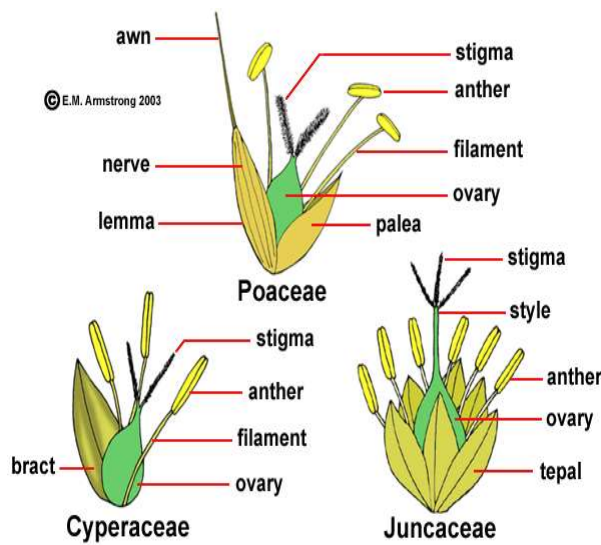


Graminoids (Families Poaceae, Juncaceae and Cyperaceae)

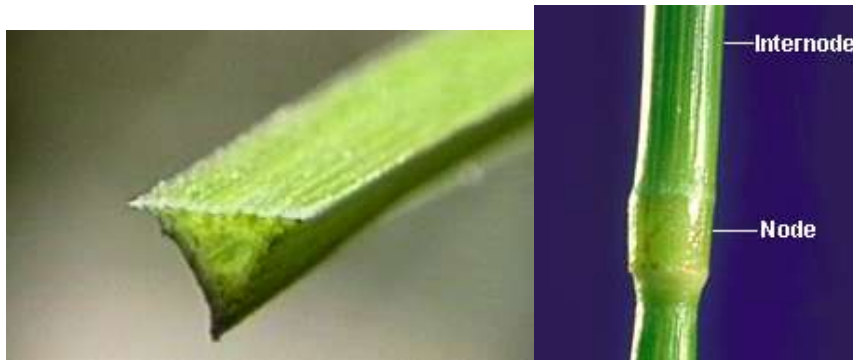
One of the most challenging things you will do at DWP is key-out graminoids (grass and grass-like plants). There are three families that you will need to be able to distinguish in order to identify graminoids; the grasses (Poaceae), the sedges (Cyperaceae), and the rushes (Juncaceae). The following table lists the distinguishing characteristics of each.

Family	stems	leaves	flowers	fruit
Poaceae	Round, hollow at internodes	<i>Ligulate</i> , sheaths open, 2-ranked*	Modified into glumes, lemmas, and paleas	grain
Cyperaceae	3-sided, solid	Sheaths closed, 3-ranked*	scales	achene
Juncaceae	Round and solid	Basal, forming tufts, sheaths closed	Made of 6 <i>tepals</i> – 3 sepals, and 3 petals	Many seeded capsule

*Two ranked means the leaves come out on the two opposite sides of the stem. Three ranked means the leaves come out from three different “sides” of the stem.



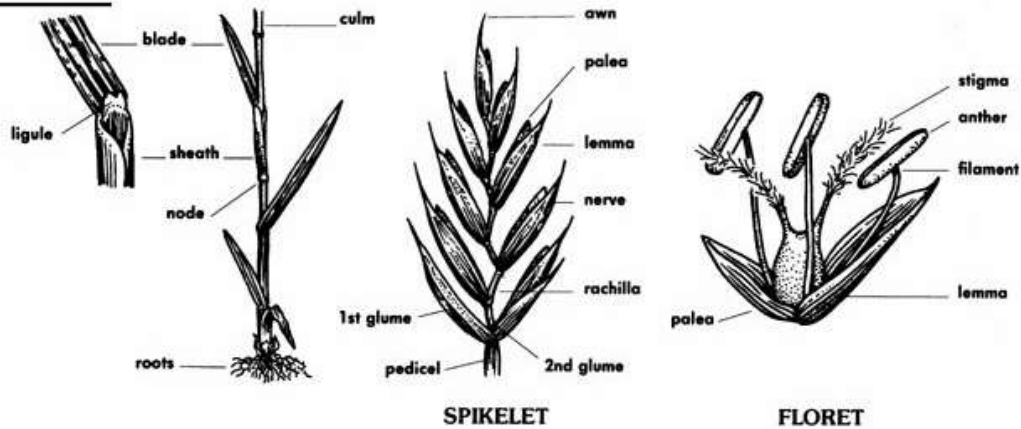
A comparison of the typical flowers of the grass family (Poaceae), sedge family (Cyperaceae) & rush family (Juncaceae). In grasses, the individual flower is referred to as a *floret*. In the sedge family, each flower is subtended by a scalelike bract. Since the scalelike petals and sepals of the rush family are very similar in appearance, they are referred to as *tepals*. The ovary of a grass develops into a one-seeded grain (*caryopsis*). The ovary of a sedge develops into one-seeded *achene*, while the ovary of a rush develops into a *many-seeded capsule*. Sedge and rush stems often contain spongy *aerenchyma* tissue with abundant air spaces. This allows air to reach the root systems which are often submerged in water-logged mud. Rush stems (Juncaceae) are generally circular in cross section, while the stems of sedges (Cyperaceae) are typically three-sided (triangular).



Cross-section of a sedge, “Sedges have edges”. Grasses are round in cross section and generally have hollow internodes.

Family Poaceae (grasses):

GRASSES



Awn — a stiff bristle situated at the tip of a glume or lemma.

Collar — the junction of the leaf sheath and blade.

Culm — the stem of a grass.

Floret — a single small flower, usually a member of a cluster, such as a spikelet or a head.

Glume — the lowest two (sometimes one) empty scales subtending the usually fertile scales in grass spikelets.

Lemma — the lowermost of the two scales forming the floret in a grass spikelet -- the uppermost, less easily seen, is called the palea.

Ligule — an extension, often scarios (papery), of the summit of the leaf sheath.

Nerve — same as a vein. The central vein running lengthwise on a scale

Node — the point along a stem which gives rise to leaves, branches, or inflorescences.

Palea — the uppermost of the two scales forming the floret in a grass spikelet (often obscure or hidden).

Rachilla — a secondary rachis. The axis of a spikelet.

Sheath — a tubular structure effected by the formation of leaf margins around the stem. The base of a grass leaf that runs from the node up to the blade.

Spikelet — a secondary or small spike; specifically, in the Poaceae family, the unit composed of one or two glumes subtending one to several sets of lemma and palea combinations.



Family Juncaceae (rushes):



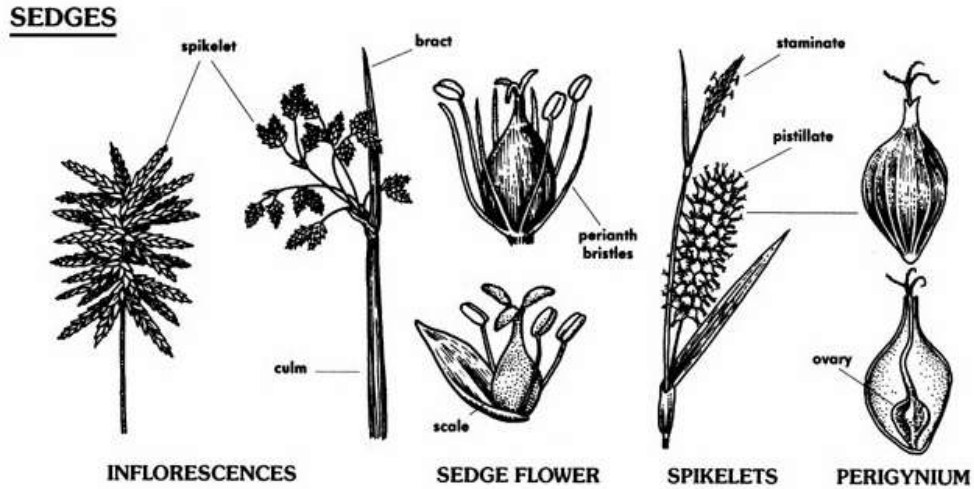
Note the perianth segments (sepals and petals) in these rush flowers. There are three *sepals* and three *petals* that look pretty much alike. Collectively we call them *tepals* – there are **6 tepals** in a rush flower. You will not find this flower structure in the Poaceae or the Cyperaceae.

At right is another picture of a rush. This photo shows the fruit of the rushes, the many seeded capsule has split open releasing the seeds. This fruit type is also unique among the three graminoid families.



Family Cyperaceae (The sedges):

There are numerous genera within the family Cyperaceae that you will encounter at DWP. We will discuss the family characteristics in general and three genera within the family. Examples of sedges, and their flower structure, are shown in the illustration below.

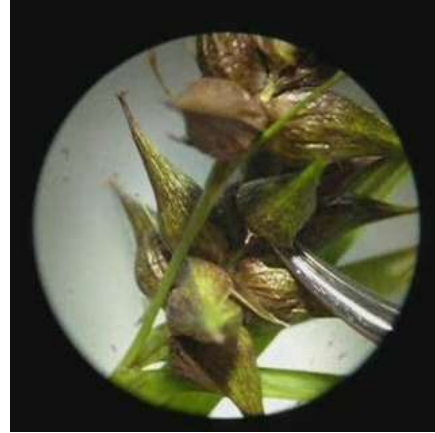


The key to the most common genera of sedges you will encounter at DWP is provided. However, there are numerous genera not listed in this key that are present at DWP (e.g. *Fimbristylis*, *Fuirena*, *Bulbostylis*, *Dulichium*, *Kyllinga* and *Scirpus*), so use this key with that fact in mind. You will use this key during exercises designed to familiarize you with this group. A more detailed discussion of *Cyperus*, *Carex* and *Rhynchospora* follows.

- 1 Achene enclosed in a sac (*perigynium*), with style and stigmas protruding through a terminal opening; flowers unisexual, the staminate flowers either above or below the pistillate in the same or separate spikelet, leaf blades with a midrib.....*Carex*
- 1 Achene not enclosed in a perigynium; flowers perfect (except in *Scleria*, which has exposed and bony white achenes)
 - 2 Florets unisexual; achene exposed and with a white, bony-crusty covering.....*Scleria*
 - 2 Florets bisexual; achene enclosed within scales and lacking a whitish covering.
 - 3 Scales of spikelets 2-ranked, obviously in 2 rows along the axis, bristles absent, achene 2-3 sided.....*Cyperus*
 - 3 Scales of spikelets spirally arranged on axis
 - 4 Spikelet solitary, stems leafless except for bladeless sheaths.....*Eleocharis*
 - 4 Spikelet many, stems leafy.....*Rhynchospora*

The genus *Carex*: As mentioned previously male (staminate) and female (pistillate) flowers are separate in *Carex*. They are not always in entirely different spikes, however. In the photo at right the stigmas of the female flowers and anthers of the male flowers are clearly distinguishable from one another.





This series of photographs clearly shows the papery perigynium that surrounds the achene in this *Carex* sp. Note the long protuberance on the achene, which is the remnant of the style (review flower structure if you need to). The fruit characteristics shown in these photos are unique to this group.

The Genus *Cyperus*: Besides the solid triangular stem the thing you might notice first about plants in the genus *Cyperus* is the distinctly 2-ranked arrangement of the spikes evident in the photographs below. Note how the individual floral units (spikelets) are clearly arranged along opposite sides of the rachis. These also tend to be flattened in appearance. Unlike *Carex*, plants in the genus *Cyperus* do not have a perigynium. Within each scale is an achene, shown in the right photo. We will practice identifying these in the field, so you will become comfortable with distinguishing a scale from a perigynium.



The Genus *Rhynchospora*: Plants in the genus *Rhynchospora* lack a perigynium, and have scales that are arranged spirally on the axis (A) rather than in the flattened 2-ranked pattern seen in *Cyperus*. The fruit type in this group (like that in *Carex* and *Cyperus*) is the achene (B). The unique appearance of *Rhynchospora* achenes will help you recognize these plants in the field. However, these are considered by some to be one of the more difficult groups of plants to “field identify” to species due to the small size of the achenes of many species, and due to the fact that in order to accurately identify many species the achenes need to be fully ripe. But like the other challenging groups discussed thus far, with practice one can achieve some measure of confidence with in identifying these plants.

A



B



C



The achenes in photos B and C clearly show some of the characters important for the identification of *Rhynchospora*; the beak, perianth bristles, and surface features of the achene body. In order to make a species determination in this group it is essential that these features be clearly visible. This may require collection of specimens for observation under the dissecting scope. We will spend some time identifying these in the next few exercises.

Conclusions

Well that's it. Now you're an expert! Like anything worthwhile it takes time, patience, and practice to become proficient at plant identification. I think you will be surprised at how many different plant species you will be able to recognize and a plus is that you will probably gain some additional appreciation for the diversity, and intricate beauty of graminoid plants.

References

Websites:

<http://www.accessexcellence.org/RC/Ethnobotany/page3.html> - good little site on plant classification

<http://www.csd.tamu.edu/FLORA/Wilson/ftp/hdwtfpbs01.htm> - link to a plant taxonomy course website. Good overall taxonomy site, good descriptions of plant families.

http://flora.huh.harvard.edu:8080/actkey/image_key.jsp?setId=100 – excellent plant family key

http://www.geobotany.uaf.edu/teaching/biol474/plant_family_charact.html - guide to plant families

<http://arnica.csustan.edu/key/key.html> - fantastic online fruit key

<http://herba.msu.ru/mirrors/www.helsinki.fi/kmus/botvasc.html> - online guide with assorted botanical links

<http://www.plantatlas.usf.edu/> - fantastic source on Florida plants from the University of South Florida's Institute for Systematic Botany.

<http://www.virtualherbarium.org/vh/db/main.php> - A virtual herbarium, search for and view herbarium specimens on this site