



Families: Restionaceae (restiads), Juncaceae (rushes) & Cyperaceae (sedges)

Most flowering plants have obvious flowers, including the petaloid monocots, and can be separated easily from the non-petaloid rushes, restiads (a.k.a. southern rushes) and sedges, which have much less showy, small, usually brown flowers or spikelets that lack showy petals. The most similar (and closely related) family is Poaceae, the grasses.

The characteristics that most easily separate the families in the field (at least in this area) are:

- a) Grasses have leaves that have a sheath, ligule and usually well-developed blade. Most rushes and sedges lack a ligule, and many have a very reduced leaf blade like a little mucro on top of the sheath or have no blade at all. Most Restionaceae have only a tiny ligule and short leaf blade but the *Centrolepis* group of Restionaceae are tiny plants with a basal tuft of leaves.
- b) Grasses often have dull greyish green leaves. Rushes, restiads and sedges often have shiny green leaves and/or very reduced leaf blades.
- c) Grasses occur mostly in dry land habitats. Rushes, restiads and sedges are more common in damp places (often only seasonally wet).

FAMILY FEATURES

The restiads /southern rushes, rushes and sedges found in the Sydney region can be distinguished easily¹ from each other:

- **Juncaceae** (rushes) differ from the other families in having flowers with small, brownish 6-parted perianths not at all like a grass spikelet. Leaf sheaths are open to the base. Fruit is a capsule.
- **Restionaceae** (restiads or southern rushes) have flowers (florets) in grass-like spikelets. Their anthers are only 1-lobed (the other families have 2-lobed anthers). Most species have brown leaf sheaths open to the base, spaced out along the culms but the *Centrolepis* group are tiny plants with leafless flowering stems mostly 1–10 cm tall. The only other species with leaves spread along the culms are *Caustis* spp. and *Machaerina (Baumea) juncea* in the Cyperaceae, but they have sheaths that are closed (tubular) with a very reduced leaf blade on top. Recent molecular evidence indicates that the *Centrolepis* group should be included in Restionaceae, although they look very different from other members of the family and were previously placed in a separate family, Centrolepidaceae. They are very like seedlings of other Restionaceae and are small, tufted herbs with very narrow leaves 1-5 cm

¹ Well, with a bit of experience! And a hand lens or magnifying glass will make it easier.

long, and a small head of flowers within 2 bracts. Only two species in Central Coast Botanical Region: *Centrolepis fascicularis* and *C. strigosa*.

- **Cyperaceae** (sedges). Having eliminated the above families, the remainder will be in Cyperaceae, but confirm this by looking for features including 3-ranked leaves (as viewed from above), often triangular cross-section of the culms, and closed (tubular) leaf sheaths, and flowers (florets) that are in grass-like spikelets.

FLOWERS

Most species of restiads have separate male and female flowers, i.e., they are unisexual, and are dioecious (the male and female flowers are on separate plants). The two plants can look quite different from each other. However, the *Centrolepis* group has bisexual flowers on each plant. Most rushes have bisexual flowers but a few (not in the Sydney region) are dioecious. The sedges have bisexual flowers but many also have unisexual flowers within a spikelet, either above or below the bisexual flowers.

CULMS AND LEAVES

Characteristics of the culm are used in identification – their colour (when alive); the cross-sectional shape of the culm; whether filled with pith or hollow, or transversely septate.

These families are all monocots (as opposed to dicots) and thus have parallel veins in their leaves. Leaves are often reduced to sheaths spread along the culms, sometimes with a small brown leaf blade, or they are terete or flat and grouped at the base of the plant.

(NB! When checking whether a leaf sheath is open or closed, examine one of the cauline sheaths or the uppermost of the basal sheaths. The older (lower) sheaths in many sedges are split open as the plant matures and expands.)

FRUIT AND SEEDS

These groups are nearly all wind-pollinated, so at flowering time the anthers and feathery styles and stigmas are extended well clear of the perianth or floral bracts. They may be pale yellow or coloured pink to purplish red.

Fruits are either a capsule (dehiscent fruits with several to many seeds) or a nut or nutlet (dry, indehiscent, one-seeded fruits) or, in the *Centrolepis* group, tiny follicles. Some *Gahnia* species are notable for their red nutlets that dangle from the spikelet.

DISTRIBUTION

The Cyperaceae is a big cosmopolitan family with c. 90 genera worldwide and over 5,000 species. In contrast, Restionaceae is a smaller southern hemisphere family of c. 590 species: 160 Australian, 400 South African. Thus, there is a strong Gondwanan link. The family Juncaceae (c. 400 species) consists of 2 genera which occur worldwide, *Juncus* and *Luzula*, and 6 small genera restricted to South America, New Zealand and Europe.

USES

Some *Juncus* spp. are used for weaving. The Cyperaceae are more extensively used for weaving, thatching, food, perfume and medicine. *Eleocharis dulcis* tubers are the Chinese water chestnut. *E. dulcis* is a native plant which occurs in northern Australia and is the principal food for Magpie geese. Egyptian papyrus was made from *Cyperus papyrus*. Some species are exported for dried flower arrangements. They are also used in horticulture and constructed wetlands for removing pollution from water.

SEDGELANDS

Cyperaceae and Restionaceae dominate some herbaceous communities. Such sedgeland occur on soils that are waterlogged for long periods or even permanently, and are found mainly near the coast around fresh water or brackish swamps from south-eastern Queensland to Tasmania and westward into coastal South Australia. They are also found on the tablelands with little or no variation in the dominants. They are commonly found in 'wetlands', a term usually applied where there is surface water. The sedgeland flora also contains species of Juncaceae. *Juncus kraussii* grows in brackish water in estuaries. The presence of the introduced weed *Juncus acutus* in disturbed dryland habitats is an indicator that saline soils have developed.

In the Sydney geological basin, the restiads, rushes and sedges are a common component of heath vegetation. A community called Sedgeland-Shrubland characterised by *Gahnia sieberiana*, *Banksia robur*, *Sprengelia incarnata*, *Viminaria juncea*, *Callistemon citrinus* and *Banksia oblongifolia* occurs on poorly drained soils and along drainage lines. A large Sedgeland-Shrubland (Donnelly's Swamp) and a smaller area occurs in the Ku-ring-gai Wildflower Garden between the Visitor Centre and Lambert's Clearing. Both areas are dominated by *Gahnia sieberiana*.

GLOSSARY

See *Online Flora of N.S.W.* for further descriptions and illustrations at <https://plantnet.rbgsyd.nsw.gov.au/cgi-bin/NSWfl.pl?page=nswfl&glossary=yes&alpha=A>

See also the glossary in the *Online Flora of Australia* at <https://profiles.ala.org.au/opus/foa/glossary#?page=a>

Acute: pointed

Awn: a bristle-like appendage terminating a plant part

Axillary: arising in the angle between stem and leaf or stem and bract

Axis: the central stem

Basal: attached or grouped at the base

Basifixed: of an anther, attached at its base to the filament (e.g., in rushes, sedges)

Blade (lamina): the broad, upper portion of a leaf

Bract: usually a modified leaf associated with a flower or inflorescence

Capsule: a dry, dehiscent fruit derived from 2 or more carpels

Caryopsis: the very small, dry, 1-seeded, indehiscent fruit of grasses, in which the seed is fused to the wall of the fruit

Cauline: borne on the aerial part of a stem or culm

Culm: an aerial stem bearing the inflorescence in grasses, rushes, etc., measured from base of the plant to lowest bract under the inflorescence

Decumbent: spreading horizontally with the ends growing upwards

Dioecious: having male and female flowers on different plants

Distichous: arranged in two rows on opposite sides of a stem & in same plane

Dorsifixed: of an anther, attached firmly near the middle of its back to the filament (e.g., in restiads)

Flexuous: bent from side to side in zig zag

Floret: reduced flower in a spikelet

Follicle: A dry fruit (developed from a single carpel) that splits open along one seam

Glumes: in Cyperaceae and Restionaceae, the bract under each floret in the spikelet; in grasses, the 2 bracts at the base of a spikelet

Head: a dense cluster of more or less sessile flowers or spikelets

Imbricate: closely packed and overlapping

Inflorescence: flower-bearing section of a plant

Involucral bract: one or more bracts at the base of a flower or inflorescence

Ligule: a membrane or hairs, etc., at the collar (blade/sheath junction) of a leaf

Monoecious: having male and female flowers on the same plant

Mucro: an acute, usually suddenly constricted, apical point on a leaf or bract

Nut: dry, indehiscent, 1-seeded fruit formed from 2 or more carpels, typically with a hard woody layer (pericarp), e.g., the chestnut

Nutlet: a small nut, lacking a thick woody layer, e.g., docks and sedges

Panicle: a compound inflorescence

Perianth: collective name for the calyx (sepals) and corolla (petals); present in some sedges in the form of small bristles or scales

Pith: the centremost tissue of a stem, often soft and spongy

Rachilla: the stem (axis) of a grass or sedge spikelet above the glumes

Rachis: the stem (axis) of an inflorescence, pinnate or bipinnate leaf

Rhizome: an underground stem

Scale: small papery body, e.g., rudimentary leaf or perianth segment

Scape: flowering stalk of a plant which has its leaves clustered at base

Sessile: without a stalk

Sheath: lower part of a leaf that surrounds the stem or culm. It may be slit down one side (open) or tubular (closed)

Spikelet: flowering unit in grasses, rushes, etc.; made up of a rachilla, 1 or more florets and glumes

Stem: a general term for the main axis or branch of the main axis; 'culm' is the preferred term in describing grasses, restiads, rushes, sedges

Terete: cylindrical and elongated

Versatile: of an anther, attached near its middle (or lower) to the filament but dangling very freely (e.g., in grasses) – cf. dorsifixed

Viscid: sticky.

Key to distinguish Grasses from Restiads, Rushes & Sedges

- A Flowers solitary, not in grass-like spikelets, with 6 well-developed scale-like perianth parts in 2 whorls of 3 each Juncaceae (rushes)
A* Flowers (florets) grouped in spikelets, without a scale-like perianth, or tiny tufted plants to c. 20 cm tall with slender leafless flower stems -> B
B Leaf sheaths closed [NB: check the uppermost leaf on a culm for this feature!]; anthers 2-lobed, basifixed Cyperaceae (sedges)
B* Leaf sheaths open with well-developed leaf blades, often only at base of plant; anthers 2-lobed, versatile Poaceae (grasses)
B** Leaf sheaths open, mostly with reduced leaf blades to 5 mm long, usually regularly spaced along culm, or (*Centrolepis* group) tiny tufted plants to c. 20 cm tall with slender leafless flower stems; anthers 1-lobed, dorsifixed Restionaceae (restiads)

Key to species in Ku-ring-gai Wildflower Garden

* in front of a plant name means it is not native.

Family Juncaceae - Rushes

- A Flat leaf blades -> B
A* Leaves terete or reduced to leaf sheaths at culm bases -> D
B Leaf blades broad 1.5-11 mm wide *Juncus planifolius*
B* Leaf blades narrow to 1.5 mm wide -> C
C Leaves basal and cauline **Juncus bufonius*
C* Leaves all basal **Juncus cognatus*
D Some terete leaves along culms **Juncus articulatus*
D* Leaves all basal -> E
E Leaves and involucral bracts pungent, capsule yellow-brown; seeds tailed **Juncus acutus*
E* Leaves and involucral bracts acute but not pungent; seeds without a tail -> F
F Continuous pith in culm *Juncus continuus*
F* Interrupted patches of pith in culm *Juncus usitatus*

Family Restionaceae – Restiads, Southern Rushes

Mostly with unisexual flowers; dioecious plants; male and female plants can look very different; fruit a capsule or nut. *Centrolepis* subgroup: diminutive tufted plants, not dioecious; fruit tiny follicles clustered on an elongated axis; previously in a separate family, Centrolepidaceae.

A Diminutive tufted annuals; leaves not reduced to sheaths; not dioecious; tiny plants to c. 20 cm tall with slender leafless flower stems -> B

A* Perennial plants, tufted or rhizomatous; leaves reduced to sheaths on the culms -> C

B Involucral bracts tapering to an elongated apex c. 2 mm long; leaf apex blunt
Centrolepis fascicularis

B* Involucral bracts abruptly contracting to a short mucro c. 0.5 mm long; leaves with a hair-like point
Centrolepis strigosa

C Culms flexuous with tiny recurved green leaf blades on each leaf sheath
Empodisma minus

C* Culms upright or if some flexuous no tiny recurved green leaf blades -> D

D Culms flattened
Eurychorda complanata

D* Culms rounded in cross-section -> E

E Culms with numerous whorled, finely divided, sterile leaf-like branches
Baloskion tetraphyllum

E* Culms without numerous whorled leaf-like branches -> F

F Unbranched culms or mostly unbranched, grey-green culms -> G

F* Branched culms -> J

G Inflorescence axillary -> H

G* Inflorescence terminal -> I

H Leaf sheaths 10-15 mm long, with white hairs 1-4 mm long at apex
Baloskion fimbriatum

H* Leaf sheaths 20-30 mm long, not hairy at apex
Baloskion gracile

I Leaf sheath closely encircling culm
Leptocarpus tenax

I* Large (15-30 mm) outward arching, light brown leaf sheaths
Lepyrodia scariosa

J Culms with whitish lines, looking grey-green overall; female spikelets mostly terminating branches
Hypolaena fastigiata

J* Culms greenish; female spikelets in axils of sheaths along the culm -> K

K Leaf sheath tightly encircling culm, dark red-brown
Chordifex fastigiatus

K* Leaf sheath more open, spreading towards the top, golden brown
Chordifex dimorphus

Family Cyperaceae - Sedges

- A Glumes distichously arranged in the spikelet -> B
A* Glumes spirally arranged in the spikelet -> C
- B Culms triangular to terete; inflorescence a simple or compound umbel or head; spikelet rachilla straight see *Cyperus* species below
B* Culms terete; inflorescence panicle-like or a head; spikelet rachilla zig-zag at maturity (except in *Anthelepis paludosa*) see *Schoenus /Anthelepis* spp.
- C Leaf sheaths spread along culms see *Caustis* spp.
C* Leaves at base of plant, or a few cauline -> D
- D Leaves much shorter than the top of the inflorescence -> E
D* Leaves shorter than or as long as the top of the inflorescence -> F
- E Leaf blades elongated, twisted, to 40 cm long *Cyathochaeta diandra*
E* Leaf blades reduced to a mucro on the top of a leaf sheath
Netrostylis capillaris (formerly *Tetraria capillaris*)
- F Inflorescence enclosed in 2 black bracts with awns *Ptilothrix deusta*
F* Different involucre bracts (or none) under inflorescence -> G
- G Robust plants to 2 m high; leaves flat with narrow papery ligule, 3-ranked; culms terete; inflorescence brown or black, c. 40 cm long see *Gahnia* spp.
G* Smaller, softer plants, differing in the other characters -> H
- H Involucre bracts 0-2, culm-like, longer than inflorescence *Isolepis inundata*
H* Involucre bracts shorter than inflorescence -> I
- I Inflorescence panicle-like see *Lepidosperma* spp.
I* Some spikelets on branches or sessile -> J
- J Spikelets numerous, in dense clusters see *Machaerina* spp.
J* Spikelets few, solitary on branches to 10 cm long *Fimbristylis dichotoma*

Cyperus species

- A Inflorescence a single dense head **Cyperus brevifolius*
A* Inflorescence branched, umbel-like, rarely reduced to a single head but then spikelets are not dense -> B
- B Spikelets arranged spicately on the ends of branches; glumes dark reddish; style 3-fid **Cyperus congestus*
B* Spikelets in digitate clusters on the ends of branches -> C
- C Glumes green with very dark red tinges *Cyperus sanguinolentus*
C* Glumes green to pale yellowish -> D

- D Style 2-fid; nutlet lenticular
 D* Style 3-fid; nutlet 3-angled in cross-section

Cyperus polystachyos
 **Cyperus eragrostis*

Schoenus & Anthelepis species

- A Inflorescence a head-like cluster of spikelets -> B
 A* Inflorescence elongated -> C

B Perennial; culms mostly more than 12 cm long, rigid *Schoenus imberbis*
 B* Annual; culms less than 12 cm long, soft; glumes red-brown *S. apogon*

- C Leaves reduced to sheaths with small, rigid, mucro-like blade -> D
 C* Leaves with well-developed blades, soft, slender -> E

D Red-brown spikelets; culms erect *Schoenus brevifolius*
 D* Black spikelets; culms spreading to weeping *Schoenus melanostachys*

- E Plant tufted, erect, to 65 cm high
Anthelepis paludosa (formerly *Schoenus paludosus*)
 E* Plant small, mat-forming, rooting at nodes *Schoenus maschalinus*

Caustis species

- A Culms with curly branches, less than 1 m high; stamens 3 or 4; style 3-fid.
Caustis flexuosa
 A* Straight, erect culms, about 1 m high; stamens 5; style 5-fid
Caustis pentandra

Gahnia species

- A Culms to 45 cm high; leaves filiform, to 45 cm long; sheaths red-brown to dark brown; nutlet dark grey-brown *Gahnia microstachya*
 A* Culms 50-300 cm high; leaves about as long as culms -> B

B Spikelets with 1-3 small sterile basal glumes; culms to 300 cm high, to 12 mm diam.; inflorescence 30-100 cm long, erect to spreading; sheaths brown to black; nutlet red to orange, 2.5-4 mm long *Gahnia sieberiana*
 B* Spikelets with 5-12 small sterile basal glumes -> C

- C Culms 50-75 cm high, c. 5 mm in diameter; inflorescence 30-75 cm long, more or less erect; spikelets 8-13 mm long; sheaths brown; nutlet pale to dark red-brown, 5-5.5 mm long *Gahnia erythrocarpa*
 C* Culms 80-200 cm high, to 10 mm in diameter; inflorescence 50-125 cm long, spreading; spikelets 4-6 mm long; sheaths pink to brown; nutlet orange to red, 2.5-3 mm long *Gahnia clarkei*

Lepidosperma species

A Culms and leaves terete in cross-section, to 2 mm diam. -> B

A* Culms and leaves flat, more than 2.5 mm wide -> C

B Long rhizomes; spikelets in a dense, ovate, erect inflorescence to 9 cm long

Lepidosperma neesii

B* Tufted; spikelets numerous, spread along often flexuous branches in an elongated, erect to spreading inflorescence

Lepidosperma filiforme

C Culms viscid on margins; culms and leaves to 60 cm high

Lepidosperma sp. aff. *viscidum*

C* Culms not viscid; culms longer than leaves -> D

D Inflorescence drooping, 25-40 cm long; culms biconvex in cross-section, 5-15 mm wide

Lepidosperma sp. aff. *elatus*

D* Inflorescence erect, to 25 cm long; culms flat or slightly convex on one surface, to 4 mm wide -> E

E Inflorescence more or less linear, 5-25 cm long

Lepidosperma laterale

E* Inflorescence ovate to oblong, to 15 cm long

Lepidosperma sieberi

Machaerina species

A Culms 4-10 mm diam., hollow with numerous strong transverse septa; inflorescence drooping

Machaerina articulata

A* Culms 1-5 mm diam., not hollow or strongly transversely septate; inflorescence erect

Machaerina rubiginosa

Produced for the Walks & Talks program at the Ku-ring-gai Wildflower Garden by the North Shore Group of the Australian Plants Society.

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WEEDS

The many species from these families that have become weeds are mainly *Cyperus* spp. and *Juncus* spp., with a few others from the Cyperaceae. They mostly occur in disturbed situations, e.g., roadsides. Only a few occur in the Garden.

Weed Species of Rushes and Sedges in the Central Coast Botanical Region listed in the *Online Flora of N.S.W.*

| | |
|---|-------------------------------|
| <i>Carex divulsa</i> | <i>I. marginata</i> |
| <i>Cyperus aggregatus</i> | <i>I. prolifera</i> |
| <i>C. albostriatus</i> | <i>I. sepulcralis</i> |
| <i>C. brevifolius</i> | |
| <i>C. compressus</i> | <i>Juncus acuminatus</i> |
| <i>C. congestus</i> | <i>J. acutiflorus</i> |
| <i>C. eragrostis</i> | <i>J. acutus</i> (Spiny Rush) |
| <i>C. esculentus</i> (Yellow Nut Sedge) | <i>J. articulatus</i> |
| <i>C. flavescens</i> | <i>J. bulbosus</i> |
| <i>C. involucratus</i> (Umbrella Sedge) | <i>J. capillaceus</i> |
| <i>C. reflexus</i> | <i>J. capensis</i> |
| <i>C. rigens</i> | <i>J. capitatus</i> |
| <i>C. rotundus</i> (Nutgrass) | <i>J. cognatus</i> |
| <i>C. sesquiflorus</i> | <i>J. effusus</i> |
| <i>C. vorsteri</i> | <i>J. imbricatus</i> |
| <i>Eleocharis minuta</i> | <i>J. microcephalus</i> |
| <i>E. pachycarpa</i> | <i>J. tenuis</i> |
| <i>Isolepis hystrix</i> | |
| <i>I. levynsiana</i> | |

FURTHER READING

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