

# PROVANCHERIA

## No 12

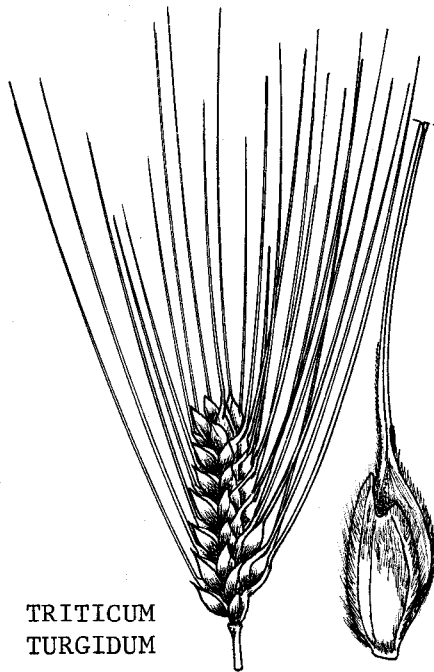
Mémoire de l'Herbier Louis-Marie  
Faculté des Sciences de l'Agriculture et de l'Alimentation  
Université Laval, Québec, Canada

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### FLORA OF THE PRAIRIE PROVINCES

by

**Bernard Boivin**



TRITICUM  
TURGIDUM

**Part V**

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Université Laval, Québec  
1981



PROVANCHERIA

12

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FLORA  
OF THE  
PRAIRIE PROVINCES

A HANDBOOK  
TO THE FLORA OF THE PROVINCES OF  
MANITOBA, SASKATCHEWAN AND ALBERTA

by

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MAURICE-F. VITTOZ

Part V  
Gramineae

Québec

1981

Scale of drawings:

The heavy vertical bar next to each drawing is a scale indicator and corresponds to a decimal division of the metric scale. Next to an inflorescence the bar usually represents a centimeter, but next to a spikelet it is usually a millimeter.

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FLORA  
OF THE PRAIRIE PROVINCES

Bernard Boivin

Part V  
(continued)

GRAMINEAE

Order 72. GRAMINALES

A single family of herbs with round and hollow stems obturated by a plate at each node. Includes many major crop plants such as Wheat, Oats, Barley, Rice, Corn, etc.

126. GRAMINEAE

GRASS FAMILY

Flower highly reduced, the perianth lacking or vestigial and replaced by a pair of bracts termed "lemma" (the outer one) and "palea". Florets borne in a spikelet subtended by a pair of bracts termed "glumes". Starting from the base, the various elements of a 1-flowered spikelet (such as *Calamagrostis*) occur in the following sequence: 1-- lower glume, 2-- upper glume, 3-- lemma, 4-- palea, 5-- stamens, 6-- ovary. Except at flowering time, the palea tends to be completely enclosed by the lemma and hence is not readily examined.

The listing of *Briza maxima* L. from Blue Bell, Sask., by Russell 1954 is held to be questionable and presumably based on cultivated material. The justifying specimen has yet to be located; it was not in the Russell herbarium in 1965 nor in the Fraser Herbarium in 1967.

A fairly complex family that may frustrate the beginner. We have prepared two diagnostic tools. The various evolutionary lines within the family constitute somewhat natural groups called tribes, each a single evolutionary line. Ten are represented in our area and each tribe has been provided for in a first key. But the tribes will not become meaningful and useful concepts until a certain familiarity has been achieved with a fair number of genera. For the beginner we have therefore prepared an artificial key based primarily on the gross organisation of the inflorescence and spikelets. But first for the more advanced user we have brought together brief descriptions of each tribe and its contents, the basic types being the *Panicaceae* and the *Poeae*.

1. ANDROPOGONEAE: 1. *Andropogon* and 2. *Sorghastrum* -- Stem solid (i.e. not hollow). As the *Panicaceae*, but the spikelets in pairs, of which the lower one is sessile and perfect-flowered, number two is pedicellate and its floret is somewhat reduced, being staminate only or reduced to a mere rudiment.

2. PANICEAE: 3. *Panicum* to 6. *Setaria* -- Spikelet not compressed or compressed dorsally (compare with *Poeae*), that is the spikelet is flattened in such a way that, when it is lying down flat, one sees only half of the chaff pieces, but of those that are visible, the whole width is visible. Glume solitary at the base of the spikelet. Florets 2-(3) per spikelet, of which the lower one is reduced to a lemma that looks like an upper glume; floret number two is normal; floret number three is lacking or rudimentary.

3. ORYZEAE: 7. *Zizania* and 8. *Leersia* -- No glumes. Reduced from the *Poeae*, the spikelets with a single unisexual floret. Hence each spikelet comprises only two pieces of chaff, a lemma and a palea.

4. PHALARIDEAE: 9. Phalaris to 11. Hierochloa -- As in Poeae but the spikelet reduced to one normal and terminal floret and two vestigial ones located below. In other reduced types of Poeae the lower floret is always the normal one.

5. STIPEAE: 12. Aristida to 16. Muhlenbergia -- Spikelets reduced to a single flower as in the next tribe, but the lemma and palea enveloping the seed completely and permanently, falling off with it.

6. AGROSTIDEAE: 17. Phleum to 25. Calamovilfa -- As in Poeae, but the spikelet reduced to a single floret.

7. AVENEAE: 26. Deschampsia to 29. Danthonia -- Glumes fairly large, usually overtopping the spikelet or at least equalling the lower lemma. Similar to Poeae, but the spikelet usually reduced to two florets.

8. CHLORIDEAE: 30. Spartina to 35. Munroa -- Rachis of the spiciform racemes triangular and flattened, the spikelets borne along two of the angles, the other angle bearing none. Hence the inflorescence is made up of strongly secund spikes and the spikelets are in two parallel rows. Floret number variable.

9. POEAE (or Festuceae): 36. Phragmites to 54. Bromus -- A basic type of the family, the inflorescence, spikelets and florets not reduced. Inflorescence a panicle. Spikelets many-flowered and ± flattened laterally, that is the spikelet is flattened in such a way that when it is lying down flat one sees one half of each glume and lemma, since they are more or less folded longitudinally. By far the largest tribe, comprising nearly one third of the genera and species.

10. TRITICEAE: 55. Lolium to 61. Sitanion -- Inflorescence reduced to a single terminal spike. Otherwise as in the Poeae.

#### SYNOPSIS OF THE TRIBES

There are so many lines of specialization and so many cases of parallel evolution in the Gramineae that it is not possible to provide an effective key to the tribes. The following key is merely intended to help the beginner gain an overall view of the tribal classification.

- a. Spikelet not compressed, or compressed dorsally; glumes and lemmas rounded on back; spikelets reduced to one flower.
- b. Spikelets all similar, all perfect ..... 2. Paniceae
- B. Spikelets dissimilar and in pairs, of which one member holds a perfect flower, while the other member holds only a staminate or aborted flower, or even no flower at all, being reduced to a mere pedicel ..... 1. Andropogoneae
- A. Spikelets ± compressed laterally, the glumes and lemmas usually keeled.
- c. Spikelets all one-flowered; all flowers unisexual ..... 3. Oryzeae
- C. Perfect flowers present.
- d. Spikelet of 2 or 3 florets, of which the terminal one is perfect, the lower one(s) staminate or reduced to their lemma ..... 4. Phalarideae
- D. All flowers in the spikelet perfect, or at least the lower one perfect, or the spikelet is reduced to a single floret without extra chaff.
- e. Spikelets sessile and gathered into one or more strongly secund spikes; rachis of the spike trigonous and bearing two rows of spikelets, on row on each of two of the angles, the other angle free of any spikelet; 1-3 flowers per spikelet ..... 8. Chlorideae
- E. Spikelets pedicellate or borne on either side of a flattened rachis.
- f. Spikelet reduced to one floret.
- g. Lemma and palea closely wrapped around the seed and falling off with it ..... 5. Stipeae

- G. Lemma and palea, as well the glumes, merely keeled and partly folded over the seed, but not enclosing it ..... 6. Agrostideae
- F. Two or more florets per spikelet.
  - h. Spikelets pedicellate, usually gathered into a panicle, sometimes reduced to a raceme.
    - i. Glumes often overtopping the spikelet, or at least the upper glume longer than the lowest lemma; mostly only 2 florets per spikelet ..... 7. Aveneae
    - I. Glumes shorter or at least not longer than the lower lemmas ..... 9. Poeae
  - H. Spikelets sessile and gathered into single spike; rachis flattened and the spikelets inserted alternately on either face ..... 10. Triticeae

## ARTIFICIAL KEY TO GENERA

- a. Inflorescence small, leafy and subcapitate, the spikelets overtopped by the many subtending leaves.
  - b. Leaves glabrous, stiff and pungent ..... 35. Munroa p. 53
  - bb. Leaves sparsely long-pilose ..... 34. Buchloe p. 50
- aa. Inflorescence leafless, or rarely with much reduced leaves.
  - c. Spikelets gathered in one or more spikes.
    - d. Inflorescence a single spike ..... Group A
    - dd. Two or more spikes ..... Group B
  - cc. Inflorescence a panicle of spikelets which is sometimes narrow and spiciform, or more rarely reduced to a raceme or to one or a few spikelets.
    - e. Panicle spiciform ..... Group C
    - ee. Panicle more obvious, often open or lax, or the lower branches longer than the spikelets.
      - f. Functional florets 2 or more per spikelet.
        - g. Glumes overtopping the spikelets, or at least the upper glume reaching to the summit of the lowest lemma (awns excluded) ..... Group D
        - gg. Glumes shorter, the lowest lemma at least as long as the upper glume and overtopping it ..... Group E
      - ff. Only one functional floret per spikelet.
        - h. Glumes lacking.
          - i. Spikelets all alike ..... 8. Leersia p. 21
          - ii. Spikelets dimorphic ..... 7. Zizania p. 21
        - hh. Glumes present; spikelets all alike ..... Group F

## Group A

Inflorescence obviously a single spike, not branched, and the spikelets sessile or essentially so. Mostly Triticeae. N.B.: the raceme of racemes of Bouteloua curtipendula superficially resembles a spike. Depauperate individuals of Buchloe and Bouteloua may have only one spiciform raceme.

- a. Spikelets 2 or 3 to each node of the rachis. Spike not secund.
  - b. Spikelets 3 to a node, the lateral ones often reduced ..... 59. Hordeum p. 98
  - bb. Spikelets 2 to a node and of equal development.
    - c. Rachis breaking up at each node at maturity; main awns 5-10 cm long ..... 61. Sitanion p. 106
    - cc. Spikelets falling off at maturity while the rachis remains in one piece; awns shorter ..... 60. Elymus p. 101
- aa. Only one spikelet to a node.
  - d. Spikelets with only one glume, namely the outer one,

- the spikelet being borne edgewise to the rachis ..... 55. Lolium p. 88
- dd. Both glumes present and the spikelet borne sidewise to the rachis.
- e. Spikelet reduced to 2 florets ..... 57. Secale p. 98
- ee. Florets more numerous.
- f. Glumes and lemmas strongly asymmetrical, tending to be 3-toothed at tip ..... 58. Triticum p. 98
- ff. Glumes and lemmas entire at tip and quite symmetrical, the keel being located along the middle ..... 56. Agropyron p. 91

#### Group B

Spikelets borne in 2 or more spikes or spiciform racemes. The spikes are usually strongly secund and are borne in a raceme or in a panicle or in a terminal cluster. Mainly Chlorideae.

- a. Spikes borne together in a terminal, digitate or subdigitate cluster.
- b. Spikes distichous ..... 1. Andropogon p. 10
- bb. Spikes strongly secund ..... 4. Digitaria p. 16
- aa. Spikes in a raceme or panicle.
- c. Inflorescence a raceme of 2 or more spikes.
- d. Spikes spreading horizontally.
- e. Spikes about 1 cm long ..... 32. Bouteloua p. 49
- ee. Mostly 2-5 cm long ..... 31. Schedonnardus p. 49
- dd. Erect or strongly ascending.
- f. Spikes 4-15 per plant ..... 30. Spartina p. 49
- ff. Only 2-3 spikes; smaller plants.
- g. Spikes purple, 2-5 cm long ..... 32. Bouteloua p. 49
- gg. Pale and only 0.5-1.5 cm long ..... 34. Buchloa p. 50
- cc. Inflorescence a panicle, open or narrow and spiciform.
- h. Spikes lax, distichous ..... 1. Andropogon p. 10
- hh. Strongly secund.
- i. Glumes lacking ..... 8. Leersia p. 21
- ii. Glumes present.
- j. Spikelets lanceolate, borne along a very flat rachis ..... 30. Spartina p. 49
- jj. Spikelets ovoid and borne on a triangular rachis.
- k. Glumes laterally compressed and enclosing the spikelet ..... 33. Beckmannia p. 50
- kk. Glumes somewhat dorsally flattened and less than half as long as the spikelet ..... 5. Echinochloa p. 17

#### Group C

Panicle contracted, dense and narrow, its branches very short, shorter than the spikelets, and not obvious, due to the crowding of the spikelets. The whole inflorescence with the superficial aspect of a compact spike. Each spikelet comprising a single normal flower.

- a. Spikelets awnless.
- b. Spike ovoid, over 1 cm wide ..... 9. Phalaris p. 21
- bb. Linear and much narrower ..... 18. Alopecurus p. 31
- aa. Spikelets bearing awns.
- c. Awns subtending the spikelet ..... 6. Setaria p. 18
- cc. Awns terminating the glumes or lemmas.
- d. Glumes awned; lemmas awnless, acicular-ciliate on the keel ..... 17. Phleum p. 31



- dd. Glumes awnless; lemma bearing an obvious dorsal awn.
  - e. Spikelets 2-5 mm long, densely packed into a long cylindric spiciform head ..... 18. Alopecurus p. 31
  - ee. Spikelets bigger, 6-9 mm long, loosely gathered into a  $\pm$  secund and spiciform panicle .. 10. Anthoxanthum p. 22

## Group D

Inflorescence an obvious panicle, commonly open, but often closed, the lower branches much longer than the spikelets. Sometimes the panicle is much reduced, and its branches are short, but then the spikelets are not densely crowded, and the lower spikelets are obviously borne on branches. Sometimes reduced to a raceme or even to a single spikelet. Functional (i.e. staminate or pistillate, or perfect) florets 2 or more. Glumes fairly long, at least the upper one longer than the more or less enclosed lemmas. Mostly Aveneae.

- a. Spikelets awnless or with awns arising from the tip of the lemmas.
  - b. Spikelet suborbicular ..... 11. Hierochloa p. 22
  - bb. Elongate and  $\pm$  lanceolate.
    - c. Spikelets few, each primary branch bearing only 1-2-(3) spikelets.
      - d. Upper glume at least as long as the lowest lemma and usually as long as the spikelet, the latter usually of two flowers ..... 48. Dupontia p. 71
      - dd. Glumes less than half as long as the spikelet, the latter of 4-10 florets ..... 53. Festuca p. 74
    - cc. Spikelets more numerous.
      - e. Panicle cylindric, the branches uniformly short and less than 1 cm long ..... 39. Koeleria p. 55
      - ee. Branches much longer and the lower ones 2-4 times longer than the upper.
        - f. Callus glabrous ..... 53. Festuca p. 74
        - ff. With a tuft of hairs 0.5 mm long or more.
          - g. Spikelets with 2-(3) flowers; panicle closed ..... 27. Trisetum p. 42
          - gg. Spikelets with 3-4 flowers; panicle open and diffuse ..... 49. Scolochloa p. 71
  - aa. Lemmas awned, the awn arising below the tip of the lemma.
    - h. Lemma bifid at tip, the awn arising from the bottom of the sinus ..... 29. Danthonia p. 47
    - hh. Awn arising from the back of the lemma.
      - i. Awn borne toward the tip of the lemma ..... 27. Trisetum p. 42
      - ii. Awn arising from near the middle or towards the base.
        - j. Lemma bidentate at tip; spikelet 1 cm long or more, excluding the awns ..... 28. Avena p. 44
        - jj. Lemma merely erose at tip; spikelet much shorter.
          - k. Spikelet 3-flowered ..... 11. Hierochloa p. 22
          - kk. Only 2 flowered ..... 26. Deschampsia p. 41

## Group E

Like D, but the spikelet more elongate, the glumes not longer than the lemmas and enclosing only part of the spikelet. Festuceae.

- a. Inflorescence a somewhat secund panicle of dense, one-sided clusters ..... 44. Dactylis p. 59
- aa. Spikelets more uniformly distributed, not forming well defined clusters.
  - b. Rachilla long bearded, the hairs overtopping the florets; tallest grass with largest leaves ..... 36. Phragmites p. 53
  - bb. Rachilla not bearded or the hairs much shorter.

- c. Most inflorescence branches sharply reflexed at base and stiffly descendent or pendent ..... 47. Colpodium p. 71
- cc. All or most branches spreading or ascending to erect.
  - d. Spikelets short, not much longer than the glumes and the lowest lemma about equaling the tip of the upper glume.
    - e. Upper glume at least twice as large as the lower; spikelet disarticulating below the glumes ..... 38. Sphenopholis p. 53
    - ee. Glumes nearly similar and located below the articulation; branches very short ..... 39. Koeleria p. 55
  - dd. Spikelets more elongate, with the lower lemma much overtopping the upper glume.
    - f. Florets successively smaller, the 1-(3) upper florets reduced to a much smaller and sterile lemma.
      - g. Callus glabrous ..... 41. Melica p. 55
      - gg. Bearded with hairs 1-2 mm long ... 42. Schizachne p. 56
    - ff. All florets similar or the upper slightly reduced.
      - h. Lemma minutely to obviously bifid at tip, often aristate and nearly always over 1 cm long ..... 54. Bromus p. 80
      - hh. Entire at tip, mostly not aristate and mostly shorter.
        - i. Lemmas keeled ..... Group E-1
        - ii. Rounded on back ..... Group E-2

#### Group E-1

Remainder of group E with the spikelets as if flattened laterally and the lemmas keeled, that is forming a well defined (and usually sharp) angle along the dorsal midnerve.

- a. Spikelets mostly ovate, with 2-5-(8) florets ..... 45. Poa p. 59
- aa. Spikelets elongate and mostly with 10-15 florets.
  - b. Spikelets few, mostly less than 10 and only 1-(2) to a branch ..... 43. Distichlis p. 59
  - bb. Spikelets much more numerous ..... 37. Eragrostis p. 53

#### Group E-2

Remainder of group E with the lemmas not folded nor keeled along the midnerve but with a broadly rounded back. Spikelet often nearly terete in cross-section.

- a. Lemma subulate to aristate at tip.
  - b. Lemma 5-nerved; spikelet with 3-13 florets ..... 53. Festuca p. 74
  - bb. Lemma obscurely 3-nerved; flowers 2-3 ..... 46. Eremopoa p. 70
- aa. Tip of lemma obtuse to rounded and narrowly to broadly membranous-margined.
  - c. Lemma and palea similar and the one barely overlapping the edges of the other; spikelets 1-2 flowered .... 40. Catabrosa p. 55
  - cc. Palea strongly differentiated, smaller, and largely enclosed by the lemma.
    - d. Lemma with 5-9 obvious and about equally raised nerves.
      - e. Leaf sheath forming a closed cylinder, its margins being fused ventrally ..... 50. Glyceria p. 71
      - ee. Sheath margins free ..... 51. Torreyochloa p. 73
    - dd. Lemma almost nerveless or with the midnerve conspicuous

and raised, the other 2-4 nerves much weaker to obscure.

f. Nerves all about equally faint ..... 52. Puccinellia p. 74

ff. Midnerve much stronger and clearly raised ..... 45. Poa p. 59

#### Group F

Like D or E, but with only one functional (i.e.: perfect, or staminate or pistillate) floret. Often with a second vestigial floret usually reduced to a stunted and empty lemma. Mostly Agrostideae.

- a. Lemma (and glumes) awnless.
  - b. Glumes strongly differentiated ..... Group F-1
  - bb. Similar to the lemma ..... Group F-2
- aa. Lemma (or glumes) bearing a dorsal or terminal awn ..... Group F-3

#### Group F-1

Group F with lemmas obtuse or merely acute at tip, not prolonged into an awn. Glumes, or at least one of them, strongly differentiated and smaller, usually less than half as long as the spikelet.

- a. Spikelets and lemmas broadly obovoid to suborbicular.
  - b. Inflorescence diffusely branched ..... 3. Panicum p. 13
  - bb. Secondary branches short, the spikelets gathered in crowded, one-sided and spiciform units ..... 5. Echinochloa p. 17
- aa. Spikelets and lemmas much longer than wide.
  - c. Lemma with 3 obvious and raised nerves ..... 40. Catabrosa p. 55
  - cc. Only one nerve ..... 19. Sporobolus p. 33

#### Group F-2

Like group F-1, but the glumes and lemmas fairly similar.

- a. Ligule replaced by a line of long hairs ..... 25. Calamovilfa p. 41
- aa. Ligule hyaline.
  - b. Lemma coriaceous, of much harder texture than the glumes.
    - c. Panicle crowded, cylindric ..... 9. Phalaris p. 21
    - cc. Panicle open, its branches spreading ± horizontally ..... 15. Milium p. 26
  - bb. Lemma similar to the glumes or of thinner texture.
    - d. Palea obscure or very much smaller than the lemma ..... 23. Agrostis p. 34
    - dd. Palea similar to the lemma and about as long.
      - e. Lemma one-nerved ..... 19. Sporobolus p. 33
      - ee. With faint lateral nerves.
        - f. Achene permanently enclosed by the lemma ..... 16. Muhlenbergia p. 29
        - ff. Achene free from the lemma.
          - g. Glumes shorter than the floret.. 21. Arctagrostis p. 33
          - gg. Upper glume overtopping the floret.. 48. Dupontia p. 71

#### Group F-3

Group F with awned lemmas.

- a. Spikelet subtended by a suborbicular glume, less than half as long as the spikelet ..... 5. Echinochloa p. 17
- aa. Glumes nearly as long as, to much longer than, the floret,

awns excluded.

- b. Awn over 1 cm long, geniculate and twisted.
- c. Lemma bearing 3 very long awns ..... 12. Aristida p. 23
- cc. Bearing only one awn.
  - d. Each floret with a conspicuous, long-pilose, sterile rachis standing outside the glumes ..... 2. Sorghastrum p. 13
  - dd. No such structure accompanying the spikelet.
    - e. Awns 2 cm long or more, persistent ..... 13. Stipa p. 23
    - ee. Shorter and more or less deciduous .... 14. Oryzopsis p. 25
- bb. Awn shorter ..... Group F-4

#### Group F-4

Group F with short awns.

- a. Awn arising dorsally on the lemma.
- b. The single floret subtended by 6 pieces of chaff ..... 10. Anthoxanthum p. 22
- bb. Subtended by only (3)-4 pieces of chaff.
  - c. Callus not barbellate ..... 23. Agrostis p. 34
  - cc. Callus bearing a tuft of hairs often as long as the spikelet ..... 24. Calamagrostis p. 38
- aa. Awn terminal.
  - d. Lemma of a much harder structure than the glumes and tightly enclosing the seed ..... 14. Oryzopsis p. 25
  - dd. Lemma and glumes of a similar structure, or the lemma thinner than the glumes.
    - e. Lemma or glumes bidentate at tip and the awn arising from between the teeth.
      - f. Glumes bidentate and long-awned, the lemma awnless ..... 20. Polypogon p. 33
    - ff. Lemma bidentate and short-awned, the glumes awnless ..... 22. Cinna p. 34
  - ee. Lemma and glumes entire.
    - g. Achene permanently enclosed by the lemma ..... 16. Muhlenbergia p. 29
    - gg. Achene free from the lemma; upper glume awnless and longer than the floret ..... 48. Dupontia p. 71

#### 1. ANDROPOGON L.

#### BEARDGRASS

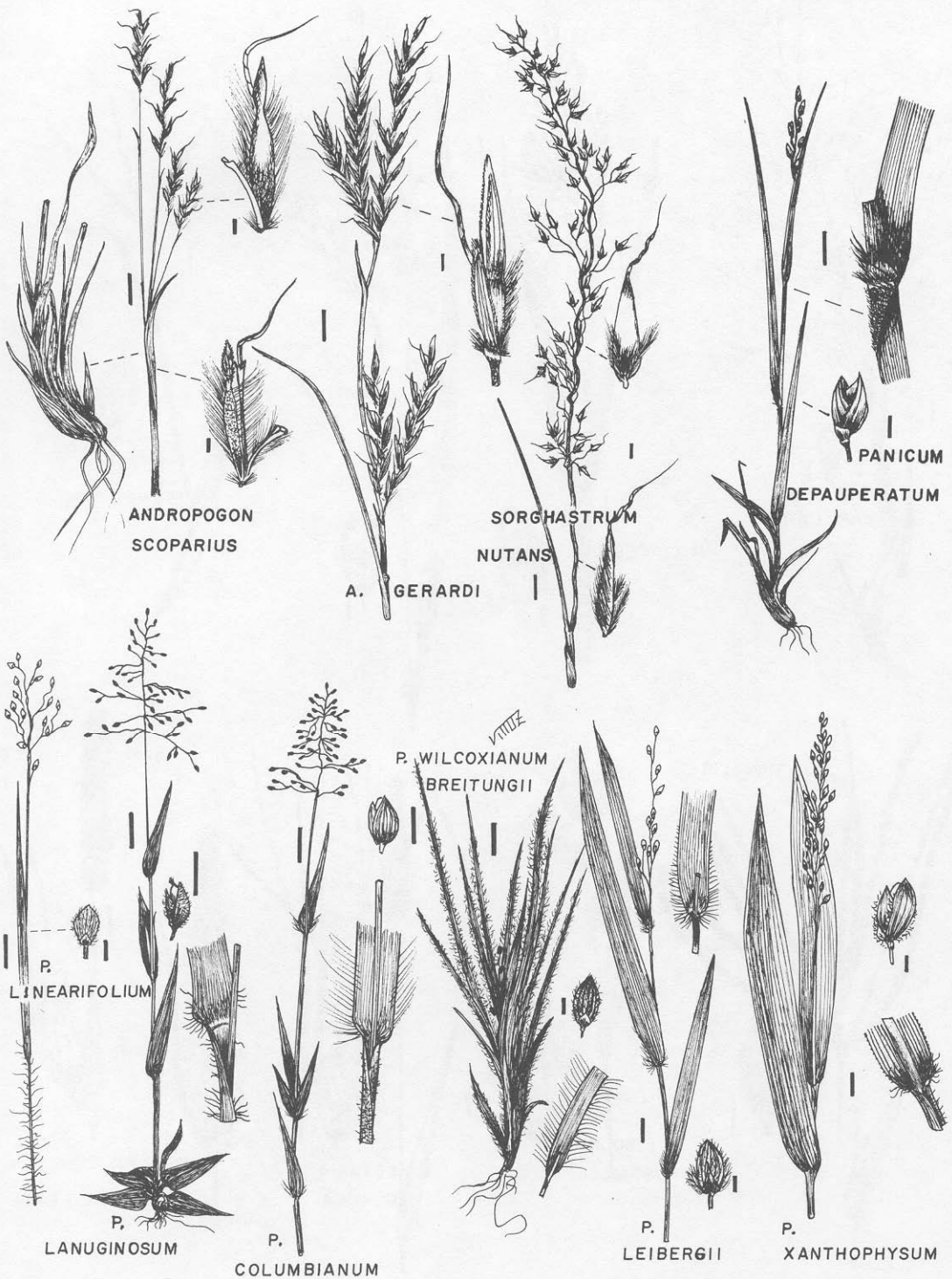
Spikelets of two kinds, borne in pairs in a spike, the rachis of which is strongly flattened and very long ciliate along the edges. Lower spikelet of each pair sessile and one-flowered. Upper spikelet reduced to a sterile and abortive floret, borne on a stipe which is nearly as long as the fertile floret and which is flattened and ciliate in the manner of the rachis.

- a. Inflorescence narrow and elongate, of many spikes borne on very long peduncles ..... 1. A. scoparius
- aa. Spikes crowded in a digitate cluster at the summit of the stem (and branches) ..... 2. A. Gerardii

1. A. scoparius Mx. var. scoparius -- Wiregrass, Bunchgrass -- Florets in a distichous spike along a sinuous and very flat rachis. Forming dense and very large clumps. Spikes mostly much shorter than their peduncle, the latter appressed to the stem. Cilia around 2-3 mm long. Fertile floret completely enclosed by the glumes, except for the twisted awn. Mid summer. A major component on well drained chernozems. -- (cNS, wNB)-Q-BC, US -- Plate 1 page 11.

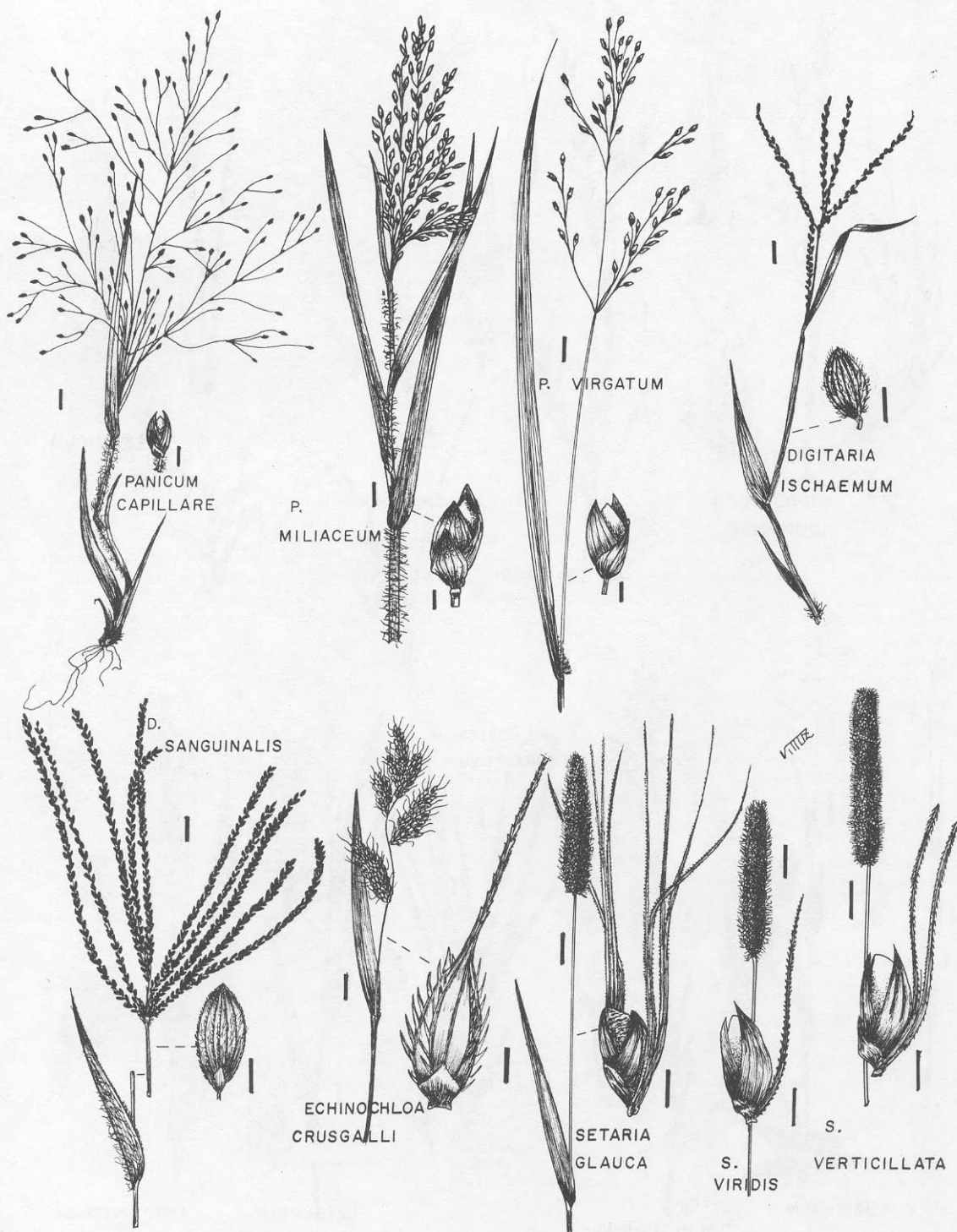
Plate 1

Andropogon, Sorghastrum, Panicum



## Plate 2

Panicum, Digitaria, Echinochloa, Setaria



Around the Great Lakes it gives way to var. littoralis (Nash) Hitchc. with longer and more conspicuous ciliation, the cilia usually 4-5 mm long; sheaths more strongly keeled, often with a raised keel along the midnerve.

2. A. Gerardii Vitman var. Gerardii (A. furcatus Muhl.) -- Bluestem, Blue Joint -- A tall and conspicuous purplish herb with spikes on short pedicels in digitate clusters at the end of the stem and branches. Commonly 1 m tall, loosely tufted. Cilia less than 2 mm long. Sterile spikelet awnless, longer than its stipe and about as long as the fertile spikelet. Mid summer. Light soils on chernozem. -- swQ-seS, US, (CA) -- Var. incanescens (Hackel) Boivin (A. Hallii Hackel) -- Turkey-Foot -- More glaucous and short stoloniferous. Cilia longer, often 4-6 mm. Sterile flower often short aristate. Sands of the Souris basin, where it is often a pioneer. -- (Q-0)-swMan, cUS -- Plate 1 page 11.

Paler plants, i.e. yellowish, have been called var. chrysocomus (Nash) Fern., but there is some doubt about the type of this taxon belonging with var. Gerardii or var. incanescens.

## 2. SORGHASTRUM Nash

## INDIAN GRASS

Resembles Andropogon but the spikes not obvious, being reduced to 2-3 spikelets of which one is fertile, the other 1-2 sterile and reduced to their stipe.

1. S. nutans (L.) Nash -- Indian Grass, Wood-Grass -- Each spikelet accompanied by 1(-2) long-ciliate rachides, 3-5 mm long, and bearing nothing or a merely vestigial spikelet. Tall stoloniferous perennial. Inflorescence paniculate, narrow. Spikelets brownish, long-hairy. Awns 1.0-1.5 cm long, twisted and geniculate. Mid summer. Dry prairies. -- swQ-sMan, US, (CA) -- Plate 1 page 11.

A Kalm (LINN) specimen was selected as type by Hitchcock (Contr. US Nat. Herb. 12: 125. 1908. This was objected to by Baum (Can. J. Bot. 45: 1850. 1967), but Voss (Mich. Bot. 11: 31. 1972) and Dore 1980 (p. 511) agree with Hitchcock. So do we.

## 3. PANICUM L.

## PANIC-GRASS

The typical member of the Panicaceae, genera 3-6: spikelet either not compressed or compressed dorsally, the chaff thus flattish or merely convex; spikelet one-flowered, articulated below the glumes and falling off with its glumes. In this genus the spikelet awnless, borne in a panicle and the lower glume much smaller than upper glume. A sterile lemma is present below the fertile floret and looks like a third glume. Fertile floret shorter than both the covering upper glume and sterile lemma. Fertile lemma smooth and hard, enclosing the seed permanently.

The usual ligule is replaced by a fringe of hairs in this and in a few other genera of Grasses. Although not employed in the generic key, this criterion is very useful at the generic and specific levels. Genera with a fringe of hairs in lieu of ligule are mainly Bouteloua, Buchloë, Calamovilfa, Danthonia, Distichlis, Eragrostis, Munroa, Setaria, Spartina, Sporobolus and especially Panicum.

The ligule may be present and normal but long ciliate in Aristida, Bouteloua, Danthonia, Hierochloë, Phragmites and Sporobolus. In Eragrostis the narrow ligule may be either long ciliate or reduced to a fringe of hairs.

a. Stoloniferous; leaves scabrous-margined, the herbage

- otherwise glabrous ..... 10. P. virgatum
- aa. Tufted and mostly pilose.
- b. Annual with a rather large inflorescence.
- c. Spikelet fat, 4.5-5.5 mm long, about 2 mm wide .... 9. P. miliaceum
- cc. Obviously smaller and narrower ..... 8. P. capillare
- bb. Perennial. Inflorescences of two kinds.
- d. Leaves very long and narrow, all or nearly all borne in the lower  $\frac{1}{4}$  of the plant.
- e. Fruit ovoid or obovoid, 1.5-2.0 mm wide; panicle usually closed ..... 1. P. depauperatum
- ee. Fruit smaller and ellipsoid; panicle open, ovoid ..... 2. P. linearifolium
- dd. Stem more evenly leafy, at least up to the middle, or even with the leaves crowded upwards; leaves broader or shorter.
- f. Spikelets 1.6-2.0 mm long.
- g. Ligule of hairs 2-5 mm long ..... 3. P. lanuginosum
- gg. Shorter, not over 1.5 mm ..... 4. P. columbianum
- ff. Longer, 2.7-4.0 mm long.
- h. Spikelet 2.7-3.0 mm long; plant growing in hemispheric tufts ..... 5. P. Wilcoxianum
- hh. Spikelet bigger, 3.2-4.0 mm long; plants less crowded, with larger leaves.
- i. Leaves glabrous on both faces ..... 7. P. xanthophyllum
- ii. Pilose on one or both faces; spikelet long pilose ..... 6. P. Leibergii

1. P. depauperatum Muhl. var. depauperatum (var. involutum (Torrey) Wood, var. psilophilum Fern.) -- Leaves borne well below the middle of the plant and the main ones at least half as long as the whole plant. Leaf blades 2-4 mm wide, finely scabrous on both faces to pilose, very long ciliate towards the base. Inflorescences dimorphic, the vernal ones on long peduncles and more or less overtopping the foliage; the later ones more or less hidden among the leaf bases. Spikelets 3.0-4.0 mm long, 1.5-2.0 mm wide, subacuminate. Early summer. Sandy woods. -- NS-(PEI)-NB-sMan, US -- Var. perlongum (Nash) Boivin (P. perlongum Nash) -- Spikelets obtuse or rounded at tip, hence only 2.7-3.5 mm long. Sand dunes. -- O-sMan, cUS -- Plate 1 page 11.

Mentions for Moosomin, Sask., were based on a sheet of Sporobolus heterolepis: J.L. Bolton 20, Moosomin, open prairie, July 8, 1938 (SASK).

Less pubescent forms (=var. psilophilum or var. involutum (Torrey) Wood) are much less common, but apparently just as widely distributed.

2. P. linearifolium Scribner (var. Wernerii (Scribner) Fern.) -- Similar to the first but for the smaller spikelets in a more open inflorescence. Spikelets mostly 2.5 mm long, about 1 mm wide, those of the vernal inflorescences usually purplish at base. Early summer. Dry acid soils. -- NS, swQ-seMan, US -- Plate 1 page 11.

3. P. lanuginosum Ell. var. lanuginosum (var. fasciculatum (Torrey) Fern., var. implicatum (Scribner) Fern., var. septentrionale Fern.; P. subvillosum Ashe) -- Browntop-Grass -- Spikelets smallest, 2.0 mm long or less. Tufted, lanky, commonly 4-5 dm high, with conspicuous vernal ovoid panicles. Pubescence highly variable, mainly a long pilosity. The ligule is a line of stiff hairs (2)-3-4-(5) mm long. Leaves dimorphic, the basal triangular-lanceolate, at least as broad and only half as long as the stem leaves, the latter (3)-5-8-(10) mm wide and less than 1 dm long. Spikelets obovoid, minutely puberulent. Early summer. Common in sandy Pine woods. -- NF-(SPM), NS-BC, US, (eEur) -- Var. papillosum (Schmoll) Boivin (P. ferventicola Schmoll, var. papillosum Schmoll, var. sericeum Schmoll; P. occidentale AA.; P. thermale AA.) -- Leaves more variable, the main ones broader and stubbier. Tending to



be somewhat smaller and regularly forming more open tufts, the first stem 1-2 dm high and erect, the latter ones ascending from a decumbent base. Upper stem leaf often triangular-lanceolate. Main leaves on the central stem narrowly lanceolate, (3)-4-(6) cm long, 8-12 mm wide, 4-6 times longer than wide. Later leaves tending to be only half as broad. Around hot springs at Banff. -- swAlta-(seBC)-nwUS -- Plate 1 page 11.

The nearly glabrous extreme, var. septentrionale, is perhaps worthy of recognition as a more northern variant.

Former reports of P. nitidum Lam. west to the Saskatchewan by Hooker 1840 were repeated by Macoun 1888 as P. dichotomum L. var. nitidum (Lam.) Wood. Relevant sheets have not been retraced and we speculate that the reports probably refer to P. lanuginosum. Around the turn of the century the classification of Panicum underwent some drastic changes and old reports should not be accepted unchecked. We have not yet met with any tangible evidence to the occurrence of P. nitidum anywhere in Canada.

4. P. columbianum Scribner var. columbianum -- Differs from the last by its shorter ligule, (0.3)-0.5-1.0-(1.5) mm, and its mixed pubescence, predominantly very short. Habit of the last, but the leaves somewhat narrower. Sometimes quite tufted and less than 1 dm high. Leaves near glabrous above, but with some very long hairs, 2-3 mm, near the edge and base. Otherwise finely puberulent throughout, including the spikelets (but not the upper part of the inflorescence) with hairs about 0.1 mm long and some admixture (especially on the sheaths) of longer ones around 1 mm long. Stem leaves mainly 4-8 cm long and (3)-4-(5) mm wide. Spikelets (1.5)-1.6-(1.7) mm long, 0.8-0.9 mm wide, obovate, slightly less than twice as long as wide. Early summer. Sandy ridges about lake Athabaska. -- sQ-O, nwS, swBC, US -- var. siccanum (Hitchc. & Chase) Boivin (P. tsugetorum Nash) -- Spikelets a bit longer, ellipsoid, (1.7)-1.8-(1.9) mm long, 0.7-0.8 mm wide, a bit more than twice as long as wide. Local on sandy formations. -- NS, swQ-seMan, US -- Plate 1 page 11.

The range of this sand dweller is reminiscent of that of Elymus arenarius, Tanacetum huronense, etc. Their distribution is possibly a remnant of more continuous ranges about the periglacial lakes.

The distinction of var. siccanum from var. columbianum is rather tenuous and perhaps artificial. We have retained it in deference to Hitchcock 1951 who credited them with widely different ranges in the U.S.

The lake Athabaska plants were originally identified and reported upon as P. subvillosum.

5. P. Wilcoxianum Vasey var. Breitungii Boivin -- Forming dense hemispheric tufts on light sand; up to 1 dm high and 2 dm across. Stem and spikelets puberulent. Vernal stems sometimes elongate and overtopping the tuft by up to 1 dm, more commonly shorter and not exerted from the tuft. Leaves and sheaths very long villous. Leaf blades 2-5 mm wide. Ligules  $\pm$  0.5 mm long. Early summer. Scattered on sand dunes. -- swMan-cAlta, ncUS -- Plate 1 page 11.

The typical and more southern phase has taller stems, up to 3.5 dm high, in smaller tufts or even solitary; ligules commonly twice longer.

6. P. Leibergii (Vasey) Scribner var. Leibergii -- Spikelet pubescence longest. Tufted, 2-6 dm high, the upper internodes somewhat shorter, the herbage mostly hispid or pilose, the main leaves mostly 8-12 mm wide, pubescent above. Vernal inflorescence on a long peduncle. Later inflorescences on shorter peduncles and borne on separate and slightly shorter stems. Panicle closed. Early summer. Dry rolling prairies west of the Petite Montagne de Cyprès to Rocanville and Denare Beach; isolated at Holborn Ferry. -- O-sMan-cAlta, US. -- Var. Baldwinii Lepage -- Leaves glabrous above like the next

species. Dry stony or sandy places. From the Petite Montagne de Cyprès eastward across northern Ontario. -- O-seMan -- Plate 1 page 11.

Collections from the boundary survey of 1873-74 were reported by Dawson 1875 and Macoun 1888 as *P. pauciflorum* Ell. and by Scoggan 1957 and Looman 1979 as *P. oligosanthos* var. *Scribnerianum* (Nash) Fern. But the Red River collection of June 21, 1873 (TRT) and a Dawson collection (MTMG), presumably from the same place, proved to belong to *P. Leibergii* var. *Leibergii*, as did a Burgess collection from Dufferin (MTMG) and a Millman collection (TRT) also from the latter place. Other collections from the Whiteshell (CAN, WIN) and by Lowe from Victoria Beach (WIN) were also originally included in *P. oligosanthos* var. *Scribnerianum*, but have now been revised to *P. xanthophyllum*. There seems to be no tangible evidence left for the presence of *P. oligosanthos* in our area.

7. *P. xanthophyllum* Gray -- Leaves largest, (0.5)-1.0-1.5-(2.0) cm wide. Similar to the last, but less pubescent. Leaves glabrous on both faces, scabrous and often ciliate at margin. Sheath pubescent or at least long ciliate. Spikelet pubescence 0.1-0.3 mm long. Early summer. Dry Pine woods. -- NS, NB-swQ-ecS, neUS -- Plate 1 page 11.

8. *P. capillare* L. (var. *occidentale* Rydb.) -- Witch-Grass, Tickle-Grass (*Mousseline*, *Monte-au-cul*) -- Panicle large and diffuse, of numerous small spikelets. Very variable annual, often branching from the base. Sheaths conspicuously pilose with long, spreading hairs. Panicle often half the height of the plant, often incompletely disengaged from the upper sheath. Spikelets 2-3 mm long, lanceolate, glabrous. Lower glume about half as long as the spikelet. Second half of summer. Sandy soils, receding shores and disturbed soils. -- NS-BC, US, (CA), Eur -- Plate 2 page 12.

Many morphological variants have been provided with a binomial or trinomial handle, but we are not yet convinced that they represent anything more than arbitrary subdivisions of a morphological and biological continuum.

A Manitoba report by Löve 1959 of *P. flexile* (Gatt.) Scribner was based on J.-P. Bernard 5507, Otterburne, remblai du chemin de fer près de la gare, 9 août 1957 (DAO). This shows long pilose pulvini, spikelets 2.5 mm long, an inflorescence only half exerted from the upper sheath, etc. It appears to be a youngish and depauperate specimen of *P. capillare*.

9. *P. miliaceum* L. -- Millet, Proso (Millet, Gernotte) -- A coarse annual with a rather heavy and nodding inflorescence. Sheath coarsely hirsute. Panicle tending to be fastigiate, sometimes diffuse. Spikelets  $\pm$  5 mm long. Lower glume  $\pm$  3 mm long. Mid summer. Cultivated and a casual volunteer along roadsides, etc. -- (NS)-PEI, Q-S, BC, US, Eur -- Plate 2 page 12.

An Alberta report by Moss 1959, queried by Boivin 1967, could not be substantiated at ALTA, GH, UAC, etc.

10. *P. virgatum* L. var. *virgatum* -- Switchgrass, Wild Redtop -- A wiry grass with a conspicuous panicle of partly purple spikelets. Stolonerous, the stolons conspicuously and coarsely scaly on the newer parts. Stem 0.5-1.0 m high. Ligule of long hairs. Panicle open. Fertile lemma whitish. Mid summer. Chernozems. -- swQ-seS, US, (CA) -- Plate 2 page 12.

In the planicostal var. *spissum* Linder the rhizome is shorter, thicker and enlarged at the nodes; the internodes less than 1 cm long, hence the stems grow close together.

#### 4. DIGITARIA Heist.

#### CRABGRASS

Spikelets in one-sided spiciform racemes clustered towards the tip of

the stem. Rachis very flat.

- a. Glabrous ..... 1. D. Ischaemum  
 aa. Sheaths ± long pilose; spikelet longer ..... 2. D. sanguinalis

1. D. Ischaemum (Schreber) Muhl. -- Crabgrass, Red Millet -- Like the next, but glabrous throughout and usually smaller. Spikelets ± 2 mm long, narrowly ovoid, solitary or in two's on subterete pedicels. Late summer. Rare lawn weed: Moose Lake, Winnipeg, Lethbridge. -- NS-Man, Alta-BC, US, Eur, (Oc) -- Plate 2 page 12.

2. D. sanguinalis (L.) Scop. var. sanguinalis -- Crabgrass (Sanguinette, Manne terrestre) -- Inflorescence a terminal cluster of purplish racemes. Nodes and leaf blades usually long pilose. Spikelet 2.5-3.0 mm long, broadly lanceolate, mostly in two's on sharply triangular pedicels. Second half of summer. Rare garden weed. -- NS-PEI, Q-BC, US, (SA), Eur -- Plate 2 page 12.

Specimens were checked from Brandon (DAO), Pré-Ste-Marie (DAO) and Lacombe (GH).

South of us one may run into var. rhachiseta (Henrard) Boivin with leaves glabrous or nearly so, and the upper glume a little longer. Sometimes treated a species of its own and then called D. adscendens (HBK.) Henrard.

#### 5. ECHINOCHLOA Beauv.

#### BARNYARD-GRASS

Awns borne on the sterile lemma and the upper glume, these two enclosing the awnless single floret. Lower glume less than half as long as the upper. Leaf without a ligule (n.b.: the only such case in our Grass flora).

1. E. Crusgalli (L.) Beauv. var. Crusgalli (E. muricata (Beauv.) Fern.; E. pungens (Poiret) Rydb., var. microstachya (Wieg.) Fern. & Grisc., var. Wiegandii Fass.) -- Barnyard-Grass, Cockspur (Pied de coq, Patte de poule) -- Spikelets very irregularly awned, borne in a raceme (or panicle) of spiciform racemes. Coarse and very variable annual. Sheaths glabrous, compressed and crested or even narrowly winged along the keel. No ligule. Inflorescence often maturing purple-black. Spikelets puberulent and acicular-hispid. Second half of summer. Uncommon weed of disturbed soils, especially if wetish. -- (Aka), NF-SPM, NS-BC, US, (CA, SA), Eur, (Afr), Oc -- Cv. Fruentacea (E. frumentacea (Roxb.) Link; E. utilis Ohwi & Yabuno) -- Japanese Millet, Billion-Dollar-Grass (Blé du Deccan) -- Inflorescence awnless, much more crowded and blackish from the beginning, rarely paler. Upper glume usually very coarsely hispid. An ephemeral volunteer after cultivation; rare: Brokenhead, Brooks, Hardisty. -- NS, swQ-sMan, sAlta, US, Eur -- Plate 2 page 12.

In Eastern North America one may recognize a var. hispida (Ell.) Farwell (= E. Walteri (Pursh) Heller) by its sheaths sparsely to abundantly long hispid, especially the lower sheaths, and its more heavily awned inflorescence; most spikelets bearing 2 awns, of which the longer is usually 2-3 cm, the shortest (2)-3-5-(10) mm. Both criteria are not well linked, yet this variation is recognizable as a native population because it is not part of the variation of the old world material.

Our species appears to be present in North America both as a native and as an introduced plant. There is a long history of attempts at distinguishing the native from the introduced and most current floras will reflect this approach by recognizing one or more of the following segregates as native species: E. Walteri (Pursh) Heller, E. muricata (or E. pungens), E. microstachya (Wieg.) Rydb. and E. occidentalis (Wieg.) Rydb. All five taxa are distinguished by Dore 1980.

Despite our numerous attempts, we are not satisfied that there is a morphological basis by which most North American specimens can be placed in one or the other of these pigeonholes with a reasonable degree of accuracy.

The latest monograph (1972) recognize two species in our area: E. Crusgalli and E. muricata. They are expected to differ as follows.

E. Crusgalli has generally 54 chromosomes, E. muricata always 36 chromosomes. Not a commonly available piece of information.

E. muricata is also said to differ mainly by some minutiae of pubescence at the base of the acumen of the lemma of the fertile floret, but we have never been able to see this difference clearly and are not yet convinced that it can provide a satisfactory means for distinguish the native populations from the introduced plant. Actually it would be more accurate to state that the acumen is green and minutely puberulent, but the hairs are not readily detected against the green background. However if the puberulence extends slightly beyond the margin of the green zone the hairs seen against the paler background are more easily detected and seem to form a shining ring around the base of the acumen. Even if this difference were to prove workable it would be hardly enough to justify specific rank for the cisatlantic taxa. Other differences are arbitrary or broadly overlapping size distinctions within a morphological continuum, while certain seemingly important criteria such as "broadly ovate or ellipsoid" vs. "narrowly ovate or ellipsoid" are rated intangible. Nix.

E. frumentacea was also reported for Alberta by Moss 1959, queried by Boivin 1967. We know of no voucher at ALTA or elsewhere.

## 6. SETARIA Beauv.

## FOXTAIL

Spikelet as in Panicum and awnless, but its pedicel bearing 1 or more awns at the base, these awns derived from sterile branchlets. Inflorescence dense and spiciform, abundantly awned.

- a. Spikelet about 3 mm long, subtended by tufts of bristles ..... 1. S. glauca
- aa. Shorter,  $\pm$  2 mm long, and subtended by only 1-3 single bristles.
- b. Inflorescence upwardly scabrous, crowded ..... 2. S. viridis
- bb. Retrorsely scabrous and very catchy ..... 3. S. verticillata

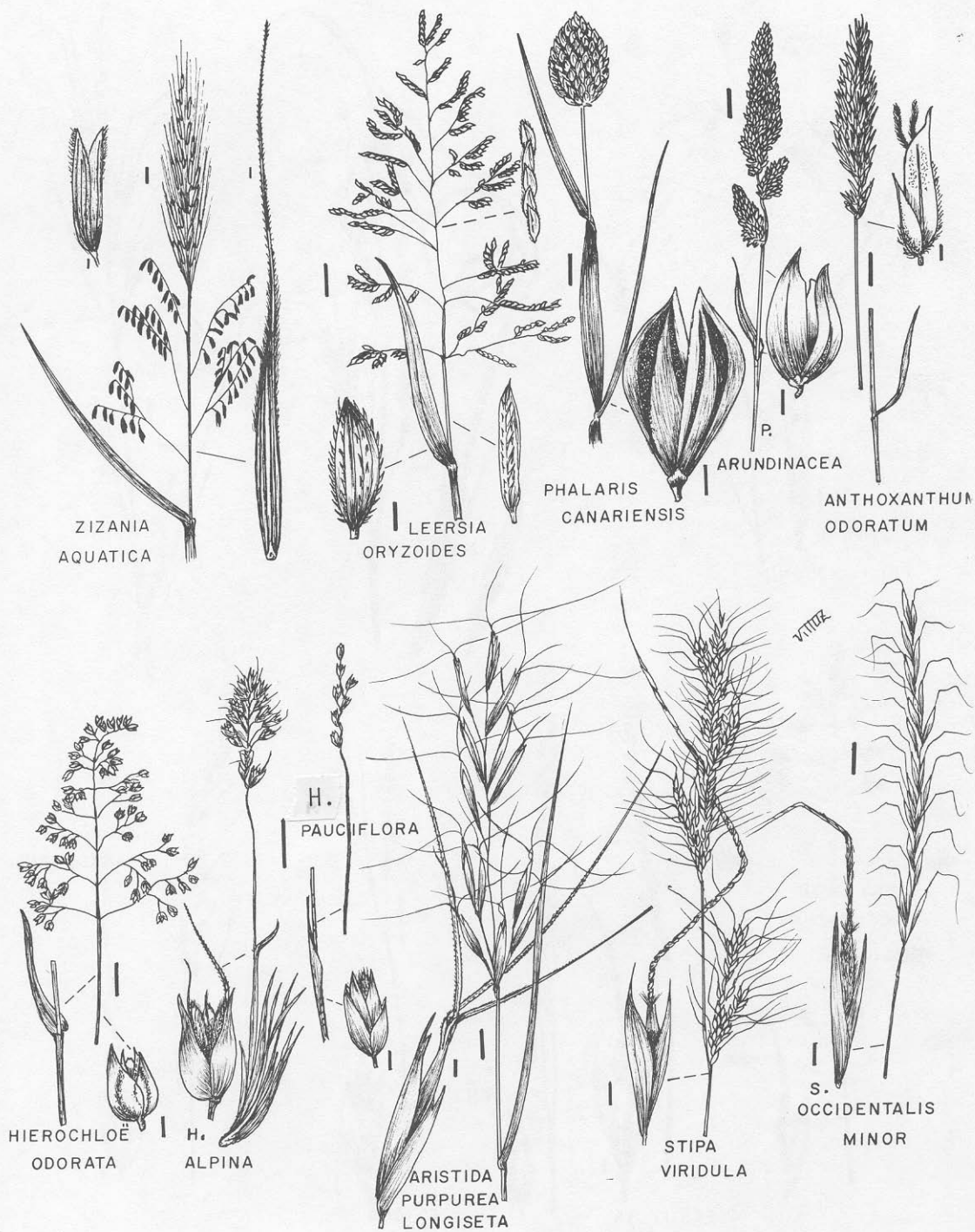
1. S. glauca (L.) Beauv. (S. lutescens F.T. Hubbard) -- Foxtail, Pigeon-Grass (Foin sauvage, Mil sauvage) -- Inflorescence dense, spiciform, abundantly bristly in golden yellow. Erect annual, finely and strongly upwardly scabrous along the leaf margins, the upper parts of the stem and the awns. Upper glume only  $\pm$  2 mm long, thus much of the larger and rugulose lemma is readily visible. Summer. Rare weed of cultivated ground: Brandon, Regina, Saskatoon, Swift Current, Vanscoy. -- SPM, NS-S, BC, US, (CA, SA), Eur, (Afr, Oc) -- Plate 2 page 12.

Reported for Alberta by Moss 1959, queried by Boivin 1967, but no relevant specimen could be located at ALTA, GH, UAC, etc.

2. S. viridis (L.) Beauv. -- Green Foxtail, Bottle-Grass (Mil sauvage, Miliasse) -- Similar to the first, but green or slightly purplish. Spike 1.0-2.0 cm wide, including awns. Rachis of the inflorescence pilose. Branches crowded and not obviously verticillate. Not catchy. Spikelets falling off spontaneously at maturity. Upper glume as long as the spikelet and covering the lemma. Summer. Frequent weed of cultivation and bare soils. -- sMack, (Aka), NF, NS-BC, US, (CA), Eur, (Afr, Oc) -- Cv. italica (S. italica (L.) Beauv.) -- Millet, German Millet (Millet des oiseaux, Millet d'Italie) -- Inflorescence thicker, 2-3 cm wide, the spikelets not falling off at maturity. -- (NS), Q-Man, BC, US, Eur, Oc -- Plate 2 page 12.

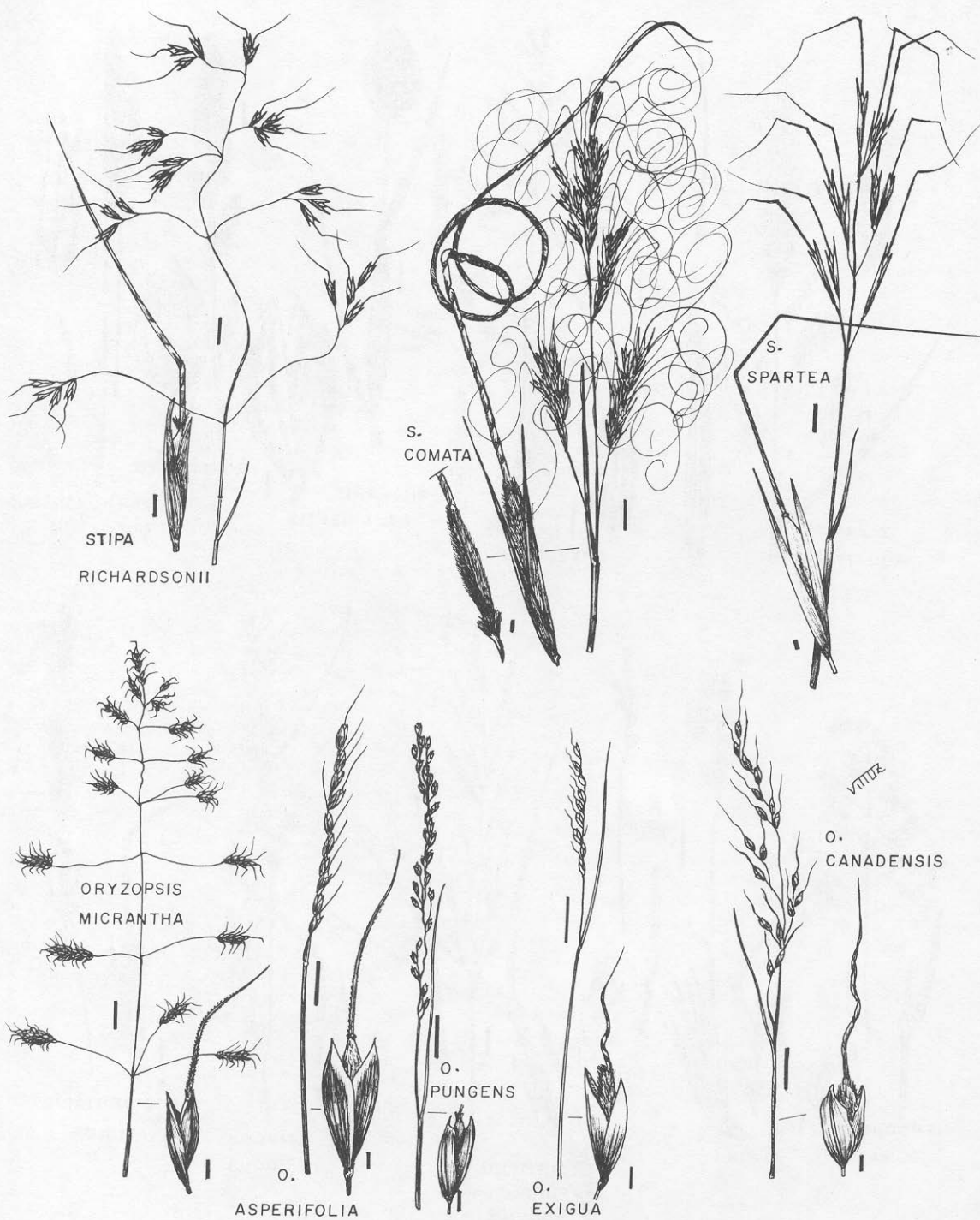
Plate 3

Zizania, Leersia, Phalaris, Anthoxanthum  
Hierochloë, Aristida, Stipa



## Plate 4

## Stipa, Oryzopsis



One of our earliest recorded weed: it was collected in our area by E. Bourgeau in 1857-58 (GH).

3. S. verticillata (L.) Beauv. -- Cow-Grass -- Retrorsely-scabrous and extremely catchy, the inflorescences readily tangling with one another. Leaf margins antrorsely scabrous; upper part of the stem, rachis and awns retrorsely scabrous. Inflorescence tending to be moniliform, the branches being subverticillate. Otherwise similar to S. viridis. Summer. Rare weed of cultivation and waste places: Winnipeg, Brandon. -- Mack, Q-sMan, (BC), US, CA, SA, Eur, (Afr, Oc) -- Plate 2 page 12.

## 7. ZIZANIA L.

## WILD RICE

Spikelets lacking glumes like the next and further specialized into staminate and pistillate spikelets borne in different parts of the inflorescence.

1. Z. aquatica L. var. interior Fass. -- Wild Rice, Water-Oats (Folle Avoine, Riz Sauvage) -- Inflorescence pistillate, yellow-green and narrow with appressed branches in the upper part, but the lower half of the inflorescence staminate, often purplish, open and branching widely. Coarse annual 1-3 m high with leaves 1-3 cm wide. Ligule 10-15 mm long. Pistillate spikelets erect, long-awned; the staminate ones drooping and usually awnless. Mid summer. Shallow and quiet waters; native in southern Manitoba, often seeded in elsewhere. -- (NS, NB)-Q-sMan-wcS, cUS -- Var. angustifolia Hitchc. -- Smaller, mostly 1 m high or less and the leaves usually 1 cm or narrower. Ligule 3-7 mm long. Vivian, Lake Sewell, La Ronge, etc., apparently native east of Lake Winnipeg, north to the Berens R., but probably introduced elsewhere. -- NS-cS, US -- Plate 3 page 19.

An Alberta report by Moss 1959 has not been investigated.

## 8. LEERSIA Sw.

Glumes lacking. Spikelet 1-flowered.

1. L. oryzoides (L.) Sw. -- Cutgrass (Aspérelle) -- Inflorescence a large panicle of small, secund, spiciform racemes. Up to 2 m high. Leaves strongly scabrous at least at margin. Spikelets ovate, pale green, very flat, overlapping. Late summer. Muddy shores. -- NS-sMan, BC, US, Eur -- Plate 3 page 19.

## 9. PHALARIS L.

## CANARY-GRASS

Spikelets 3-flowered, but not obviously so, the lower two florets being small rudiments which remain attached to the base of the fertile flower and fall off with it at maturity. Our two species not obviously related.

- a. Inflorescence an ovoid spiciform panicle ..... 1. P. canariensis  
 aa. A linear and closed panicle ..... 2. P. arundinacea

1. P. canariensis L. -- Birdseed-Grass, Canary-Grass (Graines d'oiseau, Graines de canari) -- Glumes rather large, pale green, broadly winged along the keel and with a dark green stripe along the base of the wing. Annual. Inflorescence 2.0-3.5 cm long, the dark green stripes conspicuous. Glumes pilose, strongly asymmetrical, flattened, semi-obovate, with 2 strong nerves on the outer face. Early summer. Infrequent and evanescent volunteer of waste places and dumps. -- sMack-Aka, (NF), NS-BC, US, (CA), SA, Eur, (Afr) -- Plate 3 page 19.

2. P. arundinacea L. -- Reed-Grass, Reed-Canary-Grass (Roseau) -- Tall, coarse grass with a closed panicle about the size and shape of a finger. Long stoloniferous, 1.0-1.5 dm tall. Leaves about 1 cm wide, scabrous especially along the margin. Ligule large, membranous, puberulent on the outer face. Mid summer. Shore and wet meadows, infrequent. -- sMack-Aka, L-NF, NS-BC, US, (CA, SA), Eur, (Afr, Oc) -- Cv. Picta (f. variegata (Parnell) Druce) -- Ribbon-Grass, Lady's Garters (Ruban de la Vierge, Ruban de bergère) -- Leaves longitudinally striped in white. Usually sterile. Persistent or spreading from cultivation. -- NS-PEI-(NB)-Q-sMan, (BC, US, CA, Eur) -- Plate 3 page 19.

Cv. Picta has also been listed for Saskatchewan, but only as a cultivated ornamental. It is very likely to become naturalized, or at least to be long persistent.

## 10. ANTHOXANTHUM L.

## VERNAL GRASS

Spikelet 3-flowered, as in the last genus, the terminal floret perfect, the other two reduced to their lemma, but the lemmas not reduced in size. Thus the spikelet seems to comprise a single flower surrounded by six pieces of chaff, the two intermediate ones bearing a long, dorsal awn.

1. A. odoratum L. var. odoratum -- Spring-Grass, Pig-Grass (Foin d'odeur, Foin dur) -- A sweet-scented Grass, even after many years in the herbarium. Tufted and thin-stemmed. Inflorescence at first green, turning golden brown, spiciform from the branches and pedicels being short and appressed. Glumes minutely scabrous, the midnerve somewhat ciliate towards the base. Upper glume 7-9 mm long, about twice as long as either the lower glume or the sterile lemmas, the latter aristate and pilose in golden yellow. Awns included or slightly exserted, geniculate, turning brown. Fertile lemma glabrous, awnless and somewhat smaller. Early summer. A rare escape from hay fields or lawns, able to colonize wet or shaded places: Lake Louise. -- G, Aka, NF-SPM, NS-O, swAlta-BC, US, Eur, (Afr, Oc) -- Plate 3 page 19.

Has been collected once in our area, in 1897 at Laggan (MTMG), now Lake Louise.

Grades into a less common var. Puelii (Lec. & Lam.) Coss. & Dur. (A. aristatum Boiss.), a smaller plant with shorter spikelets; upper lemma only 6-7 mm long; awns longer, the bigger one overtopping the spikelet by 2-4 mm, the smaller one exserted sideways. The latter variety is perhaps only an ecologically conditioned variant of drier habitats.

## 11. HIEROCHLOË Br.

## HOLY GRASS

Like the last, with 3 florets of which only the upper is fertile, but the lower 2 staminate and not reduced, rather slightly larger than the terminal one. Sweet scented herbs, remaining so even in the herbarium.

a. Spikelets few, less than 10; awns short and included ..... 3. H. pauciflora  
aa. More numerous in a more open inflorescence.

b. Spikelets awnless ..... 1. H. odorata  
bb. Lemmas with awns 3-7 mm long ..... 2. H. alpina

1. H. odorata (L.) Beauv. var. odorata -- Sweetgrass, Holy Grass (Foin d'odeur, Herbe sainte) -- Panicle usually brownish, open and pyramidal, slightly nodding and slightly one-sided. Long stoloniferous. Spikelets suborbicular. Glumes acuminate, hyaline or purplish towards the base. Lemmas shorter, brownish and brownish-hairy. Late spring. Frequent in damp meadows. -- G-(F)-K-Aka, L-SPM, NS-BC, US, Eur -- Plate 3 page 19.



In the more southern parts of its Asiatic range the sheaths are pilose:  
var. dahurica (Trin.) stat. n., Mém. Ac. St. Pét. s.V, 6,2: 82. 1839.

2. H. alpina (Sw.) R. & S. (S. orthantha S&r.) -- Panicle narrower and smaller, with protruding awns about half as long as the spikelet. Loosely tufted, the leaf bases usually purplish in the tuft. Inflorescence more commonly purplish. Awns arising from the back of the staminate lemmas, unequal, the lower nearly straight, the upper longer and geniculate. Mid summer. Rocky arctic barrens. -- G-Aka, L-SPM, Q, (nMan, wAlta), nBC, US, Eur -- Plate 3 page 19.

3. H. pauciflora Br. -- Panicle reduced to a raceme linear or nearly so. Long stoloniferous. Stem leaf bladeless or nearly so. Spikelet broadly lanceolate. Lemma slightly exserted. Mid summer. Marshy arctic tundra: Churchill. -- F-Mack-(Y)-Aka, nQ-nO-nMan, (nEur) -- Plate 3 page 19.

## 12. ARISTIDA L.

## THREE-AWN

Lemma divided at tip into 3 long awns, or bifid with a long central awn. Otherwise as in Stipa.

1. A. purpurea Nutt. var. longiseta (Steudel) Vasey (A. longiseta Steudel, var. robusta Merr.) -- Awns 4-8 cm long, strongly divergent in a cluster of 3 at the end of the lemma. Tufted perennial. Leaves fine, stiff, arching. Panicle narrow, of few spikelets. Glumes linear, mostly 1-2 cm long. Just before mid summer. Dry hillsides, rare. -- sMan(Agassiz delta)-swS(Val-Marie)-swAlta-sBC, US, (CA) -- Plate 3 page 19.

Ours are at the northern limit of the range and should belong to the taller and more northern var. robusta. But our specimens are not particularly taller, hence the varietal distinction is not upheld. Otherwise this species is a complex of three intergrading varieties of which the more southern var. purpurea has a purplish and more branchy inflorescence, its tip and branches nodding, the awns shorter, mostly 2-4 cm long.

## 13. STIPA L.

## NEEDLE-GRASS

This, like the last and the next 2, has the lemma indurated, that is of a different and much harder texture than the glumes. The lemma also encloses the achene permanently and ends in a long, or very very long, persistent, geniculate and twisted awn. Base of fruit is termed callus, it is hard and narrowed to a point. Fruit readily clinging to fur or clothing by its stiffly bearded and sharply pointed callus.

- a. Awn 6-20 cm long.
  - b. Terminal segment of awn straight or nearly so; fruit ripening dark brown ..... 5. S. spartea
  - bb. Terminal segment usually spirally coiled; fruit  $\pm$  1 cm, whitish to light brown ..... 4. S. comata
- aa. Shorter, 2-3 mm long.
  - c. Panicle open, its spikelets drooping ..... 3. S. Richardsonii
  - cc. Panicle closed and narrow.
    - d. Sheaths abundantly long ciliate along the edge and conspicuously bearded at summit ..... 1. S. viridula
    - dd. Sheaths not ciliate and weakly, if at all, bearded; inflorescence often purplish ..... 2. S. occidentalis

1. S. viridula Trin. -- Feather-Bunchgrass -- With a fruit similar to that of S. comata, bearing an awn twice geniculate and spirally twisted below, but the awn only 2-3 cm long. Usually 6-10 dm tall. Inflorescence green,

closed. Lemma 5-6 mm long, a little over 1 mm wide. Early summer. Common on chernozems. -- swMack, sMan-BC, US -- Plate 3 page 19.

2. S. occidentalis Thurber var. minor (Vasey) C.L. Hitchc. (S. columbiana Macoun, var. Nelsonii AA., S. Nelsonii AA., var. Dorei Bark. & Maze) -- Very similar to the first, but tending to be smaller and the inflorescence purplish because of the dark purple-brown lemmas, the latter a little thinner, 5-7 mm long, a little less than 1 mm wide. Generally a smaller plant than the first and usually under 6 dm high. Early summer. Edge of woods on rolling prairies; from Saskatoon and the Missouri Coteau westward. -- swY, S-BC, US -- Plate 3 page 19.

In the typical and more western phase the lower internode of the awn is pilose with hairs  $\pm$  1 mm long, the upper internode merely finely scabrous. In our var. minor the awn is short scabrous throughout.

Out of range reports, from further east and north, appear to have been based on specimens (SASKP) of S. viridula, except for one collection from Moosomin (DAO) where adventive along a railroad.

3. S. Richardsonii Link -- Like the first two, but the inflorescence branches widely spreading and bearing only a few drooping spikelets towards the end. Herbage glabrous or scabrous, but neither pilose nor ciliate. Basal tufts about 2 dm high. Inflorescence branches few and in 2's. Glumes 8-9 mm long. Awn 2.5-3.0 cm long, geniculate once. Early summer. Prairie openings in lightly wooded regions, westward from Hudson Bay Junction. -- swY, S-BC, US -- Plate 4 page 20.

Manitoba records by Scoggan 1957 and Boivin 1967 are apparently to be discounted, as they are based on a Riding Mountain collection (DAO) since revised to Oryzopsis canadensis. The latter plant is quite similar, but its glumes and awns are only half as long.

4. S. comata Trin. & Rupr. var. comata -- Speargrass, Prairie Needles, Needle-and-Thread, Hay-Needles -- Fruit with a very long awn, twice bent at right angle, the terminal (i.e. third) segment becoming spirally coiled (about 2½ turns) in dry weather. Tufted, (2)-5-(8) dm high. Herbage sometimes glabrous, but usually retrorse-puberulent, especially the basal sheaths. Ligule variable; typically 3-5 mm long (often smaller on the lesser basal leaves), minutely puberulent dorsally, lacerate and bifid, the lobes acute. Inflorescence secund, nodding, of about 15-20 spikelets, usually incompletely disengaged from the upper sheath. Upper glume 1.5-2.0 cm long, including the long-tapered tip. Lower glume similar or slightly shorter. Body of fruit (=lemma minus awn)  $\pm$  1 cm long, whitish, or yellowish or pale green to light brown, densely hirsute near the base, less densely so above, its base a sharp, hard and curved point. Early summer. Mainly steppes; common. -- swY, sMan-BC, US, (AC) -- Var. falcata Boivin (var. intermedia AA.) -- Awn shorter and its upper internode shorter and arched to falcate rather than coiled. Tending to be smaller, 2-4 dm high. Spikets usually bicolour, the glumes tending to be purplish tinged. Waterton. -- soAlta-sBC, wUS -- Plate 4 page 20.

In the eastern part of our range S. comata and S. spartea are obviously distinct, but westward there is a certain amount of intergrading.

Var. falcata has usually been called var. intermedia, but the type specimen of the latter has the longer glumes, longer fruit, etc. of the short-awned phase of S. spartea.

Although she had examined the type of var. intermedia, Barkworth 1978 did use this name essentially in the sense of var. falcata. Her map on page 620 carries 5 dots for Canada; they are located approximately at Princeton, Kamloops and perhaps Midway or Trail in B.C., at Stettler and Milk River in

Alberta. However, no specimens were cited in the text.

Three specimens at DAO carry Barkworth's revision label. One is from Princeton as expected, the other two are from Midway and Invermere. At CAN there is only one specimen, it comes from Waterton. With only two specimens out of four approximately matching the dots on the map, it seems best to regard this map as unreliable and to ignore the range extensions illustrated.

Key points were also checked on some of the other maps published by Barkworth. Too often they proved to be similarly unreliable.

5. S. spartea Trin. var. spartea -- Northern Buffalo-Grass, Porcupine-Grass -- Upper glume 3-4 cm long. Similar to the last, but the awn 1-2 dm long with a straight or falcate terminal segment which is about as long or shorter than the lower segment. Glabrous and commonly 6-10 dm high, usually a larger plant than S. comata growing in the same area. Ligule variable, typically 1-2 mm long on the lower leaves, short ciliate, emarginate, rounded on the shoulders. Body of fruit 1.5-2.0-(2.5) cm long, ripening dark brown, glabrous on the upper half except for a heavy line of ciliation along the overlapping edge of the lemma. Inflorescence usually long peduncled and quite free of the upper sheath. First half of summer. Prairies, especially around bluffs -- (swY), O-sBC, US -- Var. intermedia (Scribner & Tweedy) Boivin (var. curtiseta Hitchc.; S. comata Trin. & Rupr. var. intermedia Scribner & Tweedy; S. curtiseta (Hitchc.) Barkworth) -- Generally smaller. Upper glume 1.8-3.0 cm long. Ligule usually about 1 mm long. Inflorescence often only partly freed of the upper sheath. Body of fruit 0.8-1.5 cm long. Awn less than 1 dm long, its terminal segment 2-5 cm long. The more common phase northward and more tolerant of dryer conditions. -- sMack, sMan-BC, US -- Plate 4 page 20.

An intergeneric hybrid, Stiporyzopsis Bloomeri (Bol.) Johnson, is presumed to represent the combination Oryzopsis hymenoides X Stipa occidentalis and has been reported by Scoggan 1978 as occurring in all three of our provinces. The justifying sheets are at CAN. They have not been checked yet, but the Manitoba report seems improbable since one of the putative parents do not occur near the area.

#### 14. ORYZOPSIS Mx.

#### RICE-GRASS

Closely similar to Stipa, the awn shorter, rarely twisted and more or less deciduous at maturity.

- a. Glumes 6-9 mm long.
  - b. Lemma long silky, the hairs longer than the lemma itself ..... 6. O. hymenoides
  - bb. Pubescence much shorter and appressed ..... 2. O. asperifolia
- aa. Shorter, less than 6 mm long.
  - c. Awns 2 mm long or less ..... 3. O. pungens
  - cc. 4 mm long or more.
    - d. Awns merely flexuous ..... 1. O. micrantha
    - dd. Geniculate.
      - e. Awn once geniculate and not twisted ..... 4. O. exigua
      - ee. Strongly twisted and ± twice geniculate ..... 5. O. canadensis

1. O. micrantha (Trin. & Rupr.) Thurber -- A shining, brown fruit, with a flexuous apical awn, the achene fairly visible through the nearly hyaline glumes, the latter merely greenish towards the base. Ligule broader than the blade. Inflorescence at first closed, its branches geminate and eventually spreading or descending, bearing the few spikelets crowded towards the tip. First half of summer. Wooded sandhills; rare or inconspicuous; also a railway adventive at Medicine Hat. -- swMan-BC, (US) -- Plate 4 page 20.

2. *Q. asperifolia* Mx. -- Winter-Grass -- Inflorescence a closed and ± second raceme of (8)-12-(20) spikelets. Tuft often purple at base. Leaves mostly 5 mm wide, glaucous, long attenuate at base, often overtopping the inflorescence. Lowest node of the inflorescence long-ciliate. Glumes green with a broad and near hyaline margin. Awn mostly 1 cm long, flexuous. Late spring and early summer. Frequent in dry woods. -- seK-sMack, NF, NS, NB-BC, US -- Plate 4 page 20.

3. *Q. pungens* (Torrey) Hitchc. -- Awn short and usually deciduous by flowering time. Foliage filiform, stiff and scabrous. Inflorescence a closed panicle, less than 1 dm long. Lower branches often in 3's, bearing only 1-3 spikelets. Glumes purplish or light brown, glabrous and strongly contrasting the pale green and densely long pilose lemma. Early summer. Frequent in sandy woods. -- seK-Y, L-(NF, NS, NB)-Q-BC, US -- Plate 4 page 20.

4. *Q. exigua* Thurber -- Inflorescence as in *Q. asperifolia* but the spikelets only half as large and half as numerous. Tufts mostly 2-4 dm high, not reddish at base. Leaves filiform, stiff. Awn geniculate at about a right angle. Early summer. Dry, eroded places at the lower altitudes: Waterton. -- swAlta-seBC, US.

5. *Q. canadensis* (Poiret) Torrey -- Closely resembling *Stipa Richardsonii*, but the floral parts smaller. Basal tufts (2)-3-4 dm high. Glumes 4.0-5.5 mm long. Awn (6)-7-9-(10) mm long, vaguely twice geniculate. Early summer. In and around Aspen bluffs on sandy soil, from the Coteau de Prairie westward to Fort Saskatchewan. -- L-NF, NS-Alta, (US) - Plate 4 page 20.

Either highly sporadic or overlooked in our area.

6. *Q. hymenoides* (R. & S.) Ricker -- Silkgrass, Indian Millet -- Large, very open and very diffuse panicle with the main branches in 2's, the lesser ones dichotomously divergent. Forming large and dense tufts 4-8 dm high. Spikelets 6-9 mm long, pale, solitary on flexuous pedicels mostly 1.5-2.5 cm long. Early summer. Blowouts and recently stabilized dunes. -- swMan-sBC, US, (CA) -- Plate 5 page 27.

# 15. MILIUM L.

Lemma and palea indurate and closely enclosing the seed, like the last 3 genera, but awnless, hence resembling the fruit of a *Panicum*.

1. *M. effusum* L. var. *cisatlanticum* Fern. -- A tall herb, about 1 m high, with broad leaves, about 1 cm wide, and an open panicle of spreading branches. Spikelets green, awnless. Glumes with 3 fine, subequal nerves, the margin white. Late spring and early summer, disappearing by about mid summer. Dense, deciduous woods; rare: Norgate and Porcupine Hills. -- NF, NS, NB-Man-(eS), neUS -- Plate 5 page 27.

The transatlantic var. *effusum* has a more crowded panicle, the middle branches being commonly in fascicles of 5-7. In our var. *cisatlanticum* the branches of the middle of the panicle are mostly in 3's, sometimes in 2's more rarely in 4's or exceptionally in 5's.

In the original description of var. *cisatlanticum* Rhodora 52: 218. 1950, the diagnostic characters were unfortunately overemphasized and it was described as having branches in 2's. Many other characters were also mentioned, none of them proved to be convincing.

Our only known location in Manitoba is isolated by 400 to 500 miles from the main part of the range. This suggests that the species should be looked for all along the Coteau de Prairie. There are other entities reaching

Plate 5

Oryzopsis, Milium, Muhlenbergia  
Phleum, Alopecurus

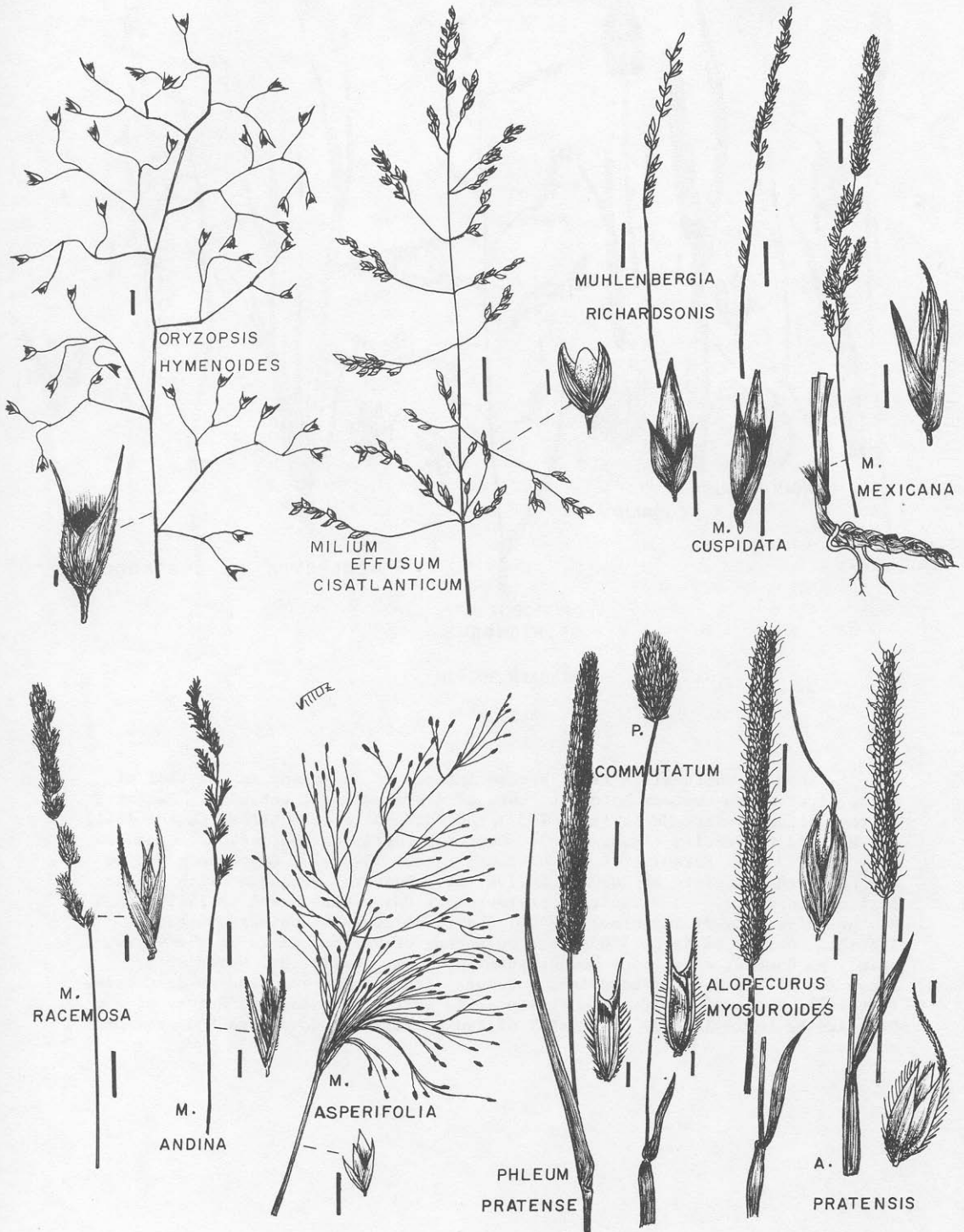
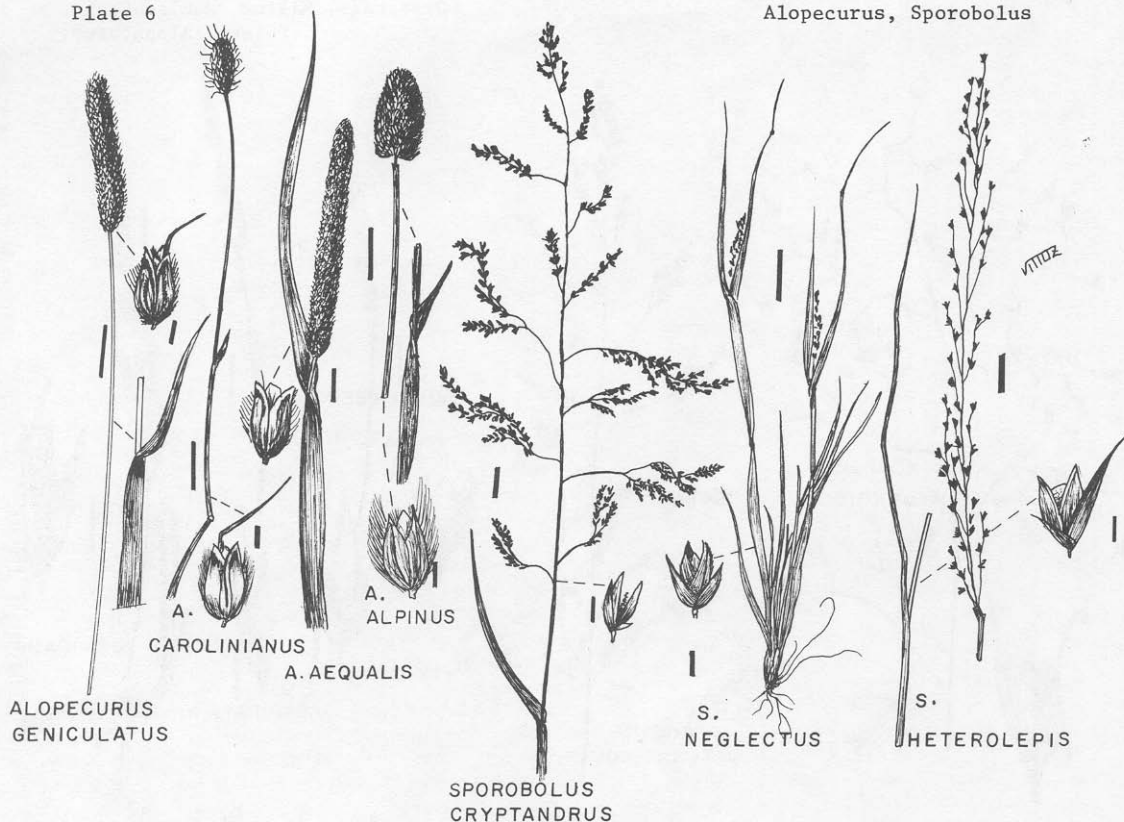


Plate 6

Alopecurus, Sporobolus



SPOROBOLUS  
CRYPTANDRUS

BERNARD BOIVIN

AUTHOR

Born in Montréal in 1916, became interested in botany in the fall of 1931, first as an amateur botanist, then as a professional botanist. Educated at the Collège Sainte-Marie (B.A. 1937), the Université de Montréal (L.Sc. 1941) and Harvard University (Ph.D. 1944). Doctoral thesis on *Thalictrum*. Canadian army in 1943-46. Botanist at the National Museum 1946-47. Guggenheim Fellow and Research Associate at Harvard in 1947-48. Research scientist with Canada Agriculture in 1948-81. Visiting professor at Université Laval in 1965-66 and at the University of Toronto 1969-70. Chargé de cours at Université Laval 1980-81. Author of about 100 papers on botany of various parts of the world, mainly on Canada, of various monographs (*Apocynum*, *Thalictrum*, *Westringia*, etc.) and of a number of botanical volumes: *Énumération des plantes du Canada* (1966-67), *Flora of the Prairie Provinces* (5 parts, 1967-81) and *Survey of Canadian Herbaria* (1980). Initiator of two serials: *Ludoviciana* and *Provancheria*.

their northwest limit in the form of isolated colonies on the Coteau de Prairie, such as Hepatica nobilis var. obtusa, Phryma leptostachya, Rhus glabra, Ostrya virginiana var. virginiana, Asarum canadense var. acuminatum, Smilax herbacea var. herbacea, etc. The rather large distributional discontinuities of these entities suggest that they may occur with us only as relicts of formerly more extensive and more continuous distributions.

During the period of the existence of Lake Agassiz, the Prairie Coteau constituted its western shore. It is easy to visualize that a sheet of water the size of Lake Agassiz must have had a moderating effect on the local climate, thus favouring the expansion northward of some species growing under otherwise marginal conditions. With the draining of the lake and its shrinking to the present Lake Winnipeg, the climate must have deteriorated and become more continental; some of the more sensitive species must have been adversely affected, undergoing a substantial reduction in their distribution. But some of them may be expected to have left behind a few isolated colonies wherever a more favourable microclimate will have allowed this kind of survival, such as the sheltered gullies that dissect here and there the Prairie Coteau. Most of the species listed above were found to be actually restricted to such gullies.

## 16. MUHLENBERGIA Schreber

MUHLY

Rhizome, when present, bearing leaves reduced to conspicuous scales. Lemma and palea tightly and permanently enclosing the achene at maturity, in the manner of the last 4 genera, but the lemma not indurated, that is, not particularly thicker or harder than the glumes. The single-flowered spikelet is mostly much longer than the glumes and the latter are often very uneven in size.

- a. Larger leaves up to 3-6 mm wide; panicle closed.
  - b. Glumes 1.8-3.2 mm long and awnless or nearly so, or at least the awn not longer than the lemmatic awn; hence the glumes are overtopped by the lemmas or their awns.
    - c. Lemmatic pubescence about 1 mm long, the lemma usually awnless ..... 3. M. mexicana
    - cc. Pubescence longer and more conspicuous, reaching about the summit of the lemma, the latter long-aristate ..... 5. M. andina
  - bb. Glumes aristate and over 4 mm long including the awn, the lemma shorter and awnless or at least not longer-awned than the glumes; thus the glumeal awns overtop the florets ..... 4. M. racemosa
- aa. Leaves less than 2 mm wide and usually filiform.
  - d. Panicle open and diffuse ..... 6. M. asperifolia
  - dd. Panicle narrower, closed and crowded, lanceolate to linear.
    - e. Leaves 1-5 cm long ..... 1. M. richardsonis
    - ee. Longer, the middle ones 6-18 cm long.
      - f. Inflorescence very thin and awnless or nearly so ..... 2. M. cuspidata
      - ff. Dense and narrowly cylindric; lemmas awned ..... 5. M. andina

1. M. richardsonis (Trin.) Rydb. -- Resembles the next but finer, smaller and glabrous. Densely tufted. Inflorescence usually less than 5 cm long. Spikelets few, darkish, longer than their pedicels. Glumes 1.0-1.5 mm long, somewhat less than half as long as the spikelet. Mid summer. Low lying spots in the prairie; tolerant of alkali. -- Mack-Y, WNB-BC, US -- Plate 5 page 27.

2. M. cuspidata (Torrey) Rydb. -- Inflorescence often infected and some of the spikelets transformed into conspicuous, round, yellow galls. A fine and tufted herb with a long and narrow inflorescence of small spikelets, mostly

longer than their appressed pedicels. Lower glume nearly as long as the upper, the latter 1.8-3.2 mm long, more than half as long as the spikelet. Mid summer. Dry prairies on gravel or hillsides. -- sMan-Alta, cUS -- Plate 5 page 27.

The range does not extend west of us although Eastham 1947 speculated that it might turn up in B.C.

An old range extension to New Brunswick is found in Bull. Nat. Hist. Soc. N.B. 6: 83. 1887, repeated by Macoun 1888. It could not be substantiated and seems improbable.

3. *M. mexicana* (L.) Trin. (*M. sylvatica* Torrey) -- Conspicuously scaly rhizomes borne near the surface. Herbage more or less scabrous, the stem finely reflexed-puberulent below the nodes. Leaves 3-5 mm wide, the main ones mostly borne towards the middle of the stem. Inflorescence or its sub-units only 2-3 mm wide. Glumes narrowly lanceolate, mostly nearly as long as the spikelet. Lemma finely long-pilose towards the base. Mid summer. Moist ground in or near shade. -- NS, NB-cS, swBC, US -- Plate 5 page 27.

Our only Saskatchewan collections are from Pike Lake (DAO) and Big Muddy (DAO), and are quite removed from the rest of the range. The apparent discontinuity may or may not be real. There is some sporadism with many of the species of *Muhlenbergia* in our area and it may be related to nothing more than some inadequacy of field surveying.

Specimens with a less crowded panicle have been segregated as *M. sylvatica*. These occur throughout the range and appear to be an extreme of variation usually found in the more shaded habitats.

4. *M. racemosa* (Mx.) BSP. var. *racemosa* -- Wild Timothy -- Glumes longest and inflorescence densest, often suggesting Timothy. Otherwise similar to the last, but the inflorescence 4-8 mm thick. Stem minutely retrorse-puberulent for 1-3 mm below each node. Ligule 0.5-(1.0) mm long. Inflorescence less than 1 dm long. Glumes long attenuate to an awn mostly 2-5 mm long and overtopping the lemma, unless the latter be also aristate. Lemma long pilose towards the base with hairs  $\pm$  1 mm long. Mid summer. Dry or moist grassy places. -- wO-BC, US -- Var. *cinnoideus* (Link) Boivin (*M. glomerata* (W.) Trin.) -- Internodes more densely retrorse-puberulent over a longer zone, usually (5)-10-20 mm. Ligule 0.1-0.5 mm long. Shores and wetter places. -- sMack-sY, NF-SPM, NS-BC, US -- Plate 5 page 27.

One collection from Lacombe (DAO) is atypical and has been identified as *M. glomerata* X *andina*, but is probably best treated as an exceptional variant of *M. racemosa* since *M. andina* is not known to occur in Alberta. In the Lacombe specimen both the glumes and lemmas are aristate, the awns only 1-2 mm long, not an unknown condition in *M. racemosa* (i.e. f. *setiglumis* (Watson) Fern.), and the hairs are obviously longer than usual, although nowhere near reaching to the top of the lemma. Further, the ligules are 0.5-0.8 mm long and the stem puberulent for 3-12 mm below each node. Hence this Lacombe collection is probably best regarded as a varietal intermediate within *M. racemosa*.

The distinctive criteria of var. *cinnoideus* (= *M. glomerata*) are grossly exaggerated in some floras.

5. *M. andina* (Nutt.) Hitchc. -- Foxtail-Muhly -- Lemma and palea very long-pilose towards the base, the hairs about 2 mm long and nearly reaching to the base of the awn. Habitally similar to *M. racemosa*, but with the awn arrangement reversed, the glumes awnless or nearly so, the lemma aristate with an awn mostly 3-7 mm long, and the lemma pilosity much longer. Stem finely retrorse puberulent for 1-4 mm below each node, otherwise glabrous. Leaves (1)-3-(5) mm wide, densely and finely scabrous on both faces. Ligule less than



1 mm long. Glumes awnless, scabrous, about as long as the lemma, the latter 2.5-3.0 mm long bearing an awn 4-7 mm long. Palea similar to the lemma, but awnless and shorter by about 0.5 mm. (Just before mid summer?). Rare on gravelly shores along the Prairie Côteau: Birch River, Lake Laurie, Clear Lake. -- wMan, wUS -- Plate 5 page 27.

Known in the U.S. from the Rockies westward and in Canada from a Scamman collection at Clear Lake (GH) in 1941 and two collections by J. Looman on the Prairie Côteau (DAO) in 1970. The disjunction is rather surprising, but perhaps the species has been overlooked across the central part of our area.

6. *M. asperifolia* (Nees & Meyen) Parodi -- Scratchgrass -- Panicle very diffuse, of numerous small spikelets on pedicels many times longer. Long stoloniferous. Spikelet about 1.5 mm long, on a pedicel mostly over 1 cm long. Mid summer. Low, alkaline places in prairies on light soils. -- swO-sMan-seBC, US, (CA, SA) -- Plate 5 page 27.

Usually infected by a fungus which transforms some of the fruits into rather conspicuous orange globules.

To our knowledge *M. filiformis* (Thurb.) Rydb. occurs in Canada only at Chilliwack, B.C. (CAN). Its range was extended to Alberta by Hitchcock 1969, but no justifying sheet could be located at WTU in 1969.

## 17. PHLEUM L.

TIMOTHY

Inflorescence compact and spiciform, the branches very short and not obvious unless the inflorescence is broken open. Spikelet articulated above the glumes, the latter awned, the lemma awnless.

- a. Spike 6-8 mm wide, including the awns, and usually over 5 cm long ..... 1. *P. pratense*
- aa. Thicker and shorter ..... 2. *P. commutatum*

1. *P. pratense* L. -- Timothy, Herd's Grass (*Mil*) -- Common grass with a dense, cylindric spike and a slightly bulbous base. Tufted. Upper sheath barely dilated. Spikelet strongly flattened, oblong. Glumes nearly hyaline, deep green and acicular-ciliate along the keel, truncate at tip, the awn about 1 mm long. Anthers 1.5-2.0 mm long. Shortly before mid summer. Often cultivated, commonly escaped and widely naturalized. -- G, Mack-Aka, L-SPM, NS-BC, (SA), US, Eur, (Afr, Oc) -- *F. viviparum* (S.F. Gray) Louis-Marie -- Spike producing young plants. -- Q-seMan, Alta -- Plate 5 page 27.

2. *P. commutatum* Gaud. (*P. alpinum* AA.) -- Closely resembling the above, but stoloniferous. Upper sheath inflated above, 2-3 times thicker in its upper half than below. Spike ovoid to cylindric, 8-12 mm thick, 1-5 cm long, often purplish. Awns about 2 mm long. Anthers mostly shorter, 1.0-1.8 mm long. Early summer. Mountain and alpine meadows. -- G, Mack-Aka, L-NF- (SPM), NS, (NB)-Q-O, swS-BC, US, (CA), SA, Eur -- Plate 5 page 27.

## 18. ALOPECURUS L.

FOXTAIL

Resembles *Phleum*, but the spikelet is articulated below the glumes and the latter are awnless while the lemma bears a dorsal awn.

- a. Glumes densely long villous all over with hairs 1-2 mm long ..... 6. *A. alpinus*
- aa. Pubescence much shorter, except sometimes the ciliation on the keel.
  - b. Spikelet about 4-6 mm long.

- c. Keel of the glume short-ciliate below, merely finely scabrous above the middle ..... 1. A. myosuroides
- cc. Long-ciliate with hairs  $\pm$  1 mm long ..... 2. A. pratensis
- bb. Shorter, 2-3 mm long.
  - d. Awn straight and exserted by less than 2 mm ..... 5. A. aequalis
  - dd. Geniculate and exserted by 1.5-3.5 mm.
    - e. Perennial; anthers 1.3-2.0 mm long ..... 3. A. geniculatus
    - ee. Annual; anthers (0.3)-0.5-(1.0) mm long .... 4. A. carolinianus

1. A. myosuroides Hudson -- Black Twitch (Queue de Rat) -- Glumes short-ciliate on the keel and at margin, otherwise glabrous. Awn geniculate, exserted by 4-8 mm. Early summer. Rare weed of cultivation: Brandon. -- Man, BC, US, Eur -- Plate 5 page 27.

2. A. pratensis L. -- French Timothy (Vulpine) -- Like the next two but the inflorescence thicker and the glumes longer, sharply acute at tip, the keel and lateral nerves strongly contrasted in deep green or purple. Awn exserted by 2-5 mm, straight to geniculate. Anthers longest, 2.2-3.0 mm long. Early summer. Uncommon and innocuous weed: Brandon, Winnipeg, Edson, Beaverlodge. -- G, Y-Aka, L-NF-(SPM), NS-sMan, Alta-BC, US, Eur -- Plate 5 page 27.

The report from Warren Landing seems dubious; it has never been confirmed and the relevant specimen has not been located.

3. A. geniculatus L. -- Black Grass -- Like A. aequalis, with the awns longer and geniculate. Stems decumbent at base. Spikelet larger. Glumes (2.0)-2.5-3.0 mm long. Anthers 1.3-2.0 mm long. Early summer. Casually introduced in wetter, grassy areas. -- G, Aka, NF-SPM, NS-O, S-BC, US, (Eur) -- Plate 6 page 28.

4. A. carolinianus Walter -- Quite similar to the last but annual. Stems  $\pm$  erect and most often under 3 dm high. Glumes 2.0-2.5 mm long. Early summer. Rare on exundated shores: Merryflat, Wood Mountain Trail. -- scS, swBC, US -- Plate 6 page 28.

Apparently reaches the northern limit of its native range in our area. It is also introduced on the West Coast.

5. A. aequalis Sob. -- Inflorescence simulating Phleum, but paler and thinner, only 4-6 mm wide. Densely tufted, 2-5 dm high. Sheaths inflated, the upper 2-4 mm thick, and long ciliate along the margins, the cilia 1-2 mm long. Spikelet 2.0-2.5 mm long. Awn included, or exserted by less than the length of the glume. Anthers 0.5-1.0 mm long. Early summer. Wetter places and shores, frequent. -- G, Mack-Aka, L-TN, NS-BC, US, Eur -- Plate 6 page 28.

6. A. alpinus Sm. var. alpinus (A. glaucus Less.) -- Soft, villous, spiciform inflorescence resembling Timothy. Long stoloniferous and 1-2-(5) dm high. Inflorescence ovoid to cylindric, 1-2-(3) cm long, about 1 cm wide or less. Glumes 3-4 mm long, lightly to strongly purplish black, especially on the nerves. Awns variable. Anthers 1.5-2.5 mm long. Early summer. Wet tundra and cool mountain woods. -- G-Aka, L, nQ-nO-nMan, neBC, wUS, Eur -- var. occidentalis (Scribner & Tweedy) Boivin (A. glaucus AA.; A. occidentalis Scribner & Tweedy) -- Generally taller and the inflorescence tending to larger and paler. (2)-4-8-(12) dm high. Inflorescence (1)-3-4-(5) cm long, 1.0-(1.8) cm thick, ellipsoid to cylindric. Glumes whitish to straw-coloured, the nerves greenish to dark purple. Awns exserted by 2-6 mm. Moist depressions in the foothill and montane prairies. Cypress Hills and from the Porcupine Hills southward. -- swS-swAlta, wUS.

Var. occidentalis (Scribner & Tweedy) stat. n., A. occidentalis Scribner & Tweedy, Bot. Gaz. 11: 170. 1886.

## 19. SPOROBOLUS Br.

Glumes, lemma and palea often differing in size, otherwise quite similar, awnless, of membranous texture, and only one-nerved. Outer seed-coat thin and loose, often disintegrating at maturity.

- a. Inflorescence linear, remaining partly enclosed in the leaf sheath ..... 2. S. neglectus
- aa. Inflorescence open and mostly free from the upper sheath.
  - b. Spikelet 2.0-2.5 mm long ..... 1. S. cryptandrus
  - bb. Longer, 4.0-5.5 mm long ..... 3. S. heterolepis

1. S. cryptandrus (Torrey) Gray -- Summit of the sheaths conspicuously ringed with hairs 2-5 mm long and widely spreading, not to be confused with the short and inconspicuous ligule. Tufted. Inflorescence open, of spreading branches, its lower part often enclosed in the upper sheath. Spikelets deep green to blackish, longer than their pedicel and crowded on the branches. Mid summer. Abundant on sandy soil. -- swQ-BC, US, (CA) -- Plate 6 page 28.

2. S. neglectus Nash -- Inflorescence inconspicuous, short, about as long as the sheath of the subtending leaf and remaining more or less enclosed in it. Small, tufted and inconspicuous annual. Upper leaf sheaths enlarged to contain the inflorescences. Summit of sheath glabrous or nearly so, but the leaf blades mostly and sparsely long-pilose above towards the base, the hairs up to 5 mm long. Spikelets few, whitish. Late summer on exsiccated and bare or disturbed soil in dry or sandy places, possibly only a weed with us. -- swQ-Alta, US -- Plate 6 page 28.

A collection from Kleefeld, Man., was listed by Löve 1959 as S. vaginiflorus (Torrey) Wood. The justifying specimen (MSM) is sterile and does not lend itself to positive identification; yet we see no reason to suppose that it could be anything but S. neglectus.

3. S. heterolepis Gray -- Similar to S. cryptandrus but the spikelets longer in a more diffuse inflorescence, the pedicels being mostly longer than their spikelet. Sheath lacking a ring of hair or with a poorly developed one. Tufted, the tufts rather thick and compact at base. Mid summer. Dry or wet prairies. -- swQ-eS, US -- Plate 6 page 28.

## 20. POLYPOGON Desf.

## BEARDGRASS

Spikelet articulated below the glumes, otherwise quite like Phleum. Glumes awned.

1. P. monspeliensis (L.) Desf. -- Beardgrass, Rabbitfoot-Grass -- Resembles a longer awned Timothy. Tufted. Ligule 3-6 mm long, puberulent. Spike sometimes branched. Glumes 1.5-2.5 mm long, aristate, the awns 3-8 mm long. Anthers minute, 0.2-0.3 mm long. First half of summer. Rare weed: Delta, Portage, Batoche, Dunblane and Medicine Hat. -- (Y-Aka), Q-BC, US, (SA), Eur -- Plate 7 page 35.

We have checked collections from Delta (CAN, DAO, MT, MTJB), Portage (DAO), Dunblane (DAO), Batoche (SASKP) and Medicine Hat (CAN, DAO, QFA, MTJB).

## 21. ARCTAGROSTIS Gris.

Glumes shorter than the single floret. Lemma with 2 faint lateral nerves. Awnless. More or less the counterpart of Dupontia.

- 1. A. latifolia (Br.) Gris. var. latifolia -- Non-descript type devoid

of any special characteristic and extremely variable, the narrow panicle 5-35 cm long, etc. Stoloniferous perennial. Herbage very finely scabrous almost throughout, including the lemma and palea. Spikelets 4-5-(6) mm long. Lemma, palea and glumes rather similar in shape and colouring, differing mainly in size and position. Lower glume 0.5-1.0 mm shorter than the upper glume, which in turn is 0.5-1.0 mm shorter than the lemma. Palea slightly smaller than the lemma. Anthers 2-3-(4) mm long. Common in wet places in the arctic tundra. Just before mid summer. -- G-Aka, L, nQ-nMan, nAlta-(BC), Eur -- Var. arundinacea (Trin.) Gris. -- Smaller, the spikelets only 2.5-4.0 mm long. Anthers usually 1-2 mm long. -- Mack-Aka, nMan, neBC, (eEur) -- Plate 7 page 35.

A report of A. arundinacea Trin. by Raup 1936 from northern Alberta was based on a specimen from the Caribou Hills (GH) which turned out to belong to A. latifolia var. latifolia.

## 22. CINNA

## WOOD-GRASS

Like Agrostis, but the awn arising between the apical teeth of the bidentate lemma.

1. C. latifolia (Trev.) Gris. -- A tall and thin-stemmed perennial with rather broad leaves, mostly 1-2 cm wide, and strongly scabrous on both faces. Around 1 m high. Inflorescence open, of numerous small spikelets about 3 mm long. Glumes narrow, about equalling the lemma. Mid summer. Frequent in woods, especially springy deciduous woods. -- sMack, sAka, L-SPM, NS-BC, US, Eur -- Plate 7 page 35.

## 23. AGROSTIS L.

## BENTGRASS

Basic type of the Agrostideae, genera 19-25. Spikelets borne in a panicle and reduced to a single floret. This genus without a tuft of long hair on the callus and the floret shorter than the glumes. Palea shorter than the lemma, or even vestigial. Awn absent or borne on the back of the lemma.

- a. Main branches of the inflorescence bearing branchlets and spikelets from near the base up ..... 6. A. exarata
- aa. Without branchlets in the lower  $\frac{1}{2}$ - $\frac{1}{3}$ .
  - b. Lemma with a bent awn exerted beyond the summit of the glumes.
    - c. Rachis and branches scabrous ..... 3. A. hiemalis
    - cc. Branches of the inflorescence smooth ..... 4. A. borealis
  - bb. Lemma awnless or its awn short and not exerted; branches mostly scabrous.
    - d. With stolons or rhizomes; usually with longer and larger blades; spikelets mostly longer ..... 2. A. alba
    - dd. Without stolons; tufted; spikelets 1.5-2.7 mm long.
      - e. Panicle over 1 dm long, becoming very open and very diffuse ..... 3. A. hiemalis
      - ee. Panicle shorter and usually narrow or closed.
        - f. Stem leaf smallish, 1-6 cm long, 1 mm wide or less ..... 5. A. variabilis
        - ff. Main leaves, including the upper stem leaf, more ample, 5-20 cm long and mostly wider.
          - g. Panicle closed; palea nearly as long as the lemma ..... 1. A. Thurberiana
          - gg. Panicle open; palea minute ..... 4. A. borealis

1. A. Thurberiana Hitchc. -- Rachilla prolonged behind the lemma in the form of a stiff seta about 0.3 mm long, which sometimes bears a reduced lemma. A middling species, tufted, 2-4 dm high. Main leaves 5-15 cm long, 1.5-3.0 mm

Plate 7

Polypogon, Arctagrostis, Cinna  
Agrostis, Calamagrostis

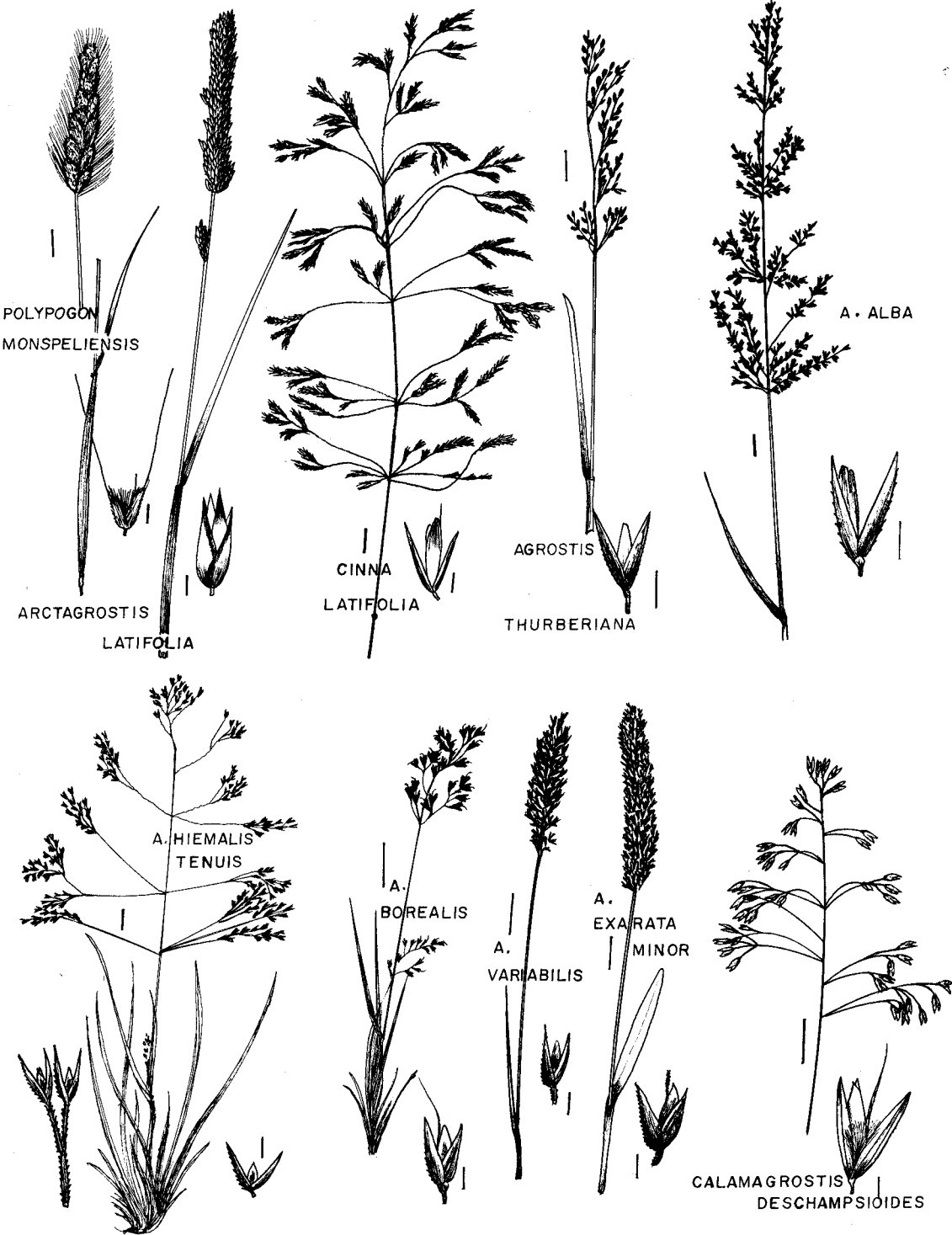
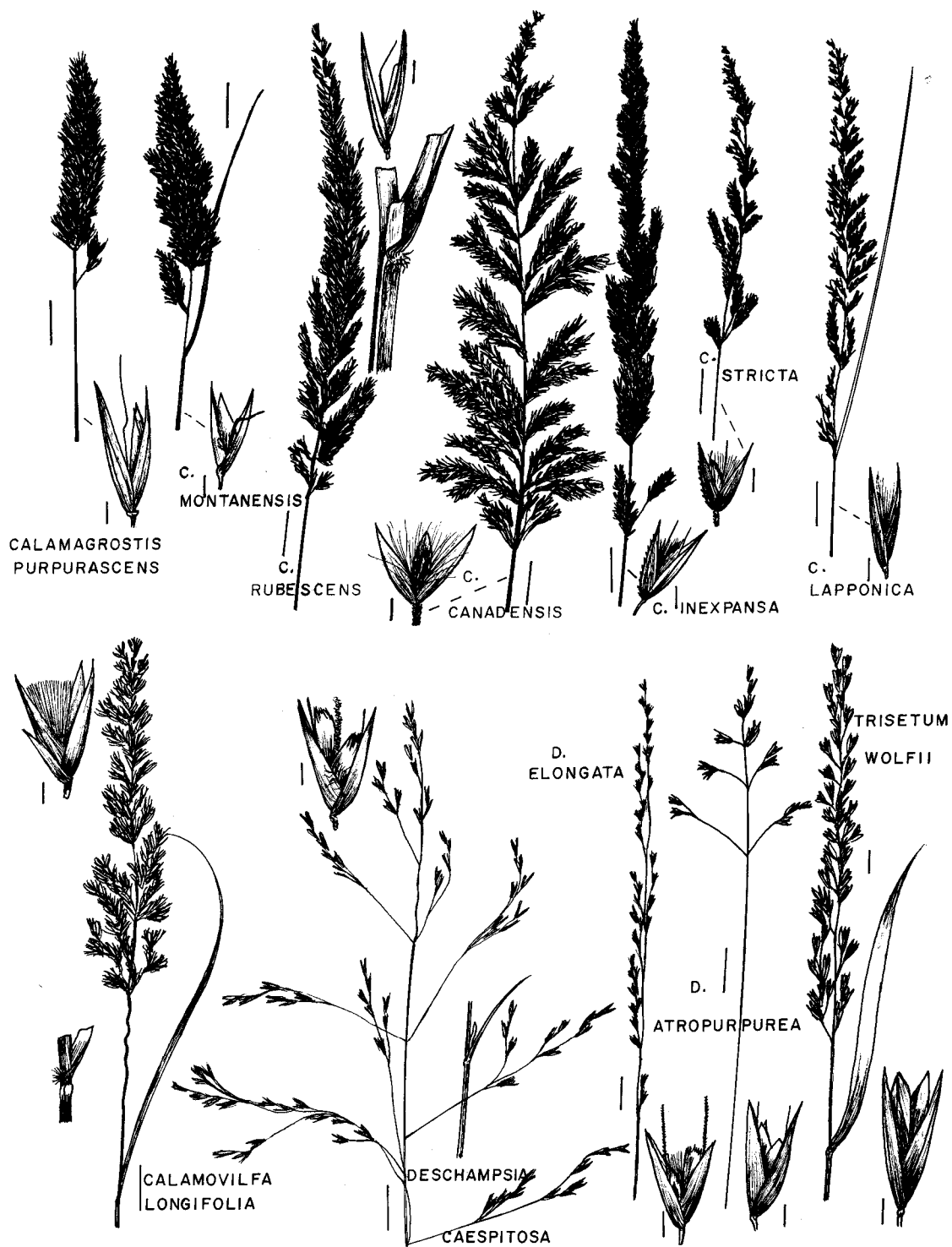


Plate 8

Calamagrostis, Calamovilfa, Deschampsia, Trisetum



wide, stiffly erect. Lemma nearly as long as the glumes. Palea a little shorter than the lemma. Anthers  $\pm 0.4$  mm. Inflorescence closed to somewhat open, its longer branches not over 5 cm. Mid summer. Wettish mountain meadows. -- sAka, swAlta-BC, US -- Plate 7 page 35.

Specimens were checked for Banff (DAO) and lake Cameron (NY). Has been reported by Louis-Marie 1941 for the Coppermine River in the Mackenzie District, but a corresponding justifying sheet could not be relocated in QFA in 1981.

2. A. alba L. (var. palustris (Hudson) Pers. var. stolonifera (L.) Sm.; A. palustris Hudson; A. stolonifera L., var. compacta Hartm., var. major (Gaud.) Farw.) -- Red Top, Herd's Grass (Traîne, Trainasse) -- Our largest species, up to 8 dm high, and perennial by superficial or buried stolons. Forming a dense or lax carpet. Leaves up to 2 dm long and mostly 3-5 mm wide. Panicle becoming open and 1-2 dm long. Palea 1.0-1.3 mm long. First half of summer. Often cultivated and readily invading the wetter places in open areas. -- (G), Mack-(Y-Aka), L-NF-(SPM), NS-BC, US, Eur, (Afr, Oc) -- Plate 7 page 35.

Rather variable and commonly subdivided into three varieties or species, although other classifications have also been proposed. We are not convinced that such distinctions are warranted and we note that Hultén 1958 is equally unconvinced. However it is an important component of some artificial prairies and certain growth forms are no doubt significant to agriculture. The main distinctions are as follows.

Taller plants with broader leaves and buried rhizomes have been called A. alba, or A. gigantea, or A. nigra, or A. stolonifera var. major.

Lower plants with an open inflorescence and numerous superficial stolons have been called A. alba or A. stolonifera.

Lower plants with superficial stolons but a closed inflorescence have been called A. alba var. palustris, or A. maritima, or A. palustris, or A. stolonifera var. compacta.

The varietal classification was adopted by Hitchcock 1969. The three growth forms then become respectively var. alba, var. stolonifera and var. palustris.

3. A. hiemalis (Walter) BSP. var. tenuis (Tuck.) Gleason (A. scabra W., var. geminata (Trin.) Swallen) -- Tickle-Grass, Hair-Grass (Foin Fou, Foin follette) -- A very fine and delicate herb with a purplish inflorescence of very small spikelets, becoming open and very diffuse. Leaves very variable, 1-5 mm wide. Inflorescence about half the height of the plant, the branches filiform and scabrous, the longer ones often over 1 dm long. Spikelet (1.5)-2.0-(2.5) mm long. Pedicels very variable, about half of them reaching up to 2-4-(5) mm long. Lemma usually awnless. Palea minute or absent. First half of summer. Common in acid situations, mainly on sands and bogs. -- (G, K)-Mack-Aka, L-NF-(SPM), NS-BC, US, (CA), Eur -- Plate 7 page 35.

Occasionally the lemma will bear a geniculate and exserted awn; f. Tuckermanii (Fern.) Scoggan. In the typical and more southern phase the spikelets average smaller, down to 1 mm, and are borne in somewhat more compact terminal clusters, the pedicels being only 2 mm long or less.

4. A. borealis Hartman var. borealis -- Lemma with a dorsal, geniculate awn overtopping the spikelet by 1-2 mm. Intermediate in size and foliage between the last and the next. Inflorescence usually 5-10 cm long, its rachis and branches smooth. Panicle  $\pm$  open, about 1/6-1/4 of the height of the plant. Anthers 0.4-0.8 mm. Palea very short. Mid summer. Sandy or rocky tundra. -- G-Mack-(Y)-Aka, L-NF, Q, nMan-nS-(Alta)-BC, US, Eur -- Var. recta (Nash) Boivin (A. idahoensis Nash). Lemma awnless. A small plant in many ways. Less than

3 dm high, usually bearing only one stem leaf and the panicle less than 1 dm long. Leaves 0.5-1.5 mm wide. Panicle open, ovoid to deltoid. Spikelet smaller, the glumes 1.5-2.0 mm long, rarely some of them up to 2.5 mm long. Anthers quite small, 0.2-0.4 mm long, as in A. exarata. Mount Edith Cavell. -- cwAlta-(BC), wUS -- Plate 7 page 35.

From the Rockies eastward, the lemmas are obviously awned as described above and are treated as var. borealis, except for a slight intrusion of var. recta and a disjunct occurrence of var. californica. On the other hand, in such specimens as we have studied from west of us the awns were lacking, or sometimes present but shorter, straight and included. These western variants are usually treated as species, yet the morphological differentiation is so limited that the rank of variety seems more realistic. They are treated here as var. recta.

As pointed out by Scoggan 1978, most of the Canadian material (CAN, GH, NY) identified a A. idahoensis belongs with A. variabilis. But one Malte collection (GH, NY) from Mount Edith Cavell seems to fit best with var. recta. This var. recta (or A. idahoensis) stands out from both A. variabilis and A. Thurberiana by its open inflorescence and its usually smaller anthers. From A. variabilis it also differs by its longer and somewhat wider leaves. From A. Thurberiana it also differs by its somewhat narrower leaves and its much reduced or vestigial palea.

An isotype (DAO) of A. idahoensis shows most florets with a vestigial palea, but the odd floret has a palea up to 2/3 as long as the lemma.

5. A. variabilis Rydb. (A. humilis AA.) -- Smallest, 2 dm high or less, and the foliage finest and shortest. Inflorescence less than 1 dm long, closed or nearly so. Lemma awnless. Palea minute. Mid summer. Drier alpine tundras. -- swAlta-BC, wUS -- Plate 7 page 35.

The glumes are minutely scabrous-ciliate on the midnerve above the middle. In two other similarly small species, A. Thurberiana and A. humilis, the midnerve is smooth and the panicle is usually tightly closed.

The relationship of A. variabilis to A. borealis var. recta needs reviewing. We find that very little distinguishes them other than leaf width and the nearly closed versus open inflorescence. A. variabilis might be better placed as a variety of A. borealis.

The western A. humilis Vasey was reported for Alberta by Porsild 1959, Packer 1972, Kershaw 1976, Argus 1978. The only Alberta collection located, S. Brown 1422, Brazeau, Aug. 3, 1908 (NY, GH), has been revised to A. variabilis.

6. A. exarata Trin. var. minor Hooker -- Inflorescence closed, green, of spikelets mostly longer than their pedicel. Densely tufted, 3-12 dm high. Leaves 2-8 mm wide. Ligule usually over 3 mm long. Panicle up to 3 dm long, mostly 1-2 dm. Glumes scabrous dorsally (other species either smooth or scabrous on the midnerve only). Lemma awnless or sometimes short awned. Palea minute. Anthers very small, 0.3-(0.4) mm long. Mid summer. Grassy stream banks from Pike Lake westward and southward. -- sAka, S-BC, US, (CA, eEur) -- Plate 7 page 35.

In the costal var. monolepis (Torrey) Hitchc. the lemmatic awn is present, exserted, geniculate and mostly 3-4 mm long. Re var. exarata see p. 107.

#### 24. CALAMAGROSTIS Adanson

#### REED-GRASS

An Agrostis type with the base of the lemma surrounded by a tuft of long hair and the palea little if at all shorter than the lemma. The latter is



also aristate on the back.

- a. Inflorescence open and with relatively few spikelets, the longer branches with only 4-6 spikelets; pedicels very unequal, some much longer than the spikelets ..... 1. C. deschampsiioides
- aa. Spikelets very numerous, their pedicels nearly always very short.
  - b. Awn geniculate and exserted upward by 1-4 mm; tufted. .... 2. C. purpurascens
  - bb. Awn shorter, included or barely exserted, or merely protruding sideways; stoloniferous.
    - c. Sheaths lanate at the junction with the blade ..... 4. C. rubescens
    - cc. Sheaths not lanate; either glabrous or merely finely scabrous.
      - d. Main leaves 4-8 mm wide; panicle usually open ..... 5. C. canadensis
      - dd. Leaves narrower and strongly involute; panicle closed.
        - e. Awn somewhat geniculate and protruding sideways from the spikelet; panicle 3-8 cm long ..... 3. C. montanensis
        - ee. Awn ± straight and usually inconspicuous; panicle commonly longer.
          - f. Leaves very scabrous on both faces; ligules 3-5 mm long ..... 6. C. inexpansa
          - ff. Leaves smooth or nearly so at least below; ligules 1-3 mm long.
            - g. Spikelets 4.5-5.5 mm long; tuft of hair about as long as the lemma ... 8. C. lapponica
            - gg. Spikelets smaller, 2.0-4.5 mm long and the tuft of hair only 1-3 mm long ..... 7. C. stricta

1. C. deschampsiioides Trin. -- Lemma about twice as long as its basal tuft of hair, bearing a dorsal awn, ± geniculate and most often exserted beyond the glumes. In small tufts and stoloniferous, 2-4 dm high. Herbage glabrous and smooth throughout or nearly so. Mid summer. Damp meadows on the arctic coast, usually near high tide level. -- eK-Mack, Aka, wQ, nMan, Eur -- Plate 7 page 35.

A species of rather discontinuous distribution, occurring on both sides of the Hudson Bay. There is no Labrador specimen at CAN and a labradorian report by Scoggan 1957 is presumably to be interpreted in the sense of northern Quebec.

2. C. purpurascens Br. var. purpurascens -- Spikelets rather long, (4)-6-8 mm long, with an exserted awn, in a somewhat narrow panicle less than 1 dm long. Loosely to densely tufted. Up to 7 dm high; resembling the next when lower, but the leaves are broader, 3-5 mm wide. First half of summer. Open woods on dry ridges in the north and the Rockies. -- G-F-(K)-Mack-Aka, (NF), Q-BC, US, (Eur) -- Plate 8 page 36.

The more western (Q.C.I.) var. tasuensis (Calder & Taylor) Boivin has longer awns, mostly 10-12 mm, and its leaves are glabrous or merely puberulent above.

The extension of the range to Labrador by J.M. Gillett, Can. Field-Nat. 74: 22. 1960 was based on a collection (DAO) since revised to C. lapponica.

A Bow River Pass (GH, QK) collection was reported as C. Porteri Vasey by Macoun 1888. Its spikelets are unusually long, 7-11 mm; it seems to be a viviparous form of C. rubescens.

3. *C. montanensis* Scribner -- Often resembling *Koeleria* in size and habit, but long stoloniferous. Only 2-4 dm high and the leaves less than 3 mm wide. All leaves borne below the middle, or sometimes with one leaf borne higher. Spikelet 3.5-5.0 mm long. Early summer. Common in steppes and prairies. -- sMan-seBC, US -- Plate 8 page 36.

4. *C. rubescens* Buckley -- Pinegrass -- With a dorsal ring of long tomentum or two tomentose patches at the junction of sheath and blade. Tall species with a closed panicle and the habit of *C. inexpansa*. Spikelets 3.5-5.0 mm long. Lemmatic hair scanty and inconspicuous, around 1 mm long. Awn geniculate and little if at all longer than the glumes, but rather tending to protrude sideways. Mid summer. Forming extensive stands in and around forests, especially in Lodgepole; Cypress Hills and Rockies, also at Grace L. near Nipawin. -- S-BC, wUS -- Plate 8 page 36.

Incorrectly keyed out as tufted in one current manual.

As for *C. Scribneri* Beal it seems to stand between *C. rubescens* and *C. canadensis*. It is a coarser plant with a laxer inflorescence in the manner of *C. canadensis*, but the top of the sheath is pilose-tomentose in the manner of *C. rubescens*. The tuft of hair is about half as long as the lemma. We have seen specimens from Montana southward. Canadian reports of *C. Scribneri* are probably to be discounted as all specimens seen under that name (DAO, GH, MT, QK, UBC, V) proved to belong to *C. canadensis* or *C. rubescens*, or *C. inexpansa*. An Alberta report by Scoggan 1978 was based on a collection from Kicking Horse Lake. But the latter is in B.C. and the specimen is *C. canadensis*.

5. *C. canadensis* (Mx.) Beauv. var. *canadensis* (1812, vel recentius (Mx.) Nutt. 1818, var. *Macouniana* (Vasey) Stebbins, var. *robusta* Vasey, var. *scabra* (Presl) Hitchc.; *C. inexpansa* Gray var. *barbulata* Kearney) -- Blue Joint (*Foin bleu*, *Herbe à liens*) -- A common and obvious but rather nondescript grass, slightly bluish-green, forming large colonies, around 1 m high, with an open panicle mostly 2 dm long and of numerous small spikelets. Sheaths smooth or nearly so. Leaves 4-8 mm wide, glabrous, mainly borne on the stem and usually 4-6 to a stem. Spikelets 3-5 mm long, more or less purplish, fading to straw-colour at maturity. Awn short and included. Tuft of hair somewhat shorter than the lemma. First half of summer. Common in dampish meadows. -- C-(F-K)-Mack-Aka, L-NF-(SPM), NS-BC, US, Eur -- Var. *Dorei* Boivin -- Densely short pilose on sheaths and the upper leaf surfaces. The common phase around the Great Lakes, scattered westward to the Cypress Hills. -- O-S, ncUS -- Plate 8 page 36.

Many more phenotypes have been named, some are frequent, others sporadic, others, such as var. *Macouniana* with glumes less than 3 mm long, mere extremes of variation. None seems to be taxonomically significant, all are estimated to be part of the normal range of variation of the species, except for the pubescence variant recently detected by Dr. W.G. Dore.

Var. *Dorei* var. n. *Vaginis foliisque superne pilosiusculis*. Type: J. Fowler, North Bay, July 20, 1891 (QFA). Paratypes at QFA are from Brûlé Lake, Postagoni Lake and Kirkland Lake. Other paratypes are at DAO where they were annotated by W.G. Dore and often designated by an unpublished epithet.

6. *C. inexpansa* Gray (var. *brevior* (Vasey) Stebbins) -- Resembles the last with a closed panicle and leaves only 2-4 mm wide. Apparently a minor segregate of *C. lapponica*, with longer ligules, very scabrous leaves, glumes only 3-4 mm long, and the tuft of hair slightly shorter than the lemma. Mid summer. Common around depressions in the prairie and in wet or dry openings further north. -- seK-Aka, (L)-NF-(SPM), Q-BC, (US) -- Plate 8 page 36.

The many named varieties do not seem to be geographically restricted, hence there is no evidence that they could constitute populations biologically

autonomous from the typical phase. The type collection of one of the named varieties actually belongs with C. canadensis. Holmgren 1977 lumps 6 into 7.

7. C. stricta (Timm) Koeler (C. neglecta AA., var. borealis (Laest.) Kearney) -- Similar to the last and another minor segregate of C. lapponica. Spikelets shorter and the callus hairs also shorter. More gracile, the peduncle only 0.3-0.6 mm thick, leaf blades 1-3 mm wide, usually involute and scabrous along the margin, but smooth dorsally. Ligule short. Panicle mostly around 1 dm long, most often pale coloured. Early summer. Common in marshes and bogs or shores. -- G-Aka, L-NF, NS-BC, US, Eur -- Plate 8 page 36.

For the justification of the correct name see A. Löve, Taxon 19: 299-300. 1970 and E.G. Voss, Mich. Bot. 11: 28-29. 1972.

Smaller plants occurring in the more northern parts of the range are sometimes segregated as var. borealis (Laest.) Hartm. or C. groenlandica (Schrader) Kunth.

8. C. lapponica (Wahl.) Hartman (var. nearctica Pors.) -- Leaves mainly basal, the stem leaves only 2. Resembles C. canadensis, but the leaves are narrower, less than 5 mm wide, and the panicle is narrow and more or less closed. Up to 1 m tall. Leaves usually smooth, at least below. Spikelets rather large. Callus hairs 3.0-4.5 mm long. Mid summer. Sandy or rocky tundra and openings in the boreal forest. -- G-(F)-K-Aka, L, Q, nMan-(nS)-swAlta, Eur -- Plate 8 page 36.

A dot around Saskatoon on a map by Porsild 1957, repeated by Hultén 1958 may have been due to a lapsus calami as we found no corresponding specimen at CAN. A report by Scoggan 1957 for southern Saskatchewan may have been based on the above dot (or specimen?).

More recently reported by Harms 1974, 1978 and Maher 1979 for northern Saskatchewan, but at least the specimens (DAO) from the La Loche area have been revised to C. inexpansa.

## 25. CALAMOVILFA (Gray) Hackel

## SANDGRASS

Spikelet one-flowered like Agrostis, but awnless and the callus long-bearded. Ligule a ring of hair.

1. C. longifolia (Hooker) Scribner var. longifolia -- Sandgrass, Big Sandgrass -- A tall and conspicuous pioneer of sand dunes with the inflorescence branches alternating. Long stoloniferous and around 1 m tall. Sheaths, especially the lower ones, usually long-ciliate with reflexed hairs. Ligule a dense line of hairs. Panicle usually nearly closed. Callus bearded with hairs 2-4 mm long. Mid summer. Sandy soils and moving dunes. -- O-sBC, ncUS -- Plate 8 page 36.

Ours is the typical variety with the panicle closed or nearly so, and the sheaths usually glabrous or nearly so. South of the Great Lakes it is largely replaced by var. magna Scribn. & Merr. with an open and usually longer panicle, and commonly pubescent sheaths.

## 26. DESCHAMPSIA Beauv.

## HAIRGRASS

Like the next 3 genera, with two flowers per spikelet but the lemma not bifid at tip, merely erose. Resembles Trisetum, but the lemma is rounded on the back and the awn arises from below the middle.

a. Glumes much longer than the spikelets and overtopping them.

- b. Awn straight, twice as long as its lemma ..... 2. D. elongata  
 bb. Awn geniculate and not so long ..... 3. D. atropurpurea  
 aa. Upper spikelet about equalling or clearly overtopping the  
 glumes ..... 1. D. caespitosa

1. D. caespitosa (L.) Beauv. var. caespitosa (var. glauca (Hartman) Lindm. f., var. littoralis (Reuter) Richter) -- Seven-Year-Grass, Bull-Faces (Herbe sure) -- Prolongation of the rachilla readily observable, usually purplish, awn-like, pilose with stiff hairs up to 1 mm long, located behind the upper floret (i.e. between the two florets) and at least half as long as the upper lemma. Less than 1 m high. Leaves narrow and nearly all in a dense basal tuft; the blades commonly folded and then slightly falcate, stiff and slightly pungent at tip. Inflorescence open and diffuse, the branches more or less scabrous. Spikelets somewhat tinted, but largely hyaline. Awns variable. First half of summer. Common in depressions and shores, tolerant of alkali. -- (G-K)-Mack-Aka, L-NF-(SPM, NS-NB)-Q-BC, US, Eur -- F. lunensis Mucke (D. alpina (L.) R. & S.) -- Viviparous, the spikelets turning into young plants. Glumes and lemmas more variable, 4-10 mm long. Calgary -- G-F, L, Q-O, Alta, (Eur) -- Var. mackenziana (Raupe) Boivin -- Coarser. Inflorescence not so widely open, pale green or light straw-coloured and hyaline, the branches smooth or nearly so. Spikelets larger, up to 12 mm long, the glumes 5-10 mm long. Often with an elongating caudex. Drifting sands of Lake Athabaska. -- nMack, nWS -- Plate 8 page 36.

An Alberta report of D. calycina Presl by Boivin 1948 was repeated by Moss 1959 and queried by Boivin 1967. We have been unable to retrace this report to its specimen basis and we now suspect that it may have started as a lapsus calami, Alberta being a lapsus for Alaska.

2. D. elongata (Hooker) Munro -- Florets short, both of them overtopped by the glumes, but the awns straight and about twice as long as the florets, hence both of them are usually exerted. Thin and lanky tufted herb with an elongated and closed panicle. Glumes rather narrow, 4-6 mm long, 1 mm wide or less with a very wide hyaline margin. First half of summer. Wet places. -- Y-(Aka), swAlta-BC, US, CA, SA -- Plate 8 page 36.

3. D. atropurpurea (Wahl.) Scheele var. atropurpurea (Vahlodea atropurpurea (Wahl.) Fries) -- Each of the two florets with an awn geniculate at about the level of the tip of the lemma. Foliage primarily basal, the leaves flat, less than 5 mm wide. Stem leaves (1)-2, only 1-3 mm wide. Panicle deltoid, light to deep purple, the branches geminate. Spikelet glabrous or nearly so, except for the callus hairs which are more than half as long as the lemma on the lower floret, but much shorter on the upper one. Mid summer. Mainly along shores in the arctic tundra. -- G, (K)-Mack, L-(NF), Q, (nMan), neUS, Eur -- Var. latifolia (Hooker) Scribner -- Foliage mainly borne on the stem, the basal leaves withered by flowering time. Leaves larger, (3)-5-(7) mm wide, mostly 3 to a stem. Alpine and subalpine meadows. -- (Mack)-Y-Aka, Alta-BC, nwUS, (eEur) -- Plate 8 page 36.

Our varietal diagnoses are at variance with descriptions in other floras. Hence the difference in stated ranges. We assume that all reports from the Rockies and westward are referable to var. latifolia.

## 27. TRISETUM L.

Awn not dorsal but the lemma bifid and the awn arising from the bottom of the sinus. Otherwise as in the related genera with the upper glume at least equalling the lowest lemma. Lemma keeled. Spikelet often with more than 2 florets.

- a. Awn lacking or very small and inconspicuous ..... 1. T. Wolffii

## aa. Awns exerted.

- b. Inflorescence ± spiciform, the branches short and the pedicels much shorter than the spikelets ..... 3. T. spicatum
- bb. Branching elongate; some of the pedicels much longer than their spikelet.
  - c. Main branches simple below the middle and spikelet-bearing in the upper 1/3 only ..... 2. T. cernuum
  - cc. Main branches dividing below the middle and spikelet-bearing in the upper 2/3 ..... 4. T. montanum

1. T. Wolfii Vasey -- Atypical for the genus, the lemma awnless or nearly so and not obviously bifid at tip. A nondescript type with a closed, green, and elongate panicle. Spikelets with 2-(3) florets. Long pilose rachilla prolonged by about 2 mm beyond the insertion point of the second floret. First half of summer. Springy meadows: Cypress Hills and Foothills. -- swS-Alta, wUS -- Plate 8 page 36.

2. T. cernuum Trin. -- Panicle open and the drooping branches naked below the middle. Spikelets, rather long, 6-12 mm, usually with 3 florets, the awns up to 1 cm long, twisted and geniculate. Upper glume about twice as long and about 4 times as large as the lower. Mid summer. Springy coniferous woods in the mountains. -- sAka, swAlta-BC, wUS, (SA) -- Plate 9 page 45.

3. T. spicatum (L.) Richter (var. Maidenii (Gand.) Fern., var. molle (Mx.) Beal) -- A fairly compact inflorescence, tending to spiciform, yet obviously a reduced panicle, with numerous twisted and geniculate awns ± 5 mm long. A fairly variable type, loosely tufted, 1-10 dm high, etc., and often subdivided into numerous segregates. Spikelet 4-6 mm long, with 2 florets. Anthers 0.6-1.2 mm long. First half of summer. Dry or rocky places in the tundra or in lightly wooded areas. -- G-Aka, L-SPM, NS, NB-BC, US, CA, SA, Eur, (Oc) -- Plate 9 page 45.

The inflorescence may be somewhat open and such plants have a superficial resemblance to T. flavescens (L.) Beauv., a Eurasian species locally established at Meteghan and Rimouski in Eastern Canada. In the latter species the spikelets are borne on longer pedicels in a laxer and longer inflorescence, the awns are longer: 6-9 mm, the anthers are 2-3 times longer: (1.7)-2.0-(2.5) mm, the glumes strongly dimenuegueth.

Habitually similar to Koeleria cristata, but the latter is awnless.

The report on T. flavescens by Boivin 1967 for Banff (DAO) and Waterton (DAO) was based on such loosely-flowered specimens since revised to T. spicatum. Similarly for the simultaneous report of T. flavescens for Whitehorse, Yukon (DAO).

4. T. montanum Vasey -- Inflorescence much less compact than the last, the spikelets fewer and borne on longer pedicels. Spikelet much as in T. spicatum. Upper glume about 1½ times as long as and twice larger than the lower. Anthers 1.0-1.7 mm long. Mid summer. Douglas Fir forests in Waterton. -- swAlta, wUS -- Plate 9 page 45.

Actually known to us in Canada by a single collection: Breitung 17334, Waterton, Mt. Crandell, 1953 (ALTA). We have seen many other Canadian collections identified as T. montanum, including Herman 13080 reported upon by Breitung 1957, but all have been revised to T. spicatum.

A report of T. canescens Buckley for Alberta by Breitung 1957, Moss 1959 and Boivin 1967 was erroneously based on the just mentioned Breitung 17334 (ALTA).

## 28. AVENA L.

## OATS

The typical genus of the Aveneae, genera 26-29, with lemmas bearing dorsal awns and the glumes rather long, overtopping the spikelet, or at least equalling the lower lemma. In Avena the lemma is bifid, the awn arises towards the middle of the back and the spikelet is rather large.

- a. Branches bearing only 1-(2) spikelets ..... 3. A. Hookeri
- aa. Longer branches bearing many spikelets.
- b. 2-(4) awns per spikelet ..... 1. A. fatua
- bb. No awn or only one straight awn per spikelet ..... 2. A. sativa

1. A. fatua L. -- Wild Oats (Folle Avoine, Avoine sauvage) -- A common weed of grain crops, usually overtopping by the whole of its open inflorescence of drooping spikelets. Tufted annual. Glumes about 2 cm long. Florets 3, with a tuft of long fulvous hairs at the base, disarticulating with a horse-shoe-shaped scar, the upper floret somewhat smaller. Awns 1-5 cm long, geniculate, blackish below the bend, pale green above. Mid summer. A most abundant weed of grain crops. -- sMack, (Aka), NF, NS-BC, US, SA, Eur, (Afr) -- Plates 9 and 19 pages 45 and 83.

The seeds mature early and fall off readily, thus a cultivated field is reseeded in Wild Oats long before the cereal crop is ready for harvesting. The reverse situation holds in A. sativa where the seeds are retained in place until harvested. This is surely a strong adaptive character and appears to us as the most fundamental difference between A. fatua and A. sativa. More recently in Can. Journ. Bot. 46: 1013-1024. 1968 and 47: 85-91. 1969 these two species and their hybrid were redefined primarily on the microstructure of lodicules and epiblasts. Since the variation in lodicules and epiblasts is only poorly linked with the previously well established criteria, especially those of fruit morphology and maturity, we have ignored the less reliable criteria and the dot maps derived from them.

1. X. A. fatua X sativa -- Fatuoids (Fatuoïde) -- Variable. Commonly the panicle less open than the first, the spikelets ± spreading. Spikelets mostly with 2 awns, these often strongly dimegueth. Floret pale brown, not disarticulating spontaneously. Rarely appearing the year after Oats have been grown in a field infected with Wild Oats. Rare: Lethbridge. -- Q, Alta.

A non-disarticulating form of A. sativa was mapped in Can. Journ. Bot. 46: 1014 (map 4). 1968. Many of the specimens dotted fall within our concept of A. fatua X sativa, but others seem to belong to A. sativa. This map is regarded as essentially heterogeneous in contents; it is therefore held meaningless and ignored.

2. A. sativa L. (A. sativa X fatua AA.) -- Oats, Tame Oats (Avoine) -- Similar but not quite so tall, the inflorescence secund and much less open. Spikelet not disarticulating readily at maturity. Floret without a tuft of hair at base. Florets commonly 2 or the third one vestigial. Mid summer. A common crop plant, often spontaneous in disturbed soils, but not persisting. -- G, Mack-Aka, NF-SPM, NS-BC, US, Eur -- Plate 9 page 45.

Specimens of A. fatua are often atypical as to the morphology of the epiblasts and lodicules and many such specimens were revised and mapped as A. fatua X sativa in Can. Journ. Bot. 46: 1014 (map 3). 1968. See above for our evaluation of lodicules and epiblasts. The specimens concerned have the general morphology of A. fatua and said map is held to illustrate nothing but the unreliability of the epiblasts and lodicules as a source of taxonomic criteria.

3. A. Hookeri Scribner (Helictotrichon Hookeri (Scribner) Henr.) -- Leaf margin and midnerve finely outlined in white. Tufted perennial. Inflorescence narrow, of 8-10 rather long spikelets, soon becoming purplish brown.

Plate 9

Trisetum, Avena

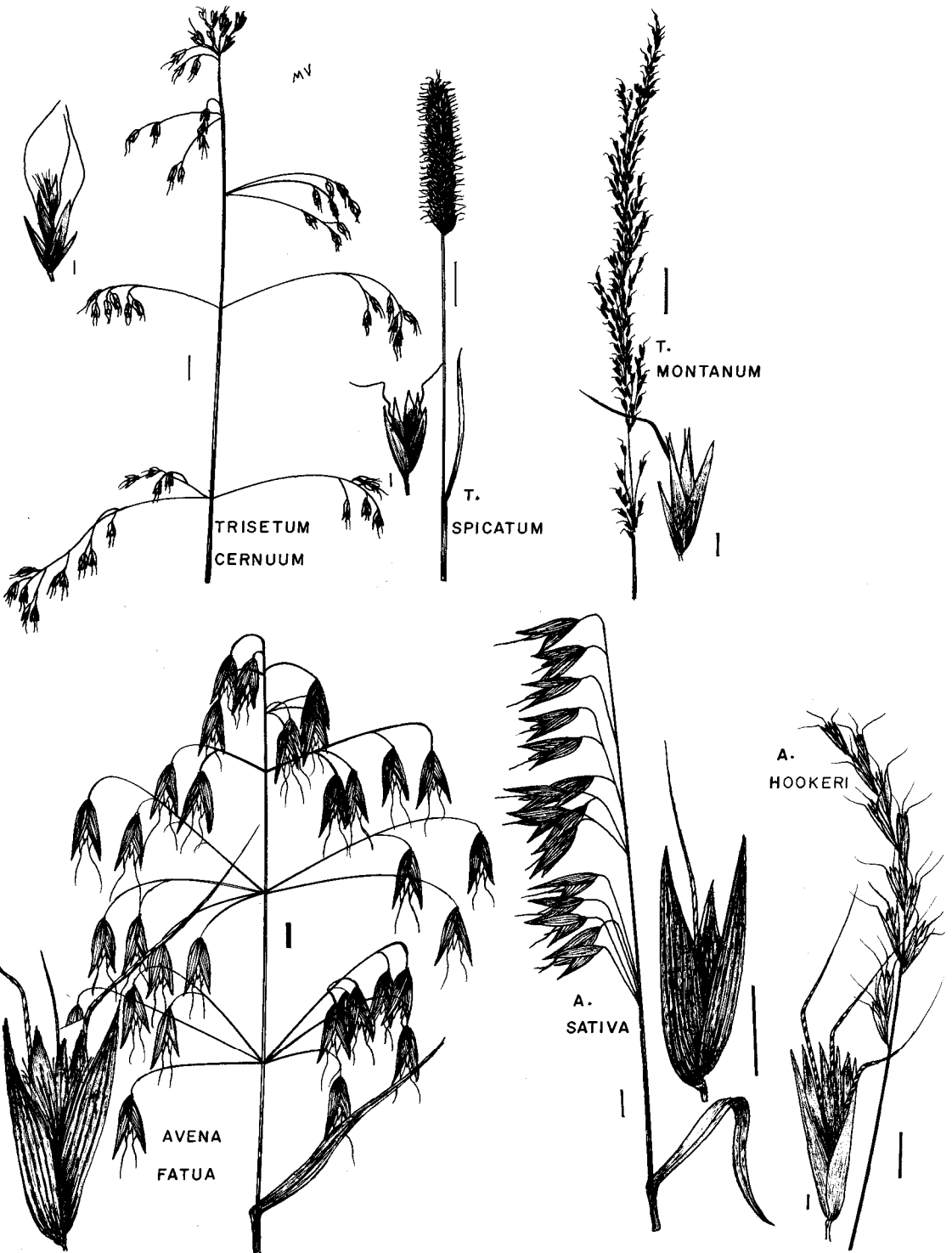
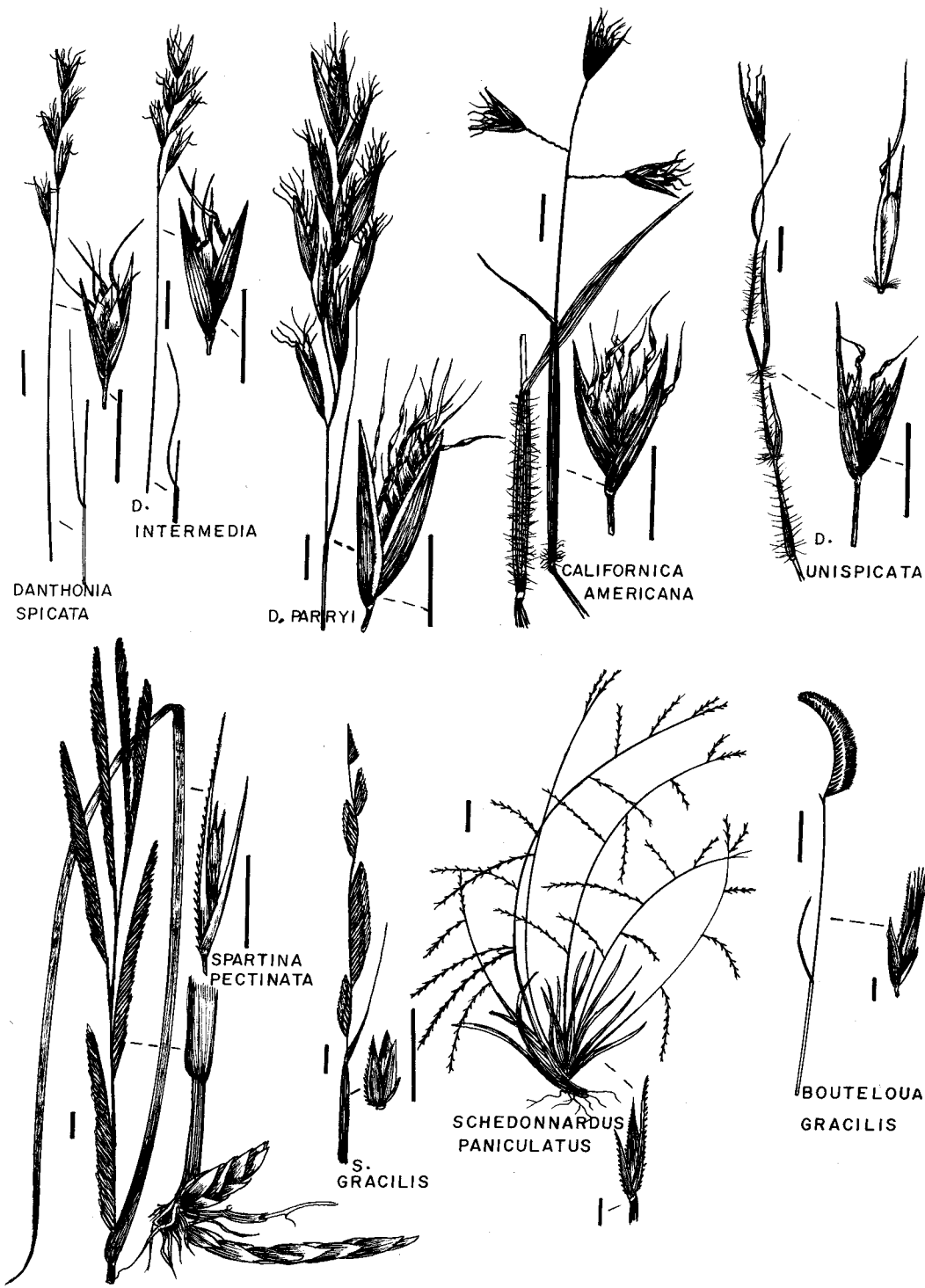


Plate 10

Danthonia, Spartina, Schedonnardus, Bouteloua





Spikelets about 1.5 cm long with 4-5 florets, the terminal one vestigial. Awns up to 2 cm long, geniculate, darker and twisted below the knee. Early summer. Common and abundant on chernozems. -- sMack-(Y, Q), sMan-neBC, cUS -- Plate 9 page 45.

## 29. DANTHONIA DC.

## OAT-GRASS

Lemma bifid and aristate with the awn arising from the bottom of the sinus as in Bromus, but the glumes longer, overtopping the lemmas and the ligule a ring of hairs. Awns flat and becoming spirally twisted.

In a recent study of the genus published in Can. J. Bot. 51: 437-450. 1973 and 52: 1573-1582. 1974, the traditional classification of the genus is discarded and replaced by a fundamentally different one based almost solely on lodicules. One new species is described solely on characters drawn from the lodicules. More than 100 possible characters were also considered and analysed, but all but one were discarded as not significant and not correlated with lodicule characteristics. That the characters drawn from the lodicules should be of higher value, or of any value at all, is apparently assumed; at least we fail to detect any demonstration to that effect.

The authors point out (p. 444) that this new sorting results in six sympatric species and this is clearly borne out by the map on p. 443. From this map we contrariwise conclude that the variations in lodicules have no predictive value, are purely random, and of no taxonomic significance. In other words, if the names assigned to the specimens had been selected by the toss of a coin, the resulting distribution map would have been essentially as random as the one provided on page 443. There is no evidence that the new classification is an improvement over the traditional one.

The material at DAO was revised and organized on lodicules in 1973. Going through the collection now at DAO, it is quite clear that the species distributions have become quite random and that the contents of each species-province folder is now highly heterogeneous morphologically and ecologically. Thus our most distinct and easily recognized species, D. unispicata, has been revised out of existence and its elements scattered between D. californica, D. canadensis, D. Parryi and D. spicata. Nearly 300 sheets were selected for closer examination: none of the few previously incorrect indentifications had been properly amended, while a very large number (100's) of erroneous ones had been introduced.

In such a set up it seems a waste of space and effort to go through the motions of discounting each and every faulty range extension and addition. It is surely simpler and more effective to assume that all the range extensions and additions resulting from the 1973 revisions (CAN, DAO) and records in the 1973-74 papers are presumably incorrect until proved to the contrary.

Up to now, none has been proved to the contrary.

- a. Inflorescence reduced to 1-(2) spikelets ..... 5. D. unispicata
- aa. Spikelets many.
  - b. Glumes (0.8)-1.0-(1.2) cm long ..... 1. D. spicata
  - bb. Longer.
    - c. Lemma pilose on back; glumes 1.8-2.2 cm ..... 3. D. Parryi
    - cc. Lemma pilose along the margins only.
      - d. Panicle closed ..... 2. D. intermedia
      - dd. Open ..... 4. D. californica

1. D. spicata (L.) Beauv. (var. pinetorum Piper) -- Poverty-Grass, Wire-Grass (Herbe de pauvreté) -- Inflorescence of only 3-10 spikelets, and more or less reduced to a raceme which is closed and secund. Tufted, with the

old leaves marcescent and curly. Glumes usually pilose or strigose. Longer lemmas 4-5 mm long, including the subulate teeth. Awn deep brown or purple in the twisted portion. Early summer. Common on rocky outcrops and lightly wooded sandy soils. -- (G), soMack, (Aka, L)-TN-(SPM), NS-BC, US -- Plate 10 page 46.

Nearly glabrous extremes should not be confused with the next species. Note the longer spikelet and florets of D. intermedia. Such glabrous specimens are particularly frequent in the northern part of our range; perhaps they constitute a yet undescribed regional variant. More vigorous plants are often identified D. Allenii Austin in the east, or D. thermalis Scribner in the west.

2. D. intermedia Vasey (D. canadensis Baum & Findlay) -- Like the first with larger and purplish spikelets. Glumes glabrous, (1.2)-1.5-(1.7) cm long. Longer lemma 5.5-8.0 mm long, its teeth 1.5-2.0 mm long. Awns with the upper segment purplish, the lower greenish or yellow. Early summer. Meadows from Duck Mountain westward, uncommon. -- Y-Aka, L-NF, Q, wCMan-BC, US, (Eur) -- Plate 10 page 46.

Mackenzie reports by Scotter 1974 and Cody 1979 were based on specimens (DAO) of the near glabrous extreme of D. spicata. Similar reports by Fernald were based on northern Alberta specimens (GH) of Avena Hookeri from Peace Point and D. intermedia from Heart Lake. An earlier Manitoba report of D. intermedia was discounted by Scoggan 1957.

3. D. Parryi Scribner -- Like the first two, with spikelets still larger and pale green to straw-coloured. Densely tufted with rather coarse bases. Ligule 1 mm or less. Panicle loose and secund, mostly of 5-7 spikelets. Glumes about 1½ times as wide as the lower lemmas. Lemmas about 1 cm long, triaristate, the central awn at least 1 cm long, with the flat lower segment ivory, especially broad, about 0.5 mm wide, the upper segment about 1 cm long, pale green; the lateral awns 1-2 mm long. Early summer. Drier prairies in the Foothills. -- swAlta, wUS -- Plate 10 page 46.

A Saskatchewan report by Boivin 1967 and Scoggan 1978 was based on Macoun, Fort Walsh, Sask., 1880 (CAN). But this was not labelled until 40 or 50 years after its collecting and has never been confirmed. The label is likely erroneous.

4. D. californica Bol. var. americana (Scribner) Hitchc. -- Spikelets typically 3, the lower two spreading horizontally. More or less long pilose, especially on the sheaths and/or the upper face of the leaf blades. Inflorescence usually reduced to a raceme of 3 spikelets shorter than their pedicels. Ligule and collar hairs very long and conspicuous, mostly 2-3 mm long. Spikelets 3-(5), purplish, especially the glumes and the awns. Glumes 1.5-2.0 cm long, somewhat narrower than the lower lemmas. Lemma teeth abruptly contracted into a short awns less than 5 mm long, the central awn 5-10 mm long, its lower internode 0.2-0.3 mm wide. Early summer. Local in submontane prairies: Cypress Hills, Foothills and locally at Mortlach. -- swS-swBC, wUS, (SA) -- Plate 10 page 46.

Saskatchewan specimens were checked from the following localities: Mortlach (DAO), Moose Jaw (GH), Eastend (DAO) and Cypress Hills (DAO, MT).

In the more western var. californica the herbage is glabrous except for the ligules.

5. D. unispicata (Thurber) Munro -- Inflorescence reduced to a single spikelet, or sometimes with a smaller secondary one. Herbage conspicuously long pilose. Glumes 12-20 mm long, divergent by 30°-90°. Lemma teeth abruptly short-cuspidate. Early summer. Local in springy ravines, -- swS-sBC, wUS -- Plate 10 page 46.

Saskatchewan specimens were checked from Dinsmore (DAO), Swift Current (DAO) and Cypress Hills (DAO). For Alberta: Pincher Creek (DAO), Crowsnest (MT) and Waterton (DAO).

## 30. SPARTINA Schreber

## CORD-GRASS

Spikelets borne in conspicuously one-side spiciform racemes, the rachis very flat and the spikelets in two rows along its edges. This characterizes the Chlorideae, genera 30 to 35. Spikelets very crowded, articulated below the glumes, reduced to a single perfect floret, without sterile lemmas or staminate florets, etc.

- a. Spikes 5-10 cm long; spikelets 12-20 mm long ..... 1. S. pectinata  
 aa. Shorter 2-6 cm long; spikelets 6-10 mm long, including the  
 very short awn, if any ..... 2. S. gracilis

1. S. pectinata Link -- Slough-Grass, Broad Leaf (Herbe à liens, Chaume) -- Coarse, tall grass with a raceme (or panicle) of appressed and one-sided spikes. Long stoloniferous, 1-2 m tall; the foliage scanty. Mostly with 10-15 spikes. Spikelets awned. Mid summer. Wet meadows, ditches, shores, etc. -- (Mack), NF-SPM, NS-seS-sAlta-(swBC), US -- Plate 10 page 46.

Probably native to southeastern Saskatchewan, introduced further west.

2. S. gracilis Trin. -- Smaller. Stem 1 m high or less. Spikes 4-8, shorter. Spikelets usually awnless. Mid summer. Shores and sloughs, alkali tolerant. -- sMack, sMan-BC, US -- Plate 10 page 46.

## 31. SCHEDONNARDUS Steudel

## TUMBLEGRASS

Spikelets articulated above the glumes. Not obviously similar to its related genera. Spikelet small, borne on a triangular-flattened rachis.

1. S. paniculatus (Nutt.) Trel. -- Tumblegrass -- A very delicate, secund and reddish inflorescence, occupying more than half of the plant, its rachis and spikes slightly falcate. Densely tufted perennial. Leaves narrow, conduplicate, with white margins and also the midnerve white dorsally. Lower spikes successively longer. Spikelets small and tightly appressed, barely overlapping to somewhat remote. Early summer. Eroded steppes on dry soils, uncommon. -- swMan-seAlta, US, (SA) -- Plate 10 page 46.

## 32. BOUTELOUA Lag.

## GRAMMA-GRASS

Type of Spartina, with 2 flowers in each spikelet, the upper flower reduced, sterile and aristate, the lower flower perfect and awnless or with shorter awns. The stem is solid in this genus and in Andropogon, while the internodes are hollow in all other Gramineae.

- a. Spikes 2-(3), elongate ..... 1. B. gracilis  
 aa. Much more numerous and forming a one-sided raceme ..... 2. B. curtipendula

1. B. gracilis (HBK.) Lag. -- Buffalo-Grass -- Inflorescence of 2-(3) one-sided, purplish spikes. Tufted perennial 1-4 dm high, with whitish, decumbent rooting bases, forming spreading carpets. Leaves filiform, curly. Early summer. Common in drier prairies, a major component of steppes. -- sMan-seBC, US, (CA) -- E. pallida (Scribner) Boivin -- Inflorescence straw-coloured, the purplish pigment lacking. Local: Rathwell. -- Man, (CA) -- Plate 10 page 46.

Native with us, but only an introduction further west at Jaffray (UBC).

Macoun 1888 reports Bouteloua hirsuta Lag. as occurring south of the Cypress Hills. We have failed to locate any specimen from the area stated, but we have found two sheets so identified and labelled J. M. Macoun 30046, Antelope 1883 (CAN) and Macoun & Herriot 72933, Ribstone Creek, Aug. 12, 1906 (CAN). Both were revised to B. gracilis by Malte in 1926 and we concur.

2. B. curtispendula (Mx.) Torrey -- Side-Oats, Hair-Beard -- Inflorescence conspicuously one-sided. Spikes many and small, each superficially resembling a spikelet. The inflorescence thus seems to be a strongly secund raceme of spreading spikelets. Actually it is a secund raceme of secund racemes. Each unit, around 1 cm long, comprises 2-9 crowded spikelets borne near the edges on the same side of a short, flatish rachis. Mid summer. Prairies on hillsides and ridges, local. -- sO-seS, US, (CA, SA) -- Plate 11 page 51.

Our plant should probably be regarded as the typical variety on account of its being stoloniferous and of its red anthers. This is contrast with an apparently undescribed variant from the southwestern U.S.A., the latter being  $\pm$  tufted and its anthers yellow.

### 33. BECKMANNIA Host

### SLOUGH-GRASS

Quite as in Spartina, but the two glumes inflated and strongly flattened into a pillbox-like unit completely enclosing the single floret.

1. B. syzigachne (Steudel) Fern. var. uniflora (Scribner) Boivin (B. eruciformis L. ssp. syzigachne (Steudel) Breitung) -- Slough-Grass -- Spikelet strongly flattened, broadly obovate to suborbicular, the two matching glumes like the two halves of a pillbox. Annual herb, pale green. Inflorescence pale green and narrow, a raceme (or panicle) of one-sided racemes of closely imbricated spikelets. Spikelets one-flowered. Glumes semi-orbicular in side view, deeply and narrowly hooded, convex along the back, straight along the edges. Mid summer. Common in exundated places, mainly around sloughs and in ditches. -- G, Mack-Aka, NS-PEI, Q-BC, US, (eEur) -- Plate 11 page 51.

The correct name of our plant is controversial. It has been called B. eruciformis, but the latter is stoloniferous, perennial, the primary branches of the inflorescence are not branched, the spikelets are two-flowered, etc., and seems amply distinct. Our plant is most closely related to the east-asiatic B. syzigachne of which it constitutes the var. uniflora with its ligules 4-6 mm long and glumes  $\pm$  1 mm wide, while the typical plant has a shorter ligule, broader glumes and a more southern distribution.

### 34. BUCHLOË Eng.

Like Bouteloua, but dioecious and the spikelets 2-flowered.

1. B. dactyloides (Nutt.) Eng. -- Buffalo-Grass -- Dioecious, the male plants rather similar to a reduced Bouteloua gracilis with spikes less than 1 cm long; pistillate plants similar to Munroa, but the leaf-blades long-pilose. Perennial, 2 dm high or less; stoloniferous with superficial stolons rooting at the nodes. Leaves up to 1 dm long, not pungent. Early summer. Low gumbo flats, rare: Estevan, Coulter. -- swMan-seS, US, CA -- Plate 11 page 51.

Gleason 1952 extends the range of this species to Alberta but in 1965 we failed to find a corresponding herbarium justification at NY (nor at GH, etc.). This was not the only such case and we admit to some puzzlement over the matter. After searching for the proper justification the first 15 or so items of a series of similar range extensions by Gleason 1952, and failing to find anything in all but one or two cases, the search was discontinued because of its relative fruitlessness and also because it was a prohibitively time

Plate 11

Bouteloua, Beckmannia, Buchloe  
Munroa, Phragmites, Eragrostis

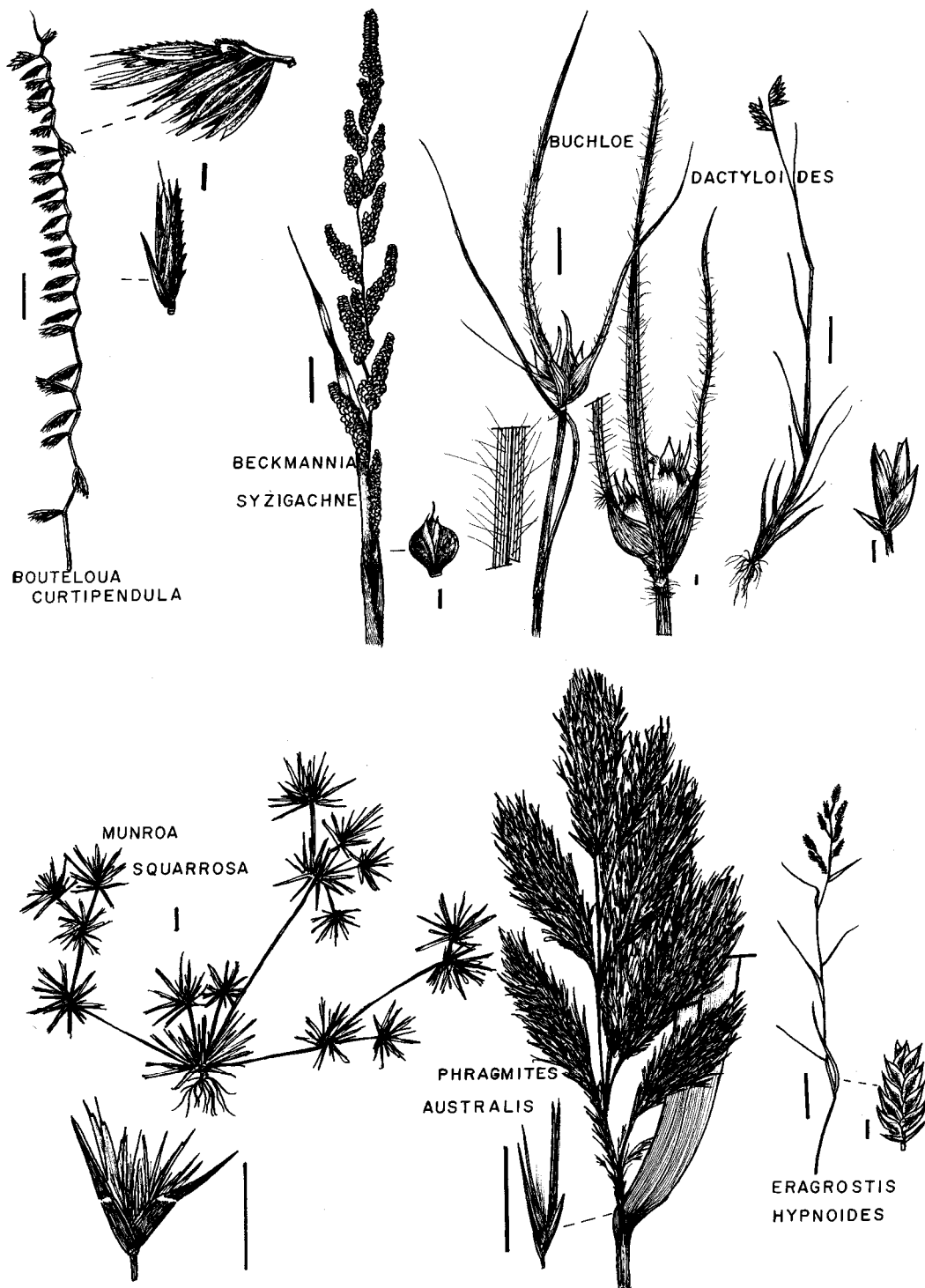
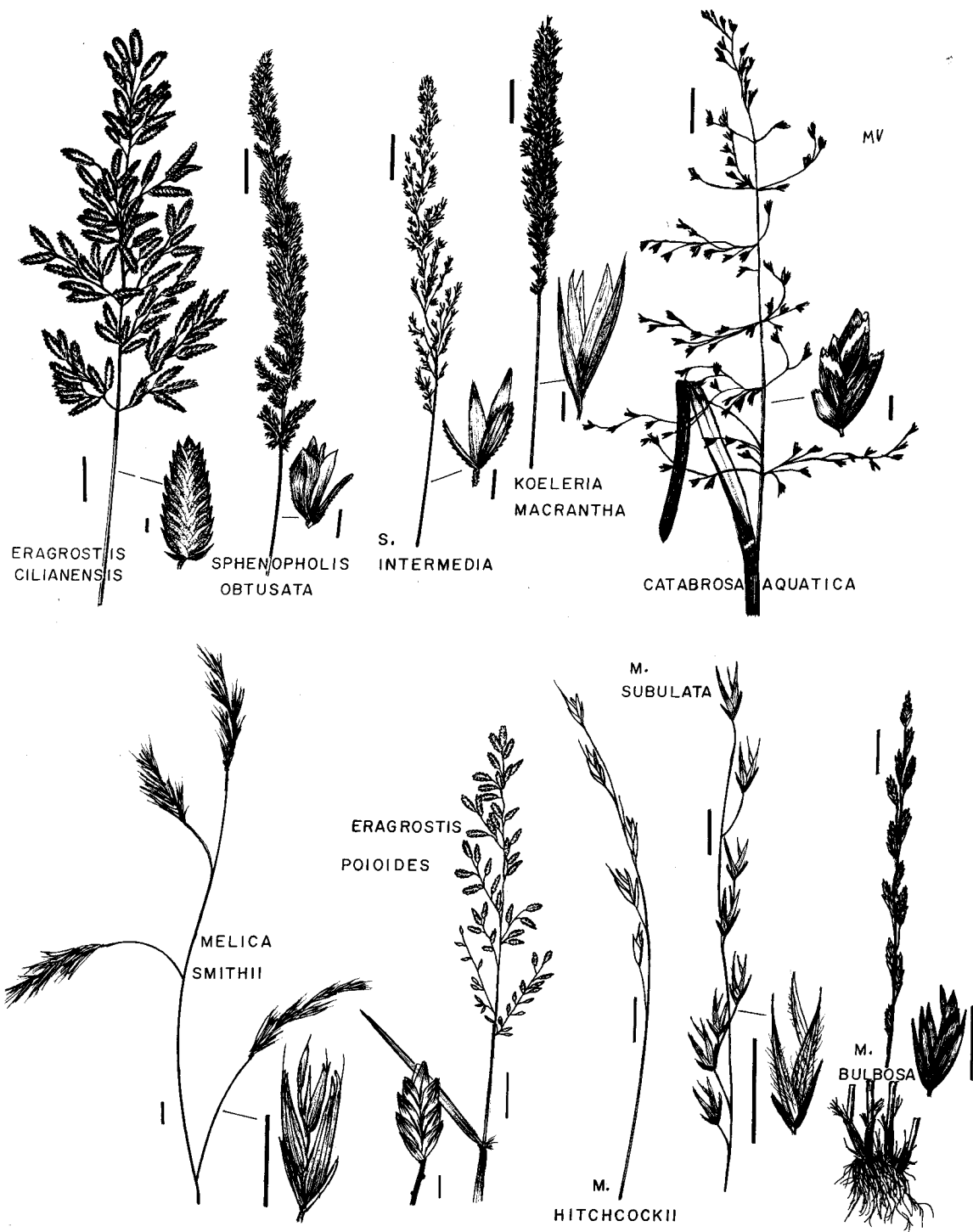


Plate 12

Eragrostis, Sphenopholis, Koeleria, Catabrosa  
Melica



consuming operation.

### 35. MUNROA Torrey

Reduced type of Bouteloua with the reduced spikes largely enclosed in the leaf sheaths. Spikelets few, borne in 2's or 3's, each with 2-4 florets.

1. M. squarrosa (Nutt.) Torrey -- Sprawling annual with the short, pungent leaves borne in clusters. Some of the blades in each cluster reduced almost to an awn. Inflorescence not well defined, the spikelets not obvious and largely enclosed in the leaf sheaths. Mid summer. Rare and evanescent weed of bare or disturbed soils. -- swS-Alta, US -- Plate 11 page 51.

A very important pioneer species south of us. We know it in Canada from Hatton 1959 (DAO, Hudson), Saskatchewan Landing 1946 (SASKP, SCS), Hardisty 1933 (DAO), Medicine Hat (DAO, QFA), Red Deer River 1879 (DAO) and Irvine 1959 (DAO). From the sporadism of the Canadian occurrences and the lack of repeat collections, we judge that Munroa is present with us only as a fleeting adventive.

### 36. PHRAGMITES Trinius

REED

Rachilla very long bearded, the hairs 5-10 mm long and very conspicuous when the spikelets are open.

1. P. australis (Cav.) Steudel (P. communis Trin., var. Berlandieri (Fourn.) Fern.) -- Reed (Roseau, Jonc à Balai) -- Tallest herb, 2-3 m high, with broadest leaves, mostly 2-3 cm wide. Conspicuous and growing in very large colonies overtopped by the large, plumose, arching panicles of the current or previous year. Lemmas deep purple, very long-acuminate. Late summer. Fresh waters, quiet and shallow; local. -- sMack, NS-BC, US, (CA, Eur) -- Plate 11 page 51.

Perhaps the neogean plant is varietally distinguishable from the paleogean, but if so it seems difficult to detect a satisfactory morphological distinction and to express it convincingly.

The choice of the correct name is according to Greuter & Rechinger, Boissiera 13: 174. 1967 and Clayton, Taxon 17: 168-9. 1968.

### 37. ERAGROSTIS Beauv.

Lemma hyaline-membranous throughout with 3 well marked nerves. Resembles Poa, the lemmas keeled, etc., but the florets very numerous and the inflorescence branches alternate rather than in fascicles. Ligule a fringe of hairs.

- a. Leaf blade 1-3-(4) cm long; herbage not glandular ..... 1. E. hypnoides
- aa. Leaves mostly much longer; herbage finely verrucose glandular.
- b. Lemma 2.0-2.5 mm long ..... 2. E. cilianensis
- bb. Spikelets shorter and narrower; lemma 1.5-1.8 mm long .. 3. E. poioides

1. E. hypnoides (Lam.) BSP. -- Tufted with the creeping stems rooting at the nodes and sending up clusters of small branches. Leaves long ciliate at the throat, minutely puberulent above. Florets mostly 10-15 per spikelet. Lemmas under 2 mm long, semi-lanceolate in folded condition. Second half of summer. Uncommon on exundated shores, from Glen Ewen eastward. -- swQ-seS, US, CA, (SA) -- Plate 11 page 51.

2. E. cilianensis (All.) E. Mosher (E. megastachya (Koel.) Link) --

Stink-Grass, Snakes-Grass (Amourette) -- Elongate spikelets with the mostest florets, usually 10-25. Tufted annual. Leaf margins, keels of glumes and lemmas, and branchlets of the inflorescence with some raised glands, circular with a depressed center, some of them often becoming larger and jet black. Spikelets mostly  $\pm 1$  cm long and 2-3 mm wide. Lower glume 1.5-2.0 mm long. Lemmas broadly semi-ovate in their folded condition. Mid summer. Uncommon weed of disturbed soils. -- NS, swQ-sMan-S(Glen Ewen, Estevan)-Alta(Medicine Hat), US, (CA, SA), Eur, Afr -- Plate 12 page 52.

We are not yet fully convinced as to the correct name of this and the next taxon.

3. E. poeoides Beauv. (E. minor Host, E. poaeoides sphalm.) -- Spikelets usually dimegueth, those from the lower part of the panicle commonly only about half as long and with half as many florets as those from the upper part. Much like a diminutive edition of the preceeding, the glands especially obvious along the keel of the sheaths. Herbage more or less long pilose, especially on the sheaths and towards the base of the leaves. As in the other members of the genus, the spikelets keeps adding new florets for a number of weeks. Fully grown spikelets mostly 5-6 mm long and mostly with  $\pm 10$  florets. Lower glume 1.0-1.5 mm long. First half of summer. A casual adventive in a railway yard at Saskatoon. -- NS-O, S, (US), Eur.

### 38. SPHENOPHOLIS Scribner

### WEDGEGRASS

Glumes dimorphic, the lower linear, the upper much broader and  $\pm$  oblan-  
ceolate in side view. Otherwise resembling Poa, but the florets only 2. Lem-  
mas not much longer than the glumes, hence this genus is often placed in the  
Aveneae.

- a. Pedicels mostly 1-2 mm long ..... 2. S. intermedia  
aa. Inflorescence shorter and more compact because of the  
shorter branches and pedicels, the latter mostly less  
than 0.5 mm ..... 1. S. obtusata

1. S. obtusata (Mx.) Scribner -- Prairie-Grass -- Often resembling Koe-  
leria in inflorescence and habit, but also sometimes the panicle larger and  
with longer branches. Inflorescence cylindrical, fairly crowded, 4-8 cm long.  
Spikelet 2.3-3.0 mm long, mostly on pedicels 0.2-0.3 mm long for the lateral  
florets, or 1 mm or less for the terminal floret. Upper glume (1.8)-2.0-(2.3)  
mm long, the side view very broadly oblanceolate, and obliquely truncate at  
tip. Somewhat cucullate at tip, the summit broadly rounded or nearly truncate,  
the midnerve straight for most of its length, but obviously incurved in the  
upper 0.5 mm, meeting the upper edge of the limb at an angle of  $\pm 90^\circ$ . Lower  
glume nearly as long. Anthers  $\pm 0.3$  mm long. Early summer. Moister depres-  
sions in the prairie; alkali tolerant. -- swO-swMan-BC, US, (CA) -- Plate 12  
page 52.

Reputedly ranging across northern Ontario eastward to lake Mistassini  
in central Quebec, but earlier reports for Ontario by Macoun 1888, Dodge 1914,  
Core 1948, Fernald 1950, Dutilly 1947, 1954 and 1963, Scoggan 1957 and 1978,  
Louis-Marie 1961 and Argus 1978 and southern Quebec by Victorin 1935, Louis-  
Marie 1961 and Rouleau 1964 are to be discounted, being based on specimens  
(CAN, DAO, GH, MT, QFA, TRT) of the following. Yet the 1966 report by Gaiser  
for Walpole Island (DAO) proved to be correct.

2. S. intermedia Rydb. var. intermedia (S. pallens AA.) -- Similar to  
the first, but about twice taller, its inflorescence laxer and usually longer,  
usually 1-2 dm long, its branches and pedicels averaging much longer. About  
half of the pedicels 1 mm long or more. Weak and pale green tufted grass, up  
to 1 m high. Spikelet 2.5-3.5 mm long. Upper glume narrower, (1.8)-2.5-



(2.8) mm long, the side view oblanceolate with an acute to obliquely obtuse top, the upper edge forming a  $45^{\circ}$ - $60^{\circ}$  angle with the midnerve, the latter slightly arching from base to top. Lower glume about 0.5 mm shorter than the upper. Anthers 0.3-0.5 mm long. Shortly before mid summer. Wet places, especially near springs, in non-saline soils. -- Mack, (Aka), NF, NS-BC, US -- Plate 12 page 52.

A variety with longer anthers is found on the Bruce Peninsula: var. macranthera f. n., antheris majoribus, 0.7-1.1 mm long. Typus: Pease & Ogden 24,869, Dyer Bay, 16 July 1935 (GH).

## 39. KOELERIA Persoon

Upper glume equalling the lowest lemma, thus resembling the Aveneae, but the lemmas neither bifid nor aristate.

1. K. macrantha (Led.) Schultes (K. cristata AA., K. pyramidata AA.) -- Junegrass -- Inflorescence almost spiciform, the longer branches not much longer than the spikelets. Puberulent above and in the inflorescence, retrorse pubescent at the nodes. Foliage fine and scabrous to pilose. Early summer, as its name says. Common in prairies. -- sMack-(Y)-Aka, Q-BC, US, CA, Eur, Afr -- Plate 12 page 52.

## 40. CATABROSA Beauv.

Palea not obviously differentiated from the lemma except for the slightly overlapping edges of the second over the first. Spikelet reduced to 1-2-(3) flowers. Lemma and palea not keeled, but rounded on the back, each with 3 strongly defined nerves. Sheaths fused ventrally as in Glyceria.

1. C. aquatica (L.) Beauv. -- Brookgrass (Banoue) -- Brownish lemma and palea almost identical and about twice as long as the whitish glumes. Soft, stoloniferous perennial. Glumes whitish, the upper cuneate and erose at tip. Lemma and palea whitish along the erose margin at tip. Early summer. Frequent around springs. -- (G), K, L-SPM, PEI-BC, EU, Eur -- Plate 12 page 52.

## 41. MELICA L.

## MELIC-GRASS

Resembles Bromus with the florets successively smaller and the upper reduced to a sterile lemma. Callus glabrous.

- a. Lemma aristate at tip and bifid.
- b. Panicle open ..... 1. M. Smithii
- bb. Spikelets fewer and forming a closed raceme ..... 2. M. Hitchcockii
- aa. Lemma entire and awnless.
- c. Lemma long attenuate at tip ..... 3. M. subulata
- cc. Broadly acute or rounded to emarginate at tip ..... 4. M. bulbosa

1. M. Smithii (Porter) Vasey -- Stem base not bulbous. Leaves 6-12 mm wide, long-narrowed to a rather small base. Panicle long and very open but rather scanty. Spikelet with the florets conspicuously smaller successively. Lemma minutely scabrous or even only obscurely so. Early summer. Rich woods on limestone, very rare: Waterton. -- sO, swAlta-BC, US -- Plate 12 page 52.

2. M. Hitchcockii Boivin -- Inflorescence reduced to 5-8 spikelets, these alternate, or partly geminate, in an arching raceme 7-12 cm long. Leaves as above but, only 5-7 mm wide. Spikelets pale green. Lemma pilose with hairs  $\pm$  0.5 mm on the lateral nerves and near the margin, more abundantly so towards the tip. Upper glume similarly pilose, the lower one glabrous or short-ciliate

on the keel. (Early summer?). Montane forest in Waterton. -- swAlta -- Plate 12 page 52.

Probably to be searched for along the Rockies of Montana and adjacent British Columbia.

3. *M. subulata* (Gris.) Scribner var. *Pammelii* (Scribner) C.L. Hitchc. -- Inflorescence closed, 1-2 dm long, racemose in the upper half. Base of stem bulbous like the next. Spikelets sometimes pale, commonly bicolour, the glumes being purple and the lemmas margined in purple. Glumes glabrous, but the lemmas finely scabrous, acute at tip. Early summer. Dry woods. -- (sAka, swAlta)-BC, wUS -- Plate 12 page 52.

The typical phase is found west of us; it has somewhat longer lemmas, long tapered at tip, and pilose along the nerves.

4. *M. bulbosa* Geyer var. *spectabilis* (Scribner) Boivin (*M. spectabilis* Scribner) -- Oniongrass -- Stem base hard and inflated like an onion. Inflorescence narrow and elongate, closed or nearly so, conspicuously two-toned, the lemmas being green with a deep purple tip. Early summer. Dry, open mountain slopes. -- swAlta-sBC, wUS -- Plate 12 page 52.

American botanists have generally recognized here a pair of species, *M. bulbosa* and *M. spectabilis*, but this point of view has not been accepted by all Canadian botanists, some of them (including ourself in 1967) recognizing only an inclusive *M. bulbosa*.

The representative series of specimens at hand has been reviewed and we are now satisfied that the two taxa are distinguishable as a pair of largely sympatric and somewhat intergradient geographical variants. The primary difference is in the root system. In var. *bulbosa* the stems are crowded into small tufts along the rhizome and the stem base is inflated into a hard, fusiform (i.e. lanceolate) bulb 3-5 mm thick. In var. *spectabilis* the rhizome is more elongated and tends to break up with one internode remaining attached to each bulb; the stems are borne singly on the rhizome and the stem base is inflated into an ovoid bulb 5-8 mm thick. Differences in spikelet parts are not very reliable and not as sharp as some books would have us believe, but the average situation may be stated as follows: var. *bulbosa*: lower glume (6)-7-(9) mm long; upper glume (7)-8-(10) mm long; lower lemmas 8-10 mm long; var. *spectabilis*: lower glume 4-5 mm long; upper glume 5-6 mm long; lower lemmas 6-7 mm long. Geographically, var. *spectabilis* is primarily found in the Rockies while var. *bulbosa* is more western. Reports of *M. bulbosa* from our area are all referable to var. *spectabilis*, but both varieties occur in B.C.

#### 42. SCHIZACHNE Hackel

#### PURPLE OATGRASS

Like *Melica*, the florets successively smaller, the terminal one much smaller and sterile. Lemma bidentate, with an awn prolonging the midnerve. Spikelet disarticulating below the lemmas. Callus bearded.

1. *S. purpurascens* (Torrey) Swallen var. *purpurascens* -- Spikelets divergently aristate and two-toned: the glumes reddish-purple, with green to hyaline margins, the florets light green to purplish at tip. Basal sheaths purplish or pale. Delicate and loosely tufted perennial somewhat less than 1 m high. Panicle arching, slightly open, of a few spikelets borne 1-2 to a branch. Early summer. Common in dry woods. -- K-Y-(Aka), L-NF, NS-BC, US, (Eur) -- *F. albicans* Fern. -- Inflorescence not purple-tinged. Sheaths green. Sporadic and infrequent. -- NS-PEI, Q, S, (neUS) -- Plate 13 page 57.

In its widespread and typical phase the leaves are glabrous on both faces, but in a recently detected eastern variant var. *pubescens* Dore the lea-

Plate 13

Schizachne, Distichlis, Poa, Dactylis

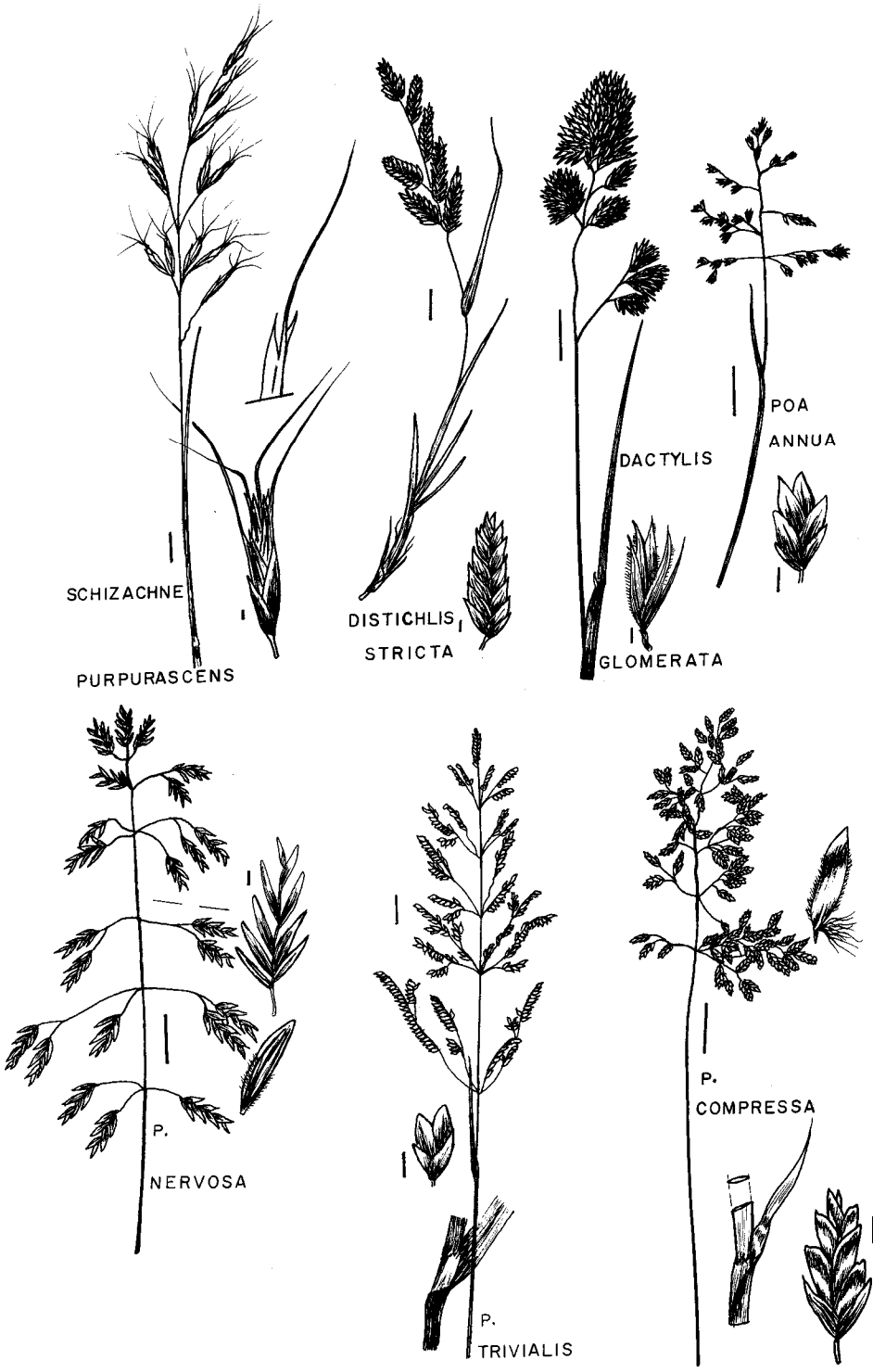
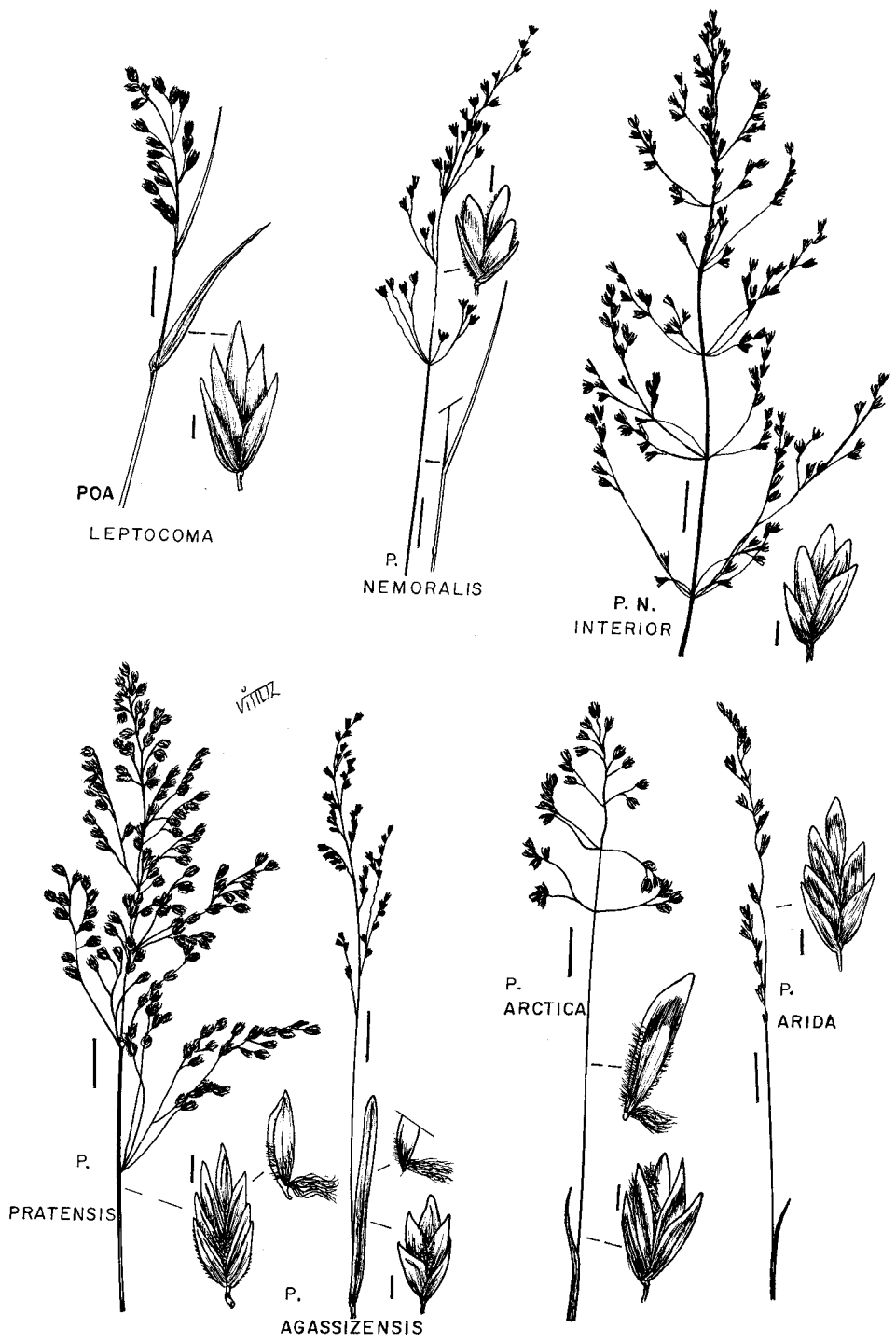


Plate 14

Poa



ves are pilose above. This new variety is seemingling intermediate to the eastasiatic var. callosa (Turcz.) Boivin in which the leaves are also pilose above and further they are generally narrower, the ligule is longer, the spikelets less numerous, etc.

## 43. DISTICHLIS Raf.

## ALKALI GRASS

Like Poa, but dioecious and the ligule replaced by a ring of hairs.

1. D. stricta (Torrey) Rydb. var. stricta -- Alkali-Grass, Salt-Grass -- A raceme of elongate spikelets, 10 or less, each with 8-15 florets. Long and deeply stoloniferous, without basal or resette leaves, the upper stem leaves gradually longer than the lower. Leaf pilose above for a good part of its length, the hairs similar to the cilia of the ligule. Early summer. Common in wet spots on heavy and alkaline soils. -- sMack, Man-BC, US, CA -- Plate 13 page 57.

In the more western var. dentata (Rydb.) C.L. Hitchc. the leaves are not pilose above or they may be pilose only along the first 1-3 mm near the base. Recently recognized in Alberta; see addenda on page 107.

## 44. DACTYLIS L.

## ORCHARD-GRASS

Spikelets slightly incurved, gathered in one-sided clusters in a one-sided inflorescence.

1. D. glomerata L. -- Orchard-Grass, Cocksfoot (Pied de poule, Chien-dent à bossettes) -- Crowded and one-sided inflorescence with the lower branch longer and more divergent in a manner suggesting the thumb of a hand. Primary branches of the panicle alternate. Glumes short, hyaline. Lemmas short-aristate, long ciliate at margin and on keel. Early summer. Rare adventive: Wembley. -- G, (Aka), NF-SPM, NS-O-(Man), Alta-BC, US, Eur, SA, Oc -- Plate 13 page 57.

The Saskatchewan reports from Waskesiu Lake (SASK) are based on a collection of apparently cultivated plants, as the label is annotated "not established".

## 45. POA L.

## BLUEGRASS

Common and unspecialized type, similar to Festuca, with the lemma keeled (forming an angle, usually acute) along the midnerve, at least in the upper half. Also the spikelet is awnless and the ligules are more prominent, being longer, but sloping on the shoulders. Sheath mostly partly closed.

A very difficult genus. We have distinguished only those species that we have learned to recognize. Many more are described in current manuals and some of these may prove distinct but we are yet unconvinced and are reluctant to ask our readers to distinguish what we cannot see.

Sometimes difficult to separate from Festuca, especially the viviparous plants. In Poa the leaf blade is  $\pm$  conduplicate and slightly cucullate at tip, the midnerve being slightly curved upward in the last few mm; the ligules are truncate to acute. In Festuca the leaf blade is  $\pm$  revolute and the tip of the midnerve straight or nearly so; the ligules have raised shoulders.

The key that follows does not take the variability of P. stenantha into full account. Most specimens of this polymorphic species lack the fuzzy hairiness at the base of the lemma and they will properly come out in group C.

Occasional specimens or populations have a tuft of crinkly hair at the base of the lemma but will not key out in group B. In pioneering situations tufts of *P. stenantha* may produce stolons, but these, on account of their outing from quite substantial tufts, should not be keyed out in group A.

- a. Stolonerous ..... Group A
- aa. Tufted.
  - b. Lemma cobwebby at base ..... Group B
  - bb. Not cobwebby ..... Group C

#### Group A

Spreading by stolons, and forming a carpet, the stems solitary or in small groups of mostly 2-5 stems.

- a. Lemmas not cobwebby at base.
  - b. Lemma glabrous or slightly pubescent towards the base on the nerves only.
    - c. Upper glume 1.8-2.7 mm long; sheaths glabrous ..... 2. *P. compressa*
  - cc. Upper glume 3.0-4.5 mm long; sheaths commonly scabrous or puberulent.
    - d. Lower lemma 4-6 mm long ..... 3. *P. nervosa*
    - dd. Only about 3 mm long ..... 4. *P. pratensis*
  - bb. Lemma pubescent to pilose dorsally towards the base on the internerves.
    - e. Panicle lanceolate; lower glume 2.5-3.0 mm long ..... 6. *P. arida*
    - ee. Panicle more open and pyramidal; lower glume 3-4 mm long ..... 7. *P. arctica*
- aa. Lemma cobwebby at base; i.e.; bearing a tuft of long, crinkly and ± arachnoid hair.
  - f. Stem compressed, 2-3 times wider than thick towards the base; upper glume 1.8-2.7 mm long ..... 2. *P. compressa*
  - ff. Stem terete; upper glume 2.2-6.0 mm long.
    - g. Upper glume 3.5 mm long or less.
      - h. Upper glume (2.2)-2.5-(2.8) mm long ..... 5. *P. agassizensis*
      - hh. Bigger, 3.0-3.5 mm long ..... 4. *P. pratensis*
    - gg. Upper glume 4.0-6.0 mm ..... 7. *P. arctica*

#### Group B

Tufted. Lemma with a tuft of hairs over 0.5 mm long, crinkly to arachnoid, borne on the callus or at the base of the lemma, sometimes extending partways up the midnerve.

- a. Panicle closed and short, the branches usually not over 1 cm long; stems not over 2 dm ..... 14. *P. abbreviata*
- aa. Panicle open, its branches longer; plant usually taller.
  - b. Spikelet 5-10 mm long ..... 7. *P. arctica*
  - bb. Smaller, 2-5 mm long.
    - c. Main branches bearing only 2-3 spikelets ..... 9. *P. leptocoma*
    - cc. Spikelets more numerous in a longer panicle.
      - d. Ligule of stem leaves truncate, all or mostly under 1.5 mm long ..... 10. *P. nemoralis*
      - dd. Ligules acutish at tip and 2-8 mm long.
        - e. Outer lateral nerves of lemma villous, the intermediate ones obscure ..... 11. *P. palustris*
        - ee. Lateral nerves glabrous, all nerves equally rugose and conspicuous ..... 8. *P. trivialis*

## Group C

Tufted. Lemma pubescence lacking or shorter and not cobwebby.

- a. Larger leaves 3-5 mm wide, but less than 7 cm long and blunt and cucullate at tip ..... 12. P. alpina
- aa. Leaves narrower and subulate-attenuate at tip.
  - b. Annual; panicle open and pyramidal, its branches usually spreading horizontally ..... 1. P. annua
  - bb. Perennial; panicle narrower, its branches ascending to appressed.
    - c. Many pedicels longer than their spikelet; main branches naked below the middle ..... 13. P. glauca
    - cc. Pedicels shorter than their spikelet; main branches bearing spikelets for most of their length.
      - d. 2 dm high or more; spikelets usually lanceolate ..... 16. P. stenantha
      - dd. Smaller plant; spikelets  $\pm$  ovate.
        - e. Lemma pilose and scabrous ..... 14. P. abbreviata
        - ee. Glabrous ..... 15. P. Lettermanii

1. P. annua L. -- Six-Weeks-Grass, Speargrass (Gazon) -- Annual; lemmas about twice as long as the lower glume. Tufted, the stems soft, divergent, or decumbent, or prostrate, usually 1-2 dm long. Lower glume 1.5-2.0 mm long, the upper glume slightly longer. Lemma glabrous to variously pubescent, but not long cobwebby. Panicle pyramidal, open, usually pale green, its branches mainly in 2's, usually spreading. Mid spring to early fall. Common weed of disturbed soils and shores, also a component of lawns. -- G, (Y)-Aka, L-NF-(SPM), NS-BC, US, CA, SA, Eur -- Plate 13 page 57.

2. P. compressa L. -- Canada-Bluegrass, Wiregrass (Gazon bleu, Pâturin du Canada) -- Culms much flattened, especially towards the base, and the sheaths strongly keeled above the middle, almost narrowly winged. Very stoloniferous, mostly 4-6 dm high, not producing basal leaves. Stem leaves with the blades somewhat narrower than the sheaths. Panicle rather short, open, its branches mostly in 2's. Lemma 2-3 mm long, the glumes similar but slightly shorter. Early summer. Commonly established in disturbed soils and wetter meadows. -- Mack-Aka, L-NF-(SPM), NS-BC, US, Eur, (Oc) -- Plate 13 page 57.

Some collections could possibly be regarded as native, but we incline to regard this species as introduced in our area during historical times.

3. P. nervosa (Hooker) Vasey -- Lower sheaths usually retrorse-scabrous or retrorse-puberulent. Phyllopodic and mostly 4-7 dm high. Generally resembling in habit the var. alpigena of the next, but usually taller and its lemmas longer and less pubescent. Panicle open, pyramidal to narrowly oblong, its branches mostly in 2's-3's. Lemmas fairly large, the lower ones (4)-5-(6) mm long. Early summer. Common in prairies. -- sMan-BC, wUS -- Plate 13 page 57.

Highly variable and possibly a complex of 2 or more taxa.

4. P. pratensis L. var. pratensis -- Kentucky-Bluegrass, June-grass (Foin à vaches) -- Panicle widely open, the main nodes bearing mostly 3-5 branches, the lowest node usually with 5 branches. Stems tending to be in small clumps of 2-5, with new rosettes arising in part from the base of the stem. Stolons buried by about 1 cm. Leaves 2-3 mm wide, the basal ones soon withering and disintegrating within a year or so. Early summer. Uncommon introduction. -- (G), Mack-(Y-Aka, L-SPM), NS-(PEI)-NB-Man-(S)-Alta-BC, (US, SA), Eur, (Afr) -- Var. alpigena Fries (P. alpigena (Fries) Lindman) -- Stems single and phyllopodic, the new rosettes arising only at the end of the stolons. Commonly 3-4 dm high. Inflorescence purplish. -- G-K-(Mack-Y)-Aka, (L)-NF, (NS)-PEI-(NB)-Q-nMan-(S)-BC, neUS, Eur -- Var. Macounii Boivin -- Lacks the cobwebby

omentum at the base of the lemma. Otherwise essentially as var, alpigena. -- swAlta-seBC -- Plate 14 page 58.

We have not yet been able to confirm or deny the presence of var. alpigena in Saskatchewan. A first report seems to be that of Porsild 1957 who included 3 dots in northern Saskatchewan on his distribution map of Poa alpigena. However, Breitung does not mention this taxon in his list of the same year. More recent reports such as Harms 1978 provide more precise information, but the vouchers for all these have yet to be located and checked. Four sheets received in exchange as P. alpigena at DAO have been revised as follows: sheets from Green Lake and Cree Lake have been revised to P. agassizensis, while one sheet from Beauval does not fit clearly into any of our current concepts and has been revised to P. pratensis sensu lato.

The material at CAN under P. Macounii Vasey, an unpublished name, proved to be a mixed bag. Most of the sheets are referable to var. alpigena and are the basis for our extending the range of this taxon to the Rockies of B.C. and also to Sproat Lake on Vancouver Island. But not all are typical and on some sheets the lemmas lack the tuft of crinkly hair at base. This is what Vasey had in mind and we are retaining it as a new variety. A few other collections of this same series actually belong with P. nervosa. The type sheet from Kicking Horse Lake, B.C., is a mixture made up of complete plants with a purple inflorescence and broken off tops with green inflorescences. The plants with the purple inflorescence are taken up as the type, while the green tops are referred to P. nervosa.

P. pratensis var. Macounii var. n. Lemmata ad basas elanata. Ceteris ut var. alpigena. Typus: J. Macoun 29,182, Kicking Horse Lake, B.C. (CAN).

5. P. agassizensis Boivin & Löve -- Native phase of the preceeding which it closely resembles; more deeply rooted and the floral parts smaller. Stolons usually buried by 3-5 cm. Stems solitary or in small clumps, phyllopoedic, the old basal leaves marcescent and the new ones arising in part from the base of the stem. Leaves 0.5-2.0 mm wide, conduplicate, the upper stem leaf shorter and usually 3 cm long or less. Ligule squarish. Panicle smaller, the lowest node usually bearing only 2-3 branches, these less than 2.5 cm long. Early summer. Common in open places, especially on chernozems; present in lawn mixtures. -- Mack, eNS, NB-BC, US -- Plate 14 page 58.

6. P. arida Vasey -- Spikelets elongate, in a narrow panicle, etc., in the manner of P. stenantha, but long stoloniferous and the stems solitary or in small clusters of 2-3. Leaves mainly basal, stiff, conduplicate and falcate. Stem leaf usually only one, short, conduplicate and stiffly divergent. Spikelets 5-9 mm long, ± lanceolate. Lemma pilose or villous, but not cobwebby. Early summer. Alkaline meadows and shores. -- (wO)-sMan-sAlta-(BC), cUS -- Plate 14 page 58.

7. P. arctica Br. var. arctica -- Spikelets rather large, purplish and not very numerous in an open, pyramidal inflorescence. Stoloniferous and not tufted, mostly 2-3 dm high. Panicle branches spreading, mostly 2-(3) per node, but more often 4-5 on the lowermost node. Spikelets 5-8 mm long, all or mostly 3 or less per branch. Upper glume 4-5 mm long. Early summer. Frequent in arctic or alpine tundras. -- G-Aka, L-NF, Q-nMan, swAlta-BC, (Eur) -- Var. lanata (Scribn. & Merr.) Boivin (P. Grayana Vasey; P. lanata Scribn. & Merr.; P. longipila Nash) -- Spikelets larger, 7-10 mm long. Upper glume 5-6-(7) mm long. -- (Mack-Y)-Aka, (nWS)-swAlta-(nBC, wUS, eEur) -- Var. caespitans (Nannf.) Boivin -- Like var. arctica but loosely to densely tufted. Stolons sometimes also present. -- (G)-F-Mack, Aka, nQ, nMan, swAlta, (Eur) -- Plate 14 page 58.

8. P. trivialis L. -- Bird-Grass (Gazon d'Angleterre) -- Ligules longest, that of the upper leaf 5-8 mm long. Stem and sheaths retrorse-scabrous.



Loosely tufted and usually over 5 dm high. Leaves up to 5 mm wide. Panicle open, oblong, with very numerous small pale green spikelets about 3 mm long. Lemma about 2.5 mm long, with 5 equally proeminent nerves and usually marginally involute along the outer nerve. Early summer. Introduced in lawns and rarely spreading to wet and shaded places: Indian Head. -- (G, Y-Aka, NF-SPM), NS-(PEI-NB)-Q-O, sS, BC, US, (SA), Eur, (Afr, Oc) -- Plate 13 page 57.

Reported for Manitoba by Lowe 1943 and Best 1971. The earlier report was discounted by Scoggan 1957; the later one has yet to be investigated.

9. P. leptocoma Trin. (P. paucispicula Scribn. & Merr.) -- Branches long and weak, most often bearing only 1-3 spikelets towards the end. Loosely tufted and less than 5 dm high. Upper leaf with a ligule 1.5-4.0 mm long. Panicle pyramidal, its branches mostly in 2's. Spikelets green or usually deep purple. Upper glume nearly as large as the lower lemma. The latter 3-4 mm long. Mid to late summer. Late snow patches and rocky slopes above timberline; gravels of mountain creeks. -- Mack-Aka, swAlta-BC, wUS -- Plate 14 page 58.

Apparently throughout the range the spikelet colour will vary from pale-green (=P. leptocoma) to purple-black (=P. paucispicula). The latter is the more common form in our area and becomes almost the only one present still further north. It is a common characteristic of plants of higher latitudes and altitudes to tend to be more vividly coloured than their counterparts from warmer climes; presumably a reaction to the variation in insolation.

A different sorting of the material was proposed by A.S. Hitchcock in 1935, accepted by C.L. Hitchcock 1969 and discussed by Hultén 1942. We are inclined to agree with Hultén in this matter.

10. P. nemoralis L. var. nemoralis -- Bishop-Grass (Foin à vaches) -- A fine herb in large tufts, with small ligules and numerous small spikelets in an open inflorescence. Stems rather tall and lanky, usually less than 1 mm thick even near the base, its nodes with a conspicuous dark green ring soon turning purple black. Stem leaves 3-5 to a stem and obviously more abundant than the basal ones. Uppermost leaf longer than its sheath. Panicle usually less than 1 dm long, open, oblong, its branches spreading and divaricately branching. Spikelets pale green, typically three-flowered. Lower glume less than 0.5 mm wide (commonly 0.3 mm) in side view, not more than half as wide as the adjacent lemma. Early summer. Shaded places, rare. -- (G, K), Y-(Aka, L-SPM), NS, NB-S, BC, US, Eur -- Var. interior (Rydb.) Butt. & Abbe (P. interior Rydb.) -- Lower glume not quite so reduced, about 0.5 mm wide in side view, more than half as large as the adjacent lemma. Stem somewhat shorter, the internodes being conspicuously shorter than the peduncle of the inflorescence. Foliage mostly borne in the lower half of the stem and the nodes less obvious, being all or mostly hidden inside the sheaths. Inflorescence often purplish and less open, sometimes closed. Spikelet purple red, typically  $\pm 3$  mm long, typically two-flowered, its lemmas commonly  $\pm 2$  mm long, but the spikelet not infrequently larger. Prairies. -- wMack-Aka, sO-BC, US -- Plate 14 page 58.

Specimens collected without representative underground structures may not be readily separable from the long stoloniferous P. agassizensis.

Various reports of P. nemoralis being native to North America were probably based mainly on specimens of var. interior.

Eastern specimens of var. interior are perhaps taxonomically distinguishable from ours. In 1959 Dore in his Grasses Ott. Distr. listed some eastern collections as Poa (? glauca) and indeed they do show some affinity to the latter species.

P. nemoralis and P. glauca are rather similar species and we are not

quite sure that the two can be clearly separated, especially since the tomentum at the base of the lemma tends to be scanty in P. nemoralis, sometimes being nearly obsolete. Both are tufted and rather thin species with numerous small spikelets in a more or less open inflorescence. P. nemoralis is usually a taller plant, commonly 4-5 dm high (hence the average herbarium specimen will be folded over); leaves more evenly spread along the stem, hence the peduncle of the inflorescence tends to represent about  $\frac{1}{4}$  of the length of the stem; leaf blades larger, the uppermost blade usually 6-8 cm long; ligules rather small, commonly less than 1 mm long. P. glauca is usually 2-3 dm tall, and never seems to exceed 4 dm; leaves smaller and borne in the lower half of the stem, hence the peduncle is typically about as long as the rest of the stem. However, there seems to be a certain amount of overlap in all these characters, especially between the smallish var. interior and the tallish var. glauca.

Another point of confusion is the next species, P. palustris, also a fine species with numerous small spikelets in an open inflorescence. Its ligules are normally longer, but by exception they may be as short as 1 mm. In P. palustris the sheaths are longer, the upper one commonly  $\pm 1$  dm long; spikelet commonly larger mostly 4-5 mm long and with 3-5 florets; glume commonly longer and  $\pm 3$  mm long. From the maps published by Hultén 1962 it would seem that P. nemoralis and P. palustris have essentially the same range. Perhaps one should wonder if the distinction is a significant one, and if so, in what respect.

The poor quality of the distinction between P. nemoralis and P. palustris was discussed by Hultén 1962. After comparing a good series of specimens and the descriptions in some of the better drawn floras, we also find that the difference adds up to little more than a few, partly arbitrary, size distinctions. That the distinction has been generally accepted for over 200 years adds in no way to its quality.

Poorly differentiated taxa often invite erratic identifications and the latter situation is indeed so often associated with the first as to be a valuable indicator. P. nemoralis provided one of the more remarkable examples. Most of the herbaria surveyed contained specimens from our area under both var. nemoralis and var. interior (or P. interior). On the basis of the known ranges of the two taxa it was assumed that all the material from our area would prove to belong to var. interior. But a check at DAO revealed collections from Birtle and Saskatoon more clearly referable to var. nemoralis. As a further check, the 21 Alberta sheets then filed under P. nemoralis at one of the leading Canadian herbaria were borrowed for study. Most specimens had rather short ligules, otherwise the series proved to be quite diverse: 5 sheets were revised to var. interior, 8 sheets to P. palustris, 3 sheets to P. glauca, 2 sheets to P. agassizensis, and 1 sheet to P. nervosa; two more sheets being fragmentary, were not readily identifiable. The original identifications were by a variety of well known botanists, none had been revised. Pity the poor amateur botanist when professionals find it so difficult to achieve mutually equivalent concepts.

11. P. palustris L. (P. crocata Mx.) -- Similar to the last, but the ligules longer and the spikelets somewhat larger. At least the uppermost leaf shorter than its sheath. Panicle commonly around 2 dm long. Mid summer. Wet meadows and grassy shores. -- Mack-(Y)-Aka, L-NF-(SPM), NS-BC, US, Eur, (Afr) -- Plate 15 page 65.

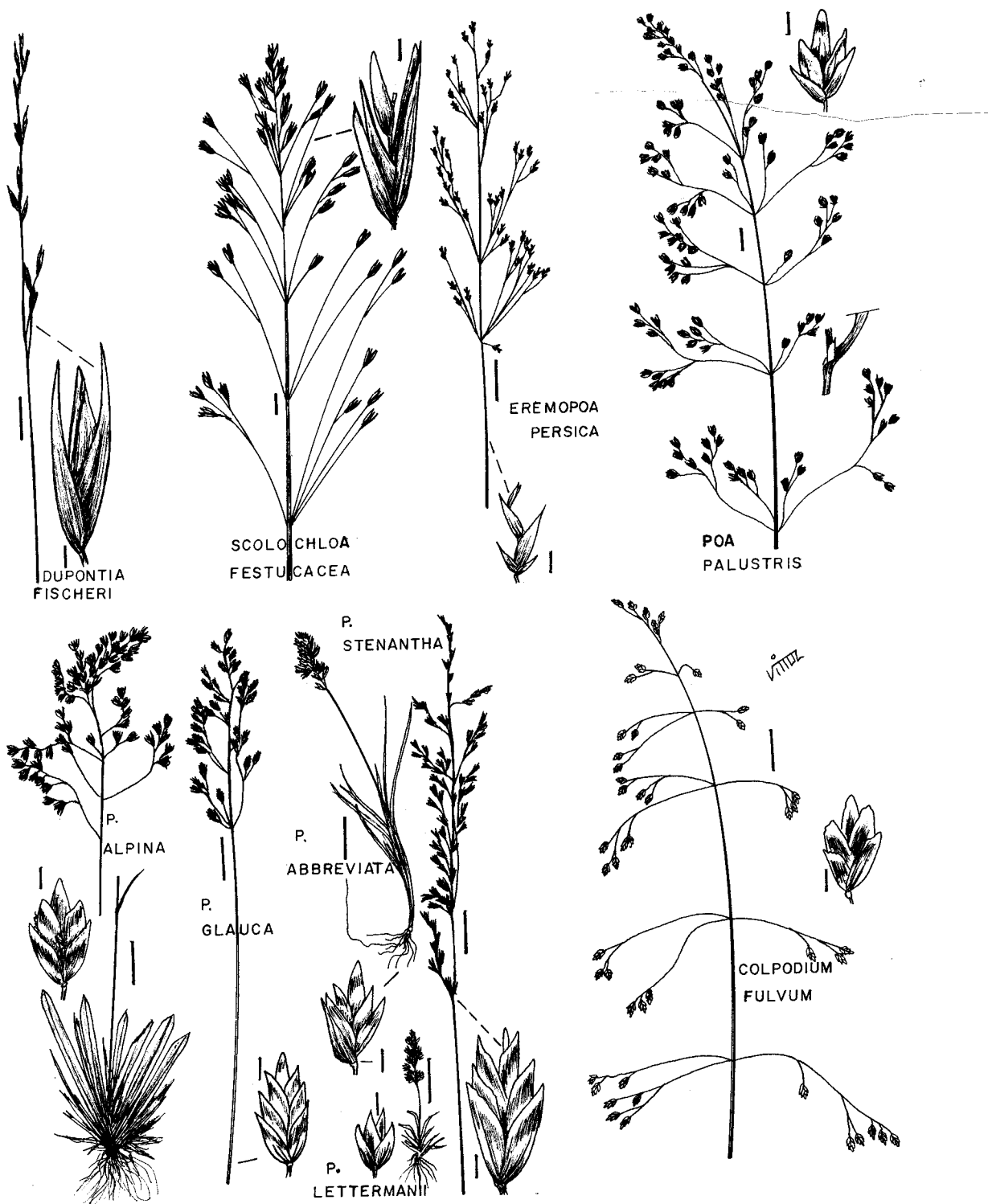
12. P. alpina L. -- Leaves rather short and broad, usually under 5 cm long, and marcescent, the sheaths accumulating to a thickness of about 1 cm at the base of each stem. Stem 2-4 dm high, bearing 1-(2) short leaves with long sheaths. Panicle small, purplish, open, pyramidal, its branches in 2's. Spikelet 5-8 mm long. Early summer. Arctic or alpine tundra, common. -- (G)-F-Mack-(Y-Aka), L-(NF-SPM), Q-Alta-(BC, US), Eur -- Plate 15 page 65.

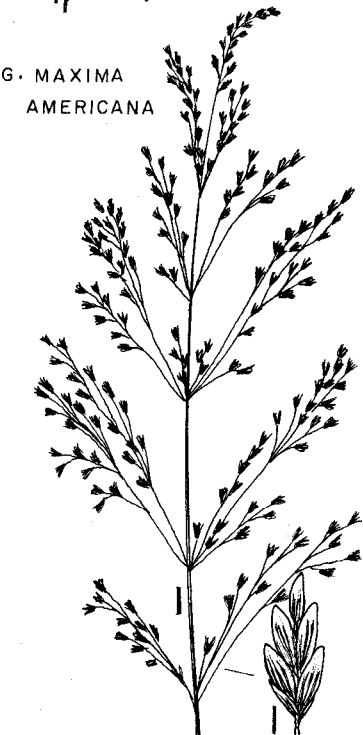
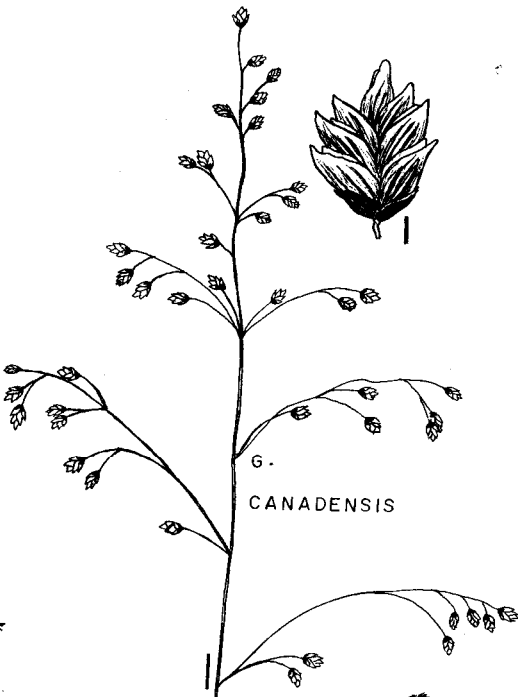
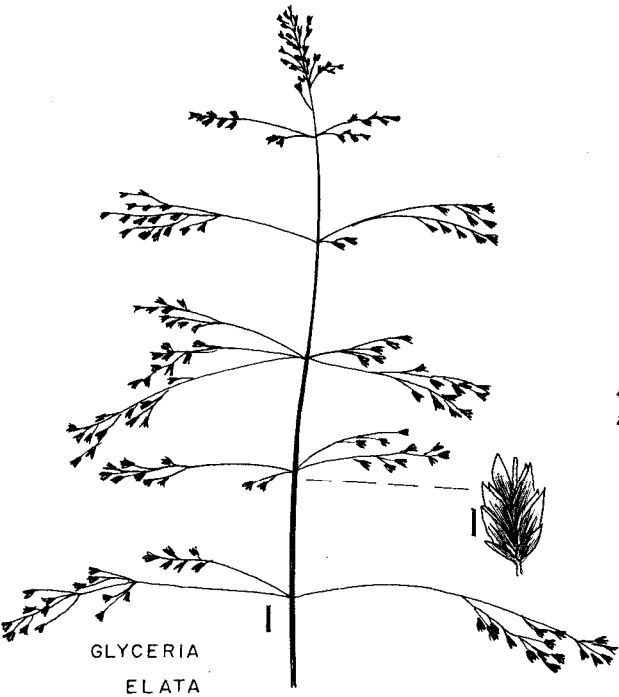
13. P. glauca Vahl var. glauca -- Stem leaves usually 3 but rather

Plate 15

Colpodium, Dupontia, Scolochloa, Eremopoa

Poa





small and borne in the lower half when full grown, the herbage somewhat glaucous and mainly made up of stems which are naked above the middle. In dense tufts, mostly 2-5 dm high, the basal foliage rather scanty. Leaf blades short, usually all under 5 cm long, with a ligule (0.5)-1.0-(2.0) mm long and rounded to truncate. Inflorescence narrow as in *P. stenantha*, or frequently more or less open, the main branches rebranching and spikelet-bearing only above the middle. Spikelets with a strong tendency to become straw-coloured at maturity. Lemma abundantly pubescent to pilose mainly in the lower half, often with a very short cobweb (less than 0.5 mm long) at base. Anthers 1.0-1.8 mm long. Early summer. Gravels and rocky outcrops or cliffs. -- G-Aka, L-NF, eNS, NB-BC, US, (Eur) -- var. *rupicola* (Nash) Boivin (*P. rupicola* Nash) -- A generally smaller plant, 1-3 dm high, and loosely to densely tufted. Foliage mainly basal, the stem often with only 1 leaf, its ligule triangular-lanceolate and 2-3 mm long. Inflorescence purplish, narrowly ovoid, mostly 3-5 cm long. Early summer. Tundra and subarctic shores. -- Y, nMan-BC, wUS -- Plate 15 page 65.

Smaller plants of var. *rupicola* seem to grade into the next species, but the longer and acutish ligule of var. *rupicola* is usually quite diagnostic.

14. *P. abbreviata* Br. var. *abbreviata* -- (*P. Pattersonii* Vasey) -- An alpine type, densely tufted and less than 2 dm high. Larger leaves about 1 mm wide. Ligules (0.3)-0.5-1.0-(1.5) mm long and truncate. Panicle purplish, closed, less than 4 cm long. Pedicels very short, mostly less than 1 mm long. Spikelet longer than the glumes by about 1-2 mm and pubescent, the glumes minutely scabrous on the midnerve, the lemma densely pilose on the 3 main nerves, minutely puberulent on the internerves. Upper glume about as large as the lower lemma, lower glume not quite as large. Lemma abundantly short villous dorsally. Anthers 0.8-1.0 mm long. Mid summer. Alpine summits. -- G-F(K)-Mack-Y-(Aka, nQ), swAlta-(neBC), wUS, Eur -- Plate 15 page 65.

In var. *Jordalii* (Pors.) Boivin from the northwest part of the range, the lemma is glabrous dorsally, or sometimes obscurely scabrous along the three main nerves.

15. *P. Lettermanii* Vasey -- Habitally quite similar to the last, densely tufted and not over 2 dm high, but the lemmas glabrous and relatively shorter. Spikelet about as long or barely longer than the glumes, these about as long or slightly longer than the adjacent lemma. Upper glume  $\pm$  4 mm long, lower lemma  $\pm$  3 mm long. Anthers 0.5 mm long. Mid summer. Alpine cliffs and rocky slopes. -- swAlta-sBC, wUS -- Plate 15 page 65.

Apparently the reputed difference in ligule length in this and the last species does not hold as our specimens of either have ligules mostly 1-2 mm long.

16. *P. stenantha* Trin. var. *stenantha* -- (*P. ampla* Merr.; *P. arida* Vasey; *P. Canbyi* (Scribner) Piper; *P. Cusickii* Vasey; *P. epilis* Scribner; *P. Fendleriana* (Steudel) Vasey; *P. glaucifolia* Scribn. & Will.; *P. gracillima* Vasey; *P. juncifolia* Scribner; *P. longiligula* Scribn. & Will.; *P. nevadensis* Vasey; *P. scabrella* (Thurber) Benth) -- Mutton-Grass -- Tufted and bearing a usually closed panicle of narrow and only slightly compressed spikelets. The more vigorous tufts are often stoloniferous. Numerous stiff stems bearing only 1-(2) leaves, the sheath 2-4 times longer than the blade. Spikelet 4-10 mm long,  $\pm$  lanceolate, usually with numerous florets. Glumes and lemmas varying from somewhat keeled to rounded on the back. Upper glume  $\pm$  1 mm wide in side view, almost as wide as the adjacent lemma. Lemmas 3-5 mm long, usually light green and very widely membranous-margined, especially so above the middle. Early summer. A major component of steppe vegetation. -- Mack-Aka, seQ-swMan-BC, US, (CA) -- Var. *Sandbergii* (Vasey) Boivin (*P. incurva* Scribn. & Will.; *P. Sandbergii* Vasey; *P. secunda* AA.) -- Generally a smaller and finer plant, usually with the herbage, and especially the peduncle of the inflorescence,

becoming reddish by early summer and turning straw-coloured by mid summer. Mostly (2)-3-(4) dm high. Leaves usually less than 5 cm long and commonly 1 mm wide or less. Late spring. More arid situations. -- swMan-BC, US -- Plate 15 page 65.

Var. Sandbergii has often been confused with the Chilean P. secunda Presl, a similar but possibly distinct plant discussed in Am. Journ. Bot. 28: 78-81. 1941.

A range extension of P. secunda (or P. Sandbergii) to Yukon by Hitchcock 1935 was repeated by Chase 1951 but discounted by Hultén 1942. Similar ranges given by Marsh 1952 and C.L. Hitchcock 1969 were probably repeats of the discounted earlier reports. A similar range extension to eastern Quebec by Victorin 1935 and Scoggan in Nat. Mus. Can. Bull. 115: 86. 1950, apparently repeated by Marsh 1952, was based on collections (MT), later revised to P. Canbyi or P. stenantha.

We are at a loss as to the best way to deal with this species or cluster of species. We have eventually opted for a drastic consolidation because the various phenotypes grade into each other so completely and because the main segregates seem to be sympatric or nearly so. Yet we are also aware that most agrostologists will recognize some segregates and that in the field a particular phenotype was often observed to be dominant or near exclusive in a particular region or habitat. The more obvious segregate in our area is probably var. Sandbergii, a smaller and reddish-tinged plant in small tufts which has usually been called P. secunda. We have retained it at varietal rank although, as pointed out by C.L. Hitchcock 1969, it may be only an ecological response to more arid conditions. It is not impossible that some of the other variants could be usefully retained at some rank, perhaps as ecological forms, perhaps as weak geographical variations, but we are not in a position to make firm proposals at this time.

In view of the great importance of the P. stenantha group as a major or minor component of much native rangeland, we shall comment further on its classification.

The elaborate subdivisions proposed by A.S. Hitchcock 1935 and repeated almost verbatim by A. Chase 1951 may be summarized as follows.

- a. Spikelets little compressed, the lemmas convex on back.
  - b. Lemma crisp-puberulent below ..... SCABRELLAE
  - bb. Glabrous or scabrous ..... NEVADENSES
- aa. Spikelet compressed; glumes and lemmas keeled.
  - c. Creeping rhizomes present ..... PRATENSES
  - cc. Creeping rhizome wanting.
    - d. Lemma pubescent on keel or nerves ..... ALPINAE
    - dd. Glabrous ..... EPILES

#### PRATENSES

- a. First glume 2.5-3.0 mm long ..... P. arida
- aa. First glume 4-5 mm long ..... P. glaucifolia

#### ALPINAE

- a. Blades folded or involute.
  - b. Ligule very short ..... P. Fendleriana
  - bb. Ligule 5-7 mm long ..... P. longiligula
- aa. Blades flat or soft ..... P. stenantha

## EPILES

- a. Blades scabrous ..... P. Cusickii
- aa. Glabrous ..... P. epilis

## SCABRELLAE

- a. Sheaths scabrous ..... P. scabrella
- aa. Glabrous.
  - b. Panicle open ..... P. gracillima
  - bb. Contracted.
    - c. Culms slender (P. Sandbergii) ..... P. secunda
    - cc. Stouter, mostly over 5 dm ..... P. Canbyi

## NEVADENSES

- a. Sheaths scaberulous, ligule long ..... P. nevadensis Vasey
- aa. Sheaths glabrous; ligule short.
  - b. Blades involute ..... P. juncifolia
  - bb. Flat ..... P. ampla

When the minor segregates of P. stenantha are scattered in this fashion, in two's and three's between five different sections, one naturally wonders if some generally useful characters were not overworked. The result looks like an exercise in artificial key making where every branchlet is decorated with a binomial of its own. But this is probably too harsh a judgement on Hitchcock's classification. Yet one should remember that a character is not necessarily significant in every particular situation, even if it has proved most useful in the taxonomy of some other species of the same assemblage.

The more recent treatment by C.L. Hitchcock 1969 is more nuanced: the array of species is reduced, intergradations are repeatedly pointed out, difficulties of separation are not glossed over, and the artificiality of some distinctions is not disguised. Two keys were provided by C.L. Hitchcock. The first key is based on vegetative characters with a strong accent on the habitat; it is not truly dichotomous. It may be summarized as follows for our area.

- a. Ligule generally truncate or rounded, rarely over 1 mm high, but up to 2 mm on the upper leaf.
  - b. Blades flat, 1.5-3.0 mm broad; sagebrush slopes to ponderosa forests ..... P. ampla
  - bb. Blades involute, rarely over 1.5 mm broad; moist alkaline areas ..... P. juncifolia
- aa. Ligule usually acute or over 2 mm long.
  - c. Sheaths closed at least half their length; leaves narrower than P. Fendleriana and the lemmas scabrous; sagebrush plains to alpine ridges ..... P. Cusickii
  - cc. Sheaths closed much less than half their length.
    - d. Blades rather soft and lax; montane to alpine.
      - e. Blades 0.5-1.5 mm broad ..... P. gracillima
      - e. Blades 1.0-2.0-(2.5) mm broad ..... P. stenantha
    - dd. Blades commonly stiff or involute.
      - f. Plants of e. Mont.; often in moist saline areas ..... P. arida
      - f. Montane phase of P. scabrella, usually only slightly scabrous; blades often flat and up to 3 mm broad ..... P. Canbyi
      - f. East side of Cascades; blades mostly stiff and scabrous; common and dioecious ..... P. Fendleriana
      - f. Often slightly rhizomatous; blades mostly flat, 2-4 mm broad; moist areas ..... P. glaucifolia

- f. Greenish, montane counterpart of P. Sandbergii;  
flowering June-Aug. .... P. incurva
- f. Mostly 5-10 dm tall; moister areas ..... P. nevadensis
- f. Usually purple-tinged and 1.5-3.0-(4.5) dm tall;  
flowering April-June; desert and dry areas ..... P. Sandbergii
- f. Scabrous culms or sheaths, mostly 4-10 dm tall;  
blades mostly less than 1.5 mm broad; deserts .... P. scabrella

The second key by C.L. Hitchcock is fully dichotomous. It may be summarized as follows for our area.

- 4. Rhizomes present.
  - 7. Partially to completely dioecious, mostly pistillate ... P. Fendleriana
  - 7. Mostly perfect-flowered; lemma not webbed at base.
    - 12. Panicle narrow.
      - 15. Second glume 3.0-3.5-(4.2) mm long; upper  
stem leaf short ..... P. arida
      - 15. Second glume (4.0)-4.5-5.0 mm long; a  
generally larger plant, the upper leaf 5-10 mm  
long ..... P. glaucifolia
    - 12. Panicle open ..... P. glaucifolia
- 4. Rhizomes lacking.
  - 25. Lemma cobwebby at base ..... P. Cusickii
  - 25. Not cobwebby.
    - 36. Spikelets compressed, less than twice as long as broad.
      - 37. Lemma villous or pilose on keel and nerves.
        - 38. Flowers nearly all imperfect, the plant  
usually functionally pistillate ..... P. Fendleriana
        - 38. Flowers mostly perfect ..... P. stenantha
      - 37. Lemma glabrous or scabrous ..... P. Cusickii
    - 36. Spikelets only slightly compressed, over twice  
as long as broad.
      - 53. Panicle open, etc. .... P. gracillima
      - 53. Panicle narrow.
        - 54. Ligule thickish, strongly ciliolate ..... P. juncifolia
        - 54. Ligule thin, rarely ciliolate.
          - 55. Lemma scabrous or glabrous ..... P. nevadensis
          - 55. Lemma crisp-puberulent below.
            - 56. Plant greenish, usually over  
4 dm tall ..... P. scabrella
            - 56. More or less reddish-tinged;  
smaller and the leaves usually  
less than 5 cm long ..... P. Sandbergii

It will be noticed that for comparison purposes we have included P. arida in all three keys above although we regard P. arida as specifically distinct from the P. stenantha group. Both P. arida and P. stenantha present a nearly parallel series of variations as to width of leaves, scabreity of herbage, pubescence of lemma, etc. P. stenantha is a tufted species but stolons may be produced by more vigorous tufts, or in wetter years, or in pioneering situations. P. arida is primarily stoloniferous and the stems are scattered along the rhizome either singly or in small groups of two or three stems. Although we have retained P. arida at specific rank, our judgement is still open to review on this point.

#### 46. EREMOPOA Rosh.

Nearer Poa, with a clear midnerve and faint lateral nerves on the lemma, but the latter is rounded on back and sharply acute, subacuminate even, as in Festuca. Glumes only half as long as the lemmas. Florets 2-3, the upper successively smaller.



1. *E. persica* (Trin.) Rosh. -- A small and delicate annual with fine foliage and diffuse panicle. Stem and sheaths smooth, blades and inflorescence scabrous. Lemmas lanceolate, 4 mm long or less. Early summer. Railways cinders, rare: Brandon. -- sMan, sEur -- Plate 15 page 65.

## 47. COLPODIUM Trinius

Like *Poa*, with lemmas and glumes hyaline-margined, obtusish to round at tip, but the lemma rounded dorsally, not keeled.

1. *C. fulvum* (Trin.) Gris. (*Arctophila fulva* (Trin.) Anderson) -- Inflorescence branches variously diverging, but not in a graded manner: upper branches ascending to erect, lower branches widely spreading to descending, middle branches more openly spreading to reflexed or pendant. Stem thick and soft. Foliage as in *Distichlis*: no basal leaves, lower stem leaves with the blade shorter than the sheath, the upper leaves with gradually longer blades. Mid summer. Common in arctic shallows, usually pioneering. -- (swG)-F-Aka, (nL, nQ)-nO-nMan, Eur -- Plate 15 page 65.

## 48. DUPONTIA Br.

Resembles *Poa*, but the glumes are longer than the lemmas and more or less enclose the whole spikelet, or at least the lowermost floret. Lemmas rounded on back.

1. *D. Fischeri* Br. (var. *aristata* Malte) -- Nondescript type of the *Poa* alliance, with the glumes longer than the lemmas. Branches and spikelets few in a purplish and rather narrow inflorescence. Spikelet (4)-5-6-(9) mm long, with (1)-2-(3) florets. Callus bearded. First half of summer. Shores and muddy or marshy places, fresh or saline. -- G-Aka, L, Q-nMan, (Eur) -- Plate 15 page 65.

## 49. SCOLOCHLOA Link

Closer to *Festuca*, yet the callus bearded, the glumes large, the upper nearly as long as the spikelet and the lemma membranous-margined at tip with the main nerves slightly excurrent.

1. *S. festucacea* (W.) Link (*Fluminea festucacea* (W.) Hitchc.) -- Sprangle-Top, Hollowstem -- Tall grass of shallow waters, with a large, pale and diffuse panicle, forming a conspicuous ring around sloughs. Stoloniferous and commonly 1.5 m high. Stem thick and rather soft below, more solid above. Spikelets pale green to straw. Early summer. Shallow, quiet waters; common east of Moose Jaw, but more spotty westward. -- sMack, sMan-BC, nUS, (Eur) -- Plate 15 page 65.

An old collection from Lake of the Woods by Dawson 1873 (MTMG) represents the eastern reach of the species, but it has never been confirmed and remains doubtful as to its provincial appertenance.

## 50. GLYCERIA Br.

## MANNA-GRASS

Leaf sheath closed ventrally for most of its length, its margins being fused. As *Festuca* without the awns and the lemma with 5-9 nerves which are about equally prominent. Upper glume uninerved.

- a. Inflorescence closed, long linear; spikelets 1 cm long  
or more, linear-cylindric ..... 1. *G. borealis*

- aa. Inflorescence open, broadly lanceolate to pyramidal; spikelets shorter and broader,
  - b. Spikelets 3.0-4.5 mm wide ..... 2. G. canadensis
- bb. Narrower, less than 2.5 mm wide.
  - c. Upper glume about twice as long as the lower, the latter about 0.5 mm long ..... 3. G. striata
  - cc. Upper glume only slightly longer than the lower, the latter 1 mm long or more.
    - d. Upper glume 1.7-2.5 mm long, entire, and  $\pm$  acute at tip ..... 5. G. maxima
  - dd. Upper glume shorter, erose and rounded at tip.
    - e. Leaves antrorse-scabrous above; sheaths retrorse-scabrous ..... 4. G. elata
    - ee. Both leaves and sheaths antrorse-scabrous; panicle smaller ..... 6. G. pulchella

1. G. borealis (Nash) Batchelder -- Float-Grass -- Spikelets narrow and about 1 cm long in a closed inflorescence, or with only the main branches divergent. Up to 1 m high. Upper glume 2.5-3.5 mm long, somewhat shorter than the lemmas and much longer than the lower glume, usually twice longer. Early summer. Shallow water; alkali tolerant. -- sMack-(Y)-Aka, L-SPM, NS-BC, US -- Plate 16 page 66.

2. G. canadensis (Mx.) Trin. -- Rattlesnake-Grass, Pearl-Grass -- Numerous fat, firm, squarish spikelets, about 5 mm long, in a large, pyramidal inflorescence. Leaves about 5 mm wide, conduplicate and stiffly ascending. Spikelets commonly bicolor, green with purplish glumes. First half of summer. Boggy shores; rare or overlooked: Denare Beach. -- L-NF-(SPM), NS-O, ecS, neUS -- Plate 16 page 66.

Perhaps an overlooked native, but it is a rather conspicuous herb and it seems more likely that west of Ontario it occurs only as an introduction.

3. G. striata (Lam.) Hitchc. -- Spikelet smallest, its glumes dimegueth and the lower very small. Spikelets 2-4 mm long, broadly lanceolate to rhomboid, usually green. Lowest lemma  $\pm$  2.0 mm long. Mid summer. Wet ground near springs and shores. -- NF, NS, NB-BC, US, Eur -- F. stricta (Scribner) Boivin -- Tending to be smaller throughout, but the lower lemmas longer, 2.0-2.2 mm long. Spikelets usually purple. Somewhat more frequent northward. -- Mack-Aka, L-SPM, NS, NB-BC, US, (CA) -- Plate 16 page 66.

4. G. elata (Nash) Hitchc. -- Leaves and sheaths scabrous in opposite directions. 1-2 m high, the stem soft and spongy below, up to 1 cm thick. Leaves 5-15 mm wide. Panicle 2-4 dm long and wide. Spikelets and lemmas slightly longer than in the last species. First half of summer. Wooded shores. -- wAlta-sBC, wUS -- Plate 16 page 66.

5. G. maxima (Hartm.) Holmb. var. americana (Torrey) Boivin (var. grandis (Watson) Breitung; G. grandis Watson) -- Reed-Grass -- A tall herb like the last, with a similarly large inflorescence, but the glumes longer and the upper acutish. Spikelets purplish and green with hyaline glumes. The latter 1.2-2.2 mm long. Mid summer. Low places and marshy shores. -- Mack-Aka, NF-SPM, NS-BC, US -- F. pallascens (Fern.) Boivin -- Spikelets yellowish green, not purplish. Stroughton. -- NF, NS, O, S, (neUS) -- Plate 16 page 66.

The typical phase is paleogean; it is a somewhat larger plant, the leaves up to 2 cm wide, the spikelets brownish and the glumes 2-3 mm long. It is naturalized at a few places in Ontario, at Saint John's Newfoundland, and Duncan B.C. Other varieties exist in the Old World; some of them bridge the morphological gap of the typical and the neogean varieties.

6. G. pulchella (Nash) K. Schum. -- Like a reduced version of the last

two: stem about 1 m high, thinner and hard; leaves 3-7 mm wide; inflorescence usually under 2 dm long. Glumes pale brown and hyaline or rarely purple and hyaline. Lemma partly purple. Early summer. Margin of sloughs. -- Mack-Aka, sMan-nBC -- Plate 17 page 75.

# 51. TORREYCHLOA Church

Like a Glyceria of the short spikelet type, but the sheath margins free and the upper glume with 3 nerves. Resembles Puccinellia, but the lemmas are prominently nerved.

Torreyochloa is a weak genus. Or perhaps one should better say that Puccinellia is a weak segregate of Glyceria and that the recognition of Puccinellia calls for the corollary creation of Torreyochloa as a repository for those species that would be misfits if placed in either Glyceria or Puccinellia.

- a. Leaves 5-7 mm wide ..... 1. T. pauciflora  
 aa. Small plant, the leaves only 1-3 mm wide ..... 2. T. pallida

1. T. pauciflora (Presl) Church var. Holmii (Beal) Boivin (Glyceria pauciflora AA.; Puccinellia pauciflora (Presl) Munz var. Holmii (Beal) C.L. Hitch.) -- Robust herb with a fine inflorescence of numerous small spikelets. Obviously of the Glyceria type, but the sheath margins free from one another. Lower glume  $\pm$  1 mm long, the upper a little longer. Lemma  $\pm$  2 mm long, at first green, soon developing an inner purple margin and an outer hyaline one. Mid summer to early fall. Wet ground. -- (wAlta, US) -- Plate 17 page 75.

Weakly divisible into three geographical varieties: var. Holmii is found mainly in the Rockies while var. microtheca is mainly in the Cascades and var. pauciflora is rather costal.

Our var. Holmii (Beal) stat. n. (Panicularia Holmii Beal, Torreya 1: 43. 1901) is generally a smaller plant, mostly less than 6 dm high, its leaves mostly 6 mm wide or less, the lower lemma  $\pm$  2 mm long and with 5 nerves.

Var. pauciflora is generally taller with broader leaves, often up to 1 cm wide or more, a lower lemma  $\pm$  2.5 mm long or commonly up to 3 mm long, and showing 7 nerves. The branches of the panicle are usually in two's.

Var. microtheca (Buckley) stat. n. (Glyceria microtheca Buckley, Proc. Ac. Nat. Sc. Phil. 1862: 96. 1863) has the lower branches mostly in 3's and the lemma is  $\pm$  2.5 mm long and has usually only 5 nerves. Otherwise much as in pauciflora.

2. T. pallida (Torrey) Church var. Fernaldii (Hitchc.) Dore (Glyceria Fernaldii (Hitchc.) St. John) -- Smaller and weaker, more reclining. Inflorescence usually remaining pale green, much smaller and the spikelets much fewer. Otherwise much resembling the above. Mid summer. Shallow waters and exsiccating shores, usually muddy. -- (seK, sL)-NF, NS-O-(seMan)-nwS, neBC, US -- Plate 17 page 75.

Four varieties are worth mentioning here. Our var. Fernaldii is 2-4- (6) dm tall, its leaves (1)-2-3-(4) mm wide, its ligules 3-4 mm long, the upper glume is 1.5 mm long or slightly less, the lemma 2.5 mm long or slightly less, and the anthers 0.4-0.5 mm long. The nearest vicariant to var. Fernaldii is not the typical eastern phase, but the eastasiatic var. natans (Kom.) Boivin, barely to be distinguished by its somewhat shorter glumes, its ligules a little longer and acute.

The eastern var. pallida is a generally larger plant, 5-12 dm high, its

leaves (3)-4-6-(7) mm wide, ligules 4-6 mm long, upper glume 1.5 mm long or a little more, lemma 2.5 mm long or a little more, and the anthers 0.6-0.8 mm long. The vicariant of var. pallida is the Japanese var. viridis (Honda) Koy. & Kuw., barely to be separated by its narrower leaves and its weakly nerved glumes.

## 52. PUCCINELLIA Parl.

## ALKALI-GRASS

Like Glyceria, but the lemmas with only 5 nerves, these not rugose but rather faint or even obscure. Sheath open ventrally.

- a. Stems creeping and rooting at the nodes ..... 2. P. phryganodes  
 aa. More or less decumbent to erect, not rooting ..... 1. P. distans

1. P. distans (L.) Parl. var. distans (P. Nuttalliana (Schultes) Hitchc.) -- A rather thin, tufted perennial with usually stiffly divergent or reflexed inflorescence branches. Highly variable. Stems erect to decumbent, mostly 2-7 dm long. Ligule broader than the leaf blade. Inflorescence closed or more commonly open, its branches usually scabrous. Spikelets appressed, pale to green or somewhat purplish. Anthers usually less than 1.0 mm long. Mid summer. Common in alkaline or saline or disturbed soils. -- (G-F)-K-Aka, (L-SPM), NS-BC, US, Eur -- Var. minor (Watson) Boivin (P. Langeana (Berlin) Sør.) -- Smaller, about 1 dm high, the inflorescence closed, purple and less than 6 cm long, often overtopped by the leaves. Arctic shores and disturbed soils. -- G-Mack-(Y-Aka, L, NB)-Q, (nMan, eEur) -- Plate 17 page 75.

Currently subdivided into about 20 species, of which some 8 or 10 have been reported or identified from our area. They are largely based on minutiae of mensuration and they run into each other; we derive no intellectual satisfaction out of their recognition. The listing of synonyms seems superfluous here.

Comments by C.L. Hitchcock 1969 about the distinctiveness of P. Nuttalliana from P. distans could stand as a general comment about the value of the segregates of P. distans. Writes C.L. Hitchcock: "Although P. Nuttalliana is considered to be specifically distinct from P. distans, with which it is largely sympatric, morphological distinction between them is rather tenuous ... In plants of some areas and particularly those of central Canada, the size distinction breaks down completely and the shape of the lemma (a rather intangible difference at best) must be relied upon as the main diagnostic feature." It seems difficult to build a practical and meaningful classification on such tenuous and unreliable distinctions.

Most commonly P. distans will be attached to plants from roadsides and other disturbed areas while P. Nuttalliana is usually reserved for plants from native habitats.

2. P. phryganodes (Trin.) Scribn. & Merr. -- Stems creeping, rooting at the nodes, the many leaves overlapping, thus forming large mats. Branches arising from a point just below the node. Inflorescences mostly borne at the end of the stolons. Branches of the inflorescence quite smooth. Anthers about 1.5 mm long. Mid summer. Tidal gravels and flats. -- G-Y-(Aka, L), nQ-nO-nMan, Eur -- Plate 17 page 75.

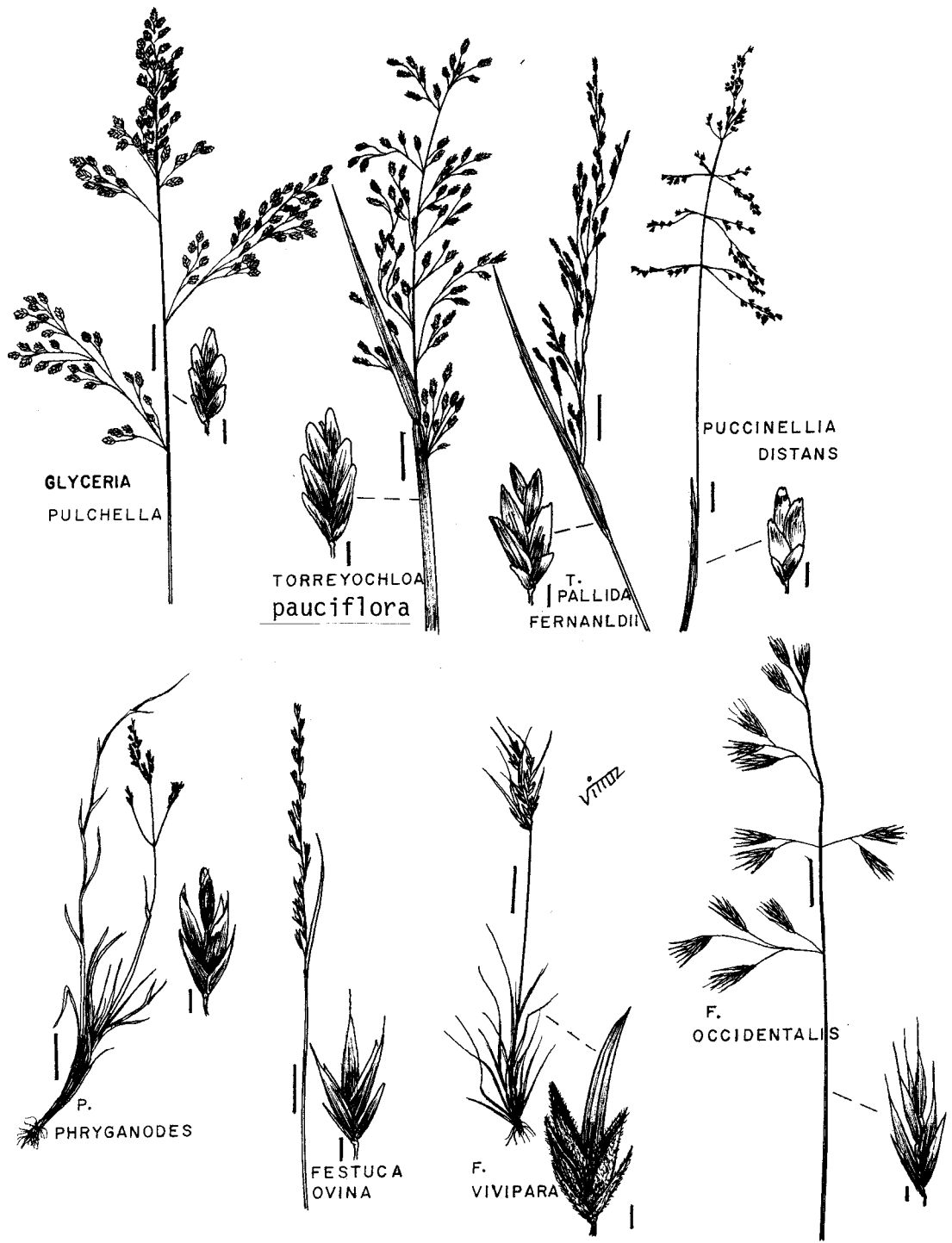
## 53. FESTUCA L.

## FESCUE

A basic, unspecialized genus of Grasses, with numerous spikelets in an open panicle; spikelets with 2 or more fertile flowers. Lemmas not keeled, but rounded on back, with 5 distinct nerves, and subulate or aristate at tip. Ligule short and truncate usually broader than wide and mostly concave across

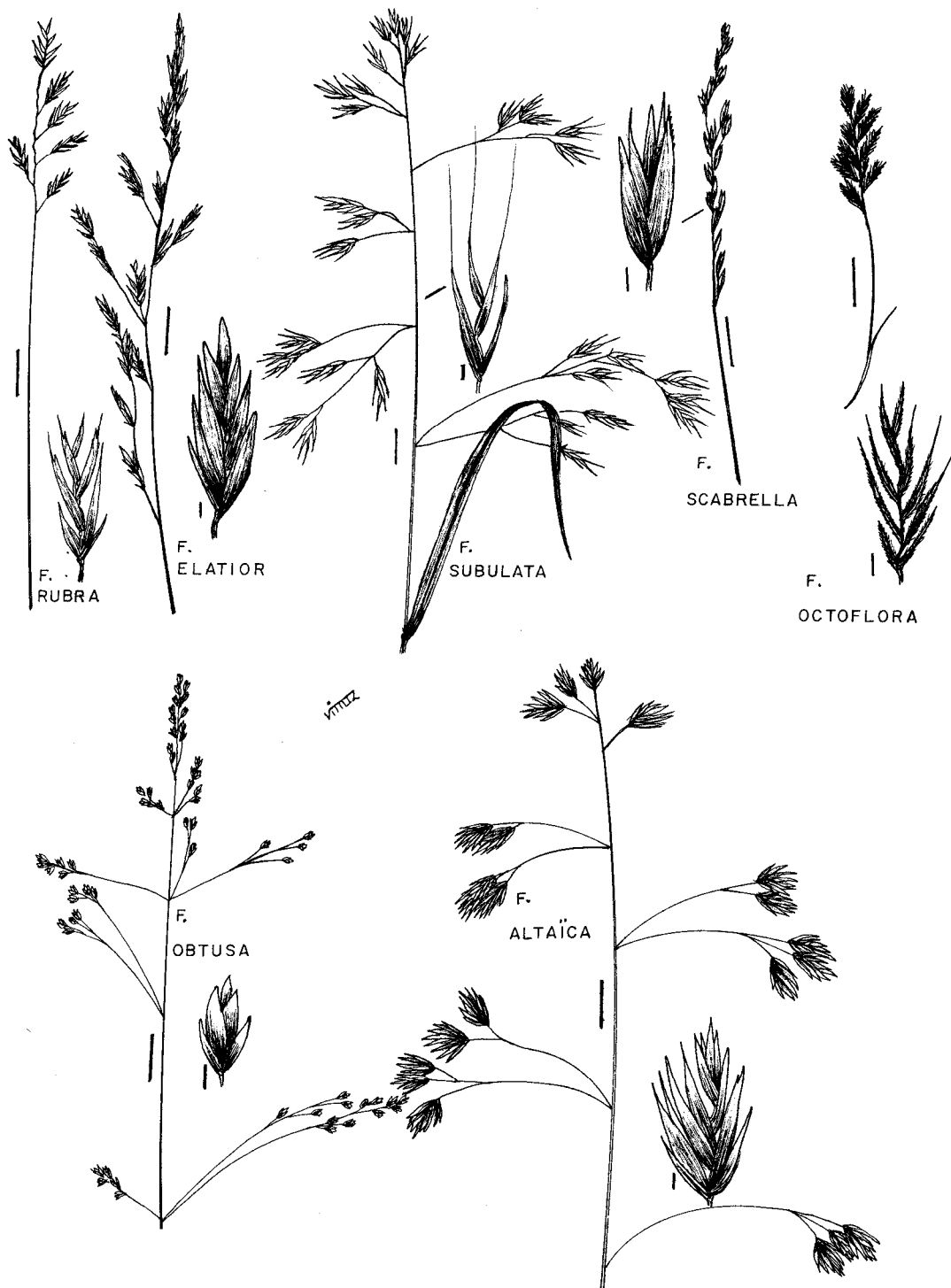
Plate 17

Glyceria, Torreyochloa, Puccinellia, Festuca



## Plate 18

## Festuca



the summit and higher on the shoulders. Sheaths open.

Viviparous plants are best distinguished from similar plants in the genus Poa by the shape of the leaf tip. See under Poa for the diagnostic criteria.

- a. Leaves narrow to filiform ..... Group A
- aa. Main leaves 2 mm wide or more ..... Group B

#### Group A

Leaves less than 2 mm wide.

- a. Annual, producing neither stolons nor new sterile rosettes from the base of the tuft ..... 10. F. octoflora
- aa. Perennial.
  - b. Stoloniferous and forming a carpet of small, loose tufts .. 4. F. rubra
  - bb. Growing in dense clumps.
    - c. Spikelets viviparous ..... 2. F. vivipara
    - cc. Not normally viviparous, but maturing and shedding its seeds.
      - d. Upper glume 5-9 mm long; plants usually 5-10 dm high.
        - e. Lemma with an awn 2-8 mm long ..... 3. F. occidentalis
        - ee. Awn very short or lacking.
          - f. Lower glume as long as the lower lemma, or shorter by only 1-(2) mm ..... 9. F. scabrella
          - ff. Spikelet deep purple and the glumes relatively shorter ..... 8. F. altaica
      - dd. Upper glume 2.5-5.0 mm long; plant usually shorter.
        - g. Lemma 4-5 mm long; plant usually 1-4 dm high ..... 1. F. ovina
        - gg. Longer; plant usually taller ..... 3. F. occidentalis

#### Group B

Main leaves 2 mm wide or more.

- a. Awns as long as, to longer than, the spikelet ..... 6. F. subulata
- aa. Awn much shorter or lacking.
  - b. Spikelet 4-6 mm long ..... 7. F. obtusa
  - bb. Larger, 8-20 mm long.
    - c. Upper glume more than half as long as the spikelet.
      - d. Spikelet overtopping the glumes by 3-5 mm, the latter shorter than the lemmas ..... 8. F. altaica
    - dd. Upper glume larger, equalling or longer than the lemmas, reaching to the summit of the spikelet, or shorter by only 1-2 mm ..... 9. F. scabrella
    - cc. Spikelet longer, about twice as long as the upper glume ..... 5. F. elatior

1. F. ovina L. var. ovina -- Sheep's Fescue, Black Twitch (Petit Foin, Poil de Loup) -- Forming dense tufts, up to 3 dm across, of filiform foliage. Basal sheaths marcescent, becoming pale gray to whitish. Leaves 0.3-1.5 mm wide, scabrous or sometimes smooth. Spikelets 5-10 mm long. Awn 1-3 mm long. Anthers 1.5-3.0 mm long. Early summer. Sometimes cultivated and spreading to dry, open places. -- Y-(Aka, L-NF), NS-BC, US, Eur -- Var. brevifolia (Br.) Watson (var. brachyphylla (Schultes) Piper, var. Rydbergii St.-Yves, var. saximontana (Rydb.) Gleason; F. brachyphylla Schultes; F. rubra L. var. saximontana (Rydb.) Hitchc., nomen; F. saximontana Rydb.) -- Usually less than 3 dm high. Leaves rather smooth, 0.3-0.5 mm wide, rather short. Anthers 0.3-2.0 mm long.

Dry ridges and outcrops northwards and in the mountains. -- G-(F)-K-Y-(Aka, L-NF), Q-BC, US, (Eur) -- Plate 17 page 75.

Our native plants, var. brevifolia, are usually subdivided into a trio of closely related varieties or species: F. baffinensis Pol., F. brachyphylla (=var. brevifolia) and F. saximontana (=var. Rydbergii). We have not yet been able to implement this distinction on the basis of observable criteria, linked inter se, and reasonably correlated with individualized ecologies and distributions. All three taxa are reputed to have a transcontinental range at our latitudes, with southern extensions into the mountains of the U.S.A. Their distinction is usually implemented as follows: taller plants, over 2 dm high, with anthers over 1 mm long are placed in var. Rydbergii (or var. saximontana). Lower plants with shorter anthers are placed in var. brevifolia. And plants with a puberulent stem (instead of smooth to scabrous) are filed as F. baffinensis.

2. F. vivipara (L.) Sm. -- Similar to the first, but the spikelets viviparous. Glumes and lemmas more or less elongated. Alpine or subarctic tundra, rare: Waterton. -- G, (Mack), Aka, L-NF, (Q-nwO, S)-swAlta-eBC, Eur -- Plate 17 page 75.

Likely to be only a viviparous form of the preceeding.

3. F. occidentalis Hooker var. occidentalis -- Quite similar to F. ovina, yet the stem (4-9 dm), leaves, spikelets, glumes and lemmas longer. Body of the lemma 5-6 mm long and the awn 3-8 mm long. Leaves smooth. Inflorescence closed or more often open, sometimes reduced and becoming racemiform. Spikelets 8-15 mm long including the awns. First half of summer. Dryer chernozems in the foothills. -- cO, swAlta-sBC, US -- Var. ingrata (Hackel) Boivin (F. idahoensis Elmer) -- Leaves usually strongly scabrous. Inflorescence usually closed, the spikelets 1-2 cm long and somewhat more numerous. Awn 2-4 mm long, about half as long as the lemma. Cypress Hills and Rockies. -- swS-BC, wUS -- Plate 17 page 75.

There is a more southern and montane to alpine var. oregona (Hackel) Boivin which is more or less intermediate between our two varieties, the panicle being usually more open as in var. occidentalis, but the awns shorter as in var. idahoensis. Further the leaves of var. oregona tend to be shorter, being usually less than 7 cm long.

4. F. rubra L. (var. arenaria (Osbeck) Fries, var. mutica Hartman) -- Red Fescue -- The marcescent basal sheaths red-brown to dark brown. Often confused with F. ovina, but larger, stoloniferous, the spikelets, glumes and lemmas larger, as in the last. Spikelets 7-20 mm long. First half of summer. Natural or artificial prairies. -- G-K-(Mack-Y)-Aka, L-(NF)-SPM, NS-BC, US, (CA), Eur, (Afr) -- F. prolifera (Piper) Hyl. -- Spikelets transformed into young plants. Rare. -- (F)-K, (NF), NS, Q-nMan-nwS, US, (Eur) -- Plate 18 page 76.

A report of f. prolifera for Mackenzie by Boivin 1967 was based on a sheet (QFA) now revised to Poa pratensis L. var. vivipara (Malmgr.) Boivin.

5. F. elatior L. var. elatior (F. pratensis Hudson) -- Dover-Grass, English Bluegrass (Grande Queue de Rat) -- Leaves fairly large and the spikelets rather long and borne in a closed and usually greenish panicle. Stoloniferous, 0.6-1.0 m high. Leaves 3-7 mm wide, auriculate at base, the auricles usually acute. Panicle 1-2 dm long. Lemma (4)-5-(7) mm long, acute to subulate tipped. First half of summer. Cultivated and spreading to ditches and shores. -- (G, Y)-Aka, (NF)-SPM, NS-BC, US, Eur -- Var. arundinacea (Schreber) Wimmer. -- Tufted and not stoloniferous. Leaves broader, usually over 5 mm wide. Panicle open, 1.5-3.0 dm long. Lemma (6)-7-(9) mm long. -- Aka, NS, Q-Man, BC, US, (Eur) -- Plate 18 page 76.



Var. arundinacea is often treated as a species, yet there is an overlap in all morphological criteria (see Rhodora 70: 566, 1968) and these are only poorly correlated. We are unable to establish a clear discontinuity between our two taxa. Thus one of the Otterburne collections listed by Löve 1959 as F. arundinacea Schreber is conspicuously tufted, yet by all the criteria of size, width of foliage, size of inflorescence, number of spikelets, length and vestiture of lemmas, etc., it is var. elatior.

6. F. subulata Trin. var. subulata -- Awns longest, 7-12 mm long. Tufted, the leaves (3)-5-10 mm wide. Panicle thin, pale green, widely open. Glumes about half as long as the lemmas, the lower glume 2.0-2.5 mm long, the upper glume longer by 0.5-1.0 mm. Early summer. Wet, shaded places, especially near brooks: Waterton. -- (seAka, wAlta)-BC, wUS -- Plate 18 page 76.

Ours have anthers 1.5-2.0 mm long while the east-asiatic var. japonica Hackel is reputed to have smaller ones, only 1.0-1.4 mm long. Such few specimens as we have examined did conform to this dichotomy.

7. F. obtusa Bieler -- Spikelets smallest, deep green and awnless, the lemma obtusish. Inflorescence scanty, becoming widely open and secund. Primary branches appressed to spreading, secondary branches and spikelets closely appressed, the latter few in number and borne only towards the tip of the rather long branches. Early summer. Wet woods of the Prairie Coteau and perhaps also at Winnipeg. -- NS, Q-sMan, US -- Plate 18 page 76.

8. F. altaica Trin. -- Differs from the next mainly by its shorter glumes and more deeply coloured inflorescence. Inflorescence open, usually deeply coloured and the glumes about the colour of the lemmas. Spikelets compressed, usually elliptic to rhomboid-flabellate, mostly nearly twice longer than the glumes. Lower glume 3-4-(6) mm long, shorter than the lowest lemma by (2)-3-(5) mm. Larger lemmas with a short awn of  $\pm 1$  mm. Mid summer. Alpine and subalpine prairies. -- wMack-Aka, wAlta-BC, Eur -- Plate 18 page 76.

Our classification differs quite a lot from that of Gleason 1952. The latter would place in F. altaica only collections from Asia, Alaska, Gaspé and Newfoundland, the remaining North American collections, including all the material from our area, being versed into F. scabrella (as F. altaica var. major).

9. F. scabrella Torrey (F. altaica AA., var. major (Vasey) Gleason, var. scabrella (Torrey) Breitung; F. Doreana Looman, nom. inv.; F. Hallii Piper) -- Rough Fescue, Bunchgrass -- Spikelets commonly lanceolate, terete, barely if at all longer than the glumes. In large dense tufts, 4-8 dm high. Basal leaves numerous, 1-4 dm long, 1-4 mm wide, their sheaths up to 1 dm long and marcescent. Inflorescence narrow or commonly closed, purplish or more often pale because of the largely hyaline glumes. Glumes nearly as long as the lower lemmas, or shorter by only 1-(2) mm. Lower glume usually 5-6 mm long. Lemmas mostly not aristate, or sometimes with a very short awn. Early summer. A major dominant species on chernozems. -- L-(NF), Q-wO-Alta-(BC, US) -- Plate 18 page 76.

Not sharply different from the last species; it could just as well be called F. altaica var. major.

In Canada, F. viridula Vasey is known from B.C. only. It has also been reported for Alberta by Eastham 1947, Chase 1951, Hubbard 1955, Moss 1959, Boivin 1967, Hitchcock 1969, Looman 1979, and probably many others. Only one Alberta sheet (NY) has been found under that name and it was merely a mixture of Festuca rubra and Danthonia spicata. The report by Packer 1972 has not been investigated yet.

10. F. octoflora Walter (Vulpia octoflora (Walter) Rydb.) -- Six-Weeks-Fescue -- Very fine annual, 0.5-4.0 dm high. Basal leaves soon withering.

Stem leaves filiform, 1-5 cm long. Inflorescence closed, linear. Spikelets less than 1 cm long, including the awns. Lemmas short-aristate. Late spring and early summer. Semi-bare ground, especially if wind-eroded; not common. -- swQ-sO, S(Piapot)-sAlta-BC, US, SA -- Plate 18 page 76.

Reported by Best 1971 as found throughout the area, but we are aware of it only in southern Alberta and at Piapot (SASK) in Saskatchewan.

This last species is often placed in the segregate genus Vulpia C.C. Gmelin on the basis of its being annual and of its anther being commonly only 1, but sometimes 2 or 3, against the regular 3 in Festuca.

## 54. BROMUS L.

## BROME-GRASS

Resembles Poa and Festuca with the lemma obscurely to clearly bifid at tip, the awn (if present) arising from the bottom of the sinus as a direct continuation of the midnerve. Spikelets rather large, with many florets.

The outer coat of the seed is gelatinous and, upon drying, will stick to the palea and lemma; accordingly herbarium specimens will be easier to examine if a floret is well moistened first.

The typification of most older names of Grasses was reviewed or effected by A.S. Hitchcock, Contr. U.S. Nat. Herb. 12: 113-156. 1908. Some of Hitchcock's 1908 typifications were recently challenged (Can. J. Bot. 45: 1845-1952. 1967), especially those based on Kalm's specimens, resulting in many name changes in Bromus, Panicum, Sorghastrum, etc. But we agree with E.G. Voss (Mich. Bot. 11: 26-37. 1972) that Hitchcock's typifications were generally sound, conforming with the better practice of the time, and essentially in accord with our current Code of Nomenclature.

- a. Lemma prolonged into an awn more than 1 cm long.
  - b. Lemma  $\pm$  2 mm wide ..... 12. B. tectorum
  - bb. Broader, 4-5 mm wide ..... 11. B. japonicus
- aa. Awn shorter or lacking.
  - c. Lemma obviously bifid at summit, the apical teeth 1-3 mm long.
    - d. Awn straight, or flexuous and erect ..... 9. B. secalinus
  - dd. Recurved below, the tip divergent.
    - e. Lemma 5-7-(8) mm wide, its membranous margin nearly 1 mm wide ..... 10. B. squarrosus
    - ee. Lemma only (3)-4-5 mm wide and the membranous margin narrower by half ..... 11. B. japonicus
  - cc. Apical teeth much shorter or obscure.
    - f. Lemma with awn 3-10 mm long ..... Group A
    - ff. Awn shorter or lacking ..... Group B

## Group A

Apical teeth of lemma short, usually under 0.5 mm long. Lemma with a middle-size awn.

- a. Lemma glabrous dorsally or merely scabrous on the nerves, sometimes short puberulent.
  - b. Lemma clearly carinate along the midnerve, more obviously so above the middle ..... 8. B. sitchensis
- bb. Broadly rounded dorsally, at least below.
  - c. Stoloniiferous; branches of the inflorescence up to 4-7-(10) cm long ..... 6. B. inermis
  - cc. Tufted; branches more widely spreading and up to

- 10-15-(20) cm long ..... 1. B. purgans  
 aa. Lemma pubescent or pilose dorsally.  
   d. Leaves 1-5 mm wide.  
     e. Spikelets drooping on filiform branches ..... 4. B. anomalus  
     ee. Spikelets erect on short, stiff branches; panicle  
         narrower ..... 8. B. sitchensis  
 dd. All or mostly 5-17 mm wide.  
   f. Lemma partly glabrous, either pilose only towards  
     the edge, or pubescent only in the lower half, or  
     only on the nerves.  
     g. Awn 3-5 mm long ..... 2. B. ciliatus  
     gg. More obvious, 6-10 mm long; ligule longer ..... 5. B. vulgaris  
 ff. Uniformly puberulent or pubescent on the back.  
   h. Lemma clearly carinate along the midnerve,  
     more obviously so above the middle ..... 8. B. sitchensis  
 hh. Lemma broadly rounded dorsally ..... 1. B. purgans

## Group B

Like group A, but awnless or nearly so.

- a. Lemma uniformly pubescent dorsally.  
   b. Leaves 2-5 mm wide ..... 4. B. anomalus  
 bb. Wider.  
   c. Panicle secund and drooping, 1 dm long or less ..... 3. B. Kalmii  
   cc. Longer and more open ..... 1. B. purgans  
 aa. Partly or completely glabrous, or sometimes minutely  
   scabrous.  
   d. Lemma glabrous along a central zone, pubescent or  
     pilose near the margins.  
     e. Primary branches branched again, hence bearing  
         many spikelets ..... 2. B. ciliatus  
     ee. Most or all branches simple and bearing a single  
         spikelet ..... 7. B. Pumpellianus  
 dd. Lemma quite glabrous or merely minutely scabrous  
   dorsally.  
   f. Tufted; spikelets of a paler green than the leaves  
     and borne on divergent to spreading branches.  
     g. Lemma 10-12 mm long and broadly rounded  
         dorsally ..... 1. B. purgans  
     gg. Keeled and generally longer ..... 8. B. sitchensis  
 ff. Stoloniferous; spikelets usually purplish and  
   borne on shorter and more ascending branches ..... 6. B. inermis

1. B. purgans L. (B. latiglumis (Shear) Hitchc.) -- Swamp-Chess,  
 Canada-Brome -- Spikelets pale green in a large and open inflorescence. A mid-  
 dling species, usually around 1.5 m high. Tufted. Leaves 5-17 mm wide. Pani-  
 cle 1-3 dm long. Lemma glabrous or usually pubescent dorsally, often more hea-  
 vily pubescent towards the margin. Awns middling, mostly 3-5 mm long. Anthers  
 1.5-5.0 mm long. Early summer. Galerie-forests and wooded ravines. -- sMack,  
 NB-Alta, US, Eur -- Plate 19 page 83.

The interpretation and typification of Bromus purgans has created dif-  
 ficulties and given rise to conflicting usage ever since 1908 when Hitchcock  
 typified it by the very sheet that would seem the obvious selection for the  
 type of B. Kalmii, namely sheet 93.11 in LINN.

Earlier, the situation seemed much simpler. Linné recognized only two  
 species of Bromus for North America, both credited to Kalm, the first, 3 B.  
purgans, is said to have villous chaff while the second, 4 B. ciliatus, has the  
 lemmas bearing hairs along the margins only, the back being glabrous.

There are three relevant collections in the Linnean herbarium; they are inscribed as follows:

93.10 purgans 3 HU  
93.11 4 K  
93.12 4 HU e semine canadensis

These inscriptions are in the hand of Linné except for the initial number which was added by S. Savage in 1941. The letter K refers to plants collected by Kalm and HU indicates that the plant was cultivated in Linné's garden at Upsal. The numbers 3 and 4 usually refer to the correspondingly numbered species in the 1753 edition of the Species Plantarum.

J.E. Smith (1759-1828) purchased the Linnean herbarium in 1784 for one thousand guineas. He was then 25 years of age. He wrote the word ciliatus on sheets 93.11 and 93.12, apparently taking his cue from the number 4 written by Linné on these two sheets.

Asa Gray reviewed various herbaria in 1838 with a view to check his taxonomic concepts against authentic specimens of Michaux, Linné, and others. He took many notes and often annotated the sheets he had examined. On sheet 93.10 he wrote: "all 3 one sp. and purgans not ciliatus ex char. A. Gray". And all three sheets are to-day pinned together; presumably the pinning was done at the time of Gray's visit. Ever since that time botanists who have looked at the Linnean herbarium have agreed that there is no type of B. ciliatus in it.

At the time of his visit Gray must have already suspected that purgans as described by Linné was somewhat heterogeneous, for in his Manual of 1848 he gave a restricted description of B. purgans and described as new a B. Kalmii with remarks that clearly refer to sheet 93.11 seen in 1838. And with that all three main species on Kalm's route had been distinguished: B. purgans, B. Kalmii and B. ciliatus. Some modern authors recognize more than 3 species within this same area.

Thus, as pointed out by H.K. Wagnon in Rhodora 52: 209-215. 1950, sheet 93.10 is the only one that is unambiguously designated by Linné as B. purgans and this sheet should be regarded as the type: it carries the right number, the proper epithet, has the right morphology and was grown from seed presumably collected by Kalm. Gray clearly refers to 93.11 in his original description of B. Kalmii and this should stand as the type. And there is no sheet to stand as type of B. ciliatus. On these three points we agree with Wagnon.

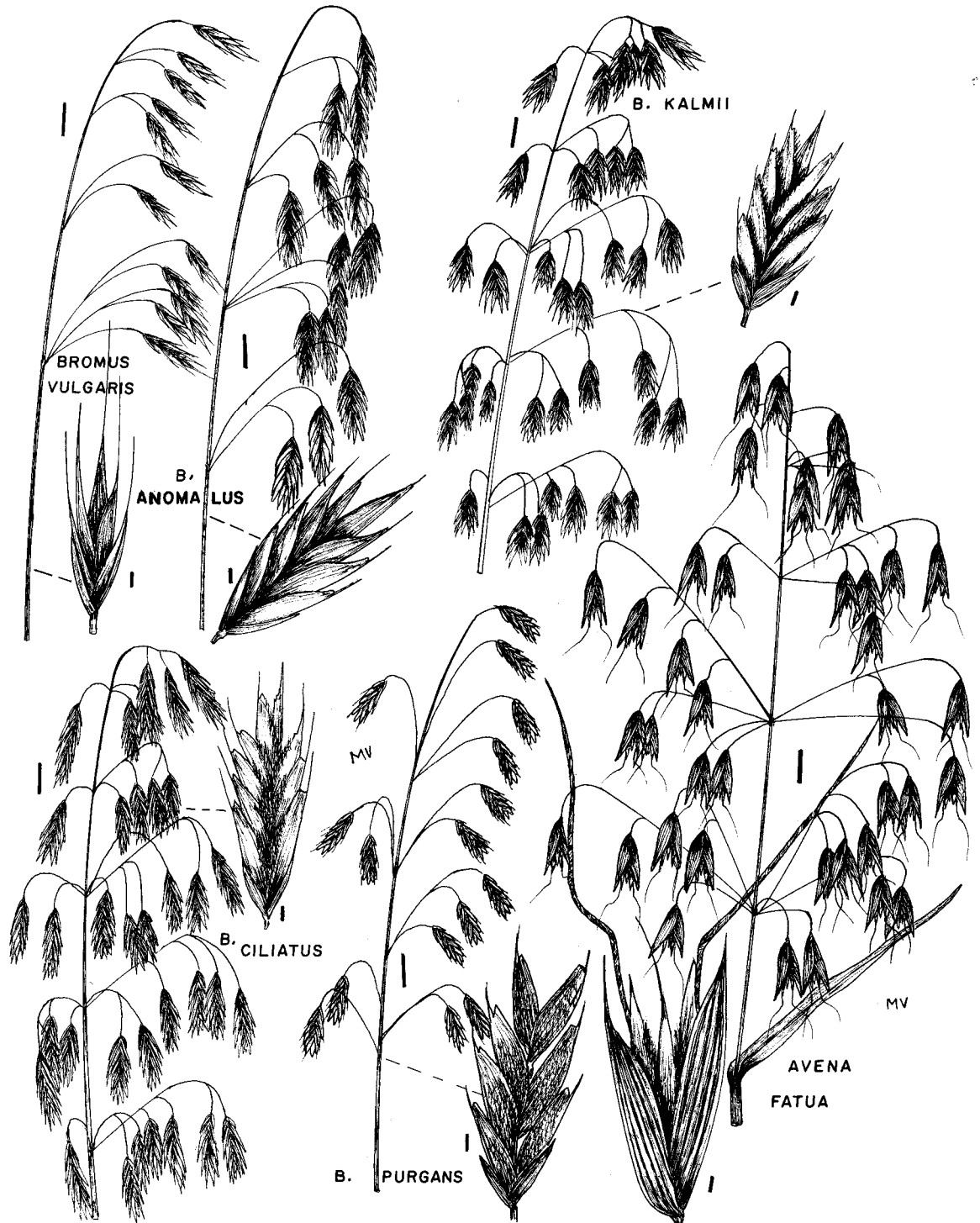
In 1908 A.S. Hitchcock published a paper on the typification of some American Grasses (Contr. U.S. Nat. Herb. 12: 113-158. 1908) in which he selected sheet 93.11 as type of B. purgans, being perhaps overly influenced by the letter K on this sheet. But as noted above we agree with Wagnon that sheet 93.10 is the only unambiguous candidate for a type specimen of B. purgans and we reject the typification by Hitchcock as not sufficiently coherent with the situation. Any review of the typification of B. purgans should take Asa Gray's publication into account and it seems that in 1848 sheet 93.11 was taken out of the picture as far as the typification of B. purgans is concerned.

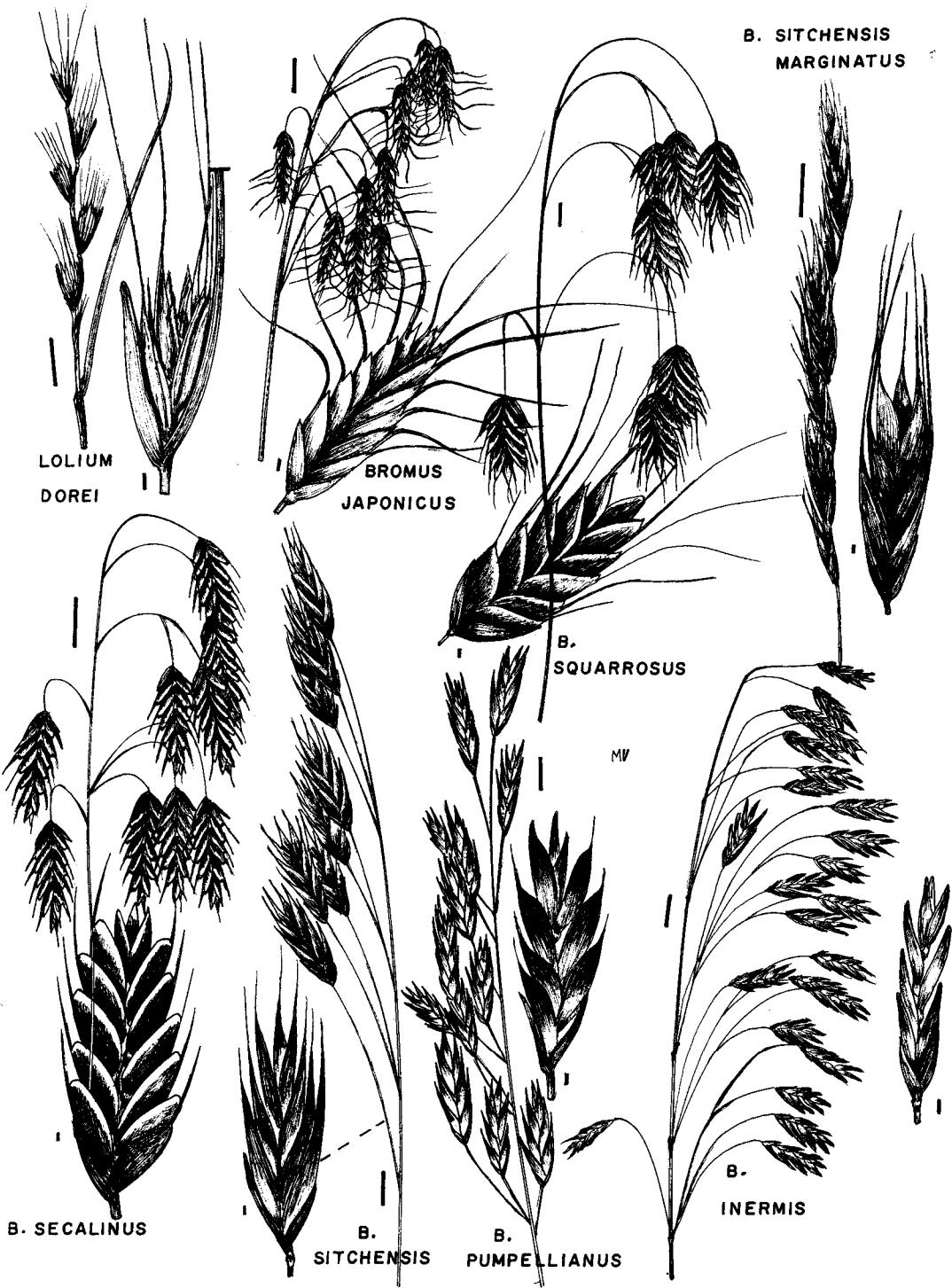
B. Baum has also disputed this point in Can. J. Bot. 45: 1845-1852. 1967 and took up sheet 93.11 as the type of B. purgans. But his application of our Code of Nomenclature places undue emphasis on actually cited material, does not take fully into account all the material available to the describer at the time of publication. This was discussed already by E.G. Voss, Mich. Bot. 11: 26-37. 1972. However J. McNeill in Taxon 25: 611-6. 1976, has accepted Baum's typification.

Further J. McNeill has proposed in the said article that B. purgans be listed as a nomen rejciendum, an unnecessary procedure since Baum's typification is no more satisfactory than that of Hitchcock. McNeill would have B. altissimus Pursh replace B. purgans, but a year later, in Taxon 26: 584. 1977

Plate 19

Bromus, Avena





he changed his opinion in favor of B. latiglumis.

We are of the opinion that the typification effected by Wagnon in 1950 is the only tenable one and that we should continue to use Bromus purgans in its traditional pre-1908 sense, which is also the usage of Fernald 1950 and Gleason 1952. There is no need to add B. purgans to the list of nomina rejicienda.

The distribution of B. purgans was incorrectly extended to southern Mackenzie by Boivin 1967 on the basis of Richardson 134, Fort Norman (GH), a collection that had already been referred to B. ciliatus by Raup 1947.

2. B. ciliatus L. var. ciliatus -- (B. Dudleyi Fern.) -- Brome-Grass, Prairie-Grass -- Like the first, but the back of the lemma glabrous along the center, pubescent towards the edge. Usually smaller and mostly  $\pm 1$  m high. Leaves usually pilose above. Ligule  $\pm 1$  mm long. Inflorescence becoming purplish in late summer. Lemma 8-12 mm long. Anthers 1.0-2.5 mm long. First half of summer. Frequent in woods. -- sMack-(Y)-Aka, L-NF-(SPM), NS-BC, US, Eur -- Var. Richardsonii (Link) Boivin -- Lemma bigger, 12-15 mm long. Leaves glabrous. -- Aka, swAlta-BC, wUS -- Plate 19 page 83.

Baum (l. c. p. 1848-9) has also written on the typification of B. ciliatus selecting a sheet in the Linnean herbarium in S as type and sheet 93.10 (a lapsus for 93.12) in LINN as isotype. McNeill (l. c. p. 611-2) and Voss (l. c. p. 28) have pointed out that both sheets have long been known to lack the essential characters of the original description (both belong with B. purgans) and thus are not eligible as type collection for B. ciliatus.

3. B. Kalmii Gray -- Wild Chess -- Like the first, with a shorter and nodding panicle, the glumes broader and with more nerves. Mostly 0.5-1.0 m high. Leaves 5-10 mm wide. Panicle 1 dm long or less, nodding, one sided, at first pale green, becoming dull purple. Spikelets 1.5-2.5 cm long. Lower glume with 3 raised nerves, the upper with 5. Lemma nearly 10 mm long, densely pilose all over the back. Mid summer. Local in drier meadows on chernozems. -- swQ-seMan, neUS -- Plate 19 page 83.

A collection from the Cypress Hills in 1880 (QK) has never been confirmed and seems questionable as to locality.

4. B. anomalus Rupr. (B. Porteri (Coulter) Nash) -- Easily confused with the last. Leaves narrower, the main ones 2-4 mm wide. Spikelets similar, or up to 4 cm long. Both glumes with 3 raised nerves. Lemma longer, 10-12 mm long. Early summer. Low lying prairies and open woods. -- Man-BC, US, CA -- Plate 19 page 83.

Sometimes treated as a pair of species: a Mexican B. anomalus and a more northern B. Porteri. See Brittonia 7: 469-471. 1952. The diagnostic criteria are rather thin and not very constant; we cannot implement the distinction satisfactorily.

5. B. vulgaris (Hooker) Shear -- Resembles B. ciliatus with the ligule 3-5 mm long, the lemma pubescent only along the nerves and only below the middle, and the awn 4-8 mm long. Panicle usually closed. Tufted, like all the previous species. Mid summer. Wettish coniferous woods. -- swAlta-sBC, (wUS) -- Plate 19 page 83.

6. B. inermis Leyss. -- Brome, Brome-Grass (Brome, Brome de Hongrie) -- Very common and very conspicuous roadside grass with a  $\pm$  one-sided panicle of long, drooping spikelets. About 1 m high. Vigorously long stoloniferous. Typically glabrous throughout except the  $\pm$  scabrous leaves. Panicle pyramidal. Spikelets 2-4 cm long, usually  $\pm$  purplish, typically awnless, or the awns very short ( $\pm 1$  mm). Lemma glabrous to puberulent. Early summer. Commonly seeded

and permanently established in plowed or disturbed soils, especially on roadsides. -- sMack-Aka, L-(NF), NS-BC, US, Eur -- F. proliferus Louis-Marie -- Inflorescence bearing young plants towards the end of the summer. -- Q, seMan, BC, (US) -- Plate 20 page 84.

This and the next are evidently related, their differences being more obvious in the field than the herbarium: the conspicuously drooping spikelets of B. inermis tend to become erect in the process of specimen making. Similarly, the second nature of the inflorescence is not always retained in the herbarium. Recently they have been reported to hybridize and intergrade and, on that basis, B. Pumpellianus was reduced to a subspecies. However our own experience leads us to disagree. We have done much of our collecting in areas where both species are common and find them to be reasonably different as species of Bromus go, we have never seen them to intergrade and know of no real hybrids. Reputed hybrids are noted under the next species.

7. B. Pumpellianus Scribner var. Pumpellianus (var. Tweedyi Scribner; B. inermis Leyss. var. Tweedyi (Scribner) C.L. Hitch., ssp. Pumpellianus (Scribner) Wagnon; B. inermis X Pumpellianus AA.) -- Lemma pilose dorsally towards the edge, ciliate along the midnerve, glabrous in between. Native vicariant of the last which it closely resembles. Nodes pubescent. Leaves glabrous below, scabrous to pilose above. Panicle short and crowded, the branching reduced, tending to racemiform, the spikelets tending to erect. Awns short. Mid summer. Edge of woods and open woods. -- Mack-Aka, O-BC, US -- Plate 20 page 84.

Has been reported from as far north as Churchill, but the relevant specimens (DAO) were revised to B. inermis.

Three variations have been recognized on the basis of chaff pubescence; we are accepting two of them. The more northern plants are more pubescent: glumes and lemmas pubescent the whole or nearly the whole of the back, including the internerves; paleas often also pubescent on the internerves. This geographical variant is properly called var. arcticus (Shear) Pors. The less pubescent plants from our area are var. Pumpellianus as described above.

Two phenotypes occur in our area. In the more common variant the lemma has two glabrous zones alternating with the ciliate keel and the villous marginal zones, the glabrous zones being about as extensive as the villous zones. This is what is sometimes distinguished as var. Tweedyi; it has the same range as the typical phase and is of no obvious taxonomic interest. But it is also sometimes defined so as to include var. arcticus in which case var. Tweedyi presents itself as a geographical variant in the northern part of its range but only as a sporadic phenotype in the southern part.

The other extreme of pubescence is var. Pumpellianus in the more restricted sense, in which the lemmatic villosity is reduced to a narrow marginal strip. Its range coincides with that of var. Tweedyi of the first definition and is not regarded as forming a population distinct from var. Tweedyi.

The less villous extreme also constitutes much the larger part of the putative hybrid B. inermis X Pumpellianus sensu Elliott 1949 and Wagnon 1952. The interpretation of this less villous phase as a very common and widely distributed interspecific hybrid is not convincing, hence we are retaining it within the nomenclaturally typical phase of the species.

8. B. sitchensis Trin. var. sitchensis (B. carinatus H. & A.) -- Spikelets rather large and flattened, the lemmas keeled. Rather large and nearly glabrous tufted species, 1.0-1.5 m high. Leaves mostly 5-10 mm wide. Sheaths generally glabrous or scabrous, sometimes slightly pilose with non-reflexed hairs. Panicle 1-3 dm long, closed or open, often racemiform with nearly all the branches bearing only 1 spikelet, or some of the lower branches bearing 2-4 of them. Spikelets 2.5-5.0 cm long, often stiffy erect or ascending.



Lemma glabrous or scabrous or lightly puberulent, its awn mostly 5-12 mm long. Summer. Near creeks, usually in woods, rare: Castlemount, Brandon. -- (Aka), O-Man, Alta-WBC, WUS -- Var. marginatus (Nees) Boivin (B. breviaristatus Buckley; B. marginatus Nees) -- More pubescent. Sheaths all, or at least the lower, lightly to densely pilose with long retrorse hairs. Lemma densely puberulent, its awn averaging shorter, mostly 3-7 mm long. Leaves more variable, 1-10 mm wide. Bois  Coteau and Rockies. -- (Aka), nO, swS-BC, US -- Plate 20 page 84.

A highly variable type which is usually subdivided into a series of confluent and more or less sympatric species.

Outlying reports for Brandon (DAO), Kapuskasing (QFA) and Milton (DAO, TRT), are no doubt the result of recent introductions. One collection supposedly from the Red Deer Lakes (DAO) is probably a mislabel.

9. B. secalinus L. (B. racemosus L.) -- Cheat-Chess (S glin, Seigle b tard) -- Tufted annual with short, straight awns. Similar to the next. Lemma shorter, 5-8 mm long, elliptic, green with a broad hyaline margin, glabrous to velvety. Awns also shorter, 2-5 mm long, straight or crooked, arising from a sinus 1.0-1.5 mm deep. First half of summer. Rare roadside weed. -- (G, Y-Aka), NF-(SPM), NS-O, Alta-BC, US, (SA), Eur, (Afr) -- Plate 20 page 84.

Breitung 1959 reports B. racemosus from Regina on the basis of a collection reportedly preserved in the Fraser Herbarium. In 1967 a loan request to SASK failed to turn up any such sheet.

Often subdivided in 3 to 5 species. It may be that in their country of origin these are significant segregates, but trying to extend such distinctions to the North American material left us with the unsatisfactory general impression of arbitrary boundaries within a morphological and geographical continuum. Briefly, the morphological basis of the split is as follows: the upper sheaths are glabrous in B. secalinus proper; the lemmas are longer, mostly 9-10 mm, in B. commutatus Schrader; the pedicels are rather short in B. mollis L. The latter may be further subdivided into B. Thominii Hardouin if the lemmas are very short, only 6.5-7.5 mm, or into B. racemosus L. (or B. mollis var. leptostachys Hartman) if the lemmas are glabrous or merely scabrous.

10. B. squarrosus L. -- Awns strongly divergent, being gradually recurved outwardly below. Tufted annual. Panicle narrower and less branched than the next, nearly racemiform, but some of the lower branches bearing two spikelets. Spikelets 2-4 cm long, few, paler green than the foliage, flattened. Lemma 9-12 mm long, glabrous, rounded on back, obtrihomboid, with a hyaline margin nearly 1 mm wide, and 4 pairs of lateral nerves of which 3 pairs are rugose and fairly obvious, the nerves of the fourth pair fainter, thinner and shorter. Awn about as long as its lemma, flattened below the middle, arising from a sinus about 3 mm deep. Early summer. Rare weed of sandy soils: Aweme and perhaps elsewhere also. -- scMan, (Alta-BC), US, Eur -- Plate 20 page 84.

11. B. japonicus Thunb. -- Japanese Chess -- Resembles the last, the lemmas narrower, only (1.5)-2.0-(2.5) mm wide in side view, and shorter, 7-9 mm long. Panicle pyramidal, nodding and secund, the longer branches with two or more spikelets. Lemma minutely scabrous dorsally, more densely so towards the margin, the 3 pairs of lateral nerves weak to obscure. Awns not so conspicuously curved outward, but somewhat longer than the lemma, the longer awns at least 1 cm long, arising from a sinus 2-3 mm deep. Palea shorter than the lemma by nearly 2 mm. Early summer. Locally frequent on roadsides and denuded ground in drier regions. -- swQ-BC, US, Eur -- Plate 20 page 84.

Known in Manitoba from Otterburne (DAO, MT) and Brandon (DAO). The Aweme (DAO) collections have been revised to B. squarrosus.

12. B. tectorum L. -- Awns longest, longer than the lemmas, about as long as the spikelet and straight. Thin annual, the leaves only 2-4 mm wide. Panicle  $\pm$  pyramidal,  $\pm$  secund, of drooping spikelets. Spikelet brush-like, the lemmas and awns being successively much shorter so that the various awns tend to terminate at about the same level. Glumes and lemmas long ciliate along the boundary between the green or coloured back and the hyaline margin. Lemmas narrowest, about 1 mm wide in side view. Early summer. Locally abundant weed of disturbed soils. -- (G), Y-Aka, NS, NB-BC, US, Eur -- Plate 21 page 89.

# 55. LOLIUM L.

Each spikelet, except the terminal one, subtended by one glume only. Resembles the much more common Agropyron, but the spikelets all flattened in the same plane, all placed edgewise to the rachis.

- a. Glume as long as, to slightly longer than, the spikelet, excluding awns ..... 2. L. temulentum
- aa. Glume shorter than the spikelet, at least the middle and upper ones.
  - b. Lemma 5-7 mm long, awnless or longer than its awn ..... 1. L. perenne
  - bb. Lemma 8-10 mm long, usually shorter than its awn ..... 3. L. Dorei

1. L. perenne L. (var. aristatum W.; L. multiflorum Lam.) -- Rye-Grass, English Rye-Grass (Bonne herbe, Pill de Bretagne) -- Spikelet seemingly borne in the axil of its bract-like glume. Annual to short-lived perennial. Main leaves with semi-orbicular to triangular-lanceolate auricles at base. Spikelet flattened. Awn, if present, apical, 8 mm long or less. First half of summer. Cultivated in lawn mixtures and fleetingly appearing in nearby denuded soils. -- G, (Y)-Aka, NF-(SPM), NS, NB-BC, US, SA, Eur -- Plate 21 page 89.

Usually subdivided into two species or varieties, but these grade into one another and appear to have essentially the same range. They seem to represent only the extreme phases of a morphological continuum. The distinction may still be a useful at the cultivar level and, if implemented, the generally larger plant with 11-22 florets to the spikelet and awned lemmas may be called var. aristatum or L. multiflorum, it probably originated in cultivation.

In Australia a similar species, L. rigidum Gaud., is grown as a welcome impurity or minor associate in a variety of crops and naturally it will sometimes turn up in experimental plots from seed originating from Down Under. The leaves are not auriculate, and the terete spikelets are narrow, awnless and only slightly longer than the glumes. Regardless of previous reports, nearly all Canadian collections examined under that name proved to belong to L. Dorei, while the few true L. rigidum were clearly from experimental plots.

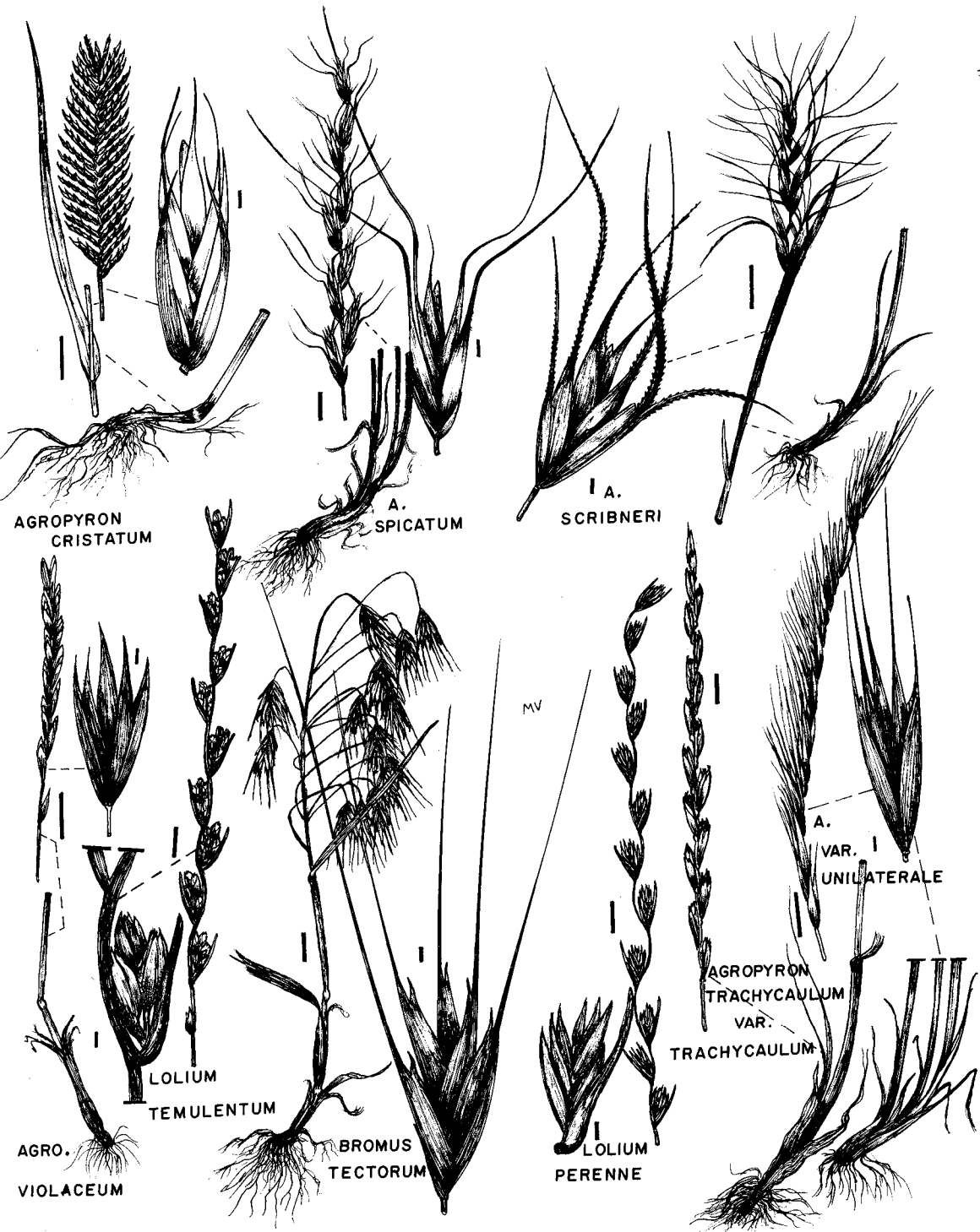
2. L. temulentum L. (var. leptochaeton Br.) -- Darnel (Ivraie, Herbe à couteau) -- Annual. Main leaves with triangular-lanceolate auricles at base. Spikelet subterete to somewhat tetragonal, not flattened. Awns, when present, arising about 1 mm below the summit of the lemma. First half of summer. Field crops and waste places, rare: Winnipeg, Lacombe. -- Y-(Aka), NB-Man, Alta-BC, (US), Eur -- Plate 21 page 89.

3. L. Dorei Boivin var. Dorei (L. persicum AA.; L. rigidum AA.) -- Darnel -- Awns longer, 8-12-(15) mm long. Annual. Stem, and especially the peduncle, very finely retrorse scabrous. Spikelet flattened, flabellate-obrhomboid. Awn terminal, up to  $1\frac{1}{2}$  times as long as the lemma. First half of summer. Weed of cereal crops and railway sidings near elevators. -- O-nBC, (US), Eur -- Var. laeve Boivin -- Stem and peduncle smooth. Less frequent. -- Man-Alta(Northmark) -- Plate 20 page 84.

We have examined a photograph of the type and a fragment of an isotype

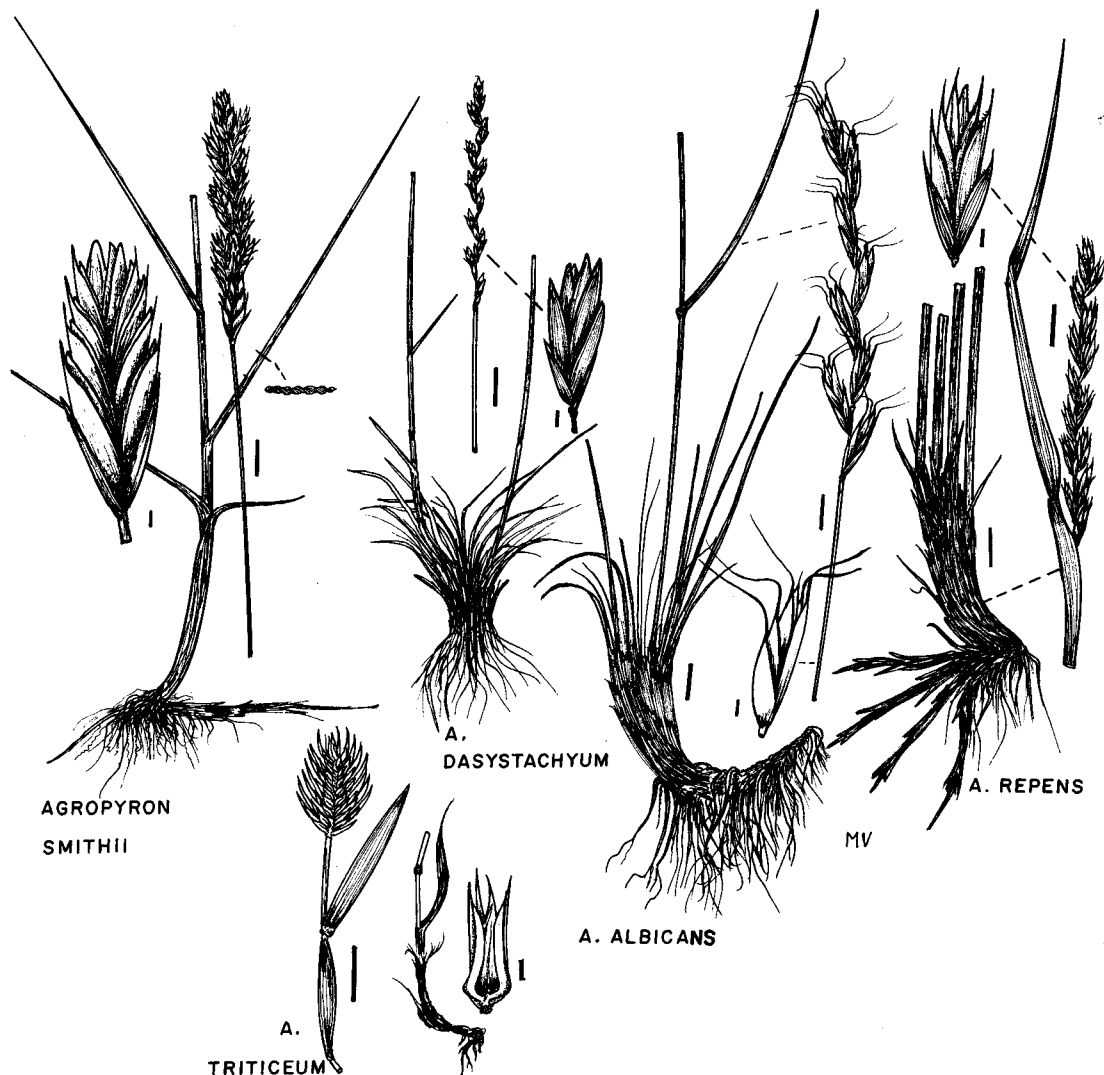
Plate 21

Agropyron, Lolium, Bromus



## Plate 22

## Agropyron



MAURICE-F. VITTOZ

ILLUSTRATOR

Born in France in 1942 and brought up in Algeria. Educated in Algeria and Canada, he holds various diplomas from Algeria, from the Université du Québec (1973-75) and from the University of Ottawa (1979). First employed as a miner in Algeria, France, Russia and French Guyana. Emigrated to Canada in 1967 and became a school teacher in Rouyn (1967-74), Ottawa (1974-76), Hull (1977-80), Sault Sainte-Marie (1980-81) and he is presently setting himself as a freelance illustrator.

He has also planned an 18-hole golf and organized study travels for geography students to London and Moscow. He has illustrated a number of story books for children and of botanical texts.

of Lolium persicum Bois. & Hb. It differs from L. Dorei by its cylindric spikelets, its shorter lemma, 4-6 mm long, its awn  $1\frac{1}{2}$ - $2\frac{1}{2}$  times as long as the lemma, etc. It is not represented in the Canadian material.

## 56. AGROPYRON Gaertner

## WHEAT-GRASS

A basic type with only a few spikelets disposed in a single terminal spike. Spikelets flattened in successive planes which are more or less parallel or slanting to the plane of the flattening of the rachis. All remaining genera below are similar but many carry 2 or more spikelets at each node of the rachis. As in many other Grass genera, the size of anthers is a very useful character though not obvious. Anthers are usually present even in fruiting specimens as they tend to get caught between lemma and palea after flowering.

- a. Glumes and lemmas with a falcate tip or a divergent to spreading awn ..... Group A
- aa. Glumes and lemmas straight; awns straight or lacking ..... Group B

## Group A

Glumes and lemmas tapering into an upwardly falcate tip and a short awn or into a long divergent to spreading awn.

- a. Glumes and lemmas laterally falcate at tip; awns very short and deflexed upward.
  - b. Spike 1.0-1.5 cm long ..... 6. A. triticeum
  - bb. Longer, 5-10 cm ..... 5. A. cristatum
- aa. Glumes and lemmas straight, bearing a spreading or outwardly deflexed awn.
  - c. Only 2-4 dm high and the stem leaves only 2-5 cm long ..... 3. A. Scribneri
  - cc. Taller and the leaves longer.
    - d. Tufted; leaves densely puberulent above; glumes and lemmas glabrous or nearly so ..... 4. A. spicatum
    - dd. Stoloniferous; leaves scabrous above; glumes and lemmas scabrous to villous ..... 8. A. albicans

## Group B

Glumes, lemmas and awns straight or the latter lacking.

- a. Tufted; anthers 1.0-2.5 mm long.
  - b. Spike (3)-4-7-(10) cm long ..... 2. A. violaceum
  - bb. Longer, up to 2.5 dm long, the spikelets less overlapping ..... 1. A. trachycaulum
- aa. Stoloniferous; anthers 3.0 mm long or more.
  - c. All or at least the larger leaves 5-10 mm wide ..... 10. A. repens
  - cc. Leaves 1-4 mm wide.
    - d. Glumes less than half as long as the spikelet and broadest at or slightly above the middle, narrowed only in the upper  $\frac{1}{3}$  ..... 7. A. dasystachyum
    - dd. Glumes at least half as long as the spikelet, broadest near the base and narrowed to the subulate tip for about  $\frac{2}{3}$  of their length ..... 9. A. Smithii

Carefully collected specimens will show that species 1 to 6 are strictly tufted; the remainder are stoloniferous. By exception some of the tufted species may produce some stolons, especially under very favorable or pioneering conditions; such specimens should not be automatically regarded as interspeci-

fic hybrids.

1. A. trachycaulum (Link) Malte (var. glaucum (Pease & Moore) Malte, var. majus (Vasey) Fern., var. novae-angliae (Scribner) Fern.; A. caninum (L.) Beauv. ssp. majus (Vasey) C.L. Hitchc.) -- Anthers shorter, 1.0-2.5 mm long. Leaves strongly scabrous on both faces, narrow to wide, not pilose, but the sheaths sometimes retrorse pilose. Rachis typically pinkish at the nodes. Spikelets tending to be only slightly overlapping. Glumes broadest somewhat below the middle, gradually tapering to the tip, 2 mm wide or slightly larger, scabrous, only slightly shorter than the spikelet. Lemma slightly scabrous, awnless or with a short and straight awn. Early summer. Steppes, prairies and open places, general and common. -- G, K-Aka, L-SPM, NS-BC, US, (CA, Eur) -- F. caninoides (Ramaley) Boivin (var. unilaterale (Cassidy) Malte; A. caninum var. andinum AA., var. unilaterale (Vasey) C.L. Hitchc.; A. Richardsonii Schrad.; A. subsecundum (Link) Hitchc.) -- Awns longer, about as long as the lemma. Spike slightly secund, slightly arching. Common and strikingly different, but does not seem to be particularly significant. -- Mack-Aka, (NF), Q-BC, US -- Plate 21 page 89.

A rather variable species and commonly subdivided in a series of nearly sympatric varieties. We have retained only the rather conspicuous form often identified A. subsecundum.

According to Hultén 1967, the correct name should be, A. pauciflorum. Pending the opportunity to check this point we have retained the current usage.

Our plants are rather closely related to the east-asiatic A. caninum from which it does not differ much. The rank of variety might possibly be appropriate for our plant, but we have accepted the conclusions of a careful study by Malte, Nat. Mus. Can. Bull. 68: 27-57. 1932.

Saskatchewan reports of A. Bakeri E. Nelson were discounted by Breitung 1957. Our 1967 Alberta report of A. trachycaulum var. Bakeri (Nelson) Boivin was based on collections which now form the basis of A. Bowdenii. And duplicates of one of the latter collections are presumably the basis for A. Bakeri as reported by Moss 1959 and possibly also by Chase 1951. At any rate, all specimens under A. Bakeri at ALTA and US were eventually revised to other species by Bowden.

A fairly tall plant is A. Bakeri with long divergent awns in the manner of A. Scribneri. It does not seem to occur in Canada, but as a name it has been much misused in Canadian botany.

A very different classification was presented by C.L. Hitchcock 1969 where this, the next species, and one of its hybrids are reduced to varieties of A. caninum, while f. caninoides is retained as a variety and A. Bakeri is said to be an intermediate to A. Scribneri.

To the obvious differences in taxonomy between the above and our text, one must add much less obvious but no less important and numerous differences in nomenclature. The main ones being that Hitchcock would place the type of A. brevifolium with A. caninum var. majus, the types of A. trachycaulum and (doubtfully) of A. pseudorepens with A. caninum var. latiglume, the types of A. Richardsonii and A. subsecundum with A. caninum var. andinum. The typification of all these names was studied carefully by Bowden and/or Malte; excellent photographs are on file or have been published. Reviewing all the documentation available, we find ourselves in essential agreement with Bowden and Malte, hence the taxonomy and nomenclature adopted herewith.

2. A. violaceum (Horn.) Lange (A. caninum (L.) Beauv. var. latiglume (Scribn. & Sm.) C.L. Hitchc.; A. latiglume (Scribn. & Sm.) Rydb.) -- Anthers short as the above, but the spike shorter and commonly ± purplish, the glumes

and lemmas often pilose. Spikelets more closely overlapping. Glumes 1-2 mm wide; broadest above the middle,  $\pm$  oblanceolate, at least half as long as the spikelet and tending to be darker coloured, the tip broadly acute or tending to be nearly rounded and abruptly short acuminate. Awns short or lacking. Just before mid summer. Arctic or alpine tundras. -- G-Aka, nL, nQ-(nO)-nMan, swAlta-BC, US, Eur -- Plate 21 page 89.

Saskatchewan reports by Macoun 1888 for Long Lake and Touchwood Hills are undoubtedly erroneous, but the species might still turn up in the northeast corner of the province.

A phenotype with densely puberulent nodes becomes more frequent northward and has been distinguished as A. alaskanum Scribn. & Merr. Detailed mapping might show if it is worth retaining as a geographical variety.

2X. A. brevifolium Scribn. (A. andinum (Scribn. & Sm.) Rydb.; A. caninum (L.) Beauv. var. andinum (Scribn. & Sm.) C.L. Hitchc.; A. subsecundum (Link) Hitchc. var. andinum (Scribn. & Sm.) Hitchc.; A. violaceum (Horn.) Lange var. andinum Scribn. & Sm.) -- A hybrid of the next and rather similar to it, low and short-leaved, but the awns much shorter and not strongly divergent. Stems 2-5 dm high. Stem-leaves 2-5-(7) cm long. Spikelets scabrous to glabrous, weakly and irregularly aristate, the awns mostly 0.5-1.0 cm long, straight to somewhat divergent. Glumes oblanceolate, 6-10 mm long exclusive of awns. Waterton: Carthew Pass and Mt. Richards. -- swAlta, nwUS.

In the botany of our area reports of A. andinum or A. brevifolium and some reports of A. Scribneri refer to the hybrid just described.

But the many reports of A. violaceum var. andinum from Yukon, Alaska and Northern B.C. and our own 1967 reports of A. andinum for the same areas actually refer mostly, if not entirely, to aristate specimens of A. violaceum, while var. andinum sensu Hitchcock 1969 is a composite of the present hybrid and A. trachycaulum f. caninoides.

3. A. Scribneri Vasey -- Lowest and bearing widely divergent awns about 2 cm long. In dense tufts, the stems 2-4 dm long, spreading to reclining. Spike 5-8 cm long. Glumes 4-7 mm long, usually bearing a small tooth on one side at the base of the awn. Lemmas 8-10 mm long and similarly one-toothed. Anthers 1-2 mm long. Mid summer. Alpine summits in Waterton. -- swAlta, WUS -- Plate 21 page 89.

The only known sheet is at US.

4. A. spicatum (Pursh) Scribn. & Sm. var. spicatum -- Conspicuously awned, the awns about as long as the spikelets and soon spreading horizontally. Leaves very densely puberulent above, but usually tightly involute and the pubescence not readily observed. Otherwise nearly smooth except for the scabrous awns and lemma nerves. Glumes up to half as long as the spikelet. Anthers 4.5-5.5 mm long. Late spring. Rolling steppes. -- Y-Aka, swS-BC, US -- Plate 21 page 89.

West of us there occurs a var. inerme (Scribn. & Sm.) Heller (A. inerme (Scribn. & Sm.) Rydb.) with awnless spikelets. Resembles A. dasystachyum, but not stoloniferous. Also glabrous, except for the leaves densely puberulent above. Var. inerme has been reported from our area. The mention by Budd 1957, 1964, reiterated by Looman 1979, was based on a sheet from Estlin (SCS) since revised to A. dasystachyum. Collections at DAO from Valeport and Whitemud Ranch were similarly revised by Bowden. A Cypress Hills report by Breitung 1954 was referred to A. riparium by Breitung 1957. The disposal of the Alberta reports by Moss 1959, Bowden 1965, 1966, and Boivin 1967 is not so straightforward. There was no Alberta sheet of A. inerme at ALTA in 1971. At DAO one collection from the Sturgeon River was revised by Bowden to A. trachycaulum

while another from Peace River was revised by Raup to A. dasystachyum; both revisions appear to be justified. A collection from Banff, Senn 2676 (DAO), was cited by Bowden 1966 under both A. spicatum var. inerme and under A. dasystachyum var. riparium X spicatum var. inerme; the first identification was presumably an oversight, the second one is discussed below. We have yet to come across any firm evidence of the occurrence of var. inerme in our area.

4X. A. Bowdenii Boivin (A. trachycaulum var. Bakeri AA.) -- Hybrid of A. trachycaulum. Spikelets with strongly divergent awns, hence this hybrid resembles vigorous plants of A. spicatum, but the awns rather strong, (1.0)-1.5-2.0 cm long, the anthers small, 1.5-2.5 mm long, and the glumes oblanceolate as in A. spicatum but bigger, 7-12 mm long excluding the awns, as in A. trachycaulum. Leaves rather narrow and tightly inrolled, their pubescence as in A. spicatum. Glumes glabrous to scabrous. Local: Twin Butte and Peace River Town, less convincingly at Yarrow Creek. Also in Glacier Park, Montana. -- wAlta, US.

5. A. cristatum (L.) Gaertner (A. cristatiforme Sarkar; A. desertorum Fischer; A. pectiniforme R. & S.) -- Crested Wheatgrass -- Spikelets divergent, crowded, often pectinately divergent in a rather short and broad spike. Tufted; glabrous to pubescent. Spikelets rather broad and flabellate. Glumes and lemmas with a short awn, their curved tips deflexed upwards and forming vertical rows of curved awns. Early summer. Commonly seeded for artificial prairies and as a soil binder along roads, etc., readily reseeding itself and casually cropping up here and there, but not aggressive. -- Mack-Y, L, NS, Q-(O)-Man-BC, (US), Eur -- Plate 21 page 89.

A variable and variously subdivided species. When the division is genetic the diploid ( $2n = 14$ ) phase is called A. cristatum and the tetraploid A. pectiniforme. The more commonly used morphological segregates are A. sibiricum for the narrower and elongate spikes, while A. cristatum is retained for the short and broad type, and A. desertorum for the more average type. Other classifications have been used, one of them is discussed by Hitchcock 1969. We are not yet convinced that our material can be realistically subdivided into reasonably distinct species.

6. A. triticeum Gaertner -- Resembles a reduced version of the last. Annual. Upper sheath conspicuously inflated, 1-3 mm wide. Spike shortest. Glumes deeply conduplicate, squarishly bicarinate on back and almost gibbous at base. Anthers shortest, 0.7-1.0 mm long. Late spring. Rare weed of waste places: Maple Creek, The Hat. -- swS-seAlta, US, Eur -- Plate 22 page 90.

Also reported by Scoggan 1978 for Brandon and Winnipeg.

7. A. dasystachyum (Hooker) Scribner var. dasystachyum (A. riparium Scribn. & Sm.) -- Lemmas often densely pilose. A middling species, rather wiry, with narrow and tightly enrolled foliage. Leaves scabrous to pilose above, smoothish below. Glabrous to pilose in the inflorescence. Glumes (3)-5-6-(7.5) mm long. Anthers 3-5 mm long. Early summer. Common in grassy places. -- (Y), wO-swMan-BC, US -- Plate 22 page 90.

Occurs east of us as a railway adventive and also on the Great Lakes as var. psammophilum (Senn & Gillett) E.G. Voss, the latter with lemmatic pubescence longer, the paleas and the spike internodes also longer.

Another variant was listed in our *Énumération* of 1967 as A. dasystachyum var. sericeum (Hitchc.) Boivin, but is probably best treated as A. macrourum (Turcz.) Drobov (= A. sericeum Hitchc.); it is a more vigorous and tufted plant, the leaves flat, (3)-5-(9) mm wide, the oblanceolate glumes 7-10 mm long, the lemmatic pubescence longer, and the anthers 1.5 mm long. A. macrourum is more closely related to A. trachycaulum from which it differs by its oblanceolate glumes and pilose lemmas; it is perhaps only varietally dis-



tinct from the latter. A. macrourum ranges from Mackenzie to Alaska.

7X. A. dasystachyum X spicatum (A. spicatum var. inerme AA.) -- Leaves pubescent in the manner of A. spicatum. Otherwise not obviously different from the less pubescent extremes (var. riparium) of A. dasystachyum, the glumes and lemmas quite smooth. Banff. -- swAlta.

We are more or less following Bowden 1965, 1966 in placing here two Banff collections, Senn 2676 and 46-200-4 (DAO), which Bowden actually postulated to represent A. dasystachyum var. riparium X spicatum var. inerme. But we are unconvinced that var. inerme had anything to do with this putative hybrid as var. inerme is not known to occur in our area or in adjacent B.C. Our postulated parentage merely implies that awnlessness is dominant over awns in this combination.

We are not even fully convinced that we are here dealing with hybrid material. We speculate that in the absence of a chromosome count these Banff specimens would have been identified with the more glabrous phase of A. dasystachyum and given no further thought. After all, the difference in leaf pubescence is small and all too often is not clear cut.

But all our native Agropyron have chromosome numbers of 28 or more, except A. spicatum which is known to have 14, 21 or 28 and when the Banff collections proved to have only 17 chromosomes, they were first identified A. spicatum var. inerme, probably on the account of the glabrous and awnless spikelets. Perhaps because of the obvious presence of stolons, both collections were later revised successively to A. dasystachyum var. riparium X spicatum var. spicatum, then to A. dasystachyum var. riparium X spicatum var. inerme. We find the first of the two formulas to be less incongruent with the data relevant to the Banff collections.

7Xa. A. pseudorepens Scribn. & Smith -- Hybrid of A. trachycaulum. Tufted and somewhat stoloniferous. Glumes and lemmas scabrous to pilose. Leaves flat, 3-5 mm wide. Spikelet disarticulating at maturity while the glumes remain on the rachis in the manner of A. trachycaulum. Glumes short and oblanceolate as in A. dasystachyum. Anthers 1.0-2.5 mm long. Here and there. -- Y, Man-BC.

Ours is the typical nothomorph. Around the Great Lakes one of the putative parents becomes A. dasystachyum var. psammophilum and the resultant local hybrid is the nothomorph A. pseudorepens nm. Sennii Boivin, mainly detectable by its somewhat longer glumes, 10-12 mm long.

8. A. albicans Scribn. & Sm. (var. Griffithsii (Scribn. & Sm.) Beetle; A. Griffithsii Scribn. & Sm.) -- Resembles A. spicatum with its divergent to spreading awns. In small tufts with numerous stolons, the stems thin and wiry, often geniculate-decumbent at base. Herbage light green or slightly glaucous. Leaves scabrous above, nearly erect and only (0.5)-1.0-(2.0) mm wide. Spikes a bit paler and soon curing to straw-colour. Glumes and lemmas villous, or at least scabrous on the nerves and internerves, the glumes otherwise short and oblanceolate as in A. dasystachyum. Anthers 4.0-4.5 mm long. (Late spring?). Steppes. -- S-BC, US -- Plate 22 page 90.

Regarded by Hitchcock 1969 as the putative hybrid A. dasystachyum X spicatum.

9. A. Smithii Rydb. var. Smithii (var. molle (Scribn. & Sm.) Jones) -- Bluestem, Go-Back-Grass -- Ubiquitous in the prairies and readily recognized, even when sterile, by its bluish, glaucous and stiffly divergent foliage. Sheaths smooth. Leaf scabrous to puberulent at least above, the nerves thickish, often broader than the internerves. Vigorous individuals often bear geminate spikelets on the lower nodes of the spike. Strongly long-stoloniferous.

Glumes 7-12 mm long, broadest at 1-2 mm above the base, narrowed from near the base to tip. Anthers 3.5-4.5 mm long, Early summer. Very common in steppes and prairies. -- Aka, swQ-BC, US -- Plate 22 page 90.

A variation with pubescent lemmas, var. molle, is sporadic and not obviously significant. But a more southern var. Palmeri (Scribn. & Sm.) Heller with pubescent or retrorsely puberulent sheaths is apparently geographically restricted.

10. A. repens (L.) Beauv. (var. subulatum (Schreber) Rydb.) -- Couch-Grass, Quackgrass (Chiendent, Herbe de charlatan) -- Leaves finely nerved, glabrous below and nearly always sparsely pilose above with very stiff hairs, while strongly scabrous at the margin. With vigorous, long and coarse stolons. Herbage green. Inflorescence as in A. trachycaulum except that the spike is only 5-15 cm long, the glumes are nearly always smooth and the anthers are (3)-4-6-(7) mm long. Early summer. Tenacious weed of gardens and loose soils. -- G, Mack-Aka, L-SPM, NS-BC, US, (CA), SA, Eur, (Oc) -- Plate 22 page 90.

Early reports from our area should be held in suspicion unless vouchers are available for checking. Collections made in 1874 by T. Millman and T.J.W. Burgess during the survey of the 49th parallel (TRT) were identified as Triticum repens but proved to be Agropyron Smithii. At DAO the earliest collection of A. repens for each province are dated as follows: Brandon, Man., in 1918; Guernsey and Noble Ville, Sask., 1929; Edmonton, Alta., 1916.

The listing of A. elongatum (Host.) Beauv. and A. intermedium (Host.) Beauv. by Breitung 1959 was avowedly based on cultivated material. Possibly this was also the case for a report by Best 1971.

#### 56X. AGROËLYMUS Camus

Usually recognizable by the variable number of spikelets, some solitary, some geminate.

The existence of an intergeneric hybrid is a strong, yet not dirimant, contraindication to generic distinctiveness. The existence of numerous intergeneric hybrids between various members of the Triticeae is a clear indication that the group is overdivided. Indeed we would go one step further and recognize that the Gramineae are largely overdivided at the generic level; many of the genera of Grasses are more comparable to the subgenera of most other families.

There is here a good argument for lumping the offending genera into an enlarged Elymus. But such a step is not considered desirable as it would facilitate neither the handling of the taxa nor the understanding of the group.

Our general lumping approach is here strongly held in check by the need for taxonomy to remain a practical scheme of dealing with the diversity of nature. In the case of the Grasses, and in particular of our Hordeae the generic criteria are rather plain and simple and the economic importance of our genera has prompted a very large amount of research and resulted in a huge body of literature, nearly all of which is readily accessible through the rather long-standing and well established scientific names. To change names at this stage would merely impose the use of two names for each entity as the body of existing knowledge under each old name is too large to be overlooked and unlikely to be superseded for a long time to come.

The intellectual advantage of an all inclusive Elymus is not sufficient to justify the major disturbances it would create for practical users of the group. We feel similarly about certain other families, such as the Cruciferae, and we are content to recognize that, for practical reasons, the accepted

genera in certain families may be more comparable to subgenera in most other families.

1. A. Bowdenii Boivin -- Hybrid of Agropyron Smithii X Elymus innovatus. Resembles E. innovatus, similarly stoloniferous, the spikelets in two's etc., but the inflorescence often greenish, less densely villous to nearly glabrous and the spikelets often bigger, 1.4-2.2 cm long. Glumes 3-9 mm long, broadest at the base and gradually narrowed. Anthers 4-6 mm long. Rare: Banff, Beaverlodge. -- Alta-BC.

The specimens of this hybrid were originally distributed as Elymus dasystachys Trin., a name which properly applies to an asiatic species. Otherwise the occasional use of E. dasystachys name in American or Canadian botany usually refers to specimens of Elymus innovatus.

2. A. Turneri Lep. -- Hybrid of Agropyron dasystachyum X Elymus innovatus and rather similar to the next, but the glumes very narrowly oblanceolate and shorter, much shorter than the adjacent lemma. Stoloniferous. Anthers bigger, 3-5 mm long. -- (S)-Alta.

3. A. hirtiflorus (Hitchc.) Bowden (A. Mossii Lep.; Elymus hirtiflorus Hitchc.) -- Hybrid of Agropyron trachycaulum X Elymus innovatus. Resembles E. innovatus but often tufted, the glumes longer, 0.8-1.5 cm long, the spike thinner and the lemmas not so heavily pubescent. Glumes broadest towards the base. Anthers 2-3 mm long. -- n0, S-BC, (US).

A. Mossii was originally published as a hybrid of Agropyron trachycaulum X Elymus canadensis, but the original description mentioned a number of characters that do not fit well into the supposed parentage. In 1967 we therefore suggested A. violaceum X E. canadensis as a more likely parentage. We have since been privileged to examine the type specimen (ALTA) and it seems to be a good match for A. hirtiflorus as the short and narrow glumes, (0.3)-0.5-(1.0) mm wide, point to E. innovatus for the Elymus parent, while the anthers are 2.2 mm long and point to A. trachycaulum as the Agropyron parent.

4. A. colvillensis Lep. -- Apparently Agropyron violaceum X Elymus innovatus. More similar to the Agropyron parent, but stoloniferous, the spike rather dark purple and the glumes somewhat smaller. Lower leaves auriculate (= like Elymus). Spikelets mostly solitary, bearing short awns. Glumes about half as long as the lemmas and lanceolate to oblanceolate, about 1 mm wide or slightly less. Anthers  $\pm$  2 mm long. Mount Harris. -- Aka, swAlta.

Another putative intergeneric hybrid is Agropyron trachycaulum X Elymus glaucus from Waterton Lakes. It was discussed in Bot. Gaz. 118: 79-88. 1956. The justifying sheets were studied by W.M. Bowden in 1961; he considered that they were "all either Elymus glaucus or Agropyron trachycaulum, not hybrid".

#### 56X A. AGROHORDEUM Camus

Spike bearing at most nodes one normal spikelet and one or two reduced spikelets, the latter often reduced to one accessory glume, which is placed laterally to the central spikelet. Spikelets tending to stand edgewise to the rachis.

1. A. Macounii (Vasey) Lep. (Elymus Macounii Vasey) -- A frequent and conspicuous hybrid of Agropyron trachycaulum X Hordeum jubatum. Densely tufted as a Hordeum but slightly taller. Spike thin, with overlapping spikelets less than 1 cm long (excluding the awns). Awns numerous, straight or nearly so, from about as long as to twice as long as the spikelet. Accessory glumes narrow, nearly always less than 0.5 mm wide. Sterile. Occasional and usually abundant where present. -- Mack-Aka, Q-BC, US.

Probably the most common of all hybrids in our area.

## 57. SECALE L.

RYE

Like the following, but the spikelet reduced to 2 flowers and the narrow glumes not lobed, merely tapered to a long awn.

1. *S. cereale* L. -- Rye (*Seigle*) -- The asymmetrical lemma setose-ciliate along the keel and edges. Tufted annual with 4 vertical rows of flowers (and seeds). Awns very long and stiff. Glumes less than 1 mm wide in lateral view. A double row of minute white dots on each of the 3 dark green nerves on the outer face of the lemma. Early summer. Much cultivated; casually sprouting on roadsides and other loose soils. -- (G), swMack-Aka, NF, NS-BC, US, Eur -- Plate 23 page 99.

## 58. TRITICUM L.

WHEAT

Glumes and lemmas asymmetrical and keeled, the keel being located off-center and the outer face of the glume being the larger one. Glumes and lemmas trifid to multiaristate at tip, but the lobes reduced to mere teeth in our species or even to a mere shoulder on the outer face. Otherwise like *Agropyron*. Spikelet many-flowered.

- a. Keel of the glume produced into a narrow wing for its whole length ..... 1. *T. turgidum*  
 aa. Keel winged near the tip only ..... 2. *T. aestivum*

1X. *T. turgidum* L. cv. *Durum* -- Hard Wheat, Macaroni-Wheat (*Blé dur*) -- Cultivated hybrid of *T. monococcum* L. X *T. speltoides* (Tausch) Gren. Sheaths and leaves smooth. Spike usually with very long and very coarse rough awns. Spikelets usually villous. Otherwise much like the following. Early summer. Casually spontaneous in loose soils, usually along roadsides and around elevators. -- Man-Alta, Eur -- Plate 23 page 99.

2X. *T. aestivum* L. -- Wheat, Soft Wheat (*Blé*, *Blé tendre*) -- Cultivated triple hybrid of *T. aegilops* Beauv. X *T. turgidum* L. Sometimes smooth, but usually with the sheaths retrorse-scabrous while the leaves are antrorse-scabrous. Tufted annual with stiffly erect stems and fattish spikes, usually awnless. Glumes ± ovate, pale yellowish-green and irregularly striped in deep green towards the tip. Early summer. Most common crop plant in our area, often seen as a volunteer around elevators, along roadsides, etc. -- (Y)-Aka, NF, NS-BC, US, (Eur) -- Plate 23 page 99.

## 59. HORDEUM L.

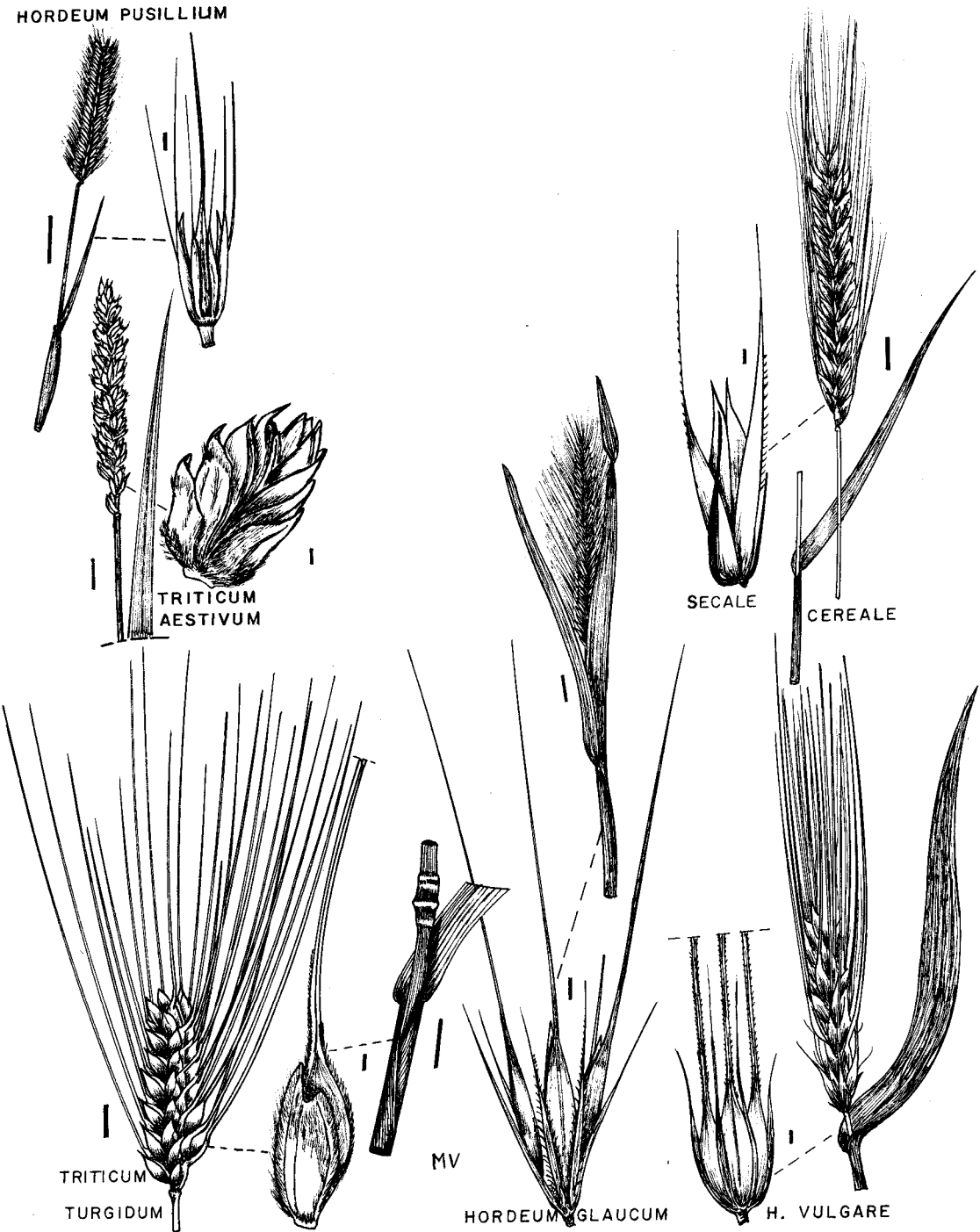
BARLEY

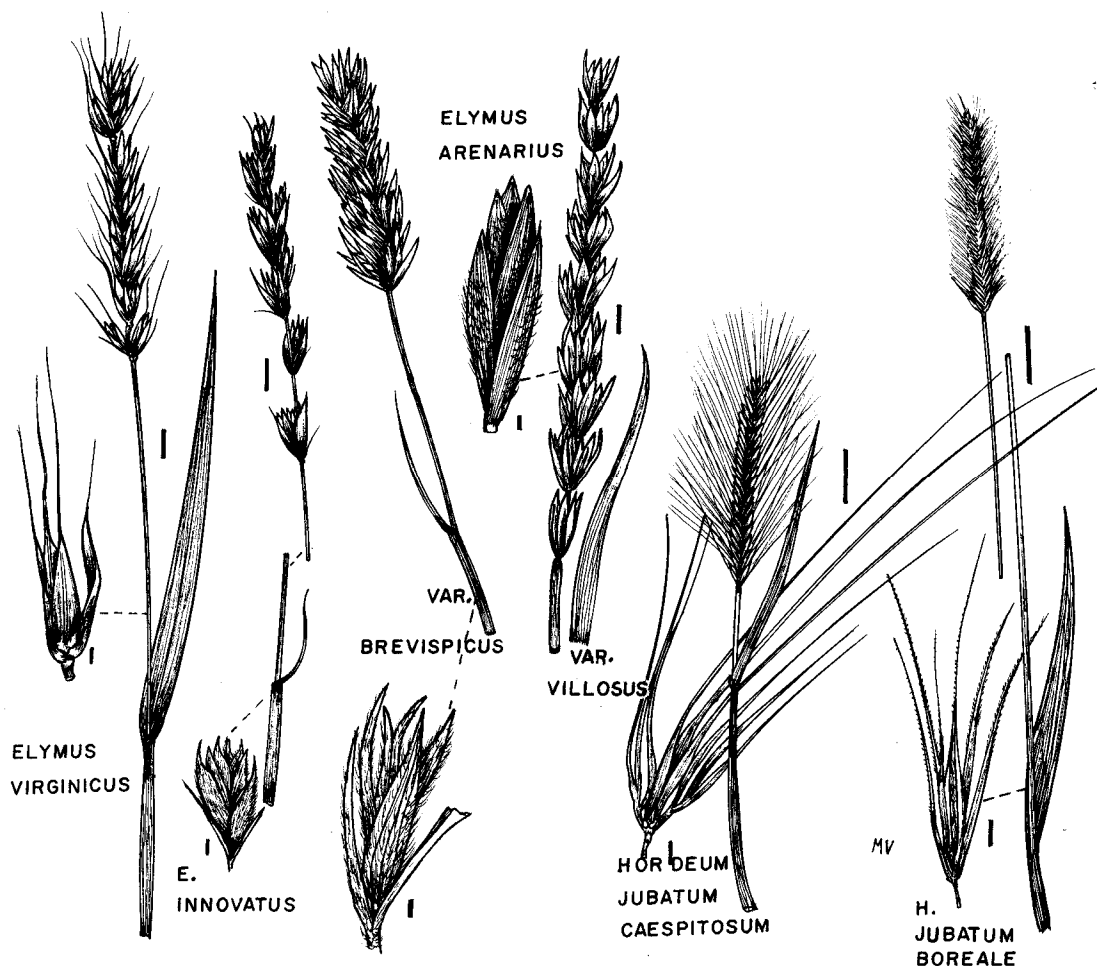
Spikelets borne 3 to a node, the central spikelet reduced to a single floret, the lateral spikelets usually stipitate and reduced to a single floret or even reduced to a few awns.

- a. All 3 spikelets sessile; blade auriculate ..... 1. *H. vulgare*  
 aa. Lateral spikelets stipitate, the stipe ± 1 mm long.  
   b. Glumes of the central spikelets setose-ciliate, the setae longer than the width of the glume ..... 3. *H. glaucum*  
 bb. Glumes merely scabrous.  
   c. All glumes reduced to awns ..... 4. *H. jubatum*  
 cc. 2 of the 6 glumes with a lanceolate body at least 1 mm wide ..... 2. *H. pusillum*  
 1. *H. vulgare* L. -- Barley (*Orge*) -- Awns very long and rough, 1-3

Plate 23

Triticum, Hordeum, Secale





JEAN-PAUL BERNARD

TECHNICIAN

Born in Saint-Hilaire-sur-Richelieu, Québec in 1921. He became deaf in 1930 but retained the ability to speak. Opened a nursery in Granby in 1936-41, later in Clarenceville 1941-42. Served as an oblate to the order of Saint-Viateur from 1942 to 1963 and was part time at their Otterburne nursery in 1950-62, being especially in charge of the grafting of fruit trees. Became an amateur botanist in 1944 and has collected plants mainly in southern Québec and Manitoba. He joined the botany staff of Université de Montréal as a part time technician in 1959, transferring full time to Université Laval in 1965.

He is the author of a number of botanical papers and co-author, with Doris Löve, of the Flora of Otterburne (1959). He is currently preparing a flora of the campus of Université Laval. He has proved to be an exceptionally capable and versatile assistant in the processing for publication of various research papers, especially those of B. Boivin and L. Cinq-Mars.

times as long as the spike, those from the lower part of the spike tending to be longer and often reaching the level of the upper. Leaves auriculate at base into a lanceolate, horizontal flange. Fertile flowers 3 to a node, maturing 6 vertical rows of seeds. Glumes 0.3-0.5 mm wide, pilose dorsally, especially along the midnerve. Late spring. Much cultivated and spontaneous along roadsides, etc. -- G, Y-Aka, NF, (NS)-PEI-BC, (US, Eur) -- Cf. Distichon -- Two-rowed Barley (Orge à deux rangs, Paumelle) -- Lateral spikelets sterile. Mature spike bearing only 2 vertical rows of grains. Athabaska Landing. -- (G), Q, (nAlta) -- Plate 23 page 99.

2. H. pusillum Nutt. -- Little Barley -- Like a small version of the above, 1-4 dm high. Glumes of varying width: the 2 outer ones reduced to mere awns, the next 2 subpetiolate with a lanceolate blade 1.0-1.5 mm wide, the 2 central ones about half as wide. Awns about as long as the spikelet. Lateral spikelets somewhat reduced. (Mid spring?). Eroded banks; Onefour. -- swO, sAlta, US, (SA) -- Plate 23 page 99.

3. H. glaucum Steudel (H. Stebbinsii Covas) -- All glumes very narrow to nearly setaceous, the larger ones coarsely ciliate with hairs longer than the width of the lemma. Leaves auriculate as in H. vulgare. Lateral spikelets larger than the central one. Awns from the lower and upper part of the spike about as long as the spikelets, those from the middle 2-4 times as long. (Late spring?). Rare roadside weed: Jasper. -- Alta, US, SA, Eur, (Afr, Oc) -- Plate 23 page 99.

4. H. jubatum L. var. jubatum -- Squirrel-Tail, Wild Barley (Orge sauvage, Queue d'Ecureuil) -- Lateral spikelets mostly reduced to a pair of awns, sometimes with a reduced floret. Perennial and often growing in large tufts. Rachis very thin, quite flat on both faces, and each internode arched into a  $\frac{1}{2}$  circle. Awns (3)-4-5-(7) cm long, very fine and rather uniform in length. First half of summer. Common, especially on saline soils. -- (K)-Mack-Aka, L-SPM, NS-BC, US, (CA, SA), Eur -- Var. caespitosum (Scribner) Hitchc. -- Awns somewhat shorter, mostly 2-3 cm long, those from the fertile lemmas about as long as the setaceous glumes of the lateral spikelets. Awns often tinted in deep violet. -- (Mack)-Y-Aka, Man-BC, (US, CA) -- Var. boreale (Hitchc.) Boivin (H. brachyantherum Nevski) -- Awns still shorter, less than 2 cm long, those of the fertile glumes usually less than 1 cm long and much shorter than the setaceous glumes of the lateral spikelets. Moist meadows in the Cypress Hills and foothills. -- Y-Aka, nNF, seQ, swS-BC, wUS, (eEur) -- Plates 24 and 26 pages 100 and 104.

A range extension of var. caespitosum (or ssp. intermedium Bowden) to the Magdalen Islands in southeastern Quebec is to be discounted since the relevant material (MT) has been revised to var. jubatum.

## 60. ELYMUS L.

## WILD RYE

Spikelet 2 to a node, otherwise essentially as in Agropyron.

- a. Spikelets spreading horizontally ..... 9. E. Hystrix
- aa. Strongly ascending to appressed.
  - b. Awns at least as long as the lemmas.
    - c. Awns straight.
      - d. Glumes longer (excluding awns) than the first lemma ..... 2. E. virginicus
    - dd. Glumes shorter than the first lemma ..... 4. E. glaucus
  - cc. Awns arching outward.
    - e. Glumes very narrow, less than 0.5 mm wide and with only one nerve ..... 7. E. diversiglumis
    - ee. Glumes wider and longer, with 3-5 rugose nerves ..... 8. E. canadensis

bb. Awns less than half as long as the lemmas.

f. Glumes 0.7-3.0 mm wide, flat.

g. Stoloniferous; spike usually soft villous ..... 1. E. arenarius

gg. Tufted; spike usually finely scabrous ..... 2. E. virginicus

ff. Less than 0.5 mm wide and more or less setaceous.

h. Long stoloniferous; spike purplish ..... 3. E. innovatus

hh. Tufted; spike pale green.

i. Rachis internode 5-9 mm long ..... 5. E. Piperi

ii. 2.5-3.5 mm long ..... 6. E. junceus

1. E. arenarius L. var. villosus E. Meyer (var. mollis (Trin.) Kořdzumi; E. mollis Trin.) -- Wild Rye, Strand-Wheat (Seigle de mer) -- Stoloniferous, a coarse and glaucous strand grass and sand binder. Commonly around 1 m high. Spike 1-2 dm long, not aristate, but soft villous. Glumes 1.5-3.0 cm long, 1.5-3.0 mm wide. Early summer. Coastal sands and gravels: Hudson Bay, Lake Athabaska. -- G-(F-Mack), Aka, L-SPM, NS-S-(neAlta)-BC, (US, eEur) -- Var. brevispicus (Scribn. & Sm.) Boivin (var. villosissimus (Scribner) Pol.) -- Generally smaller, 2-6 dm high. Spike less than 1 dm long. Glumes 1.0-1.5 cm long. Arctic shores. -- F-Aka, nQ-nwO-nMan, (eEur) -- Plate 24 page 100.

Var. brevispicus of the arctic shores is replaced further south and inland by var. villosus. The latter was reported by Hultén 1942 and Porsild 1951 from Yukon, but since the species is known there only on the arctic coast, one would expect all the Yukon specimens to belong to var. brevispicus. And indeed this was true of all the Yukon specimens preserved at DAO and QFA, hence the omission of Yukon in the above distribution of var. villosus.

2. E. virginicus L. (var. submuticus Hooker) -- Terrell-Grass, Wild Rye -- Glumes not setaceous, but with short and straight awns. In small tufts. Base of the glume thickened, yellowish and strongly arched upwards. Body of the glume commonly  $\pm$  1 mm wide. Just before mid summer. Deciduous woods, mainly galerie-forests. -- NF, NS-BC, US -- Plate 24 page 100.

3. E. innovatus Beal -- Spike typically violet-tinted, villous and short-awned. Long stoloniferous. Glumes setaceous, shorter than the lemmas, less than 1 cm long and the lower one much shorter, often less than 3 mm long. Early summer. Dry open woods. -- Mack-Aka, nO-BC, US -- F. glabratus (Bowden) Boivin -- Lemmas scabrous near the margin, otherwise glabrous. Beaverlodge, Calgary, Crowsnest Pass, Marsden. -- S-Alta -- Plate 24 page 100.

F. glabratus (Bowden) stat. n., E. innovatus var. glabratus Bowden, Can. J. Bot. 42: 597. 1964. Not to be confused with E. Piperi.

An Alberta mention of E. villiflorus Rydb. by Rydberg 1917 may have been based on some E. innovatus collections (GH) from the Rockies.

4. E. glaucus Buckley var. glaucus (var. Jepsonii Davy) -- Awns straight and 1-3 times as long as the spikelet. Rather similar to the aristate forms of Agropyron trachycaulum except for the geminate spikelets and the narrower glumes, about 1 mm wide. Leaves (8)-10-(14) mm wide. Early summer. Mostly in light Aspen woods: Deloraine, Cypress Hills and Rockies. -- Y-Aka, wO-sMan-swS-BC, US -- Plate 25 page 103.

Has also been reported by Maher 1979 for Matador, Saskatoon and Rocanville. Three sheets from Matador at DAO were revised respectively to E. canadensis, E. Maltei and E. virginicus. The vouchers for Saskatoon and Rocanville have yet to be retraced.

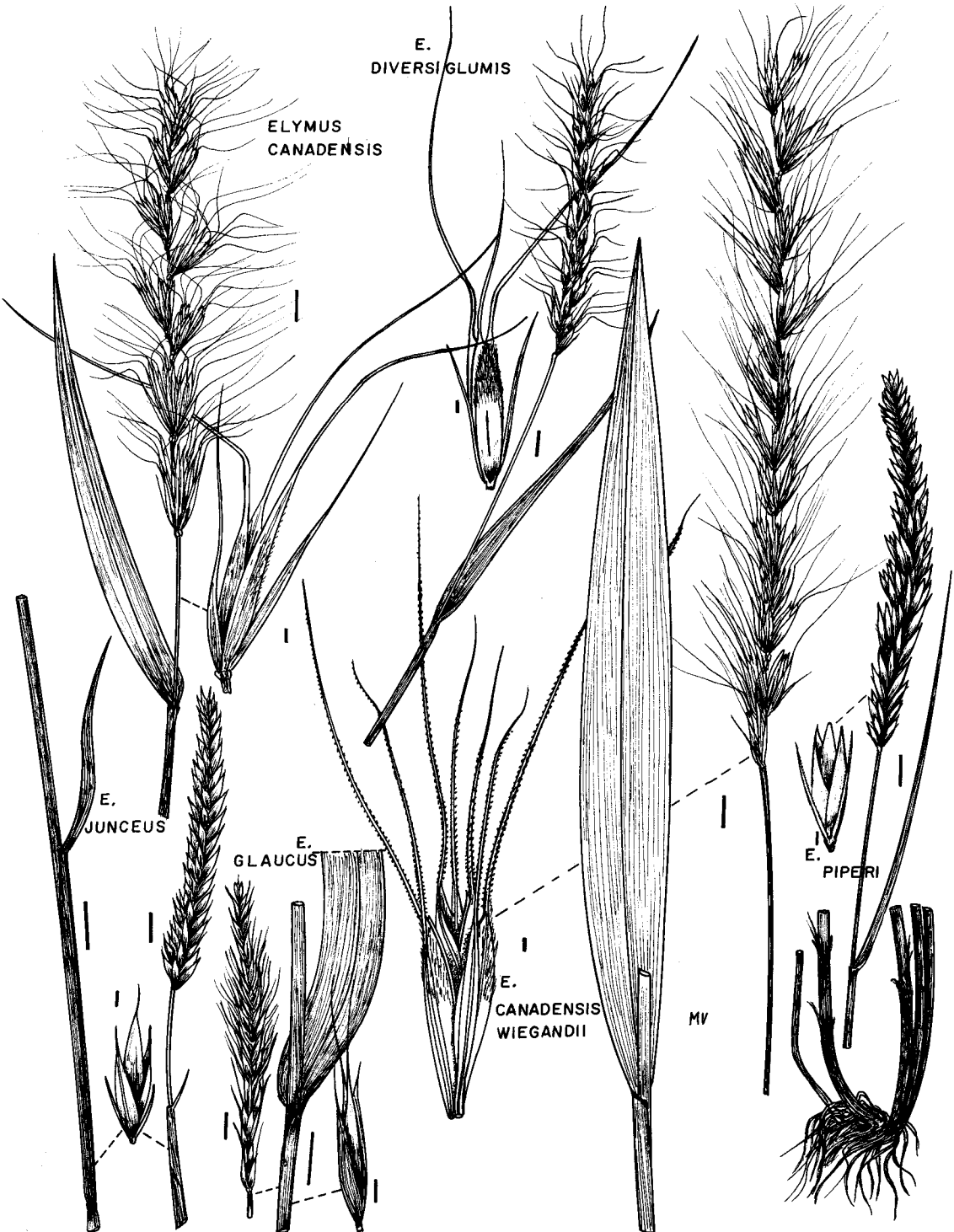
Var. Jepsonii is a sporadic form with pilose sheaths.

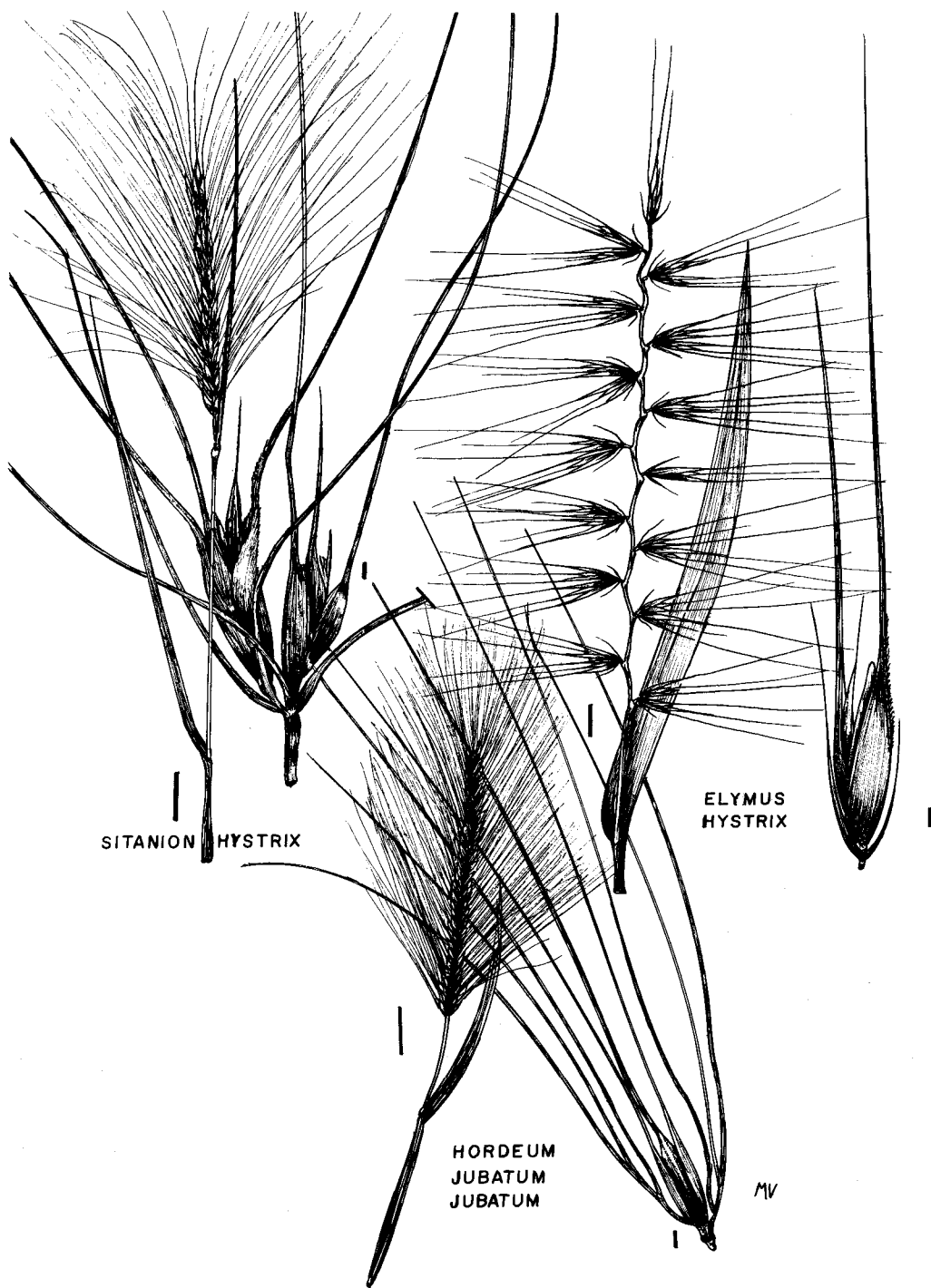
In the more western var. breviaristatus Davy (=var. virescens (Piper) Bowden) the awns are shorter than the spikelets.



Plate 25

Elymus





5. E. Piperi Bowden (E. cinereus AA.; E. condensatus AA.) -- Very coarse and tall grass, up to 2 m high and in huge tussocks. Lemmas awnless or nearly so, but the glumes setaceous and nearly as long as the lemmas. Spikelets about 1.5 cm long. Early summer. Wetter spots in steppe country. -- swS-BC, US -- Plate 25 page 103.

Upon examining the type of E. cinereus, a Nevada collection preserved at US, Bowden (Can. J. Bot. 42: 592-3. 1964) concluded that it did not belong with the coarse western Grass that was then called E. cinereus in Canada. Therefore he proposed to call our plant E. Piperi. His proposal has not been accepted by most recent authors. We have not seen the type of E. cinereus, only a photograph, but we have read the original description of Scribner & Smith (Bull. Torrey Bot. Club 29: 467. 1902) and we are inclined to agree with Bowden that Scribner's description does not fit our plants.

6. E. junceus Fischer -- Russian Wild Rye -- Spikelets rather crowded along a somewhat sinuous rachis with short internodes. In dense tussocks and about 1 m high. Spike rather villous and awnless, or with very short awns. Glumes setaceous, about half as long as the lemmas. Late spring and early summer. Sometimes cultivated and spreading to nearby land: Brandon, Saskatoon, and probably elsewhere also. -- Man-S, (US), Eur -- Plate 25 page 103.

7. E. diversiglumis Scribner & Ball (E. interruptus AA.) -- Closely resembling the next. Glumes narrower and shorter, setaceous, less than 0.5 mm wide, less than 1.5 cm long, the members of the same pair very unequal in length, the shorter one usually 4-7 mm long. Leaves somewhat villous above, often irregularly so, smooth below, less than 1.5 cm wide. Early summer. Infrequent on chernozems around wooded bluffs from Saskatoon eastward. -- wO-sMan-S, US -- Plate 25 page 103.

There have been some suggestions that we are here confronted with a series of hybrids rather than a species. Yet E. diversiglumis does not occur merely as sporadic clumps in the coincident ranges of E. canadensis and Elymus Hystris; rather it is an occasional plant within a range of its own, from the Great Lakes west to Saskatoon. Its behaviour is the normal one for a species and we are interpreting it as such.

A report of E. canadensis by Dawson 1875 from the Turtle Mountain was based on specimens (DAO) of E. diversiglumis.

8. E. canadensis L. var. canadensis -- (Seigle sauvage) -- With long awns gradually curved outwards, otherwise a middling type, tufted and perennial. Leaves less than 1.5 cm wide, smooth to scabrous on both faces, not pilose. Glumes 1.5-3.0 cm long, including the awn, commonly 1 mm wide. First half of summer. Sandy soils; frequent and conspicuous. -- swMack, NB-BC, US -- var. Wiegandii (Fern.) Bowden (E. Wiegandii Fern.) -- Leaves broader, 1-3 cm wide and usually pilose above. Glumes less than 1 mm wide. Spike more nodding. Woods, mainly alluvial woods. -- NS, NB-S, US -- Plate 25 page 103.

Var. Wiegandii is often treated as a species, but each of the diagnostic character checked showed some grading into var. canadensis. The minimum of morphological discontinuity one would expect for a species is lacking here.

8X. E. Maltei Bowden -- Hybrid with E. virginicus. Glumes thickened and yellow at base as in E. virginicus, but only slightly incurved at base. Awns irregular in length, 0.5-3.0 cm long, mostly straight. Winnipeg, Matador -- Q-S, US.

9. E. Hystris L. (Hystris patula Moench) -- Bottle-Brush-Grass -- As the name clearly suggests, the spikelets spreading horizontally. Spikelets stipitate, the stipe 1-2 mm long and remaining as a stub after the fall of the spikelet. Glumes vestigial, less than 1 mm long, or exceptionally setaceous

and up to 1 cm long. Early summer. Rare: Roseisle. -- NS, WNB-sMan, US -- Plate 26 page 104.

The range of E. ambiguus Vas. & Scribn. var. salina (M.E. Jones) C.L. Hitchc. was extended to Alberta by Hitchcock 1969. No corresponding sheet was found at WTU in 1969.

An account of E. angustus Trin. by Best 1971 and Looman 1979 seems to rest solely on cultivated material.

#### 60X. ELYHORDEUM Mansf.

Mostly with 3 spikelets, as in Hordeum, and the spikelets many-flowered, as in Elymus, but the lateral spikelets somewhat smaller than the central one.

1. E. montanense (Scribner) Bowden -- Hybrid of Elymus virginicus X Hordeum jubatum. Mostly with  $\pm 3$  spikelets to a node and with  $\pm 3$  flowers to a spikelet, the lateral spikelets slightly reduced, the upper florets very much reduced. Glumes very narrow, less than 0.3 mm wide and almost setaceous. Awns about twice as long as the spikelets. Rare: Tisdale, Cypress Hills. -- NS, Q, S, US.

#### 61. SITANION Raf.

#### SQUIRREL-TAIL

Rachis of the spike readily disintegrating at maturity, the articulation located just above the node. Otherwise as in Elymus.

1. S. Hystrix (Nutt.) J.G. Sm. -- Squirreltail -- Much resembling the more common Hordeum jubatum, similarly tufted and perennial, similar in size, the glumes similarly setaceous and the awns as numerous and about as long. But the spike much thicker, the awns coarser and the spikelets two to a node. Lowest lemma 6-9 mm long, excluding the coarse and very rough awn. (Late spring?). Eroded hills and disturbed soils, infrequent: Val-Marie, Hatton, Beechy, and westward. -- swS-BC, US, (CA) -- Plate 26 page 104.

The composition of the spike is quite variable. Usually there are two spikelets and 4 awn-like glumes to a node. Some nodes, especially the upper ones, may bear only one spikelet. Sometimes there are 5 or 6 glumes to a node. And again some glumes may be very deeply bifid. All this has led to the proposition of numerous segregates, many of which do not appear to be significant, while others, such as var. hordeoides (Suksd.) C.L. Hitchcock, are not represented among the material at hand and cannot be evaluated.

## ADDENDA

Distichlis stricta (Torrey) Rydb. var. dentata (Rydb.) C.L. Hitchc. -- This variety is perhaps the more common one west of us in B.C. (CAN, DAO, WTU). Otherwise it is much more southern in its distribution, but it has been recently recognized from southern Alberta at Brooks (DAO), Carbon (DAO) and Manyberries (DAO).

Agrostis alba L. was apparently based on Poa nemoralis and our plant should be called A. stolonifera L.

Agrostis exarata Trin. -- The typical phase, var. exarata, has been reported to extend eastward to Alberta and Saskatchewan by Holmgren 1977 and Scoggan 1978 but this needs checking. In our var. minor the glumes are 2-3 mm long and acute at tip but awnless. In var. exarata the lower glume is 3 mm long or more, including a short awn which does not exceed 1 mm.

Eragrostis cilianensis (All.) Mosher has been rejected by some authors on the basis that Allioni's type material, a collection by Bellardi, was a mixture of Eragrostis and Poa trivialis. However the name can be typified by the Eragrostis part of the collection and E. cilianensis need not be rejected in favor of E. megastachya (Koel.) Link.

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