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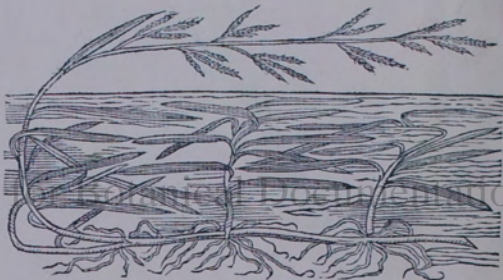
*About the Institute*

The Hunt Institute for Botanical Documentation, a research division of Carnegie Mellon University, specializes in the history of botany and all aspects of plant science and serves the international scientific community through research and documentation. To this end, the Institute acquires and maintains authoritative collections of books, plant images, manuscripts, portraits and data files, and provides publications and other modes of information service. The Institute meets the reference needs of botanists, biologists, historians, conservationists, librarians, bibliographers and the public at large, especially those concerned with any aspect of the North American flora.

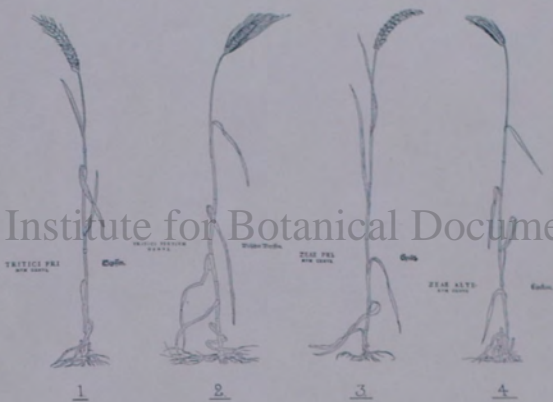
Hunt Institute was dedicated in 1961 as the Rachel McMasters Miller Hunt Botanical Library, an international center for bibliographical research and service in the interests of botany and horticulture, as well as a center for the study of all aspects of the history of the plant sciences. By 1971 the Library's activities had so diversified that the name was changed to Hunt Institute for Botanical Documentation. Growth in collections and research projects led to the establishment of four programmatic departments: Archives, Art, Bibliography and the Library.

A few have been taken out, but  
can be replaced for the rest in legends.

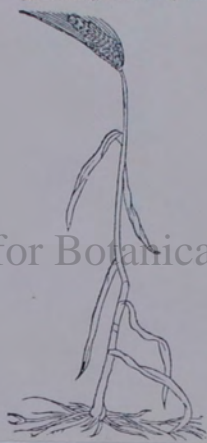
Beschrijvinge van alleley Gras/  
Shemeyn Dlor. gras.



(1)



Triticum Romanorum, aut Triticum  
Barbatum. Romaine Wheat.



Triticum Typhinum. Tophwheat.





5

5

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*Avena.*  
Habern.



6

Lolium.



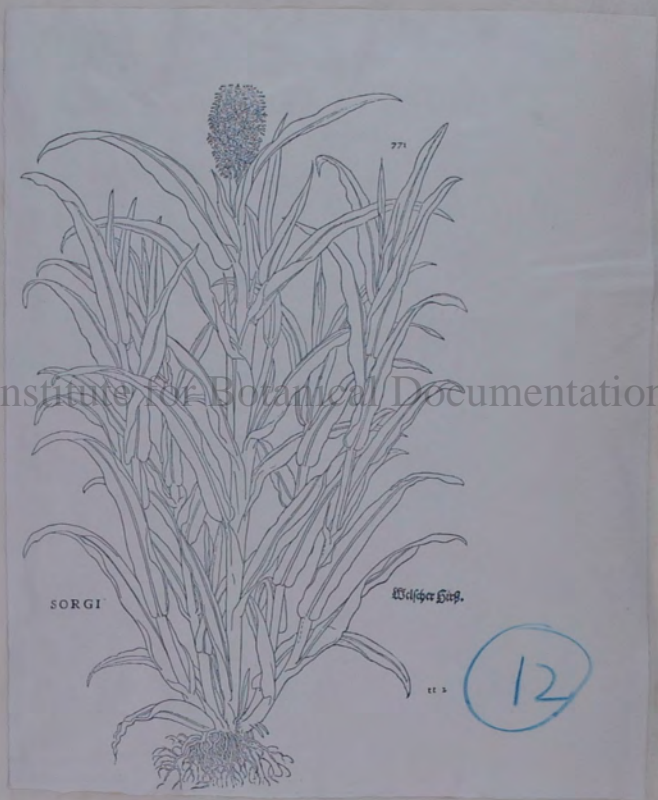
8

PANICUM.



11





771

SORGI

Walters Herb.

11 3

12

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13





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Lachryma Iobi

16

*Gramen vulgo cognitum.*  
Gemein Gras.



17

Of Grasse. Chap. xliij.

✱ The Kindes.

Man that finde many sortes of grasse, one lyke another in stemme, and  
leaves, but not in the knoppes or eares: for one hath an eare like Barley,  
the other lyke Millet, another like Pauck, another lyke Turay, and such  
unprofitable weedes that growe amongst come. Some haue rough prickley  
eares, and some are soft and gentle, others are rough & molle lyke fine downe  
or cotton, so that there are many sortes and kindes of grasse: wherof we will  
make no larger discourse, but of suche kindes onely, as haue bene used of the  
Antient Physicians, and are particularly named Agrostis and Gramen.

✱ The Description.

**T**HIS grasse wherof we shall nowe  
speake, hath long rough leaves al-  
most lyke the Cane, or Pole reede,  
but a great deale lesser, yet muche greater &  
broder then the leaves of that grasse which  
groweth commonly in meadowes. The heine  
or stemmes are small, a foote or two long,  
with five or six ioyntes, at the vppermost  
of þ stalkes there growe soft & gentle eares,  
almost like þ bulby eares of þ Cane or Pole  
reede, but smaller and slenderer. The roote  
is long and white, full of ioyntes, creeping  
hither & thither, & platted or wrapped one  
with another, & putting forth new springes  
in sundry places, & by the meanes hereof it  
doth multiplie and increase exceedingly in  
leaves and stalkes.

✱ The Place.

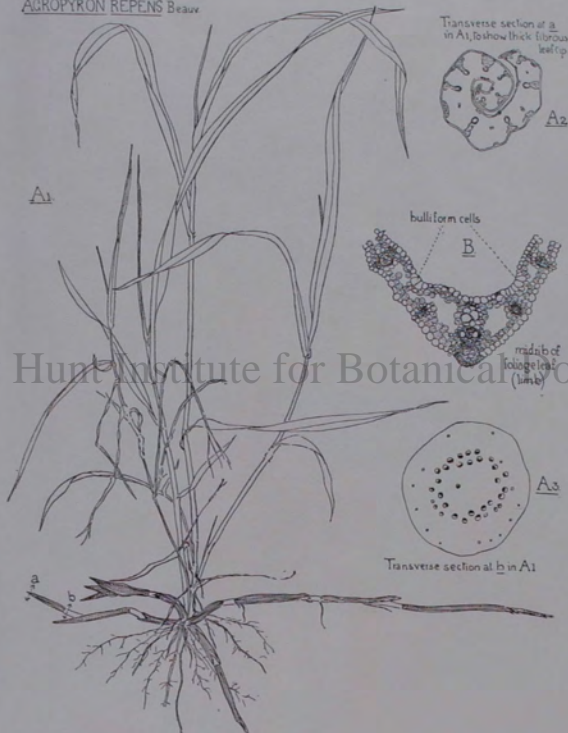
This grasse groweth not in meadowes &  
lowe places, lyke the other, but in the come  
feldes, & the borders thereof, & is a naughty  
& hurtful weede to come, the which the hus-  
bandmen would not willingly haue in their  
lande, or feedes: & therefore they take much  
payne to weede, and plucke by the same.

✱ The Names.

This grasse is called in Greeke *Agrostis*.  
Agrostis, because it groweth in the  
coyne



*AGROPYRON REPENS* Beauv



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20

Lolium.



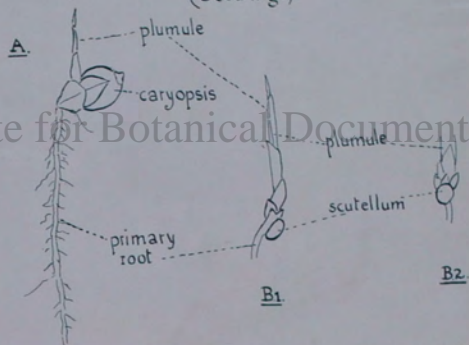
ARUNDO  
Indica Sac-  
charifera.

Franc. Canne à  
Sucre, & Ro-  
seau sucré.





DENDROCALAMUS SIKKIMENSIS, Gamble  
(Seedlings)



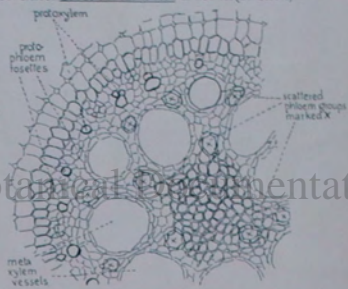
22

BAMBUSA VULGARIS Schrad. (A rhizome plexus seen from below)  
 bases of vertical aerial axes indicated in black



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Part of root-stem of *SASA PALMATA* E.C. Camus (Bambusaceae)



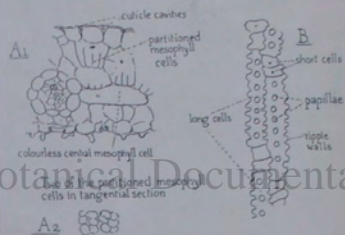
24

SASA DISTICHA E.O. Camus  
(BAMBUSA DISTICHA Milford)

Leaf structure

Segment of transverse section

Epidermis in surface view (lower)

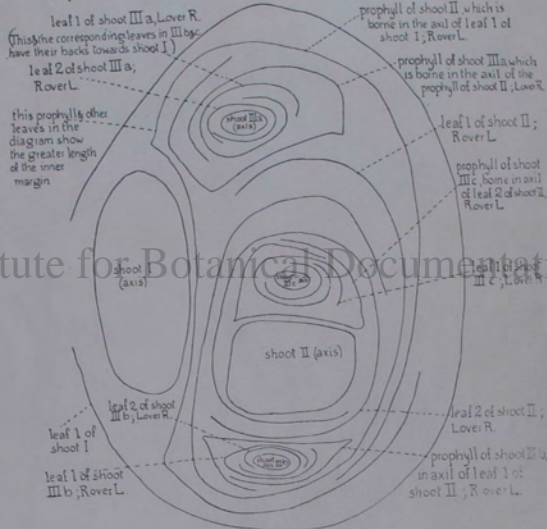


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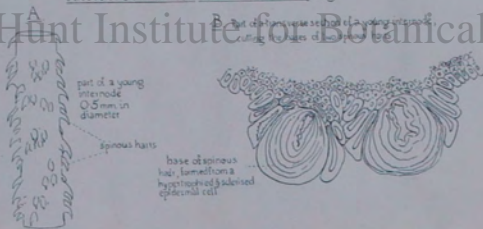
25



Ground-plan of a vegetative bud from an inflorescence of *BAMBUSA BAMBOO* Back.



ARTHROSTYLIDIUM MULTISPICATUM Pilg.



27

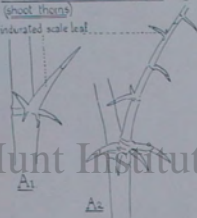


BAMBOO THORNS

GUADUA ANGUSTIFOLIA Rup

(shoot thorn)

indurated scale leaf



A1

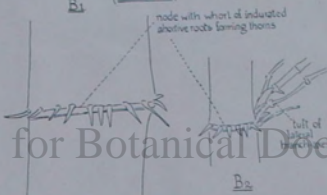
A2

ARUNDINARIA sp. near A. GRIFFITHIANA Munro

(root thorn)

B1

made with whorl of indurated  
abusive roots forming thorns

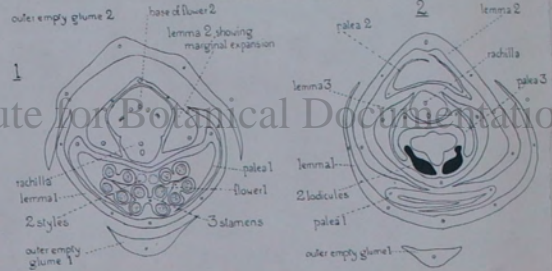


B2

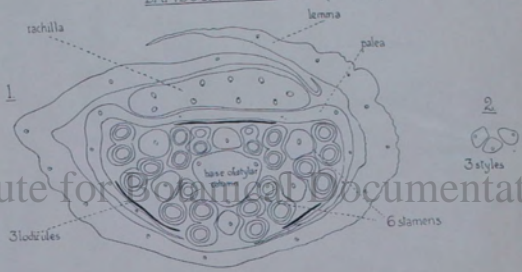
tuft of  
lateral  
shoots

30

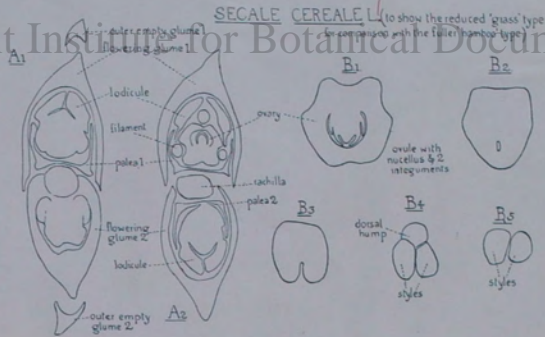
FESTUCA OVINAL (herbaceous)



BAMBUSA TULDA Roxb (arboreal)



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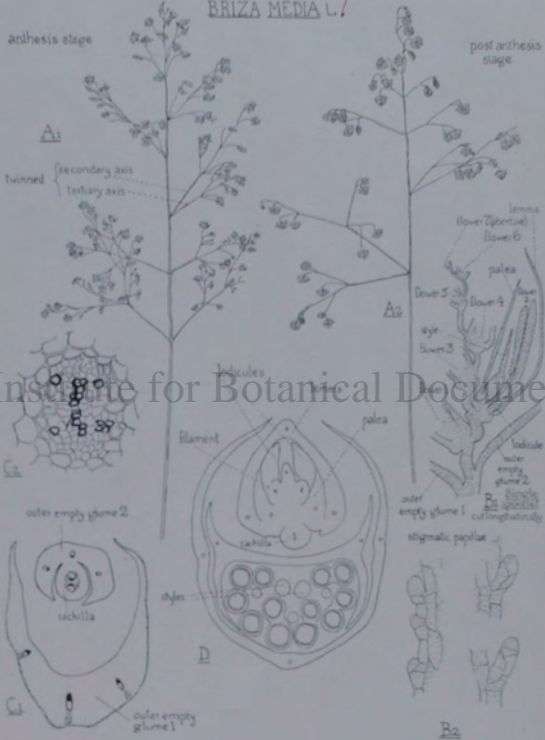


Please add full fig

BRIZA MEDIA L.

anthesis stage

post anthesis stage



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57

Structure of the spikelet & flower of AVENA, after Malpighi, 1675



ANTHESIS

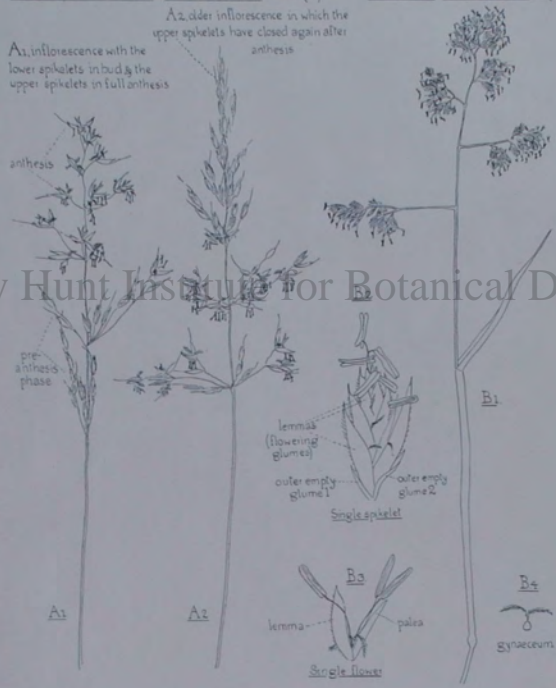
ARRHENATHERUM AVENACEUM Beauv (A)

DACTYLIS GLOMERATA L (B)

*Please name full Hsp.*

A2, older inflorescence in which the upper spikelets have closed again after anthesis

A1, inflorescence with the lower spikelets in bud & the upper spikelets in full anthesis

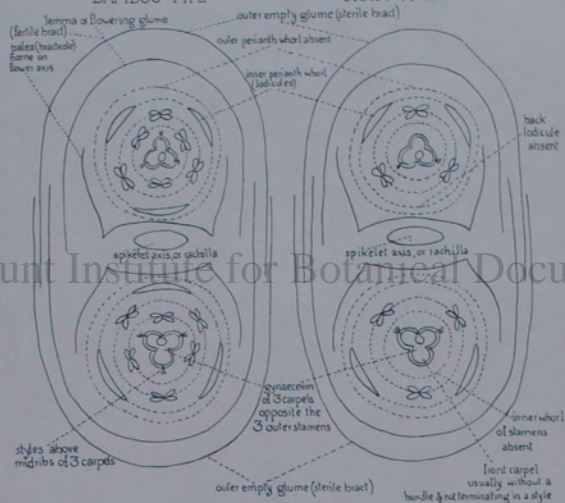


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SPIKELET STRUCTURE

BAMBOO TYPE

GRASS TYPE



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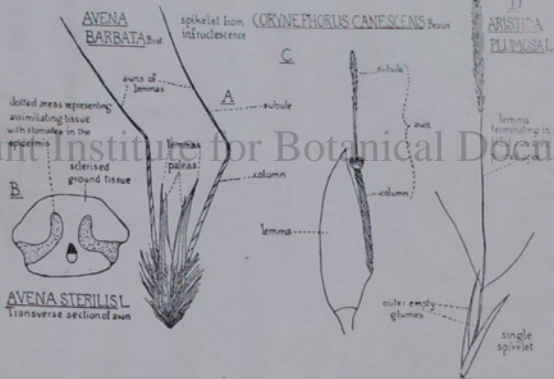
58

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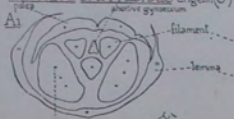
AWNS



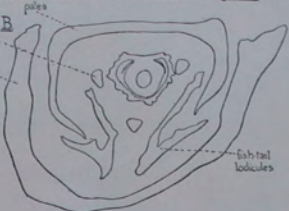
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LODICULES

RUCHLOE DACTYLOIDES Engelm. (♂)



ICHTHANTHUS RUPRECHTII Deell var. glaberrimus Deell



Iodicule bundles

A2

LOUVEA PILOSA (Presl) Scribn. (♂) (C)



STIPA PENNATA L. (D)



axis

third lodicule (non-vascular)

palea

filament

lodicules

palea

D1 synsarcium

fused basal region of lodicules

lodicules in their free upper region

C2



front lodicules each with two bundles

D2

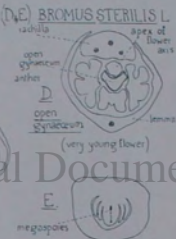
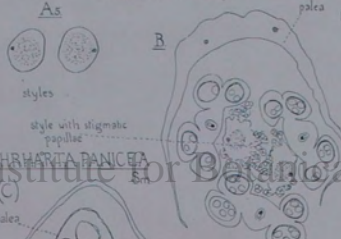
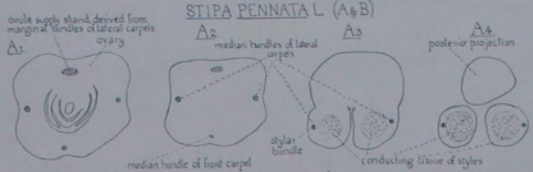
median bundle of lemma while still in axils show bilobed character which is lost above

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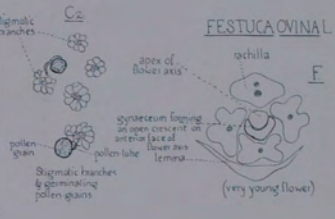
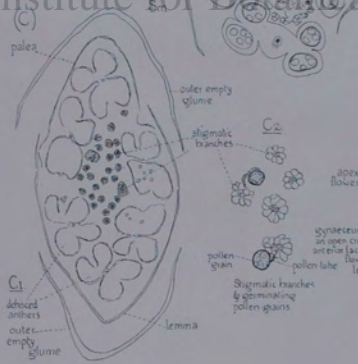
66

GYNAECEUM

*STIPA PENNATA* L. (A & B)

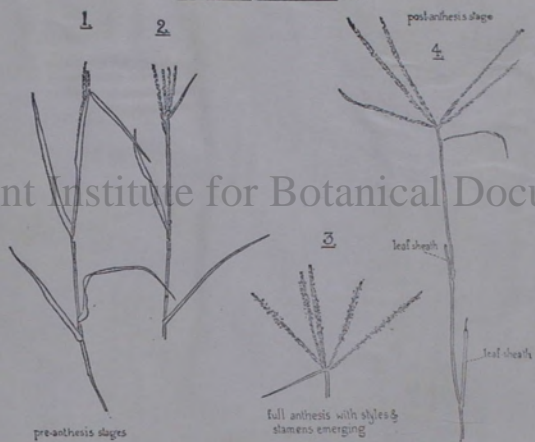


*CHRYSANTHA PANICEA* L.



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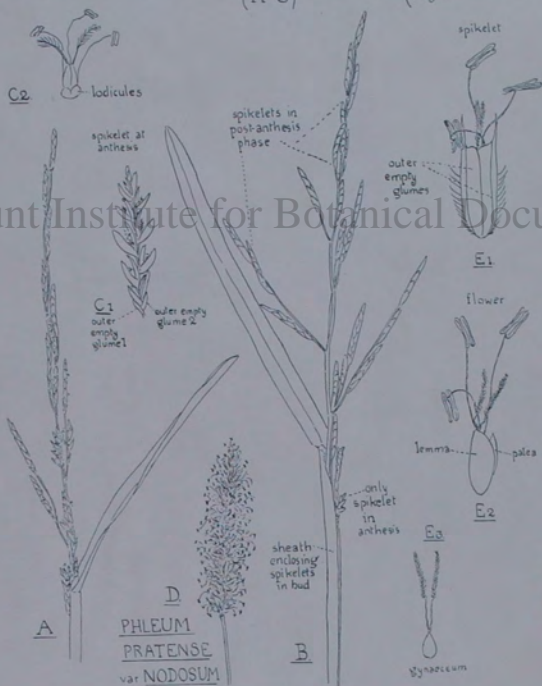
CYNODON DACTYLON Pers.



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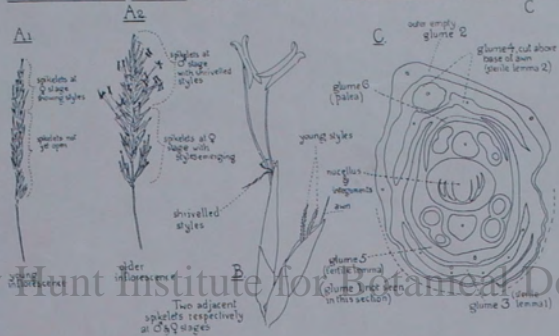
Anthesis in GLYCERIA AQUATICA Wahl. & PHLEUM PRATENSE L.  
(A-C) (D&E)



70

ANTHOXANTHUM GRACILE Bivon A, B

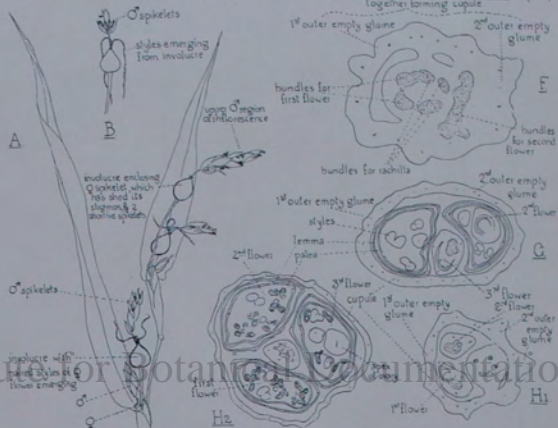
ANTHOXANTHUM ODORATUM L.



INVOLUCRES

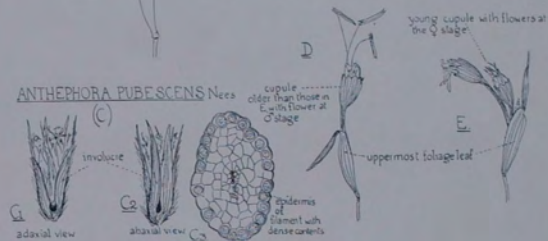
COIX LACRYMA-JOBI L (A, B)

CORNUCOPIAE CUCULLATUM L(H)



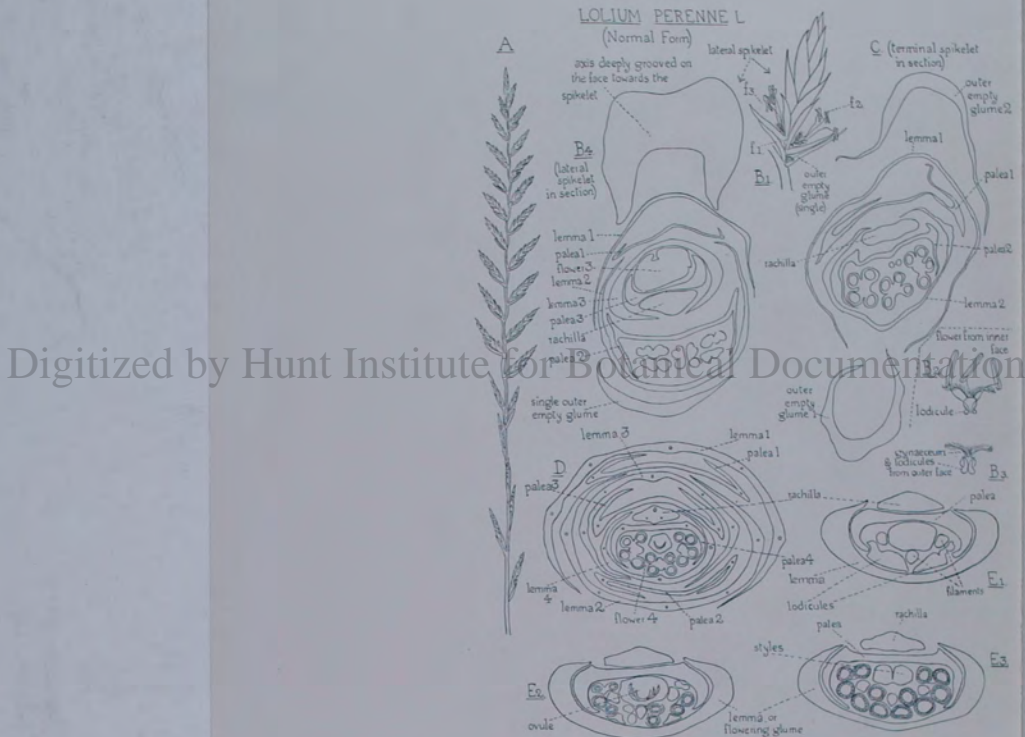
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ANTHEPHORA PUBESCENS Nees



LOLIUM PERENNE L

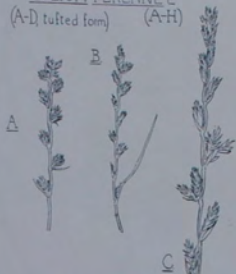
(Normal Form)



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LOLIUM PERENNEL  
(A-D) tufted form (A-H)



(E-G, cristate form)



outer empty glumes absent in region marked with a bracket

outer empty glume

lowest glume which is the lemma of a reduced flower

outer empty glume

LOLIUM MULTIFLORUM Lam.  
(I & K)



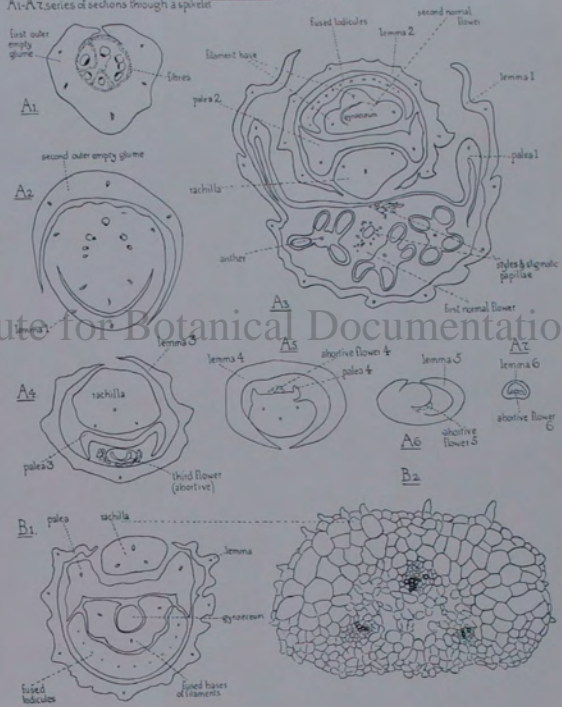
branched form

I normal form

K2

in K1 base of 2 inflorescences at X

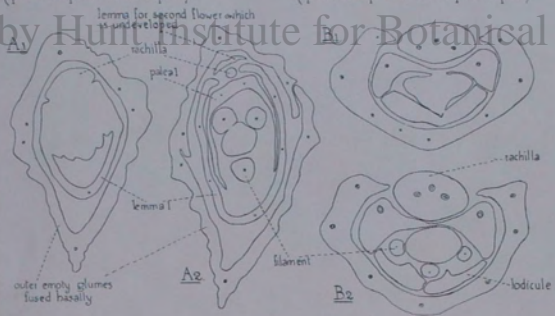
A1-A7 series of sections through a spikelet *MELICA NUTANS* L.



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PHALARIS TUBEROSA L.  
(epikelet compressed in lateral plane)

PHRAGMITES COMMUNIS Trin.  
(epikelet compressed in antero-posterior plane)



82

ANTHOXANTHUM ODORATUM L.

A1



spikelet at  
stage

A2



Synaeceum + spikelet at  
stage  
showing 2  
empty glumes

B1



spikelet at  
stage  
showing 2  
empty glumes

B2



2 glumes  
removed to  
show awned glumes  
(sterile lemmas)

B3

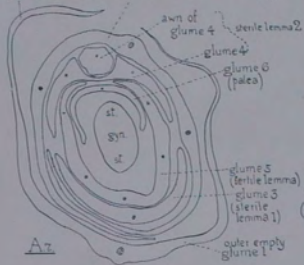
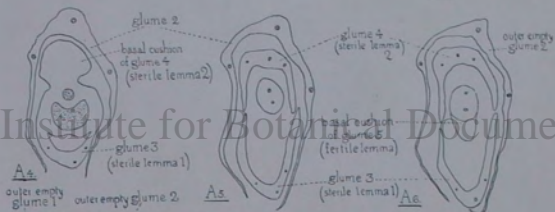
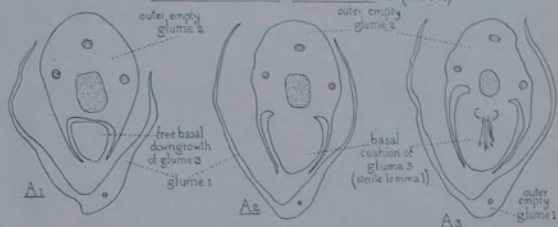


inner  
glumes  
(in lemma  
& palea)

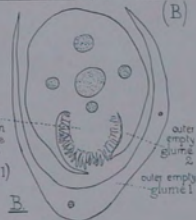
84



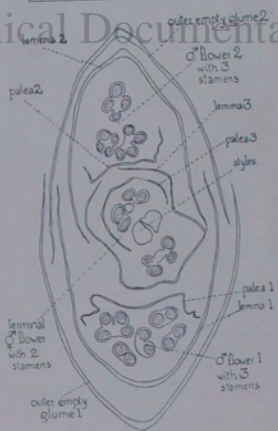
ANTHOXANTHUM ODORATUM L. (A<sub>1</sub>-A<sub>7</sub>)



ANTHOXANTHUM GRACILE Bivon. (B)

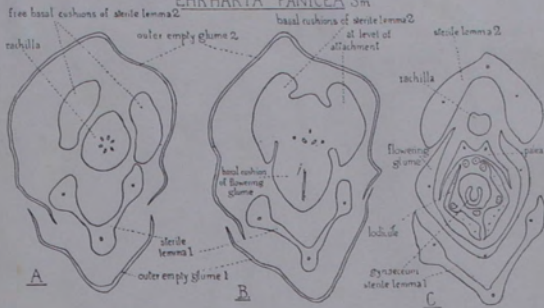


HIEROCHLOE REDOLENS RB.

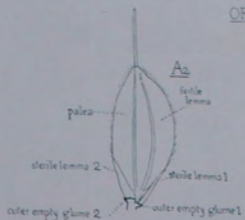


86

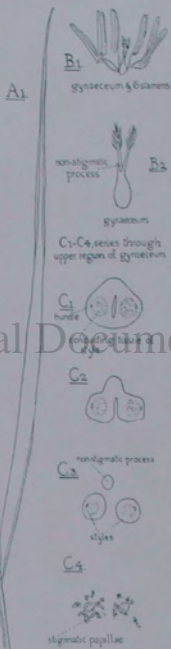
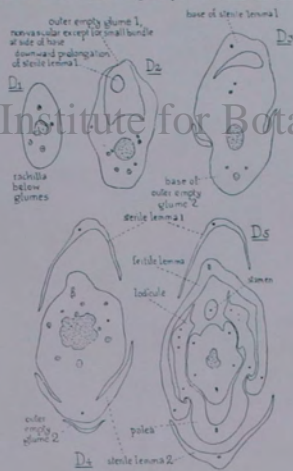
EHRHARTA PANICEA Sm



ORYZA SATIVA L.



Sections from a series through a spikelet to show the glumes



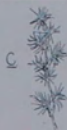


BRISTLE GRASSES

Δ  
PENNISETUM  
VILLOSUM R. Br.



CENCHRUS sp



E  
SETARIA GLAUCA Beauv



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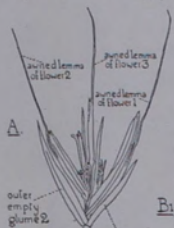
D  
CENCHRUS  
MACROSTACHYUS  
Hochst



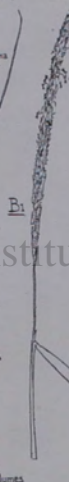
B  
CENCHRUS  
TRIBULOIDES  
L.



*AVENA PRATENSIS* L.  
spikelet (A)



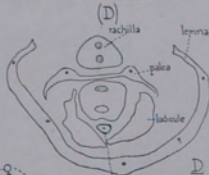
*ALOPECURUS ACRESTIS* L. (B)



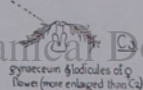
*ZIZANIA AQUATICA* L. (C)



*FESTUCA BROMODES* Sm. (D)

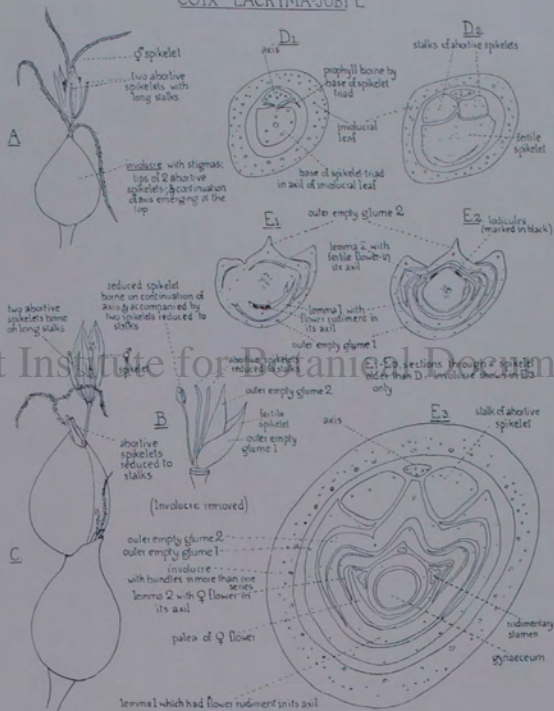


filament of the single stamen



90

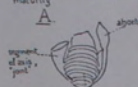
COIX LACRYMA-JOBI L



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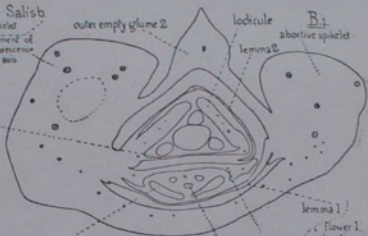
**ISCHAEMUM RUCOSUM** Salisb

A habit drawing of a sessile fertile spikelet borne on a debited joint of the axis, which breaks up at maturity



Ribbed outer glume 1

axis segment



lodicule

lemma 1

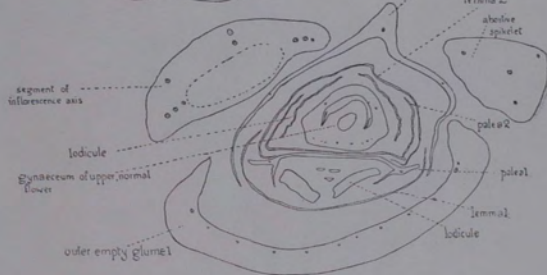
flower 1, abortive

palea 1

stamen abortive spikelet

outer empty glume 1

B2



outer empty glume 2

lemma 2

abortive spikelet

palea 2

palea 1

lemma 1

lodicule

B3

segment of inflorescence axis

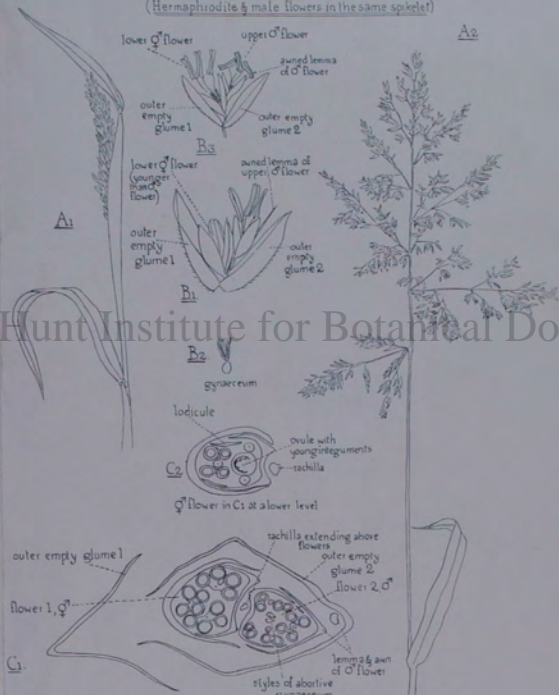
lodicule

Synaeceum of upper, normal lower

outer empty glume 1

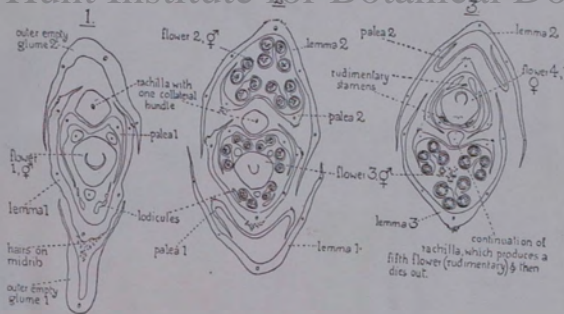


HOLCUS LANATUS L  
 (Hermaphrodite & male flowers in the same spikelet)



Section of spikelet orientated to correspond with the sketches, B1 & B3

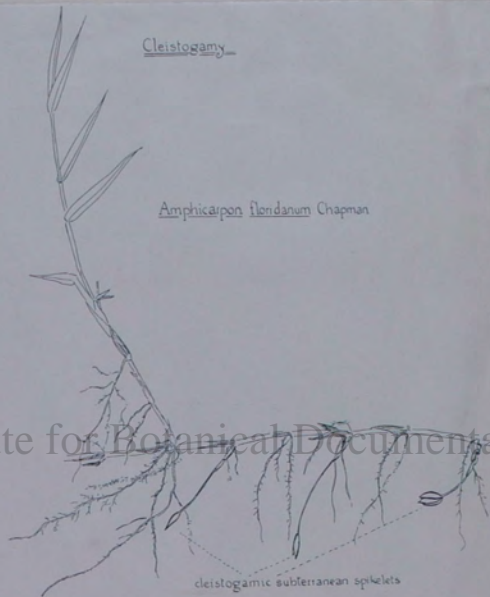
POA ANNUA L.  
 (Hermaphrodite & female flowers in the same spikelet)



100

Cleistogamy

*Amphicarpus flendani* Chapman



cleistogamic subterranean spikelets

101

DWARF GRASSES

A.

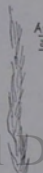


Bromus hordeaceus L.

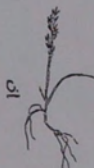


Apera praecox L.

D.  
Anhenatherum  
avenaceum Beauv.



E.



Lolium perenne L.



Mibora verna Beauv.



POA ANNUAL

apical region of inflorescence in anthesis stage

apical region of inflorescence in post-anthesis stage

pre-anthesis stage

A<sub>1</sub>

A<sub>3</sub>

leaf limb

small flowering plant (nutr. culm)

ligule

leaf sheath

A<sub>2</sub>

lower region of inflorescence in anthesis stage

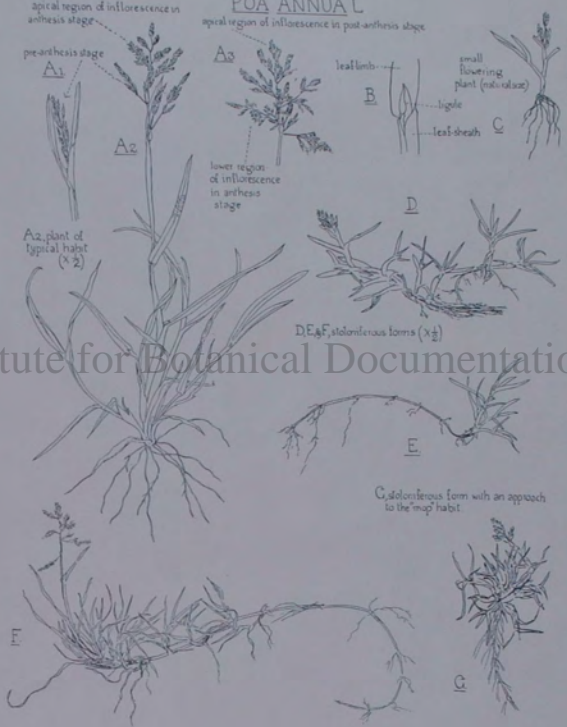
D

A<sub>2</sub> plant of typical habit (x2)

D, E, F, stoloniferous forms (x $\frac{1}{2}$ )

E

C, stoloniferous form with an approach to the "rug" habit



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THE "MOP" HABIT  
HOLCUS LANATUS (A+B)



(?) *AGROSTIS PALUSTRIS* Huds.

*GLYCERIA MARITIMA* Met & Koch.

*FESTUCA OVINA* L.

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104

Of Pole Keede, or Canes. Chap. liij.

Harundo Vallatoria.

The common Pole Keede.

*\* The kinds.*  
THERE are diuers kindes of Keedes, as Dioscorides and Plinie do write, whereof the sixth kinde is very common and well knowne in this Countreie.

*\* The Description*

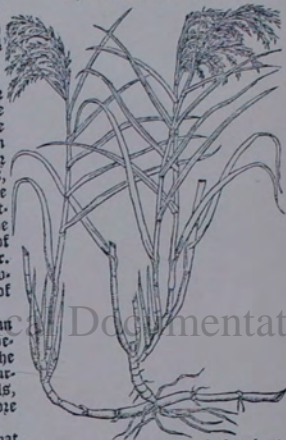
**T**HE common Keede or Cane hath a long stalke or strawe full of knotte lopnes, wherevpon grow many long rough blades or leanes, and at the top large tufts, or eares spread abroad, the which do change into a fine downe or cotton, and is carried away with the winde, almost like the eares of Mill or Millet, but farre bigger. The roote is long & white, growing outwardly in the bottome of the water.

The Cane of Inde, or Indian Cane, is of the kind of Keedes, very high, long, great, and strong, the which is vsed in temples & Churches to put out light of candels, whiche they vse to burne before their Images.

To these we may iopne that

Cane, whereof they make Sugar, in the Ilandes of Canarie, and els where.

Besides these sortes, there is another aromatical, and sweete smelling kind, vnknowne in this Countreie.



105

*AVENA STERILIS* L.

(A+B)

B. plant with sowing  
hulls, but still attached  
to the spatula of the  
previous year

Seedling



A



*TRITICUM SATIVUM* Linn

(E)

Plant in flower but  
still attached to the  
remains of the  
seed from which  
it has grown

Ea

Eb

Ec

Ed

Ee

*AVENA BARBATA* B.S.

(C+D)

awn

C  
seedling

first  
stomular  
trial

D  
coleoptile

Two views of  
seedling with  
spatula &  
endosperm  
removed

mesocotyl

scutellum  
(dorsal  
view)

D2  
mesocotyl

epicotyl

scutellum  
(side view)

awned spatula

remains  
of caryopsis

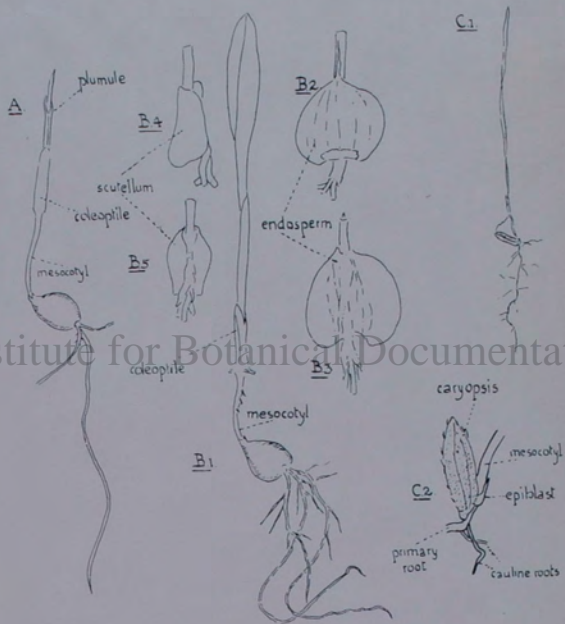
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108



A & B. COIX LACRYMA-IOBI L.

C. LEERSIA ORYZOIDES Sw.



110

AWNED CLUMES

(for comparison with scutellum & coleoptile)

AVENA SATIVA L (A)

ALOPECURUS

ANTHOXANTHUM

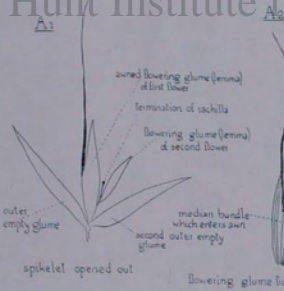
(B, C)

Alopecurus  
agrestis L.

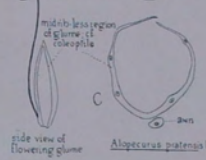
lower region of glume  
to scutellum  
handle which enters fur

upper middle less region of glume

Alopecurus pratensis L.



B

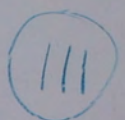


Alopecurus pratensis L.

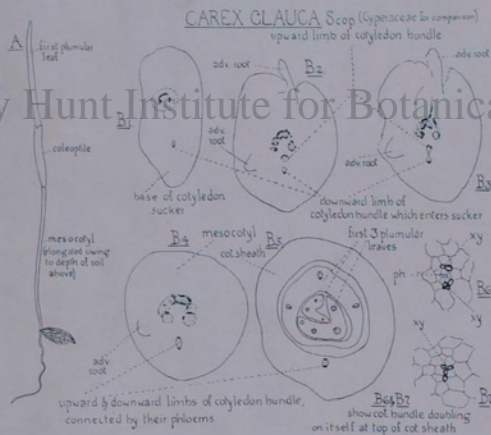


D1

C

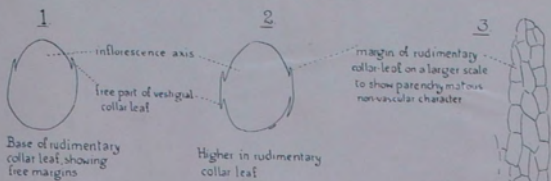


flowering glume from the back



112

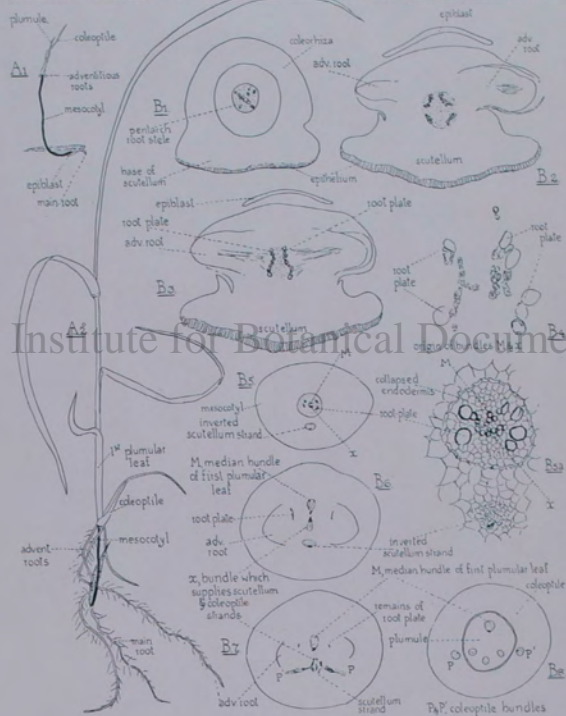
"COLLAR-LEAF" at base of inflorescence in AVENA BARBATA Brot





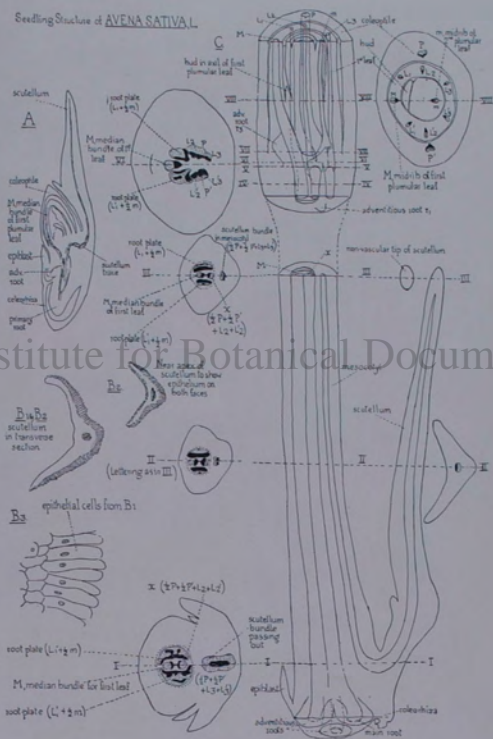
ZIZANIA AQUATICA L (A)

(B) LOLIUM MULTIFLORUM Lam



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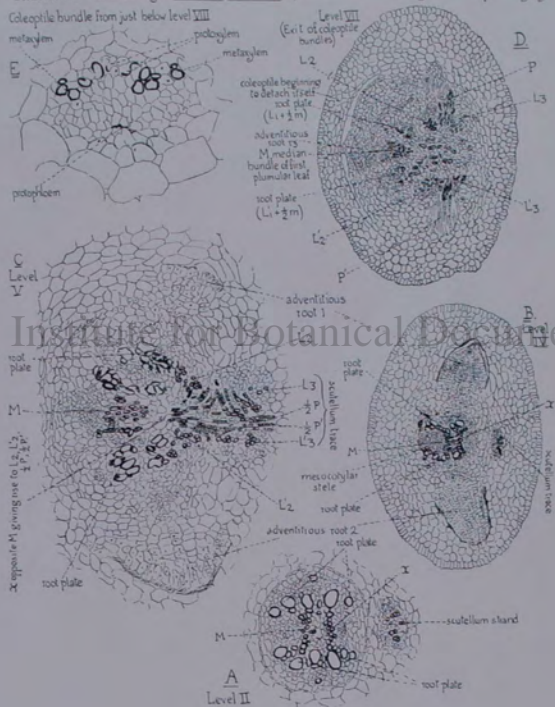
Seedling Structure of *AVENA SATIVAL*



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117

Structure of the seedling of AVENA SATIVA L. at levels marked in Diagram C of the preceding figure

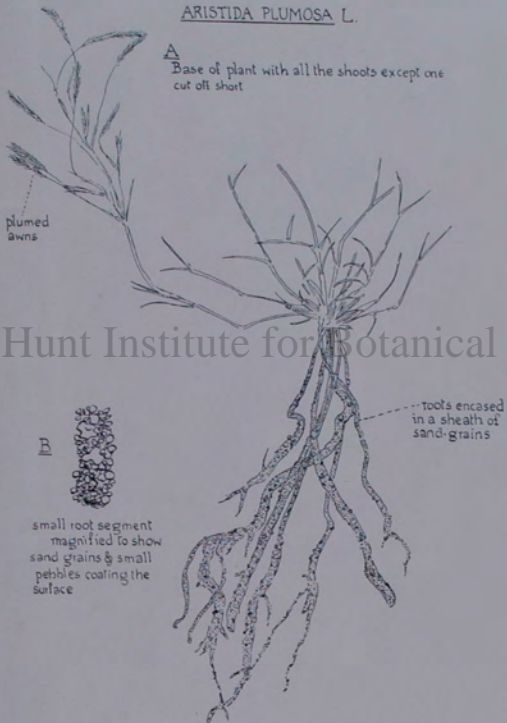


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ARISTIDA PLUMOSA L.

A  
Base of plant with all the shoots except one  
cut off short

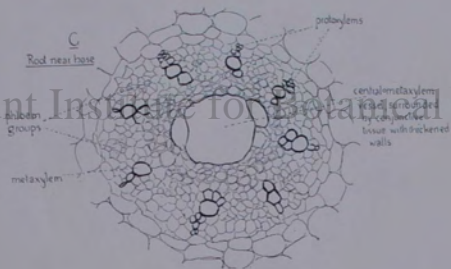
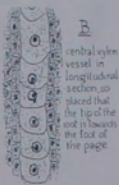
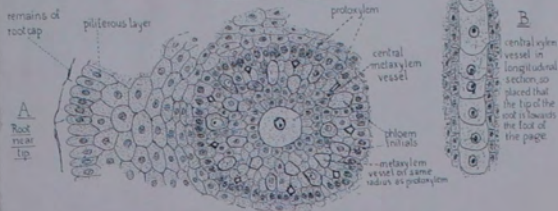


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119



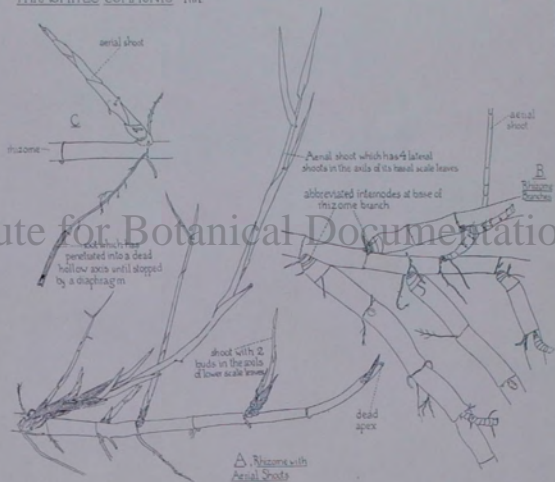
HORDEUM SATIVUM Jessen



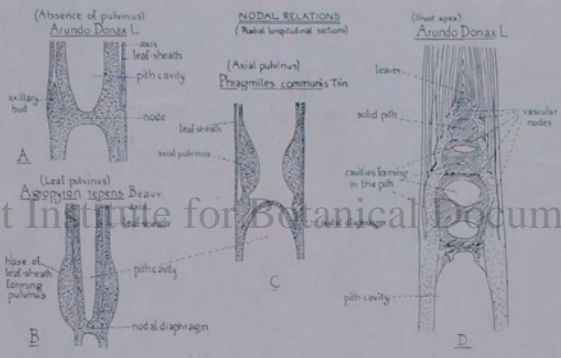
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121

PHRAGMITES COMMUNIS Trin.



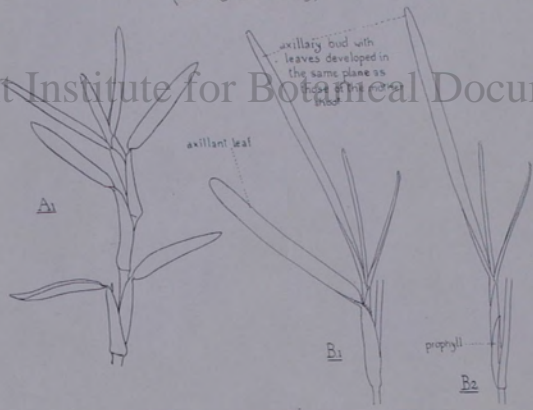
Digitized by Hunt Institute for Botanical Documentation



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124

STENOTAPHRUM SECUNDATUM Kunze  
(Intavaginal branching)



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130

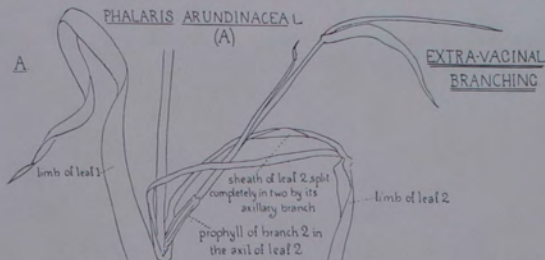


PHALARIS ARUNDINACEA L.

(A)

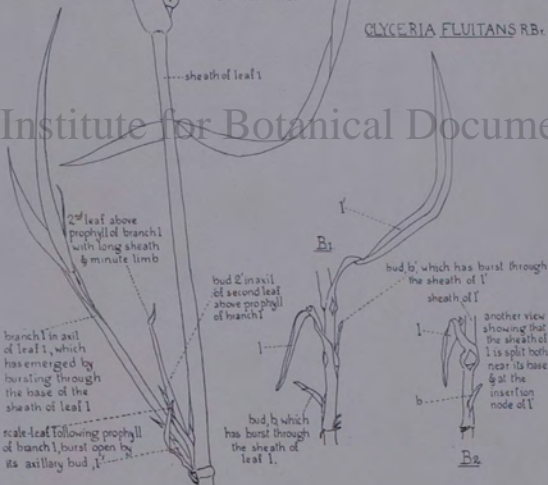
A

EXTRA-VACINAL  
BRANCHING



GLYCERIA FLUITANS RB.

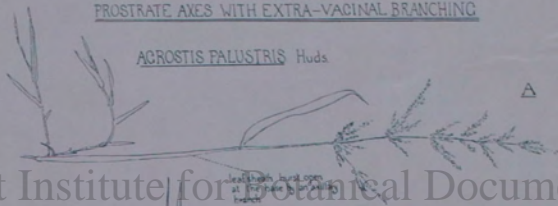
Digitized by Hunt Institute for Botanical Documentation



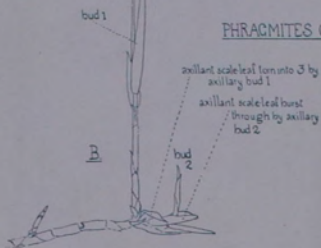
131

PROSTRATE AXES WITH EXTRA-VACINAL BRANCHING

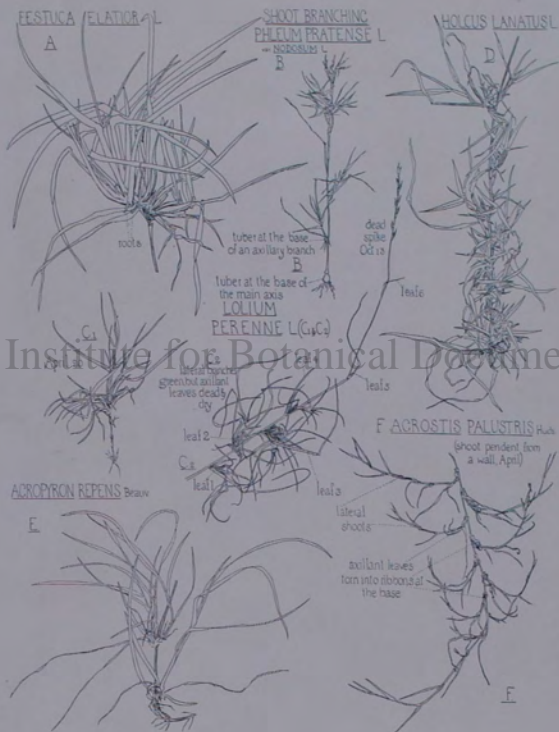
ACROSTIS PALUSTRIS Huds



PHRACMITES COMMUNIS Ten



132



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133

FESTUCA CAERULESCENS

Desf.

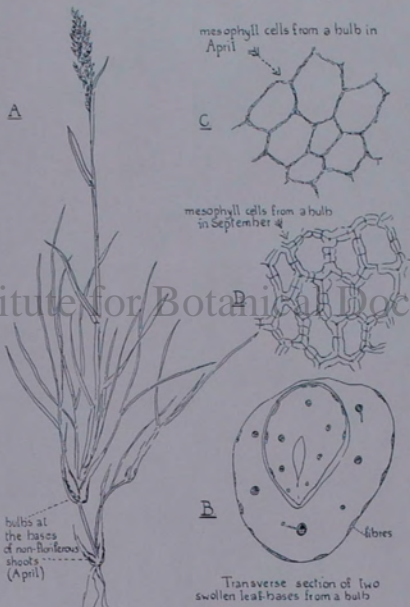
(base of herbarium specimen)



137



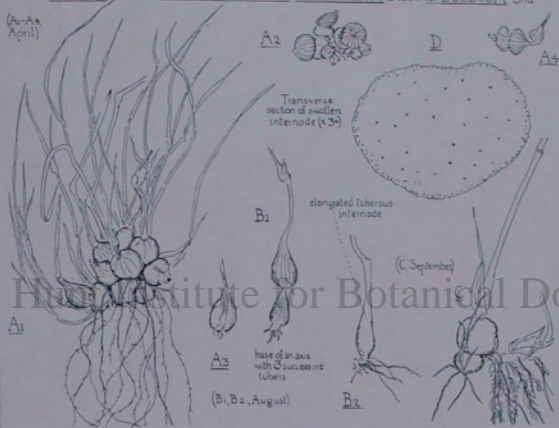
BULBS OF POA BULBOSA L.



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TUBERS OF *ARRHENATHERUM AVENACEUM* Beauv. var. *BULBOSA* Lind.

(A<sub>1</sub>-A<sub>4</sub>  
April)



Additional  
connection

B-235

Please cut  
this away,  
leaving only  
TRITICUM

Leaf ontogeny in TRITICUM SATIVUM  
(Radial longitudinal section of seedling apex)

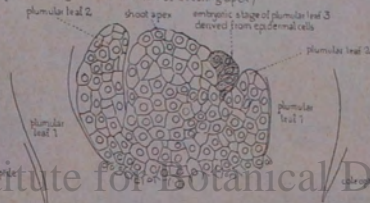
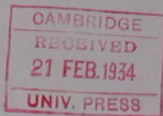


Fig. 144. Radial longitudinal section ( $\times 193$  circa) through the apex of a seedling of Triticum sativum, to show the central region of the plumular bud. The coleoptile and the first and second plumular leaves are cut on either side of the section, as their insertion encloses the apical bud. Owing to the extreme youth of the third plumular leaf, it is, at this stage, visible as a hump on one side of the shoot apex only. [A.A.]

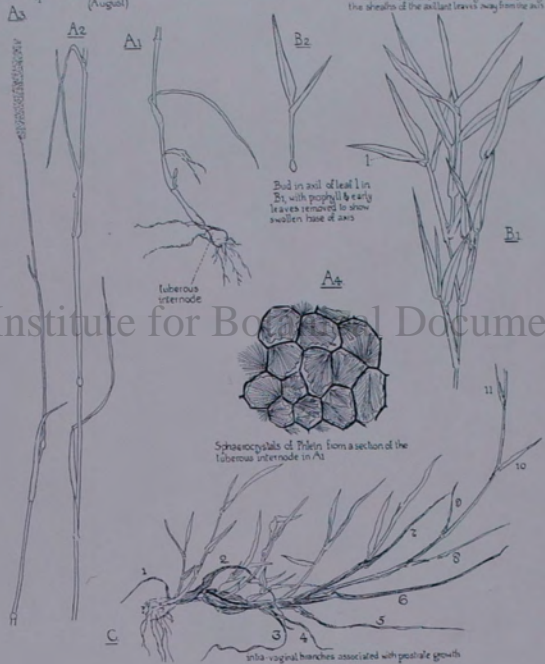
spy



*PHLEUM PRATENSE* L. var. *PNODOSUM* L.

A1-A3 plant in 3 segments  
(August)

Erect shoot with intra-nodal branches facing  
the sheaths of the axillary leaves away from the axis

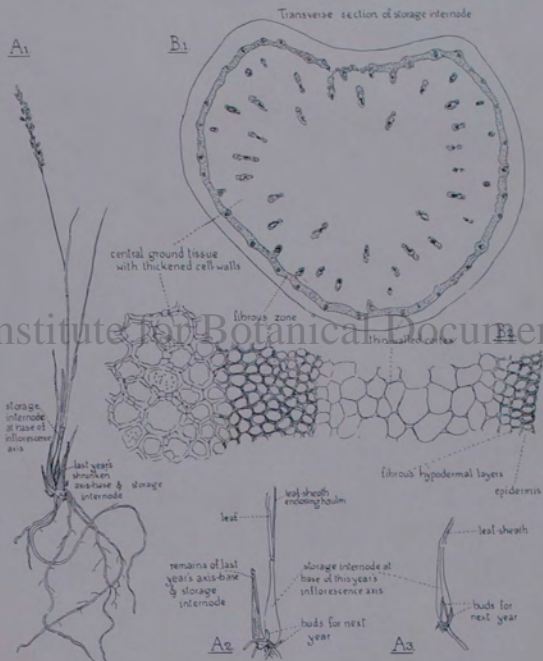


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140



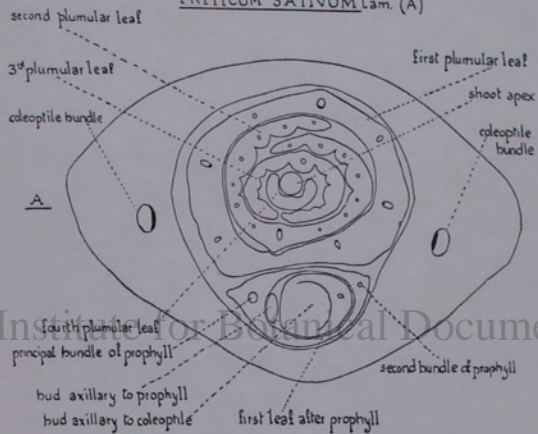
Storage Internodes in MOLINIA CAERULEA Moench



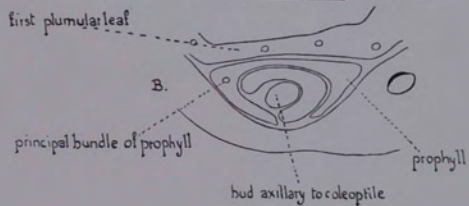
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BUD AXILLARY TO COLEOPTILE

TRITICUM SATIVUM Lam. (A)

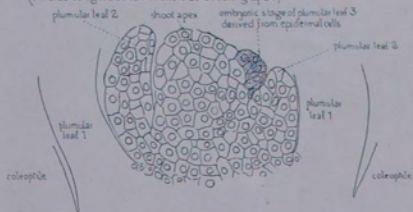


HORDEUM SATIVUM Jessen (B)



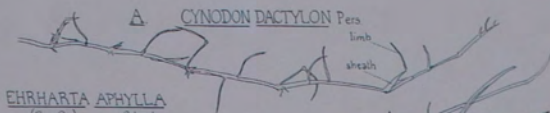


Leaf ontogeny in TRITICUM SATIVUM Lam.  
(Radial longitudinal section of seedling apex)

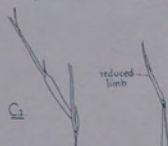


144





EHRHARTA APHYLLA  
(C<sub>1</sub> & C<sub>2</sub>) Schrad



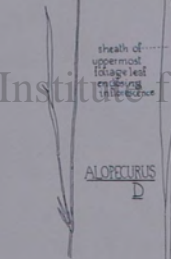
E. PHALARIS  
CANARIENSIS L.



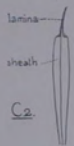
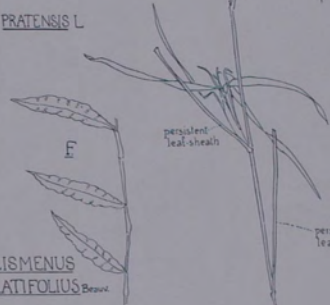
AGROPYRON  
REPENS Beauv

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ALOPECURUS  
D



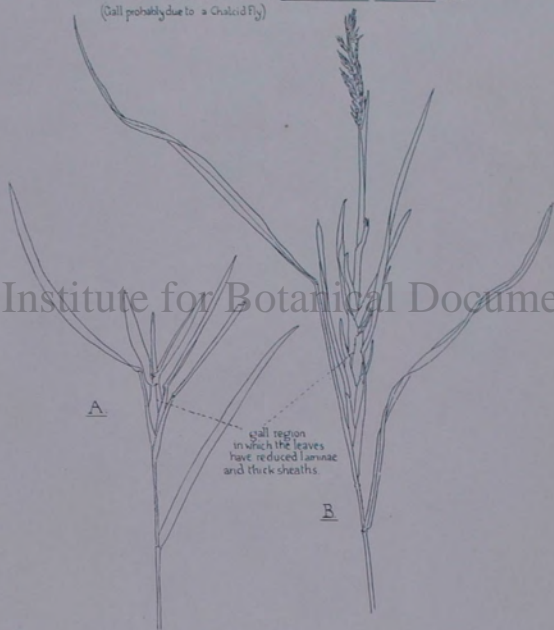
PRATENSIS L.



F. OPLISMENUS  
UNDULATIFOLIUS Beauv

145

GALL STRUCTURE IN ACROPYRON REPENS Beauv.  
(Gall probably due to a Chalcid Fly)

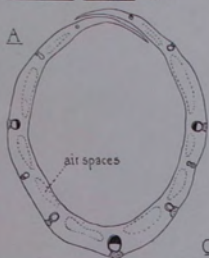


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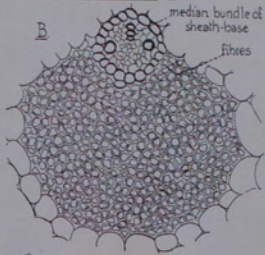
146

LEAF-SHEATH ANATOMY

AEROSTIS TENUIS Steud.



BROMUS STERILIS L.



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PHRAGMITES COMMUNIS Trin.

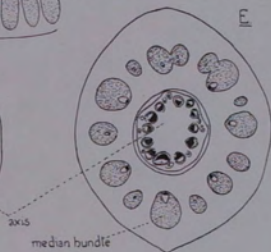
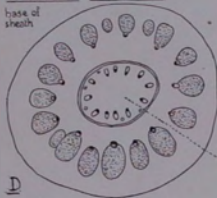
bundles from sheath-base



FESTUCA OVINA L.

CYNOSURUS CRISTATUS L.

base of sheath

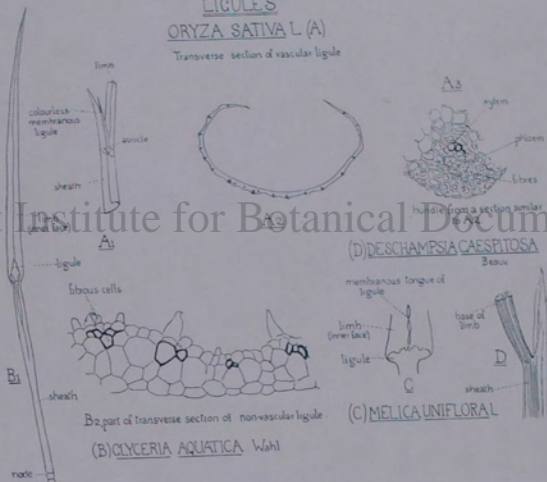


147

147

LIGULES  
ORYZA SATIVA L (A)

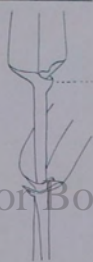
Transverse section of vascular ligule





HORDEUM DISTICHON L.

A1



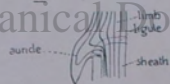
AURICLES

A2



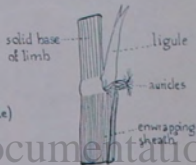
HORDEUM sp.  
(venation of auricle)

B



ORYZA SATIVA L.

C



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149

THE COMMELINACEÆ LEAF TYPE

OPLISMENUS LOLIACEUS

Lam.

(B) OPLISMENUS RARIFLORUS

Presl

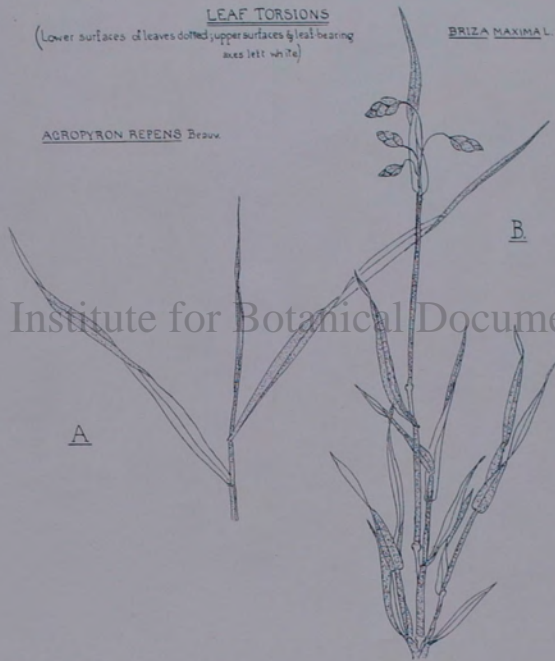


LEAF TORSIONS

(Lower surfaces of leaves dotted; upper surfaces & leaf-bearing  
axes left white)

BRIZA MAXIMAL.

ACROPYRON REPENS Beauv.

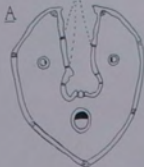


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704  
152

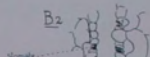
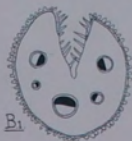
AIRA PRAECOX L.

stomates

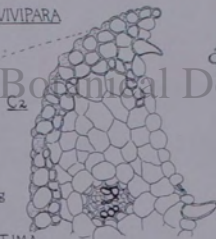


NARROW LEAF-LIMBS

ACROSTIS SETACEA Curt (B<sub>1</sub>, B<sub>2</sub>)



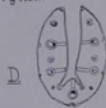
POA ALPINA L. var. VIVIPARA



leaves from a proliferating inflorescence

GLYCERIA MARITIMA

Merit & Koch



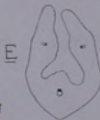
marginal region of the outer leaf in C<sub>1</sub>



radial seriation of elements

midrib of a leaf from a proliferating inflorescence

MIBORA VERNA Beauv



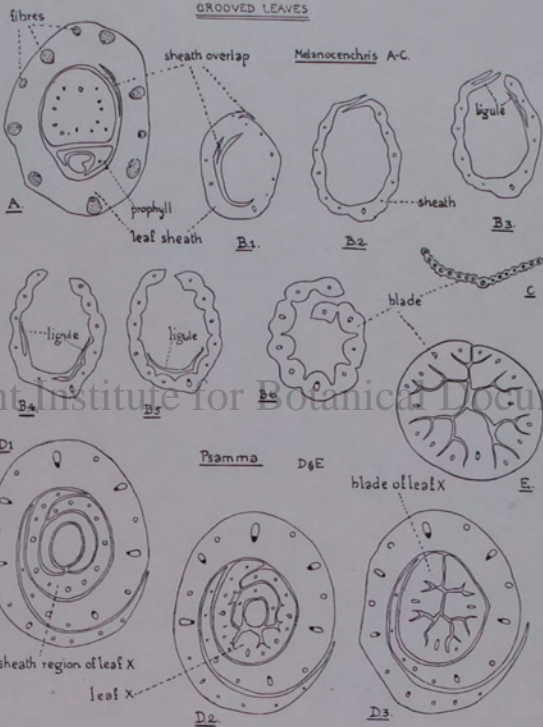
midrib of a smaller leaf than B<sub>1</sub>

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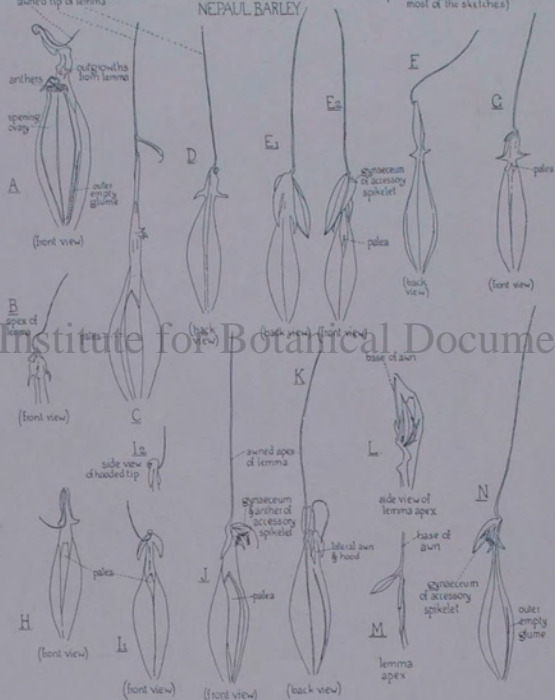


GROOVED LEAVES



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Spikelets of *HORDEUM TRIFURCATUM* Jacq. (outer empty glumes omitted in most of the sketches)  
 NEPAUL BARLEY



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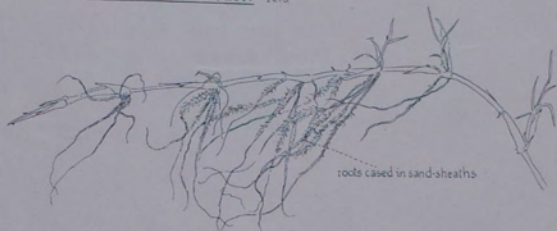
DE STIRPIVM HISTORIA

*Iuncus palustris maior.*      *Harundo.*  
Großweicher Binzen.      Rber.



175

CYNODON DACTYLON Pers



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176



FESTUCA ARUNDINACEA  
Schreb



an old leaf  
which has  
disintegrated  
into separate  
fibres

buds

roots

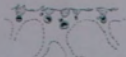
177

Wir Blor-gras.



179

ORYZA SATIVA L



1  
upper surface of base of limb from a section similar to 2a but from an older leaf, to show irregular orientation of bundles



bulliform cells

3 part of limb near apex

base of limb

2a



protoxylem space



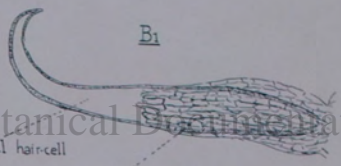
bundle marked X in 2a

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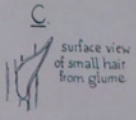
TRAGUS RACEMOSUS Scop

Outer glume with  
emergences



central hair-cell

jacket cells

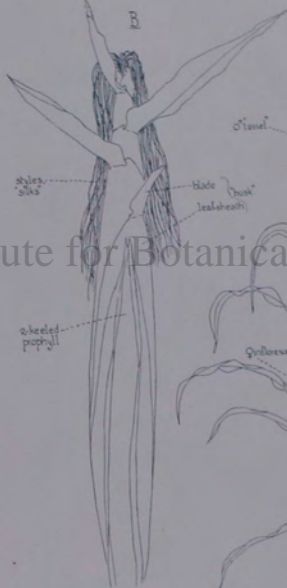


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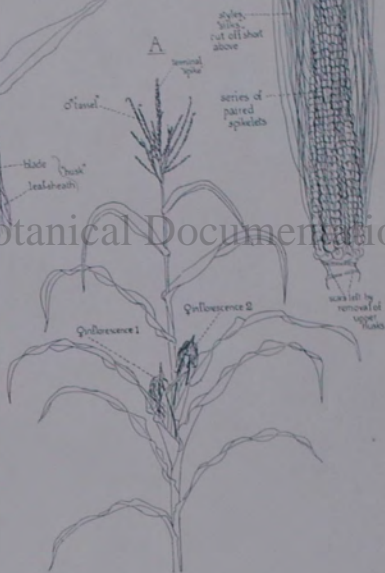


ZEA MAIS L

♂ inflorescence 1 from A  
Elongated in its husks viewed from  
side and base



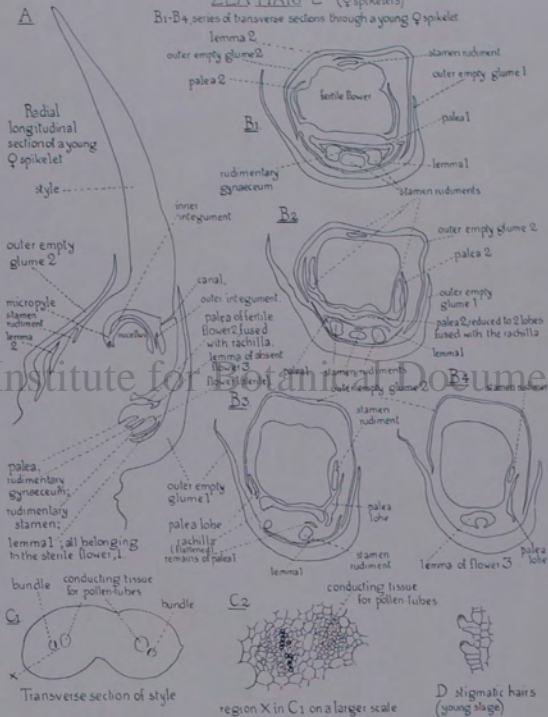
♂ inflorescence 2 from A  
base tip of axis with sterile  
spikelets



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ZEA MAYS L (♀ spikelets)

B1-B4 series of transverse sections through a young ♀ spikelet



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ZEA MAYS L

♂ inflorescence  
"tassel"

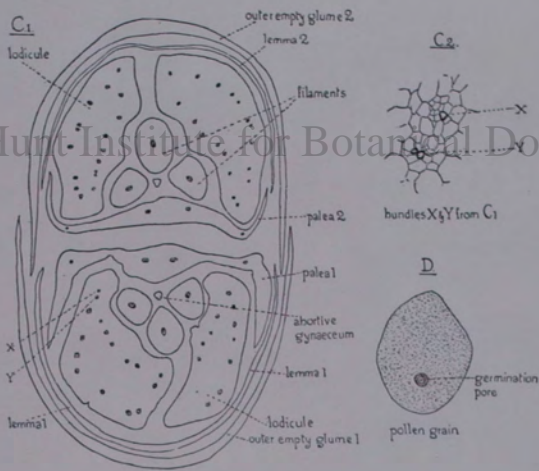
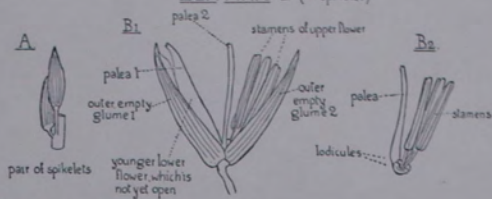
central spike



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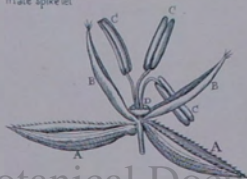
ZEA MAYS L (♂ spikelet)



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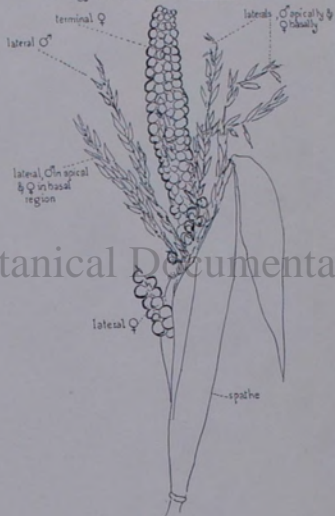
ZEA MAYS L. after Malpighi, sciz.  
Single flowered  
male spikelet



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Androgynous inflorescence of ZEA MAIS L.

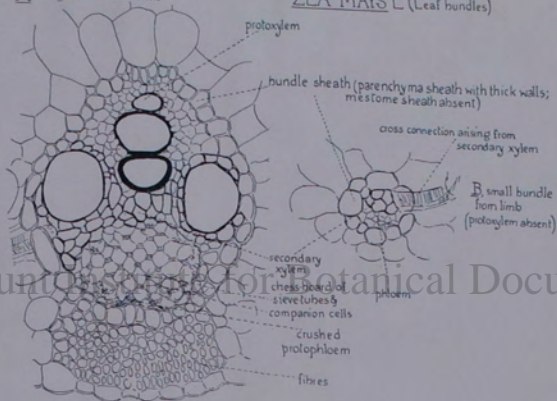


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ZEA MAYS L. (Leaf bundles)

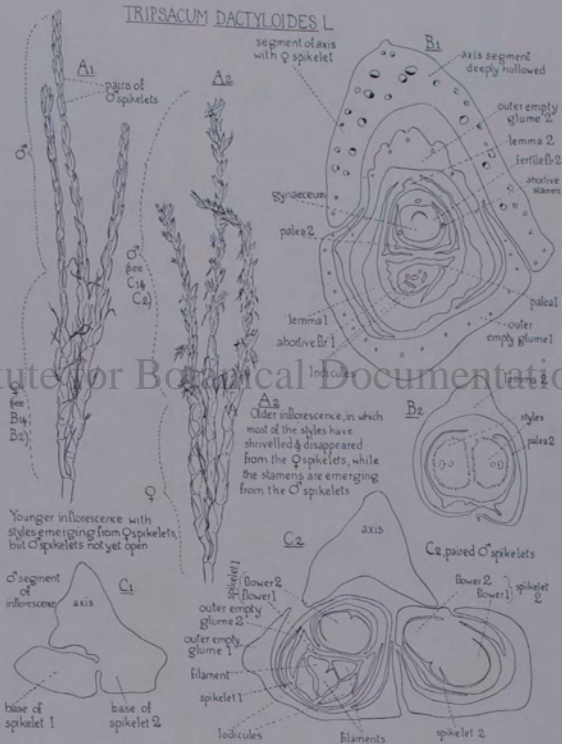
△ large bundle from limb



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TRIPSACUM DACTYLOIDES L.

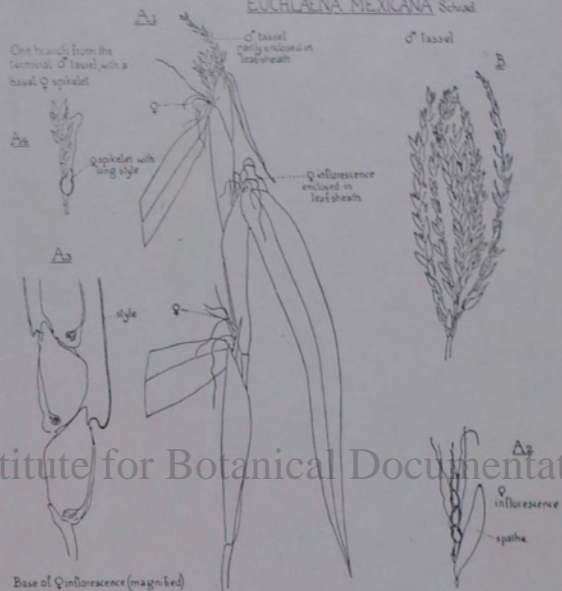


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*EUCHLAENA MEXICANA* Schrad

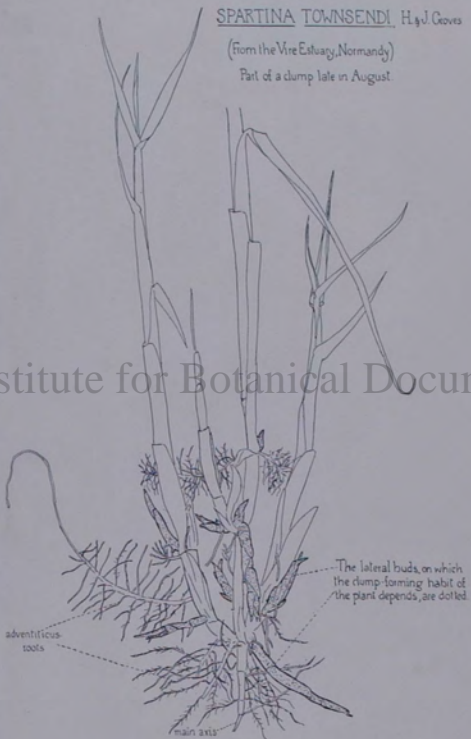


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SPARTINA TOWNSENDI, H. & J. Coevs

(From the Vire Estuary, Normandy)

Part of a clump late in August.



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1974



André Stebaene Terte/Blé loca.

LOLIUM PERENNE L.  
 (Branched & proliferated inflorescences)

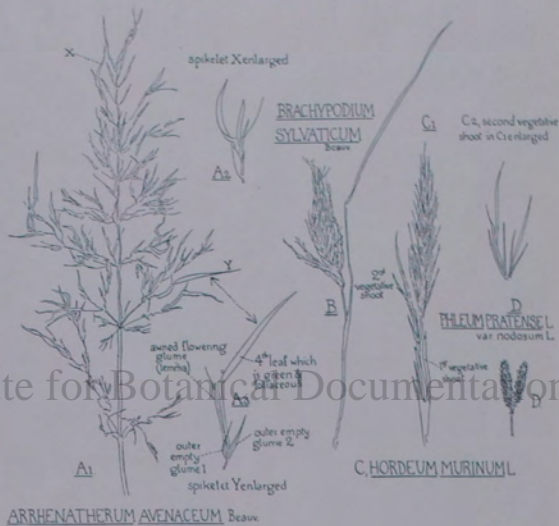


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ABNORMAL INFLORESCENCES

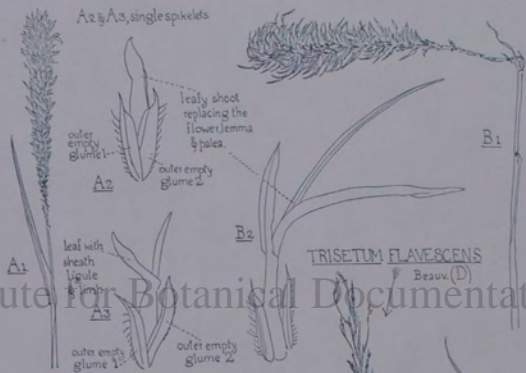


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PROLIFERATING INFLORESCENCES

PHLEUM PRATENSE L (A & B)



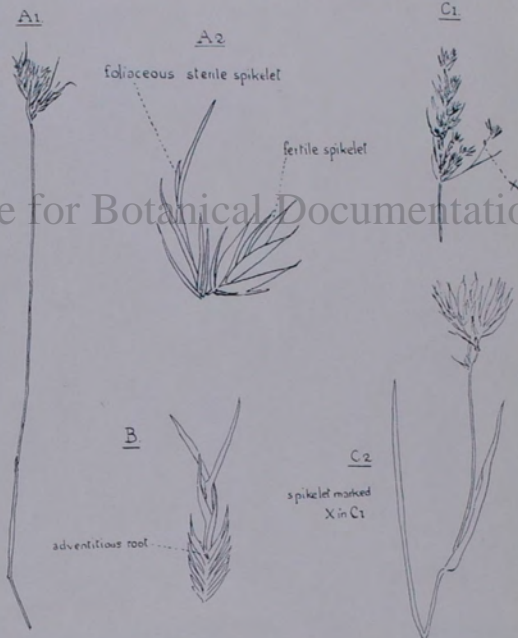
FESTUCA OVINA L (C)



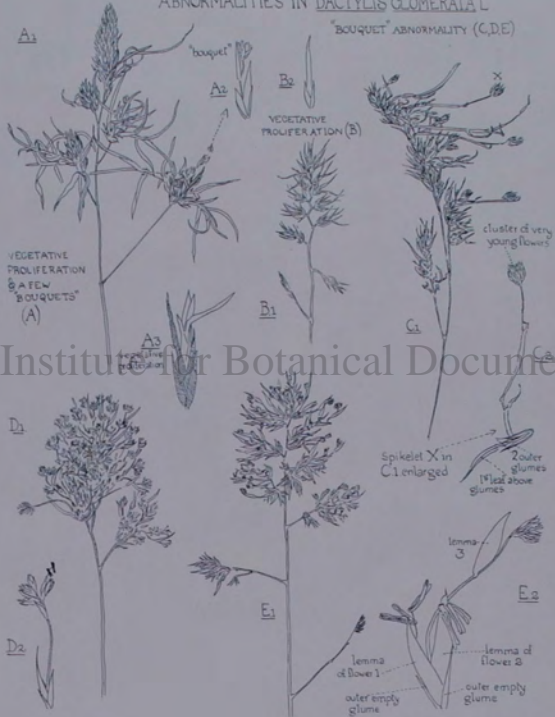
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PROLIFERATION IN CYNOSURUS CRISTATUSL.



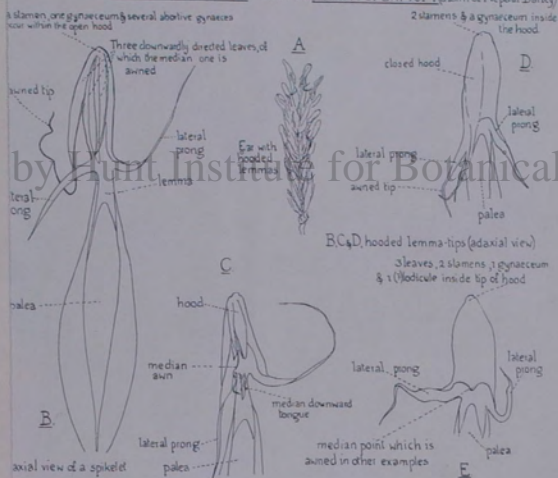
ABNORMALITIES IN *DACTYLIS GLOMERATA* L.



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HORDEUM DEFICIENS Steud. var. GYMNOSPERMUM (a form of Nepal Barley)

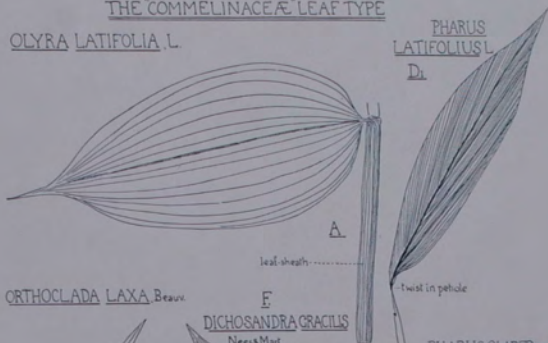


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THE "COMMELINACEÆ" LEAF TYPE

OLYRA LATIFOLIA L.

PHARUS  
LATIFOLIUS L.



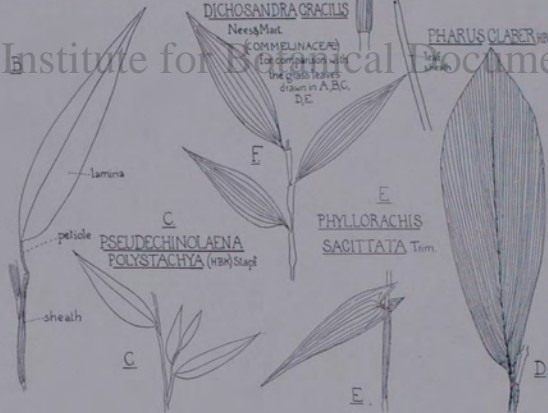
ORTHOCLADA LAXA Beauv.

DICHOSANDRA GRACILIS

Nees & Mart.

PHARUS CLABER HBK.

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PSEUDECHINOALAENA  
POLYSTACHYA (HBK) Stapf

PHYLLORACHIS  
SACITTATA Torr.

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