Sedge Identification Workshop

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Cyperaceae – the sedge family

- Third largest monocot family
- ~5000 species, 104 genera
- Largest genera
  - *Carex*, 2000 spp.
  - *Cyperus*, 550 spp. (excl. *Kyllinga, Pycreus*)
  - *Fimbristylis*, 300 spp.
  - *Rhynchospora* and *Scleria*, 250 spp. each
  - *Eleocharis*, 200 spp.
  - *Bulbostylis*, *Pycreus* and *Schoenus*, 100 spp. each

(1,2,3)

General features of sedges

- Grass-like, monocot flowering plants
- Linear leaves, parallel venation
- Small, mostly wind-pollinated flowers

This is not a sedge, but it is a monocot!

Note perianth of 6 parts.

Lilium catesbaei Walter
pine lily

Phylogenetic relationships

- Traditionally viewed as close relatives of the grasses (Poaceae)
- Recent cladistic analysis using molecular & morphological data shows closer alliance with Juncaceae & Thurniaceae.

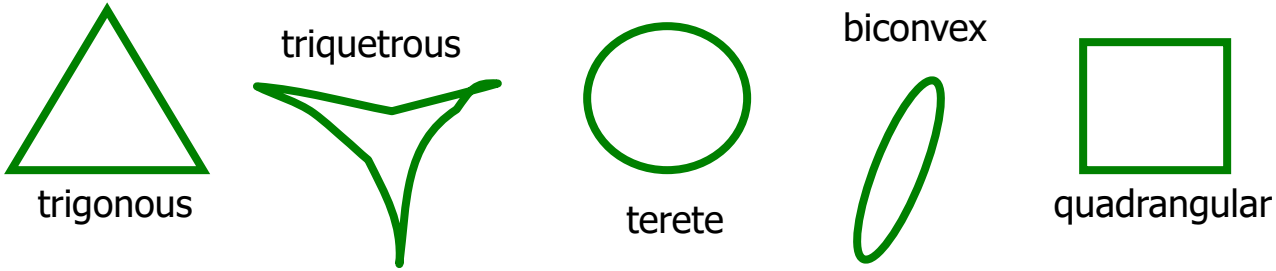
(3,4)

Graminoids

- Sedges, grasses, rushes and other similar kinds of monocot plants with small, inconspicuous flowers and linear leaves are grouped informally as graminoids.

Sedges have edges….

- *Sedges have edges; rushes are round; grasses are hollow right up from the ground.*
- Most sedges have 3-angled stems, hence *sedges have edges*; however, some do not.
  - E.g., stems of *Dulichium arundinaceum* and many *Eleocharis* species are round (terete) in cross section.



Comparison of grasses, rushes & sedges

Cyperaceae The Sedge Family	*Poaceae* The Grass Family	*Juncaceae* The Rush Family
• Stems usually three-angled (but sometimes terete, quadrangular, or lenticular)	• Stems terete	• Stems terete
• Stems usually with solid pith	• Stems with solid nodes and hollow internodes	• Stems with solid pith
• Leaf sheaths closed	• Leaf sheaths open	• Leaf sheaths open
• Inflorescence a complex of spikelets (simple spikelet in *Eleocharis*)	• Inflorescence a complex of spikelets	• Inflorescence a complex of cymes
• Perianth of 1–many bristles or hairs, or absent	• Perianth hardly evident, apparently reduced to scale-like palea (outer series?) and tiny lodicule (inner series)	• Perianth of six scale-like parts in two series
• Stamens 3 (1-2, rarely 6)	• Stamens 3 or 6 (rarely 1-2)	• Stamens 6 (rarely 3)
• Pistil of 2-3 fused carpels	• Pistil of 2(3) fused carpels	• Pistil of 3 fused carpels
• Fruit an achene	• Fruit a caryopsis (grain)	• Fruit a capsule

(3,5)

Common names can be confusing!

- Many graminoids, sedges included, escape all but passing notice and do not have common names.
- Common names are often derived uncritically.
  - Bulrushes (*Scirpus* spp., *Schoenoplectus* spp.), spike-rushes (*Eleocharis* spp.), and beak-rushes (*Rhynchospora* spp.) are sedges.
  - Cotton-grasses (*Eriophorum* spp.), umbrella-grasses (*Fuirena* spp.), and sawgrass (*Cladium jamaicense*) are sedges.
  - The nut-sedges (*Cyperus esculentus*, *C. rotundus*) are often called "nut-grasses."
- Being universal & unambiguous, scientific names promote precise communication.

Sedges can be taxonomically challenging!

- Extreme reduction of flowers and fruits in size and number
- Inherent difficulty in handling and describing such small, specialized parts
  - Good hand lens or dissecting microscope required
  - Ability to manipulate and dissect fine structures
- Reliable identification requires reproductively mature specimens with fully developed spikelets and achenes.

General Structure

- Habit
- Leaves and stems
- Inflorescence
- Flowers
- Fruits and associated structures

Habit

- Annual or perennial herbs
- Mostly perennial herbs persisting and spreading vegetatively by rhizomes, stolons, corms, or tubers

Diminutive annual

Cyperus pumilus L.

Clinch Co., Georgia

Cespitose perennial

Eleocharis tuberculosa (Michaux) R. & S.
Margin of drawn down flatwoods pond,
Atkinson Co., Georgia, USA

Vegetative proliferation by rhizomes & tubers
Eleocharis acutangula (Roxb.) Schult.
Lee County, Florida

"Walking" vegetative proliferation of aerial stems

Eleocharis melanocarpa Torr.

Nyssa biflora-Taxodium ascendens-Ilex myrtifolia-Litsea pond

Turner Co., Georgia

Aerial stems and leaves

- Stems typically trigonous – 3 sides, 3 angles
  - Exceptions previously noted
- Leaves
  - Arise at intervals along leafy stem (e.g., *Dulichium*, *Scirpus, Bolboschoenus*)
  - Clustered near base of plant (e.g., *Cyperus, Kyllinga*)
  - Closed sheathing bases
  - Blades lanceolate to linear, grass-like
  - Parallel venation
- Unique within the family, plants of *Eleocharis* have leaves reduced to bladeless sheaths and, thus, appear leafless.

Closed leaf sheath
Lanceolate blade

Dulichium arundinaceum (L.) Britt.

Parallel venation

Cymophyllus fraserianus (Ker-Gawl.) Kartesz & Gandhi

Inflorescences

- Some genera, e.g., *Cyperus* and *Kyllinga,* have prominent leafy bracts subtending inflorescence.
- Spikelet = basic unit of inflorescence
- Organization of spikelets in inflorescence varies
  - Paniculate
  - Cymose
  - Umbellate
  - Spicate
  - Solitary

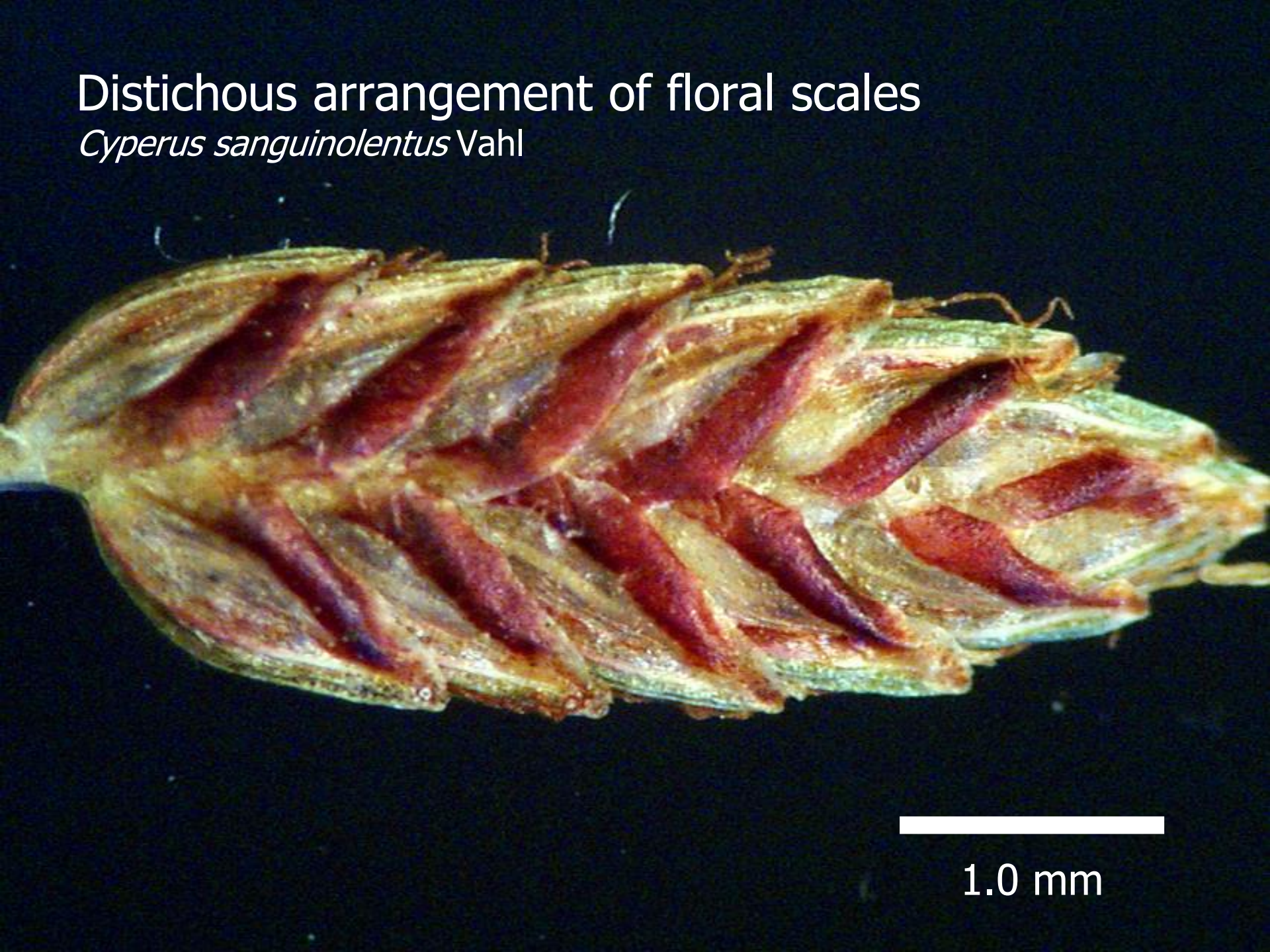
Spiral arrangement of floral scales

Eleocharis equisetoides (Ell.) Torr.

Clinch Co., Georgia

Distichous arrangement of floral scales

Cyperus sanguinolentus Vahl

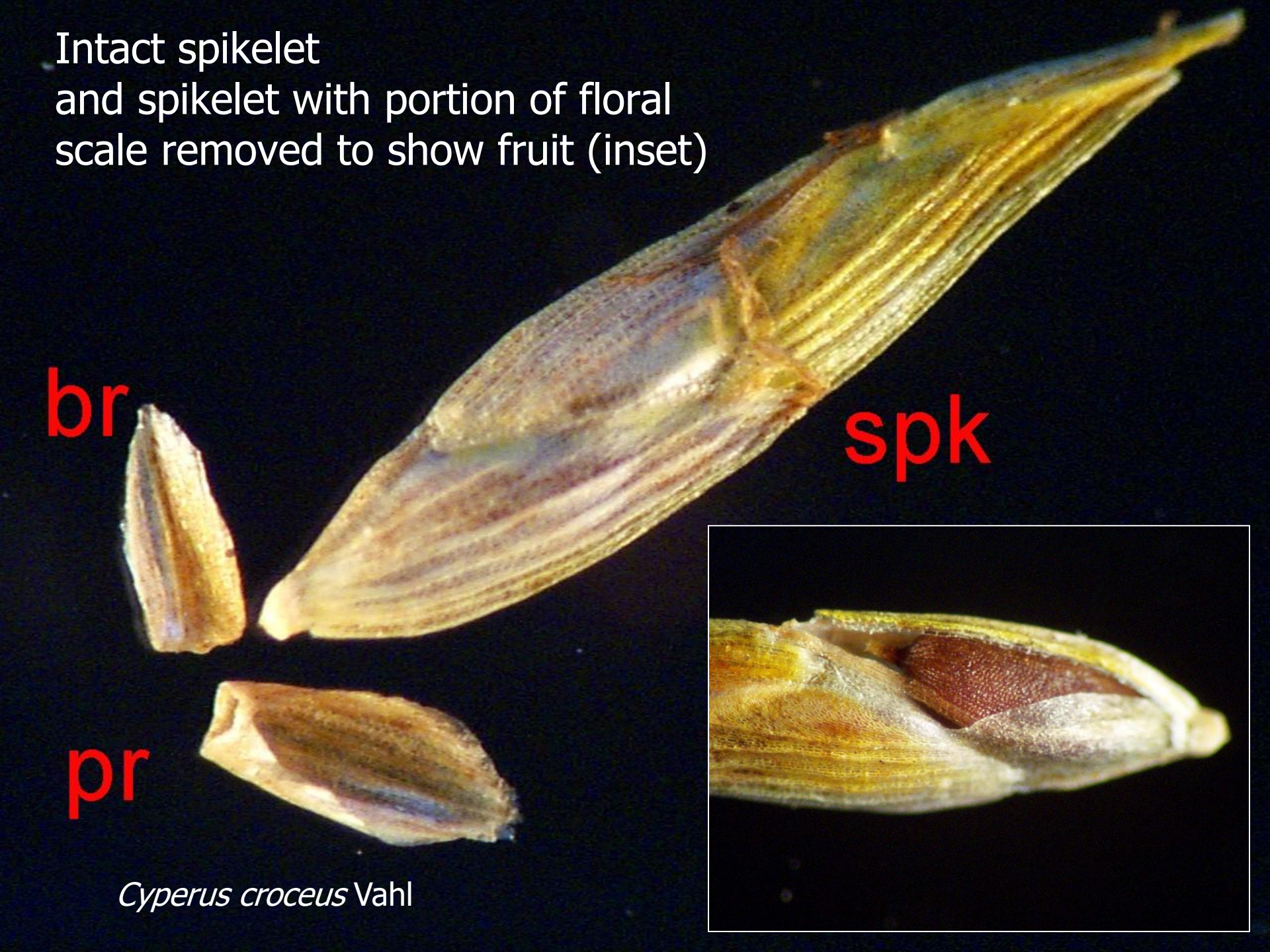


Umbellate inflorescence subtended by leafy bracts
Cyperus strigosus L.
Baker Co., Florida

Spikes and spikelets

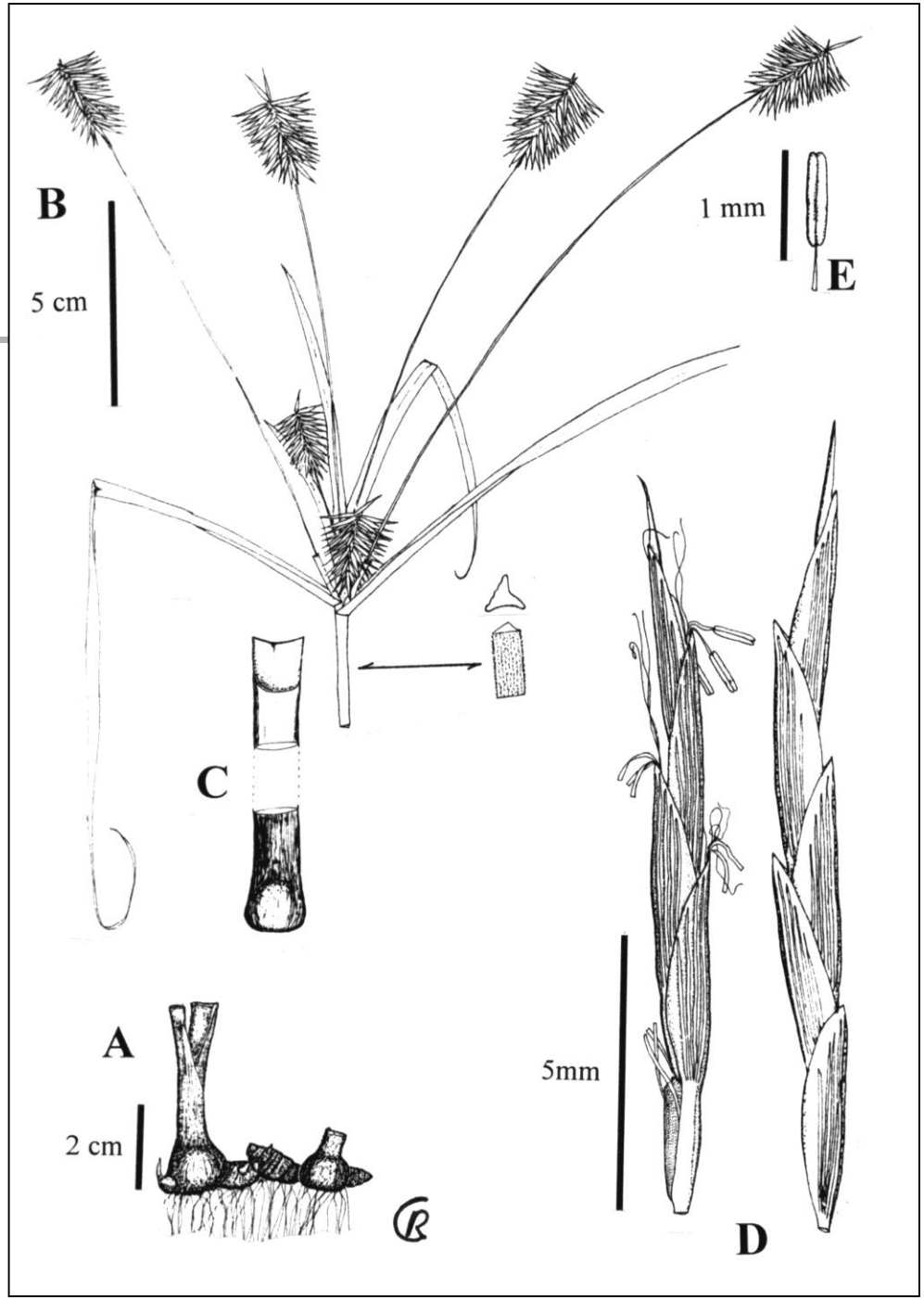
Cyperus croceus Vahl

Intact spikelet
and spikelet with portion of floral scale removed to show fruit (inset)



Cyperus croceus Vahl

General structure



Cyperus retrofractus (L.) Torr.

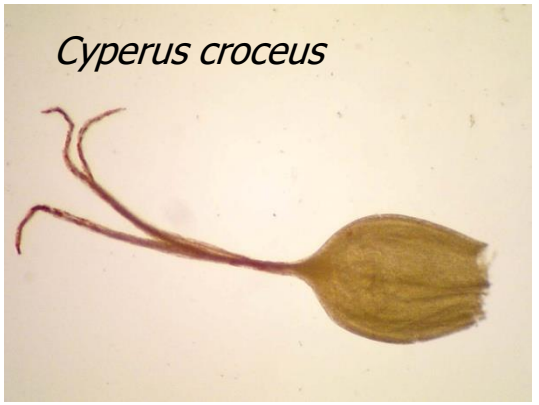
Flowers

- Wind-pollinated (anemophilous)
- Highly reduced both in size and numbers of parts
- Usually perfect
  - Imperfect, mostly monoecious – *Carex, Cymophyllus, Scleria*
- Androecium
  - 1-3 stamens
- Gynoecium
  - 2-3 carpellate pistil
- Perianth
  - Extremely reduced or completely absent
  - When present, perianth usually persists attached to fruit
    - Bristles – animal dispersal (zoochory)
      - e.g., *Eleocharis, Rhynchospora*
    - Hairs – wind dispersal (anemochory)
      - e.g., *Scirpus, Eriophorum*
    - Bristles + paddle-shaped segments
      - *Fuirena*

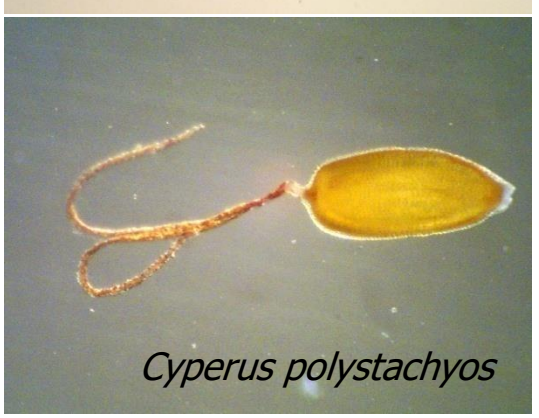

Flowering spikelets
Eleocharis montevidensis Kunth
Grady County, Georgia

Gynoecium – pistil

- 3-carpellate, 3-branched (trifid) style



- 2-carpellate, 2-branched (bifid) style



Anemophily

Fimbristylis puberula (Michx.) Vahl

Flowers generally protogynous

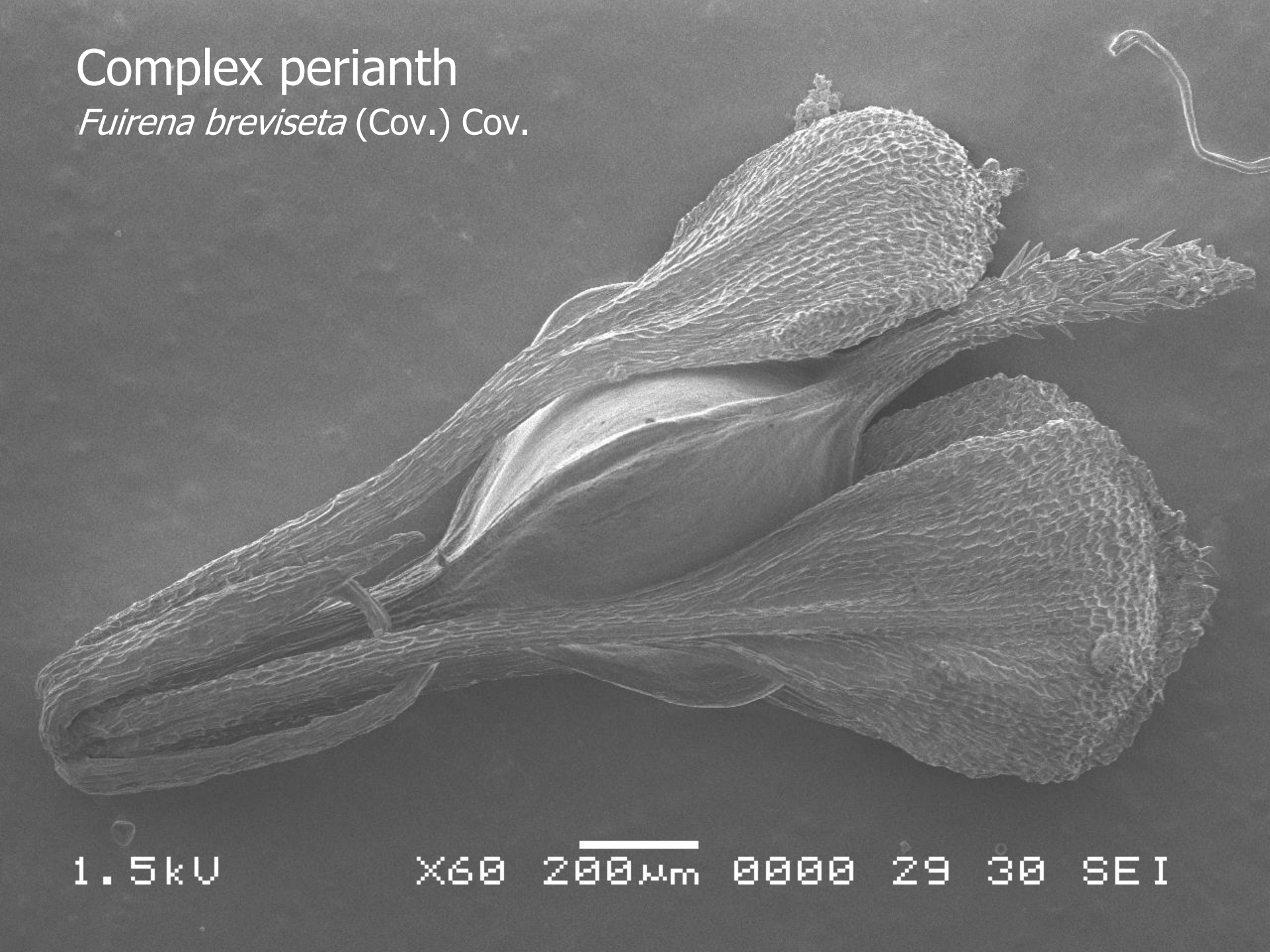
Exposed feathery, stigmas promote wind pollination

Stigmas projecting beyond perigynium

Carex striata Michx.

Complex perianth

Fuirena breviseta (Cov.) Cov.



Achenes and associated structures

- Achene = sedge fruit
  - Small
  - 1-seeded
  - Dry
  - Indehiscent
- Mature achenes essential for reliable identification of species
  - Shape, size, color, surface ornamentation taxonomically useful
- Achene shape correlated with carpel number
  - Pistils derived from 3 carpels have 3-branched (trifid) styles and form trigonous or terete achenes
  - Pistils with 2 carpels normally have 2-branched (bifid) styles and develop into biconvex (lenticular) or plano-convex achenes.

Achene shape
correlated with number of carpels & style branches

- Trigonous: 3-carpellate pistil, 3-branched style

- Biconvex (lenticular): 2-carpellate pistil, 2-branched style

Achene-tubercle-perianth complex

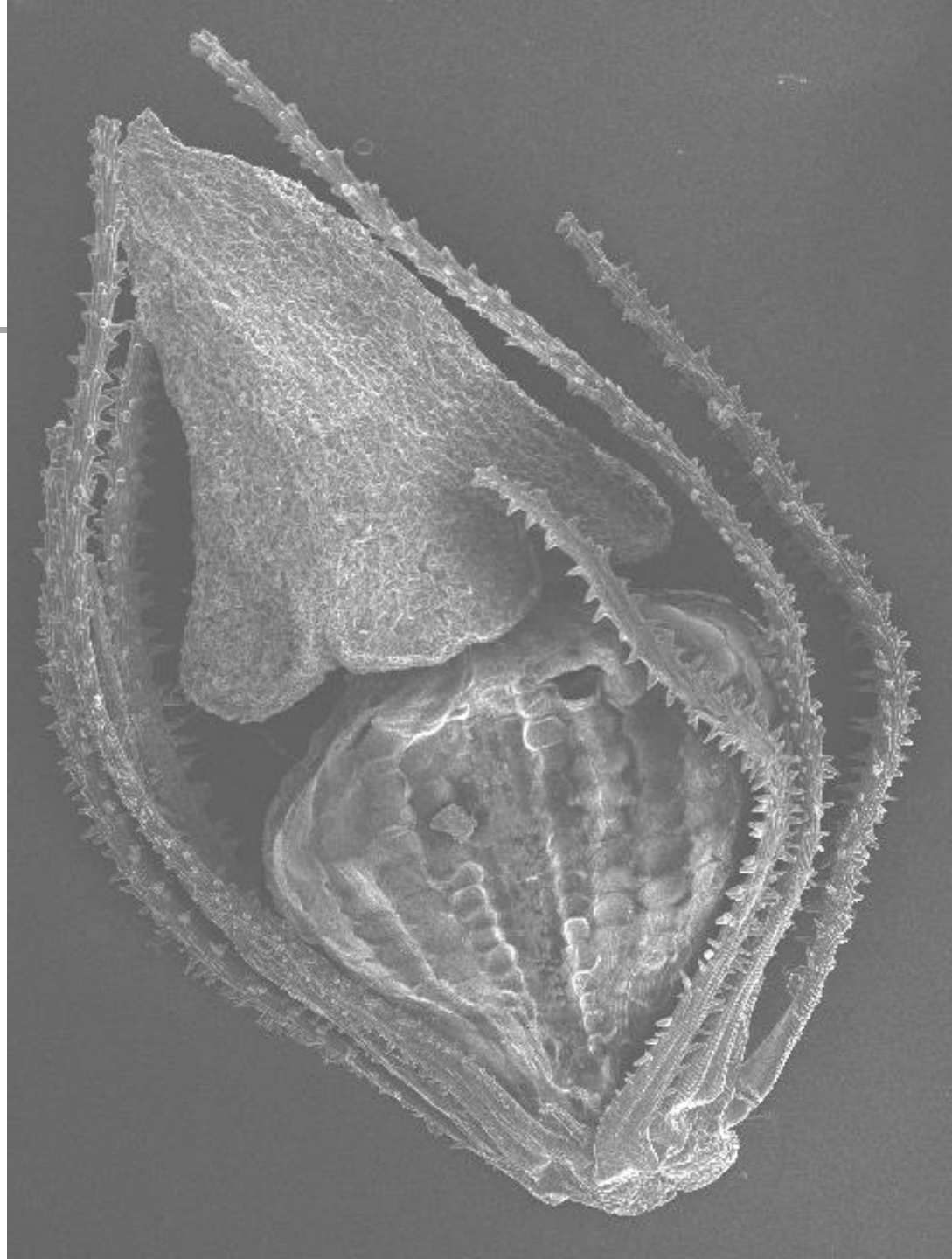
Eleocharis tuberculosa (Michx.) R. & S.

Toothed perianth bristles promote dispersal of achenes by attachment to hair & feathers

Function of spongy tubercle

Buoyancy? – water dispersal?

Lipid? – dispersal by ants?




Wind dispersal by persistant, silky perianth
Scirpus cyperinus (L.) Kunth

Survey of the major groups of sedges

- Spike-rush Sedge Group
- Bulrush Sedge Group
- Umbrella-grass Sedge Group
- Fringe-sedge Group
- Flat-sedge Group
- Three-Way Sedge Group
- Beak-rush Sedge Group
- Sawgrass Sedge Group
- Nut-rush Sedge Group
- Caric Sedge Group

Generic classification follows FNA (10).

Etymology of generic names (10,15,16)

The Spike-rush Sedge Group

- Diagnostic characteristics
  - Plants apparently leafless, with bladeless leaves reduced to sheathing bases
  - Inflorescence a single, terminal, unbranched spikelet
  - Flowers perfect
- 2 genera
  - *Eleocharis*
  - *Websteria*

Eleocharis – Spike-rushes

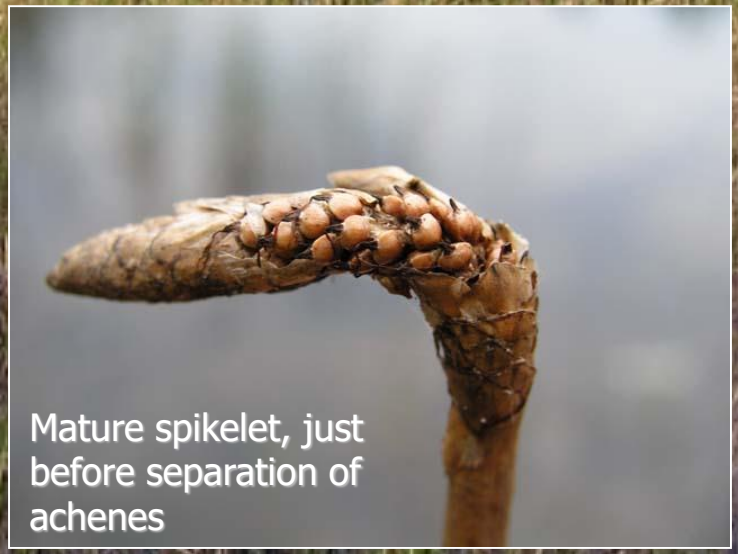
- From Greek *elos*, marsh, and *charis*, grace
- Most structurally reduced sedges, consisting of little more than an apparently leafless stem terminated by simple spikelet
- Taxonomy based largely on characteristics of perianth, tubercles, surface ornamentation of achenes
- Mostly on hydric soils
  - Wetlands
  - Floodplains
  - Seasonally wet sites in fields and pastures

Eleocharis tuberculosa
(Michx.) R. & S.
Baker Co., Florida

Endozoic dispersal of achenes by waterfowl

Eleocharis equisetoides (Ell.) Torr.

Clinch Co., Georgia, USA



Mature spikelet, just before separation of achenes


Eleocharis acutangula (Roxb.) Schult.
Florida, USA

Vegetative proliferation

Eleocharis baldwinii (Torr.) Chapm.
Lowndes Co., Georgia, USA

Eleocharis montevidensis Kunth
Grady Co., Georgia

Websteria

- Commemorating G. W. Webster, American botanist and farmer, 1833-1914
- Monotypic genus – *Websteria confervoides* (Poir.) Hooper
- Diagnostic characteristics
  - Vegetatively similar to *Eleocharis vivipara* Link.
  - Submerged aquatic
  - Stems capillary
  - Stems forming false whorls
  - Scales distichous
  - Spikelets 1-fruited
- Habitat and distribution
  - Widely distributed in tropical, subtropical and warm temperate regions around the world
  - United States
    - Infrequently collected
    - Known only from Florida and Georgia
    - Submersed in ponds and lakes

(10,17)

Websteria confervoides (Poir.) Hooper

Lake Co., Florida

Submerged plants (background),
dislodged floating plants (inset)

Photographs courtesy of
Nia Wellendorf, Florida DEP

The Bulrush Sedge Group

- Diagnostic characteristics
  - Scales spiral
  - Flowers perfect
  - Perianth of bristles or hairs, or absent
  - Style base indistinct
  - Tubercle absent
- Segregate genera traditionally included in *Scirpus* or Scirpeae
  - *Bolboschoenus*
  - *Schoenoplectus*
  - *Isolepis**
  - *Oxycaryum**
  - *Lipocarpha**

*More recently allied with Cypereae (1,10,18)

Scirpus – Bulrushes

- Classical Latin name for the bulrush
- Diagnostic characteristics
  - Leafy stems
  - Large, compound, cymose inflorescence of many spikelets
  - Scales
    - Glabrous
    - Usually acute to acuminate tips
- Various habitats, on hydric soils


Scirpus cyperinus (L.) Kunth
Wooly bulrush, wooly bully
McIntosh Co., Georgia

Dispersal along roads & railroads
Scirpus cyperinus (L.) Kunth
Wayne Co., Georgia


Scirpus divaricatus Ell.
Camden Co., Georgia

Schoenoplectus – Naked-stem Bulrushes

- From Greek, *schoinos,* rush, and *plectos*, plaited, referring to use of stems in weaving of mats, etc.
- Diagnostic characteristics
  - Leafless, wand-like stems
  - Ciliate scales
- ~10 species in Georgia, e.g.
  - *Schoenoplectus etuberculatus* (Steud.) Soják
    - Emergent in shallow ponds of the coastal plain or laxly submersed in swiftly flowing blackwater streams
  - *Schoenoplectus pungens* (Vahl) Palla
    - Coastal salt-marsh species
    - With pseudolateral clusters of sessile spikelets subtended by an erect bract that appears to be a continuation of stem

Schoenoplectus etuberculatus (Steud.) Soják
Berrien Co., Georgia

Schoenoplectus etuberculatus (Steud.) Soják
Berrien Co., Georgia

Schoenoplectus pungens (Vahl) Palla

McIntosh Co., Georgia

Bolboschoenus – Tuberous Bulrushes

- Greek *bolbos,* bulb, and *schoinos,* rush, referring to enlarged, cormous stem bases
- Diagnostic characteristics
  - Cormous stem bases
  - Leafy stems
  - Large spikelets
  - Puberulent scales

Bolboschoenus robustus (Pursh) Soják

Cameron Co., Texas

Bolboschoenus robustus (Pursh) Soják
Cameron Co., Texas

Isolepis

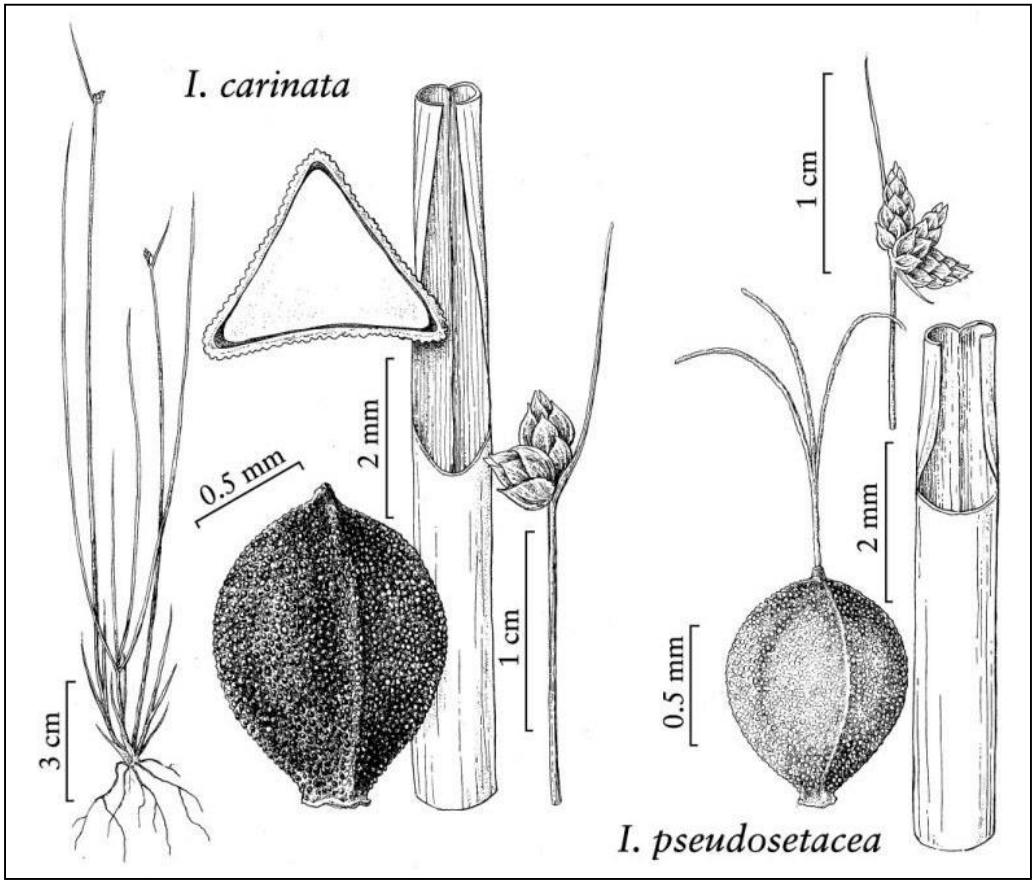
- From Greek, *isos,* equal, and *lepis,* scale, referring to the uniform floral scales
- Diagnostic characteristics
  - Low, cespitose habit
  - Basal leaves
  - Terminal or pseudolateral capitate or solitary inflorescences
- Recent molecular evidence indicates closer relationship with Cypereae

(1,4,10,18)

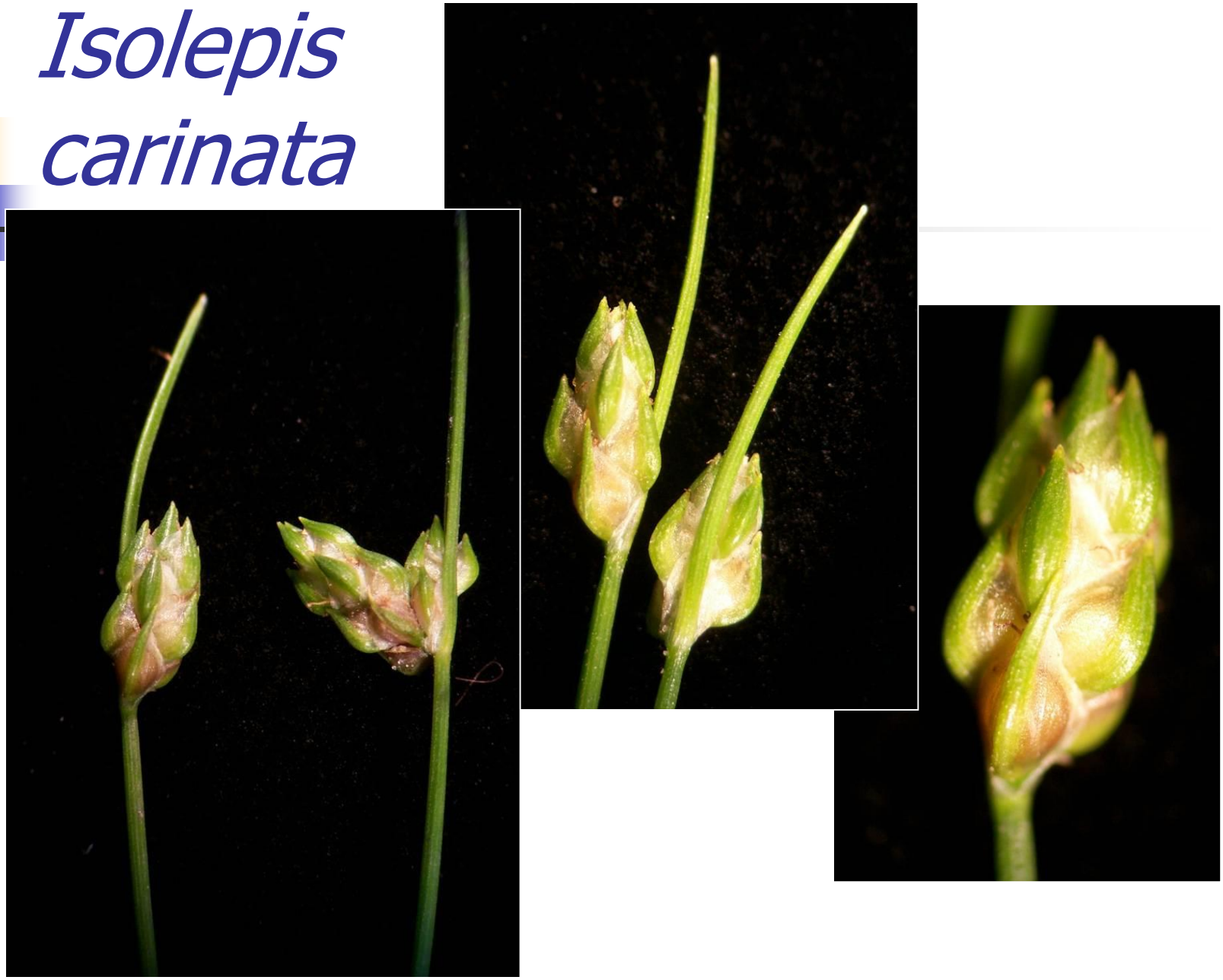
Isolepis

- 2 spp. SE United States, both annuals
  - *I. carinata* Hook. ex Arn. ex Torr. [=*Scirpus koilolepis* Steud.]
    - Native
    - Spring ephemeral of intermittently wet depressions of fields and open woods
  - *I. pseudosetacea* (Dav.) Gand. [=*Scirpus molestus* M.C. Johnst.]
    - Introduction
    - Similar habitat and phenology

Source of illustration: Ball, W, K Gandhi, RW Kiger, D Murray, JL Zarucchi, AA Reznicek and JL Strother. 2002. *Flora of North America*, vol. 23, Oxford University Press. New York.



Isolepis carinata



Oxycaryum

- From Greek, *oxys,* sharp, and *carya,* nut, referring to the sharp-pointed achene
- Monotypic genus – *Oxycaryum cubense* (Poepp. & Kunth) Lye [=*Scirpus cubensis* Poepp. & Kunth]
- Recent molecular evidence indicates closer relationship with Cypereae
- Diagnostic characteristics
  - Stoloniferous, floating aquatic
  - Terminal, umbellate or monocephalous inflorescence
  - Subtended by whorl of leafy bracts
    - Resembles *Cyperus* or *Kyllinga*
  - Spiral scales

(1,4,10,17,18)

Oxycaryum cubense
fo. *paraguayense* (Maury) Pedersen

monocephalous form

Achene with corky pericarp,
dispersed by water

Oxycaryum cubense (Poepp. & Kunth) Palla

Impounded bayswamp
Georgia, USA

- Broad, paleotropical & neotropical distribution
- Perennial, spreading locally by stolons, forming extensive floating mats in swamps & ponds
- Known from SE USA pre-1900 – TX, LA, s AL, FL
- Currently spreading in SE USA
  - 1996 – s GA
  - 2004 – Tennessee-Tombigbee River system in MS & AL

Lipocarpha

- Classification of *Lipocarpha* depends on how one interprets the various kinds of scales in the inflorescence and, thus, whether one views the inflorescence as a simple spikelet or a compound spike.
  - Simple spikelet – Scirpeae
  - Compound spike – Cypereae
- Recent molecular evidence supports classification in Cypereae
- Conundrum illustrates struggle inherent in two fundamental purposes of taxonomy to provide stable and ultimately useful means of identifying and naming plants and to construct classification schemes that reflect phylogenetic (evolutionary) relationships

(1,4,10,18)

Lipocarpha

- From Greek *leipo*, to fall, and *carpha*, chaff, referring to the deciduous inner scales of certain species
- *Lipocarpha maculata* (Michx.) Torr.
  - Resembles *Kyllinga* with its cespitose habit and terminal inflorescence of tightly clustered spikelets subtended by a whorl of leafy bracts
  - Distribution and habitat
    - Occasional to common in the coastal plain
    - Wet ditches, disturbed hydric soils of depressions in the flatwoods, and along the exposed margins of ponds

Lipocarpha maculata (Michx.) Torr.
Charlton Co., Georgia

The Umbrella-grass Sedge Group

- Diagnostic characteristics
  - Leaf blades or sheaths usually pubescent
  - Scales spiral, usually pubescent
  - Flowers perfect
  - Perianth differentiated into two series, 3 outer bristles and 3 inner paddle-like segments
  - Achene with stipitate base and peg-like apex
  - Tubercle absent

Fuirena – Umbrella-grasses

- Commemorating Georg Fuiren, Danish Botanist, 1581-1628
- 5 spp. in SE United States
  - *F. breviseta* (Cov.) Cov.
  - *F. longa* Chapm.
  - *F. pumila* (Torr.) Spreng.
  - *F. scirpoidea* Michx.
  - *F. squarrosa* Michx.
- Habitat – heliophytes of wetland habitats, including bogs, marshes, interdunal swales, ditches, margins of ponds, and wet depressions in savannas

Fuirena breviseta (Cov.) Cov.

Clinch Co., Georgia

The Fringe-sedge Group

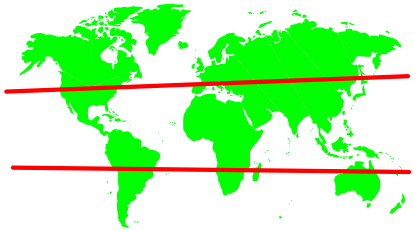
- Diagnostic characteristics
  - Leaves basal
  - Inflorescences terminal
  - Scales spiral
  - Flowers perfect
  - Perianth absent
  - Style-base distinct
  - Tubercle present (*Bulbostylis*) or absent (*Fimbristylis*)
- 3 genera
  - *Abildgaardia*
  - *Fimbristylis*
  - *Bulbostylis*

Fimbristylis – Fringe-sedges

- From Latin *fimbria*, fringed, and *stylus*, style
- Diagnostic characteristics
  - Tubercle absent
  - Fringed style with base clearly distinct from summit of achene
  - Branched, umbellate inflorescence of several to many spikelets
- Some widely distributed weeds introduced from Old World via rice agriculture
  - *F. annua* (All.) R. & S.
  - *F. dichotoma* (L.) Vahl
  - *F. miliacea* (L.) Vahl
  - *F. tomentosa* Vahl
- Species of conservation concern
  - *F. perpusilla* Harper
  - *F. brevivaginata* Kral

(10,20,21,22,23)

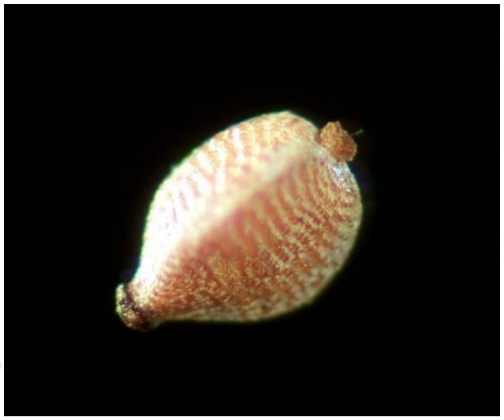
Introduced with rice agriculture
Fimbristylis miliacea (L.) Vahl



- Widely distributed in tropical & warm temperate regions of E & W Hemispheres
- Common weed of rice
- Probably indigenous to Asian rice belt
- Numerous small seed (10,13,20)

Fimbristylis autumnalis (L.) R. & S.
Bacon Co., Georgia

Bulbostylis (10,20)



- From Latin *bulbus*, bulbous, and *stylus*, style, referring to the enlarged bulbous style bases of many species
- Diagnostic characteristics
  - Swollen style base forming distinct tubercle on summit of achene
- Habitat
  - Seasonally moist to xeric sands
- *Bulbostylis barbata* (Rottb.) C. B. Clarke
  - Diminutive annual
  - Reddish-brown inflorescences
  - Open, disturbed sandy loam
  - Conspicuous en masse in the coastal plain during late summer and autumn
  - Widespread in E and W Hemispheres
- *Bulbostylis warei* (Torrey) C. B. Clarke
  - Cespitose perennial
  - Hemispherical, head-like clusters of spikelets
  - Distinctive inflorescence bracts with beautifully fringed basal sheaths
  - Endemic to Atlantic and Gulf coastal plains of SE United States
  - Inhabits open sands in longleaf pine-scrub oak communities

Bulbostylis barbata (Rottb.) Clarke

The Flat-sedge Group

- Diagnostic characteristics
  - Leaves basal
  - Leafy bracts subtending inflorescence
  - Inflorescence terminal, umbellate with pedunculate rays or capitate cluster of sessile spikes
  - Scales distichous
  - Flowers perfect
  - Perianth absent
  - Style base indistinct
  - Tubercle absent
- Largest, most taxonomically complex group

Cyperus – Flat-sedges or Umbrella Sedges

- From Greek *cyperus*, edge, referring to the sharp-edged leaves or perhaps the three-edged stems
- Diagnostic characteristics
  - Floral scales distichous (2-ranked)
  - Usually 2+ flowers or fruits per spikelet
  - Perianth absent
- Large complex genus – 550-700 spp.

(1,2,3,10)

Cyperus Classification of subgenera

- Basis of classification
  - Leaf anatomy and photosynthetic pathway
  - Number of carpels & style branches
  - Achene shape
  - Achene orientation
  - Mode of spikelet disarticulation & unit of dispersal
- Subgenera
  - Stigmas 3, achenes trigonous
    - *Anosporum (Nees) Clarke* [=*Pycnostachys* Clarke]
    - *Cyperus L.*
    - *Diclidium* (Schrad. Ex Nees) Clarke [=*Torulinium* (Desv. ex Ham.) Kük.]
  - Stigmas 2, achenes biconvex
    - *Pycreus* (Beauv.) Gray
    - *Juncellus* (Griseb.) Clarke

(24,25)

Achene shape

correlated with style branch number

- Trigonous: *Cyperus, Anosporum, Diclidium*

- Lenticular (biconvex): *Kyllinga, Pycreus, Juncellus*

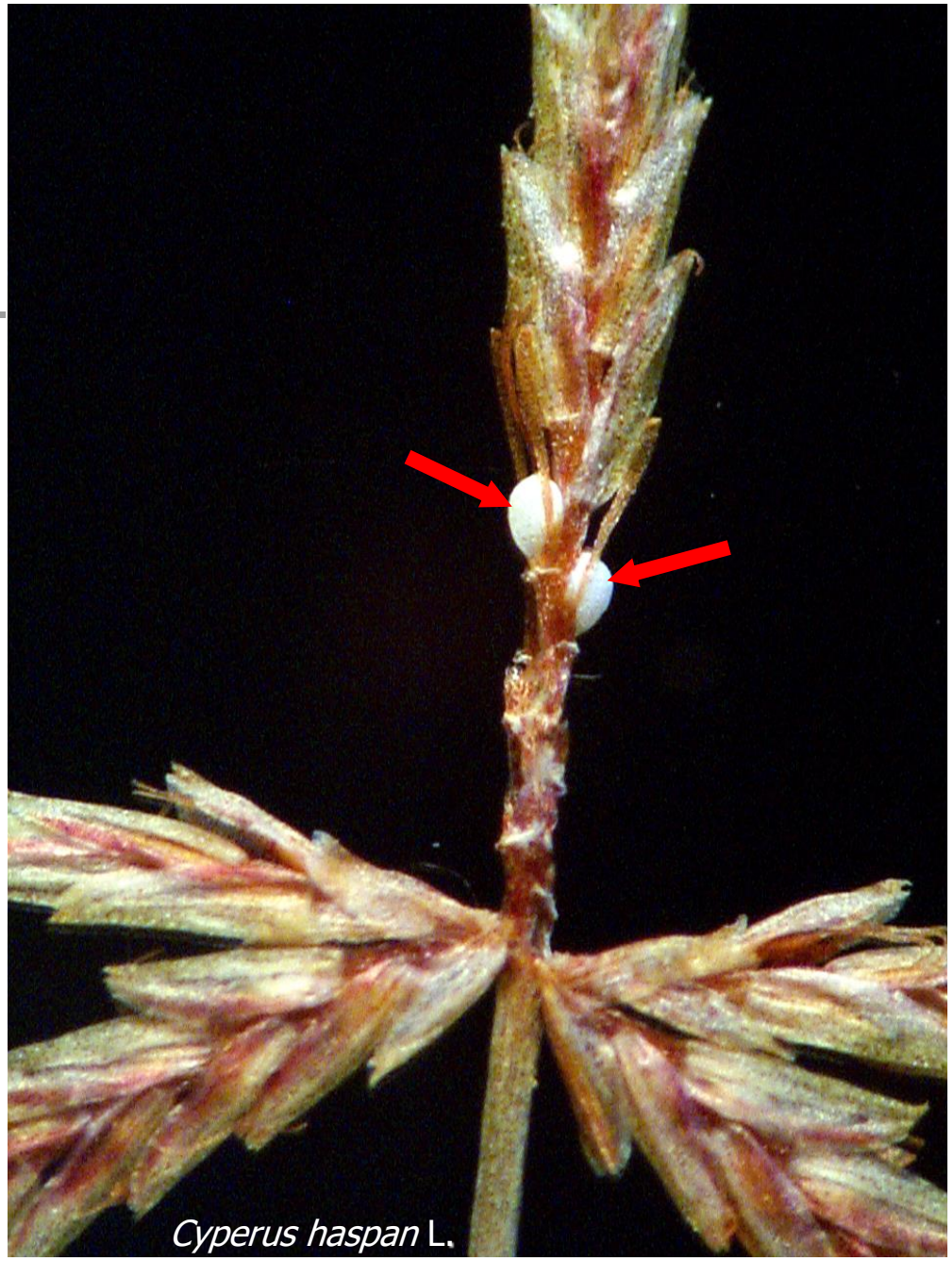
Achene orientation
lenticular achenes only

- Angle adjacent to rachilla: *Pycreus*

- Face adjacent to rachilla: *Juncellus*

Dispersal of individual achenes

Floral scales and achenes separate sequentially from base to apex of spikelet rachilla.



Dispersal of entire spikelet

Cyperus echinatus (L.) Wood


--Spikelet breaking transversely into 1-2 fruited segments
--Water dispersal by corky rachilla
Cyperus odoratus L.

Cyperus cuspidatus Kunth
Lanier Co., Georgia

Cyperus echinatus (L.) Wood

Lowndes Co., Georgia


Cyperus retrorsus Chapm.
Lowndes Co., Georgia

Cyperus nashii Britt. ex Small

Marion Co., Florida

Epizoic dispersal of spikelet with pungent terminal scale

Cyperus plukenetii Fern.

Subgenus *Diclidium*

Cyperus odoratus L.

McIntosh Co., Georgia

Subgenus *Anosporum*

Cyperus difformis L.

Copious production of small achenes, short generation time (13)

Cyperus papyrus L. cultivated in water garden

San Diego County,
California, USA


Cyperus involucratus Rottb.
cultivated in water garden
Lowndes County, Georgia, USA

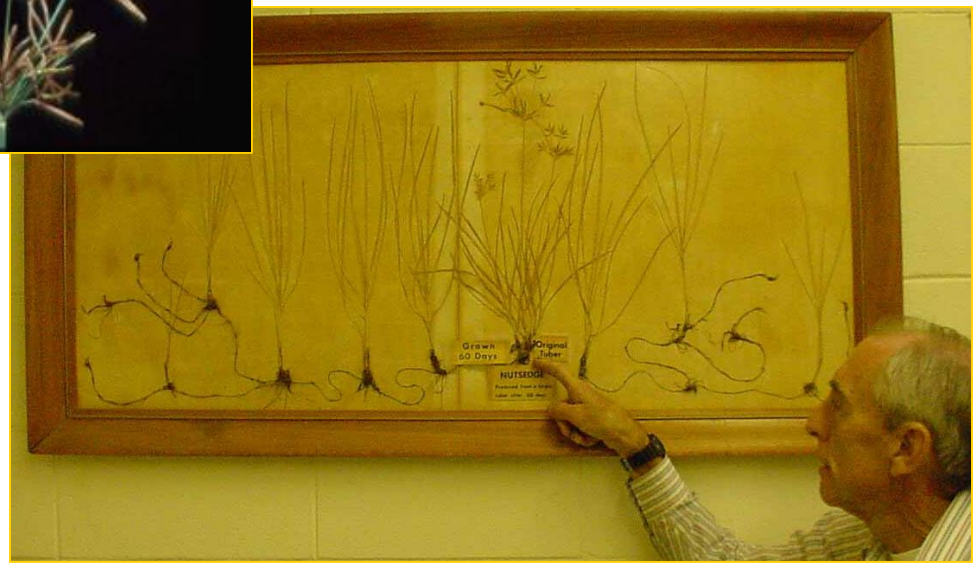
The world's worst weed!
Cyperus rotundus L.
purple nutsedge

Aggressive perennial weed of agricultural & urban areas

- Prolific production of rhizomes & tubers
- Seed rarely produced
- Rapid growth
- Allelopathy
- C_4 photosynthesis

(13)

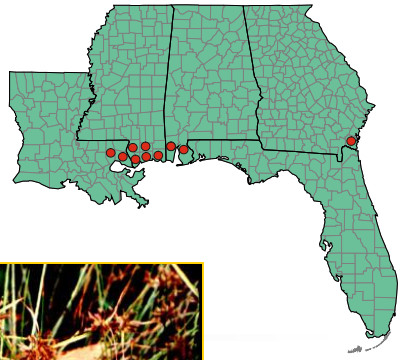
Purple nutsedge in cotton



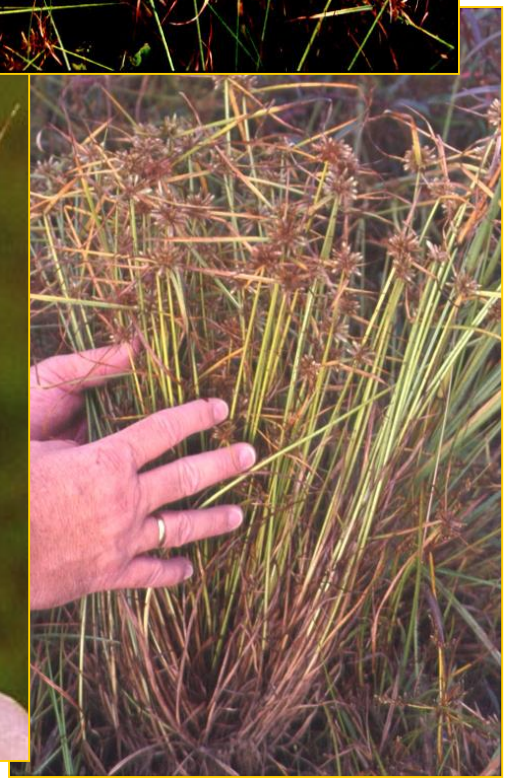
Purple nutsedge growth in 60 days – Dr. Wills

Photographs courtesy of Dr. C.T. Bryson, USDA-ARS

Subgenus *Pycreus*
Cyperus sanguinolentus Vahl

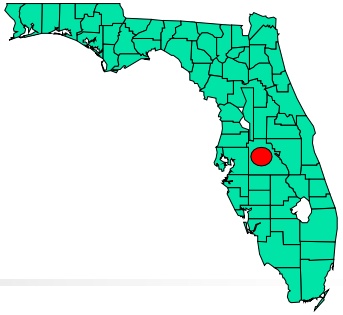


- Introduced from Asia – rice weed
- Currently, expanding its range in SEUS
- Habitat – disturbed sites, e.g., roadside ditches, margins of ponds
- Annual, small achenes
- Dispersed by highway maintenance equipment



Subgenus *Juncellus*

Cyperus alopecuroides Rottb.
recently naturalized in Florida



- Native – paleotropics
- Naturalized – West Indies & Florida, USA
- Perennial
- Numerous, small achenes
- Invasive tendencies, forming floating mats in reclamation wetlands
- Potential threat to natural wetlands & limesink ponds in Florida

Kyllinga – Green Sedges

- Name commemorating Peter Kylling, 17th century Danish botanist
- Diagnostic characteristics
  - Terminal, capitate inflorescence
  - 2-scaled, 1-fruited spikelets
  - Lenticular achenes
- *Kyllinga* closely related to and probably derived from *Cyperus*, and sometimes treated within *Cyperus* as a subgenus or section
- Five species in SE United States
  - *K. brevifolia* Rottb. – In US before 1821
  - *K. gracillima* Miq.
  - *K. odorata* Vahl – In US before 1836
  - *K. pumila* Michx. – In US before 1803, native?
  - *K. squamulata* Thonn. ex Vahl

(24,25,28,29,30,31)


Dispersal of entire spikelet
Kyllinga odorata Vahl
1 mm

Kyllinga odorata Vahl
Lowndes Co., Georgia

Kyllinga squamulata Thonn. ex Vahl
Lowndes Co., Georgia

The Three-Way Sedge Group

- Diagnostic characteristics
  - Stem terete
  - Leaves cauline
  - Upper leaves with well-developed lanceolate blades, conspicuously three-ranked
  - Inflorescences axillary
  - Scales distichous
  - Flowers perfect
  - Perianth of 6-9 bristles

Dulichium – Three-way Sedge

- Latin name for a kind of sedge
- Monotypic genus – *Dulichium arundinaceum* (L.) Britt.
- Combination of perianth bristles and distichous scales found elsewhere among sedges in SE United States only in *Eleocharis baldwinii* and *Websteria confervoides*
- Habitat – acidic soils of depressions along blackwater streams and shallows along ponds associated with such streams

(10,17)

Dulichium arundinaceum (L.) Britt.
Hamilton Co., Florida

The Beak-rush Sedge Group

- Diagnostic characteristics
  - Scales spiral
  - Flowers perfect
  - Perianth of few to many bristles or absent in sections *Dichromena* and *Psilocarya*
  - Stigmas 2 (-3)
  - Achene biconvex to subterete
  - Tubercle present

Rhynchospora – Beak-rushes

- From Greek *rhyncho*, snout or beak, and *spora*, seed, referring to the beaked achenes of many species
- Most beak-rushes inhabit hydric soils in bogs, wet savannas, margins of ponds, seeps, and depressions in flatwoods
  - *R. megalocarpa* Gray and *R. grayi* Kunth found in open, xeric, sandy pinelands or sandscrub
- Some, opportunistic colonizers of pastures, lawns, pond margins, and ditches, are treated as weeds
  - *R. caduca* Ell. recently naturalized, spreading rapidly in Hawaii
- Beak-rushes of conservation concern include
  - *R. crinipes* Gale – banks and bars of blackwater streams
  - *R. harveyi* var. *culixa* (Gale) Kral – ecotones between sandhills and bogs
  - *R. solitaria* Harper – hillside bogs
  - *R. thornei* Kral – margins of limesink ponds

(10,22,32,33)

Achene – tubercle – perianth

Rhynchospora inexpansa (Michx.) Vahl


Rhynchospora miliacea (Lam.) Gray
Cook Co., Georgia


Rhynchospora cephalantha Gray
Brooks Co., Georgia

Rhynchospora ciliaris (Michx.) Mohr
Charlton Co., Georgia

Rhynchospora macrostachya
Torr. ex Gray
Pierce Co., Georgia

Rhynchospora
Section *Dichromena*
Section *Psilocarya*

- Section *Dichromena* – conspicuous dichromatic white and green inflorescence bracts
  - *R. colorata* (L.) Pfeiff. – basic to circumneutral soils in seeps or swales
  - *R. latifolia* (Baldw.) Thomas – acidic soils of bogs and wet savannas
  - *R. floridensis* (Britt. ex Small) Pfeiff. – solution pits in limerock in S Florida
- Section *Psilocarya* – annuals lacking perianth bristles
  - *R. nitens* (Vahl) Gray
  - *R. scirpoides* (Torr.) Gray


Section *Dichromena*
Rhynchospora colorata (L.) Pfeiff.
Lanier Co., Georgia

Section *Psilocarya*

Rhynchospora nitens (Vahl) Gray

Baker Co., Florida

Schoenus – black sedge

- From Greek *schoinos*, rush-like plant
- Allied with *Rhynchospora*, usually placed in separate tribe Schoeneae
- Diagnostic characteristics
  - Inflorescence terminal to pseudolateral, capitate
  - Scales distichous, black
  - Perianth bristles usually 6, short, basally sub-plumose
  - Achene whitish
  - Tubercle absent
- Seasonally wet calcareous outcrops

(1,10)


Schoenus nigricans L. – black sedge
calcareous glade, Gadsden Co., Florida

Schoenus nigricans L. – black sedge
calcareous glade, Gadsden Co., Florida

The Sawgrass Sedge Group

- Diagnostic characteristics
  - Scales spiral
  - Flowers perfect
  - Perianth absent
  - Stigmas 3
  - Achene 1 per spikelet
  - Achene terete

Cladium – Sawgrass

- From Greek *clados*, branch, alluding to the branched inflorescence
- Only two species in SE United States
  - *C. jamaicense* Crantz
    - Inhabits brackish and freshwater marshes along the Georgia coast and occasionally inland
      - Dominant species of Everglades marshes of S Florida
    - Robust perennial
    - Graceful, delicate inflorescences
    - Lacerating foliage
  - *C. mariscoides* (Muhl.) Torrey

(10,17,25)

Cladium jamaicense Crantz
Franklin Co., Florida

Inflorescence of Sawgrass

The Nut-rush Sedge Group

- Diagnostic characteristics
  - Flowers imperfect
  - Spikelet generally with pistillate flowers below staminate and with several empty basal scales
  - Achenes whitish, bony
  - Hypogynium often present

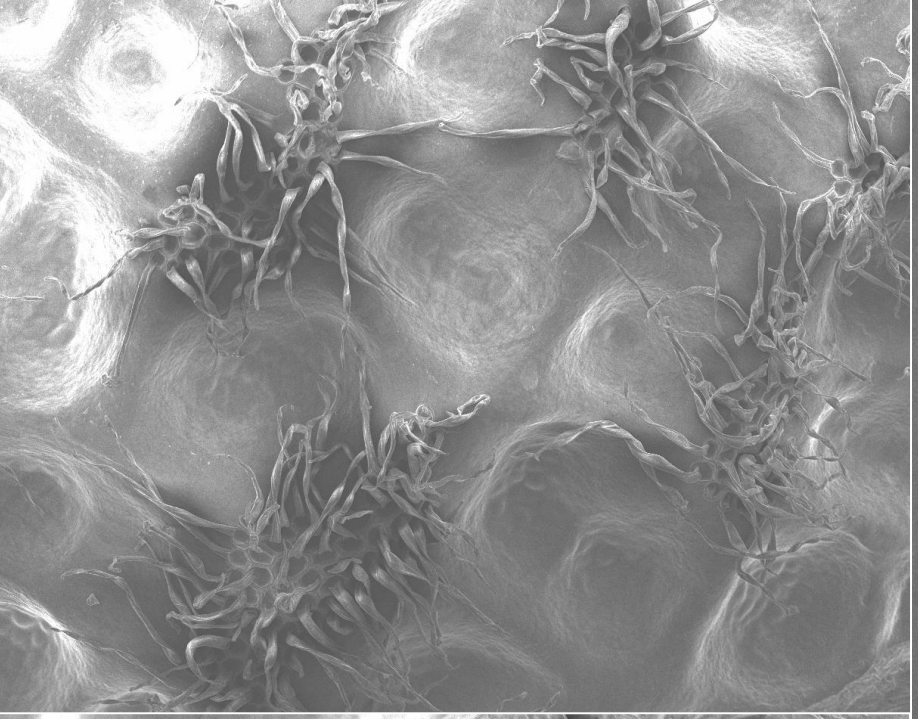
Scleria – Nut-rushes

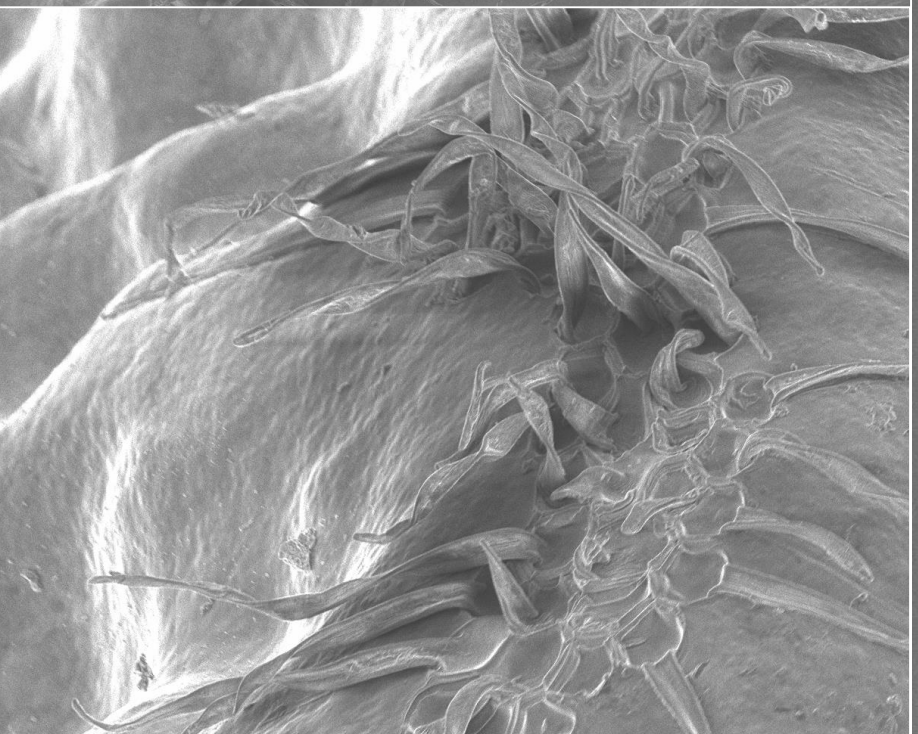
- From Greek *scleros*, hard, referring to the bony achene
- Flowers imperfect, plants monoecious
- Features of achene and hypogynium taxonomically useful
  - Whitish, bony surfaces of achenes smooth, pitted, reticulate or pubescent
  - Hypogynium (usually present) fused to base of achene – discoid, tuberculate, or lobed
- Habitat
  - Most species on fairly wet sites, e.g., open, moist, sandy or peaty soils of seepage slopes, bogs, depressions in flatwoods, and pond margins
  - *S. triglomerata* Michx. and *S. oligantha* Michx. more often on mesic to subxeric sites in shaded woods, open prairies, and pineland savannas
  - *S. ciliata* Michx. and *S. pauciflora* Muhl. ex Willd. both exhibit ample variation with several named varieties each and substantial ranges in habitat from dry to hydric sites

Scleria reticularis Michx.

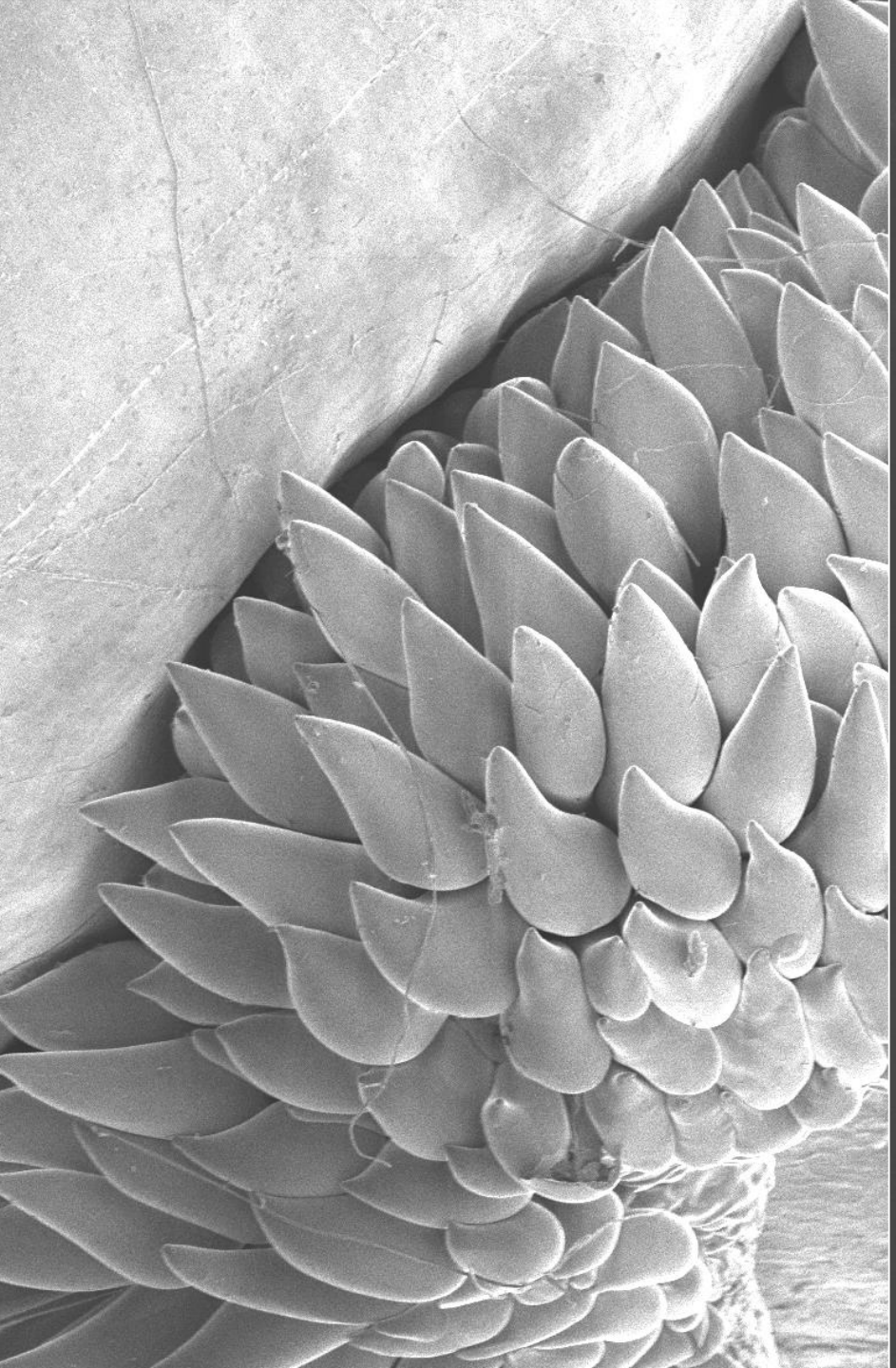
netted nut-rush

Three-lobed hypogynium and netted achene surface in *Scleria reticularis* Michx.

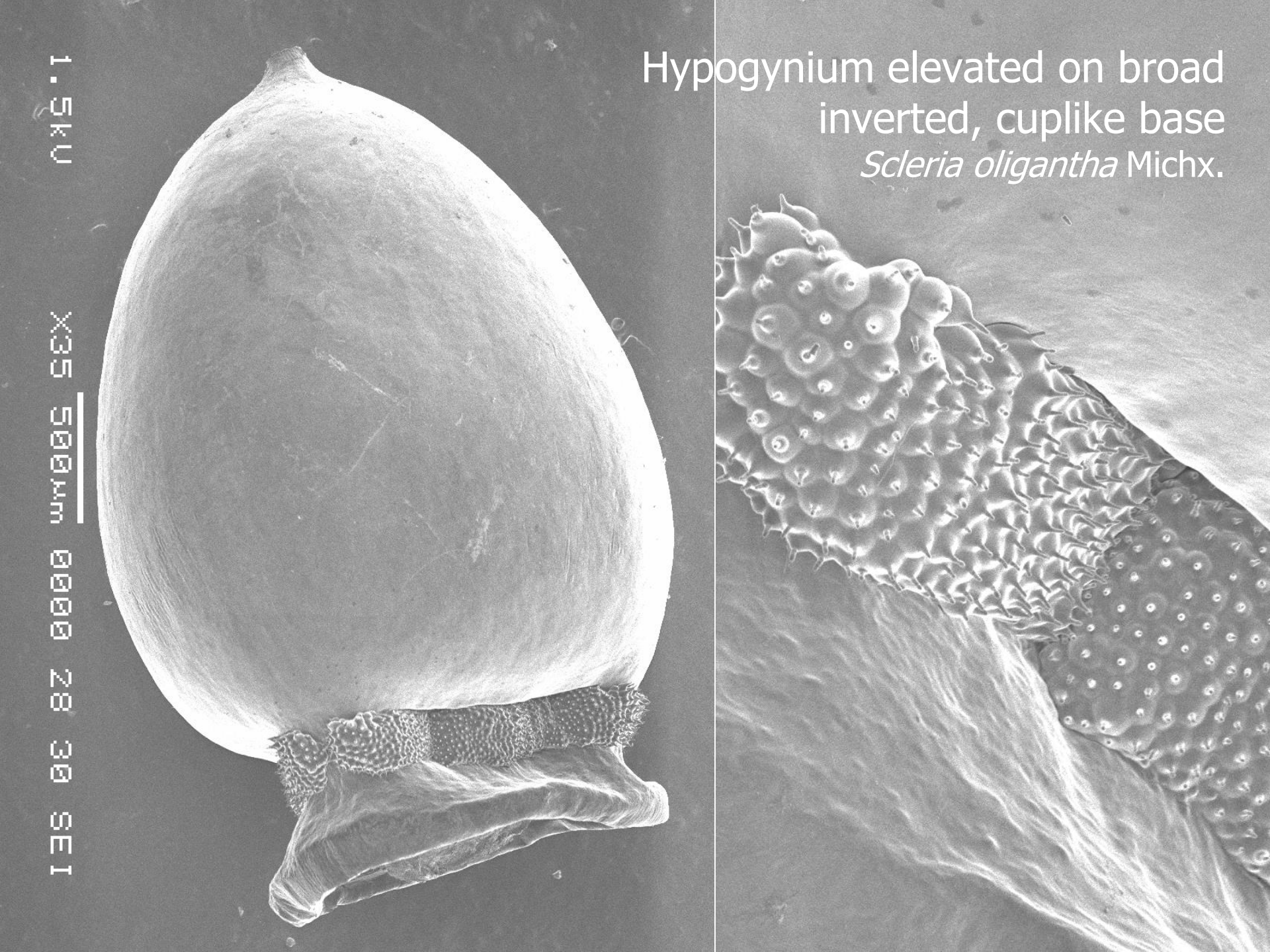




Scleria reticularis Michx.



Aculeate hypogynium
Scleria triglomerata Michx.



Hypogynium elevated on broad inverted, cuplike base

Scleria oligantha Michx.

Hypogynium absent

Scleria georgiana Core

The Caric Sedge Group

- Diagnostic characteristics
  - Flowers imperfect
  - Plants usually monoecious (dioecious in *Carex picta*)
  - Staminate (male) and pistillate (female) flowers often borne in separate inflorescences or one type above the other in the same inflorescence
  - Sac-like perigynium enclosing each pistillate flower and achene
- 2 genera in SE United States
  - *Carex*
  - *Cymophyllus* – monotypic

Carex

- From Greek *cairo*, to cut, referring to sharp edges of leaves in certain species
- Habitat, etc.
  - Mostly in mesic, woodland habitats of northern temperate zone
  - >2000 species
    - Largest genus of Cyperaceae
    - One of the largest genera of the world's flora

Flowers imperfect

Staminate & pistillate spikes separate

Carex glaucescens Ell.


Flowers imperfect
Staminate flowers below
pistillate in same spike
Carex sect. *Ovales*

Portion of pistillate spike showing perigynia and bracteoles

Carex striata Michx.

Perigynium

Pistillate spikelet with perigynium face cut away, exposing gynoecium within

--*Carex striata* Michx.

Carex lonchocarpa Willd. ex Spreng.
Lowndes Co., Georgia

Carex striata Michx.

Cypress-gum pond

Echols Co., Georgia

Carex tenax Chapm.
Turner Co., Georgia

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