

## **How to know grasses by the leaves.**

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Grasses

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M<sup>c</sup>Alpine





*C. Coote.*



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# HOW TO KNOW GRASSES BY THE LEAVES.

BY

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## PREFACE

BY

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*18 PLATES CONTAINING 200 FIGURES.*

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## P R E F A C E.

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A WANT has long been felt of some simple and attractive guide to the identification of the common pasture grasses by their leaves. Mr M'ALPINE has at length devised a means by which they can be definitely classified and presented to the student of nature, in such a way that no doubt is left as to the identity of any of our common grasses, at any season of the year. In practical experience it has long been felt that in determining the quality of a pasture, a judgment formed from the appearance of a field, when the grasses are in flower, is most unsatisfactory. If land is grazed, stock naturally eat the grasses they prefer, so that the best grasses are rarely permitted to run to seed to any extent, and they are, consequently, liable to become less abundant, unless they are enabled to extend and perpetuate their species by lateral root budding. A tendency to this is fostered, even among annual grasses, when they are prevented from completing their natural cycle of life and coming to maturity in the one season. Inferior grasses, on the other hand, are neglected by stock,



and allowed to mature their seeds. They therefore appear to the casual observer to be present in greater proportion than an examination and identification of the roots would bear out. It is clearly evident that a pasture known to be of good quality might, from its general appearance, mislead the inexperienced, unless it were one, such as is found in the fen country of Lincoln and Cambridge, eaten down uniformly, and never permitted to run to seed. Recent discussions in the agricultural press, as to the quality and presence of ryegrass in old pastures, brought up the subject in full force, and showed how little was really known, even by the greatest authorities, about the nature and composition of our pastures. It therefore became a matter of necessity to find a key to the mysteries of the complex herbage in permanent pastures, whereby it could be readily analysed at any season of the year.

Mr. M'ALPINE has made the necessary discovery ; and, after all, it is a very simple matter, although a considerable amount of labour was involved, in working out the details of the less important grasses, to make the work one of value alike to the scientific and to the practical man.

The structural characters of many of the grasses had been studied in both Germany and Denmark, but where Mr M'ALPINE has touched upon the work of others, as he was bound to do in dealing with such



a subject, he has fully and gracefully acknowledged his indebtedness. One important feature of the work, which is quite new, and which alone could make a production of this kind of value to a student, is the method of grouping. This is done in such a way that should a first test fail to identify a grass in one group, it is certain to be discovered by referring to another group which also contains the grass. The keystone of success, however, lies in the simplification of the whole system, by the ease with which the five most common grasses in pastures—Ryegrass, Fescue, Dogtail, Holcus, and Foxtail—can with the greatest certainty be eliminated from the mass of herbage, and separated from one another, by the colours of the bases of their leaf sheaths. This, I believe, is what no one who before endeavoured to formulate a scheme for the identification of grasses by their foliage, has ever noticed, and no doubt is the main reason why all attempts have hitherto failed from a practical and useful point of view. The great bulk of the work of separation can be carried through by the aid of the naked eye, and simply at a glance. All grasses that remain, after the five coloured ones are removed, are but a trifle to treat critically, as compared with the whole bulk.

I believe this work is one which will find its way into the hands of all teachers and students who are interested in the details of the composition of natural



pastures of European grasses, whether grown in our own country, our colonies, or without our Imperial boundaries. It will form one of the most complete guides to a system of object-lessons in country schools that has been offered to the public ; and I may be permitted to add, that arrangements have already been made to place it in the possession of the members of the Institute of Scottish Teachers of Agriculture, who during the current winter have over two thousand boys and young men under instruction in the principles of agriculture in the rural districts of Scotland.

ROBERT WALLACE.

THE UNIVERSITY, EDINBURGH,

*February 1890.*

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## INTRODUCTION.

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ALL agriculturists, and every one interested in the grass question, know that the value and habits of the various components of our pastures can be but imperfectly understood, if studied merely when the flowering stage is reached. To obtain full and satisfactory knowledge,—knowledge applicable to various districts of our country,—the species must be followed individually through their spring, summer, autumn, and winter life. In the case of pasture grasses, this is only possible when means other than the flower are used for purposes of recognition.

The difficulties connected with the identification of grasses in the flowerless condition are not at all so great as usually supposed. Practical experience shows that leaf distinctions are more readily grasped and understood than the characters of the minute flowers.

The object of this book is to classify those leaf characters which are most patent and most distinctive, so that, at any season of the year, a grass growing in a pasture may be readily determined on the spot, by the agriculturist himself, without the aid of a botanical expert.

In the first part, the wants of the working farmer are steadily kept in view, and common pasture grasses



are alone dealt with. These are found everywhere, and the schoolboys of agricultural districts might readily be taught to identify these common species.

The second part has a wider scope, and includes all the British grasses, except the rarest species, and a few annuals.

If farmers, clergymen, schoolmasters, and botanists use this method of identification, a flood of light will be thrown upon many questions at present involved in obscurity, and the agricultural community will assuredly be greatly benefited.

To obtain complete mastery of the subject, the farmer should commence with grasses which he already knows, follow the description in the first chapter, examine the corresponding figures, and then proceed to classify, as in the second chapter. This being done, it is advisable to study the plant in its entirety, as in Stebler's "Best Forage Plants." Having mastered five or six of the commonest grasses in this way, little difficulty need be experienced in following the subject to the extent necessary for making a complete investigation of any pasture, so far as grasses are concerned.

Many agriculturists are already familiar with the properties of the important pasture plants of their districts, but cannot speak with authority on the matter, being oftentimes at a loss for the botanical names to be assigned. The knowledge of these experienced men is the very thing which scientific agriculture is seeking after, and ought no longer to remain inaccessible and unutilised.

To simplify matters as much as possible, all im-



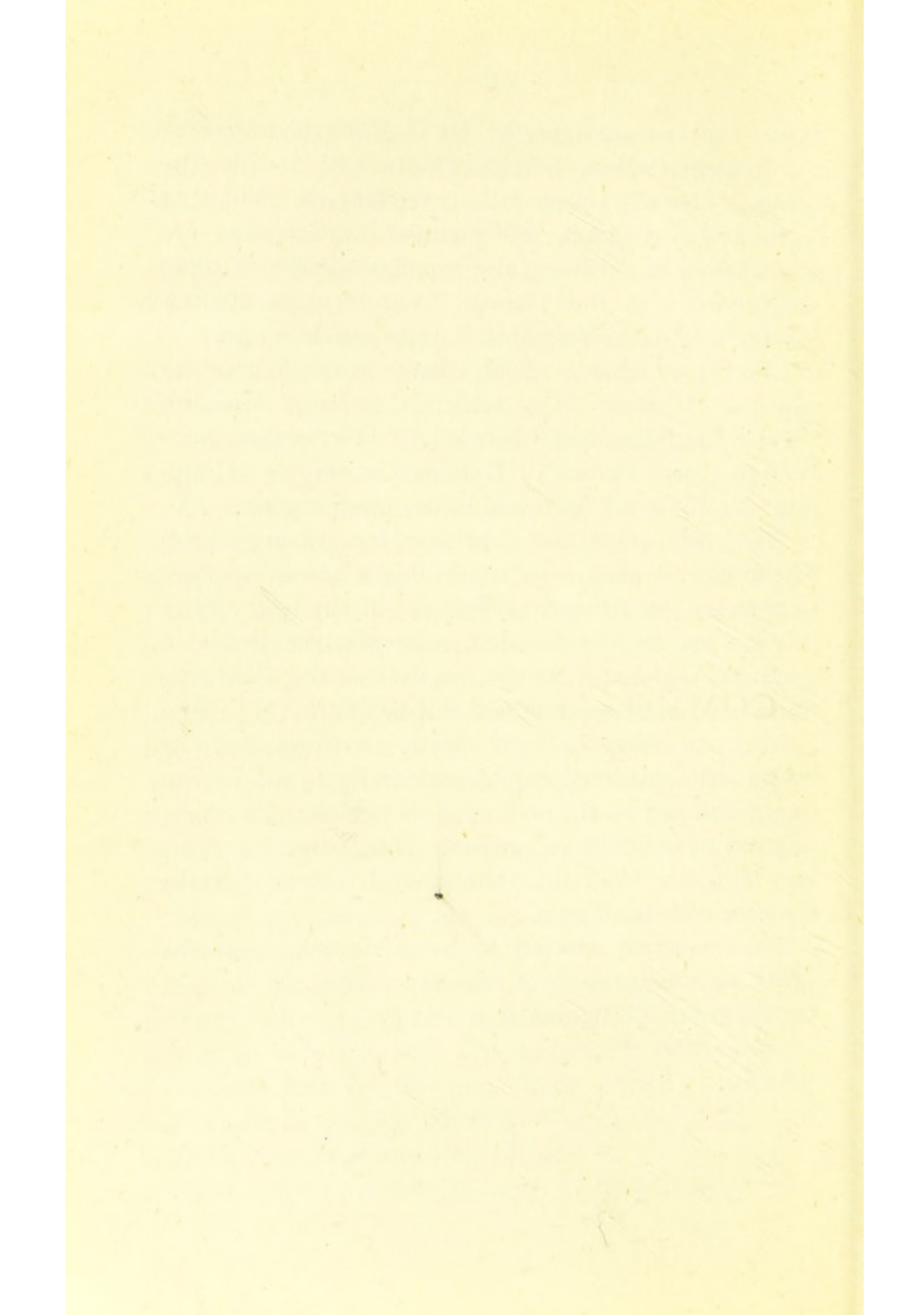
portant species are figured. Mr D. Nutt, the publisher of Stebler's "Best Forage Plants," has, with the greatest liberality, placed the excellent plates of that work at my disposal, and many of the figures are copied from it. I have also to acknowledge extreme indebtedness to the Danish "Landbrugets Kulturplanter." From Dr Samsoe Lund's article on grasses, in No. 3 of that Journal, many other figures are copied. Jessen's "Deutschlands Gräser," Vesque's "Traité de Botanique," Sinclair's "Hortus gramineus Woburnensis," Parnell's "Grasses," Sowerby's "Gramina," &c., have all been laid under contribution.

Many, who are already capable of recognising grasses by the flowers, may wish, on finding a known species, to refer to the distinctive features of the leaf. With this in view, and to facilitate reference, the Index of Common and Latin Names, as well as the Contents, have been made as complete as possible.

It is necessary to bear clearly in mind that the characters mentioned relate exclusively to the *radical leaves*, and not to the culm leaves, which are usually referred to in works on grasses. The latter are often very different from the former, and this is specially the case with the ligule.

The group is referred to by a numeral, and the figure in the group, by a number. Thus X. 3, 4, 5, means group X., figures 3, 4, and 5.





PART I.

---

COMMON PASTURE GRASSES.





## CHAPTER I.

### DESCRIPTION OF THE COMMON GRASSES.

---

#### Group I.—Characteristically Coloured Grasses.

##### RYEGRASSES AND MEADOW FESCUE.

Select those shoots whose bases appear I. 1. strikingly red.

The underground part of the shoot is flat—**perennial ryegrass.**

The underground part is not flat, but perfectly round—**Italian ryegrass or meadow fescue.**

If the pasture is old, Italian must have died out, and the round-shooted grass is, in all probability, meadow fescue. Tall fescue has all the characters of meadow fescue, and, botanically, is merely a luxuriant variety of it.

By the aid of a pocket lens, it is perfectly easy to distinguish between ryegrasses and fescue. Corresponding to each rib on the surface of the blade, there is a vein. The veins are either surrounded by the green tissue in which they are embedded, or they extend from the upper to the lower surface of the blade—in the one case, dimly distinguished by the aid of the lens; in the other, appearing as pure white lines. When, therefore, a leaf blade is held up to the light (the upper surface towards the



observer), it is quite a simple matter to determine to which category the veins belong. In ryegrass, the veins (except a few here and there) are dimly visible, whereas in fescue almost all stand out as sharply defined and pure white lines. This method of examination by *transmitted light* often reveals characters by which grasses, externally very similar, may, at once, be distinguished. The student ought to examine the blades of all the grasses in this way.

*Perennial Ryegrass.*

XIV. 7. The blade is rounded off at the base, and, usually, has a pair of acute ear-like processes. This is called an *eared leaf base*. The lower surface is always strongly shining.

XIV. 6. The margins of the blade usually run parallel till past the middle, when they begin to converge, ultimately forming a tapered, somewhat acute point.

XIV. 9. The ribs on the upper surface are prominent and rounded. The keel, that is the mid rib on the lower surface, is also prominent.

The ligule—a collar-like outgrowth at the junction of sheath and blade—is remarkably short and inconspicuous.

XIV. 8. The sheath is *flat*. Sheath flatness depends upon the arrangement of the contained leaf blades. If the blades are closely folded over one another, as is the case in this ryegrass, then the sheath is flat.

*Italian Ryegrass.*

XI. 5, 6. This resembles the preceding in almost every leaf detail. The blades are, however, *rolled*, and the sheath accordingly round.



*Meadow Fescue.*

In this case, the leaves have all the characters of XI. 5, 6. Italian.

There are, however, two distinctive features :—

1. *The veins are conspicuous by transmitted light.*
2. *The basal margin is rough.*

The roughness is due to the presence of minute, tooth-like marginal processes. Though the teeth are often too small to be directly observed by the naked eye, their presence may be readily proved by drawing the margin of the leaf backwards and forwards along the tip of the tongue. The rough quality of leaf blades ought, in all cases, to be tested in this manner.

In *tall fescue*, marginal teeth are usually very conspicuous; indeed, extra roughness of blade is the distinctive feature of this variety of meadow fescue.

**Classification of Red Sheathed Grasses.**

Blade shining on lower surface and eared; ribs prominent; ligule remarkably short.

Sheath flat.	Sheath round.	
	Margin smooth. Veins indistinct by transmitted light.	Margin rough. Veins appear as pure white lines by transmitted light.
Perennial ryegrass.	Italian ryegrass.	Meadow fescue.



## CRESTED DOGSTAIL.

- I. 2. **Select those shoots in whose bases a characteristic yellow colouring matter is developed.**

As in red sheathed grasses so here the blade is strongly ribbed on the upper, and shining on the lower surface, but the base is never eared.

- XIV. 12. The sheath is not quite so flat as that of perennial ryegrass; this is connected with the circumstance that the blades contained in the sheath are less closely folded, and thicker. Extra thickness makes the blade feel *harder* between the fingers.

- XIV. 11. The ligule has a minute character, quite unique among grasses; the short collar-like structure is peaked, opposite the blade, into a pair of *ear-like processes*. This form of ligule is described as *eared*. In sheep's fescue, the ligule, though eared, is very different.

Summary:—

- a. Sheath yellow coloured and somewhat flat.
- b. Ligule eared.

## MEADOW FOXTAIL.

- I. 3. **Select those shoots whose bases are dark, almost black, in colour.**

Meadow foxtail, to which these shoots belong, is one of the large grasses of our pastures. It is to be found on heavy soils.

The black parts are old withered sheaths. On removing these, the young sheaths are laid bare, and the very distinctive *violet* colouring matter, which these contain, is readily noticed.



The ribbing on the upper surface of the blade is very different from that of red sheathed grasses (ryegrasses and fescue). The difference may be tabulated thus :—

	Ryegrass and Fescue.	Meadow Foxtail.
Ribs . . .	Prominent and rounded.	Low and flat.

*Slender foxtail*, however, has the ribs rounded or acute, like the ryegrasses.

The nature of the ribbing is best observed when the blade is cut across by a sharp knife, and the section examined by a lens. Without cutting, the height of the ribs may be approximately estimated. This is done by holding the blade up to the light: the degree of contrast between the thin furrows and the thick ribs evidently gives a fair idea of the relative thickness of the parts.

Summary :—

- a. Black or violet sheath.
- b. Ribs low, and flat.
- c. Blade dark green in colour.

#### YORKSHIRE FOG.

Select from the grass pulled up, those I. 4. shoots which have white sheaths with red veins.—The grass is hairy.

Remove the white sheath, and hold it up to the x. 3, 4. light in order to see more distinctly the red veins in the white ground. Observe also the well-marked keel on sheath and blade.



The grass is Yorkshire fog, in Latin, *Holcus lanatus*, lanatus meaning woolly—a very appropriate name, since sheath and blade are alike clothed with *soft white wool-like hair*. The plant grows so as to form large tufts rendered conspicuous among the surrounding green vegetation by the light colour, due to the presence of wool-like hair. Between the fingers, the blades feel excessively soft—hence the name *woolly soft grass*.

Summary:—

- a.* White sheath with red veins.
- b.* Blades very hairy, and soft.

---

## Group II.—Variegated Grasses.

### TUFTED HAIR GRASS.

- II. 3, 4. This, like the common and well-known gardener's garter, has leaf blades composed of alternate strips of white and green tissue: the term *variegated* refers to this peculiarity. The thick and high ribs are dark green, and conceal the thin white strips of the furrows.

When the blade is held up to the light, the white strips are seen, appearing as five or six snow-white lines; they contrast very strongly with the dark, almost black background, formed by the thick ribs.

- XIV. 5. No other grass has *high acute ribs and bands of white tissue*.

The blades are remarkably rough on the upper surface, and in one direction, viz., from the apex towards the base. When examined by the lens, the



roughness is perceived to be due to the presence of sharp tooth-like processes on the summits of the ribs. These teeth are composed mainly of silica, and, indeed, it may be said that the surface of the plant is a siliceous shell, comparable in many respects to the shell of a mussel or of a *whelk*, only much thinner. As the thermometer indicates temperature, so tufted hair grass shows the presence of soluble silica in the soil.

. The ligule is very long and acute.

II. 1.

This grass is common on hill pastures and moorlands; it is usually very conspicuous, forming, as it does, remarkably large leafy tufts—hence the term *tufted*.

Summary :—

- a.* Five or six snow-white bands are seen when the blade is held up to the light.
- b.* Blade very rough and hard; ligule long and acute.
- c.* The plant usually forms very large and conspicuous leafy tufts.

---

### Group III.—Bulbous Grasses, with Low, Flat Ribs.

These are readily distinguished from other grasses by the *bulb-like thickening at the base of each shoot*.

#### TIMOTHY.

The leaves are light in colour, and often *glaucous*, from the presence of a superficial waxy bloom, more especially on soils of a dry type. The blades are somewhat stiff, and do not spread out horizontally, but ascend obliquely into the air.



- III. 2, 4. At the junction of sheath and blade, there is a conspicuous membrane, called ligule, from the resemblance to a ligula or tongue. In ryegrasses, fescues, and dogstail, the ligule is excessively short, and, therefore, very inconspicuous; whereas, in this case, it is a thin white membrane, nearly as long as broad, and with acute teeth at the apex. When the apical margin of the blade is drawn along the tongue, it is immediately perceived to be rough from the apex towards the base (downwards rough); on the base of the blade, the roughness is in the opposite direction (upwards rough). When the margin is examined with a lens, this roughness is found to be due to the presence of minute tooth-like processes; those directed upwards cause downward roughness, those pointing downwards, upward roughness. The upper surface of the blade has very low ribs, usually flat, but, at times, somewhat rounded. There is little or no keel on the lower surface.
- III. 5.

Summary :—

- a. Blade light-coloured, and ascending, often glaucous.
- b. Ligule a thin white membrane, longer than broad, with acute teeth.
- c. Basal margin upwards rough.
- d. Ribs very low; keel practically absent.

### *False Oat Grass.*

This is much more common in fields and on roadsides than in pastures, indeed, it can hardly occur in old pasture, as it dies out by the third or fourth



year. Pull some shoots for examination from the grass on the roadside.

The blades have usually a dark green colour, and, being thin, have a tendency to hang down; those of Timothy are much thicker, and are, therefore, capable of maintaining an erect or oblique position.

The ligule is conspicuous, and has all the characters III. 7, 9. noticed in the case of Timothy. The difference consists in the presence of fine hair on the back; to see the hair to advantage, a lens must be used. There is no *upward* roughness on the margin of the blade.

On the upper surface of the blade, the ribs are very III. 10. low, and always very flat. On the lower surface, the mid rib projects and forms the keel, which is prolonged downwards as the *keel on the sheath*. In Timothy, the keel is very slight on the blade, and absent on the sheath.

Hair is usually present, more especially on the upper surface of the blade; often it is so fine and short that it readily escapes notice, if one simply looks down upon the surface. To see the short hair to advantage, bend the blade round the finger, and look *along* the surface.

Summary :—

- a.* Blades usually dark green, very thin, dry, and hanging.
- b.* Ligule conspicuous, and hairy on the back.
- c.* No part of the margin upwards rough.
- d.* Blade and sheath keeled; upper surface with low flat ribs.
- e.* Short hair often present on upper surface of blade, and on other parts as well.



## Group IV.—Cord-rooted Grasses (in Hill Pastures).

- IV. 1. With few exceptions, the true roots of grass plants are excessively fine fibres. So-called creeping roots are not roots at all, but underground stems. In the cord-rooted group, all the roots are not fine fibres, but some are thickened into cord-like structures—very striking, when the plants which possess them are pulled out of the ground.

### MAT GRASS.

- IV. 1, 2. The blades are here remarkably hard bristles, very sharp and thorn-like at the apex. The base of the bristle is thick, and cartilaginous. The young blade is erect, but soon attains the horizontal position. The bristle blades of sheep's fescue are more or less erect, softer, and never spread out in a horizontal direction.

### FLYING BENT OR PURPLE MOLINIA.

The former name refers to the circumstance that the old blades readily detach from the parent plant. Being very thin, dry, and light, they are readily carried along by the wind. The blades often accumulate in sheltered drains on the hills, in quantities sufficient to necessitate cleaning.

- IV. 3, 4. The shape of the blade is characteristic. Starting from the narrow base, the edges gradually diverge till near the middle, when they change their course, and gradually converge, ultimately forming the acute apex. The blade is, therefore, described as *taper-based* and *acute-pointed*.



The ligule is reduced in a very interesting, and IV. 3. characteristic fashion. The membranous part is completely absent, and all that represents a *ligule* is the *tuft of hair*. A beginner might naturally suppose the ligule absent. The same ligular peculiarity is met with in *decumbent heath grass* and *common reed*.

The blade is practically ribless.

Summary:—

- a. Blade flat, acute-pointed, taper-based, and practically ribless.
- b. Ligule a tuft of hairs.

### Group V.—Acute Sheathed Grasses.

When grass is pulled from a pasture, it is easy to V. 1. identify the members of this group, in fact, the sharp (acute) edges may readily be felt by the fingers. *The shoots are quite flat on the sides, and the edges acute* (not rounded off). Perennial ryegrass, &c., have flat shoots, but the edges are rounded off.

The blades are acute, and ribless.

#### COCKSFOOT.

Among pasture grasses, this is most readily re- V. 1. cognised by the extremely broad and very flat shoots.

The blades are large and ribless, with a prominent V. 4, 3. keel on the lower surface. The margins begin to converge beyond the middle, and ultimately form a very acute point.

The ligule is a thin white membrane, longer than V. 2. broad, and, therefore, very conspicuous.



## Summary :—

- a. Sheath broad, and very flat, with two acute edges.
- b. Blade large, ribless, and acute-pointed ; keel very prominent.
- c. Ligule long, and conspicuous.

NOTE.—Two grasses are often confounded with cocksfoot, viz., smooth-stalked meadow, and reed canary grass. They are distinguished thus :—

	Cocksfoot.	Smooth Stalked Meadow.	Reed Canary.
Sheath	Flat, with acute edges. V. 1.	Flat, with round edges.	Round. VI. 17.
Blade	Acute pointed. V. 3.	Round pointed. XII. 1.	Acute pointed. VI. 15.
Ligule	Long.	Short.	Long.

## ROUGH-STALKED MEADOW GRASS.

- v. 5, 6. The sheath is flat and acute edged, but the breadth is much less than in cocksfoot.

Compared with cocksfoot, the blades are small. The base of the blade is broadest ; convergence of the margins begins at the very base, and is continued uniformly, till the acute apex is formed.

- v. 7. The upper surface is ribless, but, when carefully examined, a pair of parallel *median lines* is seen. Ribless blades with median lines are characteristic of the whole meadow grass genus (Poa).

The lower surface is keeled, and always *shining*, as in ryegrasses.

The absence of ribbing immediately distinguishes meadow from ryegrass.

Summary :—

- a.* Shoot narrow, flat, with two acute edges.
- b.* Blade relatively small, acute, tapered from the base, ribless ; shining on lower surface.

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### Group VI.—(*See Part II.*)

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### Group VII.—Bitter-tasted Grasses.

Search among the bottom vegetation of the pasture for hairy grasses (not Yorkshire fog). Pull some, and chew the blades. A peculiar bitter taste, resembling the smell of new-mown hay or woodruff, indicates the group. This characteristic taste is due to the presence of *cumarin*.

#### SWEET VERNAL GRASS.

The hair varies very much ; sometimes it is present, VII 2. sometimes, absent. The top part of the sheath has often long spreading hair, but the most characteristic feature is the presence of a long beard at the base of the blade.

The shape of the leaf blade is peculiar. The taper VII. 1, 2 which forms the acute apex often commences quite near the point, and well beyond the middle.

The base frequently shows two small rounded ears (seen by the lens), a peculiarity found in no other grass.



The ribs are quite low and fine.

- VII. 4 5. The ligule is thick, white or brown in colour, and much broader than long.

Summary :—

- a.* Tastes of cumarin.
- b.* A characteristic beard of hair at the base of the blade.
- c.* Blade often with a pair of minute round ears at base (distinction from every other grass).
- d.* Ribs low, and inconspicuous.
- e.* Ligule thick, shorter than broad.

### Group VIII.—Bristle-bladed Grasses.

MOOR MAT GRASS OR MAT GRASS.

- VIII. 1. The bristle-like blades are spread out horizontally, unless when quite young.

Excessive hardness, thick cartilaginous base, and thorn-like apex, are the distinctive features of this bristle blade.

The ligule is conspicuous, and, like the blade, thick and stiff.

When the plant is pulled up, the cord-like roots, and the fan-shaped form of the tuft, are the striking features. A fan-shaped tuft also occurs in cocksfoot.

Summary :—

- a.* Bristle thick, hard, and horizontal (when old).
- b.* Ligule thick, and fairly conspicuous.
- c.* Tuft fan-like.
- d.* Roots cord-like.

## SHEEP'S FESCUE (HARD FESCUE).

For the many varieties of this grass consult Stebler's "Best Forage Plants."

The bristle blades are more or less erect. When VIII. 5. cut, the bristle is seen to be merely a very narrow blade folded along the median line. So long as the fold persists, the bristle character is maintained.

The ligule is not seen; nevertheless a very short and characteristic ligule is present, but the base of the blade covers it over, concealing it from view.

The point of union between sheath and blade VIII. 4. should be examined by the lens. The rounding and thickening, at this spot, are very characteristic features.

The sheath is often rough from *short* stiff hair, and, in this respect, resembles the inner surface of the bristle blade.

## Summary :—

- a.* Bristles slender and erect.
- b.* Ligule inconspicuous, apparently absent.
- c.* Sheath characteristically rounded, and thickened at apex.
- d.* Roots fibrous, not cord-like.

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Group IX.—(See Part II.)

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## Group X.—Hairy Grasses.

YORKSHIRE FOG, FLYING BENT, SWEET VERNAL,  
AND FALSE OAT.

These have been already considered, and may be distinguished thus :—

Sheath white and red veined. I. 4.	Blade tastes of cumarin.	Ligule a tuft of hair. IV. 4.	Base of shoot bulbous.
Yorkshire Fog.	Sweet Vernal.	Flying Bent.	False Oat.

### YELLOW OR GOLDEN OAT GRASS.

- X. 2, 1. The blade has twenty or more fine, but distinct ribs, which are acute. The acute summit of each rib has a *single row of hair*.

The sheath is completely clothed with hair. The ligule is quite conspicuous, and has a hairy back.

Summary :—

- a. Ribs low, and *acute*.
- b. Hair abundant on sheath, arranged in single rows along each rib.
- c. Ligule conspicuous, apex toothed, back hairy.

### COUCH GRASS.

- X. 14, 12. The hair is sparse, and, at times, quite short or even absent. The ribs on the blade are very low and flat, often indistinct.

The most conspicuous and distinctive feature is seen at the base of the blade : there, *a pair of pointed ears* are readily observed by the naked eye. The very low ribs, and the ears, distinguish this from *Agrostis*.

The ligule is also unique. At a first glance, it might X. 13. be supposed absent; closer inspection might lead one to imagine that it was reduced to a tuft of very short hair; accurate observation, however, shows that it is, in reality, a remarkably short membrane with an apical fringe of fine, short, hair-like teeth.

Summary:—

- a.* Hair often sparse, and ribs faint.
- b.* Base of blade with acute ears.
- c.* Ligule unique, remarkably short, with a fringe of hair-like teeth.

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### Group XI.—(See Part II.)

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### Group XII.—Ribless-bladed Grasses with Median Lines.

These, like perennial ryegrass and cocksfoot, are XII. 4, 5. *flat sheathed*. The blades are at once distinguished from those of other grasses by the absence of ribbing (except the mid-rib), and from ribless forms like cocksfoot, by the *median lines*.

#### SMOOTH-STALKED MEADOW GRASS.

Search among uneaten clumps of grass, for *firm*, XII. 1, 2. *hairless, and ribless blades, with a pair of parallel lines along the middle of the blade*. Pull a few shoots, and examine.

The edges of the blade are *parallel*; at the very apex they come together as a *round point*.



XII. 5. Bend the blade round the finger, and examine the upper surface. A pair of parallel lines run along the middle, from base to apex: these, from their situation, are termed *median lines*. When the blade is held up to the light, and examined (preferably with the lens), the thin parts, corresponding to the parallel depressions, stand out as yellow lines, contrasting strongly with the dark background formed by the remainder of the thick blade. When faint, median lines are most readily detected by this method of examination.

XII. 3. The ligule is quite short and inconspicuous.

Summary :—

- a.* Blade with parallel edges, a rounded apex, and firm between the fingers.
- b.* The blade is ribless, with a pair of median lines. By transmitted light, the median lines appear as a pair of yellow lines. The rest of the blade, being thick, is *dark green*.
- c.* Ligule short.

NOTE.—On some soils, where this grass is not readily eaten, smooth-stalked meadow becomes very luxuriant, and, in this condition, is often confounded with cocksfoot. The following are the most obvious distinctions :—

	Cocksfoot.	Smooth-stalked Meadow.
Apex of Blade	Tapered and acute. V. 3.	Parallel edged and rounded off. XII. 1.
Median lines .	Absent. V. 4.	Present & conspicuous. XII. 4.
Ligule . . .	Long. V. 2.	Short. XII. 2.



## ANNUAL MEADOW GRASS.

Being an annual, this cannot occur in old pasture. XII. 6, 7. It may, however, be found in lowland pastures, occupying ground which has recently been bare. Search for *thin* (soft), *hairless*, *ribless*, *round-pointed blades*, *with median lines*. Select shoots for examination.

Near the apex, the edges are not parallel, but XII. 6. convergent. Between the fingers, the blade feels very soft, and often shows *transverse wrinkles*.

When held up to the light, the median lines of the blade appear as a pair of yellow bands in a *light green* ground. A light ground indicates a thin blade.

The ligule is long, conspicuous, and blunt pointed. XII. 7.

Summary:—

- a.* Blade thin and soft, with convergent apical edges, and rounded apex.
- b.* The median lines appear, by transmitted light, as yellow bands in a light green ground.
- c.* The ligule is conspicuous.

## ROUGH-STALKED MEADOW GRASS.

The blade is quite thin and soft. It commences XII. 9. to taper at the very base, and continues to do so till the acute point is formed at the apex. The lower surface is always shining. This is sometimes the case with smooth-stalked meadow grass, but very rarely with the annual species. When examined by transmitted light, the appearance is similar to that presented by annual meadow grass.

The sheath has a pair of acute edges. The V. 5. other species have flat sheaths with rounded edges.



## Summary :—

- a.* Blade tapered from the base, ending in an acute point, and always shining on lower surface.
- b.* A pair of yellow lines in a light ground.
- c.* Sheath with acute edges.

The *thin bladed* meadow grasses may be readily distinguished thus :—

	Annual Meadow Grass.	Rough-stalked Meadow Grass.
Apex of Blade .	Rounded. XII. 6.	Acute. XII. 9.
Sheath . . .	Round edged.	Acute edged. V. 5.

*Bent grass* (*Agrostis*). For the characters of this very variable grass, see Group XIV., Part II.

## CHAPTER II.

## CLASSIFICATION OF THE COMMON GRASSES.

- 
- GROUP I. *Sheath characteristically coloured.* Page 35.
- „ II. *Variegated.* Page 36.
- „ III. *Bulbous, with very low flat ribs.* Page 36.
- „ IV. *Cord rooted.* Page 37.
- „ V. *Acute sheathed.* Page 37.
- „ VI. See Part II.
- „ VII. *Bitter tasted* (from Cumarin). Page 38.
- „ VIII. *Bristle bladed.* Page 38.
- „ IX. See Part II.
- „ X. *Hairy.* Page 39.
- „ XI. See Part II.
- „ XII. *Blade ribless with median lines.* Page 40.
- Bent grass (*Agrostis*). See page 77.









*Group I.*



## Group I.—Sheath characteristically Coloured.

Blade shining on lower surface; ribs prominent; sheath red and flat.

**Perennial Ryegrass** (*Lolium perenne*).

Fig. 1. Base of shoot, shewing colour.

Sheath red and round.

**Italian Ryegrass** (*Lolium Italicum*).—Veins indistinct when the leaf is held up to the light; basal margin of blade smooth.

**Meadow and Tall Fescues** (*Festuca pratensis*).—The veins appear as white lines by transmitted light; basal margin of blade rough.

Sheath yellow, but not so flat as that of perennial ryegrass.

**Crested Dogtail** (*Cynosurus cristatus*).

Fig. 2. Base of shoot, shewing colour.

Sheath dark brown, or with a tinge of violet; ribs low and flat.

**Meadow Foxtail** (*Alopecurus pratensis*).

Fig. 3. Base of shoot, shewing colour.

Hairy; red veins in white sheath.

**Yorkshire Fog** (*Holcus lanatus*).

Fig. 4. Base of shoot, shewing red veins.

*Note.*—*Perennial Ryegrass* and *Crested Dogtail* are the only flat-sheathed grasses in this group.



## Group II.—Blade Variegated.

The narrow white strips are only seen when the blade is held up to the light (fig. 4).

### **Tufted Hair Grass** (*Aira cæspitosa*).

Fig. 1. Base of blade and long acute ligule.

Fig. 2. Acute apex of blade.

Fig. 3. Portion of blade (magnified). Observe the very high acute ribs, the summits of each with teeth, which give the file-like roughness to the blades.

Fig. 4. Portion of blade as it appears by transmitted light (magnified). The six white lines are seen.

Fig. 5. Transverse section of young blade (magnified). After Lund.

## Group III.—Bulbous Grasses.

Ribs low and flat; the ligule has no hair on its back (fig. 4).

### **Timothy** (*Phleum pratense*).—The basal margin is upwards rough.

Fig. 1. Apex of blade.

Fig. 2. Base of blade and ligule.

Fig. 3. Section of sheath; no keel.

Fig. 4. Back of ligule without hair (magnified).

Fig. 5. Transverse section of blade, shewing low ribs, and absence of keel (magnified).

The ligule has hair on the back (fig. 9).

### **False Oat** (*Avena elatior*).—The basal margin is not upwards rough.

Fig. 6. Apex of blade.

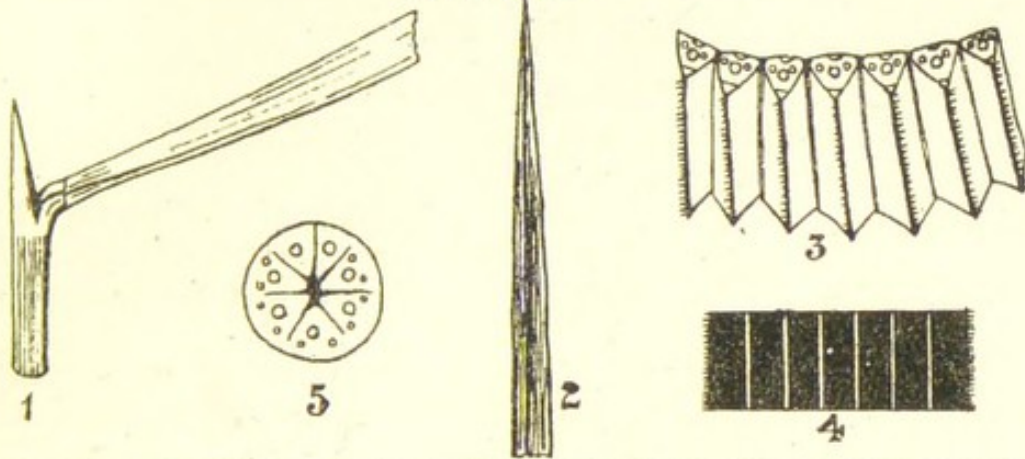
Fig. 7. Base of blade and ligule.

Fig. 8. Section of keeled sheath.

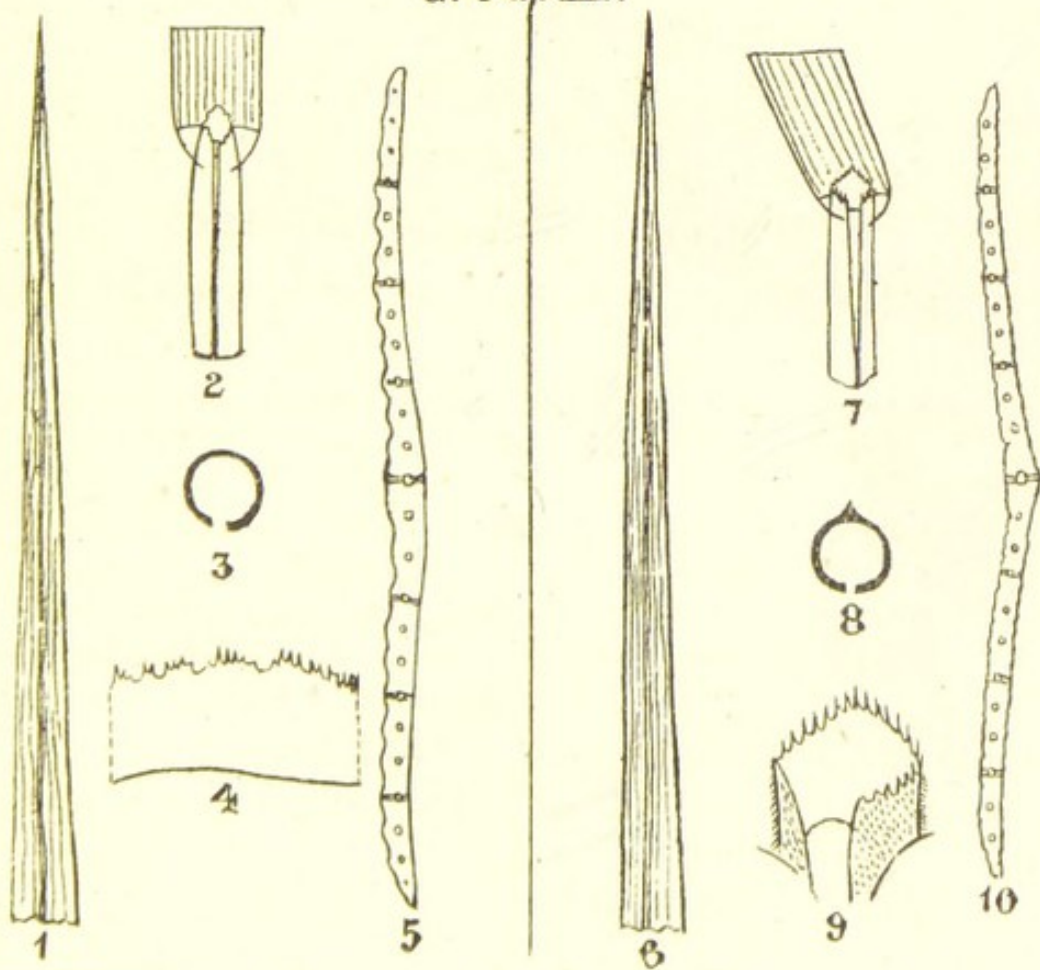
Fig. 9. The hairy ligule (magnified).

Fig. 10. Transverse section of blade, shewing the low, flat ribs, and the keel (magnified). After Stebler.

Group II.

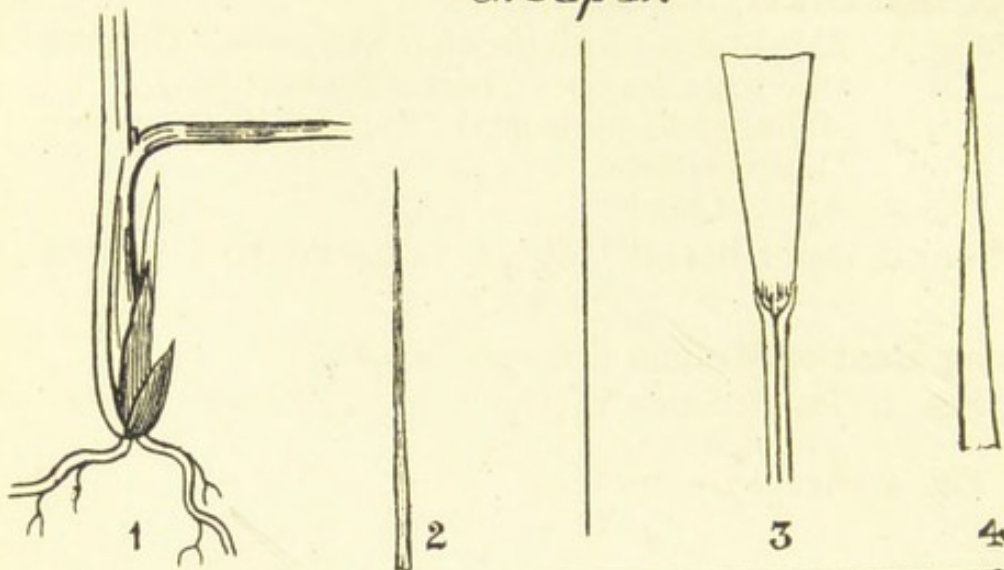


Group III.

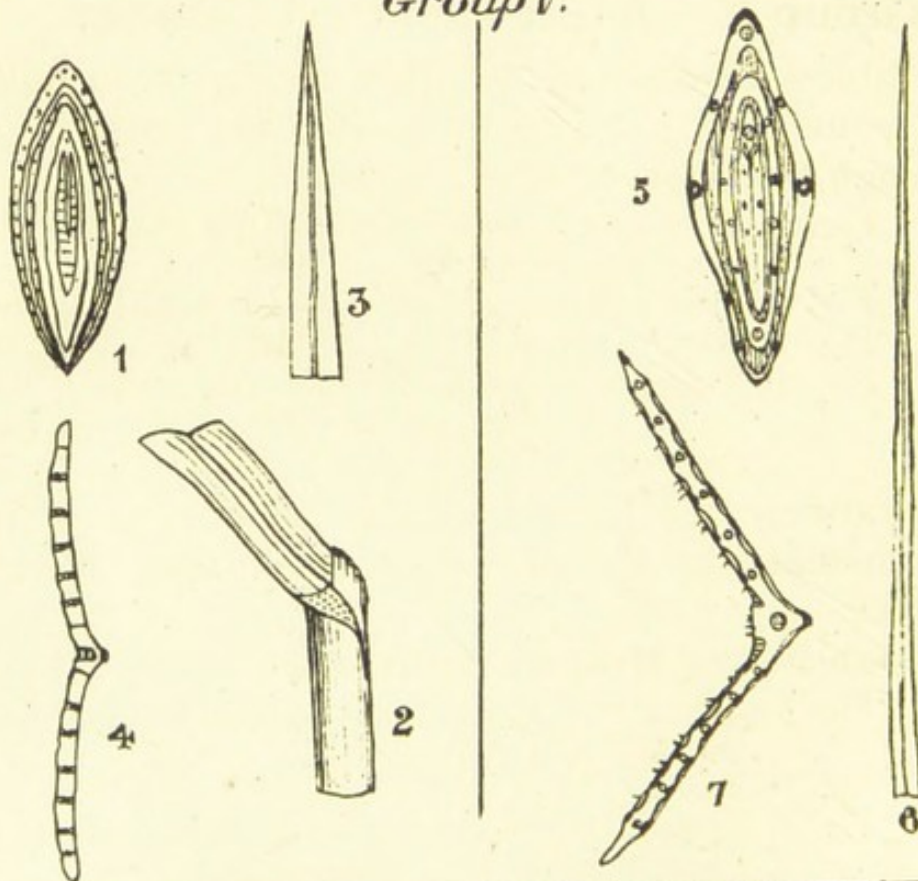




*Group IV.*



*Group V.*



### Group IV.—Cord-rooted Grasses.

Leaf a hard bristle ; ligule conspicuous, and thick.

**Moor Mat Grass** (*Nardus stricta*).

Fig. 1. Base of shoot with the cord-like roots. Observe the scale leaves at base ; the base of the old foliage leaf horizontal ; the base of the young leaf is vertical.

Fig. 2. Apex of blade.

Leaf flat and taper-based ; ligule reduced to a tuft of hairs.

**Flying Bent or Molinia** (*Molinia cærulea*).

Fig. 3. Tapered base of blade, and hairs representing the ligule.

Fig. 4. Acute apex of blade.

### Group V.—Acute-sheathed Grasses.

Large ribless blades, tapered from about the middle to the acute apex. Not shining on lower surface.

**Rough Cocksfoot** (*Dactylis glomerata*).

Fig. 1. Section of shoot, shewing the flat two-edged sheath (magnified).

Fig. 2. Base of blade and prominent obtuse ligule.

Fig. 3. Acute apex of blade.

Fig. 4. Transverse section of blade (magnified). Observe the absence of ribs and the very prominent keel.

Comparatively small and ribless blades, the taper commencing at the very base. Shining on lower surface.

**Rough-stalked Meadow Grass** (*Poa trivialis*).

Fig. 5. Section of shoot, shewing the flat two-edged sheath (magnified).

Fig. 6. Acute apex of blade.

Fig. 7. Section of blade, shewing median lines and keel (magnified). After Stebler.

### Group VI.—(See Part II.)



## Group VII.—Bitter-tasted Grasses.

### Sweet Vernal Grass (*Anthoxanthum odoratum*).

- Fig. 1. A small blade, shewing the shape.  
 Fig. 2. Base of blade. Observe the small *round ears* and the beard of hair.  
 Fig. 3. The same ; ears absent.  
 Fig. 4. The ligule (magnified). Teeth very fine.  
 Fig. 5. The ligule (magnified). Teeth coarser.
- 

## Group VIII.—Bristle-bladed Grasses (fig. 2).

Cord-rooted ; ligule distinctly visible, and thick.

### Moor Mat Grass (*Nardus stricta*).—Old bristle hard, and horizontal.

- Fig. 1. Base of shoot. Observe the roots, ligule, and blades.

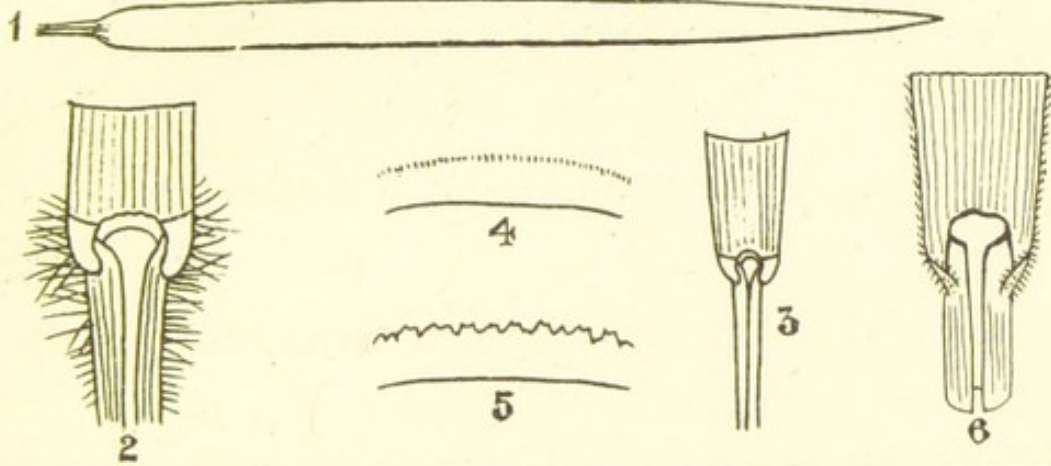
Fibrous-rooted : ligule not noticeable.

### Sheep's Fescue and its many Varieties (*Festuca ovina*). —Bristle softer and vertical.

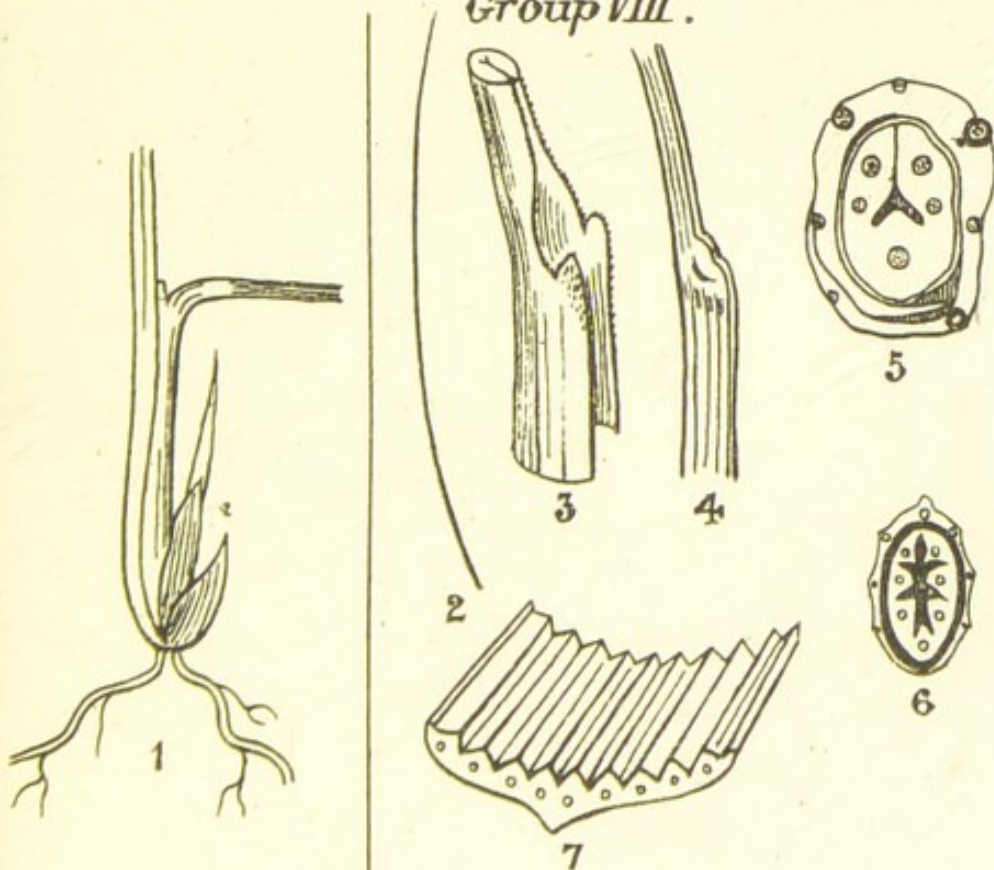
- Fig. 2. Portion of bristle-like blade.  
 Fig. 3. Base of *culm* leaf blade, shewing the ear-like ligule (magnified).  
 Fig. 4. Base of radical leaf blade. Observe the thickening where the blade joins the sheath, and the apparent absence of the ligule (magnified).  
 Fig. 5. Section of shoot (magnified). The folded ribless blade is surrounded by a sheath. After Stebler.  
 Fig. 6. Section of shoot (magnified). In this case the folded blade is ribbed. After Lund.  
 Fig. 7. Portion of an open ribbed blade (magnified). After Lund.
- 

## Group IX.—(See Part II.)

*Group VII.*



*Group VIII.*

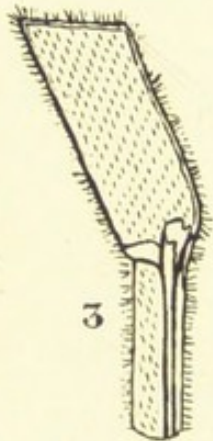




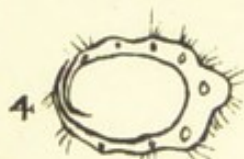
*Group X.*



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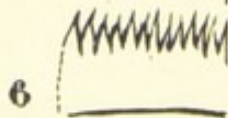
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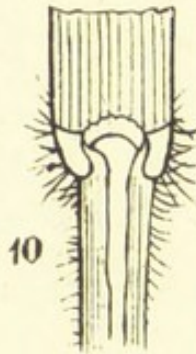
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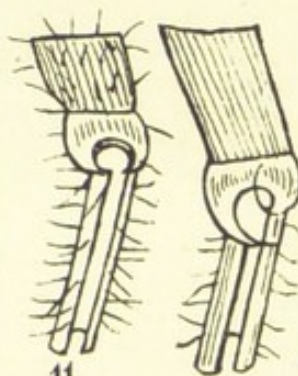
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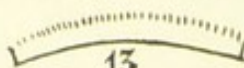


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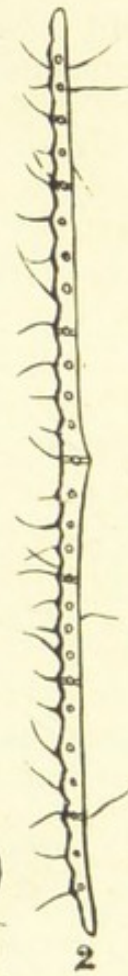


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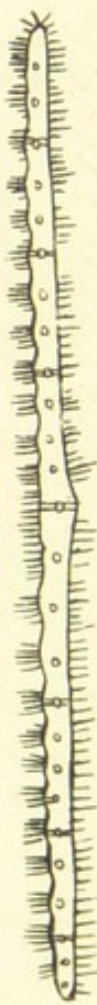
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2



15



7



14

## Group X.—Hairy Grasses.

White sheathed and red veined (I., 4).

**Yorkshire Fog** (*Holcus lanatus*).—Blades very soft.

Fig. 3. Base of blade and ligule.

Fig. 4. Section of the keeled sheath, the keel to the right.

Fig. 5. Hairy back of ligule.

Fig. 6. Hairless inner surface of ligule.

Fig. 7. Transverse section of blade (magnified). Observe the abundant hair on the low flat ribs, and also on lower surface. After Stebler.

Blade taper-based ; ligule reduced to hairs.

**Flying Bent** (*Molinia cærulea*).—The thin blade soon withers, and is carried off by the wind—hence the name “Flying bent.” Blade very thin and dry.

Fig. 8. Tapered base of blade, and ligule of hairs.

Fig. 9. Acute apex of blade.

Blade bitter-tasted.

**Sweet Vernal** (*Anthoxanthum odoratum*).

Fig. 10. Base of blade with small round ears, and beard of hair. See also VII., 1, 2, 3, 4, 5.

Blade with low *acute* ribs ; a *single row* of hair along each rib (fig. 2) ; ligule hairy on the back.

**Golden Oat Grass** (*Avena flavescens*).—Blade soft.

Fig. 1. Base of blade and ligule.

Fig. 2. Transverse section of blade (magnified). Observe the acute ribs and the hair.

Blade with low flat ribs ; ligule prominent.

**False Oat** (fig. 15) is distinguished from golden oat by the low *flat* ribs, and the bulbous base of the shoot.

Blades thin and dry.

Base of blade eared (fig. 12).

**Couch Grass** (*Triticum repens*).—Blades very thin, dry, and rough.

Fig. 11. Base of blade, with ears very short.

Fig. 12. Base of blade, the ears long, curved, and acute.

Fig. 13. The ligule (magnified). A mere margin fringed with hair-like teeth.

Fig. 14. Transverse section of the blade magnified. After Lund.

*Note.*—The low ribs distinguish this from *Ryegrass*, and the ears from *Agrostis*.

Bristle-bladed.

**Sheep's Fescue**.—The sheath is often clothed with very short, hard hair, and is, therefore, very rough. (The same is the case with the upper surface of the blade.)

## Group XI.—(See Part II.)



## Group XII.—Ribless-bladed Grasses, with Median Lines.

Blade relatively thick, and hard or fleshy, therefore dark-coloured when held up to the light.

### Smooth-stalked Meadow Grass (*Poa pratensis*).

- Fig. 1. Rounded apex of blade. Observe the *parallel* edges.
- Fig. 2. Rounded base of blade.
- Fig. 3. The extremely short ligule spread out and magnified. The transverse line marks off the ligule from the sheath. After Lund.
- Fig. 4. Transverse section of blade (magnified). Observe the relative thickness of the blade, and the thin part on each side of the middle, corresponding to a *median line*. After Stebler.
- Fig. 5. Portion of blade as it appears by transmitted light (magnified). The light band on each side of the dark mid-rib is a median line. The six black lines represent six veins, which are seen (as white lines) by transmitted light.

Blade *soft* and thin, therefore light-coloured when held up to the light.

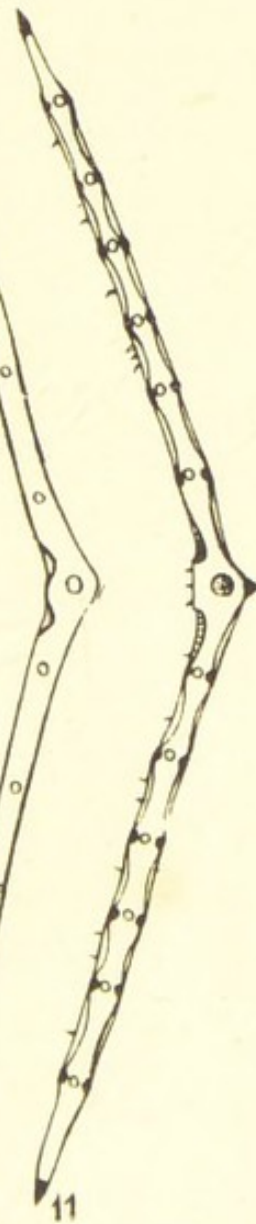
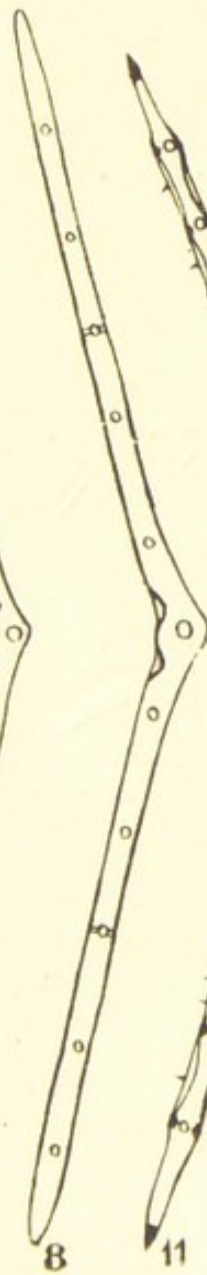
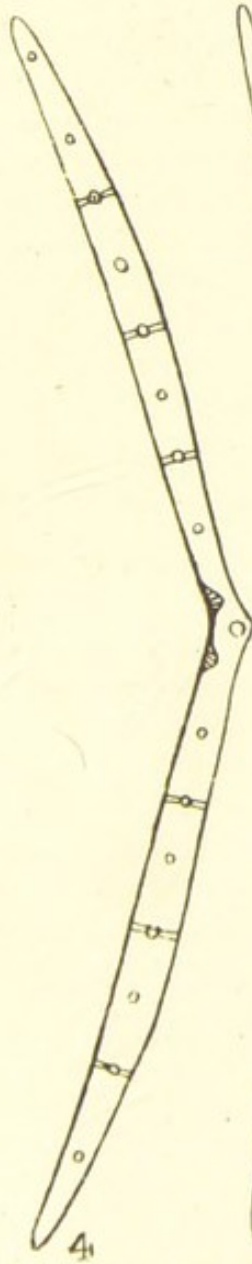
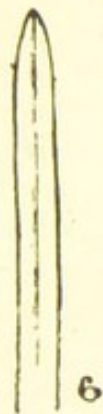
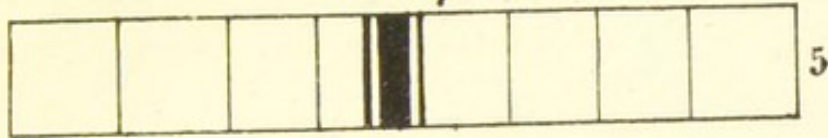
### Annual Meadow Grass (*Poa annua*).—Blade round-pointed, often transversely wrinkled.

- Fig. 6. Rounded apex of blade. Observe the edges, which are *not parallel*.
- Fig. 7. Base of blade and ligule. The prominent blunt ligule suffices to identify this species.
- Fig. 8. Transverse section of blade (magnified). Observe the relative thinness of the blade and the median lines (the thin parts). After Lund.

### Rough-stalked Meadow Grass (*Poa trivialis*).—Blade tapered from the very base to the acute apex. Always *shining* on lower surface. *Acute keel* on sheath.

- Fig. 9. Acute apex of blade.
- Fig. 10. Portion of culm with long knot. Observe the base of a *culm* leaf with a long acute ligule; the ligule of the radical leaf is short and blunt.
- Fig. 11. Transverse section of blade (magnified). After Stebler.

*Group XII.*







PART II.

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GRASSES IN GENERAL.





## CHAPTER III.

## CHARACTERS OF THE GROUPS.

**Group I.—Sheath Characteristically Coloured.** Page 49.

The colouring matter is formed in the basal parts I. 1, 2, 3, 4. of the underground sheaths.

**Group II.—Variegated Grasses.** Page 50.

Ribbon grass or gardener's garter is the most II. 4. familiar example. It is a variety of reed canary grass (*Phalaris arundinacea*) with a leaf blade composed of alternating strips of green and white tissue. The term variegated refers to the presence of these colourless strips in the green blade.

**Group III.—Bulbous Grasses.** Page 50.

The bulb is the thickened base of the shoot—not at all a root as commonly stated in books.

**Group IV.—Cord-rooted Grasses.** Page 52.

Normally, the roots of grasses are exceedingly fine IV. 1. fibres, whose purpose it is to absorb from the soil the mineral matter necessary for the sustenance of the plant. So-called creeping roots are not roots in the botanical sense, but underground stems. The grasses included in this group have thick and cord-like roots, in addition to the fine fibres.



### Group V.—Acute-sheathed Grasses. Page 52.

- V. 1, 11 The sheaths of most grasses are round. In a few species, however, the blades are folded and the sheaths are more or less flattened. If the flat (or angular) sheath has acute edges, the grass belongs to this group. All have entire sheaths and folded blades, except *Melica*.

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### Group VI.—Net-sheathed Grasses. Page 53.

- VI. 15 In the blades, and more especially in the sheaths of certain grasses, mainly *aquatics*, large chambers containing air are present. The presence of these chambers gives a netted appearance, by transmitted light, to the part in which they are present. This netted structure is the characteristic of the group.

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### Group VII.—Bitter-tasted Grasses. Page 55.

*Cumarin* is the principle which gives the characteristic taste. It is volatile, and odoriferous; the odour of new mown hay, woodruff, &c., depends on its presence. Other grasses, such as false oat, may have a bitter taste; this is not due to cumarin, but to some other substance. Grasses which contain cumurin are alone included in this group; its presence is recognised by chewing the blade.

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### Group VIII.—Bristle-bladed Grasses. Page 55.

- VIII. 2. The bristle-like (setaceous) blade is a leaf adaptation for reducing the evaporative surface of the plant. Hairiness, hardness, and wax-coxered surfaces (glaucous) are other contrivances for the same purpose,



and, either separately or combined, are frequent accompaniments of this characteristic form of leaf blade. Soils which are dry or liable to drought, such as sands or windy hillsides, are the natural habitats of these species. Some hardy plants can adapt themselves to conditions of extreme dryness by adopting the bristle form of blade; such are crested dogtail and smooth-stalked meadow grass. In *Poa maritima* the bristle-like (concave) blades serve partly as water stores, and are, accordingly, soft and succulent.

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**Group IX.—Hard-bladed Grasses.** Page 58.

Hard grasses are either bristle or broad bladed; the former belong to Group VIII., the latter are alone included here. Poor and dry soils, or those liable to drought, are the natural habitats of these grasses.

The blade is rarely flat, usually concave, or rolled up. The apex is excessively hard and sharp—a thorn to all intents and purposes. The surface is often covered with wax (glaucous), which gives a peculiar colour to the foliage.

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**Group X.—Hairy Grasses** (including those species in which the ligule is a *tuft of hair*). Page 59.

Hair, like hardness (Group IX.) and diminution of leaf surface (Group VIII.), is associated with grasses adapted for growth on dry and poor land. As moisture and richness of soil increase, the hair becomes diminished or short, and, at times, disappears; thus it happens that hairy and hairless varieties of the same species may be found. The sheath part of the leaf



retains hair with great pertinacity, and ought, in all cases, to be examined in order to determine whether the grass belongs to this group or not. If the hair is so short that it escapes the eye, and merely causes roughness, the grass will be more conveniently found in some other group. In *Phragmites* *Molinia*, and *Triodia* the ligule is reduced to a tuft of hair, and these genera are included here for convenience.

### Group XI.—Eared Grasses. Page 65.

XI. 1, 13. Ears are tooth-like appendages at the base of the blade—merely diminutive representatives of the large ear-like processes which occur at the base of arrow-shaped blades, such as sorrel. Examples of grasses easily distinguished by the ears are :—

<i>Eared.</i>	<i>Not Eared.</i>
Couch grass	Bent grass
(Triticum).	(Agrostis).
Barley	Brome grass
(Hordeum).	(except <i>Bromus asper</i> ).
Sand lyme grass	Sand mat grass
(Elymus).	(Psamma).
Rye grass	Crested dogtail
(Lolium).	(Cynosurus).

### Group XII.—Ribless Grasses with Median Lines. Page 68.

XII. 4, 5. Simple inspection of the upper surface of the leaf blade usually suffices to identify the members of this group. It is often advantageous to roll the blade round the finger before examining the surface. In

*Poa nemoralis* the median lines are most noticeable near the apex of the blade. The *median lines* are a pair of furrows which mark off a flat mid-rib. Cocksfoot, though a ribless bladed grass, does not belong to this group, because the median lines are wanting.

*Triodia*, at first sight, seems to belong to this group, but close inspection shews that the blade has low, flat, and very broad ribs. It is, therefore, assigned to the next group.

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### Group XIII.—Low (Flat) Ribbed Hairless Grasses. Page 72.

As a rule, the members of this group are immediately identified by a naked-eye examination of the upper surface of the blade. At times *Phleum* has *rounded*, rather than flat, ribs. The sheath should be noted to see that hair is absent. Short hair is most readily detected by looking *along*, not *at* the surface.

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### Group XIV.—High (Acute or Round) Ribbed Grasses. Page 73.

This group includes the species with *prominent* ribs; in *Agrostis*, the ribs are least prominent. Although well-marked ribs are usually acute, they may at times be even rounded or decidedly flat at the summit. To determine this point, the blade ought to be cut across, midway between apex and base, and the section examined by a lens.



## Annual and Perennial Grasses.

In many cases, it is important to be able, from direct examination of a species, to determine whether it is annual or not. When a grass, pulled up by the roots, shows a creeping underground stem, that is a certain indication of a perennial plant. Again, when relics of the preceding year's vegetation still persist in connection with the parent, a persistent plant is before us. Perhaps the most satisfactory procedure, is to tease asunder the leaves of the component shoots. If the grass is an annual, flowers will be found in all the shoots, *i.e.*, all the shoots are *fertile*. If the plant is destined to persist for a longer period than a year, shoots will be found with no flowers laid down in their interior; these *barren* shoots, as they are called, are another certain sign of a persistent grass; if all the shoots are barren, the grass is biennial, and in the first year of its growth; in the second year, all the shoots are fertile. See Stebler's "Best Forage Plants."

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## Group I.—Characteristically Coloured Grasses.

Blade shining on lower surface ; ribs prominent ; ligule remarkably short.

Red sheathed ; shoot flat, because the blades are folded.

**Lolium Perenne, L.** (Perennial ryegrass).

Fig. 1. Base of shoot shewing colour.

Red sheathed, shoot round, because the blades are rolled (I. 1).

**Lolium Italicum, Braun** (Italian ryegrass).—The veins do not appear as white lines when the blade is held up to the light and examined by a lens ; basal margins smooth.

**Lolium temulentum, L.** (Darnel).—An annual, very like *L. Italicum*. Reputed poisonous.

**Festuca elatior, L.** (Meadow and tall fescues).—The veins appear as white lines by transmitted light ; basal margin rough.

Old sheaths yellow.

**Cynosurus cristatus, L.** (Crested dogstail).—Blades earless, thicker than perennial ryegrass and less closely folded, hence the shoot is more rounded. Ligule eared (XIV. 11).

Fig. 2. Base of shoot shewing colour.

Sheath dark brown or violet ; ribs low and flat.

**Alopecurus pratensis, L.** (Meadow foxtail).

Fig. 3. Base of shoot shewing colour.

(**Alopecurus agrestis, L.** (Slender foxtail). Annual. Ribs acute.)

Hairy ; red veins in white sheath (fig. 4).

	<b>Holcus lanatus, L.</b> (Yorkshire fog.)	<b>Holcus mollis, L.</b> (Creeping soft grass.)
Growth.....	Tufted .....	Creeping.
Shoot .....	Contracted .....	Lengthened, with two rows of leaves.
Nodes .....	Hair little or none.....	<i>With a downward sloping ring of hair.</i>



## Group II.—Variegated Grasses.

White strips narrow, only seen when the blade is held up to the light (fig. 4).

**Aira cæspitosa**, L. (Tufted hair grass).—The snow-white strips are six (sometimes five) in number.

Fig. 1. Base of blade and long acute ligule.

Fig. 2. Acute apex of blade.

Fig. 3. Portion of blade magnified. Observe the very high acute ribs, the summit of each with teeth giving the excessive roughness to the blade.

Fig. 4. Portion of blade, magnified, as it appears by transmitted light. Observe six snow-white bands.

Fig. 5. Section of young blade, magnified. After Lund.

White strips broad, and seen without holding the blade up to the light. These are cultivated for ornament.

**Dactylis glomerata**, var. **picta** (Variegated cocksfoot).—Sheath flat (V. 1).

**Phalaris arundinacea**, var. **picta** (Ribbon grass).—Sheath round (VI. 17).

## Group III.—Bulbous Grasses.

Ribs very high (twice as high as broad) and very acute.

**Alopecurus bulbosus**, L. (Bulbous foxtail).

Ribs very low and flat. Sheath not keeled (fig. 3).

**Phleum pratense**, L. (Timothy or catstail).—*Basal margin* of blade with teeth directed downwards, therefore *upwards rough*. Ligule not hairy on the back.

Fig. 1. Apex of blade.

Fig. 2. Base of blade and ligule.

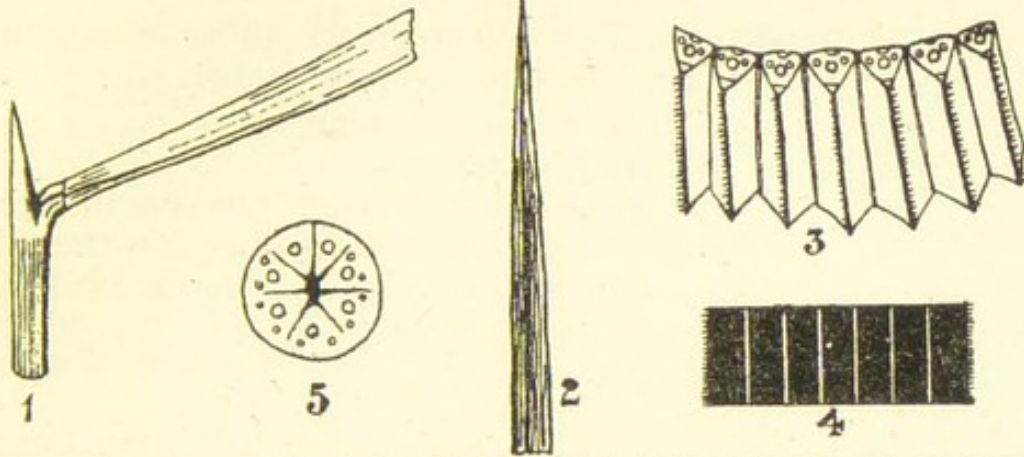
Fig. 3. Transverse section of round, keelless sheath (diagram).

Fig. 4. Ligule, magnified, without hair.

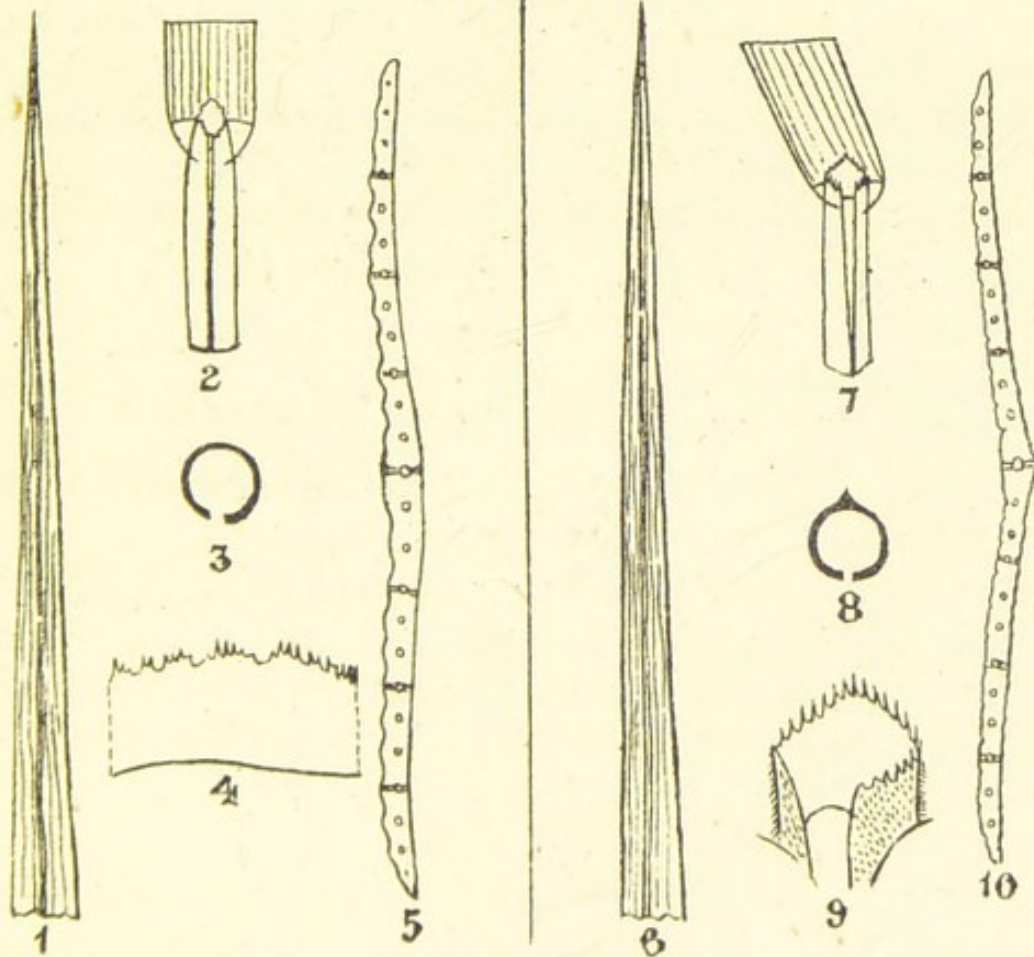
Fig. 5. Section of blade with low ribs. After Stebler.

**Phleum Boehmeri**.—Schrad. Ligule shorter than broad. Very rare.

Group II.



Group III.







Ribs very low and flat. Sheath keeled (fig. 8).

**Avena elatior**, L. (False oat grass).—Often hairy (*see* Group X.). Blades thin and dry. *Ligule hairy on the back*. Margin never upwards rough.

Fig. 6. Apex of blade.

Fig. 7. Base of blade and hairy ligule.

Fig. 8. Transverse section of round, keeled sheath (diagram).

Fig. 9. The ligule, magnified. After Lund.

Fig. 10. Section of the blade shewing the keel, and low flat ribs. After Stebler.

Blades ribless, with *median lines*.

**Poa bulbosa**, L. (Bulbous meadow grass).—A thin and narrow-bladed, taper pointed, and long liguled Alpine Poa.

## NOTES ON GROUP II.

1. *Aira*.—The other *Aira* species are bristle-bladed. Alpine forms of *A. cæspitosa* have shorter, and narrower (almost bristle-like) blades, but in all cases the white strips mark the species.
2. Variegated cocksfoot is now very commonly cultivated.
3. All the members of the group are long liguled. The blades are folded in *Aira* and *Dactylis*. The sheath is entire in cocksfoot.

## NOTES ON GROUP III.

Note 1.—*Phleum*. The other species of this genus, viz., *P. asperum*, Vill., and *P. arenarium*, L., are never bulbous. *P. arenarium* is distinguished from all the other species by the *folded blades*.

Note 2.—*Poa*. *P. Alpina*, L., is a very near ally of *P. bulbosa*. This somewhat bulbous species is thick and broad bladed: the point of the blade is abrupt, not tapered.

All Poas have ribless, keeled blades, with median lines. *P. maritima* has no keel.



### Group IV.—Cord-rooted Grasses.

Blade a hard bristle—*Nardus stricta*, L. (Moormat grass).

Blade a very *thin*, dry, *flat* band—*Molinia cœrulea*, Moench. (Flying bent).

### Group V.—Acute-sheathed Grasses.

Sheath flat, with two acute edges (fig. 1).

Blade ribless, without median lines.

**Dactylis glomerata**, L. (Cocksfoot).

Fig. 1. Section of shoot shewing the two-edged sheath (magnified). After Stebler. 2. Base of blade and prominent obtuse ligule. 3. Acute apex of blade. 4. Transverse section of blade (magnified). Ribless with a prominent keel.

Blade ribless, with median lines—*Poa*, *Glyceria*, and *Avena* species.

**Poa trivialis**, L. (Rough-stalked meadow grass).—Shoot flat, but much narrower than that of cocksfoot: *the blade tapered from the very base to the acute apex*, shining on the lower surface, and thin.

Fig. 5. Section of shoot shewing the two-edged sheath (magnified). 6. Acute apex of blade. 7. Transverse section of blade (magnified) shewing the median lines and keel.

**Glyceria aquatica**, Sm. (Reed sweet grass).—*An aquatic; blade rounded at apex* and remarkably thick, containing large air cavities: sheath netted (VI. 11, 12, 13, 14, 15).

**Avena pubescens**, L. (Downy oat).—*See Group X. continued.* Blade with median lines like *Poa*, and ribless. Hairy.

Sheath with four angles (fig. 11). Thin bladed.

**Melica uniflora**, L. (Wood melic).—*An awl-shaped process of the ligule opposite the blade* (figs. 9 and 10).

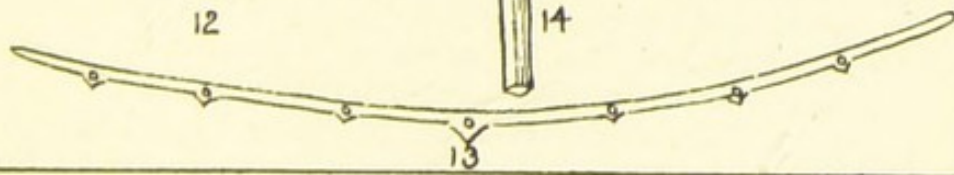
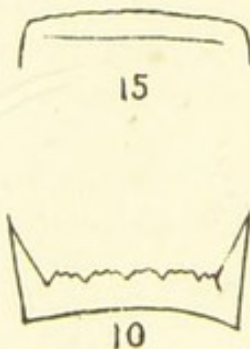
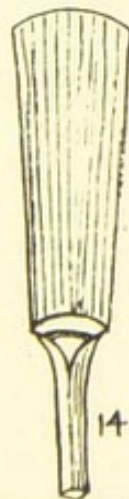
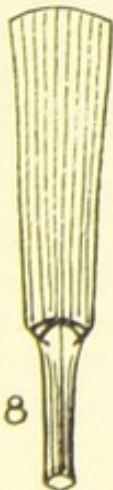
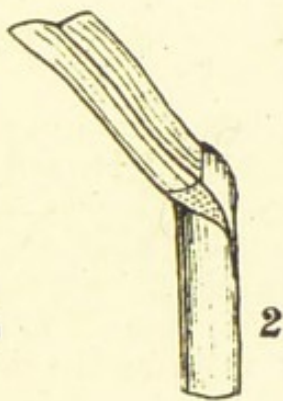
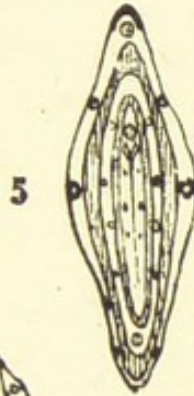
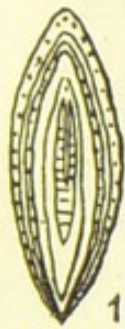
Fig. 8. Tapered base of blade. 9. Entire sheath and awl-shaped process of the ligule. 10. The ligule spread out; the awl-shaped process is split (magnified). After Lund. 11. Transverse section of the entire sheath: two angles are acute, and two obtuse (magnified). 12. Transverse section of the flatly rolled blade (magnified). 13. Transverse section of mature blade (magnified). Observe the fine ribs on *lower* surface. After Lund.

**Melica nutans**, L. (Nodding melic).—Rare.

Fig. 14. Tapered base of blade *and ligule without the awl-shaped process.* After Lund.

Fig. 15. The ligule spread out. After Lund.

*Group V.*



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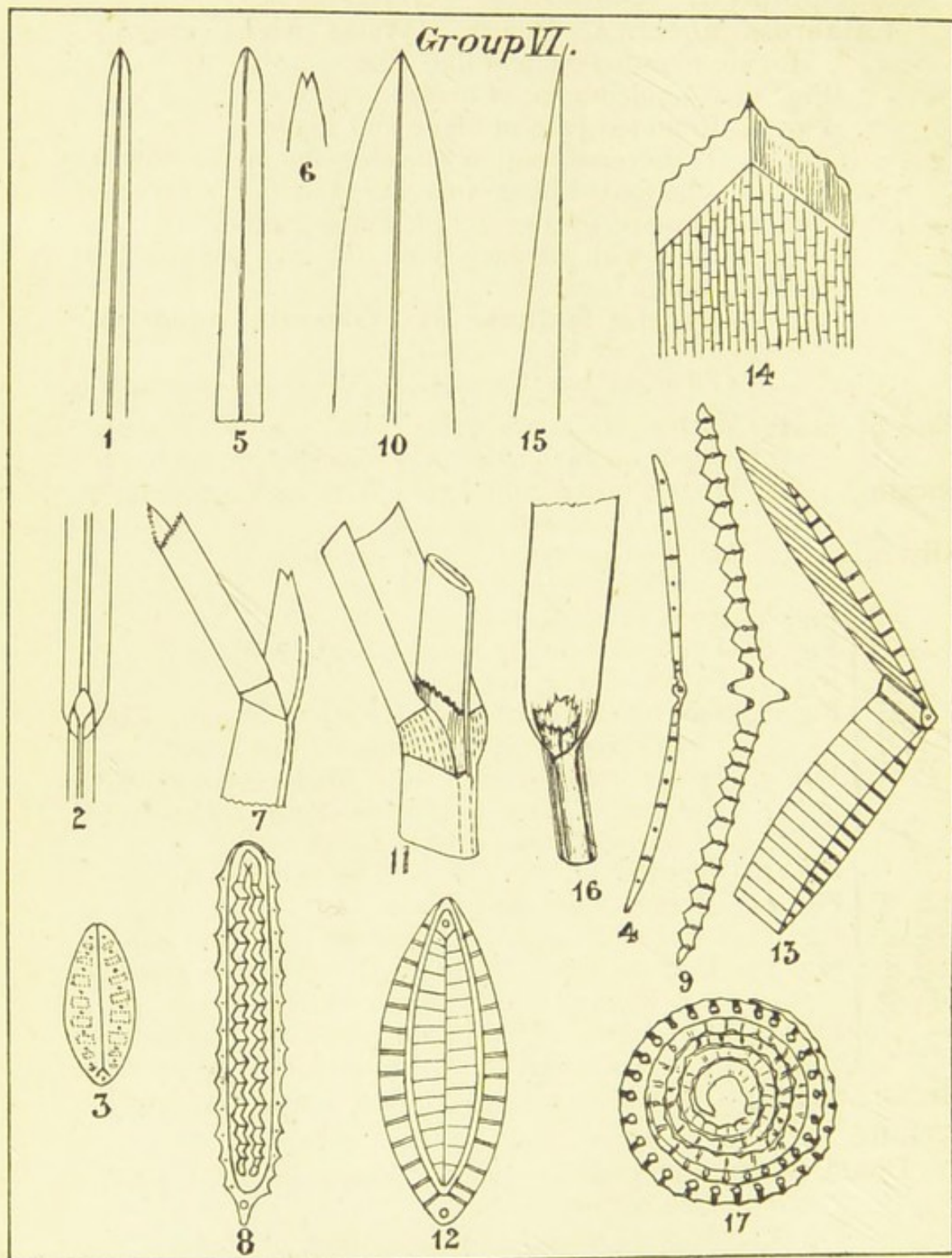
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*Group VI.*



## Group VI.—Net-sheathed Grasses. (Fig. 14.)

Sheath flat, and blade folded in bud ; aquatics ; blade blunt pointed. *Catabrosa*. *Glyceria*.

***Catabrosa aquatica*, Beauv.** (Water whorl grass).—

Ligule rounded ; blade like *Poa*.

Fig. 1. Rounded apex of blade.

Fig. 2. Rounded base of blade and ligule.

Fig. 3. Transverse section shewing the air cavities in the folded blade (magnified). After Lund.

Fig. 4. Transverse section of mature blade—ribless, and with median lines like *Poa* (magnified). After Lund.

	<b><i>Glyceria fluitans</i>, M. &amp; K.</b> (Floating sweet grass).	<b><i>Glyceria aquatica</i>, Sm.</b> (Reed sweet grass).
Base of blade	With a yellow triangular spot on each side ...	With a brown triangular spot on each side.
Sheath .....	With a prominent keel and a rounded edge	With two acute edges.
Ribs .....	Acute on upper and <i>lower</i> surface of blade .....	Absent.

- |                            |   |  |
|----------------------------|---|--|
| <i>Glyceria fluitans</i> . | { | Fig. 5. Apex of blades.  |
|                            |   | Fig. 6. The hooded apex flattened and split.   |
|                            |   | Fig. 7. Base of blade and ligule.  |
|                            |   | Fig. 8. Section of sheath (magnified). Observe keel rounded edge, and ribs. After Lund.                                |
|                            |   | Fig. 9. Transverse section of blade (magnified). Observe the acute ribs on upper and <i>lower</i> surface. After Lund. |
| <i>Glyceria aquatica</i> . | { | Fig. 10. Apex of blade.  |
|                            |   | Fig. 11. Base of blade and ligule.   |
|                            |   | Fig. 12. Section of sheath. Observe the acute edges.   |
|                            |   | Fig. 13. Part of blade (magnified). Observe the air cavities in the cut end. After Lund.                               |
|                            |   | Fig. 14. The ligule with an <i>acute</i> point, and the netted sheath spread out. After Lund.                          |

Sheath round, and blade rolled in bud ; apex of blade acute.

***Phalaris arundinacea*, L.** (Reed canary grass). Often confounded with cocksfoot.

Fig. 15. Apex of blade. Fig. 16. Base of blade.

Fig. 17. Section of shoot. Observe the rolled blade.

***Hierochloa borealis*, R. & S.** (Northern holy grass).—  
Bitter tasted, like sweet vernal. Blade thin, flaccid, and taper based. Very rare.



## NOTES ON GROUP VI.

1. Reed grasses. The largest are:—*Glyceria aquatica*,  
*Phalaris arundinacea*, and *Phragmites communis*.

Flat sheathed—*Glyceria aquatica*.

Round sheathed:—

Long liguled—*Phalaris arundinacea*.

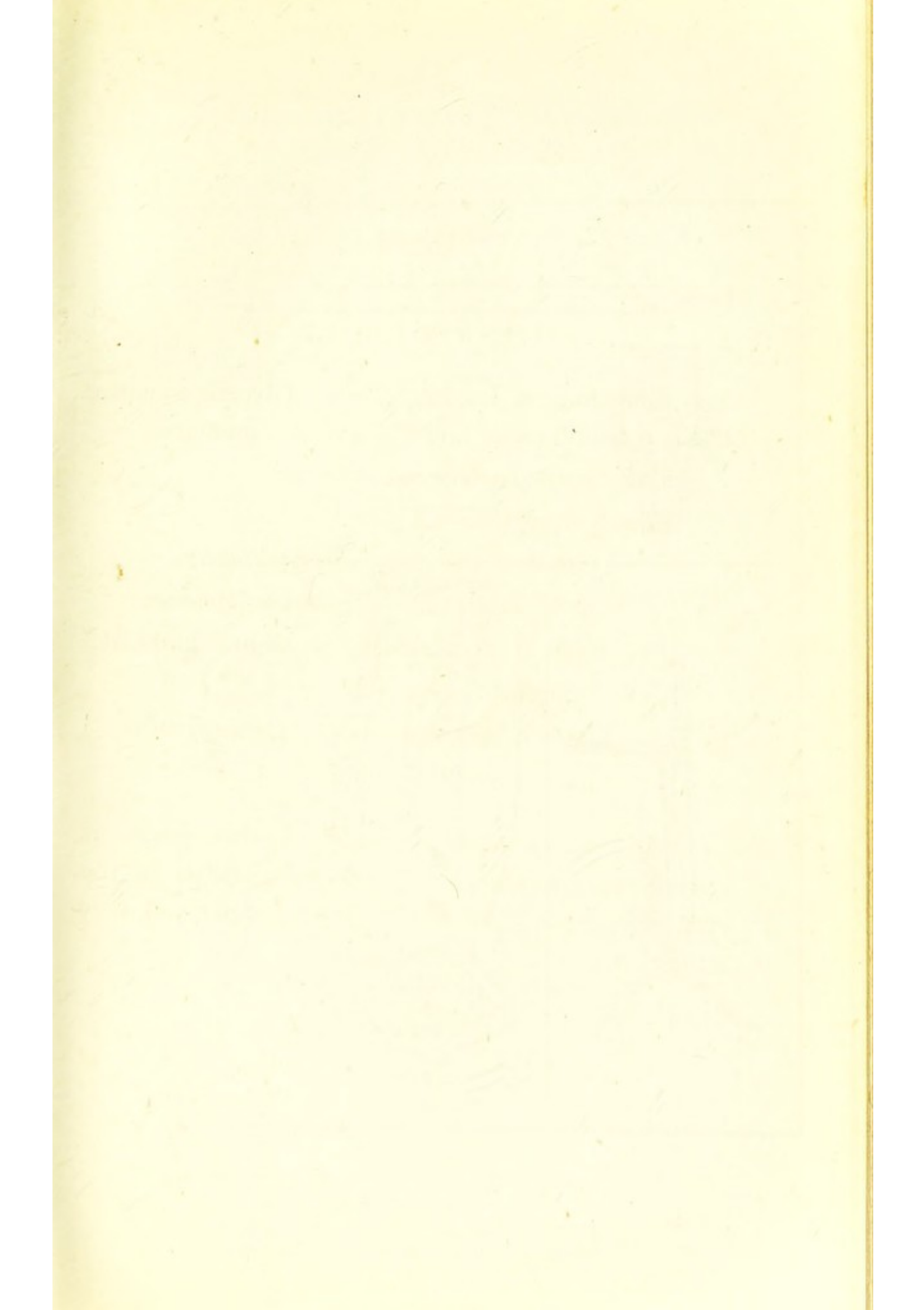
Ligule a hair tuft—*Phragmites communis*.

The small reed grasses are:—*Molinia* and *Calamagrostis*.

Ligule a long membrane—*Calamagrostis*.

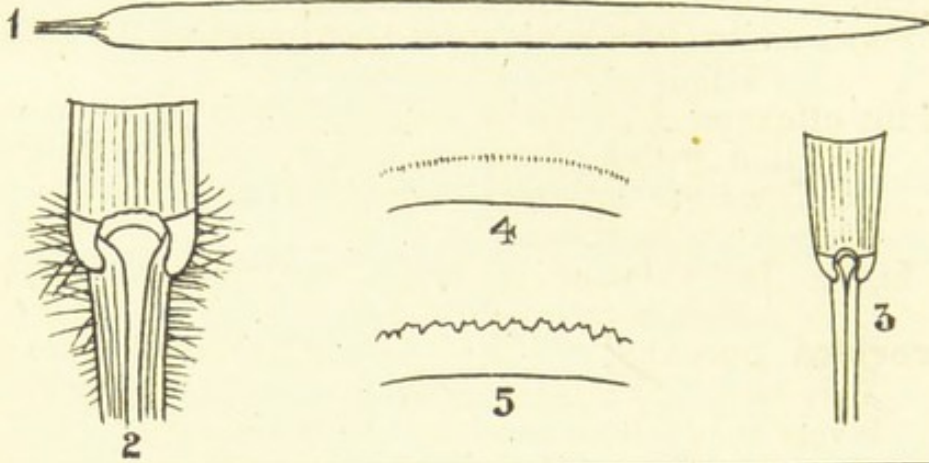
Ligule a hair tuft—*Molinia*.

2. An aquatic not included in this group is  
*Alopecurus geniculatus*. It is distinguished by the  
 very high (about twice as high as broad) and very  
 acute ribs.

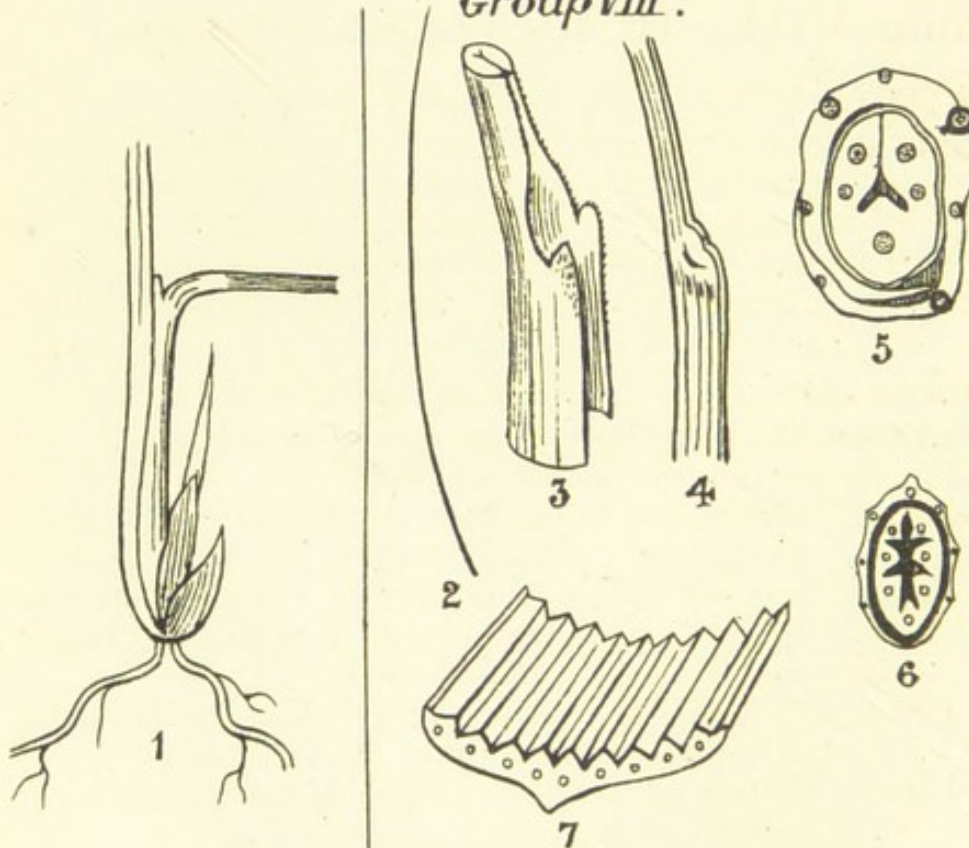




*Group VII.*



*Group VIII.*



## Group VII.—Bitter-tasted Grasses (containing Cumarin).

**Anthoxanthum odoratum**, *L.* (Sweet vernal).

Fig. 1. A small blade shewing the shape.

Fig. 2. Base of blade with small *round ears* and *beard of hair*.

Fig. 3. The same, but ears absent.

Fig. 4 and 5. The ligule spread out (magnified). After Lund.

**Milium effusum**, *L.* (Wood millet). Blade *taper based*, very thin, with a prominent keel ; practically ribless ; *basal margin upwards rough*. This grass has a tendency to hairiness.

Fig. 6. Tapered base of blade, and quadrate ligule. After Lund.

**Hierochloa borealis**, *R. & S.* (Northern holy grass).

Very rare. Sheath and blade *netted* ; the netting is very conspicuous in withered blades.

## Group VIII.—Bristle-bladed Grasses.

Cord rooted. Bristle very hard and stiff.

**Nardus stricta**, *L.* (Moor mat grass). Base of blade thick and cartilaginous ; ligule prominent and thick ; young blades erect ; old, spread out horizontally.

Fig. 1. Base of shoot. Observe the cord roots, protective scales, old horizontal blade, young erect blade, and ligule.

Ligule inconspicuous. *Festuca ovina* and its allies.

**Festuca ovina**, *L.* (Sheep's fescue), and its varieties.

Fig. 2. Portion of bristle-like blade.

Fig. 3. Base of *culm* leaf shewing the ear-like ligule (magnified). After Stebler.

Fig. 4. Base of *radical* leaf, shewing the cartilaginous thickening at junction of sheath and blade ; *no ligule is seen* (magnified).

Fig. 5 and 6. Transverse section of shoot (magnified). After Stebler and Lund.

Fig. 7. Portion of an open ribbed blade (magnified). After Lund.

**Festuca sciuroides**, *Roth.* (Barren fescue). This is an annual species. *The blade has prominent acute ribs clothed with prominent hair*. The ears of the ligule are more conspicuous in this species.



Ligule conspicuous. Bristle very hard and very stiff.

**Nardus stricta**, *L.* (Moor mat grass), Ligule thick and obtuse. See commencement of group.

Bristle solid (fig. 9). A transverse section immediately determines whether the bristle is solid or not.

**Aira flexuosa**, *L.* (Wavy hair grass). Section of bristle *heart-shaped*.

Fig. 8. Blade, sheath, and ligule. After Lund.

Fig. 9 and 10. Transverse section of the bristle (magnified). After Lund.

NOTE.—In other *Aira* species the bristle is formed by folding or inrolling of the blade.

Bristle covered with short, stiff, grey hair.

**Aira canescens**, *L.* (Grey hair grass).

Bristle very glaucous; sheath *very flat and broad*.

**Aira uliginosa**, *Weihe.* (Bog hair grass).

Bristle very blunt pointed.

**Aira præcox**, *L.* (Early hair grass). An annual.

Blade *soft and succulent*, concave and bristle like.

**Poa maritima**, *Huds. l.* (Creeping sea meadow grass).

The succulent blades have all the characters of *Poa* (*except the keel*), *i.e.* they are *ribless with median lines*. Ligule obtuse.

Fig. 11. A shoot with the bristle-like blades.

Fig. 12. Side view of base of blade and ligule (magnified). After Lund.

Fig. 13. Front view of the same (magnified). After Lund.

Fig. 14. Apex of blade (magnified).

Fig. 15. Transverse section of blade (magnified). Observe the thickness, absence of ribs and keel, and the median lines.

Fig. 16. Portion of blade (magnified) viewed from the upper surface, shewing the median lines.

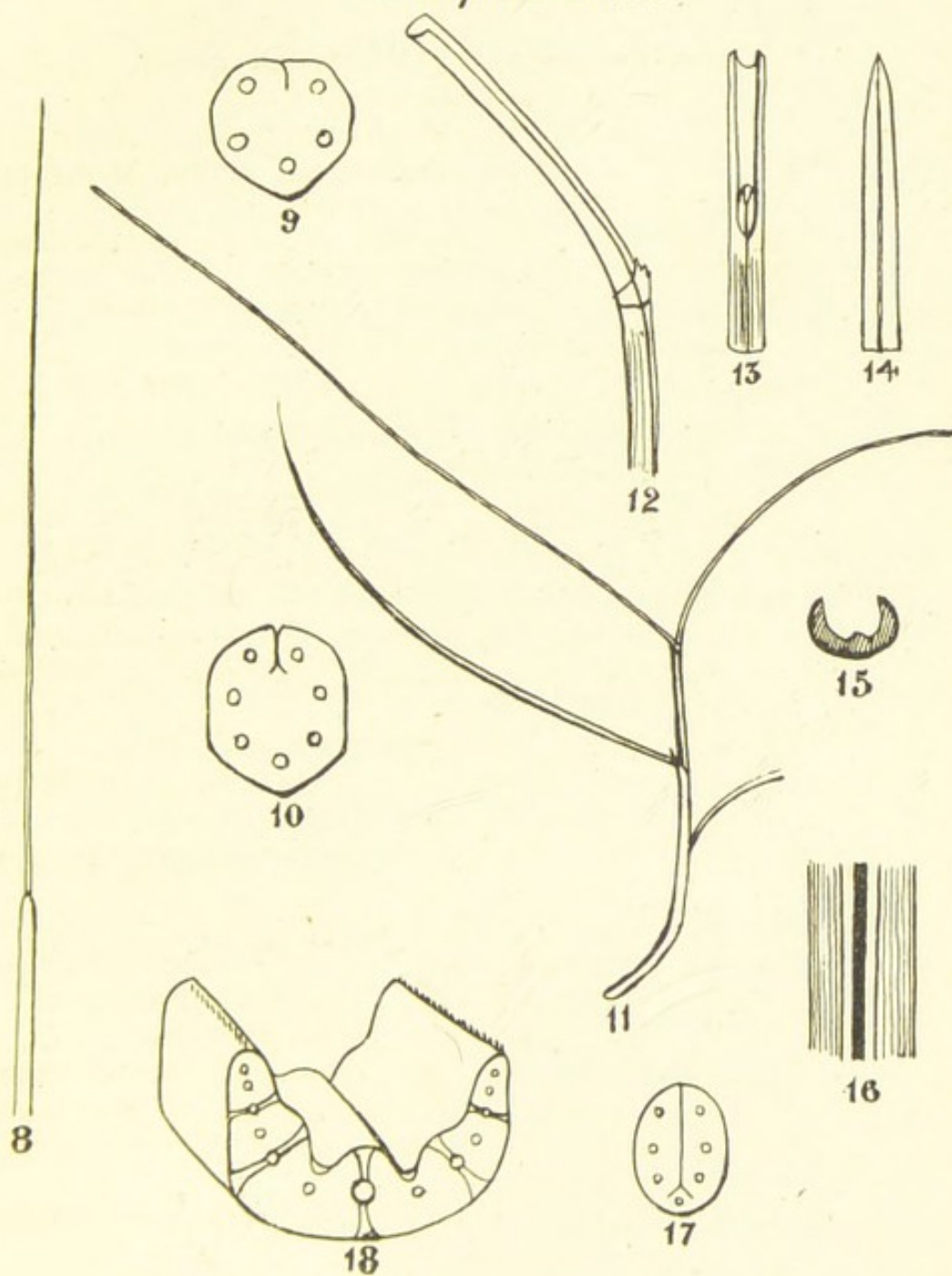
Fig. 17. Transverse section of folded blade (magnified). After Lund.

Fig. 18. Portion of mature blade (highly magnified). After Lund.

Blade comparatively thin, dry, and keeled.

**Avena pratensis**, *L.* (Glabrous oat grass). The dry blades have all the characters of *Poa*, *i.e.*, they are ribless, have median lines, and a prominent keel. Ligule with an *abrupt, acute point*.

*Group VIII contd*







## NOTES ON GROUP VII.

*Milium effusum*.—The amount of cumarin is less in this than in the other species.

## NOTES ON GROUP VIII.

*Festuca ovina* and its allies.—The ligule is remarkably short—much shorter than in *Cynosurus*—and has a pair of ears. The ears are not seen, because the base of the blade is erect, and conceals them. This and *Cynosurus* are the only grasses with the eared ligule.

*Festuca sciuroides* differs from *ovina* and its allies in the following respects :—

1. All the shoots are fertile.
2. The hair on the acute ribs is as long as the ribs are deep ; in *Festuca ovina*, the corresponding hair is so short that it merely causes roughness.

Narrow-leaved varieties (var. *angustifolia*) of the following species occur :—

<i>Poa pratensis</i> ,	{	Easily recognised by the median lines and ribless blade.
<i>Poa nemoralis</i> ,		
<i>Agrostis canina</i> ,	{	Blade very thin ; ligule long, and hairy on the back. The bristle-like radical leaves distinguish this from other <i>Agrostis</i> species.
<i>Cynosurus cristatus</i> ,		
	{	Yellow sheath, and eared ligule.



## Group IX.—Hard-bladed Grasses.

Sandbinders—*Elymus*, *Psamma*.

The creeping underground stems bind the sand.

Blade-eared—*Elymus*.

***Elymus arenarius*, L.** (Sand lyme grass).—Ribs very prominent, uniform, and flat on the summit. Ligule *a mere margin*, with a fringe of hair-like teeth, as in *Triticum*. (XIV. 3, 4.)

***Triticum*** (Sea-side species).—The *ribs* are *less prominent* than those of *Elymus*.

Blade earless—*Psamma*.

***Psamma arenaria*, R. & S.** (Sea-mat grass).—Ribs very prominent and mixed (*i.e.*, of different shapes and sizes). Ligule *very long*. (XIV. 1, 2.)

Hill and Heath Grasses—*Aira*, *Calamagrostis*, *Brachypodium pinnatum*.

***Aira cæspitosa*, L.** (Tufted hair grass).—Blade with five or six snow-white lines between the very high acute ribs. *Tufts* of grass very large and conspicuous. (II. 1, 2, 3, 4, 5.)

***Calamagrostis*** (Small reed).—Very rare. The ribs are less prominent. Blade usually taper-based. Ligule long and *thickened*.

***Brachypodium pinnatum*, Beauv.** (Heath false brome).—Hairy; ribs very low. (X. 19.)

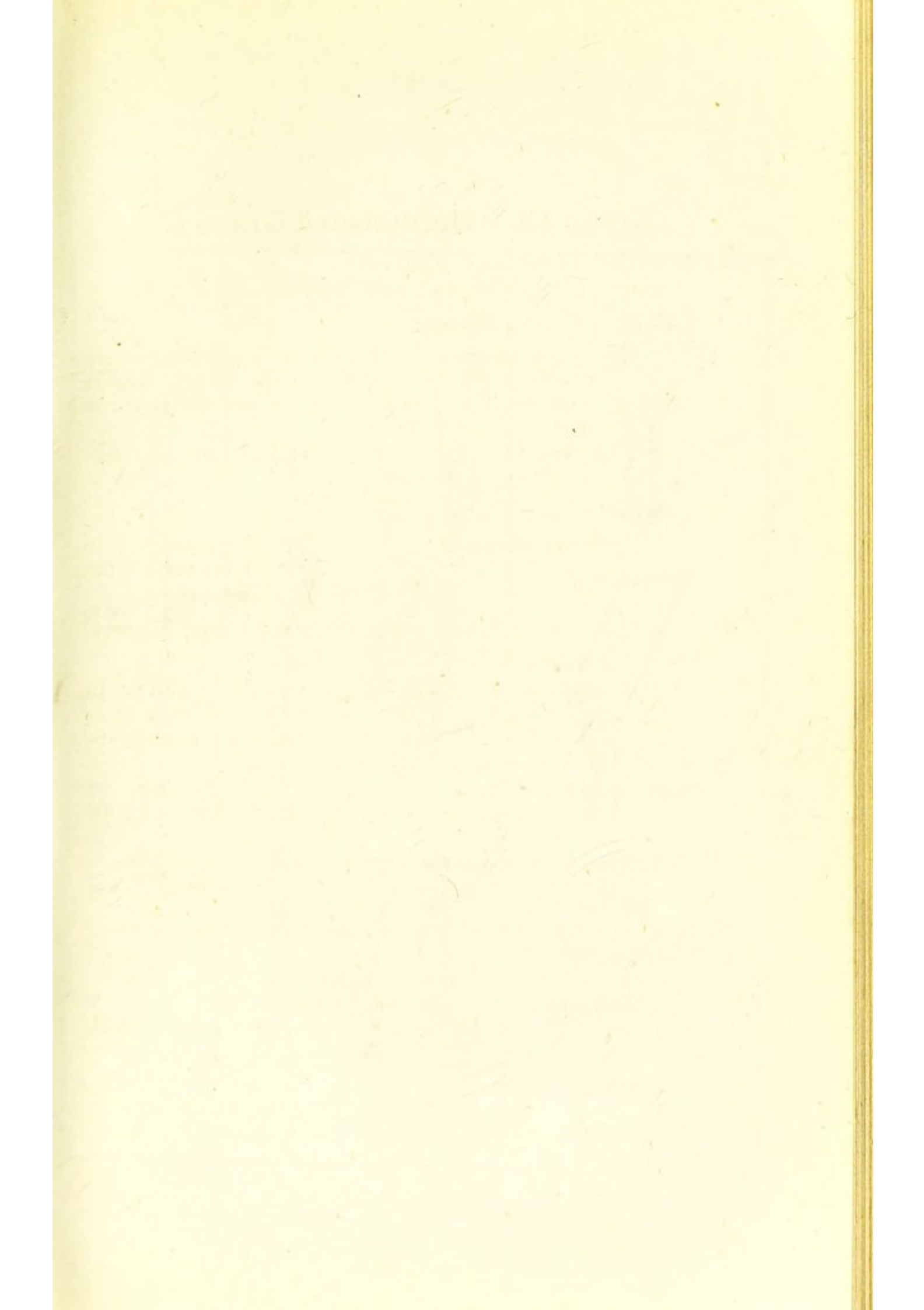
*Note.*—The following grasses, with *median lines*, are somewhat hard or succulent :—

*Poa pratensis* and *compressa*—ribless.

*Sclerochloa*—low, flat, and very broad ribs.

*Avena pratensis*—Ligule with an abrupt point. (XII. contd. 17.)

*Triodia*—*ligule a hair tuft*.

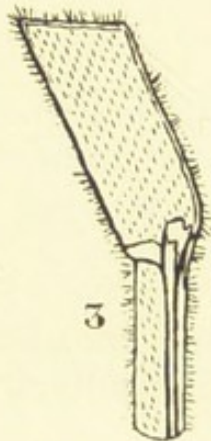




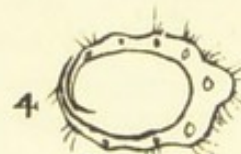
*Group X.*



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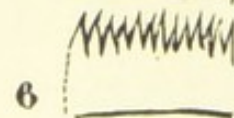
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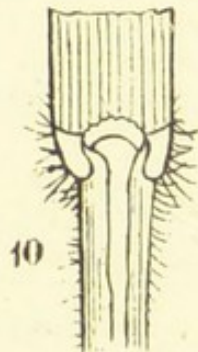
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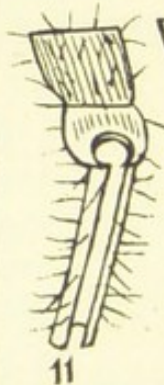
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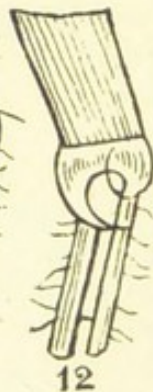
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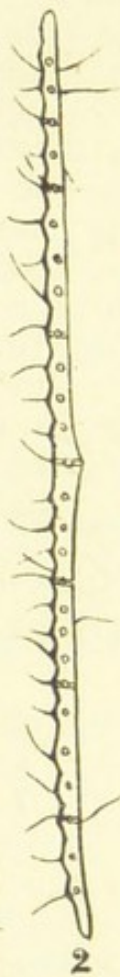
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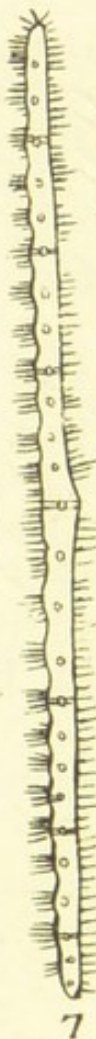
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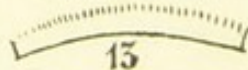
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14



13

## Group X.—Hairy Grasses.

Sheath white, with red veins (I. 4).

	<b>Holcus lanatus, L.</b> ( <i>Yorkshire fog.</i> )	<b>Holcus mollis, L.</b> ( <i>Creeping soft grass.</i> )
Hair .....	on blade and sheath ...	shorter; often little or none on sheath. <i>Nodes with a downward sloping ring of hair.</i>
Growth .....	tufted .....	creeping.
Shoot.....	.....	with two rows of leaves.
Figures .....	3. Base of blade and ligule. 4. Section of the keeled sheath. 5. Hairy back of ligule (magnified). 6. Hairless inner surface of ligule (magnified). 7. Transverse section of blade (magnified). After Stebler.	

Blades taper-based; taper commencing near middle (fig. 8). Blades remarkably thin and dry; practically ribless.

	<b>Molinia cœrulea,</b> Moench. ( <i>Flying bent.</i> )	<b>Brachypodium sylvaticum, R. &amp; S.</b> ( <i>Wood false brome.</i> )
Ligule .....	a hair tuft .....	long and conspicuous (at least as long as broad); apex toothed.
Habitat.....	hills.....	woods.
Figs. ....	8. Tapered base of blade, and ligule of hairs .....	18. (X. contd.) Base of blade, and conspicuous toothed ligule.
	9. Acute apex of blade.	

(*Koeleria cristata*, Pers. (Crested Koeleria).—Blades firm; ribs prominent and mixed.)



Base of blade with pointed ears (fig. 12).

*Ligule remarkably short, with a fringe of very short hair-like teeth.* Blades very thin, and dry. Hair on sheath sparse or absent.

**Triticum repens**, L. (Common couch).—Lower surface of blade comparatively smooth. Only a few veins appear (under the lens) as white lines by transmitted light. Growth creeping.

Fig. 11. Base of blade, with ears rudimentary.

Fig. 12. Base of blade, with the long, curved, and acute ears.

Fig. 13. The ligule (magnified).

Fig. 14. Transverse section of blade (magnified), shewing the low inconspicuous ribs.  
After Lund.

**Triticum caninum**, Huds. (Wood couch).—Lower surface of blade quite rough. Most of the veins appear as white lines by transmitted light. Growth tufted.

Sheath clothed with downward sloping hair. Blade firm (but long and hanging), and taper-based ; its keel a *white* line. Perennial species.

**Bromus asper**, Murr. (Rough brome).

Fig. 16. Eared base of blade and ligule.

**Hordeum** (Barley : the perennial species).—Very like *Bromus asper*. (*See Notes.*)

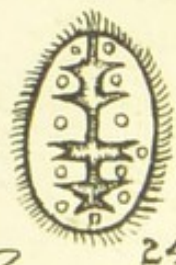
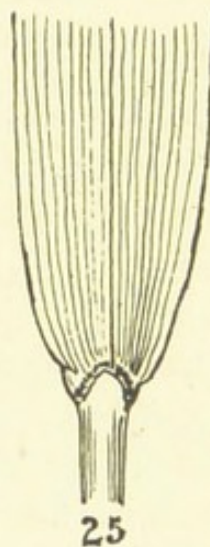
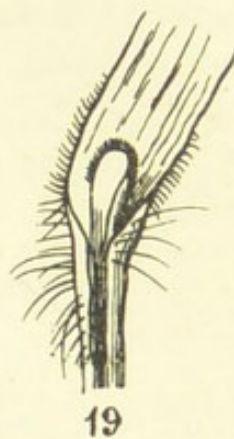
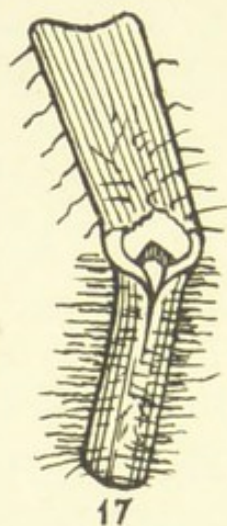
As before, but annual, with blades remarkably dry and thin.

**Hordeum murinum**, L. (Wall barley).





*Group X cont#*



Blade bitter-tasted (from cumarin).

**Anthoxanthum odoratum**, L. (Sweet-scented vernal).—  
No other grass has small, round ears (seen by the lens) at the base of the blade.

Fig. 10. Base of blade with small, round ears, and a beard of hair.

Ribs low and acute; a single row of hair along the summit of each rib (fig. 2).

**Avena flavescens**, L. (Golden or yellow oat).—No keel on sheath (distinction from *Bromus*), and very little on the blade.

Fig. 1. Base of blade and ligule.

Fig. 2. Transverse section of blade (magnified). After Stebler.

Blade with low flat ribs (fig. 15).

**Avena elatior**, L. (False oat).—Hair sparse, sometimes absent. Base of shoot *bulbous*. Sheath *keeled*.

Fig. 15. Transverse section of blade (magnified). After Stebler.

(See III. 6, 7, 8, 9, 10).

Ribs absent; ligule a membrane.

**Avena pubescens**, L. (Downy oat).—Dry, and thin-bladed.

Fig. 20. Base of blade and ligule; blade parallel-edged.

Fig. 21. Transverse section of blade, shewing absence of ribs and presence of median lines (magnified). After Lund.

Ribs very low, broad, and quite flat; ligule a hair tuft.

**Triodia decumbens**, Beauv. (Decumbent heath grass).—  
The only grass with ligule a tuft of hairs, and flat sheath.

Fig. 27. Rounded base of blade, and ligule a tuft of hair.

Fig. 28. Transverse section of the folded blade (magnified). After Lund.

Fig. 29. Transverse section of mature blade, shewing the ribs (magnified). After Lund.



Blade taper-based, with very prominent *mixed* ribs.

**Koeleria cristata**, Pers. (Crested Koeleria).

Fig. 22. Acute apex of blade.

Fig. 23. Tapered base of blade.

Fig. 24. Transverse section of blade, shewing the prominent and mixed ribs (magnified). After Lund.

Ribs prominent and acute. Ligule with two ears.

**Festuca sciuroides**, Roth. (Barren fescue).—Hair on ribs as high as the ribs are deep. An annual.

Sheath *entire*, round, and keeled.

**Annual Brome Grasses**.—The blades remarkably thin, and soft or dry. (See Note 7.)

Fig. 18. *Bromus Mollis*. The earless base of blade, entire sheath, and short ligule.

Sheath entire and quadrangular. Blades remarkably thin and dry. Hair sparse or absent.

	<b>Melica nutans</b> , L. (Nodding Melic.)	<b>Melica uniflora</b> , L. (Wood Melic.)
Ligule.....	With an awl-shaped process opposite the blade (V. 9); this is the only grass with this peculiarity.	Awl - shaped process absent (V. 14).

An *aquatic* reed-grass, the giant of the group. A crown of hair instead of a membranous ligule.

**Phragmites communis**, Trin. (Common reed).—Shoots as thick as the finger, perfectly round, and hairless.

Fig. 25. Rounded base of blade, and ligule.

Fig. 26. Acute apex of blade.

## NOTES ON GROUP X.

1. *Wood Grasses*.—These are distinguished thus :—

*Eared.*

Blades firm.

Blade taper-based: keel *white* and prominent—*Bromus asper*.

Blade not taper-based—*Hordeum sylvaticum*.

See Note 4, Group XI.

Blades remarkably thin and dry, hair sparse.

*Triticum caninum*.

*Not Eared.*

Sheath round.

Ligule long-toothed—*Brachypodium sylvaticum*.

Ligule remarkably short—*Triticum caninum*.

Sheath entire—*Annual bromes*.

Sheath quadrangular—*Melica*.

2. *Brachypodium*.

	<i>sylvaticum</i> .	<i>pinnatum</i> .
Ligule.....	Toothed (X. 18).	With a fringe of hair (X. 19).
Blade.....	Remarkably thin and dry, hanging.	Firm, and erect.
Habitat .....	Woods.	Heaths.

3. *Koeleria*.—Glaucous and hairless varieties may occur.

4. *Triticum*.—Sea-shore varieties and species have firm blades, and the ribs more prominent.

5. *Hordeum*.

	<i>Perennial</i> .	<i>Annual</i> .
Blade.....	Firm.	Very thin and dry.
Shoots .....	Some barren, some fertile.	All fertile.
Perennial Species.		
	<i>Hordeum sylvaticum</i> .	<i>Hordeum pratense</i> .
Habitat .....	Woods.	Meadows.
Annual Species.		
	<i>Hordeum murinum</i> .	<i>Hordeum maritimum</i> .
Blade.....	Very thin and dry,	Narrower, thicker, and firmer.
Habitat .....	Roadsides and fields.	Sea-shore.



6. *Annual Hordeum* and *Annual Bromes*.

	Hordeum.	Annual Bromes.
Blade.....	Eared.	Earless.
Sheath.....	Split.	Entire.

7. *Bromus*.

Perennial.—*Asper, giganteus, erectus*.

Annual or Biennial—*Arvensis, mollis, racemosus, secalinus, sterilis*, &c.

*Bromus giganteus*, L., can scarcely be distinguished from meadow fescue by its leaves.

*Bromus erectus*, Huds., has, like annual bromes, an entire sheath, and an earless blade. It is the only brome species with a *folded blade*.

*Annual bromes* can scarcely be distinguished from one another by the leaves. When annual, all the shoots are fertile; in the first year of biennial species, all the shoots are barren; in the second year, all are fertile.

8. *The blades are folded in*—*Koeleria, Avena pubescens, Triodia decumbens, Festuca sciuroides*, and *Bromus erectus*.

9. *The ribs are very prominent in*—*Koeleria* and *Festuca* species.

10. The ligule is a tuft of hair in—*Phragmites, Molinia*, and *Triodia*.

11. The rare annual genus *Digitaria* belongs to this group. The base of the blade has a tuft of long hair which is continued as a row along each margin of the reddish-coloured and ribless blade.

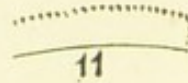
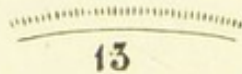
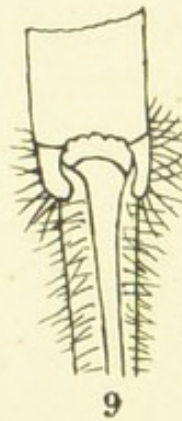
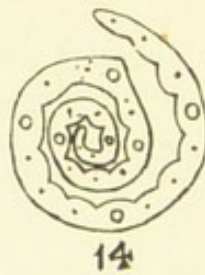
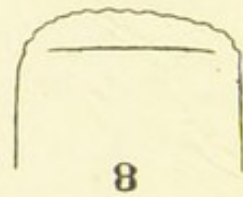
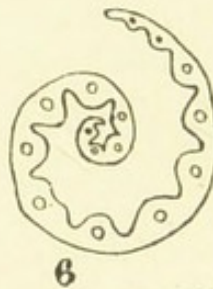
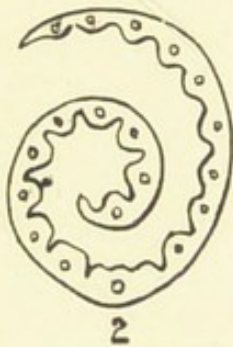
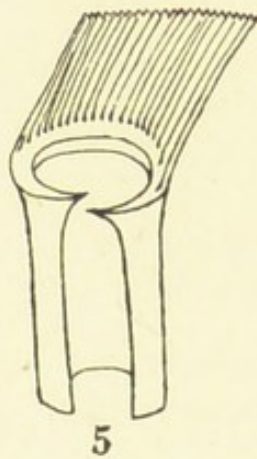
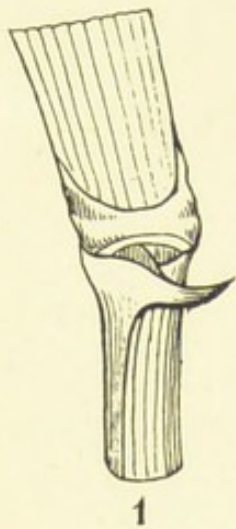
12. The ligule is a tuft of hair in the rare genus *Setaria*. The blades are keeled, and when held up to the light a white strip is seen along the median line.

13. *The ligule is entirely absent in Echinochloa*; otherwise this grass resembles *Setaria*.





*Group XI.*



## Group XI.—Eared Grasses.

*Ribs prominent*; ligule remarkably short; a hard-bladed, sand-binding grass.—*Elymus*.

**Elymus arenarius**, *L.* (Sand lyme grass).—Blade large, apex permanently rolled up, forming practically an apical thorn.

Fig. 1. Eared base of blade. After Lund.

Fig. 2. Section of blade with prominent ribs (magnified). After Lund.

Red-sheathed meadow grass (I. 1). The blade, though firm, is comparatively soft and hairless.—*Lolium*, *Festuca*.

**Lolium perenne**, *L.* (Perennial ryegrass).—*Sheath flat* and blade folded. All other members of Group XI. have round sheaths and rolled blades.

Fig. 3. Eared base of blade.

Fig. 4. Section of blade with prominent ribs. After Stebler.

**Lolium Italicum**, *Braun.* (Italian ryegrass). — Sheath round; basal margin of blade smooth.

**Lolium temulentum**, *L.* (Darnel).—An annual very like *L. Italicum*. Reputed *poisonous*!

**Festuca elatior**, *L.* (Tall and meadow fescues).—Sheath round; basal margin of blade rough; veins appear as pure white lines by transmitted light.

Fig. 5. Eared base of blade. After Stebler.

Fig. 6. Section of rolled blade with prominent ribs (magnified). After Stebler.



Ribs low and inconspicuous.—*Hairy grasses* : *Bromus asper*, *Hordeum*, *Anthoxanthum*, *Triticum* (may be hairless).

**Bromus asper**, *Murr.* (Rough brome).—Sheath clothed with long, downward sloping hair. Blade taper-based ; keel *white* and prominent ; compared with other bromes the leaf is thick and firm.

Fig. 7. Eared base of blade.

Fig. 8. Ligule spread out and magnified ; observe that it is *rounded off*. After Lund.

Very like *B. asper*. Blade firm ; sheath clothed with long hair.

**Hordeum sylvaticum**, *Huds.* (Wood barley).—In woods.

**Hordeum pratense**, *Huds.* (Meadow barley).—In meadows.

Blade remarkably thin and broader.

**Hordeum murinum**, *L.* (Wall barley).—The hair on the sheath is either comparatively sparse and stiff, or, if abundant, it is short, soft, and downy. An *annua*, the flowers to be found in *all* the shoots.

Base of blade with *small round ears* (fig. 9).

*Anthoxanthum*.

**Anthoxanthum odoratum**, *L.* (Sweet vernal).—Bitter-tasted (from cumarin). Hair often localised as a beard at top of sheath and base of blade.

Fig. 9. Base of blade with small round ears.

Fig. 10. Apex of blade.

Fig. 11. The ligule spread out and magnified. After Lund.

Ligule a mere margin, with a *fringe of very fine, hairlike teeth*. The hair on the sheath is sparse or absent.—(*Elymus*), *Triticum*.

(**Elymus**.—Ribs prominent. See beginning of Group.)  
**Triticum**.—Ribs low and flat, or inconspicuous ; blade remarkably thin and dry.

**Triticum repens**, *L.* (Common couch).—Blade rough mainly on upper surface.

Fig. 12. Eared base of blade.

Fig. 13. The ligule (magnified).

Fig. 14. Section of rolled blade, with low, flat ribs (magnified). After Lund.

**Triticum caninum**, *Huds.* (Wood couch).—Blade rough on *lower* and upper surfaces ; veins appear as *white lines* by transmitted light.

## NOTES ON GROUP XI.

1. Annual species.—*Hordeum murinum*, and *Lolium temulentum*. These are recognised as annuals, by pulling plants, and teasing asunder the leaves of the component shoots. *All the shoots are fertile*, therefore the plants are annuals. See page 48.
2. *Hordeum maritimum*, With. This is practically a sea-side variety of *Hordeum murinum*, with narrower, thicker, and firmer blades.
3. Sea-side allies of *Triticum repens*. — *Triticum junceum*, L. (Sand couch). The blades are thicker and firmer. With the thickening of the blade, the ribs become more prominent.
4. Distinction between *Hordeum sylvaticum* and *Bromus asper*.—These wood species are most readily distinguished by examining the interspaces between the veins of the apex of the sheath. This is done by holding the sheath up to the light, and observing the veins under a lens.

	<i>Hordeum sylvaticum.</i>	<i>Bromus asper.</i>
Width of interspace . . .	As broad as the vein.	Two or three times as broad as the vein.



## Group XII.—Ribless-bladed Grasses with Median Lines.

SOFT OR SUCCULENT BLADED MEADOW GRASSES,  
NEVER HAIRY—*Poa*.

*Thick-bladed Poas*.—The sheaths flat, with rounded edges; blades parallel-edged and round-pointed; hard rather than succulent.

	<i>Poa pratensis</i> , L. (Smooth-stalked meadow grass.)	<i>Poa compressa</i> , L. (Flat-stemmed meadow grass.)
Sheath .....	Elliptical in section.....	Flatter.
Ligule .....	Very short and thick ...	Longer and thin.
Nodes .....	Light coloured.....	Dark coloured.
Growth .....	Creeping underground...	Before flowering the shoots bend down, run along the ground, and strike root.
Figures .....	1. Rounded apex of blade. 2. Rounded base of blade and parallel edges. 3. The short ligules spread out (magnified). 4. Transverse section of the relatively thick blade (magnified). After Lund. 5. Portion of blade as it appears by transmitted light (magnified).	

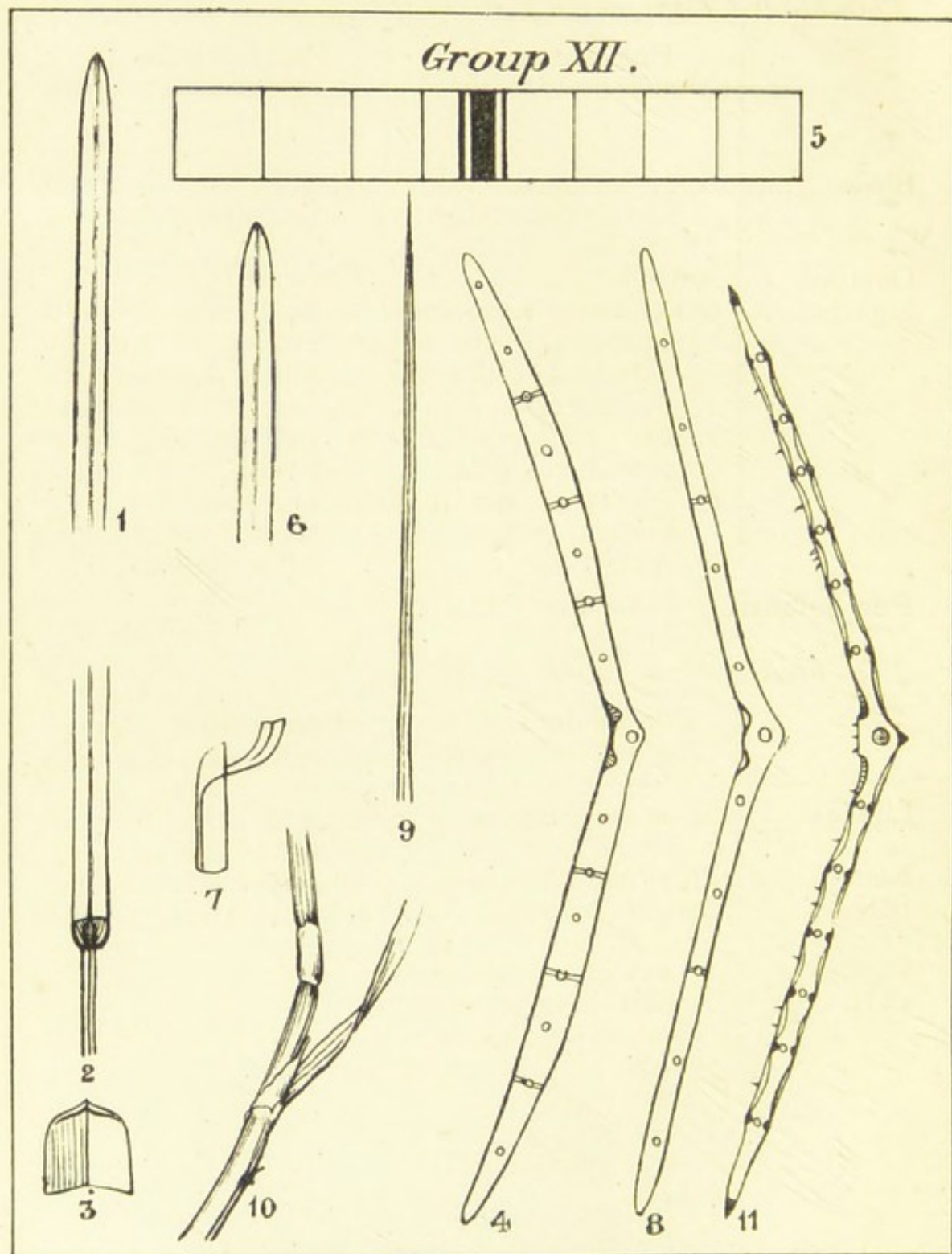
*Poa maritima*, *Huds.* (See Group VIII.) occurs here.—Blade bristle-like, or concave; succulent. *The absence of a keel on the blade distinguishes this from all other Poas.*

*Poa alpina*, *L.*—Blade flat, almost succulent; base of tuft almost bulbous. See Group III.





*Group XII.*



*Thin-bladed Poas, with flat sheaths.*

	<b>Poa annua, L.</b> (Annual meadow grass.)	<b>Poa trivialis, L.</b> (Rough-stalked meadow grass.)
Blade.....	Apex rounded, lower surface dull or slightly shining .....	Apex acute—lower surface strongly shining.
Duration ...	Annual .....	Perennial.
Figures .....	6. Rounded apex of blade (the edges are not parallel like those of <i>P. pratensis</i> ) .....	9. Acute apex of blade.
	7. Base of blade and prominent ligule.....	10. Portion of a culm with a long knot and the base of a <i>culm</i> leaf with a long acute ligule.
	8. Transverse section of blade (magnified). After Lund.	11. Transverse section of blade (magnified). After Stebler.

**Poa bulbosa, L.**—See Group III.

*Thin-bladed Poas, with round sheaths.*

	<b>Poa nemoralis, L.</b> (Wood meadow grass.)	<b>Poa fertilis, Host.</b> (Fertile meadow grass.)
Ligule .....	Short and blunt.....	Longer than broad, rounded or acute.
Nodes .....	Short and black.....	Short and black.
Blade .....	Smooth, apex acute ...	Somewhat rough; apex acute.
Figures ... (XII. Cont.)	1. Acute apex of blade. 2. Base of blade, and a portion of the culm with a short black knot. 3. Section of blade (magnified). After Lund. 4. Section of sheath (magnified).	



Net sheathed aquatics—*Catabrosa*, *Glyceria*. (See VI.)

**Catabrosa aquatica**, Beauv. (Water-whorl grass).—Ligule with a rounded apex.

Fig. 5. Apex of blade.

Fig. 6. Base of blade and ligule.

Fig. 7. Transverse section of folded blade (magnified).

**Glyceria aquatica**, Sm. (Reed sweet grass).—Ligule with an abrupt, acute point.

Fig. 8. Apex of blade.

Fig. 9. Base of blade and ligule.

Fig. 10. Transverse section of blade.

Fig. 11. Transverse section of two-edged sheath.

Dry-bladed grasses—*Avena* species.

**Avena pubescens**, L. (Downy oat grass).—Sheath clothed with conspicuous downy hair; its edges acute.

Fig. 12. Apex of blade.

Fig. 13. Hairy sheath, base of blade, and ligule.

Fig. 14. Transverse section of blade (magnified). After Lund.

Fig. 15. Transverse section of two-edged sheath (magnified). After Lund.

**Avena pratensis** (Glabrous oat grass).—Ligule with an abrupt acute point. Margins of blade thorny. Sheath stiff and elastic.

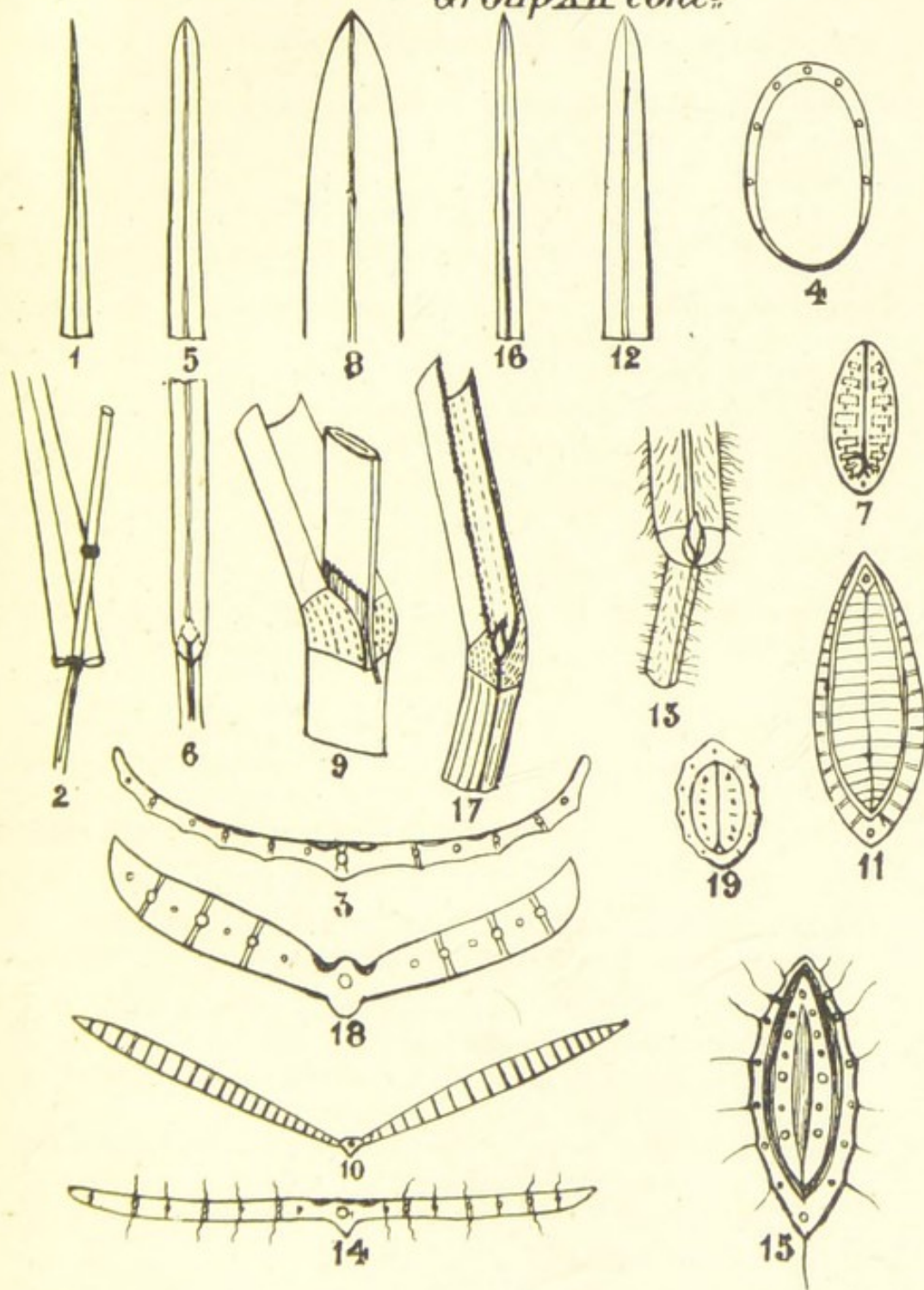
Fig. 16. Apex of blade. After Lund.

Fig. 17. Base of blade. Observe the rough margins and apex of ligule. After Lund.

Fig. 18. Transverse section of blade (magnified). Observe the thickness. After Lund.

Fig. 19. Transverse section of sheath (magnified). After Lund.

Group XII contd







## NOTES ON GROUP XII.

1. *Thick-bladed Poas*.—The blade may be recognised as thick by holding it up to the light; a *dark green* appearance means thickness; a light green, thinness. Thickness may also be recognised by the firm feel between the fingers.

2. *Thin-bladed Poas*.—Recognised by the *light-green* colour of the blade, when held up to the light, and by the softness between the fingers.

Sheath flat, { Edges rounded—*annua*.  
                  { Edges acute—*trivialis*.

This character is best observed by cutting a shoot and examining the section under the lens.

*Poa annua*.—This is recognised as annual by teasing out the shoots, and observing that they all contain flowers.

*Poa fertilis*.—Is being introduced into cultivation, and for this reason it is included.

*Poa bulbosa*.—Is dry rather than soft-bladed. Among bulbous grasses, and those with extensively creeping underground stems, the blades tend to thinness and dryness, or hardness—*e.g.*, *Avena elatior*, *Triticum repens*, *Poa pratensis*, &c.

3. *Dry-bladed Avena species*.

*Avena elatior* has also dry blades; the ribs are low and *very flat*; there are no median lines.

*Avena flavescens* has thin and softer blades; the ribs, though low, are acute; there are no median lines.

4. *Triodia decumbens*.—Superficially examined, the blade might be regarded as that of a thick-bladed *Poa*, inasmuch as the median lines are very conspicuous. The pressure of low and *very flat ribs* suffice to distinguish it. This is the only grass with a flat sheath, and ligule a tuft of hair.

5. All *Poas* have keeled blades, except *maritima*.  
(VIII. contd., 15.)



### Group XIII.—Hairless Grasses, with very Low and Flat Ribs.

Sheath dark in colour (I. 3).

**Alopecurus pratensis**, L. (Meadow foxtail).—Ligule shorter than broad, *thick*, usually coloured, *hairy on the back, and apparently entire*.

(**Alopecurus agrestis**, L. (Slender foxtail).—Has rounded or acute ribs, and is annual.)

Sheath not coloured, basal or whole margin *upwards rough*.—*Phleum*, *Briza*.

**Phleum pratense**, L. (Timothy or Catstail).—*Margin upwards rough on basal portion, downwards rough on apical portion. Ligule longer than broad, thin, and toothed; not hairy on the back*.

Fig. 1. Apex of blade.

Fig. 2. Base of blade and ligule.

Fig. 3. Section of sheath; no keel.

Fig. 4. Back of ligule (magnified); no hair.

Fig. 5. Transverse section of blade shewing the low ribs and absence of keel. After Stebler.

*Note*.—For other species, see Group III.

**Briza media**, L. (Quaking grass).—Whole margin *upwards rough*. Ligule shorter than broad, *entire*. *Sheaths entire*, except the three or four lowest.

Fig. 11. Entire sheath. After Lund.

Fig. 12. Base of blade and ligule.

Fig. 13. Margin of blade with teeth directed downwards, therefore upwards rough.

Fig. 14. Portion of transverse section of blade (magnified). After Lund.

**Milium effusum**, L. (Spreading millet).—Ribs practically absent; *blade taper-based*. Group VII. 6.

Blade with median lines, like *Poa*.

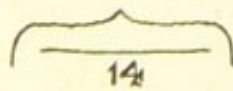
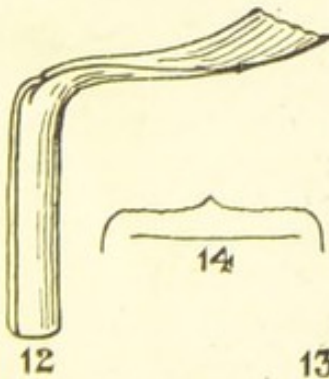
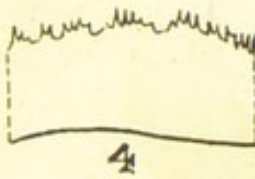
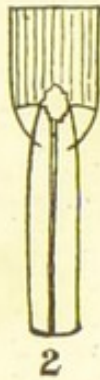
**Glyceria distans**, Wahl. (Reflexed sweet grass).—Ribs very low, very broad, and very flat. (*Poa maritima* is bristle or concave bladed and ribless.)

Fig. 15. Apex of blade. After Lund.

Fig. 16. Base of blade and ligule. After Lund.

Fig. 17. Portion of transverse section of blade shewing the ribs (magnified). After Lund.

*Group XIII*







Note 1.—Many hairy grasses have low flat ribs, for example :—

*Avena elatior*.—Ligule conspicuous, blade thin and dry.

*Triodia*.—Ligule a hair tuft ; blade with median lines like *Poa*.

*Triticum*.—Blade eared, thin and dry. Ligule inconspicuous.

Note 2.—The *marginal roughness* of the blade is important in this group ; it is detected by running the margin along the tip of the tongue. Upward roughness ; marginal teeth directed downwards. Downward roughness ; marginal teeth directed upwards.

#### Group XIV.—Ribs High and Prominent, Rounded, or Acute.

NOTE.—The ribs of *Agrostis* are lowest of all.

##### Hairless.

Extremely *hard bladed*.—*Elymus*, *Psamma*, *Aira*.  
Ligule very short.

*Elymus arenarius*, L. (Sand lyme grass).—Blade eared. Ligule very inconspicuous, like that of *Triticum*. A sandbinder.

Fig. 3. Eared base of blade ; ligule inconspicuous.

Fig. 4. Transverse section of rolled blade, shewing the prominent ribs flattened on the summit (magnified). After Lund.

Ligule very long.

*Psamma arenaria*, R. & S. (Sand mat grass).—Blade earless. Ribs mixed (uniform in *Elymus*). A sandbinder.

Fig. 1. Earless base of blade and long ligule.

Fig. 2. Transverse section of rolled blade, shewing the prominent and *mixed* ribs (magnified). After Lund.

*Aira cæspitosa*, L. (Tufted hair grass).—When held up to the light the spaces between the ribs appear as *snow-white* lines (II. 4).

Fig. 5. Transverse section of blade, shewing the *very high and very acute ribs* (magnified).



Blades not extremely hard, but *firm*. Sheath characteristically coloured. The ligule is extremely short, and the lower surface of the blade very strongly shining.—*Lolium*, *Cynosurus*, *Festuca elatior*.

Sheath flat and blade folded.

***Lolium perenne***, L. (Perennial ryegrass).—Sheath red at base, and entire. Base of blade often eared. Sheath entire.

Fig. 6. Apex of blade.

Fig. 7. Eared base of blade, extremely short ligule.

Fig. 8. Transverse section of folded blade shewing the ribs (magnified). After Lund.

Fig. 9. Transverse section of mature blades shewing prominent ribs and keel (mag.). Observe that the mid-rib is *not flat*. After Stebler.

***Cynosurus cristatus***, L. (Crested dogstail).—Sheath *yellow* at base (l. 2.), and split. Blade always earless, and ligule *eared* (the ears to be observed by the lens). The blade thicker and firmer between the fingers of perennial ryegrass.

Fig. 10. Apex of blade.

Fig. 11. Earless base of blade, and extremely short *eared ligule*.

Fig. 12. Section of the folded blade (magnified). After Lund. Sometimes the blade is slightly rolled, then the sheath is approximately round. (See Stebler's "Best Forage Plants.")

Sheath round, red at base, and blade rolled.

***Lolium italicum***, Braun. (Italian ryegrass).—Basal margin of blade *smooth*. The veins (under the lens) are *indistinct* by transmitted light. Blade usually eared; sheath entire.

Fig. 13. Apex of blade.

***Lolium temulentum***, L. (Common darnel).—Annual. Blades very similar to the preceding.

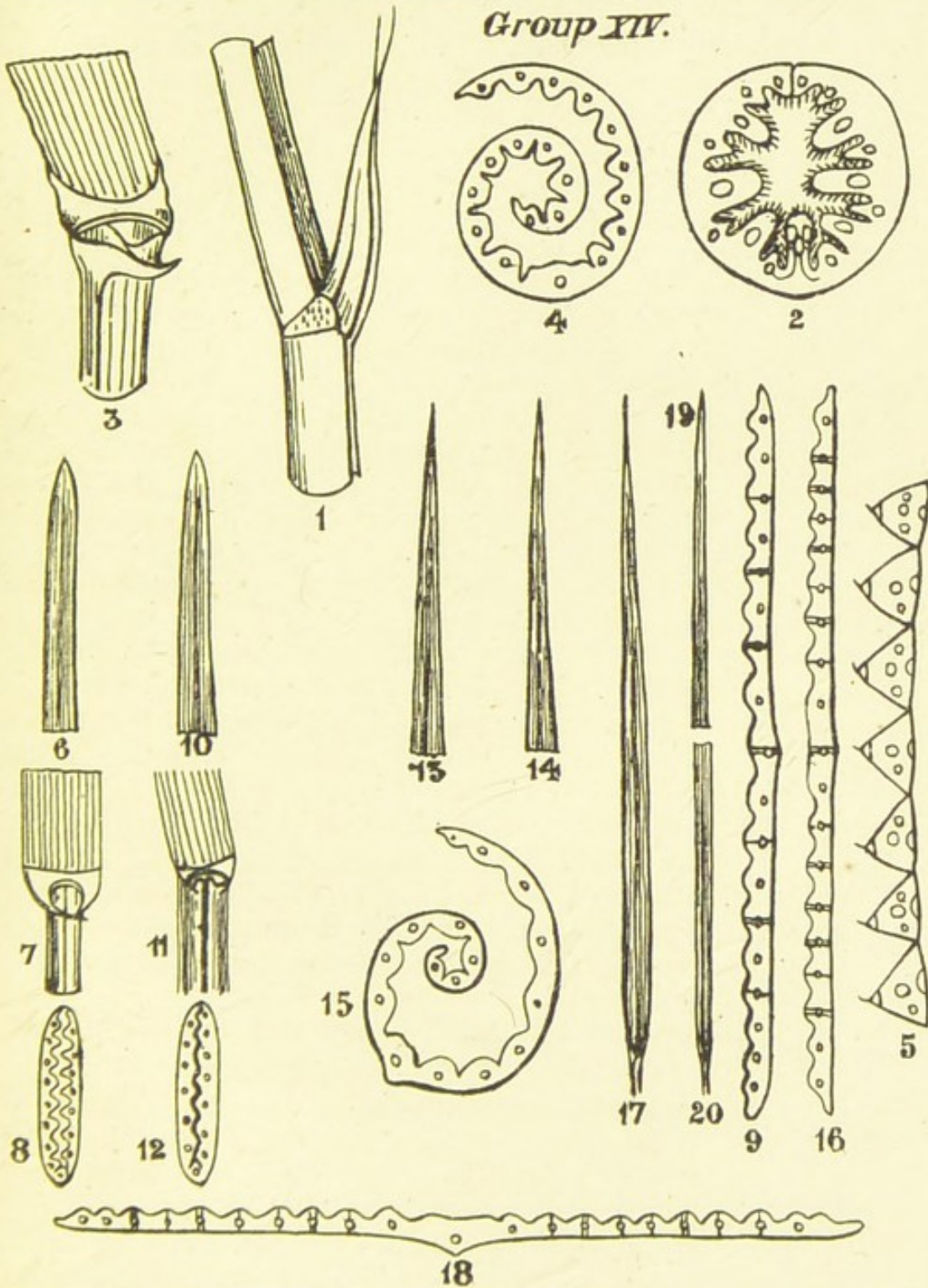
***Festuca elatior***, L. (Meadow and late fescues).—Basal margin of blade *rough*. The veins (under the lens) appear as *pure white lines* by transmitted light. Blade eared; sheath split.

Fig. 14. Apex of blade.

Fig. 15. Transverse section of rolled blade shewing the ribs (magnified). After Stebler.

Fig. 16. Transverse section of mature blade (mag.). Observe the *flat* mid-rib. After Stebler.

*Group XIV.*







No special colouring matter developed in the sheath.

The genus is thin and rough bladed, and long liguled. The ribs are acute or rounded, and *about as high as broad*. The ligule is white, thin, and hairy on the back.—*Agrostis*.

	<b>Agrostis Stolonifera, L.</b> (Fiorin.)	<b>Agrostis canina, L.</b> (Brown bent.)	<b>Agrostis vulgaris, With.</b> (Common bent.)
Ligule ...	Much longer than broad, margin usually toothed, apex somewhat acute.	Similar.	Length equal to breadth, margin entire, apex obtuse.
Blade ....	Rolled.....	Usually folded. Radical leaves bristle-like.	Rolled
Figures..	17. Complete blade. Observe the taper commencing at the base.  18. Transverse section shewing the acute prominent ribs, as high as broad. After Stebler.		19. Apex of blade. 20. Base of blade.

Ribs *very acute, about twice as high as broad*, otherwise very similar to *Agrostis*.—*Alopecurus*.

**Alopecurus geniculatus, L.** (Bent-stemmed foxtail).—An aquatic.

(**Alopecurus agrestis, L.** (Slender foxtail). A denizen of dry soils, with a thick, usually coloured, ligule. Ribs very similar to *Agrostis*. An annual or biennial.)



*Hairy*; blades small and narrow; ligule very short; eared in *Festuca*.

Blade taper-based.

**Koeleria cristata**, Pers. (Crested koeleria).—Ribs mixed (X. contd., 22, 23, 24.) Glauous varieties occur.

No hair on lower surface of blade; *ligule eared*.

**Festuca sciuroides**, Roth. (Barren fescue).—Ribs uniform and acute, covered by hair, which is as long as the ribs are high. An annual species.

(In varieties of *Festuca ovina*, the hair on the ribs is quite short, and merely causes roughness.)

## NOTES ON GROUP XIV.

### 1. Hard-bladed sandbinders.

*Elymus*.—Eared blade.

*Psamma*.—Earless blade; common.

### 2. *Lolium*, *Cynosurus*, *Festuca*.—Ligule extremely short; lower surface of blade keeled, very smooth, and strongly shining.

*Lolium perenne* and *Italicum*.—In the first year of growth, the blades of *L. perenne* may be rolled, like those of *Italicum*. The mid-rib, in such a case, distinguishes the species.

	<b>L. perenne.</b>	<b>L. Italicum.</b>
Mid-rib .....	Rounded.	Quite flat.

### Allies of *Festuca elatior*.

*Bromus giganteus*, L.—The leaves of this species are very similar to those of *F. elatior*. The blades are broader, and the marginal teeth at the base are often prolonged into bristle hairs.

*Bromus erectus*, Huds., is distinguished thus:—

	<b>F. elatior.</b>	<b>B. erectus.</b>
Sheath .....	Split; never hairy.	Entire, except at apex; usually hairy.
Blade.....	Rolled; usually eared.	Folded; never eared.

### 3. *Agrostis*.

This genus is extremely liable to variation, and accordingly is very difficult to define. The following are the most distinctive features.

The blade is *rough* on both surfaces and on margin ; *thinner and drier* than in ryegrasses, fescues, and dogstails. In these characters it resembles *Triticum*. *Agrostis canina* has bristle-like blades.

The ribs are prominent, acute, or rounded.

The margins begin to converge very near the base of the blade, giving a characteristic form.

The base is never eared.

The ligule is a long, white, thin membrane, hairy on the back. At its shortest, in *Agrostis vulgaris*, it is almost as long as broad—the distinctive feature of this species.

The blade is rolled. In *Agrostis canina*, however, the blade is folded ; accordingly, a long liguled *Agrostis* with folded blades is the species *canina*. To determine the point, the shoot is cut transversely, and the section examined under a lens.

#### Summary.

- a. No characteristic colouring matter is developed in the base of the sheath.
- b. The blades are rough on margin and surfaces, earless, and tapered from the base.
- c. The ligule is long, thin, white, and hairy on the back.
- d. The blades are rolled, but folded in *canina*.

	<b>Agrostis.</b>	<b>Triticum.</b>
Ribs .....	Prominent.	Very low.
Hair .....	Absent.	Often present.
Ligule .....	Long.	Remarkably short and quite inconspicuous.
Blade .....	Never eared.	Eared.
	<b>Agrostis.</b>	<b>Lolium, Festuca, and Cynosurus.</b>
Blade .....	Thin and dry.	Firm and comparatively thick ; lower surface strongly shining.
Sheath .....	Not coloured.	Characteristically coloured.



	Agrostis.	Alopecurus geniculatus
Ribs .....	As high as broad.	About twice as high as broad, and very acute.
Blade by transmitted light.....	Little contrast between rib and furrow.	Strong contrast between rib and furrow.

Note 4. The height of the ribs may be roughly determined by holding the blade up to the light; the amount of contrast between rib and furrow measures the height of rib. For example :—

*Aira*.—Ribs dark, furrows pure white.

*Alopecurus geniculatus*.—Ribs dark, furrows yellow. The contrast is strong, and the ribs therefore very high.

*Agrostis*.—Little contrast between rib and furrow, therefore the ribs are comparatively low.

Note 5. On the same blade the mid-rib may be different from the lateral ribs; *Festuca elatior* (XIV. 15) for example, has a flat mid-rib.

In *Psamma*, adjoining lateral ribs differ in height and shape; these are described as *mixed ribs* (XIV. 2). The same condition is a striking feature of the hairy *Koeleria*.

# INDEX I.—COMMON NAMES.

SYNONYMS AND VARIETIES IN ITALICS.

## GROUPS AND FIGURES.

- Annual (duration).  
 — brome grasses.....X. contd. 17  
 — meadow grass.....XII. 6, 7, 8  
 Alpine (habitat).  
 — *hair grass*—a variety of tufted hair grass with involute leaves.  
 — meadow grass .....See III. and XII.  
 Barley, meadow .....XI.  
 — wall .....X., XI.  
 — wood .....X., XI.  
 Barren *false brome*=heath false brome.  
 — fescue .....VIII., X., XIV. note  
 Bearded (with awned spikelets).  
 — *darnel*=darnel.  
 — *wheat grass*=wood couch.  
 Bent grass (*Agrostis*).  
 — brown .....XIV ; See VIII. contd.  
 — common .....XIV. 19, 20  
 — *dog*=brown.  
 — flying .....IV. 3, 4 ; X. 8, 9  
 — *stoloniferous*=fiorin.  
 Bent stemmed foxtail .....XIV ; See VI.  
*Black grass*=slender foxtail.  
 Bog hair grass .....VIII.  
 Brome grass, annual.....X. contd.  
 — false .....X.  
 — *hairy*=rough.  
 — soft .....X. contd. 17  
 — rough .....X. contd. 16 ; XI. 7, 8



- Bulbous (the base of each shoot specially thickened).  
 — catstail = Timothy ..... III., XIII.  
 — foxtail ..... III.  
 — meadow grass ..... III., XII.  
 — *oat grass* = false oat.  
 Catstail (referring to the form of spike) ..... III., XIII.  
 Cocksfoot ..... II., V. 1, 2, 3, 4  
 Common, bent ..... XIV. 19, 20  
 — *catstail*, or Timothy III. 1, 2, 3, 4, 5 ; XIII. 1, 2, 3, 4, 5  
 — couch ..... VII., X. 11, 12, 13, 14 ; XI. 12, 13, 14  
 — darnel ..... I. 1, XI., XIV.  
 — false oat ..... III. 6, 7, 8, 9, 10 ; X. 15, XIII. note 1  
 — *holcus* = Yorkshire fog.  
 — quaking grass ..... XIII. 11, 12, 13, 14  
 — reed ..... X. contd. 25, 26  
 — *ryegrass* = perennial ryegrass.  
 — Timothy ..... III. 1, 2, 3, 4, 5 ; XIII. 1, 2, 3, 4, 5  
 Compressed-stemmed (culm compressed).  
 — meadow grass ..... XII. ; See IX.  
 Couch grass, common ... }  
 — *creeping* = common } VII., X. 11, 12, 13, 14 ; XI. 12, 13, 14  
 — *fibrous* = wood }  
 — wood ..... } ..... X., XI.  
 Creeping (usually with an elongated, underground stem).  
 — *couch* = common.  
 — fescue, an ally of sheep's fescue (*Festuca rubra*) ..... VIII.  
 — *meadow grass* = smooth stalked.  
 — sea meadow grass  
     VIII. contd. 11, 12, 13, 14, 15, 16, 17, 18 ; XII. ; See XIII.  
 — soft grass ..... I. 4 ; X.  
 Crested (appearance of spikelets).  
 — dogstail ..... I. 2 ; XIV. 10, 11, 12 ; See VIII.  
 — *Koeleria* ..... X. 22, 23, 24 ; XIV. note contd.  
 Darnel, bearded }  
 — common ... } ..... I. 1 ; XI., XIV.  
 Decumbent heath grass  
     X. contd. 27, 28, 29 ; See IX., XII., and XIII.  
*Dog* (eaten by dogs).  
 — *bent* = brown bent.



- Dog couch* = wood couch.  
*Dogstail* = crested dogstail.  
 Downy (the sheaths with soft hair).  
 — oat grass V., X. contd. 20, 21 ; XII. contd. 12, 13, 14, 15  
 Early (season of growth).  
 — hair grass.....VIII.  
 False brome (the spikelets resembling those of brome grass).  
 — *barren* = heath.  
 — heath .....IX., X. contd. 19  
 — *sand* = heath.  
 — *slender* = wood }  
 — wood..... } .....X. contd. 18  
 False oat (the spikelets resembling those of true oat grass).  
 — bulbous }  
 — common } .....III. 6, 7, 8, 9, 10 ; X. 15  
 Fertile (referring to the productions of an extra number of shoots).  
 — meadow grass .....XII.  
 Fescue, barren.....VIII., X., XIV. note  
 — *creeping* = an ally of sheep's fescue.  
 — *fine leaved* = variety of sheep's fescue.  
 — *hard* = variety of sheep's fescue.  
 — meadow .....I. 1 ; XI. 5, 6 ; XIV. 14, 15, 16  
 — *ratstail* = barren fescue.  
 — *red* = creeping fescue.  
 — sheep's .....VIII. 2, 3, 4, 5, 6, 7 ; XIV. note  
 — *squirrel's tail* = barren.  
 — *tall* .....I. 1 ; XI. 5, 6 ; XIV. 14, 15, 16  
 — *various leaved* — an ally of sheep's fescue.  
 — *viviparous* — variety of sheep's fescue.  
 Finger grass (the spikes arranged like the fingers on the hand)  
 X. note  
 Fiorin .....XIV. 17, 18  
 Fog (soft like moss).  
 — Yorkshire .....I. 4 ; X. 3, 4, 5, 6, 7  
 Flat stemmed (culm and sheaths flat = compressed stemmed).  
 — meadow grass .....XII. ; See IX.  
 Floating (applied to aquatics with leaves floating in water)  
 — sweet grass .....VI. 5, 6, 7, 8, 9  
 Flying bent.....IV. 3, 4 ; X. 8, 9



Foxtail (named from the spike).

— bent-stemmed ..... XIV., See VI.

— bulbous ..... III.

— *common* = meadow.

— *marsh* = bent-stemmed.

— meadow ..... I. 3; XIII.

— slender ..... I., XIV.; See XIII.

— *tuberous* = bulbous.

— *water* = bent-stemmed.

*Gardener's garter* = variegated reed canary grass.. ..... II.

Glabrous (without hair).

— oat grass... VIII. contd., XII. contd. 16, 17, 18, 19; See IX.

Golden (colour of spikelets).

— oatgrass = yellow oat ..... X. 1, 2

Grey (covered with grey hair).

— hair grass ..... VIII.

Hair grass (branches of the panicle very thin and hair-like).

— *alpine* = variety of tufted hair grass with the leaves rolled up.

— bog ..... VIII.

— early ..... VIII.

— grey ..... VIII.

— *heath* = wavy hair grass.

— *short-leaved* = variety of tufted hair grass.

— tufted ..... II. 1, 2, 3, 4, 5; XIV. 5

— wavy ..... VIII. contd. 8, 9, 10

Hairy.

— *brome* = rough brome.

Hard (referring to the leaves).

— *fescue* = an ally of sheep's fescue.

Heath (the habitat).

— false brome grass ..... IX., X. contd. 19

— *hair grass* = wavy hair grass.

Heath grass.

— decumbent X. contd. 27, 28, 29; See IX., XII., and XIII.

Holcus.

— *creeping* = creeping soft grass.

— *woolly* = Yorkshire fog.

Holy grass (used in religious ceremonies).

— northern ..... VI., VII.

Italian.

— ryegrass .....I., XI., XIV. 13

Koeleria (named after the botanist Koeler).

— crested.....X. contd. 22, 23, 24 ; XIV. note

Lyme grass.

— sand or sea .....IX., XI. 1, 2 ; XIV. 3, 4

Maram (a sandbinder).

— *sea* = sea mat grass.

Marsh (habitat).

— *bent* = fiorin.

— *foxtail* = bent-stemmed foxtail.

Millet grass.

— spreading } .....VII. 6 ; XIII.  
— *wood* = spreading }

Mat grass (matting sand together, or for forming mats).

— moor .....IV. 1, 2 ; VIII. 1

— sand or sea.....IX., XIV. 1, 2

Meadow (indicates the habitat, except of meadow oat).

— fescue .....I. 1 ; XI. 5, 6 ; XIV. 14, 15, 16

— foxtail .....I. 3 ; XIII.

— *oat grass* = glabrous oat.

Meadow grass (applied to *Poa*, *Glyceria*, and *Sclerochloa*).

— annual .....XII. 6, 7, 8

— bulbous ..... III., XII.

— creeping sea ...VIII. contd. 11, 12, 13, 14, 15, 16, 17, 18

— fertile .....XII.

— flat-stemmed = compressed stemmed..... XII. ; See IX.

— *reed* = reed sweet grass.

— reflexed .....XIII. 15, 16, 17

— rough or rough-stalked.....V. 5, 6, 7 ; XII. 9, 10, 11

— smooth or smooth-stalked.....XII. 1, 2, 3, 4, 5 ; See IX.

— wood .....XII. contd. 1, 2, 3, 4

Melic grass (from *mel*, honey, referring to the sweet taste).

— *mountain* = nodding }  
— nodding ..... } .....V. 14, 15 ; X.  
— *purple* = nodding .....

— wood ..... V. 8, 9, 10, 11, 12, 13 ; X.

Molinia (named after the Italian botanist *Molina*).

— *purple* = flying bent.



Mountain (habitat).

— *melic* = nodding melic.

Murram (a sandbinder; *see* Maram).

— *sand or sea* = sea mat gras.

*Narrow-leaved* (the Latin term is *angustifolia*).

— *oat* = glabrous oat.

— smooth-stalked meadow grass.....VIII. contd.

— wood meadow grass .....VIII. contd.

Nodding (refers to the panicle).

— *false brome* = wood false brome.

— *melic* .....V. 14, 15; X.

Northern (found only in northern counties).

— holy grass.....VI., VII.

Oat grass.

— *bulbous* = false.

— downy.....V., X. contd. 20, 21; XII. contd. 12, 13, 14, 15

— glabrous

VIII. contd.; XII. contd. 16, 17, 18, 19; See IX.

— golden = yellow .....X. 1, 2

— *meadow*.....

— *narrow-leaved* ... } = glabrous.

— *perennial* ..... }

— yellow .....X. 1, 2

Perennial (duration).

— *oat grass* = glabrous.

— ryegrass ..... I. 1; XI. 3, 4; XIV. 6, 7, 8, 4

Purple (colour of spikelets).

— *melic* = nodding melic grass.

— *Molinia* = flying bent.

Quaking grass (refers to the tremulous movements of the spikelets when shaken).

— common .....XIII. 11, 12, 13, 16

*Quitch* = couch.

*Ratstail* (the form of inflorescence).

— *grass* = barren fescue.

Reed.

— canary grass.....II., VI. 15, 16, 17

— *meadow grass* = reed sweet grass } V., VI. 10, 11, 12, 13, 14;

— sweet grass..... } XII. contd. 8, 9, 10, 11

### GROUPS AND FIGURES.

- GROUPS AND FIGURES.
- Reed grass, common .....X. contd. 25, 26
- Reflexed (branches of panicle).
- meadow grass } .....XIII. 15, 16, 17
- sweet grass }
- Ribbon (blade variegated with strips of green and white).
- grass {variety of reed canary grass } .....II
- {variety of cocksfoot }
- Rough brome.....X. contd. 16; XI. 7, 8
- cocksfoot .....II., V. 1, 2, 3, 4
- stalked meadow .....V. 5, 6, 7; XII. 9, 10, 11
- Ryegrass, *common*=perennial.
- darnel .....I. 1; XI., XIV.
- Italian.....I. 1; XI., XIV. 13
- perennial .....I. 1; XI. 3, 4; XIV. 6, 7, 8, 9
- Sand (habitat)=Sea.
- lyme grass.....IX., XI. 1, 2; XIV. 3, 4
- mat grass .....IX., XIV. 1, 2
- Sea (dwellers on sea-shores).
- lyme grass .....IX., XI. 1, 2; XIV. 3, 4
- *maram*=sea mat grass }
- mat grass .....IX., XIV. 1, 2
- *murram* }
- meadow grass
- VIII. contd. 11, 12, 13, 14, 15, 16, 17, 18; XII.; See XIII.
- Sheep's fescue.....VIII. 2, 3, 4, 5, 6,
- fine-leaved—variety of sheep's fescue } 7; XIV. note,
- Short leaved (Latin, brevifolius).
- hair grass=variety of tufted hair grass.
- Slender (referring to spike=nodding).
- false brome—wood false brome.
- foxtail .....I., XIV.; See XII.
- Small reed grass .....IX.
- Smooth-stalked meadow grass.....XII. 1, 2, 3, 4, 5; See IX.
- Soft (having soft downy hairs).
- brome .....X. contd. 17
- grass=*Holcus*.
- Spreading (branches of panicle).
- millet grass .....VII. 6; XIII.
- Squirrel's tail=barren fescue.



*Squitch* = couch.

Stoloniferous (having stems creeping and rooting along the surface of the ground).

— *bent* = fiorin.

— *meadow grass* = rough-stalked.

Sweet grass (stems sweet tasted).

— floating .....VI. 5, 6, 7, 8, 9

— reed...V., VI. 11, 12, 13, 14, 15; XII. contd. 8, 9, 10, 11

— reflexed .....XIII. 15, 16, 17

Sweet (smell when dry).

— *Scented vernal* } VII. 1, 2, 3, 4, 5; X. 10; XI. 9, 10, 11  
— vernal ..... }

Tall (referring to size).

— fescue .....I. 1; XI. 5, 6; XIV. 14, 15, 16

— *oat* = false oat.

Timothy (after Timothy Hansen)

III. 1, 2, 3, 4, 5; XIII. 1, 2, 3, 4, 5

*Tuberous* (base of shoot specially thickened) = bulbous.

— *foxtail* = bulbous foxtail.

— *meadow grass* = bulbous meadow grass.

— *oat grass* = false oat.

Tufted (mode of growth).

— hair grass .....II. 1, 2, 3, 4, 5; IX., XII. 5

*Twitch* = couch.

*Various-leaved* (radical and cauline leaves differ in form).

— fescue—an ally of sheep's fescue.

Vernal (early spring growth).

— *grass* = sweet vernal.

Water (habitat).

— *foxtail* = bent stemmed foxtail.

— whorl grass .....VI. 1, 2, 3, 4; XII. contd. 5, 6, 7

Wavy (branches of panicle).

— hair grass .....VIII. contd. 8, 9, 10

Whorl grass (branches of panicle in whorls).

— water.....VI. 1, 2, 3, 4; XII. contd. 5, 6, 7

Wood (habitat).

— couch .....X., XI.

— false brome.....X. contd. 18

— meadow grass.....XII. contd. 1, 2, 3, 4

## GROUPS AND FIGURES.

Wood melic .....V. 9, 10, 11, 12, 13; X.

— *millet* = spreading millet.

Variegated (leaves with alternate white and green strips) }  
 — canary grass ..... } ...II.  
 — cocksfoot..... }

Woolly (with abundant woolly hair).

— soft grass = Yorkshire fog.

Yellow (golden colour of ripe spikelets).

— oat grass .....X. 1, 2

Yorkshire fog .....I. 4; X. 3, 4, 5, 6, 7





## INDEX II.—LATIN NAMES.

## SYNONYMS AND VARIETIES IN ITALICS.

## GROUPS AND FIGURES.

*Agropyrum*. See *Triticum*.

*Agrostis* (bent grass).

— *alba* = *stolonifera*.

— *canina*, L. (dog's—brown).....XIV.; See VIII. notes.

— *stolonifera*, L. (stolon bearing—fiorin) .....XIV. 17, 18

— *vulgaris* With. (common) .....XIV. 19, 20

*Ana* (hair grass).

— *alpina*, L.—variety of *cæspitosa*.

— *aquatica*, L. = *Catabrosa aquatica*.

— *cærulea*, L. (purple) = *Molinia cærulea*.

— *cæspitosa*, L. (tufted) .....II. 1, 2, 3, 4, 5; IX., XIV. 5

— *canescens*, L. (grey) .....VIII.

— *cristata*, L. (crested) = *Koeleria cristata*.

— *flexuosa*, L. (wavy) .....VIII. contd. 8, 9, 10

— *præcox*, L. (early) .....VIII.

— *uliginosa*, Weihe. (bog) .....VIII.

*Airopsis* (like *aira*). Applied by *Fries* to *Aira præcox*, and *caryophyllea*.

*Alopecurus* (foxtail).

— *agrestis*, L. (field) .....I., XIV.; See XIII.

— *bulbosus*, L. (bulbous).....III.

— *geniculatus*, L. (bent-stemmed).....XIV.; See VI.

— *pratensis*, L. (meadow) .....I. 3; XIII.

*Ammophila* (sand loving).

— *arundinacea*, Beauv. = *Psamma arenaria*.

*Anthoxanthum* (yellow-flowered—vernal grass).

— *odoratum*, L. (sweet scented)

VII. 1, 2, 3, 4, 5; X. 10; XI. 9, 10, 11





### GROUPS AND FIGURES.

- GROUPS AND FIGURES.
- Dactylis glomerata L. (spikelets in tufts) .....II., V. 1, 2, 3, 4  
*Digraphis*. See *Phalaris arundinacea*.  
*Deschampsia*. See *Aira*.  
*Digitaria* (finger grass) .....X. note 11  
*Echinochloa* (bristle grass) .....X. note 13  
*Elymus* (lyme grass).  
 — *arenarius*, L. (sand) .....IX., XI. 1, 2; XIV. 3, 4  
 — *caninus*, L. = *Triticum caninum*.  
 — *Europæus* = *Hordeum sylvaticum*.  
*Enodium*. See *Molinia*.  
*Festuca* (fescue grass).  
 — *elator*, L. (tall) .....I., XI. 5, 6; XIV. 14, 15, 16  
 — *ovina*, L. (sheep's) .....VIII. 2, 3, 4, 5, 6, 7; XIV. note  
 Its allies are *duriuscula* (hard), *fallax* (deceitful), *hetero-*  
*phylla* (various leaved), *rubra* (red or creeping), *tenui-*  
*folia* (fine leaved). See Stebler's "Best Forage Plants."  
 — *pratensis*, Huds. (meadow) } I. 1; XI. 5, 6; XIV.  
     —part of *F. elator*..... } 14, 15, 16  
 — *sciuroides*, Roth. (squirrel tail—barren)  
     VIII., X., XIV. note.  
*Note*.—*Molinia*, *Triodia*, *Koeleria*, *Sclerachloa*, *Glyceria*,  
 and *Brachypodium*, were regarded by old writers as parts  
 of the genus *Festuca*.  
*Glyceria* (sweet grass).  
 — *aquatica*, Sm. ...V., VI. 10, 11, 12, 13, 14; XII. contd.  
     8, 9, 10, 11  
 — *distans*, Wahl. (reflexed) .....XIII. 15, 16, 17  
 — *fluitans*, M. & K. (floating) .....VI. 5, 6, 7, 8, 9  
 — *maritima*, M. & K. (sea)  
     VIII. contd. 11, 12, 13, 14, 15, 16, 17, 18  
 — *plicata*, Fries. (folded-leaved)—variety of *fluitans*  
 — *spectabilis*, M. & K. = *aquatica* .....  
*NOTE*.—*Catabrosa* is sometimes regarded as part of this  
 genus.  
*Hierochloe* or *Hierochloa* (Holy grass)  
 — *borealis*, R. & S. (northern).....VI., VII.  
 — *odorata*, Wahl. = *borealis*.  
*Holcus avenacens*, Scop. = *Avena elator*.  
 — *lanatus*, L. (woolly) .....I. 4 X. 3, 4, 5, 6, 7



GROUPS AND FIGURES.

- Holcus mollis*, L. (soft) .....I. 4; X.  
— *odoratus*, L. (sweet smelling) = *Hierochloe borealis*.  
*Hordeum* (barley).  
— *murinum*, L. (wall).....X. XI.  
— *pratense*, Huds. (meadow) .....XI.  
— *sylvaticum*, Huds. (wood).....X., XI.  
*Koeleria cristata*, Pers. ....X. contd. 22, 23, 24; XIV. note  
*Lolium* (ryegrass).  
— *Italicum*, Braun. (Italian) .....I. 1; XI., XIV. 13  
— *perenne*, L. (perennial)...I. 1; XI. 3, 4; XIV. 6, 7, 8, 9,  
— *temulentum*, L. (darnel).....I. 1; XI., XIV.  
*Melica* (Melic grass).  
— *nutans*, L. (nodding) .....V. 14, 15; X.  
— *uniflora*, L. (one-flowered spikelets—wood) V. 8, 9, 10, 11,  
12, 13, X.  
*Milium* (Millet grass).  
— *effusum*, L. (spreading branches of pannile—wood) VII. 6,  
XIII.  
*Molinia coerulea*, Moench. (purple) .....IV. 3, 4; X. 8, 9  
*Nardus* (mat grass).  
— *stricta*, L. (narrow leaves and spike).....IV. 1, 2; VIII. 1  
*Phleum* (catstail).  
— *arenarium*, L. (sand) }  
— *asperum*, Vill. (rough) } .....See III. and XIII.  
— *Boehmeri*, Schrad (Boehmer's) .....III.; See XIII.  
— *pratense*, L. (meadow)...III. 1, 2, 3, 4, 5; XIII. 1, 2, 3,  
4, 5  
*Phalaris* (canary grass).  
— *arundinacea*, L. (sand—reed) .....II., VI. 16, 17, 18  
*Phragmites* (reed grass).  
— *communis*, Trin. (common) .....X. contd. 25, 26  
*Poa* (meadow grass).  
— *alpina*, L. (alpine).....See III. and XII.  
— *annua*, L. (annual) .....XII. 6, 7, 8  
— *Balfourii*, Bab. (Balfour's)—variety of *nemoralis*.  
— *bulbosa*, L. (bulbous) .....III., XII.  
— *compressa*, L. (compressed stemmed) .....XII.; See IX.  
— *casiia*, L.—variety of *nemoralis*.  
— *fertilis*, Host. (fertile) .....XII.



*Poa glauca*, Sm.—variety of *nemoralis*.

— *maritima*, Huds. (sea) ...VIII. contd. 11, 12, 13, 14, 15,  
16, 17, 18; XII.; See XIII.

— *nemoralis*, L. (wood) .....XII. contd. 1, 2, 3, 4

— *Parnellii*, Bab. (Parnell's)—variety of *nemoralis*.

— *pratensis*, L. (meadow—smooth-stalked) ...XII. 1, 2, 3, 4,  
5; See IX.

— *serotina*, Ehr. = *fertilis* .....

— *trivialis*, L. (trivial—rough-stalked).....V. 5, 6, 7; XII. 9,  
10, 11

*Note.*—This genus sometimes includes *Glyceria* and  
*Sclerochloa*.

*Psamma* (mat grass).

— *arenaria*, R. & S. (sand) .....IX., XIV. 1, 2

*Schedonorus*. See *Bromus* and *Festuca*.

*Sclerochloa* (Hard grass.) The leaves are succulent rather than  
hard).

— *distans*, Bab = *Glyceria distans*.

— *maritima*, Lind = *Poa maritima*.

*Serrafalcus*. See *Bromus*.

*Setaria* (bristle grass) .....X. note 12

*Triodia* (pale, with three teeth—heath grass).

— *decumbens*, Beauv. (decumbent).....X. contd. 27, 28, 29;  
See IX., XII., and XIII.

*Trisetum* (pale, with three bristles, two are teeth, and one, the  
dorsal awn). See *Avena*.

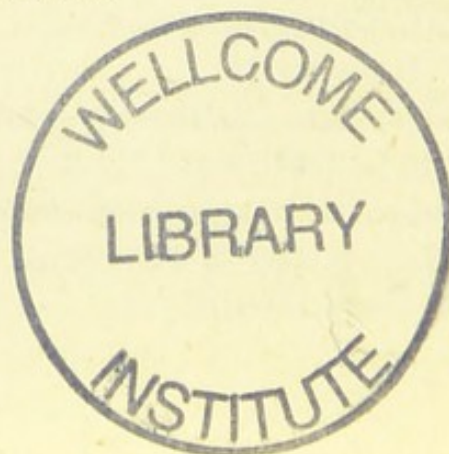
*Triticum* (couch).

— *caninum*, Huds. (dog's—wood) .....X., XI.

— *repens*, L. (creeping—common)...VII., X. 11, 12, 13, 14;  
XI. 12, 13, 14

— *pinnatum*, Moench. = *Brachypodium pinnatum*.

*Vulpia*. See *Festuca sciuroides*.





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