Identifying and Appreciating the Native and Naturalized Grasses of California

Materials Selected and Presented by

David Amme

for class offered
on May 8, 2003, Seaside, CA
under the auspices of

California Native Grass Association
P.O Box 72405 • Davis, CA 95617
Voice: 530-759-8458 FAX 530-753-1553
Email: Admin@cnga.org Web: http://www.cnga.org

What is a Grass?

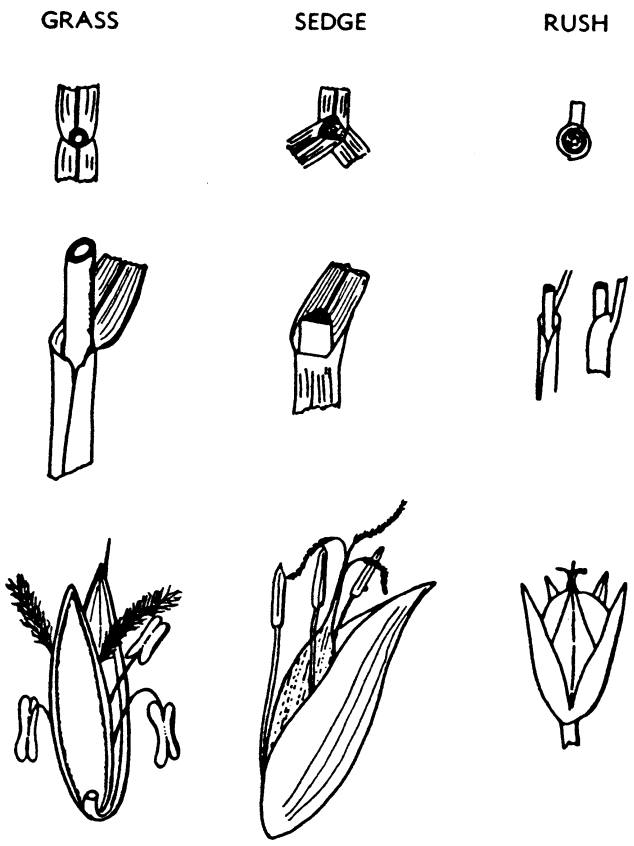
Key to Grasses, Sedges and Rushes

1a Flowers with stiff, greenish or brownish, 6 parted perianth (calyx and corolla); stamens 6 or 3; fruit a many-seeded capsule; leaves usually wiry and round in cross section . . . . . RUSH FAMILY (*Juncaceae*)

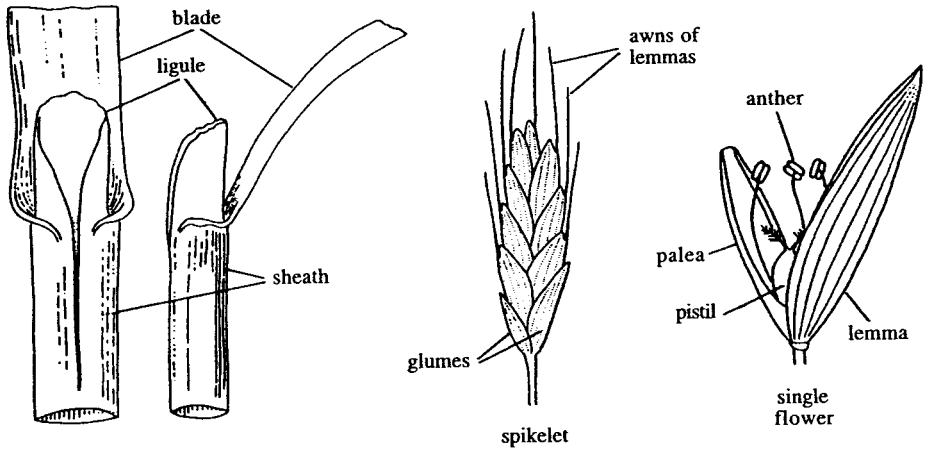
lb Flowers without evident calyx or corolla, gathered into short scaly clusters (spikelets); stamens 3; fruit with a single seed. 2

2a Leaves in 2 vertical rows or ranks; leaf sheaths usually split, with overlapping edges; stems usually round in cross section and hollow between the joints; each flower of the spikelet contained between 2 bracts, the lemma and the palea . . . . . GRASS FAMILY (*Cramineae*)

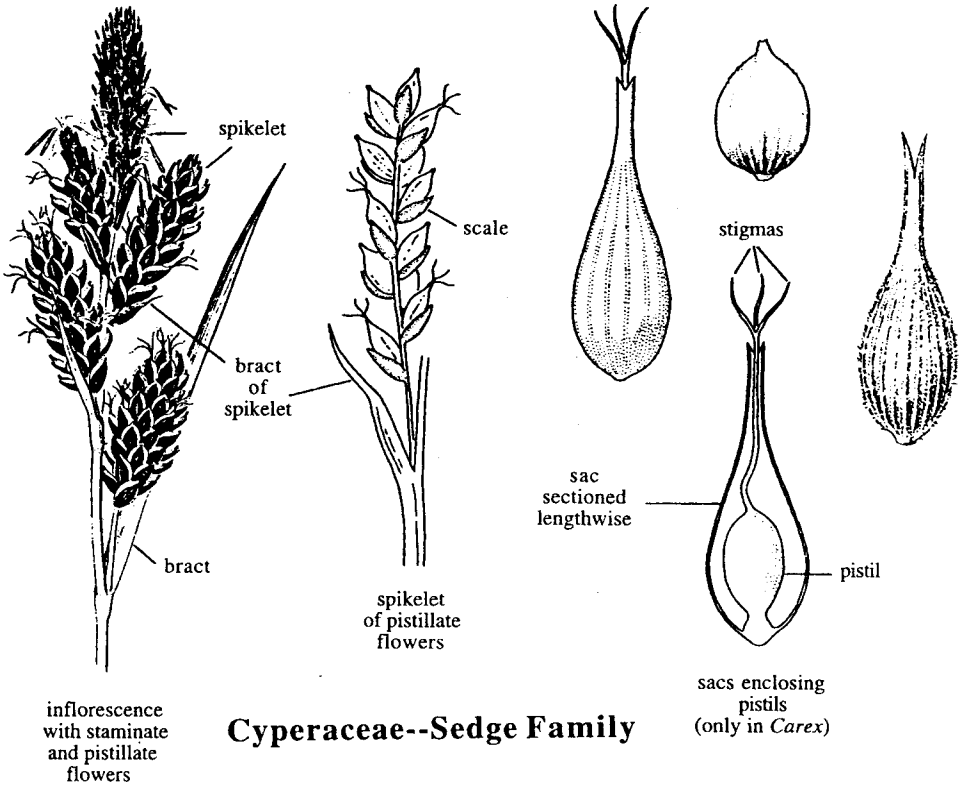
2b Leaves in 3 vertical rows or ranks; leaf sheaths tubular, not split; stems often triangular in cross section and solid between joints; each flower of the spikelet in the axil of a single bract, the glume . . . . . SEDGE FAMILY (*Cyperaceae*)



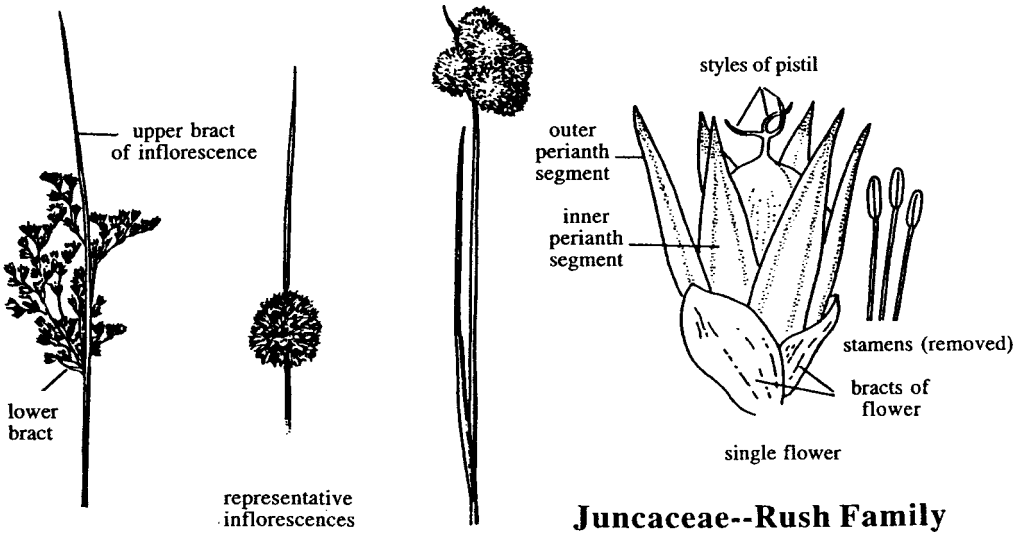
From: ***How to Know the Grasses*** by Richard W. Pohl; Wm. C. Brown Company Publishers; Dubuque, Iowa.



Poaceae (Gramineae)--Grass Family

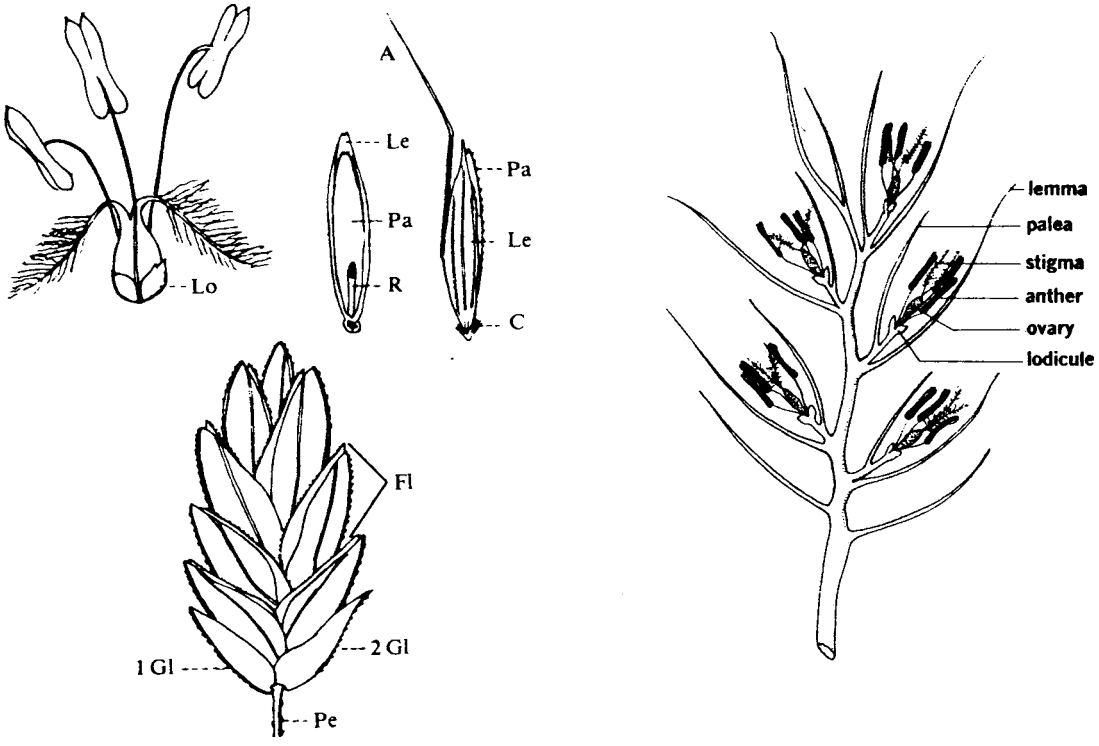


Cyperaceae--Sedge Family

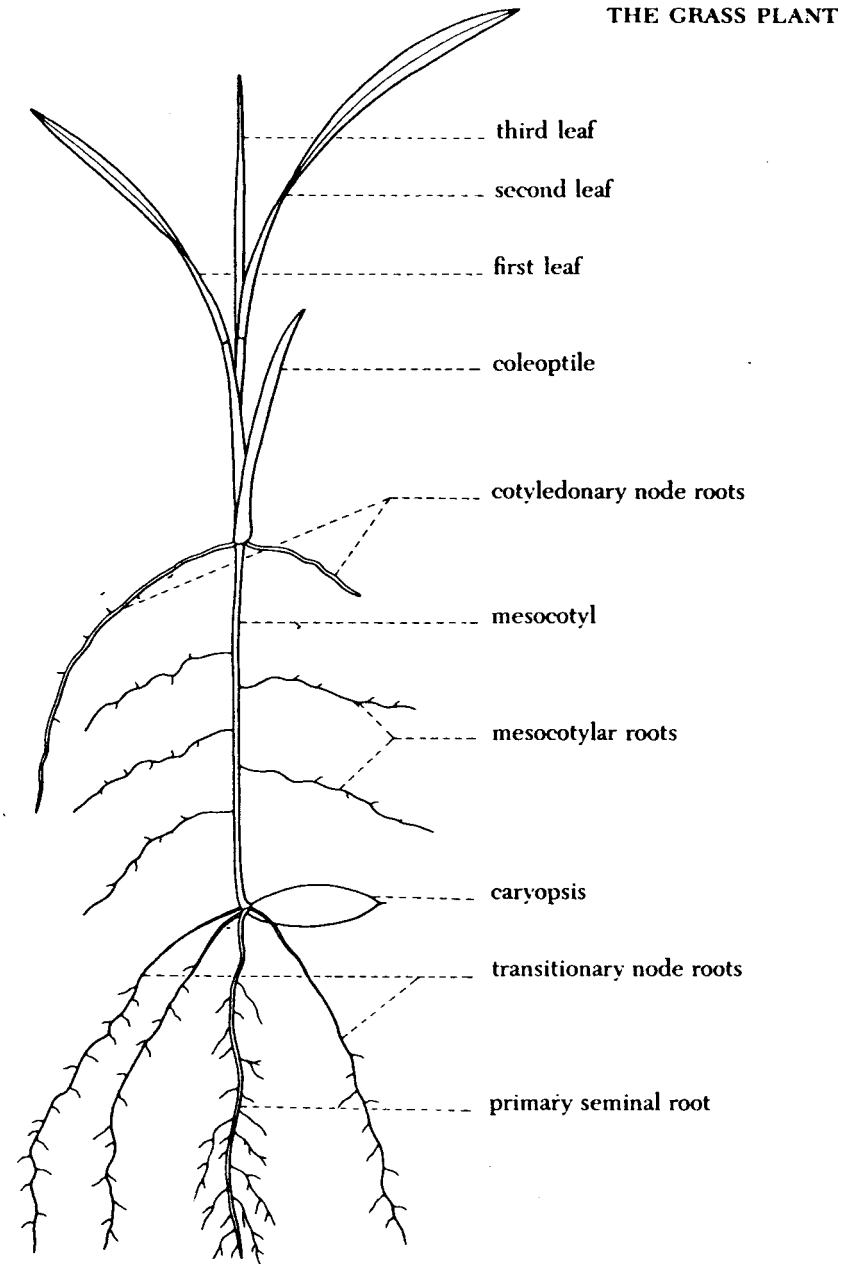


Juncaceae--Rush Family

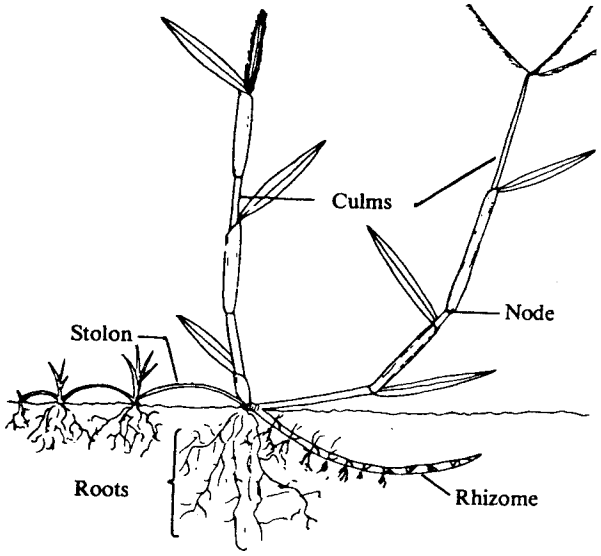
From: ***Plants of the San Francisco Bay Region;*** by Eugeen Kozloff & Linda Beidleman; Sagen Press, Pacific Grove, CA

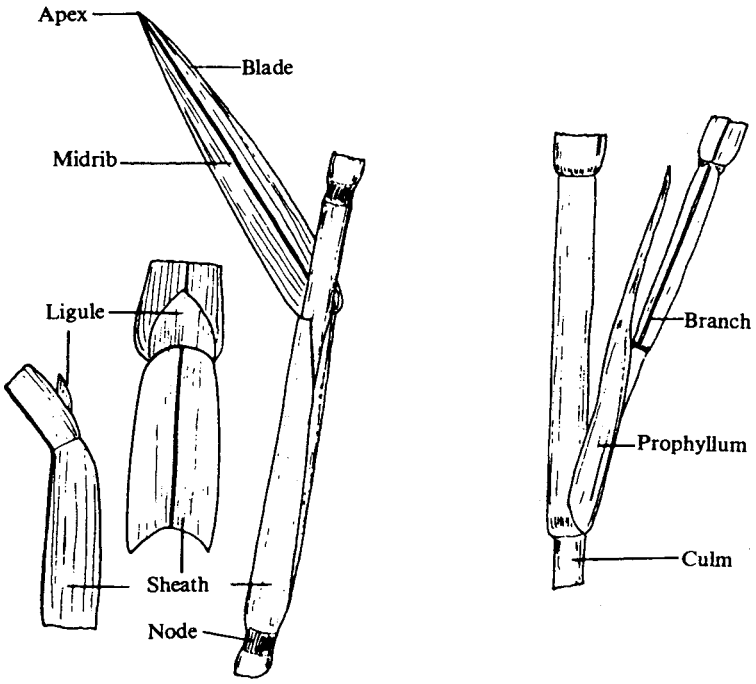


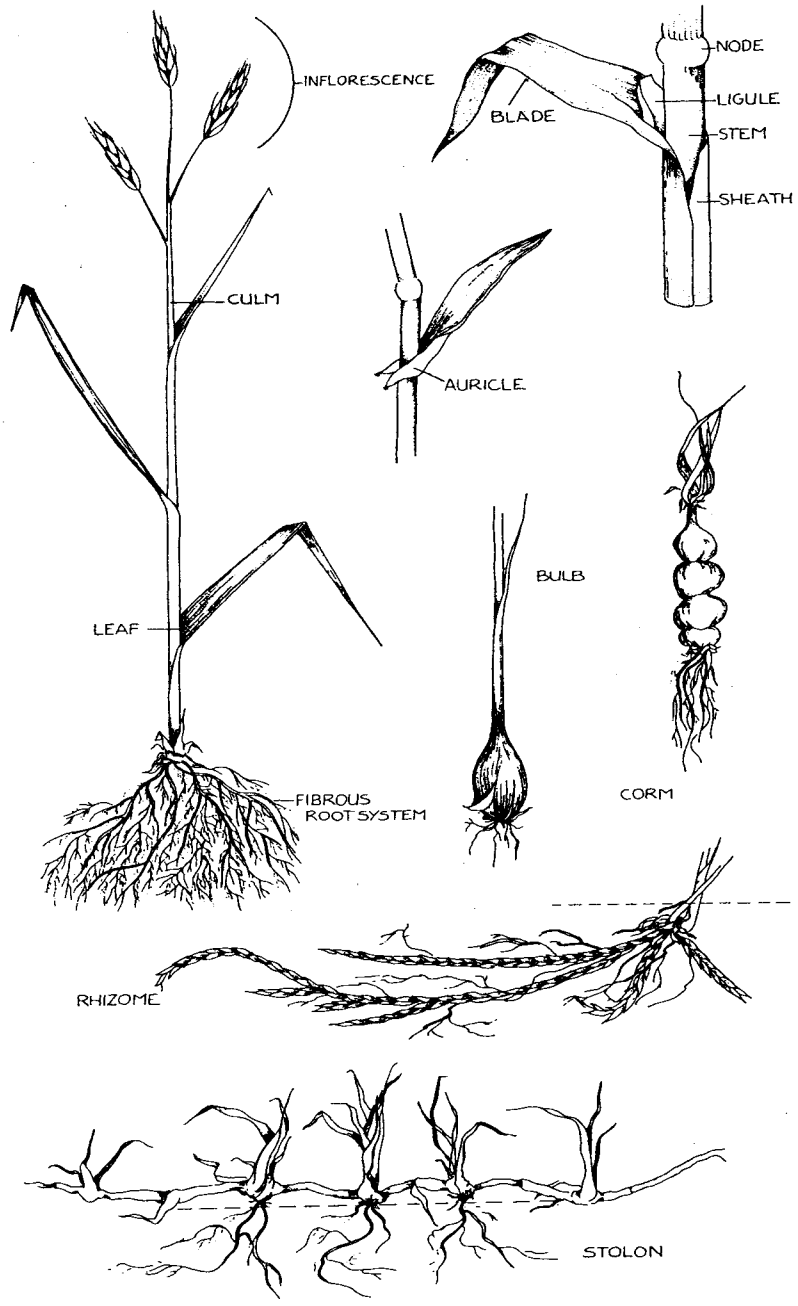
THE GRASS PLANT



Hypothetical grass seedling showing development of adventitious roots (cotyledonary node roots and mesocotylar roots). The primary root system of the seedling consists of the primary seminal root and the transitionary node roots (redrawn from Hoshikawa, 1969).

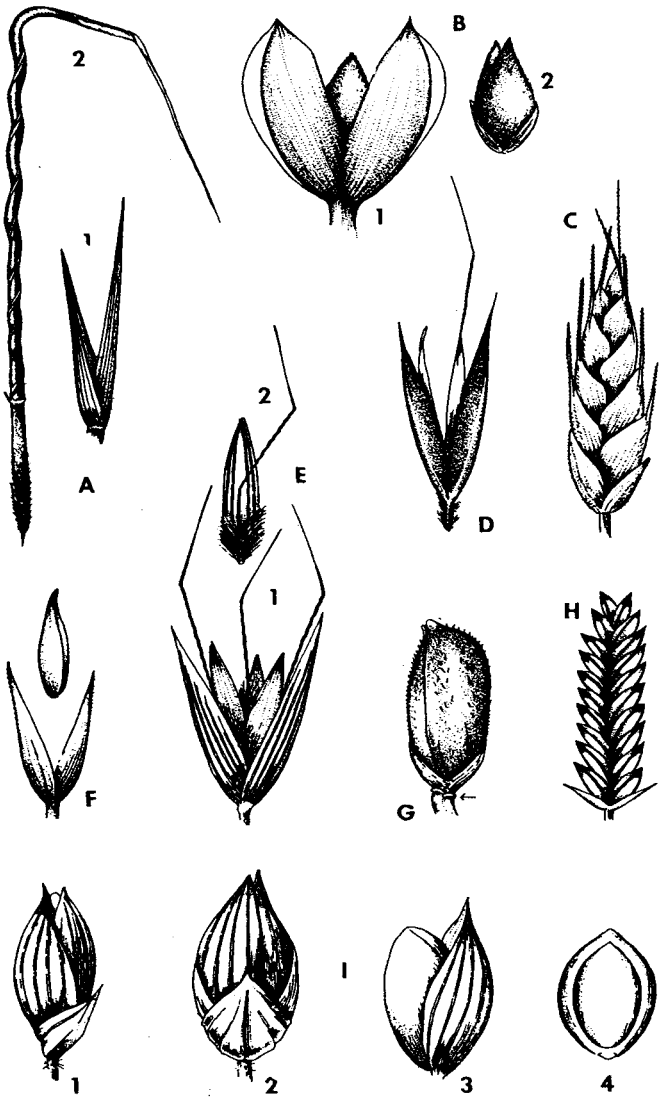

Culms
Node
Stolon
Roots
Rhizome


Apex
Blade
Midrib
Ligule
Sheath
Node
Branch
Prophyllum
Culm



VEGETATIVE STRUCTURE.

From: ***A KEY TO THE GENERA OF GRASSES OF THE CONTERMINOUS UNITED STATES***; by James P. Smith, Jr.; Mad River Press, Eureka, CA

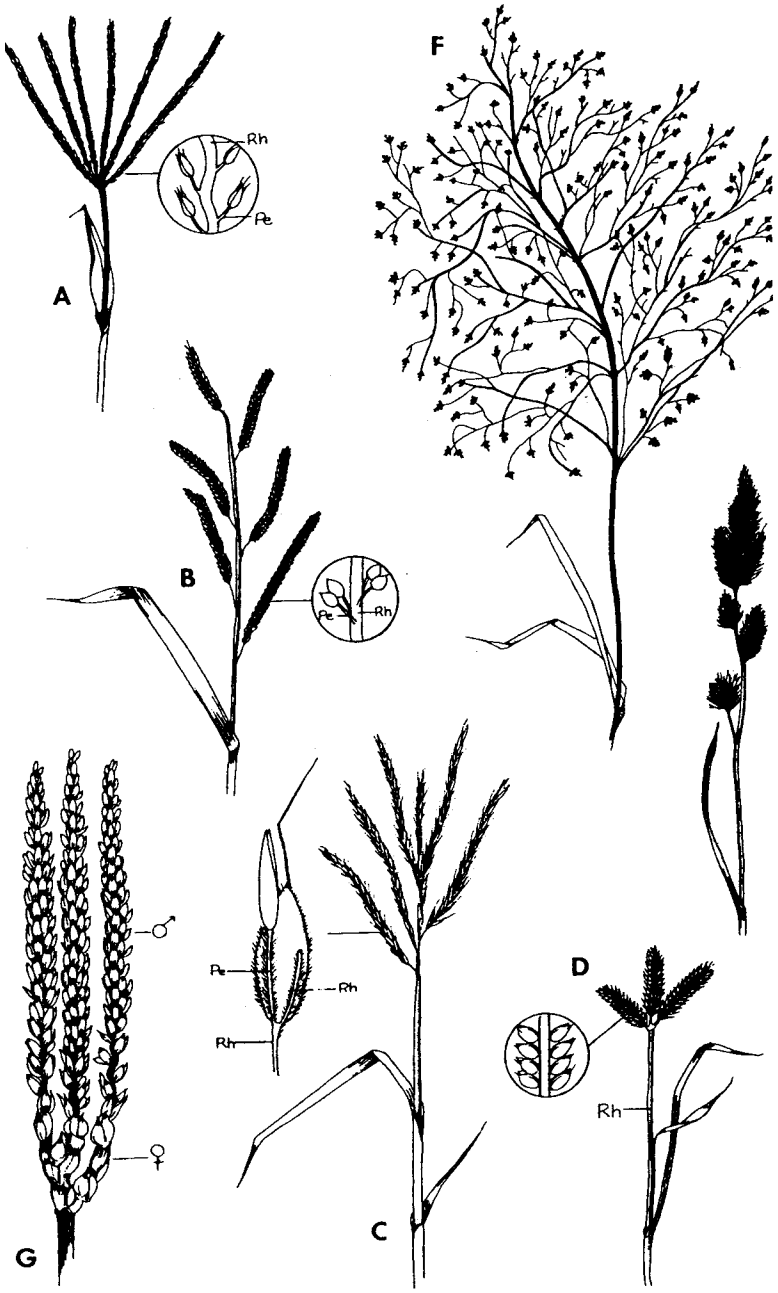


VARIATION IN SPIKELET TYPES. A. *Stipa*. 1, glumes; 2, floret. B. *Phalaris*. 1, spikelet; 2, fertile floret and two highly reduced, subtending florets. C. *Bromus* spikelet with its several fertile florets. The lemmas are several-nerved. D. *Andropogon* spikelet with its relatively firm glumes; a delicate, awned floret; and a membranous, sterile lemma. E. *Avena*. 1, spikelet with three, awned florets; 2, isolated floret. F. *Agrostis* spikelet with single floret isolated from the glumes. G. *Oryza* spikelet with single fertile floret; reduced, sterile lemmas; and rudimentary glumes (indicated by arrow). H. *Eragrostis* spikelet with its numerous florets. The lemmas are three-nerved. !. *Panicum* spikelet. 1, side view showing small first glume (right), larger second glume (left), and sterile lemma (right); 2, front view showing small first glume, partially enveloping edges of the second glume, and sterile lemma; 3, sterile lemma (right) and fertile floret (left); 4, fertile floret.

From: ***A KEY TO THE GENERA OF GRASSES OF THE CONTERMINOUS UNITED STATES***; by James P. Smith, Jr.; Mad River Press, Eureka, CA

INFLORESCENCE TYPES. A. Simple raceme of *Pleuropogon*. B. Solitary spikelet of *Danthonia*. C. Simple rame of *Schizachyrium*. D. Simple, one-sided spike of *Ctenium*. E. Simple, balanced spike of *Lolium*. In all drawings. Pe = pedicel and Rh = rachis.

From: ***A KEY TO THE GENERA OF GRASSES OF THE CONTERMINOUS UNITED STATES***; by James P. Smith, Jr.; Mad River Press, Eureka, CA



INFLORESCENCE TYPES. A. Compound, digitate raceme of *Digitaria*. B. Compound, racemose racemes of *Paspalum*. C. Compound rames of *Andropogon*. D. Compound, digitate spikes of *Dactyloctenium*. E. Condensed panicle of *Muhlenbergia*. F. Open panicle of *Eragrostis*. G. Mixed inflorescence of *Tripsacum* with its distinctive pistillate and staminate spikelets. In all drawings, Pe = pedicel and Rh = rachis.

From: ***A KEY TO THE GENERA OF GRASSES OF THE CONTERMINOUS UNITED STATES***; by James P. Smith, Jr.; Mad River Press, Eureka, CA

Distribution of C_3 and C_4 photosynthetic pathways and Kranz anatomical subtypes according to grass tribes

Subfamily	Tribe	C_3	C_4
Arundinoideae	Arundineae	*	
	Centosteceae	*	
	Danthonieae	*	*
Bambusoideae	Bambuseae	*	
	Phareae	*	
Chloridoideae	Aeluropodeae		*
	Aristideae	*	*
	Chlorideae		*
	Eragrosteae		*
	Orcuttieae		*
	Pappophoreae		*
	Unioleae		*
	Zoysieae		*
Oryzoideae	Oryzeae	*	
Panicoideae	Andropogoneae		*
	Paniceae	*	*
Pooideae	Aveneae	*	
	Brachyelytreae	*	
	Diarrheneae	*	
	Meliceae	*	
	Monermeae	*	
	Nardeae	*	
	Poeae	*	
	Stipeae	*	
	Triticeae	*	

Source: Adapted from Brown, 1977; Smith and Brown, 1973; and Waller and Lewis, 1979.

Common California Grass Species Classified in Hitchcock's original 8 Tribes Now in 14 tribes (Gould & Shaw 1983). New tribes are in parentheses.

FESTUCEAE (POEAE)

Briza
Dactylis
Bromus
Poa
Puccinellia
Brachypodium
Festuca
Vulpia
Cynosurus
Lamarckia
Hesperocholoa
Cortaderia —
Phragmites — (ARUNDINEAE)
Arundo —
Melica —
Pleuropogon — (MELICEAE)
Glyceria —
Eragrostis —
Scleropogon — (ERAGROSTEAE)
Tridens —
Orcuttia — (ORCUTTIEAE)
Neostapfia —
Distichlis — (AELUROPODEAE)

HORDEAE (TRITICEAE)

Agropyron
Aegilops
Triticum
Secale
Hordeum
Elymus
Sitanion
Hystrix
Lolium — (POEAE)

AVENEAE (AVENEAE)

Arrhenatherum
Holcus
Trisetum
Avena
Koeleria
Deschampsia
Aira
Danthonia — (DANTHONIEAE)

AGROSTIDEAE
Agrostis —
Alopercurus |
Calamagrostis |
Phleum | —(AVENEAE)
Polypogon |
Ammophila |
Gastiridium —
Muhlenbergia —
Calamovilfa | —(ERAGROSTEAE)
Sporobolus —
Aristida —(ARISTIDEAE)
Stipa —
Oryzopsis —(STIPEAE)

CHLORIDEAE (CHLORIDEAE)
Buchlöe
Spartina
Cynodon
Boteloua
Beckmannia —(AVENEAE)

PHALARIDEAE
Hierochlöe —
Anthoxanthum | —(AVENEAE)
Phalaris —

PANICEAE (PANICEAE)
Setaria
Paspalum
Digitaria
Panicum
Pennisetum

ANDROPOGONEAE (ANDROPOGONEAE)
Imperata
Andropogon
Sorgum
Sorghastrum

ZOYSIEAE
Hilaria —(CHLORIDEAE)

Note: In the United States Hitchcock has 14 tribes in 2 subfamilies and Gould and Shaw have 25 tribes in 6 subfamilies.

(Gould, F.W. and R.B. Shaw. 1983. Grass Systematics. Texas A&M University Press)

Festuca rubra. Plant. × ½; spikelet and floret, × 5. (Hitchcock 4201, Alaska.)

FESTUCEAE

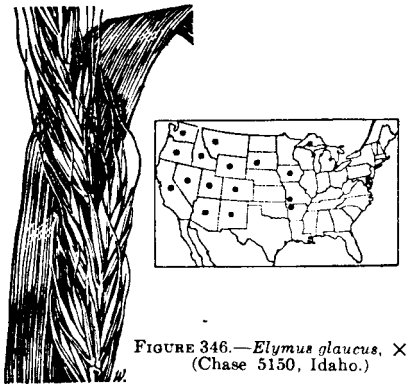


FIGURE 346.—*Elymus glaucus*, × 1. (Chase 5150, Idaho.)

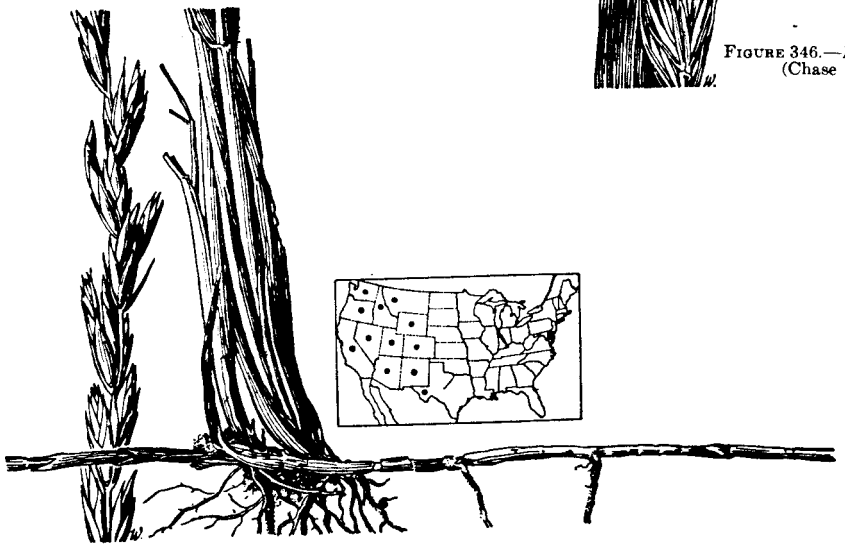
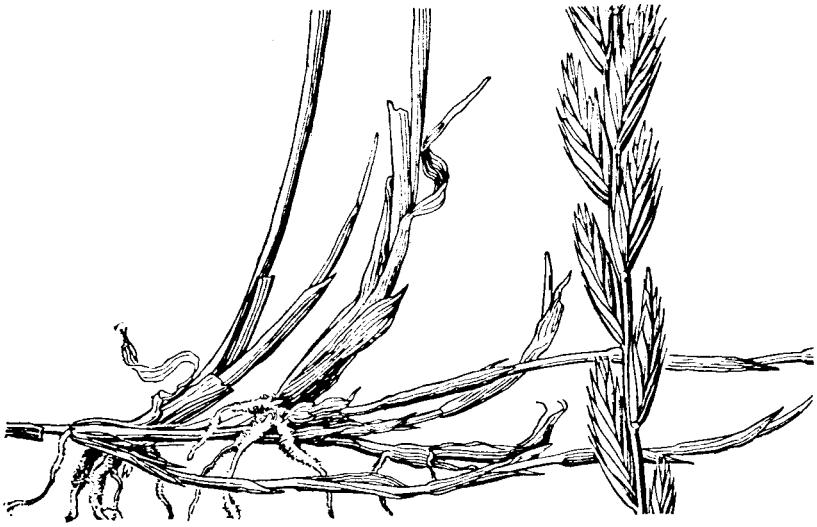


FIGURE 339.—*Elymus triticoides*, × 1. (Cusick 763, Oreg.)



Agropyron smithii, × 1. (Nelson 3918, Wyo.)

HORDEAE

Hordeum brachyantherum. Plant, × ½; group of spikelets and floret, × 3. (Whited 433, Wash.)

HORDEAE

Holcus
Trisetum
Avena
Koeleria
Deschampsia
Aira
Danthonia

(DANTHONIEAE)

(AVENEAE)

Avena fatua. Plant, × ½; spikelet and floret, × 2. (Umbach, Ill.) Ind.)

AVENEAE

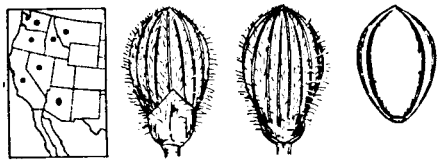
—*Calamagrostis nutkaensis*. Panicle, × 1; glumes and floret, × 10. (Hitchcock 23576, Oreg.)

Stipa pulchra. Panicle, × ½; lemma, × 5. (Chase 5598, Calif.)

Agrostis alba. Plant, × ½; 2 spikelets and floret, × 5. (Chase 5191, Mont.)

AGROSTIDEAE

—*Paspalum dilatatum*. Plant, × ½; two views of spikelet, and floret, × 10. (Hitchcock 297, La.)



—*Panicum pacificum*. Two views of spikelet, and floret, × 10. (Type.)

PANICEAE