenne* var. *aristatum*. 90. *Leersia oryzoides*.

9 Plants not strongly clumped, weakly perennial (biennial?); ligules not erose-ciliolate; blades averaging more than 3 mm wide. . . . . .*Lolium perenne* L. var. *aristatum* Willd., Italian ryegrass (Fig. 89).
CULTIVATED AND ESCAPED IN WASTE PLACES; NOT COMMON.

9 Plants strongly clumped, perennial; ligules usually clearly erose-ciliolate; blades often averaging narrower.

10 Ridges of the upper blade surface standing out sharply in the dried blade, broader than the furrows between them. . . . . .*Sitanion hystrix* (Nutt.) J. G. Smith var. *brevifolium* (J. G. Smith) C. L. Hitchc., Squirreltail (Fig. 88).
DRY WASTE PLACES; RARE.

10 Ridges of the upper blade surface less prominent, in the dried leaf evidently narrower than the furrows between them.

11 Auricles prominent. . . . . .*Agropyron cristatum* (L.) Gaertn., Crested wheatgrass (Fig. 86).
ESCAPED FROM CULTIVATION IN WASTE PLACES; NOT UNCOMMON.

11 Auricles very small and often lacking on most of the leaves. . . . . *Hordeum jubatum* L., Foxtail barley (Fig. 81).
MOIST TO DRY WASTE GROUND; VERY COMMON.

Note: See comments under lead 6, this group.

GROUP 8

Rhizomatous perennials with the ligule principally a membrane, the sheaths open to the base, auricles absent, and culms hollow

1 Ligules flanked by and fused with sheath extensions at each margin, often with a zone of pubescence at each node.

2 Plants aquatic or sub-aquatic; sheaths with cross-septae obvious in transmitted light; blades with prominent marginal scabrosity; stems usually at least partly decumbent. . . . . .*Leersia oryzoides* (L.) Sw., Rice cutgrass (Fig. 90).
AQUATIC OR SUB-AQUATIC; COMMON.

2 Plants of dry prairie; sheaths without obvious cross-septae in transmitted light; blades lacking prominent marginal scabrosity; stems erect. . . . . *Sorghastrum nutans* (L.) Nash, Indiangrass (Fig. 91).
DRY PRAIRIE; RELATIVELY COMMON.

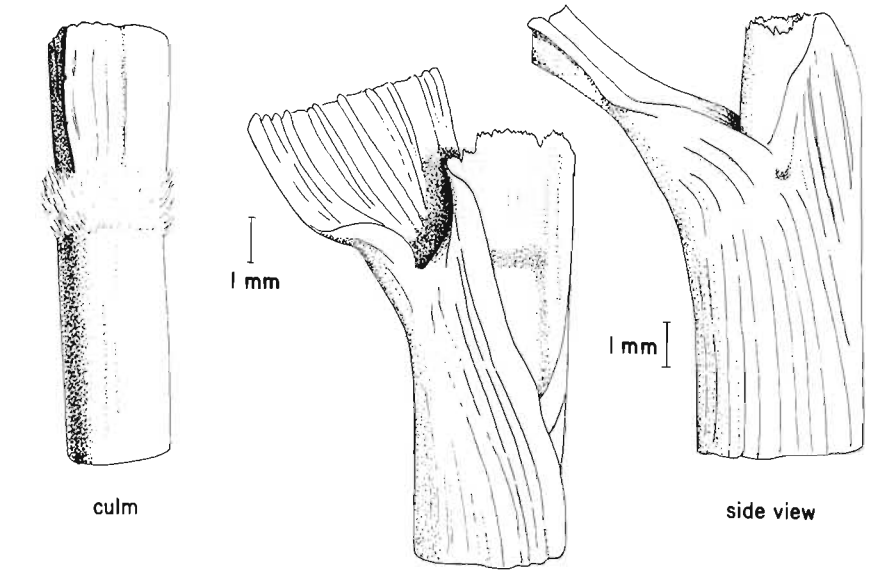
1 Ligules not flanked by a sheath extension at each margin; plants with nodes not pubescent or if pubescent, then the pubescence continuous with that of sheath or culm.

3 Sheaths with prominent air chambers between the vascular bundles, these traversed by numerous cross-septae (obvious in transmitted light); blades averaging well over 5 mm in width; plants tall, growing in wet places.

4 Ligules prominently fringed with hairs, these often nearly as long as the membranous lower portions; blades very coarse, usually 10–40 mm wide. . . . . *Phragmites australis* (Cav.) Steud., Common reed (Fig. 92).
WET GROUND OR AQUATIC; OCCASIONAL.

4 Ligules at most slightly ciliolate, generally entire or erose.

5 Cross-septae common and obvious in even the upper part of the sheath.



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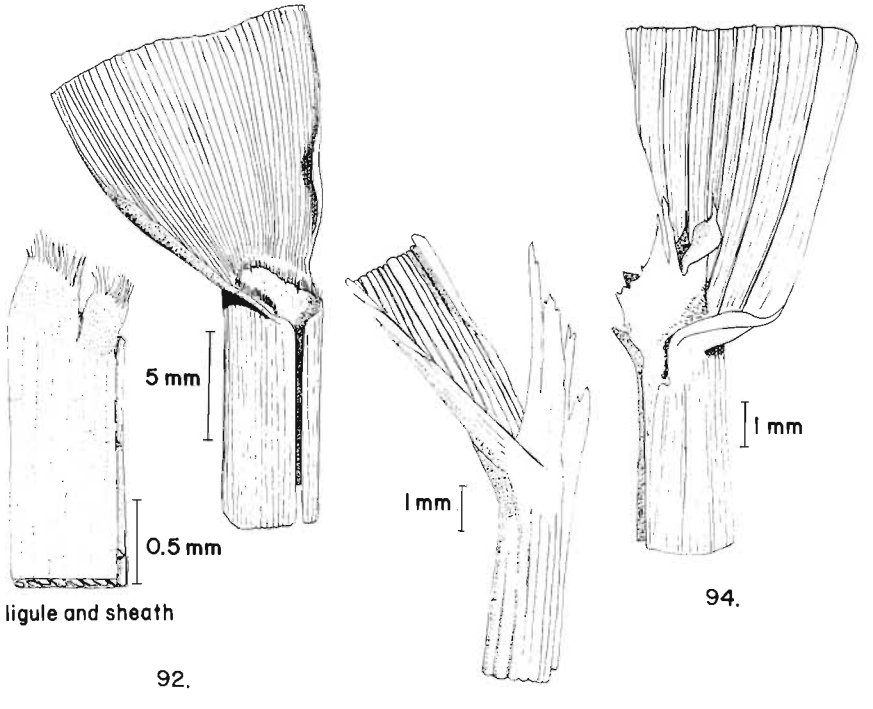

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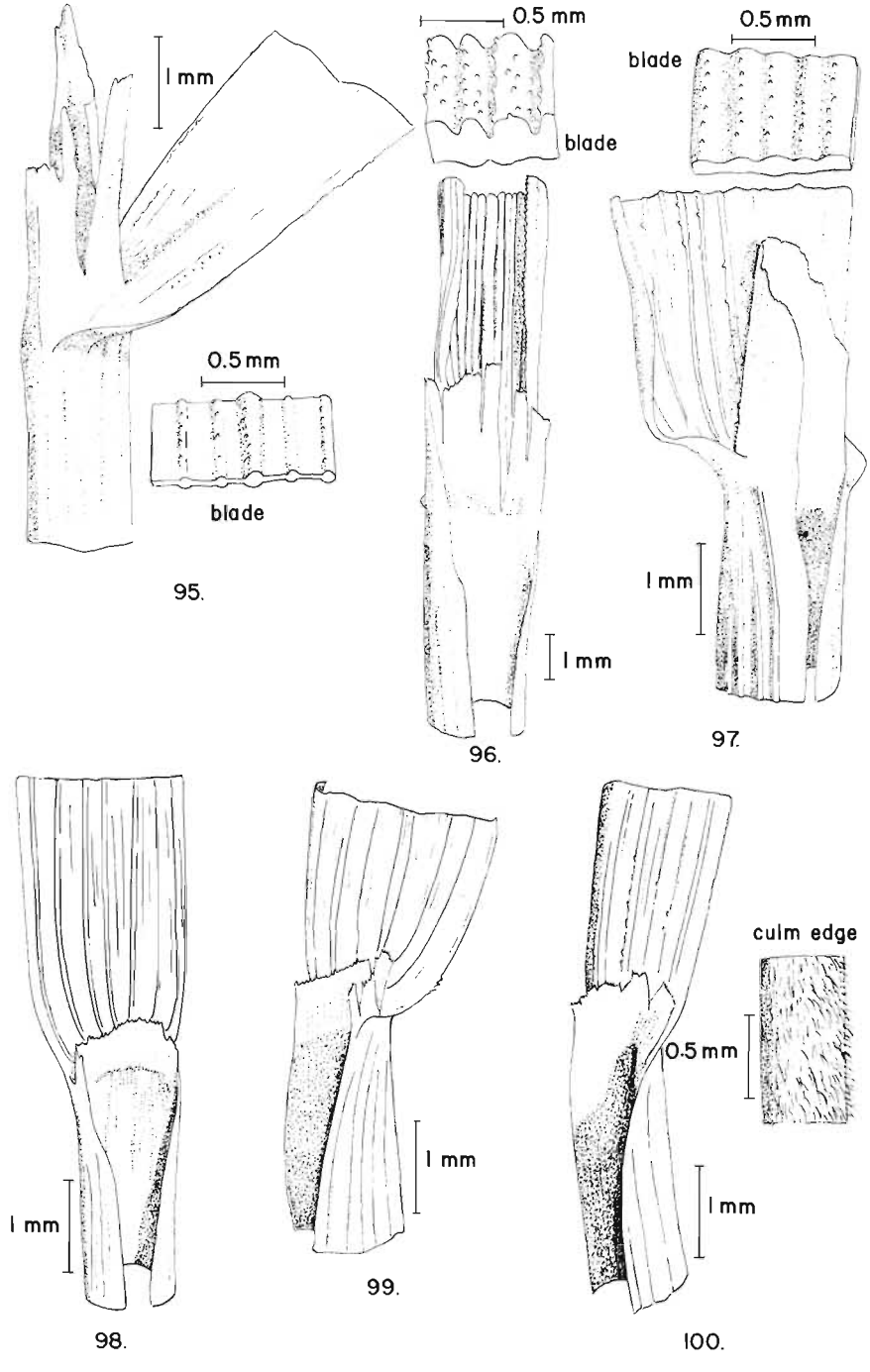
FIGURES 91–94. **91.** *Sorghastrum nutans.* **92.** *Phragmites australis.* **93.** *Scolochloa festucacea.* **94.** *Phalaris arundinacea.*



FIGURES 95–100. **95.** *Calamagrostis canadensis.* **96.** *Calamagrostis stricta.* **97.** *Agrostis stolonifera.* **98.** *Muhlenbergia racemosa.* **99.** *Muhlenbergia frondosa.* **100.** *Muhlenbergia mexicana.*

6 Grasses aquatic, rare; blades usually 5–10 mm wide, the widest parts not more than 40-ridged, the tips narrow, almost filiform. . . . . *Scolochloa festucacea* (Willd.) Link, Rivergrass (Fig. 93).
AQUATIC; VERY RARE.

6 Grasses of wet places, but not usually aquatic unless flooded, common; blades often more than 10 mm wide and more than 40-ridged in the widest part, the tips not at all filiform. . . . . *Phalaris arundinacea* L., Reed canarygrass (Fig. 94).
WET PLACES; FAIRLY COMMON.

5 Cross-septae not apparent in the upper parts of the sheaths and few or scattered in the lower parts. . . . . *Calamagrostis canadensis* (Michx.) Beauv., Bluejoint reedgrass (Fig. 95).
WET PLACES; OCCASIONAL.

3 Sheaths without numerous cross-septae, if these obvious at all, then the blades averaging less than 5 mm in width.

7 Ligule short, less than 0.5 mm in length, truncate; collar region and often the upper surface of the blade with long hairs exceeding 1 mm in length; plants mat-forming, with stiffly erect, unbranched culms and stiff, sharp-pointed, often involute leaves. . . . . *Distichlis spicata* (L.) Greene var. *stricta* (Torr.) Beetle, Inland saltgrass (Fig. 1).
MOIST TO DRY, OFTEN ALKALINE, AREAS; FAIRLY COMMON.

7 Ligule either longer or not truncate, or plants not otherwise as above.

8 Culms unbranched or branching only from the base; plants of moist associations; sheaths with at least some air chambers between veins; ligules often more than 2 mm long.

9 Blades involute, usually 2–4 mm broad, the ridges of the upper surface very strong, with deep furrows between them. . . . . *Calamagrostis stricta* (Timm.) Koel., Northern reedgrass (Fig. 96).
WET PLACES TO SUB-AQUATIC; NOT UNCOMMON.

9 Blades flat or involute, 2–10 mm broad, the ventral ridges apparent but not strong, the furrows not deep.

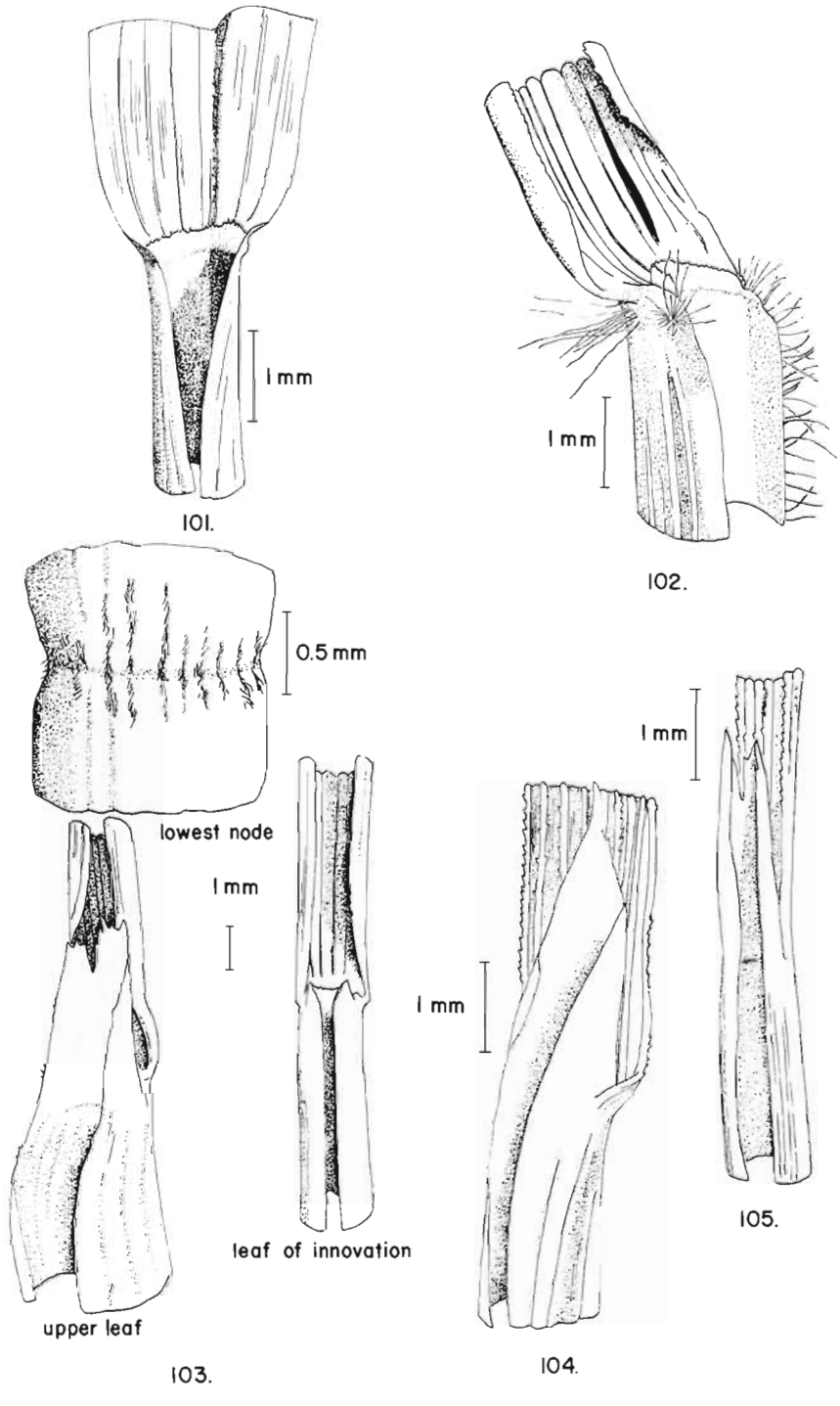
10 Plants of wet places, not weedy; culms erect; blades rather fibrous and tough. . . . . *Calamagrostis canadensis* (Michx.) Beauv., Bluejoint reedgrass (Fig. 95).
WET PLACES TO SUB-AQUATIC; OCCASIONAL.

10 Plants growing where moist, often weedy; culms often partly prostrate or decumbent; blades lax, not so tough or fibrous. . . . . *Agrostis stolonifera* L., Redtop bentgrass (Fig. 97).
MOIST WASTE GROUND; COMMON.

8 Culms often branching above; grasses of disturbed or undisturbed areas, rarely growing where very moist; ligules often less than 2 mm long; sheaths lacking air chambers.

11 Internodes glabrous and shining except sometimes at the very apex. . . . . *Muhlenbergia racemosa* (Michx.) B.S.P., Marsh muhly (Fig. 98).
Muhlenbergia frondosa (Poir.) Fern., Wirestem muhly (Fig. 99).
WASTE GROUND, AMONG SHRUBS, OR AT WOODLAND EDGE; NOT COMMON.

11 Internodes dull and puberulent, especially above.



FIGURES 101-105. **101.** *Muhlenbergia glomerata.* **102.** *Stipa viridula.* **103.** *Stipa spartea.* **104.** *Agrostis scabra.* **105.** *Agrostis hyemalis.*

12 Ligules averaging about 1 mm long or more. . . . . .*Muhlenbergia mexicana* (L.) Trin., Mexican muhly (Fig. 100).
Occasional specimens of *Muhlenbergia racemosa* (Michx.) B.S.P., Marsh muhly (Fig. 98).
WASTE GROUND, AMONG SHRUBS, OR AT WOODLAND EDGE; NOT COMMON.

12 Ligules averaging well under 1 mm long. . . . . .*Muhlenbergia glomerata* (Willd.) Trin., Roundhead muhly (Fig. 101).
WET MEADOWS AND BOGGY GROUND; VERY RARE.

GROUP 9

Non-rhizomatous perennials with the ligule principally a membrane, the sheaths open to the base, auricles absent, and culms hollow

1 Blades under 3 mm wide, often involute; ligules not usually truncate and collar-like, except sometimes those of the innovations.

2 Leaves often villous near the margin at the collar, the hairs 0.5–1.0 mm long; ligule 0.9–3.5 mm; sheath usually ciliate on one margin. . . . . .*Stipa viridula* Trin., Green needlegrass (Fig. 102).
DRY PRAIRIE; NOT ESPECIALLY COMMON.

2 Leaf not as above or plants not otherwise as above.

3 Average length of culm ligules approaching or exceeding 3 mm (the ligules of the innovations may be shorter); plants of dry soil.

4 Culm ligules often more than 4 mm long, acute to acuminate, longer than those of the innovations, but not appreciably different in shape; blades usually densely pubescent above. . . . . *Oryzopsis hymenoides* (Roem. and Schult.) Ricker, Indian ricegrass (Fig. 69).
DRY PRAIRIE OR WASTE GROUND; OCCASIONAL.

4 Culm ligules mostly (2) 3–7 (11) mm long, often acute to acuminate, those of the innovations shorter, truncate; blades puberulent to scabrous above. . . . . *Stipa comata* Trin. and Rupr., Needle-and-thread (Fig. 72).
Stipa spartea Trin., Porcupinegrass (Fig. 103).
DRY PRAIRIE; OCCASIONAL (*S. spartea*) OR COMMON (*S. comata*).
Note: *Stipa spartea* may often be distinguished by lines of pubescence at the lower nodes (usually absent in *S. comata*). *Stipa comata* is often a dominant grass in this region.

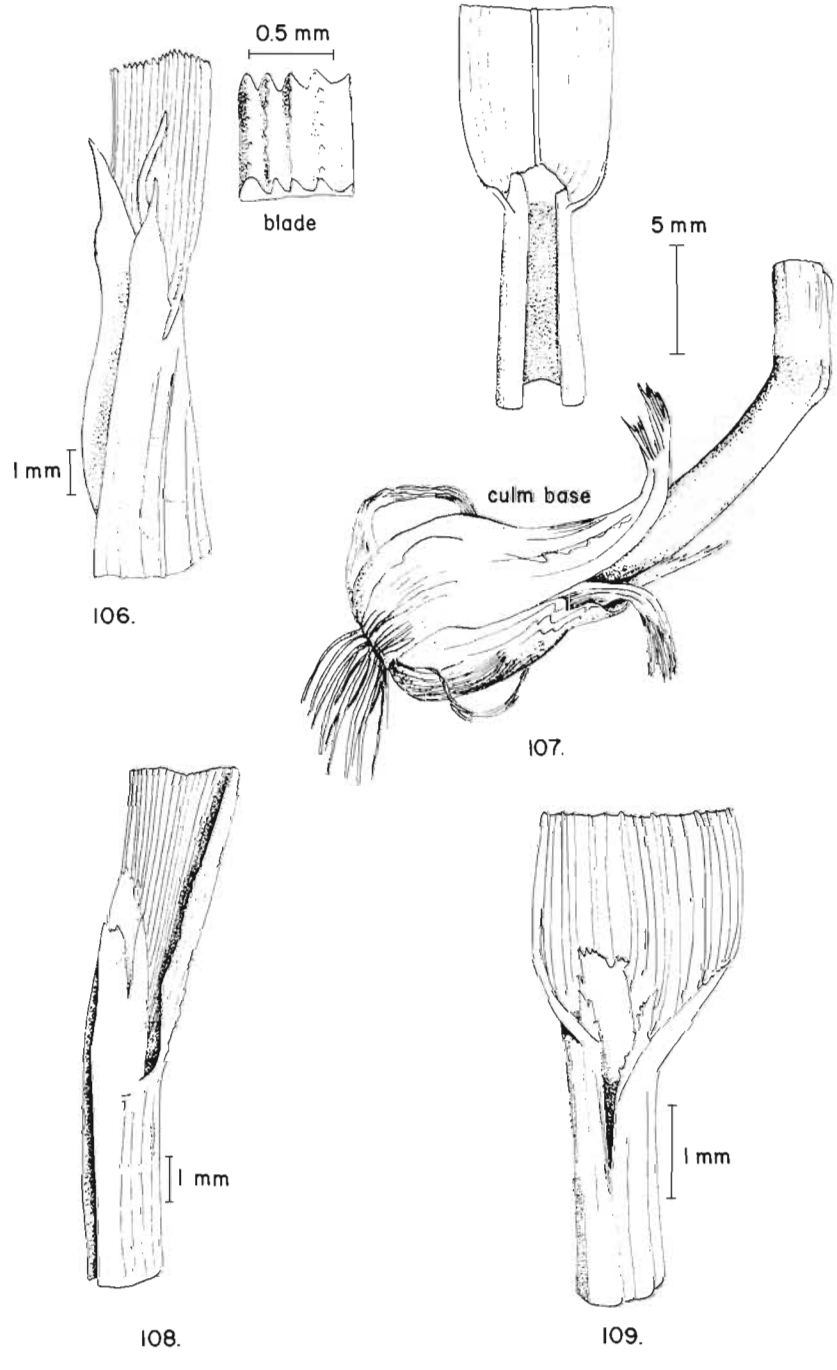
3 Average length of ligules less than 3 mm; plants of moist soil.

5 Plants of alkaline soils, not very strongly clumped; sheaths closed at the very base. . . . . .*Puccinellia nuttalliana* (Schult.) Hitchc., Nuttall alkaligrass (Fig. 39).
MOIST, OFTEN ALKALINE, SOIL; NOT COMMON.

5 Plants not characteristically of alkaline soils, clumped; sheaths open to the base.

6 Blades strongly fibrous with heavy scabrous ridges; ligules mostly 2.0–3.5 mm long. . . . . .*Agrostis scabra* Willd., Rough bentgrass (Fig. 104).
MOIST GROUND; NOT COMMON.

6 Blades weakly fibrous; ligules mostly 1.0–2.5 mm long. . . . . .*Agrostis hyemalis* (Walt.) B.S.P., Winter bentgrass (Fig. 105).
MOIST GROUND; NOT ESPECIALLY COMMON.



FIGURES 106-109. **106.** *Alopecurus aequalis.* **107.** *Phleum pratense.* **108.** *Agrostis exarata.* **109.** *Sphenopholis obtusata* var. *major.*

Blades either averaging more than 3 mm or else the ligules plainly truncate and collarlike; blades often flat.

7 Blades mostly 3–5 mm wide (sometimes narrower).

8 Leaf usually villous near the margin at the collar region, the hairs 0.5–1.0 mm long; ligule 0.6–3.0 mm long, sheaths usually ciliate on one margin. . . . . .*Stipa viridula* Trin., Green needlegrass (Fig. 102).
DRY PRAIRIE; NOT ESPECIALLY COMMON.

8 Leaf not as above or plants otherwise not as above.

9 Ligules collarlike, many of them less than 0.6 mm long.

10 Plants not characteristic of disturbance, growing in moist to dry native habitats; ligules irregularly and weakly erose-ciliolate under 30X magnification; culms hollow; blades relatively large, averaging well over 3 mm wide and 10 mm long. . . . . .*Agropyron caninum* (L.) Beauv. ssp. *majus* (Vasey) C. L. Hitchc., Slender wheatgrass (Fig. 87).
MOIST TO DRY PRAIRIE; NOT UNCOMMON.

10 Plants often growing in waste ground; ligules either strongly and regularly erose-ciliolate or plants not otherwise as above.

11 Ridges of the upper blade surface standing out sharply in the dried blade, broader than the furrows between them; (auricles usually well developed on at least some leaves). . . . . .*Sitanion hystrix* (Nutt.) J. G. Smith var. *brevifolium* (J. G. Smith) C. L. Hitchc., Squirreltail (Fig. 88).
DRY PRAIRIE OR WASTE GROUND; NOT COMMON.

11 Ridges of the upper blade surface less prominent, in the dried blade, evidently narrower than the furrows between them; (auricles usually lacking or very small ones present on some leaves). . . . . *Hordeum jubatum* L., Foxtail barley (Fig. 81).
DRY WASTE GROUND; COMMON.

Note: See comments under lead 6, Group 7.

9 Ligules not usually collarlike, more than 0.6 mm long.

12 Ligules mostly more than 4 mm long; sheaths prominently cross-septate in transmitted light; the numerous ridges on the upper surface of the blade sharp and prominent. . . . . .*Alopecurus aequalis* Sobol., Shortawn foxtail (Fig. 106).
AQUATIC; NOT UNCOMMON.

12 Ligules shorter, or if some of them exceeding 4 mm, then plants not as above in other respects.

13 Plants weedy; culms bulbous-based. . . . . *Phleum pratense* L., Timothy (Fig. 107).
CULTIVATED AND ESCAPED IN WASTE GROUND; COMMON.

13 Plants weedy or not, not bulbous-based; ligules usually toothed to erose or erose-ciliolate, sometimes also lacerate.

14 Ligules usually more than 3 mm long. . . . . *Agrostis exarata* Trin., Spike bentgrass (Fig. 108).
WET GROUND; NOT COMMON.

14 Ligules less than 3 mm long; plants general. . . . . *Sphenopholis obtusata* (Michx.) Scribn. var. *obtusata,* Prairie wedgegrass, and var. *major* (Torr.) Erdm., Slender wedgegrass (Fig. 109).
MOIST GROUND; NOT UNCOMMON.

7 Blades mostly more than 5 mm wide.

15 Ligule backed by a zone of long hairs, many of them 1.5 mm or more in length; blades with pustular-based hairs, especially on the

wavy margins; plants of dry or sandy soil. . . . . *Paspalum setaceum* Michx. var. *stramineum* (Nash) D. Banks, Sand paspalum (Fig. 74). DRY PRAIRIE OR WASTE GROUND; COMMON.

15 Ligules not backed by long hairs, although sometimes by shorter ones.

16 Leaf usually villous near the margin at the collar region, the hairs 0.5–1.0 mm long; ligule 0.5–3.0 mm long; sheath usually ciliate on one margin. . . . . *Stipa viridula* Trin., Green needlegrass (Fig. 102). DRY PRAIRIE; NOT ESPECIALLY COMMON.

16 Leaf not as above or plants not otherwise as above.

17 Plants with ligules not ciliate or ciliolate, but often lacerate; culms somewhat bulbous-based. . . . . *Phleum pratense* L., Timothy (Fig. 107). MOIST WASTE GROUND; RELATIVELY COMMON.

17 Plants with ligules ciliate or ciliolate and sometimes also lacerate. . . . . *Agrostis exarata* Trin., Spike bentgrass (Fig. 108). WET GROUND; NOT COMMON.

EPILOGUE

Comments about problems encountered in using this key would be appreciated. It is very possible that some species have been omitted or that a variant that keys poorly may be encountered. In the latter case, the notes about habitat and frequency should be helpful. It may also be helpful to look at a large number of individuals to verify that the example is typical. If other approaches fail, it is legitimate to scan the illustrations to find a match, and then work the key backwards to see if that species is possible.

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