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**A GUIDE AND KEY TO THE  
AQUATIC PLANTS OF THE  
SOUTHEASTERN UNITED STATES**

Reprint of Public Health Bulletin 286 (1944)

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A GUIDE AND KEY TO THE AQUATIC PLANTS OF  
THE SOUTHEASTERN UNITED STATES

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National Institute of Health*

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Prepared by direction of the Surgeon General



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## ACKNOWLEDGMENTS

Acknowledgement is due many who have kindly made determinations of material of different groups, and especially Mary Stipe Eyles, who impartially tested the keys both in the field and in the herbarium.

Fifteen figures in the key (No. 8, 11, 12, 15-19, 23, 25-28, 30, and 32 of Group A) have been borrowed from Coker and Totten, *Trees of the Southeastern States*. Sixty drawings (No. 2, 4, 10, 13, 14, 20-22, 24, and 34-36 of Group A; No. 4 and 6 of Group B; No. 18, 21, 23, 28, 32, 33, 35, and 36 of Group D; No. 11, 12, 14, 17, and 25-28 of Group E; No. 1, 2, 10, 21, 22, 27, 28, 33, 38, 39, 45, 46, 49, 54, 55, 57, 63, 64, 66, 68, 70, and 71 of Group F; No. 1-4 of the Alismaceae; No. 8 of the Gramineae; and No. 4, 6, 9, and 13 of the Cyperaceae) were borrowed from Britton and Brown, *Illustrated Flora of the Northern United States and Canada*, through the kindness of the trustees of the estate of Addison Brown. One figure (No. 1 of Group A) was borrowed from a Brooklyn Botanic Garden contribution of H. K. Svenson.

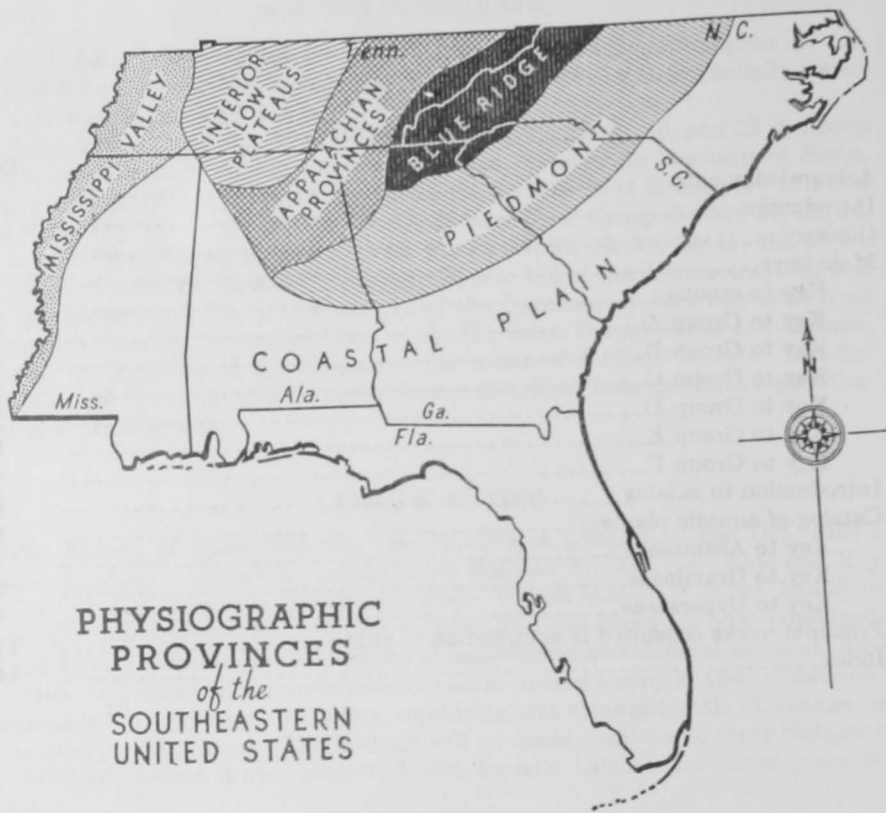
## REPRINT NOTICE

The Bureau of Sport Fisheries and Wildlife is grateful to the U.S. Public Health Service for permission to reprint its Bulletin No. 286, "A Guide and Key to the Aquatic Plants of the Southeastern United States." When issued in 1944, this publication was very well received and the supply is now exhausted. It has been available only in libraries of some State and Federal agencies, universities, and from private workers fortunate in having a copy in their possession. Because of its continued usefulness, reprinting was arranged without change or alteration to the original. The Bulletin will no doubt continue to serve biologists of the Southeastern States concerned with aquatic habitats for many years to come.



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**PHYSIOGRAPHIC PROVINCES**  
*of the*  
**SOUTHEASTERN UNITED STATES**

# A GUIDE AND KEY TO THE AQUATIC PLANTS OF THE SOUTHEASTERN UNITED STATES

## INTRODUCTION

The purpose of this compilation is to enable workers in the field, with little knowledge of botany, to identify at least generically those fresh water plants with which mosquito breeding is associated. It is hoped that the keys and short notes with their accompanying illustrations will obviate the use of the difficult and cumbersome manuals which are at present the principal source of knowledge concerning the Southeastern aquatic plants, and will enable the worker to make more accurate and adequate evaluations of the area in which he is working.

The area considered in this guide, which in the text is often referred to as "our territory" or "our range," includes the States of Tennessee, North and South Carolina, Mississippi, Alabama, Georgia, and Florida. States adjacent to these may be assumed to have similar aquatic floras, but the range was thus limited because the above States are those with which the authors are best acquainted. On the frontispiece map the primary physiographic regions of these States are shown in outline.

A difficulty in preparing a list of the kind presented here is determining which plants to include. The principal criterion used has been the possibility or likelihood of the plant's being associated with mosquito breeding. Even this breaks down, for in times of very high waters dry land plants like the common cocklebur may shelter larvae. Possibly some of these plants, purposely omitted from the list, should have been included, and undoubtedly there are unintentional omissions of plants that can be found associated with mosquito production; but it is believed that on the whole the situations met within the Southeastern States are covered.

## GLOSSARY

In as large measure as possible the authors have utilized in the keys parts of the aquatic plant most familiar to the general worker and have used terminology not requiring a great knowledge of plant morphology. But for the sake of exactness it was found necessary to use some of the precise botanical terms. All of these, and some of the better known designations, are included in the illustrated glossary below.

NOTE.—Work was done at the Office of Malaria Investigations, Memphis, Tenn.

The higher plants ordinarily are made up of roots, stems, leaves, and in proper season flowers or fruits. Each of these presents itself in the widest diversity of form and habit, and each is on occasion lacking in some species. In most cases vegetative characters have been used in the keys, as these characters are always present and are best understood by the non-botanist. In some instances, however, floral characters must be used to make clear separations in the keys.

The keys have been compiled from a variety of sources and have been tested in the field and from herbarium material. They are of the non-indented dichotomous type as this type is most economical in printing. In each case two alternatives are offered, one of which should fit best the plant in hand. The basis of the primary divisions of the key is the growth habit of the plant. This means of division is used because the habit of the plant has an important relationship to its importance as harborage for mosquito larvae. Divisions in the key are made in as great measure as possible on vegetative characters as the layman is usually unfamiliar with the anatomy of the floral organs. An illustrated glossary of both vegetative and floral characters opens the way to a fuller working knowledge of the keys.

Desirable tools are a hand lens of about 10 magnifications and a millimeter scale, as in some cases details which require magnification are used in separating the species, and in many cases comparative size is used. It is suggested that if in the process of using the key some character seems ambiguous, the plant be looked for in both divisions. If after keying and comparison with the illustrations there is still doubt as to the identity of the plant, it should be checked with the more adequate descriptions of the larger manuals.

Each genus of the main key is illustrated by a drawing of a representative plant. The majority of these have been prepared especially for this guide by Garnet W. Jex, United States Public Health Service, but a large number have been borrowed from several publications. The author-source of these borrowed figures has been acknowledged elsewhere.

The nomenclature used in this guide is conservative and follows the best present day usage. In many cases the scientific names differ from those used by Small in his *Manual of the Southeastern Flora*, and in most places these discrepancies have been noted in the text.

Roots are used in the keying in only a few instances. Stems are not widely used except in the primary divisions of the keys. Whether the stem is *woody* or *herbaceous* is of great importance but is usually obvious. The habit of the stem, whether erect or reclining, lax or rigid, is also important, as is the presence or absence of hairs or other appendages.

Leaves show great diversity in many characters. The shape is perhaps most important. The state of division of the leaf, whether

*compound* or *simple*, *dissected*, *lobed*, or otherwise, is of only slightly less importance. The manner of attachment, whether *alternate*, *opposite*, or *whorled*, is a commonly used point of separation, as is the character of the leaf margin, whether hairy, toothed, etc. Other characters also much used are the nature of the apex of the leaf, the manner of venation, and such sensory characters as color, odor, and feel. Relative size is, as stated before, often used. Leaves are used in the majority of the key separations, and it is of primary importance that the leaf terminology be learned.

Flowers are more diverse than other plant structures, and the layman is often dismayed by the complex terminology. Only the absolutely necessary terms are used in the keys of this guide. Typically a flower consists of a stalk (*pedicel* or *peduncle*) upon the summit of which are borne several concentric whorls or cycles of floral parts. The outermost whorl is the *calyx*, made up of the ordinarily green *sepals*. Next outermost is the *corolla*, made up of *petals* which usually give color to the plant. Unfortunately petals are often lacking, and if only one whorl of accessory flower parts is present, they are termed sepals, even though sometimes colored. Within the petals is one or more whorls of pollen-bearing *stamens*, and within these is the innermost whorl consisting of one or more *pistils* which ultimately give rise to the seed. Sometimes stamens and pistils are found only in separate flowers, but usually they occur together. The stamens and pistils are usually termed the essential flower parts in contrast to the accessory sepals and petals. Flowers are borne either alone or in clusters known as *inflorescences*. Several types of inflorescences are illustrated in the glossary, small circles representing individual flowers, and lines the stalks.

In using the key several floral characters are used, color and size being of much importance. The shape and number of parts is also important as is the type of inflorescence. Also used is the extent of union of parts as sepals and petals are often partially or wholly united.

Two families of plants merit special attention as regards terminology. These are the grasses, Gramineae, and the sedges, Cyperaceae. Both are important and difficult aquatic groups. Below (figures 1 and 2) are diagrams of the morphology of the two families. In recognizing grasses the *ligule* of the leaf is of great importance. This structure, present at the inner base of the leaf where it joins the *leaf-sheath*, varies in size and nature but may usually be detected. The arrangement of grass leaves in *two ranks* or rows up and down the stem is also of great importance. Sedges may be distinguished by the absence of a ligule and the *three-ranked* arrangement of the leaves.

The arrangement of the flowers in the two groups is similar in some respects and different in others. Both have the small flowers or *florets* grouped one to many in *spikelets*. In the grasses each spikelet

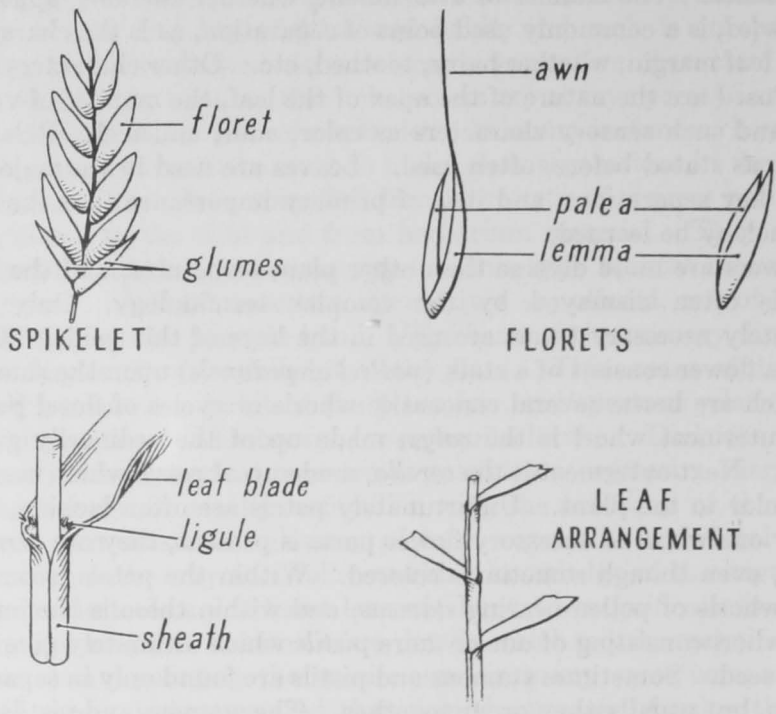


FIGURE 1.—A generalized diagram illustrating the morphology of grasses.

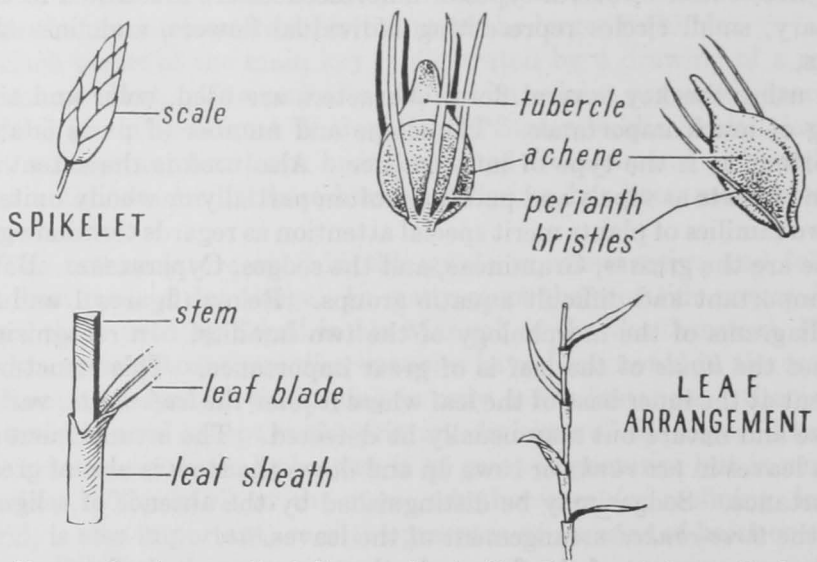


FIGURE 2.—A generalized diagram illustrating the morphology of sedges.

bears at the base two chaff-like empty *bracts* called the *glumes*, and each floret consists of two scales called the *lemma* and the *palea* with essential parts inclosed. In the sedges all of the scales or bracts are similar and are not designated by different terms. Important in identifying the sedges is the nature of the fruit or *achene*. The size, shape, presence or absence of a *tubercle* at the apex, the texture of the surface, and the nature of the *perianth-bristles* are used. Typical achenes are shown in the diagrams.

## GLOSSARY OF BOTANICAL TERMS

**ACHENE.**—A small, dry, hard, indehiscent fruit.

**ACUMINATE.**—Tapering at the end (fig. 3).

**ACUTE.**—Terminating with a sharp point (fig. 4).

**ADNATE.**—United with or adhering to.

**ALTERNATE.**—Usually pertains to leaves. Not opposite each other but borne singly at different levels on the stem (fig. 5).

**ANNUAL.**—A plant of only one year's duration.

**ANTHER.**—The pollen-bearing portion of a stamen (fig. 6).



FIGURE 3.



FIGURE 4.



FIGURE 5.

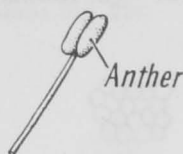


FIGURE 6.

**ARISTATE.**—Bearing an awn or bristle at the tip (fig. 7).

**ATTENUATE.**—Slenderly tapering; long drawn-out (fig. 8).

**AWN.**—A bristle-like appendage (fig. 7).

**AXIL.**—The angle formed by a leaf with the stem (fig. 9).

**AXILLARY.**—Borne in the axils of the leaves.

**BICONVEX.**—Lenticular (fig. 10).

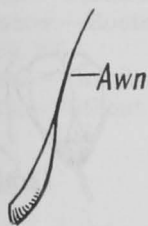


FIGURE 7.

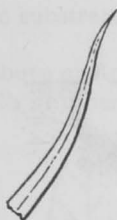


FIGURE 8.

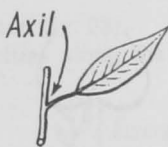


FIGURE 9.



FIGURE 10.



**BIDENTATE.**—Bearing two teeth at tip (fig. 11).

**BILATERAL.**—Having, or arranged upon, two corresponding sides.

**BLADE.**—The expanded portion of a leaf (fig. 12).

**BRACT.**—A modified leaf usually subtending a flower or flowers (fig. 13).

**BRACKET.**—A small bract.

**CALYX.**—The outermost circle of flower parts; made up of sepals (fig. 14).



FIGURE 11.

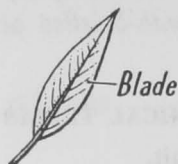


FIGURE 12.



FIGURE 13.



FIGURE 14

**CANCELLATE.**—With a cellular-like surface (fig. 15).

**CAPSULE.**—A dry dehiscent fruit composed of more than one carpel.

**CARPEL.**—A simple pistil or one of the parts of a compound pistil (fig. 16).

**CILATE.**—Fringed with hairs (fig. 17).

**CILIOLATE.**—Minutely ciliate.

**CLAW.**—The contracted stalk-like base of a petal (fig. 18).



FIGURE 15.

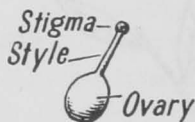


FIGURE 16.



FIGURE 17.



FIGURE 18.

**COMPOUND.**—Composed of two or more similar parts united to form one whole; for instance, a leaf (fig. 19).

**CORDATE.**—Heart-shaped with the tip upward (fig. 20).

**CORIACEOUS.**—With leathery texture.

**CORM.**—A hard, bulb-like base of a stem (fig. 21).

**COROLLA.**—The inner circle of flower parts: made up of petals which are often colored and showy (fig. 22)



FIGURE 19.



FIGURE 20.

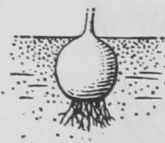


FIGURE 21.



FIGURE 22.



- COROLLA-TUBE.**—Tubular structure formed by united petals (fig. 23).  
**CORYMB.**—A type of flower cluster with a flat top (fig. 24).  
**CORYMBOSE.**—With a corymb-like inflorescence.  
**CROWN.**—In *Hymenocallis* a white membrane uniting the filaments. (See fig. 17 of Group E.)  
**CUNEATE.**—Wedge-shaped (fig. 25).  
**DECIDUOUS.**—Falling off.  
**DECUMBENT.**—Reclining but with the summit of the plant ascending.  
**DECURRENT.**—Extending or running down on another structure, as a leaf on a stem or a tubercle on an achene (fig. 26).



FIGURE 23.

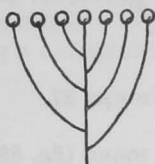


FIGURE 24.



FIGURE 25.



FIGURE 26.

- DELTOID.**—Shaped like an equilateral triangle or the Greek letter delta (fig. 27).  
**DICHOTOMOUS.**—Forking regularly by twos (fig. 28).  
**DISSECTED.**—Cut into numerous very fine segments or divisions (fig. 29).  
**DISTICHOUS.**—Coming off in two ranks (fig. 30).



FIGURE 27.



FIGURE 28.



FIGURE 29.



FIGURE 30.

- DIVARICATE.**—Diverging at a wide angle (fig. 31).  
**DORSAL.**—Surface of an organ away from the central axis of the plant.  
**ECHINATE.**—Prickly.  
**ELLIPTIC.**—Pertains to shape (fig. 32).  
**EMERGENT.**—Rooted to substratum; erect and extending upward out of water (fig. 33).  
**EMERSED.**—Standing above and out of water (fig. 33).  
**ENTIRE.**—Without teeth or other irregularities along the margin (fig. 32).



FIGURE 31.



FIGURE 32.

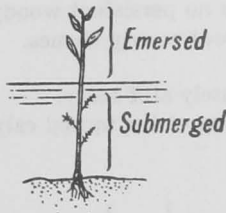


FIGURE 33.



FIGURE 34.

**EQUITANT.**—Pertaining to leaves; coming off in two ranks, making the base appear flattened (fig. 35).

**EROSE.**—Appearing as if gnawed (fig. 36).

**FASCICLE.**—A cluster or bundle (fig. 37).

**FILAMENT.**—The part of the stamen which supports the anther (fig. 38).



FIGURE 35.

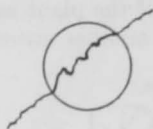


FIGURE 36.

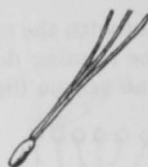


FIGURE 37.



FIGURE 38.

**FILIFORM.**—Like a thread; long, slender, and round (fig. 39).

**FLEXUOUS.**—Alternately bent or twisted in different directions (fig. 40).

**FLORET.**—A small flower of the grasses. (fig. 1).

**FOLIACEOUS.**—Leaf-like.

**FUSIFORM.**—Spindle-shaped (fig. 41).

**GIBBOUS.**—Swollen on one side (fig. 42).



FIGURE 39.



FIGURE 40.



FIGURE 41.



FIGURE 42.

**GLABROUS.**—Without hairs.

**GLAUOUS.**—Covered with a whitish or silvery bloom.

**GLOBOSE.**—Spherical (fig. 43).

**GLUME.**—A chaff-like bract at the base of a spikelet in the grasses (fig. 1).

**GRANULAR.**—Appearing as if covered by small grains; with a grainy texture.

**HASTATE.**—Like sagittate but with lobes diverging (fig. 44).

**HEAD.**—A dense cluster of sessile or almost sessile flowers borne on a very short axis (fig. 45).

**HERB.**—A plant with no persistent woody stem above the ground.

**HERBACEOUS.**—Without woody tissues.

**HISPID.**—Stiff-hairy.

**HISPIDULOUS.**—Minutely stiff-hairy.

**HYPANTHIUM.**—Portion of the united calyx investing the fruit (fig. 46).



FIGURE 43.

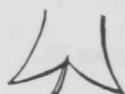


FIGURE 44.



FIGURE 45.



Hypanthium

FIGURE 46.

**HYPOGYNIUM.**—In *Scleria*, a structure underneath and supporting the ovary or fruit.

**IMBRICATE.**—Spirally overlapping (fig. 47).

**INCISED.**—Cut sharply, irregularly, and more or less deeply (fig. 48).

**INDEHISCENT.**—Remaining closed at maturity.

**INFLATED.**—Dilated or distended.

**INFLORESCENCE.**—The flowering part of a plant; a cluster of flowers.

**INVOLUCRE.**—A collection of bracts surrounding a flower cluster or head or sometimes a solitary flower.

**INVOLUTE.**—Rolled inwardly toward the midrib (fig. 49).

**IRREGULAR.**—Showing inequality in the arrangement of the floral parts; usually bilaterally symmetrical.

**KEELED.**—Possessing a central ridge as a boat (fig. 50).



FIGURE 47.

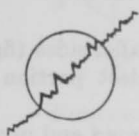


FIGURE 48.



FIGURE 49.



FIGURE 50.

**LACERATE.**—Irregularly cut as if torn (fig. 51).

**LAMELLIFORM.**—Plate-like.

**LANCEOLATE.**—Shaped like a spear-head, broadest near base, tapering to apex, and several times as long as broad (fig. 52).

**LEAFLET.**—One of the segments of a compound leaf (fig. 19).

**LEMMA.**—The lower of the two bracts enclosing each floret in the grasses (fig. 1).

**LENTICULAR.**—Lens-shaped, biconvex (fig. 10).

**LIGULE.**—A hairy or scarious projection at the point on the inner surface of a grass leaf where the sheath and blade meet (fig. 1).

**LINEAR.**—Long and narrow and with parallel sides (fig. 53).

**LOBED.**—With projection or divisions (fig. 54).

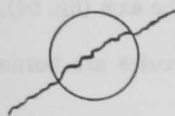


FIGURE 51.



FIGURE 52.



FIGURE 53

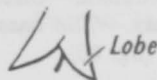


FIGURE 54.

LONGITUDINAL.—Along the long axis of a structure.

MEMBRANOUS.—With membrane-like texture.

MIDRIB.—Main rib of normal leaf running from base to apex (fig. 55).

MUCRONATE.—Ending in an abrupt, fine, slender tip (fig. 56).

NODES.—The places on the stems that normally bear leaves (fig. 57).

NODOSE.—Knotty or knobby.

OBLANCEOLATE.—Lanceolate in outline but with the broadest part toward the apex (fig. 58).



FIGURE 55.



FIGURE 56.

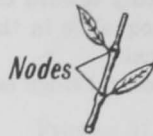


FIGURE 57.

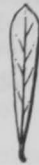


FIGURE 58.

OBLONG.—Longer than broad and with nearly parallel sides (fig. 59).

OBOVATE.—Ovate in outline but with the broadest portion toward the apex (fig. 60).

OBPYRAMIDAL.—Shaped like a pyramid with the broad end uppermost (fig. 61).

OBTUSE.—Blunt or rounded at the tip (fig. 62).



FIGURE 59.



FIGURE 60.



FIGURE 61.



FIGURE 62.

OCREA.—A tubular sheath present on the stem just above the base of the leaves of docks and smartweeds. It is formed of the fused stipules (fig. 63).

OCREOLAE.—Small ocrea-like structures on the rachis of the flower clusters in *Polygonum*.

OPPOSITE.—Coming off opposite each other at the same level on the axis (fig. 64).

ORBICULAR.—Circular or round (fig. 65).

OVARY.—The basal portion of the pistil in which the seeds or ovules are borne (fig. 66).



FIGURE 63.



FIGURE 64.

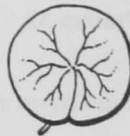


FIGURE 65.



FIGURE 66.

**OVATE.**—Having an outline like that of an egg, with the broadest part downward (fig. 67).

**OVOID.**—Egg-shaped; see ovate.

**PANICLE.**—An irregularly compound flower cluster with stalked flowers (fig. 68).

**PANICULATE.**—With a panicle-like inflorescence.

**PAPILLOSE.**—Bearing small pimple-like projections.

**PEDICEL.**—The stalk of a single flower (fig. 69).

**PEDUNCLE.**—The stalk which supports a flower cluster or a solitary flower.

**PELTATE.**—Petiole attached not at margin of leaf but in the middle of the lower surface (fig. 70).



FIGURE 67.

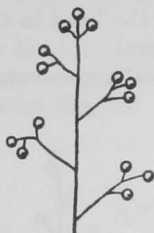


FIGURE 68.



FIGURE 69.



FIGURE 70.

**PERENNIAL.**—A plant of more than two years' duration.

**PERIANTH.**—The calyx and corolla taken together (fig. 71).

**PERIANTH-BRISTLES.**—Rudimentary perianth parts in sedges (fig. 2).

**PERIGYNIUM.**—The inflated sac which contains the ovary or fruit of *Carex*.

**PERSISTENT.**—Not falling off or away.

**PETAL.**—A member of the inner circle of flower parts; often colored and showy (fig. 72).

**PETIOLE.**—The stalk of a leaf (fig. 73).

**PISTIL.**—The seed-bearing part of a flower (fig. 74).



FIGURE 71.



FIGURE 72.



FIGURE 73.



FIGURE 74.

**PISTILLATE.**—With or pertaining to pistils.

**POLLEN.**—The usually yellow grains contained in the anther.

**PROCUMBENT.**—Lying or crawling along the ground.

**PROLIFEROUS.**—Producing off-shoots.

**PUBERULENT.**—With minute hairs.

**PUBESCENT.**—Covered with hairs, often short and downy (fig. 75).

**PUNCTATE.**—With small dots, which can often be seen only with a lens (fig. 76).

**RACEME.**—A flower cluster with the flowers stalked and coming off a common and more or less elongated axis (fig. 77).

**RACHILLA.**—A secondary inflorescence rachis.

**RACHIS.**—The axis of an inflorescence (fig. 77).

**RAY-FLOWERS.**—The flat marginal flowers of the head in the Compositae.

**RECURVED.**—Curved backwards or toward base.

**REGULAR.**—Pertaining to flowers; flowers radially symmetrical.

**RENIFORM.**—Kidney-shaped (fig. 78).



FIGURE 75.

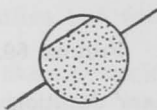


FIGURE 76.

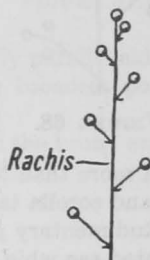


FIGURE 77.



FIGURE 78.

**RETICULATE.**—With a network-like surface (fig. 79).

**REVOLUTE.**—Appearing as if rolled back from the margins (fig. 80).

**RHIZOME.**—A prostrate or underground stem.

**ROSETTE.**—With the leaves clustered symmetrically around the base of the stem or scape (fig. 81).

**SAGITTATE.**—Like an arrowhead, with the lobes turned downward (fig. 82).



FIGURE 79.



FIGURE 80.

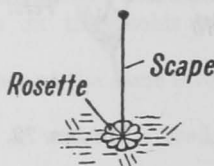


FIGURE 81.



FIGURE 82.

SCABROUS.—Rough.

SCAPE.—A naked peduncle rising from the ground (fig. 81).

SEPAL.—A member of the outermost circle of flower parts (fig. 83).

SEPTATE.—Possessing partitions or septa.

SEPTUM.—A partition (pl. septa).

SERRATE.—Toothed like a saw (fig. 84.)

SERRULATE.—Minutely sharp-toothed.

SESSILE.—Without a stalk of any kind. May refer to leaves, bracts, flowers, or flower clusters.

SETOSE.—Bristly.

SHRUB.—A woody plant smaller than a tree and often with several stems.

SIMPLE.—Not compound.

SINUS.—A cleft or recess between two lobes (fig. 85).

SPATHE.—Leaf-like structure more or less enclosing a fleshy inflorescence, particularly in the Araceae (fig. 86).



FIGURE 83.



FIGURE 84.

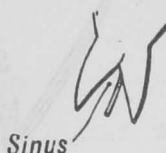


FIGURE 85.



FIGURE 86.

SPATULATE.—Pertains to shape (fig. 87).

SPIKE.—A flower cluster with the flowers sessile along a common more or less elongated axis (fig. 88).

SPIKELET.—A small or secondary spike as in the grasses and sedges (fig. 1 and 2).

SPINULOSE.—Minutely spiny.

SPUR.—A hollow sac-like or tubular extension of some part of a flower (fig. 89).

STAMEN.—The pollen-bearing organ of the flower (fig. 90).



FIGURE 87.



FIGURE 88.



FIGURE 89.



FIGURE 90.

STAMINATE.—With or pertaining to stamens.

STIGMA.—The sticky portion of the pistil, usually terminal, upon which the pollen is deposited (fig. 91).

STIPE.—A stalk.

STIPITATE.—Possessing a stipe.

STIPULE.—An appendage at the base of the petiole of a leaf; normally occurring in pairs (fig. 92).

STOLONIFEROUS.—Producing runners from the base.

STYLE.—The part of the pistil connecting the stigma and the ovary. Generally it is attenuated (fig. 91).

STYLE-APPENDAGES.—Petaloid wings on the styles of *Iris*.

SUBCORDATE.—Somewhat heart-shaped (fig. 93).

SUBGLOBOSE.—Almost spherical.

SUBTEND.—To come out below.

SUBULATE.—Shaped like an awl (fig. 94).



FIGURE 91.

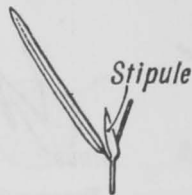


FIGURE 92.



FIGURE 93.



FIGURE 94.

TOMENTOSE.—Densely woolly.

TREE.—A large single-stemmed woody plant; has been defined as being over 6 meters tall and over 1 decimeter in diameter.

TRUNCATE.—Ending abruptly as if cut off (fig. 95).

TUBERCLE.—An enlarged, persistent style base often found on the summit of the fruits of sedges (fig. 96).

TURBINATE.—Top-shaped or conical with the broad end uppermost (fig. 97).

UMBEL.—A type of flat-topped flower cluster (fig. 98).



FIGURE 95.



FIGURE 96.



FIGURE 97.

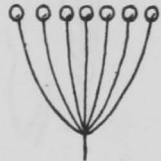


FIGURE 98.

UNDULATE.—With a wavy margin (fig. 99).

VILLOUS.—Possessing long soft hairs.

WHORL.—An arrangement of leaves or other parts in which they come off several at the same level around the stem (fig. 100).



FIGURE 99.



FIGURE 100.



## KEY TO GROUPS

- |                                                                                                                              |                 |
|------------------------------------------------------------------------------------------------------------------------------|-----------------|
| 1. Shrubs or trees.....                                                                                                      | Group A, p. 15. |
| 1. Vines or herbs.....                                                                                                       | 2.              |
| 2. Vines.....                                                                                                                | Group B, p. 24. |
| 2. Herbs.....                                                                                                                | 3.              |
| 3. Plants free-floating.....                                                                                                 | Group C, p. 25. |
| 3. Plants attached to substratum.....                                                                                        | 4.              |
| 4. Plants floating, submerged, or forming mats on<br>or just above the surface of the water.                                 | Group D, p. 28. |
| 4. Plants erect and emergent; rooted to the sub-<br>stratum and extending upward out of the<br>water.                        | 5.              |
| 5. Plants without leaves or with long narrow leaves at<br>least 12 times as long as broad and usually grass or<br>rush-like. | Group E, p. 38. |
| 5. Plants with shorter, broader leaves.....                                                                                  | Group F, p. 47. |

### KEY TO GROUP A

- |                                                                                                                     |                    |
|---------------------------------------------------------------------------------------------------------------------|--------------------|
| 1. Leaves very narrow, often needle-like.....                                                                       | 2.                 |
| 1. Leaves with expanded blades.....                                                                                 | 4.                 |
| 2. Shrub with yellow flowers (fig. 1).....                                                                          | Hypericum, p. 123. |
| 2. Cone-bearing trees.....                                                                                          | 3.                 |
| 3. Needles long and two to several in fascicles (fig. 2)---                                                         | Pinus, p. 68.      |
| 3. Needles shorter, arranged in two ranks along twig, or<br>sometimes appressed to twig; not in fascicles (fig. 3). | Taxodium, p. 68.   |



x 1/2

FIGURE 1.



x 2/5

FIGURE 2.



x 1/2

FIGURE 3.

- |                                                                                                                          |                           |
|--------------------------------------------------------------------------------------------------------------------------|---------------------------|
| 4. Leaves opposite.....                                                                                                  | 5.                        |
| 4. Leaves alternate or borne irregularly.....                                                                            | 13.                       |
| 5. Leaves simple.....                                                                                                    | 6.                        |
| 5. Leaves compound.....                                                                                                  | 11.                       |
| 6. Leaves lobed (fig. 4).....                                                                                            | <b>Acer, p. 122.</b>      |
| 6. Leaves not lobed.....                                                                                                 | 7.                        |
| 7. Shrubs, often very low; leaves with tiny semi transparent dots visible with hand-lens; flowers showy yellow (fig. 5). | <b>Hypericum, p. 123.</b> |
| 7. Shrubs or small trees; leaves without dots; flowers not showy yellow.                                                 | 8.                        |

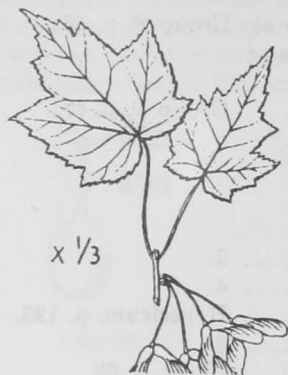


FIGURE 4.

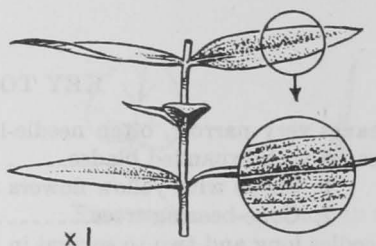


FIGURE 5.

- |                                                                                              |                            |
|----------------------------------------------------------------------------------------------|----------------------------|
| 8. Stems sturdy and erect, leaves elliptic to wider; flowers not showy purplish.             | 9.                         |
| 8. Stems weakly arching; leaves lanceolate; flowers showy purplish (fig. 6).                 | <b>Decodon, p. 125.</b>    |
| 9. Leaves remotely toothed, acuminate at apex; flowers appearing before the leaves (fig. 7). | <b>Forestiera, p. 133.</b> |
| 9. Leaves entire, acute but not acuminate; flowers appearing after leaves are on the plant.  | 10.                        |

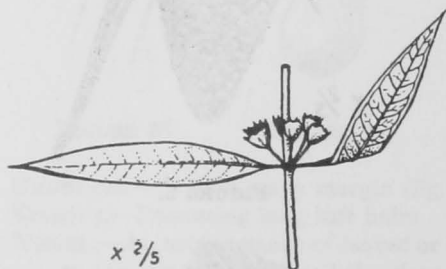


FIGURE 6.

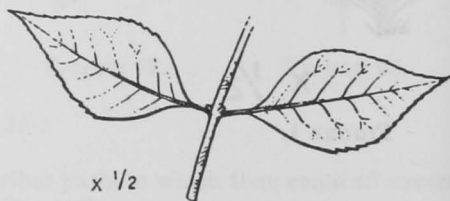


FIGURE 7.

10. Flower clusters conspicuous because of large, leaf-like, pink sepals **Pinckneya**, p. 138.  
 10. Flowers white in stalked globose clusters; fruits aggregated in spherical clusters (fig. 9). **Cephalanthus**, p. 138.



FIGURE 8.

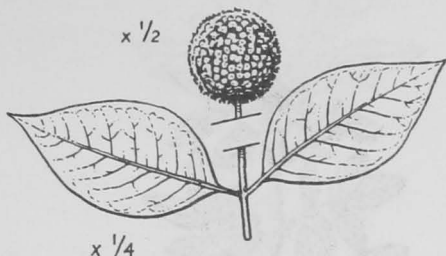


FIGURE 9.

11. Trees ----- 12.  
 11. Shrub (fig. 10) ----- **Sambucus**, p. 138.  
 12. Leaflets usually 3; very prominently toothed (fig. 11). **Acer**, p. 122.  
 12. Leaflets usually more than 3; not prominently toothed (fig. 12). **Fraxinus**, p. 133.



FIGURE 10.



FIGURE 11.

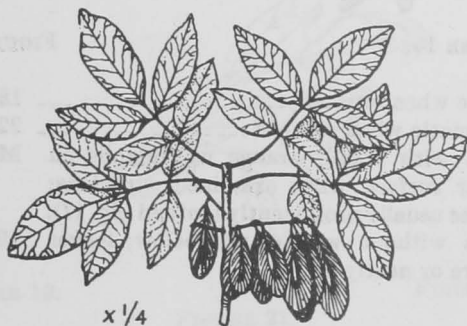


FIGURE 12.

- 13. Leaves simple..... 17.
- 13. Leaves compound..... 14.
- 14. Trees..... 16.
- 14. Shrubs..... 15.
- 15. Plant thorny; leaflets not over 9 usually 7 or 5 (fig 13) - **Rosa**, p. 119.
- 15. Plant not thorny; leaflets more than 11 (fig. 14)----- **Amorpha**, p. 120.



FIGURE 13.



FIGURE 14.

- 16. Leaflets many and small, usually 12-22; tree prominently thorny (fig. 15). **Gleditsia**, p. 120.
- 16. Leaflets fewer and large, usually 9; tree not thorny (fig. 16). **Carya**, p. 112.



FIGURE 15.



FIGURE 16.

- 17. Leaves aromatic when crushed..... 18.
- 17. Leaves not aromatic when crushed..... 22.
- 18. Leaves with small, orange wax glands on lower surface when examined with lens; leaves usually prominently toothed (fig. 17). **Myrica**, p. 112.
- 18. Leaves without wax glands below; leaves entire or nearly so. 19.

19. Leaves, at least the younger ones, densely hairy or wooly beneath (fig. 18). *Persea*, p. 124.  
 wooly beneath (fig. 18).  
 19. Leaves not wooly beneath, glabrous or nearly so..... 20.



FIGURE 17.

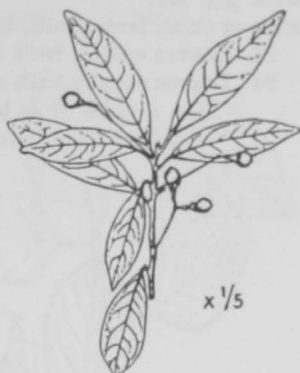


FIGURE 18.

20. Leaves silvery (glaucous) beneath (fig. 19)-- *Magnolia*, p. 119.  
 20. Leaves not silvery beneath----- 21.  
 21. Fruit oval, longer than broad; leaves mostly over 6 cm. long (fig. 20). *Benzoin*, p. 124.  
 21. Fruit globose, about as long as broad; leaves mostly less than 6 cm. long (fig. 21). *Glabraria*, p. 124.



FIGURE 19.



FIGURE 20.



FIGURE 21.

- 22. Leaves distinctly toothed..... 27.
- 22. Leaves entire or nearly so..... 23.
- 23. Trees with swollen bases; fruit a drupe, longer than wide (fig. 22). *Nyssa*, p. 130.
- 23. Shrubs or small trees; fruit, if not dry, globose..... 24.
- 24. Leaves entire; fruit dry..... 25.
- 24. Leaves usually with a few remote teeth above the middle or at least bristle-tipped; fruit a red or black berry (fig. 23). *Ilex*, p. 121.

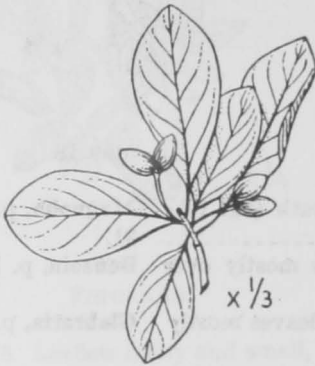


FIGURE 22.

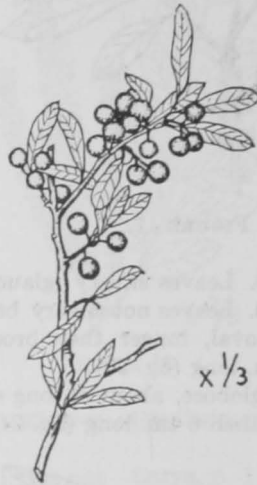


FIGURE 23.

- 25. Leaves leathery, broad, and with a conspicuous vein running just inside the margin (fig. 24). *Desmothamnus*, p. 132.
- 25. Leaves not leathery or broad, but oblong and with no intramarginal vein. 26.
- 26. Flower clusters lateral; fruit not winged (fig. 25). *Cyrilla*, p. 121.
- 26. Flower clusters terminal; fruit winged (fig. 26). *Cliftonia*, p. 121.



FIGURE 24.

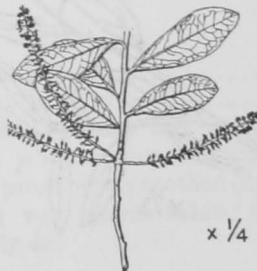


FIGURE 25.



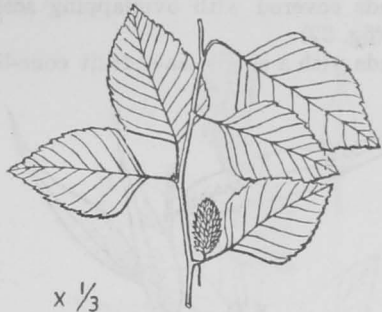
FIGURE 26.

27. Branches spiny; fruit apple-like (fig. 27)----- **Crataegus**, p. 120.  
 27. Branches not spiny; fruit not apple-like----- 28.  
     28. Bark falling away in reddish, papery layers **Betula**, p. 113.  
         (fig. 28).  
     28. Bark not falling away in papery layers----- 29.



x 1/3

FIGURE 27.



x 1/3

FIGURE 28.

29. Low, brittle shrub with wood lighter than cork; green **Stillingia**, p. 121.  
     parts with a milky sap (fig. 29).  
 29. Shrubs or trees, not brittle or lighter than cork; sap 30.  
     not milky.  
     30. Leaves leathery; evergreen; flowers showy, **Gordonia**, p. 124.  
         white, large (6 cm. across); tree (fig. 30).  
     30. Leaves not leathery or evergreen (except one 31.  
         species of low-shrubby *Leucothoë*); flowers  
         not individually large.



x 1/2

FIGURE 29.



x 1/5

FIGURE 30.

31. Small trees or shrubs; flowers not white or showy and appearing in early spring. 32.
31. Shrubs; flowers white in showy racemes, appearing usually in late spring or summer. 34.
32. Leaves over 4 times as long as broad (fig. 31) ... **Salix**, p. 112.
32. Leaves scarcely over 2 times as long as broad... 33.
33. Buds covered with overlapping scales; fruit warty (fig. 32). **Planera**, p. 113.
33. Buds with a single scale; fruit cone-like (fig. 33)----- **Alnus**, p. 113.

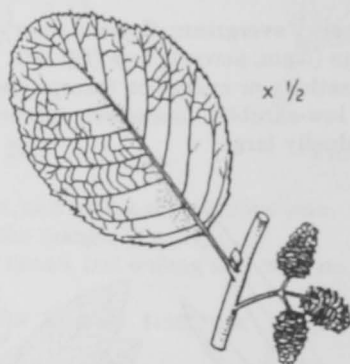


FIGURE 31.

FIGURE 33.

FIGURE 32.



34. Petals not united; anthers not awned..... 35.

34. Petals united to form tubular corolla; anthers with prominent awns at tip (fig. 34). *Leucothoë*, p. 132.

35. Sepals not pubescent or only slightly so; fruit a linear, 2-grooved capsule; leaves elliptic (fig. 35). *Itea*, p. 119.

35. Sepals copiously pubescent; fruit a subglobose, 3-valved capsule; leaves cuneate (fig. 36). *Clethra*, p. 132.



FIGURE 34.



FIGURE 35.



FIGURE 36.

KEY TO GROUP B

- 1. Leaves compound (fig. 1)----- **Ampelopsis**, p. 122.
- 1. Leaves simple----- 2.
- 2. Leaves with several veins running from base to apex; stems often thorny (fig. 2). **Smilax**, p. 109.
- 2. Leaves without several veins running from base to apex; stems not thorny. 3.



FIGURE 1.

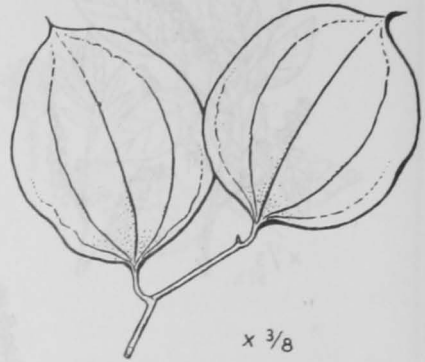


FIGURE 2.

- 3. Stems woody----- 4.
- 3. Stems herbaceous----- 5.
- 4. Leaves leathery, toothed only near apex (fig. 3). **Ampelothamnus**, p. 132.
- 4. Leaves not leathery, entire or with wavy edge **Berchemia**, p. 122. (fig. 4)

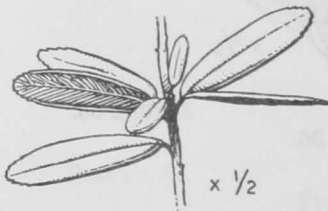


FIGURE 3.



FIGURE 4.

- 5. Leaves alternate, not prominently toothed, subcordate **Breweria**, p. 134. at the base (fig. 5).
- 5. Leaves opposite, with wavy margins or angularly toothed (fig. 6). **Mikania**, p. 139.

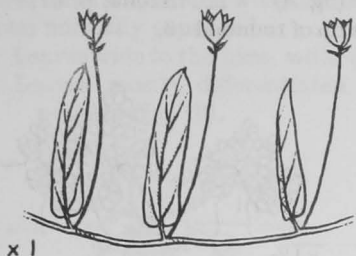


FIGURE 5.



FIGURE 6.

KEY TO GROUP C

- 1. Plants very small; seldom over a centimeter along any dimension. 2.
- 1. Plants large; usually measuring at least 0.5 decimeter along some dimension. 8.
- 2. Plant body dichotomously 2-lobed, or repeatedly dichotomously branched. 3.
- 2. Plant body not dichotomously branched and if 2-lobed not equally so. 4.
- 3. Divisions of plant body fine and many; plant body usually floating below surface (fig. 1). **Riccia**, p. 67.
- 3. Divisions of plant body coarse, 2-lobed; floating on surface (fig. 2). **Ricciocarpus**, p. 67.

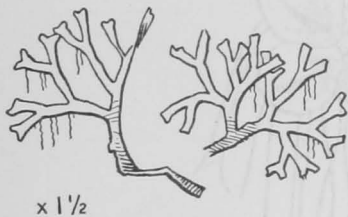


FIGURE 1.



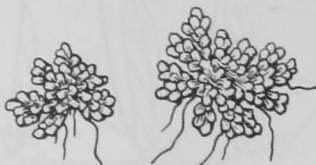
FIGURE 2.

4. Plants floating on surface..... 5.  
 4. Plants floating just below water surface; plant body made up of a clump of short filaments (fig. 3). **Wolffiella**, p. 103.  
 5. Plant body of small overlapping scales (fig. 4) --- **Azolla**, p. 67.  
 5. Plant body simple or compound, made up of rounded floating leaves. 6.



x 1/2

FIGURE 3.



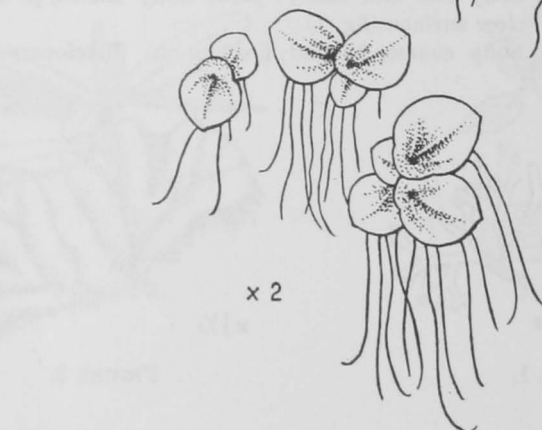
x 1/2

FIGURE 4.

6. Plants simple, extremely minute, appearing as grains on surface of water (fig. 5). **Wolffia**, p. 103.  
 6. Plants compound, made up of several rounded-oblong disk-like bodies, floating on surface of water. 7.  
 7. Plant body inconspicuously nerved, rootlets 1 per disk **Lemna**, p. 103. (fig. 6).  
 7. Plant body conspicuously nerved, rootlets 2 to several per disk (fig. 7). **Spirodela**, p. 104.



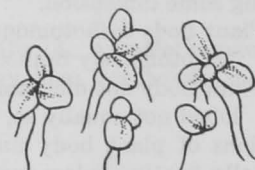
x 8



x 2

FIGURE 5.

FIGURE 7.



x 2 1/2

FIGURE 6.

- 8. Leaves broad and blade-like, sometimes inflated near base. 9.
- 8. Leaves (plant body in *Riccia*) narrow or finely divided. 11.
- 9. Leaves large and dilated with inflated petioles (fig. 8) - *Eichhornia*, p. 107.
- 9. Leaves normally expanded..... 10.
- 10. Leaves wide to the base, without petioles (fig. 9) - *Pistia*, p. 103.
- 10. Leaves mostly differentiated into blades and petioles (fig. 10). *Limnobium*, p. 76.

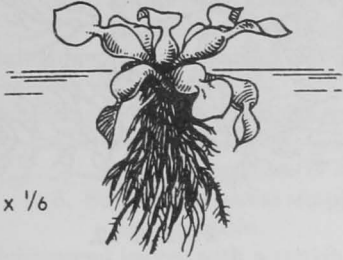


FIGURE 8.

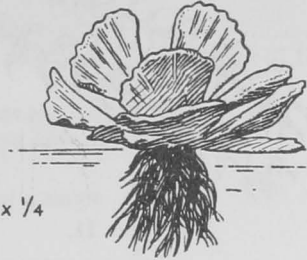


FIGURE 9.

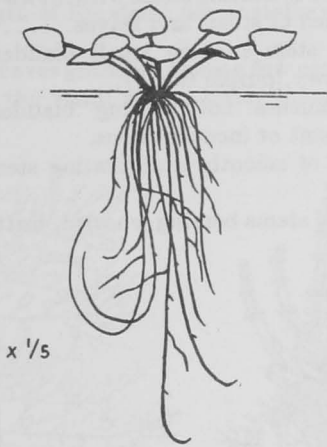


FIGURE 10.

- 11. Plant body repeatedly dichotomously branched (fig. 1) - **Riccia**, p. 67.
- 11. Leaves not dichotomously branched----- 12.
  - 12. Leaves entire not dissected or bearing bladders, and whorled (fig. 11). **Anacharis**, p. 75.
  - 12. Leaves dissected and bearing bladders (fig. 12) - **Utricularia**, p. 137.

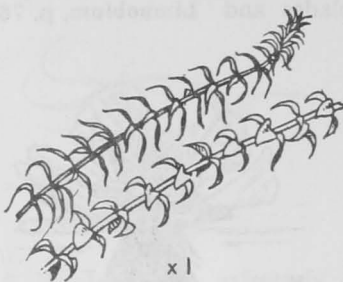


FIGURE 11.

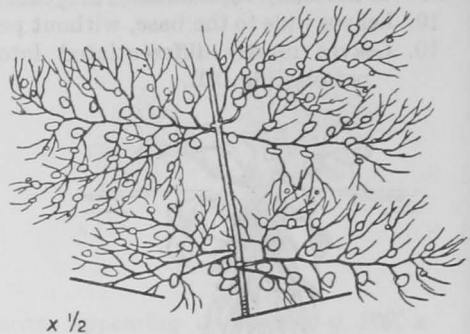


FIGURE 12.

KEY TO GROUP D

- 1. Vegetative body formed of floating stems without leaves. 2.
- 1. Vegetative body formed of stems and leaves----- 4.
  - 2. Branches of stem bearing small bladders; **Utricularia**, p. 137. flowers showy, purple (fig. 1).
  - [ 2. Stem or branches not bearing bladders; 3. flowers absent or inconspicuous.
- 3. Plant body made up of smooth, proliferating stems **Eleocharis**, p. 88. (fig. 2).
- 3. Plant body made up of stems bearing whorled, brittle branches (fig. 3). **Chara**, p. 67.

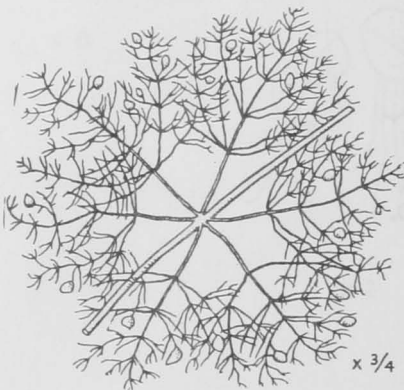


FIGURE 1.



FIGURE 2.

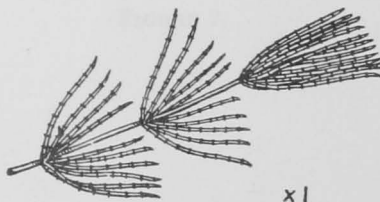


FIGURE 3.

4. Plants bearing linear, sometimes long and ribbon- or thread-like submerged leaves, or compound submerged leaves with narrow divisions; plants often entirely submerged, with or without floating or emerged leaves.

4. Plants not bearing submerged linear, ribbon- or thread-like leaves or narrowly segmented submerged leaves; plants often not entirely submerged; submerged leaves, if any, similar to the floating or emerged leaves. 26.

5. Submerged leaves bearing bladders; flowers irregular, showy yellow or purple (fig. 4). *Utricularia*, p. 137.

5. Submerged leaves not bladder bearing; flowers regular. 6.

6. Submerged leaves compound, made up of narrow segments or leaflets. 7.

6. Submerged leaves simple, made up of a single narrow blade. 13.

7. Submerged leaves with a central axis..... 8.

7. Submerged leaves irregularly forking ..... 11.

8. Submerged leaves scattered along almost the entire length of the stem; flower stalks not inflated. 9.

8. Submerged leaves gathered along a few centimeters of the stem; flower stalks inflated (fig. 5). *Hottonia*, p. 132.

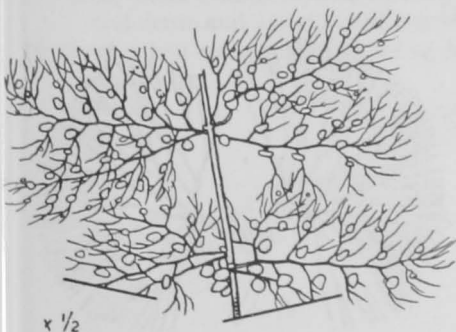


FIGURE 4.

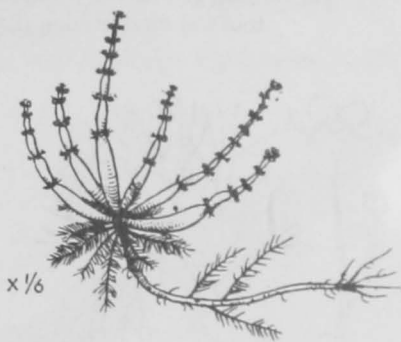


FIGURE 5.

9. Submerged leaves whorled, stems usually very lax **Myriophyllum**, p. 129.  
(fig. 6).
9. Submerged leaves scattered, stems not so lax..... 10.  
10. Submerged leaves with simple divisions **Proserpinaca**, p. 129.  
(fig. 7).
10. Submerged leaves with leaflets again divided **Neobeckia**, p. 119.  
(fig. 8).



FIGURE 6.

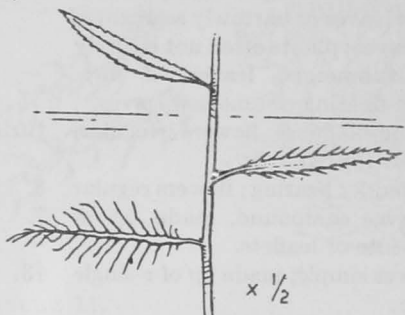


FIGURE 7.

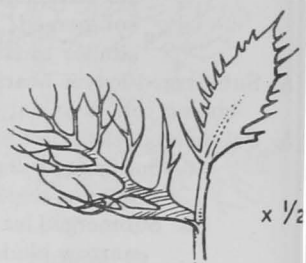


FIGURE 8.

11. Submerged leaves alternate or irregularly borne **Ranunculus**, p. 118.  
(fig. 9).
11. Submerged leaves borne opposite each other on stem or whorled. 12.  
12. Submerged leaves opposite; leaflets not toothed (fig. 10). **Cabomba**, p. 117.
12. Submerged leaves whorled; leaflets minutely toothed on one edge (fig. 11). **Ceratophyllum**, p. 116.

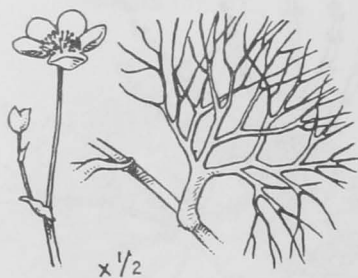


FIGURE 9.

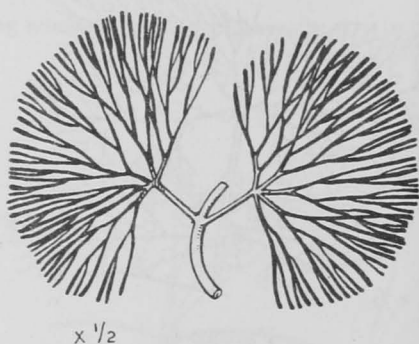


FIGURE 10.

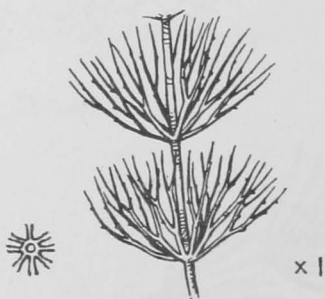


FIGURE 11.



13. Submerged leaves long and ribbon-like, at least 3 mm. wide. 14.  
 13. Submerged leaves not ribbon-like; often thread-like but if wider than 3 mm., less than 2.5 cm. long. 17.  
 14. Leaves all borne from one point..... 16.  
 14. Leaves scattered along the stem..... 15.  
 15. Leaves without midribs evident when examined against transmitted light; flowers yellow (fig. 12). **Heteranthera**, p. 106.  
 15. Leaves with midribs evident when examined against light; flowers inconspicuous, not yellow (fig. 13). **Potamogeton**, p. 69.

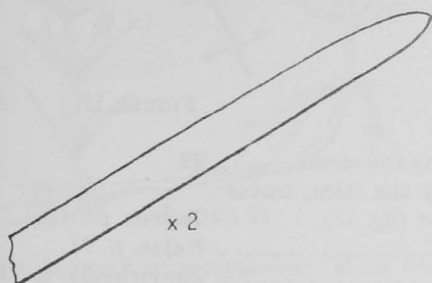


FIGURE 12.

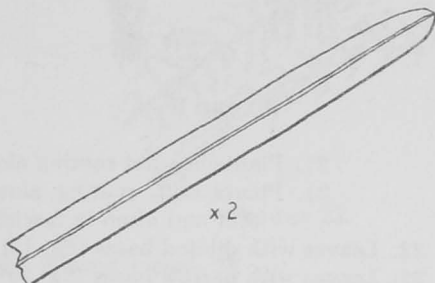


FIGURE 13.

16. Leaf, when examined with hand lends, showing a central dense and a peripheral less dense zone (fig. 14). **Vallisneria**, p. 75.  
 16. Leaf, when examined with hand lends, not showing zones (fig. 15). **Alismaceae**, p. 72.

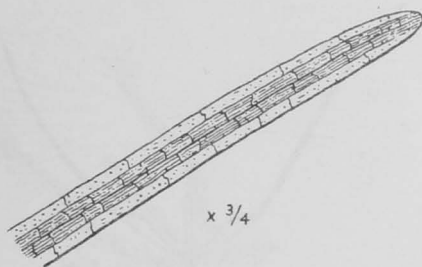


FIGURE 14.

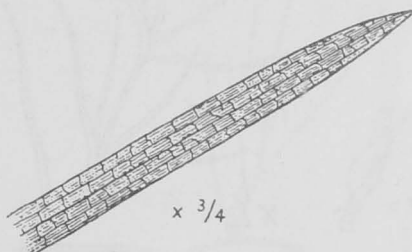


FIGURE 15.

17. Leaves all from a hardened base or from a single point; base of leaves with spore-sacs (fig. 16). **Isoetes**, p. 68.  
 17. Leaves borne along stem..... 18.  
 18. Leaves opposite or whorled..... 19.  
 18. Leaves alternate or singly borne or crowded..... 24.  
 19. Leaves opposite, but sometimes appearing whorled because of fascicles of leaves in the axils of the opposite leaves. 20.  
 19. Leaves whorled..... 23.

20. All leaves long and narrow..... 21.  
 20. Upper leaves shorter and broader (fig. 17)..... **Callitriche**, p. 121.

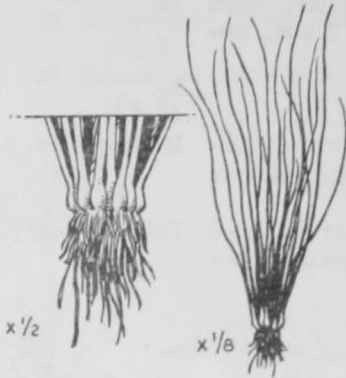


FIGURE 16.

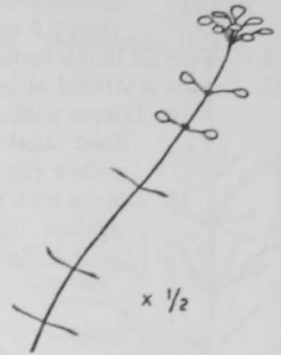


FIGURE 17.

21. Plants lax, not rooting along the stem..... 22.  
 21. Plants stiff, rooting along the stem; leaves stiff and often in fascicles (fig. 18). **Juncus**, p. 107.  
 22. Leaves with dilated bases (fig. 19)..... **Najas**, p. 71.  
 22. Leaves with narrow bases (fig. 20)..... **Zannichellia**, p. 71.



FIGURE 18.

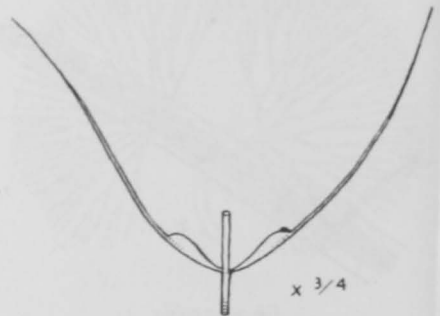


FIGURE 19.



FIGURE 20.

23. Leaves 4-6 in whorls, blades very narrow; **Sclerolepis**, p. 139.  
 flowers conspicuous, purple (fig. 21)
23. Leaves usually 3 in whorls (sometimes 4); **Anacharis**, p. 75.  
 flowers minute and inconspicuous (fig. 22).

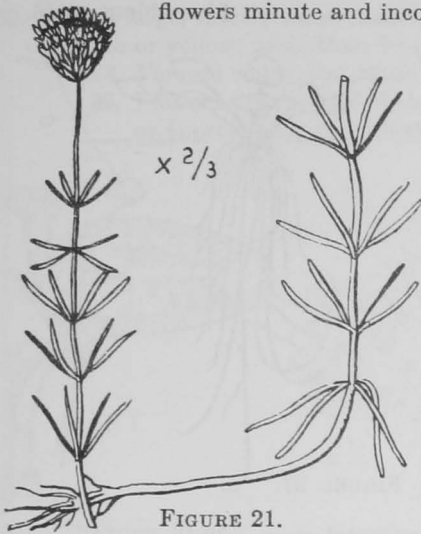


FIGURE 21.

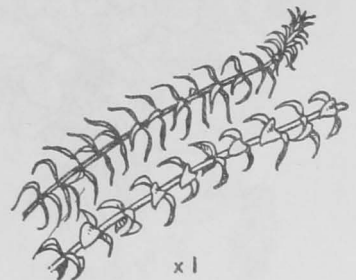


FIGURE 22.

24. Leaves borne separately along stem; flowers inconspicuous.
24. Leaves crowded on stem; flowers 3-petaled, pink and fairly conspicuous (fig. 23). **Mayaca**, p. 104.
25. Leaf-base apparently inflated (fig. 24)----- **Ruppia**, p. 71.
25. Leaf-base narrow, sometimes with stipules (fig. 25). **Potamogeton**, p. 69.

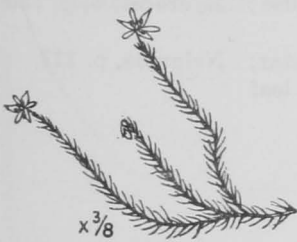


FIGURE 23.

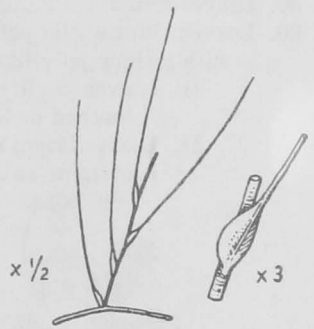


FIGURE 24.



FIGURE 25.

- 26. Leaves in rosettes which float on the surface of the water. 27.
- 26. Leaves not in rosettes floating on the surface of the water. 28.
- 27. Petioles of leaves greatly inflated (fig. 26) --- **Eichhornia**, p. 107.
- 27. Petioles not inflated (fig. 27)----- **Limnobium**, p. 76.

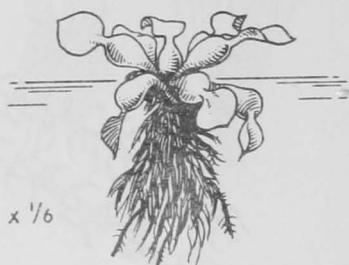


FIGURE 26.

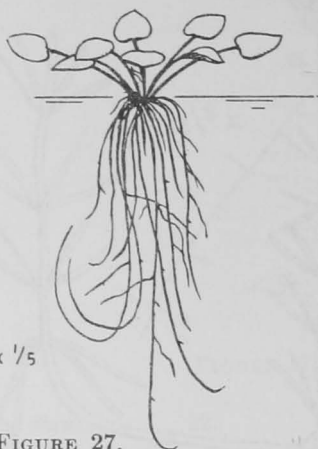


FIGURE 27.

- 28. Leaves arising from points along a horizontal stem, this stem being either buried under the substratum or lying procumbent along it. 29.
- 28. Leaves from lax stems which float in the water with the leaves. 34.
- 29. Leaves peltate----- 30.
- 29. Leaves not peltate----- 32.
- 30. Leaves round----- 31.
- 30. Leaves elliptic, the petiole and under surface coated with a thick jelly-like material (fig. 28). **Brasenia**, p. 117.
- 31. Leaves small, about 8 cm. in diameter or less; toothed or lobed (fig. 29). **Hydrocotyle**, p. 130.
- 31. Leaves large; more than 20 cm. in diameter; margins entire and impossible to wet leaf (fig. 30). **Nelumbo**, p. 117.

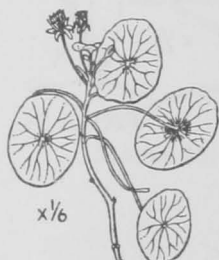


FIGURE 28.

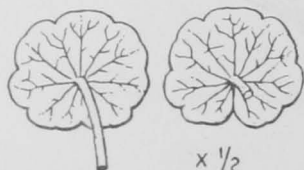


FIGURE 29.

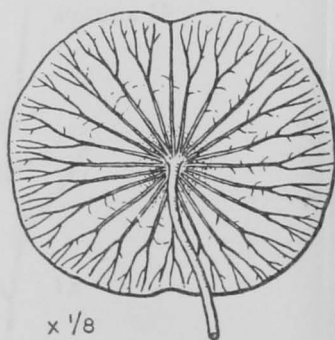


FIGURE 30.

32. Leaves small, mostly less than 15 cm. long, heart-shaped; flowers white and less than 2.5 cm. across (fig. 31). **Nymphoides**, p. 134.
32. Leaves large, mostly more than 15 cm. long; flowers white or yellow, more than 5 cm. across. 33.
33. Flowers white; leaf-blade round (fig. 32)----- **Nymphaea**, p. 117.
33. Flowers yellow; leaf-blade longer than wide, or approaching an orbicular shape (fig. 33). **Nuphar**, p. 116.

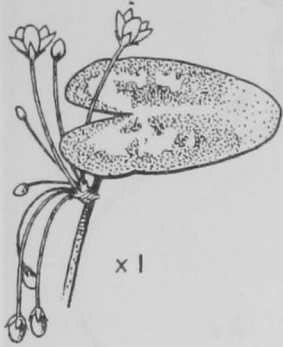


FIGURE 31.



FIGURE 32.

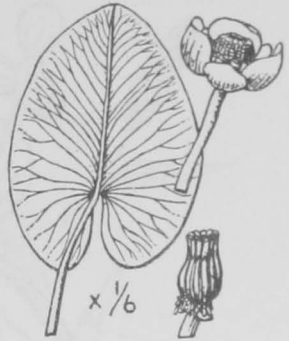


FIGURE 33.

34. Leaves round, often peltate; the long petiole attached near center of leaf (fig. 34). **Hydrocotyle**, p. 130.
34. Leaves usually longer than broad; petiole, if present, not attached at center of leaf. 35.
35. Leaves broadened and often clasping at the base. 36.
35. Leaves narrowed at the base----- 38.
36. Plants aromatic when crushed; flowers blue (fig. 35)--- **Hydrotrida**, p. 135.
36. Plants not aromatic when crushed; flowers white----- 37.

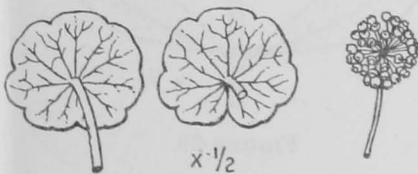


FIGURE 34.



FIGURE 35.

37. Stem finely pubescent; flowers 3–4 mm. long **Herpestris**, p. 135.  
(fig. 36).

37. Stem not finely pubescent; flowers not more than 1.5 mm. long (fig. 37).  
**Micranthemum**, p. 136.

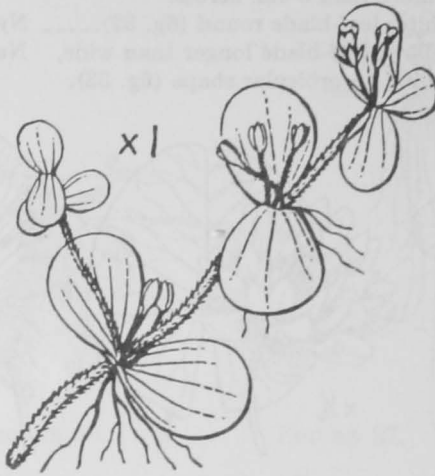


FIGURE 36.

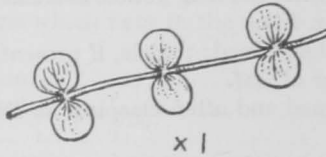


FIGURE 37.

38. Leaves opposite..... 39.

38. Leaves alternate..... 40.

39. Flowers solitary in the axils of the leaves; leaves less than 3.5 cm. long (fig. 38). **Ludwigia**, p. 126.

39. Flowers in stalked head-like spikes; leaves over 3.5 cm. long (fig. 39). **Alternanthera**, p. 115.

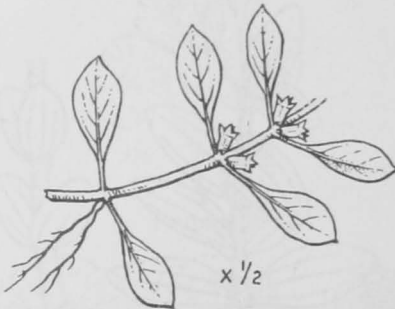


FIGURE 38.

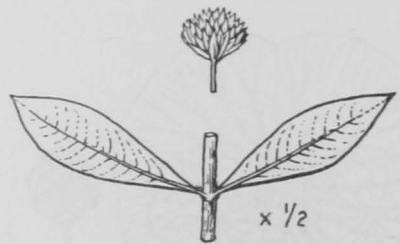


FIGURE 39.

40. Leaves grass-like, continued as a sheath below base of blade (fig. 40). **Hydrochloa**, p. 82.
40. Leaves not grass-like and not continued as a sheath below the base of the blade. 41.
41. Stems with a sheath (ocreae) just above attachment point of leaf; flowers individually small, white to pink (fig. 41) **Polygonum**, p. 114.
41. Stems with no sheaths ----- 42.

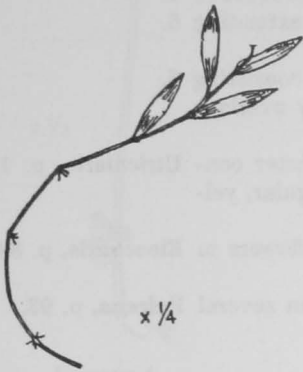


FIGURE 40.



FIGURE 41.

42. Flowers large, showy yellow; fruit a 4-angled capsule **Jussiaea**, p. 128. (fig. 42).
42. Flowers small, inconspicuous; fruit a 3-angled nutlet **Proserpinaca**, p. 129. (fig. 7).



FIGURE 42.

## KEY TO GROUP E

1. Plants without leaves, consisting only of naked stems, 2. sometimes with bladeless leaf sheaths, often bearing a flower cluster at or near top.
1. Plants bearing leaves..... 12.
  2. Plants surmounted by a flower or fruit cluster. 3.
  2. Plants without flowers..... 7.
3. Flower cluster terminal..... 4.
3. Flower cluster appearing lateral with stem extending beyond. 6.
  4. Leaf-sheaths present; flower cluster consisting of groups of flowers concealed by overlapping scales. 5.
  4. No leaf-sheaths present; flower cluster consisting of 1 to several showy, irregular, yellow, or purple blossoms (fig. 1). *Utricularia*, p. 137.
5. Leaf-sheaths present only at base of stem; flowers in one group (fig. 2). *Eleocharis*, p. 88.
5. Leaf-sheaths scattered along stem; flowers in several groups (fig. 3). *Fuirena*, p. 93.

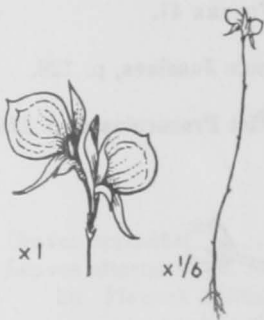


FIGURE 1.

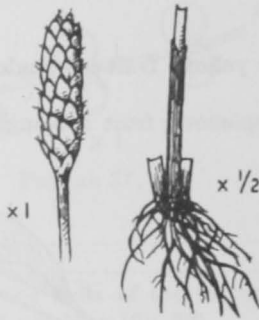


FIGURE 2.



FIGURE 3.



- 6. Flowers or fruits hidden by overlapping scales **Scirpus**, p. 91. (fig. 4).
- 6. Flowers or fruits individually manifest; parts **Juncus**, p. 107. in threes (fig. 5).

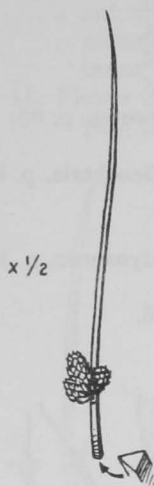


FIGURE 4.

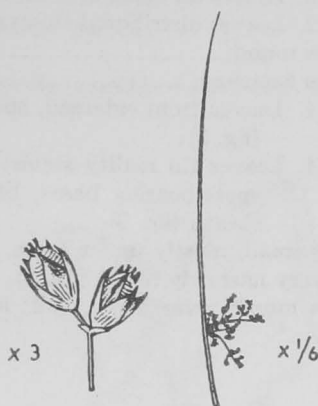


FIGURE 5.

- 7. Stems round in cross-section..... 8.
- 7. Stems angled in cross-section..... 10.
- 8. Stems large and long (1 meter or more)..... **Scirpus**, p. 91.
- 8. Stems shorter..... 9.
- 9. Sheaths at base of stem with edges united to form tube **Eleocharis**, p. 88. (fig. 6).
- 9. Sheaths at base of stem merely overlapping (fig. 7)--- **Juncus**, p. 107.



FIGURE 6.



FIGURE 7.

- |                                                                                                                   |                            |
|-------------------------------------------------------------------------------------------------------------------|----------------------------|
| 10. Stems 4-angled.....                                                                                           | <b>Eleocharis</b> , p. 88. |
| 10. Stems 3-angled.....                                                                                           | 11.                        |
| 11. Stems long ( $\frac{1}{2}$ meter or more).....                                                                | <b>Scirpus</b> , p. 91.    |
| 11. Stems shorter.....                                                                                            | <b>Eleocharis</b> , p. 88. |
| 12. Leaves all basal or from one point.....                                                                       | 13.                        |
| 12. Leaves distributed along stem.....                                                                            | 24.                        |
| 13. Leaves round.....                                                                                             | 14.                        |
| 13. Leaves flattened.....                                                                                         | 15.                        |
| 14. Leaves from enlarged, spore-containing bases<br>(fig. 8).                                                     | <b>Isoetes</b> , p. 68.    |
| 14. Leaves (in reality stems) not from enlarged,<br>spore-bearing bases; bases with a tubular<br>sheath (fig. 6). | <b>Eleocharis</b> , p. 88. |
| 15. Plants small, mostly under 1 dm. tall; leaves filiform,<br>or very narrowly linear (fig. 9).                  | <b>Myosurus</b> , p. 118.  |
| 15. Plants mostly over 1 dm. tall; leaves more broadly<br>linear.                                                 | 16.                        |

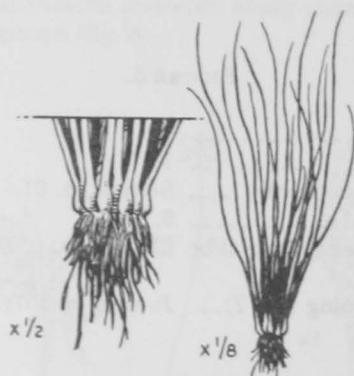


FIGURE 8.



FIGURE 9.

- 16. Leaves keeled or folded..... 17.
- 16. Leaves flat and not keeled..... 19.
- 17. Plants aromatic when crushed (fig. 10)..... **Acorus**, p. 102.
- 17. Plants not aromatic..... 18.
- 18. Flowers violet, over 3 cm. across; leaves equitant at base; that is coming in two ranks, making the base of the plant appear flattened (fig. 11). **Nemastylis**, p. 110.
- 18. Flower inconspicuous and hidden by overlapping scales (fig. 12). **Cyperus**, p. 87.

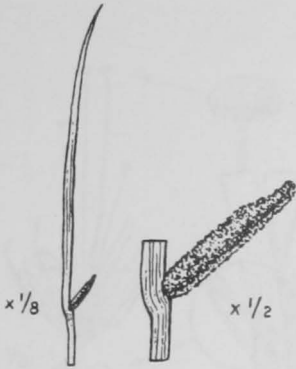


FIGURE 10.



FIGURE 11.



FIGURE 12.

19. Leaves equitant at base; that is, coming in two ranks 20.  
 making the base of the plant appear to be flattened.
19. Leaves coming out from all sides of base..... 21.
20. Leaves large (1 cm. wide or wider); flowers **Iris**, p. 110.  
 very showy (fig. 13.)
20. Leaves smaller, rigid; small yellow flowers **Xyris**, p. 104.  
 gathered in dense heads at top of naked  
 stalk, each subtended by a scale-like bract  
 (fig. 14).

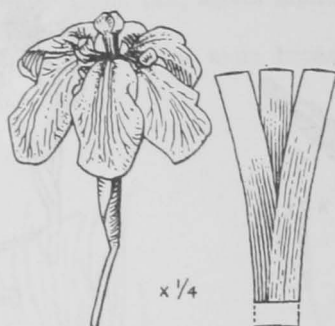


FIGURE 13.



FIGURE 14.

- 21. Leaves arising from a bulb..... 23.
- 21. Leaves not arising from a bulb..... 22.
  - 22. Leaves from base of scape bearing button-like whitish heads of minute flowers; roots with cross-constrictions (fig. 15). **Eriocaulon**, p. 106.
  - 22. Leaves from base of scape bearing evident white flowers in racemes; roots without cross-constrictions (fig. 16). **Sagittaria**, p. 72.

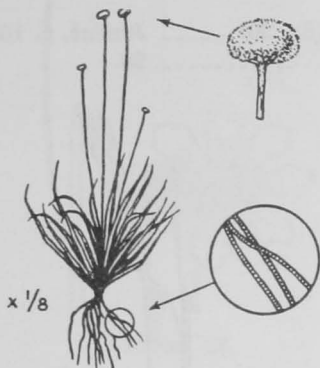


FIGURE 15.



FIGURE 16.

- 23. Flowers with filaments connected by a funnel-like membrane (crown) (fig. 17). **Hymenocallis**, p. 109
- 23. Flowers with free filaments (fig. 18)..... **Crinum**, p. 109.

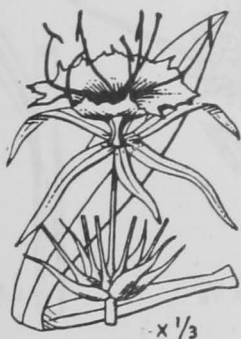


FIGURE 17.

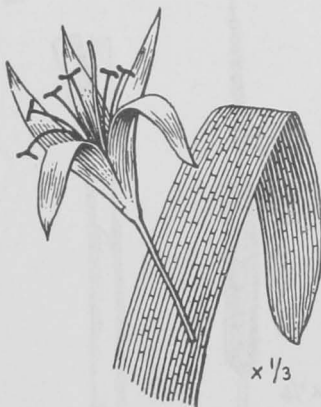


FIGURE 18.

19. Leaves equitant at base; that is, coming in two ranks 20.  
 making the base of the plant appear to be flattened.
19. Leaves coming out from all sides of base----- 21.  
 20. Leaves large (1 cm. wide or wider); flowers **Iris**, p. 110.  
 very showy (fig. 13.)
20. Leaves smaller, rigid; small yellow flowers **Xyris**, p. 104.  
 gathered in dense heads at top of naked  
 stalk, each subtended by a scale-like bract  
 (fig. 14).



FIGURE 13.



FIGURE 14.

- 21. Leaves arising from a bulb..... 23.
- 21. Leaves not arising from a bulb..... 22.
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- 22. Leaves from base of scape bearing evident white flowers in racemes; roots without cross-constrictions (fig. 16). **Sagittaria**, p. 72.

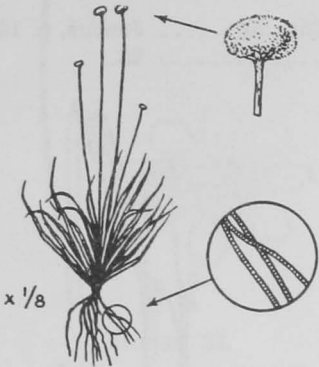


FIGURE 15.

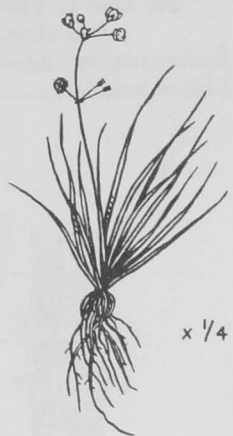


FIGURE 16.

- 23. Flowers with filaments connected by a funnel-like membrane (crown) (fig. 17). **Hymenocallis**, p. 109
- 23. Flowers with free filaments (fig. 18)..... **Crinum**, p. 109.

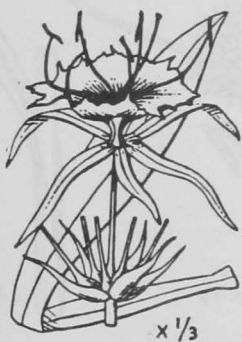


FIGURE 17.

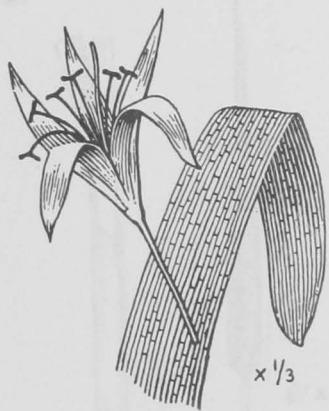


FIGURE 18.

24. Stem usually triangular in cross-section particularly near base (edges sometimes rounded); leaves 3-ranked, flowers in close clusters and concealed by overlapping scales. **Cyperaceae**, p. 84.
24. Stems round in cross-section, leaves not 3-ranked. 25.
25. Leaf with a ligule at base (junction of leaf and sheath) (fig. 19). **Graminae**, p. 76.
25. Leaf without ligule..... 26.
26. Leaves with sheaths at base..... 27.
26. Leaves without definite sheaths, but bases sometimes sheathing. 29.
27. Leaves narrow, mostly less than 1 cm. (fig. 20)..... **Juncus**, p. 107.
27. Leaves broader..... 28.

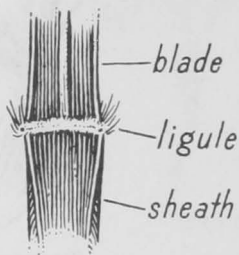


FIGURE 19.



FIGURE 20.

28. Sheaths abruptly contracted to blade of leaf; leaves without keels (fig. 21). **Typha**, p. 68.
28. Sheaths narrowed to blade; leaves with keels **Sparganium**, p. 68. (fig. 22).

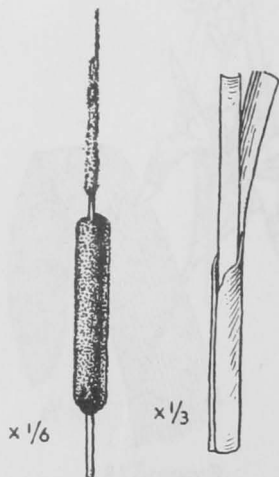


FIGURE 21.

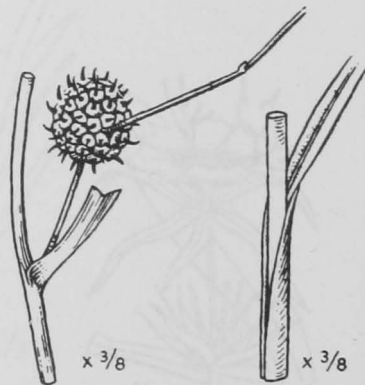


FIGURE 22.



29. Leaves round..... 30.  
 29. Leaves flat..... 32.  
     30. Flowers few, showy, pinkish purple (fig. 23) -- **Coreopsis**, p. 140.  
     30. Flowers many in compound umbels, inconspicuous. 31.  
 31. Fruit flattened laterally; fruit not winged (fig. 24)---- **Ptilimnium**, p. 131.  
 31. Fruit flattened dorsally; fruit prominently winged (fig. 25). **Oxypolis**, p. 131.

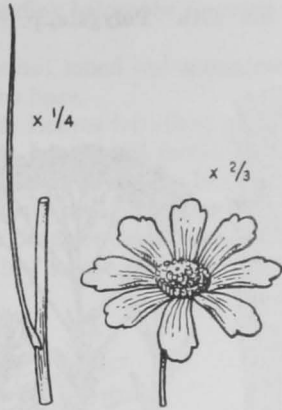


FIGURE 23.

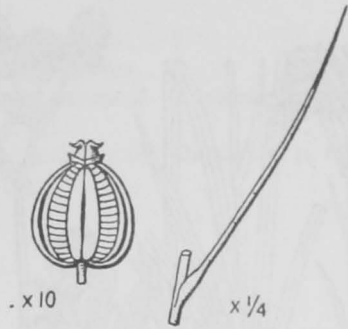


FIGURE 24.

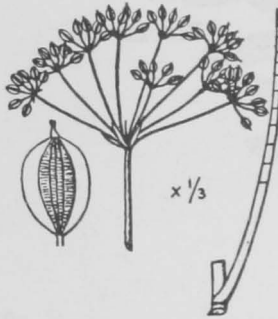


FIGURE 25.

32. Leaves keeled (fig. 10)----- **Acorus**, p. 104.  
 32. Leaves not keeled----- 33.  
 33. Root red (fig. 26)----- **Gyrotheca**, p. 111.  
 33. Root not red----- 34.  
 34. Leaves equitant at base; flowers few and  
 showy purple or sometimes white (fig. 13). **Iris**, p. 110.  
 34. Leaves not equitant at base of plant----- 35.  
 35. Flowers white in dense button-like heads; leaves  
 bristly-margined (fig. 27). **Eryngium**, p. 130.  
 35. Flowers yellow, not in button-like heads nor with  
 bristly-margined leaves (fig. 28). **Polygala**, p. 120.

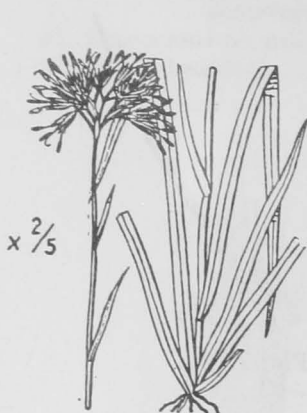


FIGURE 26.



FIGURE 27.

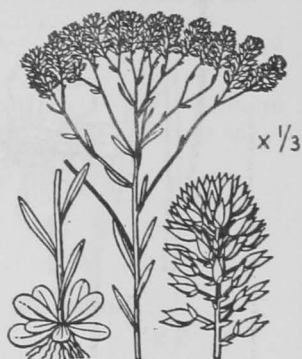


FIGURE 28.

KEY TO GROUP F

- 1. Leaves simple----- 2.
- 1. Leaves, or some of them, compound or at least cut into narrow segments almost to the midrib. 4.
  - 2. Leaves deeply lobed other than at base of blade. 15.
  - 2. Leaves not deeply lobed except sometimes at base of blade. 3.
- 3. Leaves definitely lobed at base of blade; that is, lobes extending below the junction of the petiole and the leaf. 20.
- 3. Leaves not lobed but sometimes sessile and clasping at the base. 30.
  - 4. Leaves fern-like; plant not bearing flowers... 5.
  - 4. Leaves not fern-like; plants bearing flowers... 6.
- 5. Spores borne in sacs on lower leaf surface; divisions of the leaf small, less than 2 cm. long (fig. 1). **Anchistea**, p. 67.
- 5. Spores borne on terminal modified leaves; divisions of the leaf larger, more than 2 cm. long (fig. 2). **Osmunda**, p. 67.

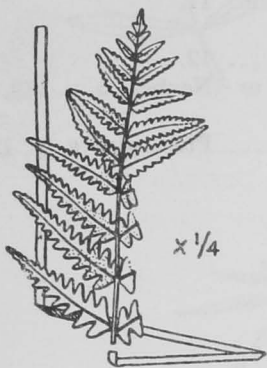


FIGURE 1.



FIGURE 2.

6. Leaves opposite (fig. 3)----- **Bidens**, p. 140.

6. Leaves alternate or irregularly placed----- 7.

7. Leaflets usually 3, no more than 5 (fig. 4)----- **Ranunculus**, p. 118.

7. Leaflets more than 5----- 8.

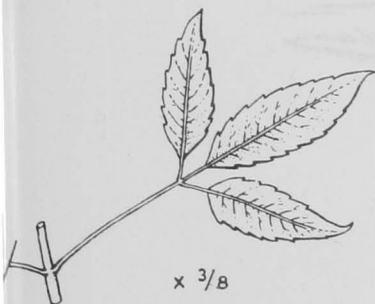


FIGURE 3.

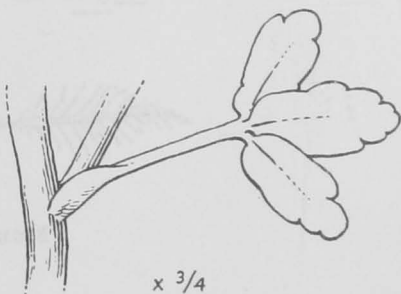


FIGURE 4.

- |                                              |                             |
|----------------------------------------------|-----------------------------|
| 8. Leaves with terminal leaflet largest..... | 9.                          |
| 8. Leaflets all near the same size.....      | 10.                         |
| 9. Flowers yellow (fig. 5).....              | <b>Rorippa</b> , p. 119.    |
| 9. Flowers white (fig. 6).....               | <b>Nasturtium</b> , p. 119. |

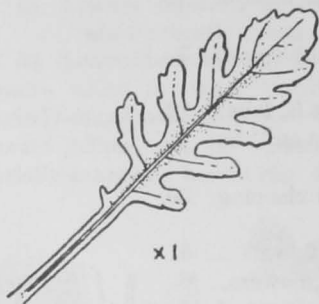


FIGURE 5.

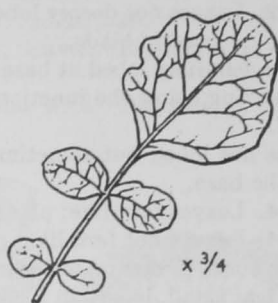


FIGURE 6.

- |                                                                            |                               |
|----------------------------------------------------------------------------|-------------------------------|
| 10. Plants with simple as well as compound leaves.                         | 11.                           |
| 10. Plants with all leaves compound.....                                   | 12.                           |
| 11. Individual leaflets of compound leaves also lobed or divided (fig. 7). | <b>Neobeckia</b> , p. 119.    |
| 11. Individual leaflets simple (fig. 8).....                               | <b>Proserpinaca</b> , p. 129. |

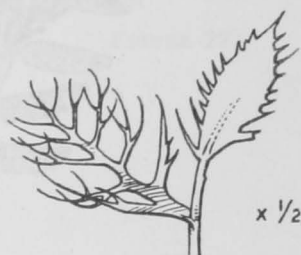


FIGURE 7.

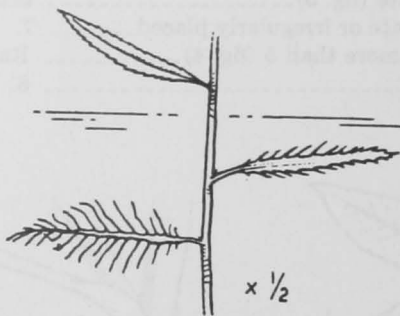


FIGURE 8.

12. Base of petiole of leaf expanded into a sheath which encircles stem at junction. 13.  
 12. Base of petiole not expanded (fig. 8)----- **Proserpinaca**, p. 129.
13. Leaves, at least the upper ones, only once compound (fig. 9) **Sium**, p. 131.
13. Leaves twice divided----- 14.  
 14. Leaflets narrowly linear, untoothed; plants annual (fig. 10). **Ptilimnium**, p. 131.
14. Leaflets wider, toothed; plants perennial (fig. 11). **Cicuta**, p. 131.

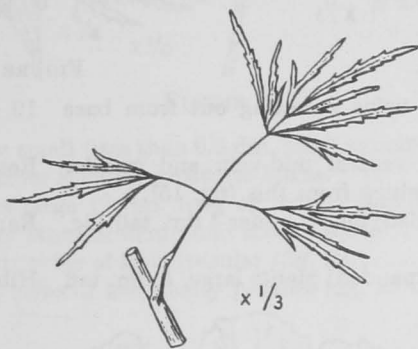
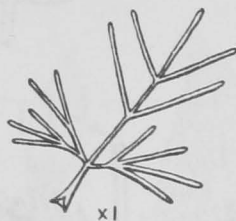


FIGURE 9.

FIGURE 11,

FIGURE 10.

- 15. Leaves coming off of a creeping or horizontal stem **Hydrocotyle**, p. 130.  
(fig. 12).
- 15. Leaves scattered along an upright stem..... 16.
- 16. Leaves opposite..... 17.
- 16. Leaves alternate or irregularly borne..... 18.
- 17. Stems 4-angled; flowers small, in dense clusters in the **Lycopus**, p. 135.  
    axils of the leaves (fig. 13).
- 17. Stem round, or nearly so, in cross-section; flowers **Bidens**, p. 140.  
    showy, yellow (fig. 14).

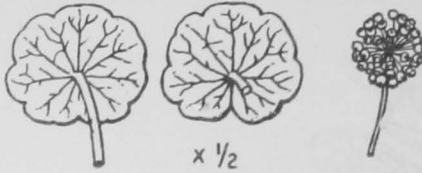


FIGURE 12.

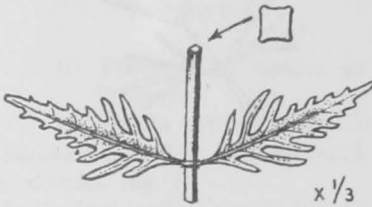


FIGURE 13.

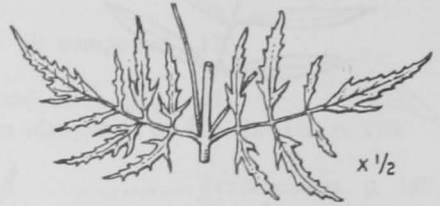


FIGURE 14.

- 18. Leaves with veins radiating out from base of leaf. 19.
- 18. Leaves with central mid-vein and smaller veins branching from this (fig. 15). **Rorippa**, p. 119.
- 19. Base of petiole expanded; plants under 4 dm. tall (fig. 16). **Ranunculus**, p. 118.
- 19. Base of petiole not expanded; plants large, 5 dm. tall or taller (fig. 17). **Hibiscus**, p. 122.



FIGURE 15.

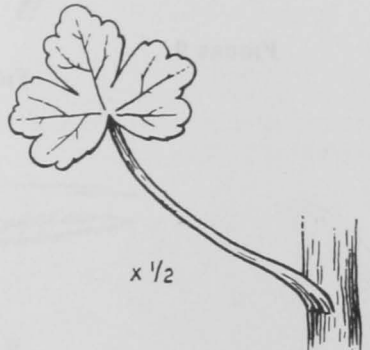


FIGURE 16.



FIGURE 17.

- 20. Leaves all basal or arising from points along a horizontal stem. 21.
- 20. Leaves distributed along stem..... 26.
- 21. Leaves coming off at points along a horizontal stem. 24.
- 21. Leaves basal to flower stalk ..... 22.
- 22. Leaves with several prominent rib-like veins running from base to apex (fig. 18). **Alismaceae**, p. 72.
- 22. Veins of leaves not prominent..... 23.
- 23. Leaves with blunt lobes; flower conspicuous, purple, not on a fleshy axis enclosed in a leaf-like sheath (fig. 19). **Pontederia**, p. 107.
- 23. Leaves usually with sharp lobes; flowers individually inconspicuous, on a fleshy axis enclosed in a leaf-like sheath (fig. 20). **Peltandra**, p. 103.



FIGURE 18.

x 1/4

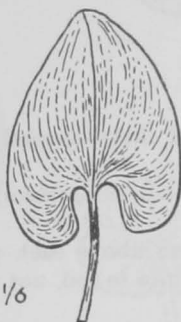


FIGURE 19.

x 1/6



x 1/3

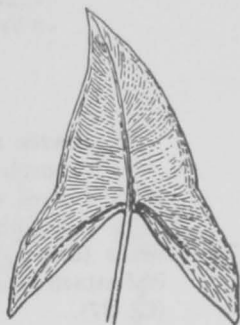


FIGURE 20.

- 24. Leaves small (less than 0.5 dm. long), coming off from slender, prostrate stems. 25.
- 24. Leaves large (2 dm. long or more), coming off of stout underground stems (fig. 21). **Nuphar**, p. 116.
- 25. Leaves toothed; veins of leaf irregular (fig. 22)----- **Centella**, p. 131.
- 25. Leaves entire; veins of leaf nearly parallel (fig. 23)--- **Heteranthera**, p. 106.

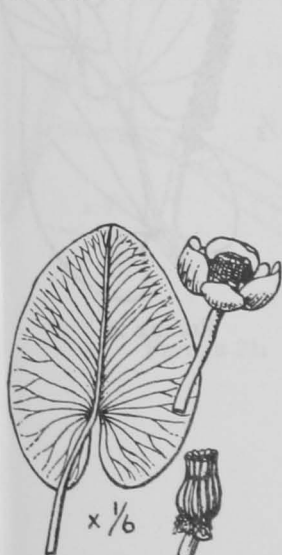


FIGURE 21.

x 1/6



FIGURE 22.

x 1/2

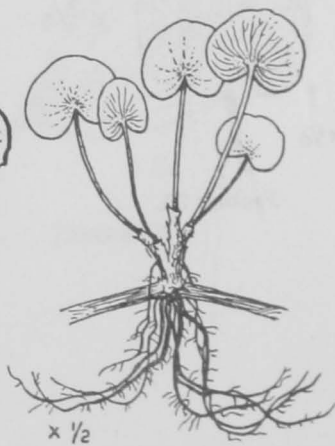


FIGURE 23.

x 1/2

26. Leaves toothed..... 27.  
 26. Leaves not toothed (entire)..... 28.  
 27. Plant small, less than 4 dm. tall; flowers yellow (fig. 24) - **Caltha**, p. 118.  
 27. Plant large, over 5 dm. tall; flowers large, white, pink, or purplish (fig. 25). **Hibiscus**, p. 122.

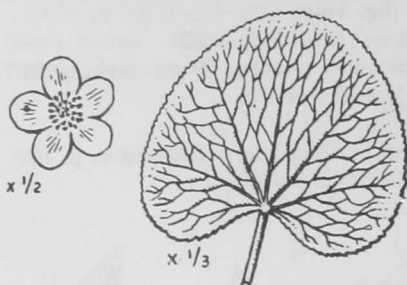


FIGURE 24.

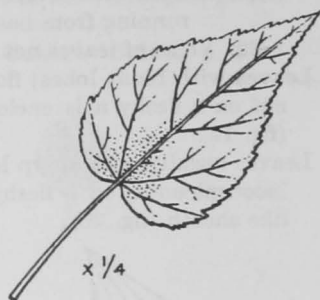


FIGURE 25.

28. Leaves mostly basal, heart-shaped; flowers purple (fig. 26). **Pontederia**, p. 107.  
 28. Leaves well distributed along stem; flowers not purple. 29.  
 29. Sheaths (ocreae) around stem above each point of leaf-attachment; flowers white to red, not fragrant (fig. 27). **Polygonum**, p. 114.  
 29. Stems with no sheaths; flowers white, fragrant (fig. 28) - **Saururus**, p. 112.

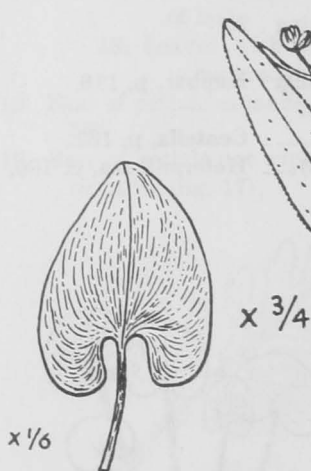


FIGURE 26.

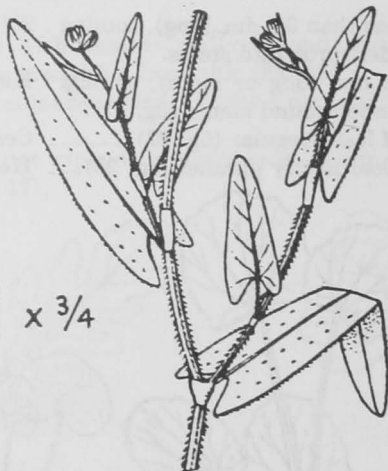


FIGURE 27.



FIGURE 28.



- 30. Leaves all from one point, or mostly all basal, or from points along a horizontal stem. 33.
- 30. Leaves distributed along the upright stem... 31.
- 31. Leaves opposite..... 32.
- 31. Leaves alternate or irregularly borne..... 40.
- 32. Leaves entire or nearly so..... 41.
- 32. Leaves prominently toothed..... 55.
- 33. Leaves from points along a horizontal stem, peltate... 34.
- 33. Leaves mostly basal, not peltate..... 35.
- 34. Leaves large, 2 dm. or more in diameter, impossible to wet; flowers solitary, showy, yellow (fig. 29). **Nelumbo**, p. 117.
- 34. Leaves small, only a few cm. across; flowers small, white, and in close clusters (fig. 30). **Hydrocotyle**, p. 130.

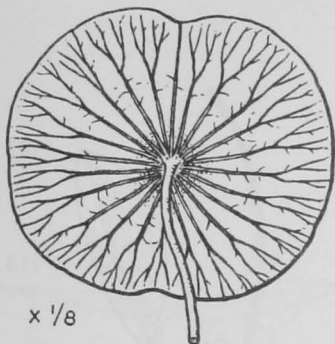


FIGURE 29.

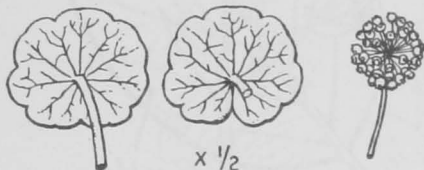


FIGURE 30.

- 35. Leaves with several veins running from base to tip... 36.
- 35. Veins not as above (fig. 31)..... **Rumex**, p. 113.
- 36. Leaves with several very prominent ribs running from base to apex (fig. 32). **Alismaceae**, p. 72.
- 36. Leaves without prominent ribs..... 37.

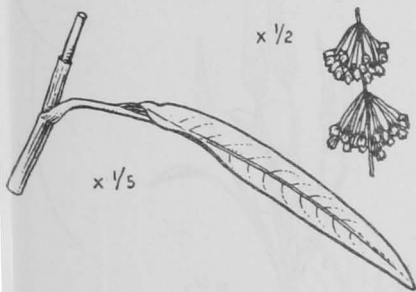


FIGURE 31.

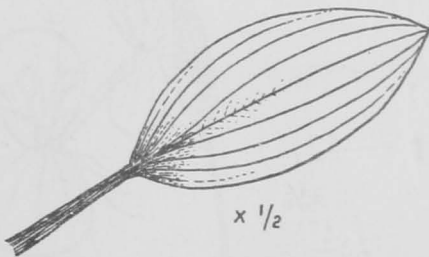


FIGURE 32.

37. Plants white-powdery above; plants extremely large, usually over 1 m. (fig. 33). **Thalia**, p. 111.
37. Plants smaller; not white-powdery above..... 38.
38. Petiole often very short; leaves shed water easily; flowers along fleshy spike enclosed in a leafy sheath (fig. 34). **Orontium**, p. 102.
38. Petioles long; flowers and leaves not as above. 39.



FIGURE 33.



FIGURE 34.

39. Flowers many; leaves large, over 10 cm. long (fig. 35) - **Pontederia**, p. 107.
39. Flowers solitary; leaves small, less than 5 cm. long (fig. 36). **Heteranthera**, p. 106.



FIGURE 35.



FIGURE 36.

- 40. Leaves entire or nearly so ..... 65.
- 40. Leaves prominently toothed ..... 77.
- 41. Leaf, when examined against light with lens, showing semitransparent dots; flowers yellow or pink (fig. 37). **Hypericum**, p. 123.
- 41. Leaves not showing semitransparent dots ..... 42.
- 42. Leaves broadened at base ..... 43.
- 42. Leaves narrowed to base ..... 46.
- 43. Leaves mostly under 2.5 cm. long ..... 44.
- 43. Leaves mostly over 2.5 cm. long ..... 45.
- 44. Plant aromatic when crushed (fig. 38) ..... **Hydrotrida**, p. 135.
- 44. Plant not aromatic when crushed (fig. 39) ..... **Herpestris**, p. 135.

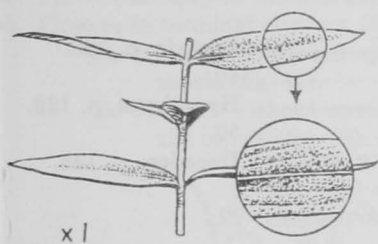


FIGURE 37.

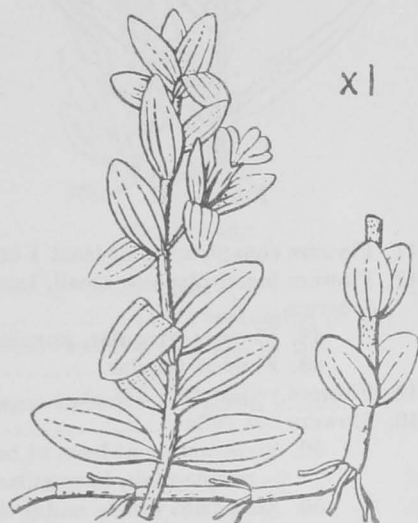


FIGURE 38.

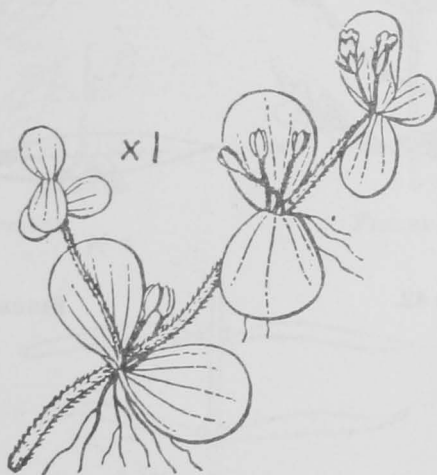


FIGURE 39.

45. Flowers showy, in clusters, yellow or pink (fig. 37)--- **Hypericum**, p. 123.  
 45. Flowers not showy, in axils of leaves, mostly purple **Ammannia**, p. 125.  
 (fig. 40).  
 46. Leaves covered with tiny black dots visible with lens; flowers small, white (fig. 41). **Gratiola**, p. 135.  
 46. Leaves not covered with black dots; flowers various. 47.

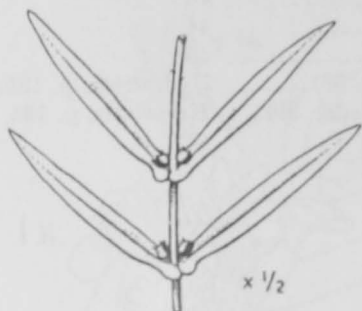


FIGURE 40.

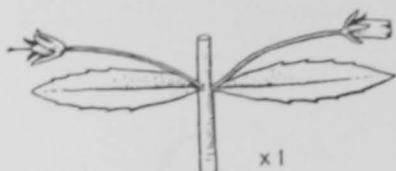


FIGURE 41.

47. Flowers conspicuous, at least 1 cm. long or across--- 48.  
 47. Flowers inconspicuous, small, less than 1 cm. long or across. 53.  
 48. Flowers irregular, purplish (fig. 42)----- **Justicia**, p. 136.  
 48. Flowers regular----- 49.  
 49. Flowers yellow (fig. 37)----- **Hypericum**, p. 123.  
 49. Flowers not yellow----- 50.  
 50. Stem woody at least at base, arching; flowers purple-pink, in auxiliary clusters (fig. 43). **Decodon**, p. 125.  
 50. Stems not woody and arching, but sometimes corky at base. 51.

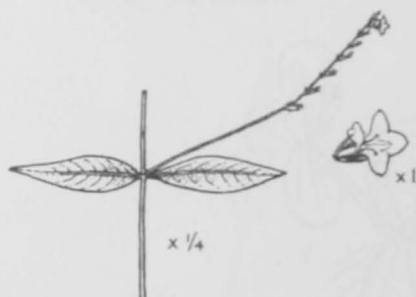


FIGURE 42.

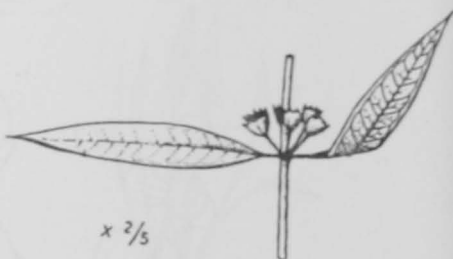


FIGURE 43.

51. Flowers purple; plant usually corky at base (fig. 44) -- **Lythrum**, p. 126.  
 51. Flowers white or pink; plant usually not corky at base. 52.  
 52. Flowers pink (fig. 37) ----- **Hypericum**, p. 123.  
 52. Flowers white, or, if pink, with a yellow or green eye in center (fig. 45). **Sabatia**, p. 133.



FIGURE 44.



FIGURE 45.

53. Flowers solitary in the leaf axils ----- 54.  
 53. Flowers in terminal clusters (fig. 46) ----- **Nyctotonum**, p. 133.  
 54. Flowers with small appendages between the sepals (fig. 47). **Rotala**, p. 125.  
 54. Flowers without small appendages between the sepals (fig. 48). **Didiplis**, p. 125.



FIGURE 46.



FIGURE 47.

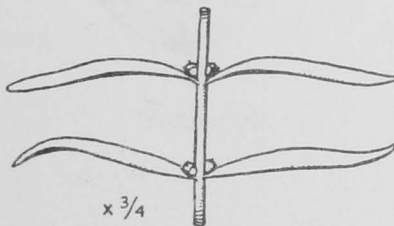


FIGURE 48.

55. Leaves with three prominent ribs..... 62.  
 55. Leaves without three prominent ribs..... 56.  
     56. Stems square or 4-angled..... 57.  
     56. Stems round in cross-section..... 60.  
 57. Leaves petioled..... 58.  
 57. Leaves sessile..... 59.  
     58. Calyx of flower bearing a crest above (fig. 49)..... **Scutellaria**, p. 135.  
     58. Calyx bearing no crest (fig. 50)..... **Mimulus**, p. 136.



FIGURE 49.

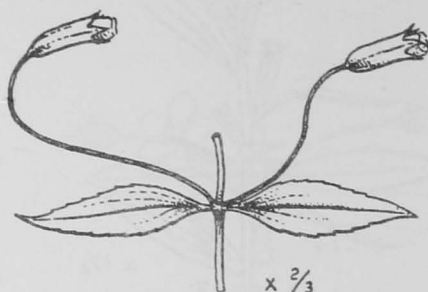


FIGURE 50.

59. Flowers small, white, gathered in dense, sessile clusters in the axils of the leaves (fig. 51). **Lycopus**, p. 135.  
 59. Flowers solitary in the axils of the leaves (fig. 50)..... **Mimulus**, p. 136.  
     60. Leaves small, mostly under 3 cm. long; usually with black dots visible with a lens covering them (fig. 52). **Gratiola**, p. 135.  
     60. Leaves large, mostly over 5 cm. long and not covered with black dots. 61.

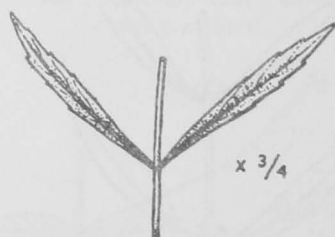


FIGURE 51.

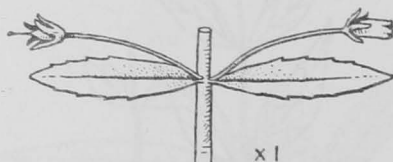


FIGURE 52.

61. Plants decumbent at base and usually rooting at the lower nodes (fig. 53). **Lippia**, p. 134.
61. Plants entirely erect..... 63.
62. Leaves long petioled; flowers inconspicuous (fig. 54). **Boehmeria**, p. 113.
62. Leaves sessile or very short petioled; flowers showy (fig. 55). **Rhexia**, p. 124.



FIGURE 53.



FIGURE 54.



FIGURE 55.

- 55. Leaves with three prominent ribs
- 55. Leaves with four prominent ribs
- 56. Stem square or 4-angled
- 56. Stem round in cross-section
- 57. Leaves petioled
- 57. Leaves sessile
- 58. Calyx of flower bearing a crest above (fig. 49)
- 58. Calyx bearing no crest (fig. 50)



FIGURE 49.

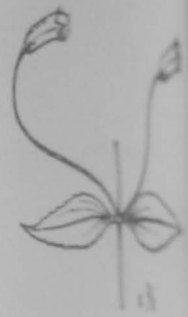


FIGURE 50.

- 59. Flowers small, white, gathered in dense, sessile clusters in the axils of the leaves (fig. 51).
- 59. Flowers solitary in the axils of the leaves (fig. 52)
- 60. Leaves small, mostly under 3 cm. long, usually with black dots visible with a lens when viewing them (fig. 52).
- 60. Leaves large, mostly over 5 cm. long and not covered with black dots.

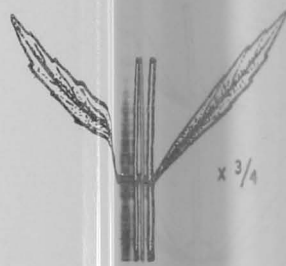


FIGURE 51.



FIGURE 52.



67. Stems with sheaths (ocreae) just above attachment point of leaves.
67. Stems without sheaths..... 69.
68. Plant with broad leaves, many basal; flowers stalked and drooping (fig. 60). **Rumex**, p. 113.
68. Plant with narrower leaves, none basal; flowers sessile, in terminal spikes (fig. 61). **Polygonum**, p. 114.

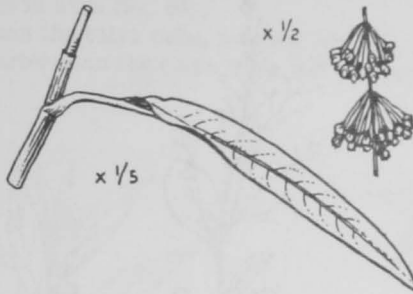


FIGURE 60.



FIGURE 61.

63. Leaves long petioled; flowers minute, in sessile clusters **Boehmeria**, p. 113.  
on branch (fig. 54).
63. Leaves sessile or short petioled..... 64.
64. Flowers showy, yellow, or at least with yellow **Bidens**, p. 140.  
centers (fig. 56).
64. Flowers white or purplish (fig. 57)..... **Eupatorium**, p. 139.



FIGURE 56.



FIGURE 57.

65. Leaves with several veins running from base to apex.. 66.
65. Leaves with branched veins..... 67.
66. Leaves large, mostly over 6 cm. wide; flowers **Canna**, p. 111.  
yellow, very large (fig. 58).
66. Leaves smaller; flowers individually small, in **Habenaria**, p. 112.  
terminal spike-like clusters (fig. 59).



FIGURE 58.



FIGURE 59.

67. Stems with sheaths (ocreae) just above attachment point of leaves. 68.
67. Stems without sheaths..... 69.
68. Plant with broad leaves, many basal; flowers stalked and drooping (fig. 60). Rumex, p. 113.
68. Plant with narrower leaves, none basal; flowers sessile, in terminal spikes (fig. 61). Polygonum, p. 114.

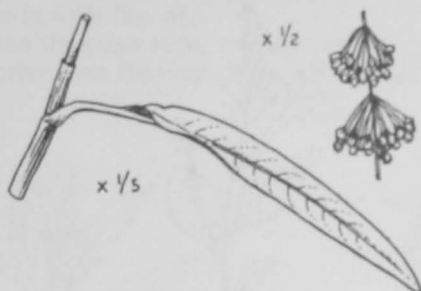


FIGURE 60.



FIGURE 61.

69. Leaves not over twice as long as broad (fig. 62)----- **Samolus**, p. 132.  
 69. Leaves much longer than broad----- 70.  
 70. Large herb with a very stout stem, often from **Acnida**, p. 115.  
 1 to 3 dm. in diameter at base, over 1.5 m.  
 tall (fig. 63).  
 70. Smaller herbs; base of stem sometimes corky 71.  
 but not extremely thick.



FIGURE 62.



FIGURE 63.

- 71. Flowers blue, violet, or purple----- 72.
- 71. Flowers various but not blue or violet; petals some- 74.  
times wanting.
- 72. Sepals united at base into a tube enclosing 73.  
the ovary and later the fruit; leaves with-  
out spines in axils.
- 72. Sepals free to base and not including the **Hydrolea**, p. 134.  
ovary; leaves, or some of them, often with  
spines in axils (fig. 64).
- 73. Sepals longer than the calyx tube, reflexed (fig. 65)--- **Campanula**, p. 138.
- 73. Sepals much shorter than the calyx tube, not reflexed **Lythrum**, p. 126.  
(fig. 44).



FIGURE 64.



FIGURE 65.

- 74. Flowers regular; petals, if present, yellow----- 75.
- 74. Flowers irregular; white, orange, or yellow 76.  
in color.
- 75. Capsule or calyx tube short and stout, less than 1.5 cm. **Ludwigia**, p. 126.  
long; stamens 4 (fig. 66).
- 75. Capsule or calyx tube long and slender, over 1.5 cm. **Jussiaea**, p. 128.  
long; stamens 8 (fig. 67).



FIGURE 66.



FIGURE 67.

76. Flowers in terminal clusters which may be *Polygala*, p. 120.  
compound (fig. 68).
76. Flowers solitary or a few in the axils of the *Hygrophila*, p. 136.  
leaves (fig. 69).



FIGURE 68.



FIGURE 69.

77. Leaves aromatic when crushed (fig. 70) ----- *Pluchea*, p. 139.
77. Leaves not aromatic ----- 78.
78. Leaves large, over 5 cm. broad; flowers large, *Hibiscus*, p. 122.  
over 5 cm. across (fig. 71).
78. Leaves and flowers much smaller ----- 79.



FIGURE 70.



FIGURE 71.

79. Flowers not in terminal clusters, but more or less distributed over plant. 81.  
 79. Flowers in terminal clusters ----- 80.  
 80. Flowers conspicuous, white, 4-petaled; fruit as *Neobeckia*, p. 119.  
 in figure (fig. 72).  
 80. Flowers greenish, 5-petaled; fruit as in figure *Penthorum*, p. 119.  
 (fig. 73).

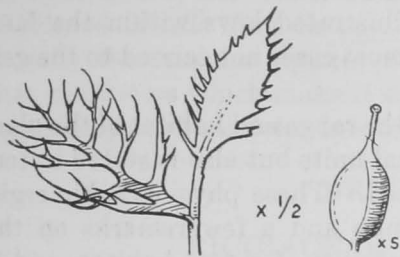


FIGURE 72.

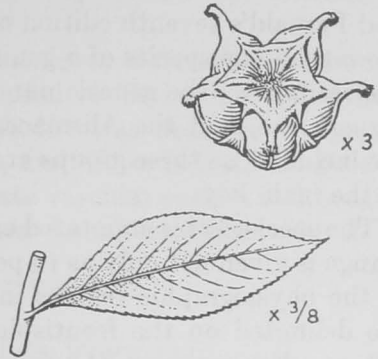


FIGURE 73.

81. Flowers sessile, in the axils of the leaves; fruit a single *Proserpinaca*, p. 129.  
 3-angled nutlet (fig. 74).  
 81. Flowers stalked; fruit a group of several, scarcely *Ranunculus*, p. 118.  
 angled, small nutlets (fig. 75).

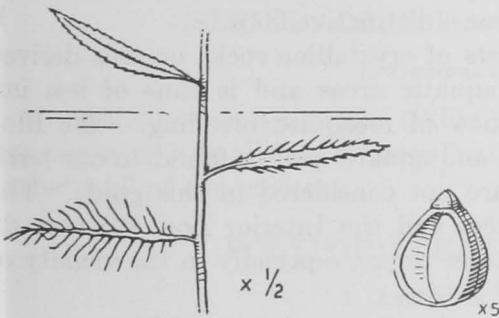


FIGURE 74.



FIGURE 75.

## INTRODUCTION TO THE CATALOG

On the following pages is a list of the families, genera, and species of Southeastern aquatic plants. These follow the order of Robinson and Fernald's seventh edition of Gray's New Manual of Botany. If more than one species of a genus is present in the region, a key to the species follows the generic name. In the case of the Gramineae, the Cyperaceae, and the Alismaceae, illustrated keys within the family are included, as these groups are in most cases not carried to the genus in the main key.

The species list is annotated as to the range and habitat of the plants. Range is given not only as to political units but also is stated in terms of the physiographic regions involved. These physiographic regions are delimited on the frontispiece map and a few remarks on them follow. For economy of space statements of range, habitat, and frequency are usually given in phrases rather than complete sentences.

The Coastal Plain, which is a region made up of recent sediments lying adjacent to and extending back from our coasts, is the most important from a malariological point of view. The length of this guide is due in part to its rich aquatic flora, which is often quite different from that of the more northern regions such as are so well treated by Fassett in *A Manual of Aquatic Plants*. The subdivided Mississippi Valley is geologically similar to the Coastal Plain but is here differentiated because it has a distinctive flora.

The Piedmont, which consists of crystalline rocks or soils derived therefrom, has few extensive aquatic areas and is thus of less importance from the point of view of mosquito breeding. The Blue Ridge is also of little interest, and aquatic plants found in our territory only in the mountains are not considered in this guide. The paleozoic Appalachian Provinces and the Interior Low Plateaus do have a problem, along their larger rivers, especially in the vicinity of impoundments.

Also annotated are synonyms when nomenclature in this treatment differs from that offered by Small, *Manual of the Southeastern Flora*. A few notes on the association of mosquitoes with specific plants are given, but sufficient knowledge is lacking to make extensive generalizations.

A recently introduced species, the water-chestnut (*Trapa natans* L.) has not been recorded from our territory but occurs nearby in the Potomac River, where it has been found harboring *Anopheles quadrimaculatus*. It is not listed in this catalog.



## CATALOG OF AQUATIC PLANTS

### THALLOPHYTA

#### CHARACEAE Muskgrass family

##### 1. *Chara* L.

*Chara* spp.—No attempt will be made to differentiate here the species of *Chara*, nor will it be attempted to distinguish *Chara* from the related *Nitella* (not listed). This list was designed to include primarily the vascular aquatic plants, and *Chara* is included because it has characters which make it simulate vascular species and because *Anopheles quadrimaculatus* is sometimes found associated with it.

### BRYOPHYTA

#### RICCIACEAE Thallose liverworts

##### 1. *Riccia* L.

*R. fluitans* L.—Ponds, swamps, and springs over all our territory.

##### 2. *Ricciocarpus* Corda

*R. natans* (L.) Corda—Common in ponds and swamps over most of our territory.

### PTERIDOPHYTA

#### OSMUNDACEAE Flowering fern family

##### 1. *Osmunda* L.

*O. regalis* L. var. *spectabilis* (Willd.) A. Gray. Royal-fern—When aquatic mostly in alluvial swamps, not commonly encountered, range includes all of our territory.

#### POLYPODIACEAE Fern family

##### 1. *Anchistea* Presl

*A. virginica* (L.) Presl. Virginia Chain-fern—Ranges over all of our Coastal Plain, most often found in very acid swamps or ponds.

#### SALVINIACEAE *Salvinia* family

##### 1. *Azolla* Lam.

*A. caroliniana* Willd. Mosquito Fern—Assumes a red color when growing in the sun. Common in ponds, lakes and alluvial swamps over most of our area.

## ISOETACEAE Quillwort family

1. *Isoetes* L.

*I. flaccida* Shuttlw. Quillwort—Limesink ponds and other situations, Coastal Plain, South Georgia, and Florida. There are two varieties distinguishable in fruiting condition. There are several additional species of this genus in our territory, but only the above is likely to be encountered in mosquito work.

## GYMNOSPERMAE

## PINACEAE Pine family

1. *Pinus* [Tourn.] L.

*P. serotina* Michx. Pond-pine—Acid ponds and swamps, Coastal Plain, Florida north to beyond the limits of our territory and west at least to Alabama.

2. *Taxodium* L. C. Rich.

*T. distichum* (L.) L. C. Rich. Cypress—This species, with two-ranked spreading needles, has a well-marked Coastal Plain variety with appressed needles (variety *imbricarium* (Nutt.) Sudw.) The variety with appressed needles is particularly characteristic of acid ponds in the Coastal Plain, while the typical plant is found over all our area (except the Piedmont and mountains) and reaches its best development in river swamps.

## ANGIOSPERMAE

## TYPHACEAE Cattail family

1. *Typha* [Tourn.] L.

- |                                                                                                                                               |                             |
|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| 1. Leaves flat; inflorescence with staminate and dark brown pistillate portions separated; pollen of simple grains.                           | 1. <i>T. latifolia</i> .    |
| 1. Leaves rounded on back; inflorescence with staminate and light brown pistillate portions usually contiguous; pollen grains grouped in 4's. | 2. <i>T. angustifolia</i> . |

1. *T. latifolia* L. Broad-leafed Cattail—Common over all our territory. *Anopheles quadrimaculatus* often found associated.

2. *T. angustifolia* L. Narrow-leafed Cattail—Characteristic of aquatic situations along the coast, very local inland, much less common than the preceding.

## SPARGANIACEAE Bur-reed family

1. *Sparganium* [Tourn.] L.

- |                                                                |                           |
|----------------------------------------------------------------|---------------------------|
| 1. Achene fusiform, the body stalked; stigma 1                 | 1. <i>S. americanum</i> . |
| 1. Achene obpyramidal, cut nearly square across top; stigmas 2 | 2. <i>S. eurycarpum</i> . |

1. *S. eurycarpum* Engelm. Bur-reed—Not common in the south-east, but noted north of our territory in association with *Anopheles quadrimaculatus*.

2. *S. americanum* Nutt. Bur-reed—Not collected by the writers but supposed to occur over most of our territory.

## NAJADACEAE Pondweed Family

### 1. *Potamogeton* [Tourn.] L.

- |                                                                                                                                              |                              |
|----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| 1. Plants with both floating and submerged leaves, the floating leaves with expanded blades and differing from submerged ones.               | 2.                           |
| 1. Plants with all leaves alike and submerged                                                                                                | 10.                          |
| 2. Submerged leaves filiform or very narrowly linear, less than 2 mm. wide.                                                                  | 3.                           |
| 2. Submerged leaves lanceolate or ovate or if linear more than 2 mm. wide.                                                                   | 5.                           |
| 3. Flowers in cylindrical, many-flowered spikes only                                                                                         | 1. <i>P. natans</i> .        |
| 3. Flowers in globular, few-flowered spikes in the axils of the submerged leaves as well as in cylindrical, many-flowered emersed spikes.    | 4.                           |
| 4. Submerged leaves 0.5–2 mm. wide, not tapering to a long point; floating leaves, when present, rounded at the tip, the larger 5–15 nerved. | 2. <i>P. diversifolius</i> . |
| 4. Submerged leaves 0.1–0.6 mm. wide, tapering to a long point; floating leaves, when present pointed at the tip, 3–7 nerved                 | 3. <i>P. capillaceus</i> .   |
| 5. Submerged leaves linear and ribbon-like                                                                                                   | 4. <i>P. epihydrus</i> .     |
| 5. Submerged leaves lanceolate or ovate                                                                                                      | 6.                           |
| 6. Floating leaves heart-shaped at base                                                                                                      | 5. <i>P. pulcher</i> .       |
| 6. Floating leaves rounded or tapering at base.                                                                                              | 7.                           |
| 7. Floating leaves with 30–50 nerves                                                                                                         | 6. <i>P. amplifolius</i> .   |
| 7. Floating leaves with less than 30 nerves                                                                                                  | 8.                           |
| 8. Upper submerged leaves with long petioles                                                                                                 | 7. <i>P. nodosus</i> .       |
| 8. Upper submerged leaves with obscure short petioles or sessile.                                                                            | 9.                           |
| 9. Submerged leaves with an abrupt awl-shaped tip, 2–4 mm. long.                                                                             | 8. <i>P. angustifolius</i>   |
| 9. Submerged leaves with no awl-shaped tip.                                                                                                  | 9. <i>P. gramineus</i> .     |
| 10. Leaves lanceolate or broader, with curved not parallel sides.                                                                            | 11.                          |
| 10. Leaves thread-like or ribbon-like, linear with parallel sides.                                                                           | 15.                          |
| 11. Leaves short petioled or sessile but not clasping at base.                                                                               | 12.                          |
| 11. Leaves clasping at base                                                                                                                  | 14.                          |
| 12. Leaves with an awl-shaped tip 2–4 mm. long                                                                                               | 13.                          |
| 12. Leaves without awl-shaped tip                                                                                                            | 9. <i>P. gramineus</i> .     |
| 13. Fruit with a single keel                                                                                                                 | 10. <i>P. illinoensis</i> .  |
| 13. Fruit with 3 distinct keels                                                                                                              | 8. <i>P. angustifolius</i> . |

- |                                                                                                                                               |                              |
|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| 14. Leaves undulate or crisped with 3-7 prominent nerves.                                                                                     | 11. <i>P. perfoliatus</i> .  |
| 14. Leaves flat and with 1 prominent nerve.....                                                                                               | 12. <i>P. bupleuroides</i> . |
| 15. Leaves ribbon-like, more than 2 mm. wide.....                                                                                             | 4. <i>P. epihydrus</i> .     |
| 15. Leaves narrower, usually filiform.....                                                                                                    | 16.                          |
| 16. Stipules united to base of leaf forming a sheath more than 1 cm. long; fruits on spike interrupted appearing like beads on a string.      | 13. <i>P. pectinatus</i>     |
| 16. Stipules not united to leaves or if united forming a sheath much less than 1 cm.; fruits continuous on spike.                             | 17.                          |
| 17. Plants with axillary globular spikes as well as cylindric terminal spikes; fruit flat and spiralled like a snail shell.                   | 18.                          |
| 17. Plants with terminal cylindric spikes only; fruit plump.                                                                                  | 19.                          |
| 18. Submerged leaves 0.5-2 mm. wide, not tapering to a long point; floating leaves, when present, rounded at the tip, the larger 5-15 nerved. | 2. <i>P. diversifolius</i> . |
| 18. Submerged leaves 0.1-0.6 mm. wide, tapering to a long point; floating leaves, when present, pointed at the tip, 3-7 nerved.               | 3. <i>P. capillaceus</i> .   |
| 19. Leaves without basal glands.....                                                                                                          | 14. <i>P. foliosus</i> .     |
| 19. Leaves with a pair of glands at base of leaf.....                                                                                         | 15. <i>P. berchtoldi</i> .   |

1. *P. natans* L.—Found in various provinces but known only from northern part of our territory in Tennessee.

2. *P. diversifolius* Raf. Pondweed.—One of our more common Pondweeds, found in various provinces over most of our territory, although no positive record from Florida. *Anopheles quadrimaculatus* sometimes found associated.

3. *P. capillaceus* Poir.—Very similar to preceding but more characteristically Coastal Plain in distribution, found in all of our States except Tennessee. In Tennessee there are a few stations for the very similar *P. bicupulatus* Fernald which may be distinguished by its light brownish fruits with a coarsely toothed keel from *P. capillaceus* with its greenish fruit with an entire or finely toothed keel. *P. capillaceus* is often found in rather acid waters.

4. *P. epihydrus* Raf.—Known in our territory only from highland areas in Georgia, North Carolina, and Tennessee.

5. *P. pulcher* Tuckerm.—Found in ponds in various provinces, range includes all of our territory, not frequent.

6. *P. amplifolius* Tuckerm.—Range similar to preceding, found mostly in hard waters.

7. *P. nodosus* Poir.—One of the more common Pondweeds, found in various provinces, range includes all of our territory, commonly referred to as *Potamogeton americanus* C. & S.

8. *P. angustifolius* Berchtold & Presl—Range same as two preceding, but infrequent.
9. *P. gramineus* L.—The range of this very variable species covers all of our territory.
10. *P. illinoensis* Morong—Should occur over all of our range.
11. *P. perfoliatus* L.—Slow streams and ponds, various provinces, over all of our territory.
12. *P. bupleuroides* Fernald—Found mostly in brackish waters, range extends south to Florida.
13. *P. pectinatus* L.—Characteristic of hard water streams or lakes, range includes all of our territory.
14. *P. foliosus* Raf.—Known from our area only in Georgia and Tennessee except for isolated stations in the Coastal Plain of South Carolina and Florida.
15. *P. berchtoldi* Fieber—Very variable species, known only from one or two isolated stations in our territory, probably occurs more widely unrecognized. Cited as *P. pusillus* L. by Small.

## 2. *Zannichellia* [Mich.] L.

*Zannichellia palustris* L. Horned Pondweed—Hard waters and brackish as well as fresh situations, infrequent, should range over most of our area.

## 3. *Najas* L.

1. Seed shining and obscurely marked; style 1 mm. or more long ----- 1. *N. flexilis*.
1. Seed dull, coarsely pitted; style 0.5 mm. long or less ----- 2. *N. guadalupensis*.
1. *N. flexilis* (Willd.) R. & S.—Species of *Najas* observed by the senior author in the southeast have not been separated, but this is likely the most common species.
2. *N. guadalupensis* (Spreng.) Morong—Supposed to be rare and local. In addition another species, *N. gracilis* (Morong) Small, listed by Small from fresh water situations in Florida, is probably more properly *N. marina* L. var. *gracilis* Morong.

## 4. *Ruppia* L.

*R. maritima* L. Widgeon-grass—Rarely occurs inland, primarily a brackish water species, noted in artesian ponds along the coast in Georgia.

ALISMACEAE Water plantain family

- 1. Fruits borne in a ring; stamens 6; inflorescences much branched (fig. 1). 1. *Alisma*, p. 72.
- 1. Fruits in dense heads; stamens usually more than 6; inflorescences not greatly branched. 2.
- 2. Lowest flowers with only carpels, or with only stamens (fig. 2). 2. *Sagittaria*, p. 72.
- 2. Lowest flowers with both stamens and carpels... 3.



FIGURE 1.



FIGURE 2.

- 3. All flowers with stamens and carpels (fig. 3)----- 3. *Echinodorus*, p. 75.
- 3. Upper flowers with stamens only (fig. 4)----- 4. *Lophotocarpus*, p. 75.

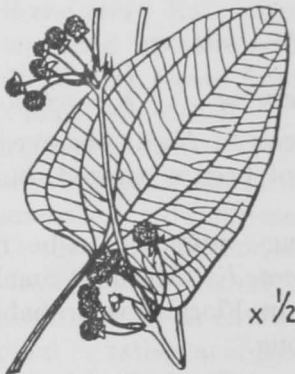


FIGURE 3.



FIGURE 4.

1. *Alisma* L.

*A. subcordatum* Raf.—Should occur over most of our territory but noted only a few times. Seems to prefer alluvial situations.

2. *Sagittaria* L.

- 1. Sepals appressed to the fruit head----- 1. *S. montevidensis*.
- 1. Sepals lax or reflexed but not appressed to the fruit head. 2.
- 2. Fruit-bearing pedicels reflexed or recurved... 3.
- 2. Fruit-bearing pedicels ascending----- 5.

3. Filaments glabrous..... 4.
3. Filaments pubescent..... 2. *S. platyphylla*.
4. Inflorescence not branched; leaves not attenuate. 3. *S. subulata*.
4. Inflorescence branched; leaves attenuate..... 4. *S. filiformis*.
5. Leaves without basal lobes..... 6.
5. Leaves, at least some of them, with basal lobes..... 16.
6. Pedicels of pistillate flowers as long (or nearly so) as staminate. 7.
6. Pedicels of pistillate flowers very short or nearly wanting. 15.
7. Filaments not dilated, slender..... 8.
7. Filaments dilated, relatively short..... 10.
8. Bracts and sepals granular-papillose..... 5. *S. falcata*.
8. Bracts and sepals ribbed..... 9.
9. Achene gradually long-beaked; dorsal wing thick and even. 6. *S. lancifolia*.
9. Achene abruptly minutely beaked, dorsal wing thick and crested. 7. *S. angustifolia*.
10. Leaf-blades 3-sided, often imperfectly developed. 11.
10. Leaf-blades flat..... 12.
11. Achene 2 mm. long with several facial wings; anthers longer than filaments. 8. *S. teres*.
11. Achene 1 mm. long with 3 low facial ribs; anthers shorter than filaments. 9. *S. isoetiformis*.
12. Achene oval or broadly elliptic..... 10. *S. cycloptera*.
12. Achene cuneate..... 13.
13. Beak large, horizontal, at top of achene body..... 11. *S. mohrii*.
13. Beak minute, borne below top of achene body..... 14.
14. Inflorescence simple; achene with lateral wings or ribs. 12. *S. graminea*.
14. Inflorescence compound; achene without lateral ribs or wings. 13. *S. chapmanii*.
15. Fruit head not echinate; achene widely-winged and short-beaked. 14. *S. macrocarpa*.
15. Fruit head echinate; achene narrowly-winged and long-beaked. 15. *S. rigida*.
16. Achene minutely beaked..... 12. *S. graminea*.
16. Achene prominently beaked..... 17.
17. Beak of achene horizontal or nearly so..... 16. *S. latifolia*.
17. Beak of achene erect..... 18.
18. Filaments pubescent..... 19.
18. Filaments glabrous..... 17. *S. longirostra*.
19. Pistillate pedicels very short; sepals and bracts glabrous. 15. *S. rigida*.
19. Pistillate pedicels elongate; sepals and bracts pubescent. 18. *S. viscosa*.

1. *S. montevidensis* C. & S. Giant Arrow-leaf—Noted by the senior author only in ditches, marshes, and ponds along the coast but probably occurs elsewhere. Is easily distinguished by its gigantic size—the leaves sometimes reach a half a meter in length.



2. *S. platyphylla* (Engelm.) J. G. Smith. Swamp-potato—Found only in the western part of our territory, most abundant along the lower Mississippi River.

3. *S. subulata* (L.) Buchenau—The representative of this species most likely to be found in southeastern fresh water habitats is var. *natans* J. G. Smith. Has not been collected by the writers.

4. *S. filiformis* J. G. Smith—Ponds in Alabama, Florida, and possibly the Carolinas. It has not been noted by the writers.

5. *S. falcata* Pursh—Similar to the following two species. Collected from ponds and marshes along the Georgia coast.

6. *S. lancifolia* L.—The giant *Sagittaria* of the Everglades, often grows higher than a man's head. Should be found only in the southern part of our territory.

7. *S. angustifolia* Lindl.—Georgia to Louisiana in swamps, not noted by the writers.

8. *S. teres* S. Wats.—This small *Sagittaria* with imperfectly developed leaves has been collected by the senior author from the edges of open, acid limesinks in southwest Georgia. Its published range is South Carolina to Massachusetts.

9. *S. isoetiformis* J. G. Smith—Said to occur in Georgia and Florida in the Coastal Plain.

10. *S. cycloptera* (J. G. Smith) C. Mohr—Swamps in the Coastal Plain, Florida to South Carolina and westward along the Gulf of Mexico to beyond the limits of our range.

11. *S. mohrii* J. G. Smith—Coastal Plain, Florida to Georgia and Mississippi in ponds.

12. *S. graminea* Michx.—This narrow-leafed *Sagittaria* should range over most of our territory. Has been noted often.

13. *S. chapmanii* (J. G. Smith) C. Mohr—Strictly Coastal Plain in distribution, Florida, Georgia, and Alabama.

14. *S. macrocarpa* J. G. Smith—Ponds, South and North Carolina.

15. *S. rigida* Pursh—Well distributed species, probably not common in our territory, although said to occur south to Florida. Forma *elliptica* (Engelm.) Fernald has broad and sometimes lobed leaves.

16. *S. latifolia* Willd.—Most abundant and one of our most variable species, found in some form over all of our territory. Variety *pubescens* (Muhl.) J. G. Smith is hairy on the bracts, sepals, and inflorescence rachis and is primarily Coastal Plain in distribution. Variety *obtusa* (Muhl.) Weigand has the leaf tip blunt or rounded. Forma *gracilis* (Pursh) Robinson has very narrow leaf-lobes. Forma *diversifolia* (Engelm.) Robinson has lobeless as well as lobed leaves. Forma *hastata* (Pursh) Robinson has hastate rather than sagittate leaves. This species has been found in association with *Anopheles quadrimaculatus*.



17. *S. longirostra* (Micheli) J. G. Smith—Usually found in the Coastal Plain, noted in acid, open ponds in Georgia.

18. *S. viscosa* C. Mohr—Restricted to North Florida and South Alabama in marshes.

### 3. *Echinodorus* L. C. Rich.

- |                                                                                                       |                           |
|-------------------------------------------------------------------------------------------------------|---------------------------|
| 1. Achene with little or no beak, stamens 9; plants small (usually less than 1.5 dm.), leaves narrow. | 1. <i>E. tenellus</i> .   |
| 1. Achene prominently beaked, stamens 12–21; plants usually longer, leaves broadened,                 | 2.                        |
| 2. Flowering stems erect; stamens 12.....                                                             | 2. <i>E. cordifolia</i> . |
| 2. Flowering stems arching or creeping, often rooting at nodes; stamens about 21.                     | 3. <i>E. radicans</i> .   |

1. *E. tenellus* (Martius) Buchenau—Should range over most of our territory, not noted by the writers. Called by Small *Helanthium parvulum* (Engelm.) Britton.

2. *E. cordifolius* (L.) Griseb. Burhead—Should also be well distributed over our area, not common.

3. *E. radicans* (Nutt.) Engelm. Burhead—Well distributed over our area, but infrequent. Prefers hard or neutral waters, noted principally in alluvial aquatic areas.

### 4. *Lophotocarpus* T. Durand

*L. calycinus* (Engelm.) J. G. Smith—Confined to western part of our territory. Noted along Mississippi River just north of our territory.

## HYDROCHARITACEAE Frog-bit family

### 1. *Anacharis* Planch

- |                                                                |                           |
|----------------------------------------------------------------|---------------------------|
| 1. Leaves 3 in whorls; petals less than 5 mm. long or wanting. | 1. <i>A. canadensis</i> . |
| 1. Leaves 4 in whorls; petals prominent, about 1 cm. long.     | 2. <i>A. densa</i> .      |

1. *A. canadensis* (Michx.) Planch. Waterweed—Occurs mostly north of our territory but present in Reelfoot Lake, Tennessee.

2. *A. densa* (Planch.) Victorin—Occurs as an escape from aquaria. Collected in Chatham County, Georgia, where it harbored *Anopheles quadrimaculatus*. Besides the above two, there is a third, very local species in middle Tennessee.

### 2. *Vallisneria* [Mich.] L.

*V. americana* Michx. Eelgrass—Some authorities differentiate two species of *Vallisneria* in the southeast, but these two are very similar. Except along the Gulf Coast, Eelgrass is very rare (or absent) in our territory.

3. *Limnobium* L. C. Rich.

*L. spongia* (Bosc) Steud. Frog-bit—Fairly common over most of our territory. It has been noted in very acid and in alkaline waters, thus showing considerable tolerance. It has been found in association with *Anopheles* and is mat-forming.

## GRAMINEAE Grass family

- |                                                                                          |                               |
|------------------------------------------------------------------------------------------|-------------------------------|
| 1. Plants floating, or forming mats at surface of water, 2.<br>or creeping along ground. | 3.                            |
| 1. Plants essentially erect.....                                                         | 3.                            |
| 2. Leaves floating flat on surface; inflorescences<br>minute and inconspicuous (fig. 1). | 7. <i>Hydrochloa</i> , p. 82. |
| 2. Leaves not flat-floating; inflorescences large<br>and conspicuous (fig. 2).           | 9. <i>Paspalum</i> , p. 82.   |

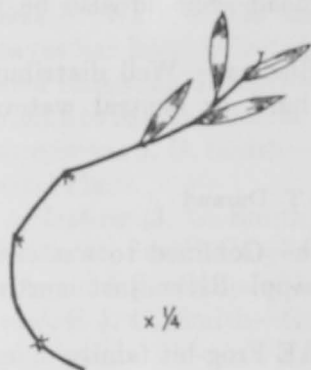


FIGURE 1.



FIGURE 2.

- |                                                                                                                |                                |
|----------------------------------------------------------------------------------------------------------------|--------------------------------|
| 3. Plants with two kinds of spikelets; that is, pistils and stamens borne in different spikelets.              | 4.                             |
| 3. Plants with all spikelets alike; stamens and pistils in same spikelets.                                     | 6.                             |
| 4. Inflorescences not expanded; the lower pistillate portion breaking up into bony, bead-like joints (fig. 3). | 16. <i>Tripsacum</i> , p. 84.  |
| 4. Inflorescence expanded-----                                                                                 | 5.                             |
| 5. Pistillate spikelets borne above staminate in inflorescence; leaves not cutting (fig. 4).                   | 4. <i>Zizania</i> , p. 81.     |
| 5. Pistillate and staminate spikelets intermixed; leaves with scabrous, cutting margins (fig. 5).              | 6. <i>Zizaniopsis</i> , p. 82. |

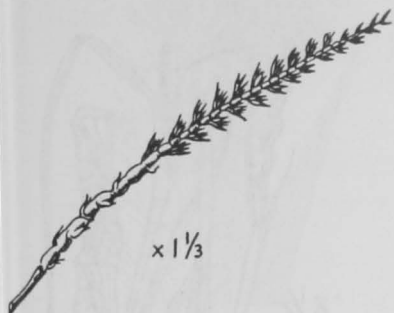


FIGURE 3.



FIGURE 4.



FIGURE 5.

- |                                                                                       |                                 |
|---------------------------------------------------------------------------------------|---------------------------------|
| 6. Plants woody, bamboo-like (fig. 6)-----                                            | 1. <i>Arundinaria</i> , p. 80.  |
| 6. Plants not woody-----                                                              | 7.                              |
| 7. Inflorescence made up of bony, bead-like joints (fig. 7).                          | 15. <i>Manisuris</i> , p. 84.   |
| 7. Inflorescence not made up of bony, bead-like joints----                            | 8.                              |
| 8. Inflorescence feathery, long-hairy, or spiny---                                    | 9.                              |
| 8. Inflorescence smooth-----                                                          | 11.                             |
| 9. Inflorescence plume-like, feathery or at least spiny;<br>not appearing branched.   | 10.                             |
| 9. Inflorescence not plume-like nor feathery; panicle<br>obviously branched (fig. 8). | 12. <i>Echinochloa</i> , p. 83. |



FIGURE 6.



FIGURE 7.



FIGURE 8.

- |                                                                                                      |                               |
|------------------------------------------------------------------------------------------------------|-------------------------------|
| 10. Spikelets spineless (awnless) but subtended by several bristles; panicle often nodding (fig. 9). | 13. <i>Setaria</i> , p. 84.   |
| 10. Spikelets long-spiny (long-awned), with or without hairs at base; panicle not nodding (fig. 10). | 14. <i>Erianthus</i> , p. 84. |



FIGURE 9.

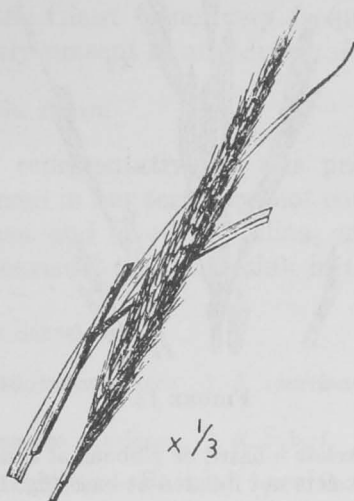


FIGURE 10.

- |                                                                                                                   |                             |
|-------------------------------------------------------------------------------------------------------------------|-----------------------------|
| 11. Spikelets appressed along one side of rachis, forming 1 to many compact 1-sided spikes or spike-like racemes. | 12.                         |
| 11. Spikelets not appressed along one side of rachis-----                                                         | 14.                         |
| 12. Spikelets 6 mm. long or more; grass growing in huge clumps (fig. 11).                                         | 3. <i>Spartina</i> , p. 81. |
| 12. Spikelets 5 mm. long or less-----                                                                             | 13.                         |
| 13. Spikelets arranged along rachis with back of fruit away from rachis; rachis 3-sided (fig. 12).                | 8. <i>Axonopus</i> , p. 82. |
| 13. Spikelets arranged along rachis with back of fruit toward rachis; rachis often winged or foliaceous (fig. 2). | 9. <i>Paspalum</i> , p. 82. |

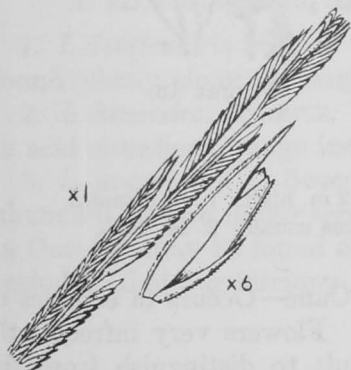


FIGURE 11.

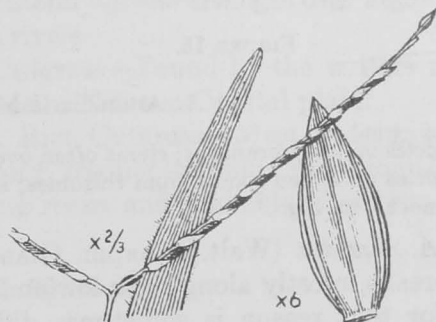


FIGURE 12.

14. Spikelets with several florets (fig. 13)----- 2. *Glyceria*, p. 81.  
 14. Spikelets 1-flowered----- 15.  
 15. Spikelets very strongly flattened (fig. 14)----- 4. *Leersia*, p. 81.  
 15. Spikelets not strongly flattened----- 16.



FIGURE 13.

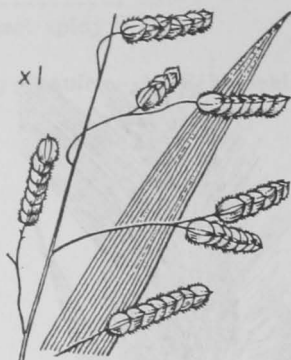


FIGURE 14.

16. Spikelets inflated or gibbous at base (fig. 15)----- 11. *Sacciolepis*, p. 83.  
 16. Spikelets not inflated at base (fig. 16)----- 10. *Panicum*, p. 82.

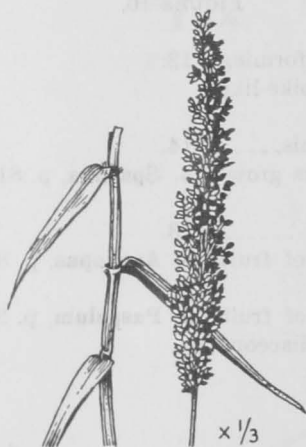


FIGURE 15.



x8



x1

x10

FIGURE 16.

### 1. *Arundinaria* Michx.

1. Panicles on leafy branches; stems often over 2 m. high. 1. *A. gigantea*.  
 1. Panicles on naked shoots from rhizomes; stems usually under 2 m. high. 2. *A. tecta*.

1. *A. gigantea* (Walt.) Chapm. Giant Cane—Occurs in colonies or canebreaks, mostly along river lowlands. Flowers very infrequently and for that reason is sometimes difficult to distinguish from the following species. Both species occur over all of our area, but the

Giant Cane is evidently much less abundant. *Phragmites communis* Trin., another large bamboo-like species, is found locally in our territory, mostly in brackish situations. It may be distinguished by its wide, spreading leaves and its feathery inflorescence.

2. *A. tecta* (Walt.) Muhl. Small Cane—More characteristically Coastal Plain in distribution than the Giant Cane, very frequent in moist places of many kinds but rarely present in any depth of water.

## 2. *Glyceria* R. Brown

*G. septentrionalis* Hitchc.—Only representative of this primarily aquatic genus which must be considered in our territory, not common. It has been recorded from Alabama and South Carolina, and the senior writer collected it on one occasion from a limesink in Coastal Plain Georgia.

## 3. *Spartina* Schreb.

1. Spikes numerous, at least more than 10; inflorescence dense, cylindric. 1. *S. spartinae*.

1. Spikes fewer, not more than 10; inflorescence not dense. 2. *S. bakeri*.

1. *S. spartinae* (Trin.) Merr. Cordgrass—Several species of this genus occur in our territory but only this and the following species are characteristically found in fresh water. In our territory it has been collected near the coast in Florida and Mississippi where it occurs in marshes and swamps.

2. *S. bakeri* Merr. Cordgrass—Well distributed in Florida, found less commonly near the coast in Georgia and further north; occurs also in brackish water.

## 4. *Leersia* Swartz

1. Spikelets broadly oval, 3 to 4 mm. wide----- 1. *L. lenticularis*.

1. Spikelets narrower, elliptic----- 2.

2. Panicles narrow the branches ascending or appressed. 2. *L. hexandra*.

2. Panicles expanded, the branches spreading----- 3. *L. oryzoides*.

1. *L. lenticularis* Michx. Catchfly-grass—Ranges over all our area, found mostly along the larger rivers.

2. *L. hexandra*. Swartz. Cutgrass—Found by the writers mostly in acid situations, range includes all of our Coastal plain.

3. *L. oryzoides* (L.) Swartz. Rice Cutgrass—Most widespread and abundant *Leersia* in our territory, frequently found in limesink ponds in Georgia, may be found along rivers and probably elsewhere, range includes all of our territory.

## 5. *Zizania* L.

*Z. aquatica* L. Wild rice—Not common in our territory, seen most frequently in fresh-water marshes near the coast, but has been recorded from every State in our range.

6. *Zizaniopsis* Doell and Aschers

*Z. miliacea* (Michx.) Doell and Aschers. Cutgrass—Often grows in the same situations as *Zizania* but usually more abundant. Marshes along the larger rivers seem to be favored by it, and in Reelfoot Lake, Tennessee, *Anopheles quadrimaculatus* has been found associated with it. Its range includes all of our Coastal Plain.

7. *Hydrochloa* Beauv.

*H. caroliniensis* Beauv.—Widespread in the Coastal Plain, Florida to North Carolina and Louisiana; occurs in acid to neutral water, showing considerable tolerance; has often been found harboring *Anopheles quadrimaculatus*.

8. *Axonopus* Beauv.

- |                                                             |                         |
|-------------------------------------------------------------|-------------------------|
| 1. Spikelets 4 to 5 mm. long, glabrous.....                 | 1. <i>A. furcatus</i> . |
| 1. Spikelets about 2 mm. long, sparsely appressed, silky... | 2. <i>A. affinis</i> .  |

1. *A. furcatus* (Flügge) Hitchc.—Coastal Plain species, noted along acid lake margins in the Okefinokee Swamp, occurs in all of our States except Tennessee.

2. *A. affinis* Chase. Carpet-grass—Coastal Plain species, most often found in acid situations, well distributed over our area but seldom grows in over an inch or two of water. Often behaves like a weed.

9. *Paspalum* L.

- |                                                                                   |                          |
|-----------------------------------------------------------------------------------|--------------------------|
| 1. Rachis of inflorescence foliaceous, broad.....                                 | 2.                       |
| 1. Rachis not foliaceous or winged.....                                           | 3.                       |
| 2. Rachis extending beyond uppermost spikelets;<br>racemes many, at least over 6. | 1. <i>P. repens</i> .    |
| 3. Rachis not extending beyond uppermost spike-<br>let; racemes 2 to 4.           | 2. <i>P. dissectum</i> . |
| 3. Racemes usually 2 (sometimes with a third).....                                | 3. <i>P. distichum</i>   |
| 3. Racemes usually 4 to 6.....                                                    | 4. <i>P. praecox</i> .   |

1. *P. repens* Berg.—Floating or reclining plant, has been recorded from all the States in our territory except possibly North Carolina, not frequent.

2. *P. dissectum* L.—Well distributed in our area, infrequent, collected once from limesink in Georgia, habit similar to preceding.

3. *P. distichum* L.—Has been recorded from all of the States in our territory, most common near the coast.

4. *P. praecox* Walt.—Coastal Plain, sometimes in aquatic situations. In addition to the four species given above, there are several other species of *Paspalum* which sometimes occur in wet places, but since this is only an occasional habit for these species they are not included here.

10. *Panicum* L.

- |                                                            |    |
|------------------------------------------------------------|----|
| 1. Spikelets short-pedicelled along one side of the rachis | 2. |
| forming spike-like racemes.                                |    |
| 1. Inflorescences open or sometimes contracted and with    | 3. |
| one-sided racemes but not as above.                        |    |



- |                                                                               |                            |
|-------------------------------------------------------------------------------|----------------------------|
| 2. Glume almost as long as the lemma.....                                     | 1. <i>P. gymnocarpon</i> . |
| 2. Glume much shorter than lemma.....                                         | 2. <i>P. hemitomum</i> .   |
| 3. Plants with conspicuous creeping rhizomes.....                             | 3. <i>P. virgatum</i> .    |
| 3. Plants without creeping rhizomes.....                                      | 4.                         |
| 4. Panicles narrow and few-flowered.....                                      | 4. <i>P. tenerum</i> .     |
| 4. Panicles more or less spreading.....                                       | 5.                         |
| 5. Spikelets 1.8 to 2 mm. long; panicle branches ascend-<br>ing or spreading. | 5. <i>P. agrostoides</i> . |
| 5. Spikelets 2.5 mm. long; panicle branches erect or<br>nearly so.            | 6. <i>P. condensum</i> .   |

1. *P. gymnocarpon* Ell.—Lower Gulf State species, Georgia and Florida westward, usually associated with rivers or streams.

2. *P. hemitomum* Schultes. Maidencane—Coastal Plain species, ranges over all of our Coastal Plain territory. Makes good growth in open, grassy limesinks and occurs also in the Okefinokee Swamp. It is perhaps the most important of the aquatic Panic-grasses.

3. *P. virgatum* L. Switchgrass—Aquatic and other situations mostly along the coast, but range includes most of our area.

4. *P. tenerum* Beyr.—Coastal Plain, North Carolina to Florida and Texas, seems to prefer acid situations.

5. *P. agrostoides* Spreng.—Well distributed over our area, in some places an important constituent of the aquatic flora, usually occupies a marginal position.

6. *P. condensum* Nash—Resembles the preceding, but of Coastal Plain distribution. In addition to the six given, there are several other Panic-grasses which sometimes appear to be aquatic, and there are in South Florida perhaps two truly aquatic species which are not listed.

#### 11. *Sacciolepis* Nash

*S. striata* (L.) Nash—Frequent in portions of our region, in Georgia seems to prefer acid situations, range includes all of our Coastal Plain.

#### 12. *Echinochloa* Beauv.

- |                                                                                   |                          |
|-----------------------------------------------------------------------------------|--------------------------|
| 1. Lower leaf-sheaths smooth; awns various but panicles<br>not densely hairy.     | 1. <i>E. crusgalli</i> . |
| 1. Lower leaf-sheaths hairy; panicles densely hairy from<br>long-awned spikelets. | 2. <i>E. walteri</i> .   |

1. *E. crusgalli* (L.) Beauv. Wild Millet—Widely distributed, often weedy, range includes all of our area, it and the following species common near the coast.

2. *E. walteri* (Pursh) Heller—In marshes along the coast, less commonly in aquatic areas near the larger rivers, range includes all of our territory.

13. *Setaria* Beauv.

*S. magna* Griseb. Giant Bristlegrass—Marshes near the coast over most of our territory.

14. *Erianthus* Michx.

- |                                                        |                            |
|--------------------------------------------------------|----------------------------|
| 1. Spikelets naked or nearly so at base-----           | 1. <i>E. strictus</i> .    |
| 1. Spikelets with a conspicuous hair tuft at base----- | 2.                         |
| 2. Basal hairs sparse and shorter than spikelets-----  | 2. <i>E. brevibarbis</i> . |
| 2. Basal hairs copious and longer than spikelet-----   | 3. <i>E. giganteus</i> .   |

1. *E. strictus* Baldw. Narrow Plumegrass—Coastal Plain acid aquatic areas, over most of our area.

2. *E. brevibarbis* Michx. Brown Plumegrass—Distribution similar to the preceding.

3. *E. giganteus* (Walt.) Muhl. Giant Plumegrass—More truly aquatic than the preceding two, similarly distributed.

15. *Manisuris* L.

*M. rugosa* (Nutt.) Kuntze—In acid situations, range includes all of our Coastal Plain territory.

16. *Tripsacum* L.

*T. dactyloides* L. Gamagrass—Widely distributed in moist places; not common, range includes all of our territory.

## CYPERACEAE Sedge family

- |                                                             |                               |
|-------------------------------------------------------------|-------------------------------|
| 1. Flowers with both stamens and pistils-----               | 2.                            |
| 1. Stamens and pistils in different flowers-----            | 12.                           |
| 2. Stem with one or more terminal spikelets;                | 3.                            |
| leaves absent.                                              |                               |
| 2. Stem with a leaf or leaves extending beyond              | 4.                            |
| spikelets (If a single leaf, this leaf may                  |                               |
| appear like continuation of scape).                         |                               |
| 3. Stem topped by a single spikelet; a leaf-sheath present  | 4. <i>Eleocharis</i> , p. 88. |
| only at the base of the stem (fig. 1).                      |                               |
| 3. Stem topped by 1 to several spikelets; leaf-sheaths dis- | 6. <i>Fuirena</i> , p. 93.    |
| tributed along the stem (fig. 2).                           |                               |

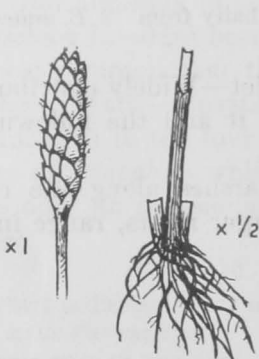


FIGURE 1

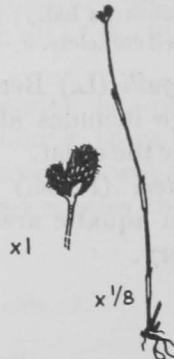


FIGURE 2

- 4. Spikelets subtended by conspicuous white or partly white bracts (fig. 3). 7. *Dichromena*, p. 94.
- 4. Spikelets not subtended by white bracts----- 5.
- 5. Scales of the spikelet 2-ranked, often making the spikelet appear flattened. 6.
- 5. Scales of the spikelet spirally overlapping, not 2-ranked. 7.
- 6. Stem round, hollow; spikelets borne in axillary as well as terminal clusters (fig. 4). 1. *Dulichium*, p. 87.
- 6. Stem 3-angled, sometimes bluntly so; spikelets borne in terminal clusters (fig. 5). 2. *Cyperus*, p. 87.



FIGURE 3



FIGURE 4



FIGURE 5

7. Achene bearing a tubercle (formed by the swollen persistent style base). 8.
7. Achene not bearing a tubercle----- 9.
8. Spikelets with more than 2 scales enclosing achenes; no perianth-bristles present (fig. 6). 8. *Psilocarya*, p. 94.
8. Spikelets with only 1 or 2 scales enclosing achenes; perianth-bristles usually present (fig. 7). 9. *Rhynchospora*, p. 94.

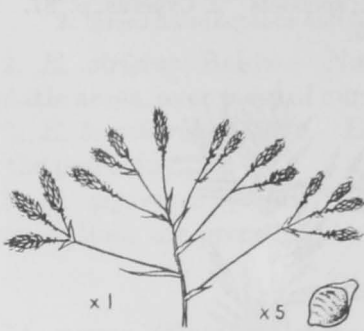


FIGURE 6



FIGURE 7

9. Spikelets with the uppermost scale only enclosing an achene; our commonest species has saw-edged, cutting leaves (fig. 8). 10. *Cladium*, p. 98.
9. Spikelets with the upper several scales bearing achenes; leaves not armed. 10.
10. Each scale of spikelet bearing a bristle or awn near the apex (fig. 9). 6. *Fuirena*, p. 93.
10. Each scale of spikelet not bearing a bristle or awn. 11.

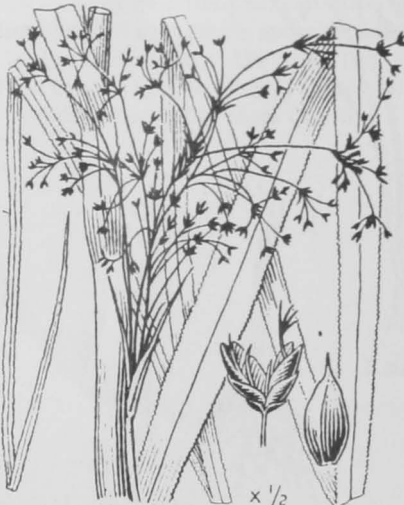


FIGURE 8

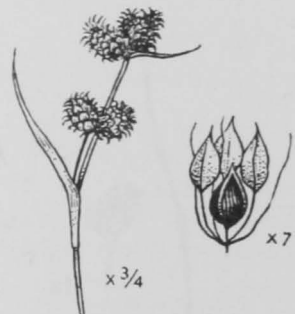


FIGURE 9

11. Style swollen at base but the swollen base not persistent on achene (fig. 10). 3. *Fimbristylis*, p. 88.  
 11. Style not swollen at base (fig. 11)----- 5. *Scirpus*, p. 91.

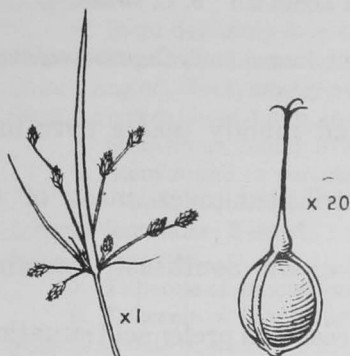


FIGURE 10

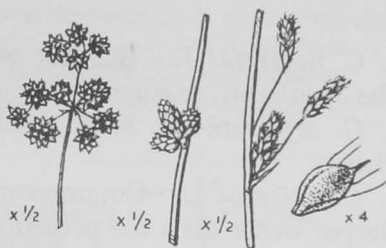


FIGURE 11

12. Achene exposed (fig. 12)----- 11. *Scleria*, p. 98.  
 12. Achene enclosed in a sac (perigynium) (fig. 14) - 12. *Carex*, p. 98.



FIGURE 12.

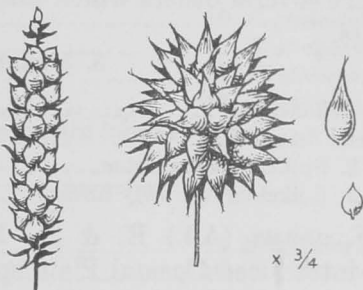


FIGURE 13.

1. *Dulichium* L. C. Rich.

*D. arundinaceum* (L.) Britton—This species is distributed over most of our area, and seems to prefer acid situations, at least in the Coastal Plain.

2. *Cyperus* [Tourn.] L.

1. Achenes lenticular, 2-sided----- 1. *C. flavescens*.  
 1. Achenes triangular in x-section, 3-sided----- 2.  
     2. Plants perennial; bases hardened, corm-like, or stoloniferous. 3.  
     2. Plants annual; bases not hardened or stoloniferous. 2. *C. erythrorhizos*.  
 3. Scales of spikelets deciduous, falling away from the rachilla of the spikelet. 4.

- |                                                                       |                              |
|-----------------------------------------------------------------------|------------------------------|
| 3. Whole spikelet falling away from the main rachis.....              | 3. <i>C. strigosus</i> .     |
| 4. Stems naked below; rachilla of spikelet winged.....                | 4. <i>C. haspan</i> .        |
| 4. Stems leafy below.....                                             | 5.                           |
| 5. Achenes narrowly ellipsoid; scales of spikelet about 2.5 mm. long. | 5. <i>C. virens</i> .        |
| 5. Achenes linear; scales of spikelet about 2 mm. long.....           | 6. <i>C. pseudovegetus</i> . |

1. *C. flavescens* L.—Shallow water and muddy places over most of the Southeast, frequent.

2. *C. erythrorhizos* Muhl.—Also distributed over most of our territory.

3. *C. strigosus* L.—Common over all of the Southeast, sometimes in deeper water than the preceding.

4. *C. haspan* L.—Often truly aquatic, seems to prefer acid situations, Coastal Plain, Florida north and west to beyond the limits of our territory.

5. *C. virens* Michx.—Collected from aquatic areas near the coast in Georgia, range includes all of our Coastal Plain.

6. *C. pseudovegetus* Steud.—Fairly common in shallow waters, mostly in Coastal Plain, Florida north and west to beyond the limits of our area. In addition to the six species of *Cyperus* here enumerated, there are several others which may occasionally be found in aquatic habitats.

### 3. *Fimbristylis* Vahl

- |                                   |                           |
|-----------------------------------|---------------------------|
| 1. Achene lenticular.....         | 1. <i>F. annua</i> .      |
| 1. Achene 3-angled.....           | 2.                        |
| 2. Spikelets subglobose.....      | 2. <i>F. miliacea</i> .   |
| 2. Spikelets narrowly linear..... | 3. <i>F. autumnalis</i> . |

1. *F. annua* (All.) R. & S.—Noted in shallow water along the coast, introduced Coastal Plain species, Florida to Georgia and westward to beyond the limits of our territory.

2. *F. miliacea* Vahl—Introduced species, collected by the senior writer from several stations near the coast in Georgia, also known to occur in North Florida.

3. *F. autumnalis* (L.) R. & S.—Common over all of our territory. Variety *mucronulata* (Michx.) Fernald is the only form which the writers have encountered. There are in addition perhaps one or two unlisted species of this genus which may occasionally be found in fresh water.

### 4. *Eleocharis* R. Brown

- |                                                                          |    |
|--------------------------------------------------------------------------|----|
| 1. Spikelets little or no thicker than the stem; scales mostly leathery. | 2. |
| 1. Spikelets much thicker than the stem; scales mostly membranous.       | 7. |
| 2. Stem with definite septa making it appear nodose.                     | 3. |
| 2. Stem not nodose-septate.....                                          | 4. |

3. Septa becoming much closer together near top of stem; perianth-bristles longer than achene. 1. *E. interstincta*.
3. Septa evenly spaced; perianth-bristles shorter than the achene. 2. *E. equisetoides*.
4. Stem definitely 3 or 4-angled..... 5.
4. Stem round or sometimes flattened..... 6.
5. Stem 4-angled, stout, mostly over 2 mm. in diameter... 3. *E. quadrangulata*.
5. Stem 3-angled, about 1 mm. in diameter..... 4. *E. robbinsii*.
6. Stem stout, round, over 2 mm. in diameter... 5. *E. cellulosa*.
6. Stem round or sometimes flattened, about 1 mm. in diameter. 6. *E. elongata*.
7. Achenes lenticular; 2-sided..... 8.
7. Achenes 3-angled..... 12.
8. Tubercle of achene lamelliform (plate-like)--- 7. *E. obtusa*.
8. Tubercle of achene not lamelliform..... 9.
9. Sheaths at base of stem firm at the apex..... 10.
9. Sheaths at base of stem membranous at apex..... 13.
10. Plants perennial from elongated rootstocks... 11.
10. Plants tufted and annual, without conspicuous rootstocks. 12.
11. Tips of spikelet scales spreading; 2 or 3 non-fertile scales at base of spikelet. 8. *E. smallii*.
11. Tips of spikelet scales erect; 1 non-fertile scale present at base of spikelet and this entirely encircles the base. 9. *E. calva*.
12. Achene 1 mm. long..... 10. *E. geniculata*.
12. Achene 0.5 mm. long..... 11. *E. atropurpurea*.
13. Mature achene olive colored..... 12. *E. olivacea*.
13. Mature achene black or deep-brown..... 13. *E. flavescens*.
14. Achene cancellate; that is the surface formed into small cells. 15.
14. Achene smooth, papillose, or irregularly ridged. 18.
15. Achene with longitudinal ribs..... 14. *E. acicularis*.
15. Achene without longitudinal ribs..... 16.
16. Achene 1 mm. or less long; stems often proliferous. 15. *E. vivipara*.
16. Achene at least 1.5 mm. long; stems not proliferous. 17.
17. Tubercle as large as the achene or larger, mitre-like... 16. *E. tuberculosa*.
17. Tubercle smaller than achene, conic..... 17. *E. tortilis*.
18. Achenes shining, black, topped by a depressed whitish tubercle. 18. *E. melanocarpa*.
18. Achenes not black..... 19.
19. Achenes with the 3 angles ribbed..... 19. *E. tricostata*.
19. Achenes with the angles not ribbed..... 20.
20. Spikelets obviously distichous; that is, scales of spikelets in 2-ranks. 20. *E. baldwinii*.
20. Spikelets scales not 2-ranked..... 21. *E. microcarpa*.

1. *E. interstincta* (Vahl) R. & S. Spikerush—Tropical species known from two Florida counties but probably occurs more widely in that State. The senior writer collected it from marshes near Lake Okechobee in Glades County.



2. *E. equisetoides* (Ell.) Torr. Knotted Spikerush—Chiefly Coastal Plain, should occur over most of our territory. In Georgia most often seen in acid, open ponds.

3. *E. quadrangulata* (Michx.) R. & S. Square-stemmed Spikerush—Ponds and marshes, chiefly Coastal Plain. Not definitely recorded from Florida, Alabama, or Mississippi, but may occur in these as well as our other states. In Georgia found mostly along the coast but at least one inland station, a grassy limesink, was observed.

4. *E. robbinsii* Oakes—Occurs widely on the Coastal Plain over all of our territory, observed by the senior writer mostly in acid, open limesink ponds.

5. *E. cellulosa* Torr.—Confined to areas along the coast in Florida, Georgia, Mississippi, and probably Alabama. In Florida frequently seen in acid freshwater ponds just behind the dunes along the Gulf of Mexico.

6. *E. elongata* Chapm.—Noted by the senior author with the preceding in the Gulf region of North Florida, and collected from the Okefinokee Swamp and from acid, open limesinks in Georgia. Occurs also in South Alabama, but its range in our territory is not extensive.

7. *E. obtusa* (Willd.) Schultes—One of the most frequent of our Spikerushes, usually occurs at the margins of ponds or in swamps and muddy places, range includes all of our territory.

8. *E. smallii* Britton—Northern range but recently collected from Tennessee by Dr. H. K. Svenson in the Interior Low Plateaus. A collection from Meadow Pond near Wilson Reservoir in North Alabama by T. F. Hall has been determined as this species by Dr. Svenson, and it may prove to have an even wider distribution in our territory.

9. *E. calva* Torr.—Known in our area from Florida (no locality given on collection), South Carolina, and Middle Tennessee. It, too, may prove to have an even wider distribution, as it is difficult to identify.

10. *E. geniculata* (L.) R. & S.—Usually not strictly aquatic but occurs marginal to freshwater areas in Florida and has been recorded once from South Carolina.

11. *E. atropurpurea* (Retz.) Kunth—Has been recorded from wet places in the Coastal Plain of Georgia and Florida.

12. *E. olivacea* Torr.—Infrequent, not seen by the writers. Has been collected so seldom in the Southeast that it is difficult to characterize its distribution.

13. *E. flavescens* (Poir.) Urban—Coastal Plain, most frequently along the coast, Florida north and west to the limits of our territory.

14. *E. acicularis* R. & S.—Rare in our territory but occurs in most of the States. The senior author collected it once from an acid, open limesink pond in South Georgia.



15. *E. vivipara* Link—Very rarely flowers and so is difficult to identify, forms proliferating mats at the surface of ponds, very likely more common than the records indicate. Coastal Plain in distribution, range extends beyond the limits of our territory, not definitely recorded from Alabama or Mississippi.

16. *E. tuberculosa* (Michx.) R. & S.—One of the most frequent of the Coastal Plain Spikerushes, easily identified by the enormous tubercle of its achene. Usually in very shallow water or in moist marginal situations, often in acid soil; range includes all of our Coastal Plain.

17. *E. tortilis* (Link) Schultes—Much less common than the preceding, primarily Coastal Plain but also in the Piedmont over most of our territory.

18. *E. melanocarpa* Torr.—Distinctive species, known only from South Georgia and North Florida, perhaps because of a lack of data. It has been observed mostly in acid situations.

19. *E. tricostata* Torr.—Coastal Plain, South Georgia and North Florida, also known beyond the limits of our territory.

20. *E. baldwinii* (Torr.) Chapm.—Collected frequently only in Florida and South Georgia, single record for North Carolina. Frequents mostly pine-barrens, noted proliferating in open, grassy lime-sink ponds.

21. *E. microcarpa* Torr.—Has been collected from all of our States, common in acid moist places in the Coastal Plain. It has two well-marked varieties which are more wide-ranging than the typical plant.

### 5. *Scirpus* L.

- |                                                                                                            |                              |
|------------------------------------------------------------------------------------------------------------|------------------------------|
| 1. Inflorescence subtended by a single leaf or none, this bract appearing like a continuation of the stem. | 2.                           |
| 1. Inflorescence subtended by 2 or more bracts, leaf-like.                                                 | 8.                           |
| 2. Spikelets 1-----                                                                                        | 1. <i>S. subterminalis</i> . |
| 2. Spikelets 2-numerous-----                                                                               | 3.                           |
| 3. Spikelets 2-12, appearing lateral, not in umbel-like clusters.                                          | 4.                           |
| 3. Spikelets in umbel-like clusters, numerous-----                                                         | 6.                           |
| 4. Plants annual; scapes not sharply 3-angled----                                                          | 2. <i>S. debilis</i> .       |
| 4. Plants perennial; scapes sharply 3-angled----                                                           | 5.                           |
| 5. Scales of spikelet awned, bract much surpassing inflorescence; spikelet acute.                          | 3. <i>S. americanus</i> .    |
| 5. Scales of spikelet mucronate; bract only slightly surpassing the inflorescence; spikelets obtuse.       | 4. <i>S. olneyi</i> .        |
| 6. Stems sharply 3-angled; leaves (also 3-angled) as long as scape.                                        | 5. <i>S. etuberculatus</i> . |
| 6. Stems round; leaves reduced to mere sheaths...                                                          | 7.                           |

- |                                                                                                                  |                             |
|------------------------------------------------------------------------------------------------------------------|-----------------------------|
| 7. Achene gray, reddish, or black, abruptly acuminate----                                                        | 6. <i>S. validus</i> .      |
| 7. Achene nearly white, narrowed to short tip-----                                                               | 7. <i>S. californicus</i> . |
| 8. Spikelets crowded into 1-several globose heads.                                                               | 8. <i>S. cubensis</i> .     |
| 8. Spikelets not crowded into globose heads-----                                                                 | 9.                          |
| 9. Perianth-bristles downwardly barbed or wanting-----                                                           | 10.                         |
| 9. Perianth-bristles smooth or occasionally with a few ascending hairs.                                          | 13.                         |
| 10. Perianth-bristles wanting-----                                                                               | 9. <i>S. georgianus</i> .   |
| 10. Perianth-bristles present-----                                                                               | 11.                         |
| 11. Perianth-bristles twice as long as the achene-----                                                           | 10. <i>S. polyphyllus</i> . |
| 11. Perianth-bristles not exceeding achene in length-----                                                        | 12.                         |
| 12. Spikelets 3-8 in each head; scales obtuse; lower leaf-sheaths red-tinged; perianth-bristles barbed to base.  | 11. <i>S. sylvaticus</i> .  |
| 12. Spikelets 8-20 in each head; scales acute; lower leaf-sheaths green; perianth-bristles not barbed near base. | 12. <i>S. atrovirens</i> .  |
| 13. Perianth-bristles at maturity scarcely if at all exceeding the scales.                                       | 14.                         |
| 13. Perianth-bristles at maturity greatly exceeding scales making spikelet appear wooly.                         | 13. <i>S. eriophorum</i> .  |
| 14. Perianth-bristles about equalling achene; scales acute.                                                      | 15.                         |
| 14. Perianth-bristles about twice as long as achene; scales mucronate.                                           | 14. <i>S. lineatus</i> .    |
| 15. Spikelets 1 mm. thick; achene not papillose; inflorescence terminal only.                                    | 15. <i>S. divaricatus</i> . |
| 15. Spikelets 2-3 mm. thick; achenes papillose; inflorescence terminal and lateral.                              | 16. <i>S. fontinalis</i> .  |

1. *S. subterminalis* Torr.—Probably occurs in western part of our range, not noted by the writers.

2. *S. debilis* Pursh—Swamps mostly in the northern parts of our territory.

3. *S. americanus* Pers. Three-square Bulrush—Should occur over all of our territory, uncommon except along the coast, noted in marshes in the Everglades of Florida.

4. *S. olneyi* A. Gray—Supposed to occur in our territory from Florida north but not observed by the writers. Probably will be found along the coast.

5. *S. etuberculatus* (Steud.) Kuntze—Mostly Coastal Plain, in acid limesinks in Georgia and South Carolina, not frequent, ranges from Florida north and west to beyond the limits of our territory.

6. *S. validus* Vahl. Great Bulrush—Range covers all of our territory, observed mostly along the coast, but occurs in hard waters inland.

7. *S. californicus* (C. A. Meyer) Britton—Similar in appearance to the preceding, occurs in the southernmost part of our territory from Florida westward, common in marshes along some parts of the Gulf of Mexico.

8. *S. cubensis* Poepp. and Kunth—Introduced species, simulating *Cyperus*, found in the southernmost part of our territory from Florida westward.

9. *S. georgianus* Harper—Swamps in the northern part of our territory. Some authorities consider it merely a variety of *S. atrovirens* (#12).

10. *S. polyphyllus* Vahl—Range similar to preceding but more common.

11. *S. sylvaticus* L.—Also present only in the northern part of our territory.

12. *S. atrovirens* Muhl.—Another of the more northerly ranging group of *Scirpus*. None of the preceding four has been encountered often in the Coastal Plain by the writers.

13. *S. eriophorum* Michx. Wool-grass—Very frequent in our territory in a variety of aquatic situations. Has been found in extremely acid places, in alluvial swamps, and basic artesian ponds. Its close relative, *S. cyperinus* (L.) Kunth, with sessile instead of pedicelled spikelets, may be present in the northern part of our territory. Its range includes all of our States.

14. *S. lineatus* Michx.—Range includes all of our territory, should occur in swamps.

15. *S. divaricatus* Ell.—Mostly in swamps of creeks and rivers in the Coastal Plain, Florida north and west to beyond the limits of our territory.

16. *S. fontinalis* Harper—Known in our territory only from springy pond margins in the Coastal Plain of Georgia, may occur more widely for a variety of the species has recently been described from the Virginia Coastal Plain.

#### 6. *Fuirena* Rottb.

- |                                                                                                                   |                           |
|-------------------------------------------------------------------------------------------------------------------|---------------------------|
| 1. Leaves reduced to mere sheaths.....                                                                            | 1. <i>F. scirpoidea</i> . |
| 1. Leaves with well-developed blades.....                                                                         | 2.                        |
| 2. Plants annual, without rhizomes; perianth-<br>bristles equalling or exceeding the achene.                      | 2. <i>F. pumila</i> .     |
| 2. Plants perennial, with rhizomes; perianth-<br>bristles only reaching the middle of achene or<br>shorter.       | 3.                        |
| 3. Perianth-bristles very short, not exceeding the stipe of<br>the achene; perianth-scales orbicular or reniform. | 3. <i>F. breviseta</i> .  |
| 3. Perianth-bristles reaching the middle of the achene;<br>perianth scales deltoid-ovate                          | 4. <i>F. squarrosa</i> .  |

1. *F. scirpoidea* Michx.—Strictly Coastal Plain in distribution, Florida, South Georgia, and probably South Alabama and Mississippi. A similar species, *F. longa* Chapm. in which the upper leaf-sheaths bear leaves, occurs from West Florida to Mississippi but is not definitely aquatic.

2. *F. pumila* Torr. Umbrella-grass—Mostly of Coastal Plain distribution, supposed to occur most frequently in brackish marshes, but collected from acid pond margins. Ranges from Florida to north of our territory.

3. *F. breviseta* Coville—Common in Coastal Plain, Florida north and west to the limits of our territory.

4. *F. squarrosa* Michx.—Difficult to distinguish superficially from the preceding. Found also in acid places, Coastal Plain, Florida north and west to beyond the limits of our territory.

#### 7. *Dichromena* Michx.

1. Bracts subtending flower clusters 4-6, linear; tubercle not decurrent on the sides of the achene. 1. *D. colorata*.

1. Bracts 7-10, lanceolate; tubercle decurrent on sides of achene. 2. *D. latifolia*.

1. *D. colorata* (L.) Hitchc. White-top Rush—Coastal Plain, Florida north and west to beyond the limits of our territory in less acid situations than the following species. Common along the coast.

2. *D. latifolia* Baldw.—Range similar to preceding, habitat more acid.

#### 8. *Psilocarya* Torr.

1. Tubercle higher than wide, as long or nearly as long as achene, somewhat decurrent. 1. *P. corymbifera*.

1. Tubercle broader than long, much shorter than achene, not decurrent. 2. *P. nitens*.

1. *P. corymbifera* (C. Wright) Britton—Around ponds in acid situations, Coastal Plain, Florida, Georgia, and probably Alabama and Mississippi.

2. *P. nitens* (Vahl) Wood. Bald-rush—Similar situations to the above but more widespread, Florida north and west to beyond the limits of our territory. A third species, *P. scirpoides* Torr., may enter our territory in North Carolina, and the senior writer has one or two Georgia specimens which have been determined as this.

#### 9. *Rhynchospora* Vahl

1. Tubercle of achene over twice as long as achene..... 2.

1. Tubercle as long as achene or shorter..... 6.

2. Tubercle very slender over all; spikelets in 1-4 dense, globose heads. 1. *R. tracyi*.

2. Tubercle broadened at the base, narrowed upward; spikelets pedicelled. 3.

3. Perianth-bristles shorter than achene..... 2. *R. corniculata*.

3. Perianth-bristles much longer than achene..... 4.

4. Plant not stoloniferous; spikelets in clusters of 10-50 together. 3. *R. macrostachya*.

4. Plant stoloniferous; spikelets few in each cluster. 5.

5. Achene ellipsoid-obovate, much longer than wide..... 4. *R. inundata*.
5. Achene broadly-obovate, slightly longer than wide... 5. *R. careyana*.
6. Perianth-bristles wanting or very short..... 7.
6. Perianth-bristles well-developed..... 8.
7. Achene transversely wrinkled..... 6. *R. intermixta*.
7. Achene smooth..... 7. *R. chapmanii*.
8. Perianth-bristles downwardly barbed..... 9.
8. Perianth-bristles upwardly barbed..... 13.
9. Clusters of spikelets loose..... 10.
9. Spikelets in dense globose heads..... 11.
10. Achene 1.5-2 mm. long; panicles rather loose; if achene is 1.5 mm. long spikelets 2-3 flowered. 8. *R. glomerata*.
10. Achene 1.5 mm. long, panicles dense; spikelets with 1 perfect flower. 9. *R. chalarocephala*.
11. Achenes 2.5 mm. long; spikelets 5-6 mm. long..... 10. *R. cephalantha*.
11. Achenes about 1.5 mm. long; spikelets 3-3.5 mm. long. 12.
12. Heads not truly globose, not tightly compacted; basal leaves 1-2 mm. wide, involute. 9. *R. chalarocephala*.
12. Heads very compact and globose; basal leaves 1.5-3 mm. wide, flat. 11. *R. microcephala*.
13. Achenes smooth or cancellate, not transversely wrinkled. 14.
13. Achenes transversely wrinkled..... 20.
14. Achenes cancellate..... 12. *R. harveyi*.
14. Achenes smooth..... 15.
15. Tubercle of achene serrulate to ciliate..... 16.
15. Tubercle of achene smooth or granular..... 18.
16. Achene 1 mm. long, light brown..... 13. *R. filifolia*.
16. Achene 1.5-2 mm. long, dark brown..... 17.
17. Achenes narrowly obovoid, much less than 1 mm. wide. 14. *R. fusca*.
17. Achene broadly obovoid, about 1 mm. wide..... 15. *R. harperi*.
18. Perianth-bristles much longer than achene.. 16. *R. gracilentia*.
18. Perianth-bristles much shorter than achene.. 19.
19. Leaf-blades linear; spikelets 4-5 mm. long..... 17. *R. fascicularis*.
19. Leaf-blades bristle-like, filiform; spikelets 2.5-3 mm. long. 18. *R. wrightiana*.
20. Perianth-bristles shorter than the achene..... 21.
20. Perianth-bristles as long as achene or longer... 26.
21. Leaf-blades involute..... 19. *R. torreyana*.
21. Leaf-blades flat..... 22.
22. Achene biconvex, not constricted under tubercle. 23.
22. Achene compressed, constricted under tubercle. 20. *R. compressa*.
23. Achene 1 mm. long; tubercle wider than high..... 24.
23. Achene 1.5 mm. long; tubercle about as long as wide... 21. *R. cymosa*.
24. Achene ellipsoidal, manifestly longer than broad, finely wrinkled. 22. *R. edisoniana*.
24. Achene nearly orbicular, about as long as broad, coarsely wrinkled. 25.

- |                                                                                                                |                             |
|----------------------------------------------------------------------------------------------------------------|-----------------------------|
| 25. Inflorescence with many spikelets, more or less nodding; tubercle confluent with achene body.              | 23. <i>R. perplexa</i> .    |
| 25. Inflorescence with few spikelets; tubercle with a ring-like base, sharply differentiated from achene body. | 24. <i>R. globularis</i> .  |
| 26. Achene constricted at base to a stipe.....                                                                 | 25. <i>R. stipitata</i> .   |
| 26. Achene not stipitate.....                                                                                  | 27.                         |
| 27. Clusters of spikelets on erect or ascending stalks.....                                                    | 28.                         |
| 27. Clusters of spikelets with divaricate stalks.....                                                          | 26. <i>R. miliacea</i> .    |
| 28. Tubercle not setose.....                                                                                   | 29.                         |
| 28. Tubercle setose.....                                                                                       | 31.                         |
| 29. Perianth-bristles about as long as achene but shorter than tubercle.                                       | 30.                         |
| 29. Perianth-bristles as long as achene and tubercle.....                                                      | 27. <i>R. schoenoides</i> . |
| 30. Tubercle blunt, achene orbicular.....                                                                      | 28. <i>R. microcarpa</i> .  |
| 30. Tubercle sharp-pointed, achene ellipsoidal....                                                             | 20. <i>R. decurrens</i> .   |
| 31. Perianth-bristles not longer than achene and tubercle..                                                    | 30. <i>R. patula</i> .      |
| 31. Perianth-bristles longer than achene and tubercle.....                                                     | 32.                         |
| 32. Achene broadly obovoid or orbicular obovoid..                                                              | 31. <i>R. caduca</i> .      |
| 32. Achene narrowly obovoid.....                                                                               | 32. <i>R. mixta</i> .       |

1. *R. tracyi* Britton—Coastal Plain pineland ponds and swamps, Florida to Georgia and Mississippi.

2. *R. corniculata* (Lam.) A. Gray—Mostly on the Coastal Plain over most of our territory. A variety, *interior* Fernald, is found in the western part of our range.

3. *R. macrostachya* Torr.—Found in a variety of aquatic situations, range includes all of our territory.

4. *R. inundata* (Oakes) Fernald—Coastal Plain, probably most common in the eastern part of our territory.

5. *R. careyana* Fernald—Coastal Plain, recorded in the literature only from Florida. The senior author has collected it also in South Georgia.

6. *R. intermixta* C. Wright—Pineland ponds and swamps in the southern part of our territory, Florida westward along the Gulf to beyond the limits of our territory.

7. *R. chapmanii* M. A. Curtis—Coastal Plain in acid situations, Florida to North Carolina and Louisiana.

8. *R. glomerata* (L.) Vahl—As used here, includes *R. capitellata* (Michx.) Vahl and *R. leptocarpa* (Chapm.) Small. Ranges over all of our territory, common mostly in acid situations especially in the Coastal Plain.

9. *R. chalarocephala* Fernald & Gale—Recently described species, acid ponds, Virginia south to South Carolina. May prove to have a wider distribution.

10. *R. cephalantha* A. Gray—Acid ponds and swamps, Coastal Plain, over most of our territory.

11. *R. microcephala* Britton—Similar species, distribution very like that of the preceding.

12. *R. harveyi* W. Boott—Georgia to Virginia and westward, infrequent.
13. *R. filifolia* Torr.—Acid ponds in the pine-barrens, Coastal Plain, Florida to North Carolina and westward along the Gulf to beyond the limit of our territory.
14. *R. fusca* (L.) Ait. f.—Distribution similar to that of the preceding.
15. *R. harperi* Small—Known only from pineland ponds in the Coastal Plain of Georgia.
16. *R. gracilentia* A. Gray—Acid ponds and swamps, mostly in the Coastal Plain, Florida north and west beyond the limits of our territory. One of the more frequent species of the genus.
17. *R. fascicularis* (Michx.) Vahl—Low pinelands and pineland ponds, Coastal Plain, Florida to North Carolina and westward to the limit of our range.
18. *R. wrightiana* Boeckl.—Coastal Plain in acid situations, Florida north to North Carolina.
19. *R. torreyana* A. Gray—Acid swamps, Coastal Plain, Georgia to the northern limit of our territory.
20. *R. compressa* Carey—Pineland ponds, Coastal Plain, Florida to Georgia and westward.
21. *R. cymosa* Ell.—Various provinces, range covers all of our territory.
22. *R. edisoniana* Britton—Ponds and swamps of peninsular Florida.
23. *R. perplexa* Britton—Coastal Plain swamps, Florida to North Carolina and Louisiana.
24. *R. globularis* (Chapm.) Small—Coastal Plain pinelands, Florida north and west to the limits of our territory.
25. *R. stipitata* Chapm.—Coastal Plain pineland swamps, Florida to North Carolina and Louisiana.
26. *R. miliacea* (Lam.) A. Gray—Pond margins mostly in calcareous areas, Coastal Plain, Florida to North Carolina and Louisiana.
27. *R. schoenoides* (Ell.) Britton—Pond margins, Coastal Plain, Florida to North Carolina and Louisiana.
28. *R. microcarpa* Baldw.—Acid pineland ponds, Coastal Plain, Florida to North Carolina and westward along the Gulf to beyond the limits of our territory.
29. *R. decurrens* Chapm.—Known only from swamps in West Florida.
30. *R. patula* A. Gray—Acid pineland swamps, Coastal Plain, Florida north to North Carolina and west to Mississippi.
31. *R. caduca* Ell.—Swamps, mostly Coastal Plain, Florida to North Carolina and west beyond the limits of territory.
32. *R. mixta* Britton—Coastal Plain swamps and ponds, Florida to Georgia and westward beyond the limit of our range.



10. *Cladium* P. Browne

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|---------------------------------------------------------|----------------------------|
| 1. Leaves smooth and unarmed.....                       | 1. <i>C. mariscoides</i> . |
| 1. Leaves spinulose on margins and midribs beneath..... | 2. <i>C. jamaicensis</i> . |

1. *C. mariscoides* (Muhl.) Torr.—Not observed by the writers, but supposed to occur south to Florida in our territory.

2. *C. jamaicensis* Crantz. Saw-grass—The famous vicious Saw-grass of the Everglades, occurs also along the coast to the limits of our territory. Most common in Florida and along the Gulf of Mexico in fresh to brackish situations. Both of these species are placed in the genus *Mariscus* by Small.

11. *Scleria* Berg.

- |                                                                                  |                             |
|----------------------------------------------------------------------------------|-----------------------------|
| 1. Achene bearing a disk-like body (hypogynum) below..                           | 2.                          |
| 1. Achene without a hypogynum.....                                               | 3.                          |
| 2. Achene body reticulate.....                                                   | 1. <i>S. muhlenbergii</i> . |
| 2. Achene body papillose.....                                                    | 2. <i>S. pauciflora</i> .   |
| 3. Spikelets in a single terminal cluster.....                                   | 4.                          |
| 3. Spikelets in several distant clusters along the upper part of the stem.       | 5.                          |
| 4. Achene 3 mm. long or less with a pair of prominent pits on each side of base. | 3. <i>S. georgiana</i> .    |
| 4. Achene over 3 mm. long, without prominent pits on each side of base.          | 4. <i>S. baldwinii</i> .    |
| 5. Achene papillose-ridged; bracts merely serrulate near apex.                   | 5. <i>S. verticillata</i> . |
| 5. Achene smooth; bracts with long spreading hairs near apex.                    | 6. <i>S. hirtella</i> .     |

1. *S. muhlenbergii* Steud.—Acid aquatic areas, should be well distributed over our territory, especially in the Coastal plain.

2. *S. pauciflora* Muhl.—Should be distributed much as the preceding.

3. *S. georgiana* Core—Acid places, Coastal Plain, north in our territory to South Carolina. Cited by Small. as *S. gracilis* Ell.

4. *S. baldwinii* (Torr.) Steud.—Coastal Plain, found only in the Southernmost part of our territory from Florida westward along the Gulf.

5. *S. verticillata* Muhl.—Coastal Plain, Florida north and west beyond the limits of our territory.

6. *S. hirtella* Swartz—Coastal Plain, north only to South Carolina but westward beyond the limits of our range.

12. *Carex* [Rupp.] L.

- |                                                                                          |                        |
|------------------------------------------------------------------------------------------|------------------------|
| 1. Achenes lenticular; styles 2.....                                                     | 2.                     |
| 1. Achenes 3-sided; styles 3.....                                                        | 11.                    |
| 2. Lateral spikes sessile.....                                                           | 3.                     |
| 2. Lateral spikes stalked.....                                                           | 1. <i>C. stricta</i> . |
| 3. Spikes with staminate flowers uppermost.....                                          | 4.                     |
| 3. Spikes with pistillate flowers uppermost (lower spikes sometimes all pistillate)..... | 6.                     |



4. Perigynium abruptly contracted to a beak..... 5.  
 4. Perigynium gradually narrowed to a beak..... 9.
5. Perigynium yellowish; opaque part of leaf-sheath transversely-wrinkled..... 2. *C. vulpinoidea*.
5. Perigynium brownish; opaque part of leaf-sheath not wrinkled..... 3. *C. decomposita*.
6. Wing of perigynium abruptly narrowed near the middle of body..... 4. *C. tribuloides*.
6. Wing of perigynium not narrowed near middle of body..... 7.
7. Scales of spikelet obtuse or acute; achenes not slenderly stipitate..... 8.
7. Scales of spikelet long-accumbent to aristate; achenes slenderly stipitate..... 5. *C. alata*.
8. Tips of perigynia appressed..... 6. *C. longii*.
8. Tips of perigynia spreading..... 7. *C. albolutescens*.
9. Perigynium 4 to 6 mm. long, without a disk-like base; beak 1 to 2 times length of body; leaf-sheaths not red-dotted within..... 10.
9. Perigynium 6 to 7 mm. long, with a hard disk-like base; beak 2-3 times length of body; leaf-sheaths red-dotted within..... 8. *C. crus-corvi*.
10. Sheaths transversely wrinkled within, easily broken, not thickened at mouth..... 9. *C. stipata*.
10. Sheaths not transversely wrinkled within, not easily broken, thickened at mouth..... 10. *C. laevi-vaginata*.
1. Lowest bract strongly green-sheathing; beak of perigynium bidentate, but with weak teeth..... 11. *C. cherokeensis*.
1. Lowest bract not strongly green-sheathing, or if so perigynium with strongly bidentate apex with stiff teeth..... 12.
12. Perigynium beakless or very short beaked... 13.
12. Perigynium strongly beaked; beak strongly bidentate..... 17.
3. Terminal spike, if staminate, without rough-awned scales..... 14.
3. Terminal spike staminate; scales rough-awned..... 15.
14. Terminal spike staminate; lateral spikes slender-stalked, the lower drooping; pistillate scales obtuse or acute, shorter than the perigynia..... 12. *C. barrattii*.
14. Terminal spike with pistillate flowers uppermost; lateral spikes short-stalked or sessile, erect; pistillate scales strongly awned, exceeding the perigynia..... 13. *C. buzbuamii*.
5. Perigynium strongly ribbed; staminate scales gradually awned..... 14. *C. joorii*.
5. Perigynium nerved; staminate scales abruptly awned..... 16.
16. Pistillate spikes erect; perigynium strongly nerved..... 15. *C. verrucosa*.
16. Pistillate spikes nodding; perigynium obscurely nerved..... 16. *C. glaucescens*.
7. Style jointed with achene..... 17. *C. walteriana*.
7. Style continuous with achene..... 18.

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|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| 18. Perigynium coriaceous with impressed nerves                                                                                               | 18. <i>C. hyalinolepis.</i> |
| 18. Perigynium membranous, the nerves or ribs not impressed.                                                                                  | 19.                         |
| 19. Perigynium lanceolate, tapering into the beak, many nerved.                                                                               | 20.                         |
| 19. Perigynium broader; abruptly contracted into the beak, usually strongly ribbed.                                                           | 21.                         |
| 20. Perigynium teeth reflexed, green                                                                                                          | 19. <i>C. collinsii.</i>    |
| 20. Perigynium teeth not reflexed, yellowish-green.                                                                                           | 20. <i>C. lonchocarpa.</i>  |
| 21. Perigynium less than 1 cm. long                                                                                                           | 22.                         |
| 21. Perigynium more than 1 cm. long                                                                                                           | 26.                         |
| 22. Perigynium body ovoid or globose, but not truncately contracted into beak.                                                                | 23.                         |
| 22. Perigynium body obovoid or obconic, truncately contracted into the prominent beak.                                                        | 20.                         |
| 23. Perigynium coarsely ribbed or nerveless                                                                                                   | 24.                         |
| 23. Perigynium finely and closely ribbed                                                                                                      | 21. <i>C. comosa.</i>       |
| 24. Pistillate scales rough-awned                                                                                                             | 22. <i>C. lurida.</i>       |
| 24. Pistillate scales not rough-awned                                                                                                         | 25.                         |
| 25. Perigynium abruptly beaked, strongly inflated; pistillate spikes 20-40 flowered.                                                          | 23. <i>C. bullata.</i>      |
| 25. Perigynium less abruptly beaked, not strongly inflated; spikes 10-20 flowered                                                             | 24. <i>C. elliotii.</i>     |
| 26. Pistillate spikes globose or subglobose; style straight; stolons short, ascending.                                                        | 27.                         |
| 26. Pistillate spikes oblong or cylindric; style abruptly bent; stolons long, horizontal.                                                     | 28.                         |
| 27. Perigynium rounded at base, shining; leaf-blades 2.5-8 mm. wide, their sheaths short prolonged upward at mouth beyond base of leaf-blade. | 25. <i>C. intumescens.</i>  |
| 27. Perigynium cuneate at base, dull, often hispidulous; leaf-blades 4.5-14 mm. wide; sheath not prolonged.                                   | 26. <i>C. grayi.</i>        |
| 28. Perigynium ascending; beak less than twice length of body.                                                                                | 29.                         |
| 28. Perigynium spreading at right angles to spike axis; beak 2-3 times length of body.                                                        | 27. <i>C. gigantea.</i>     |
| 29. Stems in tufts; leaf-blades 4-12 mm. wide                                                                                                 | 28. <i>C. lupulina.</i>     |
| 29. Stems arising singly from elongate rootstock; leaf-blades 2-5 mm. wide.                                                                   | 29. <i>C. louisianica.</i>  |
| 30. Scales exceeding perigynia; achenes about 1.5 mm. long.                                                                                   | 30. <i>C. frankii.</i>      |
| 30. Scales much shorter than perigynia; achenes 2.2-3 mm. long.                                                                               | 31.                         |
| 31. Beaks of perigynia appressed ascending; style straight below; achenes obovoid with concave sides.                                         | 31. <i>C. typhina.</i>      |
| 31. Beaks of perigynia widely radiating; style strongly curved or bent below; achenes linear-oval with flat sides.                            | 32. <i>C. squarrosa.</i>    |

1. *C. stricta* Lam.—This tussock-forming species and its variety *strictior* (Dewey) Carey occur only in the most northern part of our

- territory. The related *C. torta* Boott is found in our territory but was not included because it does not inhabit still waters.
2. *C. vulpinoidea* Michx.—Moist places, various provinces over most of our territory.
  3. *C. decomposita* Muhl.—Rare species, various provinces, south to Florida. Collected from logs in Reelfoot Lake, Tennessee, by the senior author.
  4. *C. tribuloides* Wahlenb.—Various provinces over all of our territory.
  5. *C. alata* Torr.—Supposed to occur mostly along the coast or in calcareous regions mostly in the Coastal Plain, over all of our territory.
  6. *C. longii* Mackenzie—Coastal Plain, apparently preferring acid situations, should be found in most of our states.
  7. *C. albolutescens* Schk.—Range includes all of our territory.
  8. *C. crus-corvi* Shuttlw.—Enters our territory from the west but is found all the way to Florida, seems to prefer neutral soils.
  9. *C. stipiata* Muhl.—This includes also variety *maxima* Bailey which is the frequent form in our territory. Occurs in neutral soils and has been collected from alluvial areas.
  10. *C. laevi-vaginata* (Kukenth.) Mackenzie—Should range over most of our territory but has not been noted by the writers.
  11. *C. cherokeensis* Schwein.—Swamps, Coastal Plain, Florida to Georgia and westward.
  12. *C. barrattii* Schwein. & Torr.—Said to occur in very acid swamps and bogs, Coastal Plain, south to North Carolina.
  13. *C. buxbaumii* Wahlenb.—Said to occur in swamps in calcareous regions, various provinces, south to Georgia. Neither this nor the preceding species has been noted by the writers.
  14. *C. jorii* Bailey—Coastal Plain, Florida to South Carolina and westward in acid cypress ponds and swamps.
  15. *C. verrucosa* Muhl.—Coastal Plain in acid ponds and swamps, distribution almost identical to preceding in our territory.
  16. *C. glaucescens* Ell.—Acid ponds and swamps, Coastal Plain, perhaps more common than the two preceding species. Range similar, but found northward to Virginia.
  17. *C. walteriana* Bailey—Acid ponds and swamps, Coastal Plain, in the eastern part of our territory south to Florida. A related species *C. lanuginosa* Michx. may enter our territory in the north.
  18. *C. hyalinolepis* Steud.—Neutral swamps over most of our area. The closely related *C. riparia* Curtis variety *lacustris* (Willd.) Kukenth. enters our territory in Tennessee.
  19. *C. collinsii* Nutt.—Very acid swamps, Coastal Plain, in the eastern portion of our range from Georgia north.

29. *C. lonchocarpus* Willd.—Swamps, Coastal Plain, Florida to South Carolina and westward. The closely related *C. floridata* L. also probably enters our territory in the north.

21. *C. amara* Boott.—Swamps, various provinces, Florida north. Collected by the senior author in our territory mostly in alluvial situations.

22. *C. larida* Wahlenb.—Swampy areas over all of our territory. Apparently has no marked soil preference and is very frequent.

23. *C. bullata* Schk.—Coastal Plain in the eastern part of our area. Has been taken from river swamps but is said to occur in many swampy meadows.

24. *C. elliptica* Schwein. & Torr.—Coastal Plain, Florida, Alabama and North Carolina in very acid places, infrequent.

25. *C. intumescens* Rudge.—Branch swamps and river swamps, various provinces over all of our range.

26. *C. grayi* Bailey.—Various provinces, Georgia north, being to prefer neutral soils.

27. *C. gigantea* Rudge.—Leak ponds or swamps, Coast plain and occasionally adjacent provinces over most of our territory.

28. *C. lupulina* Muhl.—Swamps, various provinces, over most of our territory.

29. *C. louisianica* Bailey.—Said to occur mostly in the Coastal Plain, range includes all of our territory.

30. *C. frankii* Kunth.—Northern part of our territory in more or less soils.

31. *C. typhina* Michx.—Most characteristic of calcareous tracts, various provinces, Georgia north and west.

32. *C. squarrosa* L.—Mostly in the northern part of our territory, being known from North Carolina and Tennessee. This is one recorded occurrence in a river swamp in the Coastal Plain, Georgia. In addition to the above 32 species of *Cyperus* there are given a few others which are either only occasionally aquatic or which enter our range in its northern part.

#### ARACEAE Arum family

##### I. *Acerus* L.

*A. calamus* L. Sweet-flag—Various provinces, range should include all of our area, but very infrequent.

##### I. *Oxycodon* L.

*O. aquaticum* L. Never-wet—Most frequently found along sluggish creeks or rivers or in alluvial swamps, also present in the very acid Okefinokee Swamp and in other non-alluvial aquatic situations. Range covers all of the Coastal Plain of our territory. *Strophocheilus quadrimaculatus* can often be found associated.

3. *Peltandra* Raf.

1. Spathe narrow, green throughout; fruits green----- 1. *P. virginica*.  
 1. Spathe broad and spreading, mostly white; fruits crimson. 2. *P. glauca*.

1. *P. virginica* (L.) Kunth Arrow-arum—Well distributed in swamps and shallow water over all of our territory, frequent.

2. *P. glauca* (Ell.) Feay. White Arrow-arum—Very acid swamps or ponds, Coastal Plain, Florida to Alabama and North Carolina. Not nearly as frequent as the preceding.

4. *Pistia* L.

*P. stratiotes* L. Water-Lettuce—Floating plant very often forming a complete carpet on streams, lakes and ponds in the Coastal Plain in Florida. Found westward to Louisiana and may be present in Alabama and Mississippi. It is very often in association with species of *Mansonia*.

## LEMNACEAE Duckweed family

1. *Wolffia* Horkel

1. Plant rounded on back; not covered with minute brown dots. 1. *W. columbiana*.  
 1. Plant flat on back; covered with minute brown dots----- 2. *W. punctata*.

1. *W. columbiana* Karst. Watermeal—Smallest, with the next, of our flowering plants. When abundant, they form a granular layer on the surface of ponds or lakes. Both this and the following species are well distributed over our territory.

2. *W. punctata* Griseb. Watermeal—All that has been said of the preceding applies to this species except that it has not been as frequently noted. These two species are listed under *Bruneria* by Small.

2. *Wolffiella* Hegel

*W. floridana* (J. D. Smith) C. H. Thompson. Bog-mat—Very common, even in very acid waters, in the Coastal Plain of our territory. It has been taken as far north as Reelfoot Lake, Tennessee, in the Mississippi Valley.

3. *Lemna* L.

1. Joints or disks long, narrow and stalked; plants commonly forming masses below surface of water. 1. *L. trisulca*.  
 1. Joints not stalked; floating on surface of water----- 2.  
     2. Joints symmetrical or nearly so----- 3.  
     2. Joints asymmetrical----- 4.  
 3. Joints elliptic-obovate 2-4 mm. long; fruit lenticular---- 2. *L. minor*.  
 3. Joints elliptic or oblong 1.5-3.9 mm. long; fruit elongate. 3. *L. minima*.

20. *C. lonchocarpa* Willd.—Swamps, Coastal Plain, Florida to South Carolina and westward. The closely related *C. folliculata* L. also probably enters our territory in the north.

21. *C. comosa* Boott—Swamps, various provinces, Florida north. Collected by the senior author in our territory mostly in alluvial situations.

22. *C. lurida* Wahlenb.—Swampy areas, over all of our territory. Apparently has no marked soil preference and is very frequent.

23. *C. bullata* Schk.—Coastal Plain in the eastern part of our area. Has been taken from river swamps but is said to occur in acid, swampy meadows.

24. *C. elliottii* Schwein & Torr.—Coastal Plain, Florida to Alabama and North Carolina in very acid places, infrequent.

25. *C. intumescens* Rudge—Branch swamps and river swamps, various provinces over all of our range.

26. *C. grayi* Bailey—Various provinces, Georgia north, seeming to prefer neutral soils.

27. *C. gigantea* Rudge—Acid ponds or swamps, Coastal Plain and occasionally adjacent provinces over most of our territory.

28. *C. lupulina* Muhl.—Swamps, various provinces, over all of our territory.

29. *C. louisianica* Bailey—Said to occur mostly in the Coastal Plain, range includes all of our territory.

30. *C. frankii* Kunth—Northern part of our territory in calcareous soils.

31. *C. typhina* Michx.—Most characteristic of calcareous districts, various provinces, Georgia north and west.

32. *C. squarrosa* L.—Mostly in the northern part of our territory—being known from North Carolina and Tennessee. There is one recorded occurrence in a river swamp in the Coastal Plain of Georgia. In addition to the above 32 species of *Carex* there are perhaps a few others which are either only occasionally aquatic or which enter our range in its northern part.

## ARACEAE Arum family

### 1. *Acorus* L.

*A. calamus* L. Sweet-flag—Various provinces, range should include all of our area, but very infrequent.

### 1. *Orontium* L.

*O. aquaticum* L. Never-wet—Most frequently found along sluggish creeks or rivers or in alluvial swamps, also present in the very acid Okefinokee Swamp and in other non-alluvial aquatic situations. Range covers all of the Coastal Plain of our territory. *Anopheles quadrimaculatus* can often be found associated.

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 1. Spathe broad and spreading, mostly white; fruits crimson. 2. *P. glauca*.

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2. *W. punctata* Griseb. Watermeal—All that has been said of the preceding applies to this species except that it has not been as frequently noted. These two species are listed under *Bruneria* by Small.

2. *Wolffiella* Hegel

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3. *Lemna* L.

1. Joints or disks long, narrow and stalked; plants commonly forming masses below surface of water. 1. *L. trisulca*.  
 1. Joints not stalked; floating on surface of water----- 2.  
 2. Joints symmetrical or nearly so----- 3.  
 2. Joints asymmetrical----- 4.  
 1. Joints elliptic-obovate 2-4 mm. long; fruit lenticular---- 2. *L. minor*.  
 1. Joints elliptic or oblong 1.5-3.9 mm. long; fruit elongate- 3. *L. minima*.



4. Joints with unequally rounded sides, thick, 3-nerved or -veined. 4. *L. perpusilla*.  
 4. Joints with parallel sides, thin, 1-nerved or -veined. 5. *L. valdiviana*.

1. *L. trisulca* L. Star Duckweed—Found in only the western part of our territory, not noted by the writers.

2. *L. minor* L. Duckweed—Extremely difficult to distinguish from the following species except in fruit, and fruits very rarely in nature. The range of this species includes all of our territory, and it is common. A dense covering of this plant often inhibits mosquito breeding, but partial growths often harbor *Anopheles quadrimaculatus* larvae.

3. *L. minima* Philippi—The remarks under the preceding apply alike to this species, although its distribution is probably more limited.

4. *L. perpusilla* Torr.—Ponds, range includes all of our territory.

5. *L. valdiviana* Philippi—The remarks under the preceding species apply also to this.

#### 4. *Spirodela* Schleid.

*S. polyrhiza* (L.) Schleid.—This easily recognized, large Duckweed occurs over practically all of our territory and is very frequent. It has often been found in association with *Anopheles quadrimaculatus* except when in dense, blanket-like growth.

### MAYACACEAE Bog-moss family

#### 1. *Mayaca* Aubl.

1. Stalks of flowers much longer than the leaves..... 1. *M. aubletii*.  
 1. Stalks shorter than the leaves..... 2. *M. fluviatilis*.

1. *M. aubletii* Michx. Bog-moss—Ranges over most of our Coastal Plain, generally in acid ponds.

2. *M. fluviatilis* Aubl.—Range more restricted, known only from Florida to Georgia and Mississippi. Much less frequent than the preceding species and is considered by some to be only a form of it.

### XYRIDACEAE Yellow-eyed Grass family

#### 1. *Xyris* [Gronov.] L.

1. Leaves round, filiform; sterile filaments glabrous..... 1. *X. baldwiniana*.  
 1. Leaves flat; sterile filaments bearded..... 2.  
     2. Lateral sepals included under bracts..... 3.  
     2. Lateral sepals partially exerted..... 11.  
 3. Keel or wing of the lateral sepal ciliate..... 4.  
 3. Keel or wing of the lateral sepal incised, cross-toothed or lacerate. 6.  
     4. Lateral sepals winged, the wing partially ciliate, not bearded. 5.  
     4. Lateral sepals keeled, the keel mainly ciliate its entire length, bearded at the apex. 2. *X. torta*.



5. Sepal wing narrow, narrower than the sepal body---- 3. *X. ambigua*.  
 5. Sepal wing broad, broader than the sepal body----- 4. *X. stricta*.  
     6. Keel or wing cross-toothed or incised----- 7.  
     6. Keel or wing lacerate----- 9.  
 7. Spike ovoid, oval or globular, 5-15 mm. long at 8.  
     maturity; scales in relatively few series.  
 7. Spikes oblong to conic-oblong, 16-23 mm. long at 5. *X. elata*.  
     maturity; scales in many series.  
     8. Bracts loosely imbricate in few series, decid- 6. *X. caroliniana*.  
        uous.  
     8. Bracts closely imbricate in several series, 7. *X. jupacai*.  
        persistent.  
 9. Lateral sepals crested from about the middle or just 10.  
     below it to the apex, the crest erect or nearly so.  
 9. Lateral sepals crested from the base to the apex, the 8. *X. iridifolia*.  
     crest spreading or partially recurved.  
     10. Spike acute; lateral sepals with the wing nar- 9. *X. difformis*.  
        row or obsolete near the base; leaves and  
        scape smooth.  
     10. Spike obtuse; lateral sepals with the wing 10. *X. serotina*.  
        broad to the base; leaves and scape rough-  
        margined.  
 11. Leaves numerous, blades mostly 1-2 mm. wide at 11. *X. elliotii*.  
     maturity.  
 11. Leaves few; blades mostly 5-10 mm. wide at maturity-- 12.  
     12. Crest of the lateral sepals of very short erect 12. *X. smalliana*.  
        segments; upper part of scape smooth.  
     12. Crest of the lateral sepals of very long spread- 13. *X. fimbriata*.  
        ing segments; upper part of scape rough.

1. *X. baldwiniana* R. & S. St. Marys-grass—Coastal Plain pine-land ponds, Florida to North Carolina and westward to beyond our boundary.

2. *X. torta* J. E. Smith—Of more northern distribution, various provinces, Georgia north and west.

3. *X. ambigua* Beyr.—Swamps in the Coastal Plain, Florida to North Carolina and westward along the Gulf to beyond the limit of our territory.

4. *X. stricta* Chapm.—More southerly in its distribution. Found around pineland pools, Coastal Plain, Florida to Mississippi along the Gulf of Mexico.

5. *X. elata* Chapm.—Florida northward and westward to the limits of our range in Coastal Plain swamps and ponds.

6. *X. caroliniana* Walt. Yellow-eyed Grass—Shallow ponds and swamps, often very acid, Coastal Plain, Florida north and west to the limits of our territory.

7. *X. jupacai* Rich.—Distribution very similar to the preceding. Called *X. communis* Kunth in many manuals.

8. *X. iridifolia* Chapm.—Shallow ponds, Florida to Georgia and westward mostly in the Coastal Plain.

9. *X. difformis* Chapm.—Swamps, Coastal Plain, Florida, Georgia, and Alabama.

10. *X. serotina* Chapm.—Known only from pineland swamps in Florida and Mississippi.

11. *X. elliottii* Chapm.—Pinelands and swamps, Florida to Virginia in the Coastal Plain.

12. *X. smalliana* Nash—Acid ponds, Coastal Plain, Florida to South Carolina and west to the limit of our territory. Not as common as the following.

13. *X. fimbriata* Ell.—Acid ponds or swamps, Coastal Plain, Florida to Mississippi and northward to the limit of our range.

## ERIOCAULACEAE Pipewort family

### 1. *Eriocaulon* [Gronov.] L.

- |                                                          |                            |
|----------------------------------------------------------|----------------------------|
| 1. Flower heads, when mature, white villous at summit... | 2.                         |
| 1. Flower heads, when mature, brown or blackish.....     | 1. <i>E. ravenessii</i> .  |
| 2. Flower heads less than 10 mm. in diameter             | 2. <i>E. lineare</i> .     |
| when mature; scape 3-5 ridged.                           |                            |
| 2. Flower heads more than 10 mm. in diameter             | 3.                         |
| when mature; scape 10-14 ridged.                         |                            |
| 3. Sheath at base of scape surpassing leaves except when | 3. <i>E. compressum</i> .  |
| plant is submerged; flowers March-April.                 |                            |
| 3. Sheath at base of scape surpassed by leaves; flowers  | 4. <i>E. decangulare</i> . |
| June-September.                                          |                            |

1. *E. ravenessii* Chapm.—Swamps, Coastal Plain, Florida to Mississippi and South Carolina. Apparently the most infrequent of the genus.

2. *E. lineare* Small—Mostly in Coastal Plain pinelands but occasionally in acid swamps or ponds, Florida, Alabama, and Georgia.

3. *E. compressum* Lam. Pipewort—The species of *Eriocaulon* most frequently found in truly aquatic situations. Occurs in acid ponds in the Coastal Plain over most of our territory.

4. *E. decangulare* L.—Most often found in pine-barrens but occasionally in acid swamps, range similar to that of the preceding species.

## PONTEDERIACEAE Pickerel-weed family

### 1. *Heteranthera* R. & P.

- |                                                  |                           |
|--------------------------------------------------|---------------------------|
| 1. Leaves ribbon-like.....                       | 1. <i>H. dubia</i> .      |
| 1. Leaves broad.....                             | 2.                        |
| 2. Leaves as wide as long, lobed at base.....    | 2. <i>H. reniformis</i> . |
| 2. Leaves longer than wide obtuse at both ends.. | 3. <i>H. limosa</i> .     |

1. *H. dubia* (Jacq.) MacM. Water Star-grass—Ponds or lakes, various provinces, over all of our territory. Apparently prefers neutral or alkaline waters, and *Anopheles quadrimaculatus* is sometimes found associated.

2. *H. reniformis* R. & P. Mud-plantain—Georgia northward and westward, like others of the genus seeming to prefer neutral or alkaline waters.

3. *H. limosa* (Swartz) Willd.—Range embraces all of our territory, but not common.

## 2. *Pontederia* L.

*P. lanceolata* Nutt. Pickerel-weed—All of the Pickerel-weeds observed by the writers in our territory are included under this species, although it may be that *P. cordata* L. could also be differentiated. One of the most frequent aquatic plants over most of our range and found in a wide variety of aquatic situations. The shape of its leaves varies considerably from linear to very broad and lobed at the base.

## 3. *Eichhornia* Kunth

*E. crassipes* (Mart.) Solms. Water Hyacinth—Coastal Plain, over most of our territory, but most abundant in Florida, Georgia, and westward along the Gulf. In Florida is occasionally so abundant as to impede navigation. Often grows in enormous pure masses and can be found in association with *Anopheles quadrimaculatus*. Another species, *E. paniculatus* (Spreng.) Solms, is said to occur in peninsular Florida.

# JUNCACEAE Rush family

## 1. *Juncus* [Tourn.] L.

- |                                                                                                                   |                             |
|-------------------------------------------------------------------------------------------------------------------|-----------------------------|
| 1. Plants creeping or forming mats in or on the surface of the water.                                             | 1. <i>J. repens</i> .       |
| 1. Plants erect and emergent.....                                                                                 | 2.                          |
| 2. Stem appearing to continue upward beyond inflorescence.                                                        | 3.                          |
| 2. Inflorescence terminal.....                                                                                    | 4.                          |
| 3. Sheaths at base of stem without leaf-blades.....                                                               | 2. <i>J. effusus</i> .      |
| 3. Sheaths at base of stem with round blades.....                                                                 | 3. <i>J. coriaceus</i> .    |
| 4. Leaves with node-like septa.....                                                                               | 6.                          |
| 4. Leaves flat without node-like septa.....                                                                       | 5.                          |
| 5. Heads of inflorescence 5-15 flowered; heads usually few,                                                       | 4. <i>J. marginalis</i> .   |
| 5. Heads of inflorescence 2-5 flowered; heads usually many.                                                       | 5. <i>J. biflorus</i> .     |
| 6. Clusters reduced to only a single flower.....                                                                  | 6. <i>J. abortivus</i> .    |
| 6. Clusters of inflorescence with many flowers....                                                                | 7.                          |
| 7. Capsule truly subulate.....                                                                                    | 8.                          |
| 7. Capsule ellipsoid to linear-lanceolate in outline sometimes acute or mucronate at apex but not truly subulate. | 11.                         |
| 8. Uppermost leaf-sheath with very short blade or none (at most 1-2 cm. long).                                    | 7. <i>J. megacephalus</i> . |
| 8. Uppermost leaf-sheath with well-developed blade (3 cm. long or more).                                          | 9.                          |

- |                                                                                         |                               |
|-----------------------------------------------------------------------------------------|-------------------------------|
| 9. Stamens as long as petals, the anthers exerted between them.                         | 8. <i>J. scirpoides</i> .     |
| 9. Stamens much shorter than petals, included.....                                      | 10.                           |
| 10. Leaf-blades flattened and usually with incomplete septa; capsule manifestly beaked. | 9. <i>J. polycephalus</i> .   |
| 10. Leaf-blades only slightly compressed; septa complete; capsule beakless.             | 10. <i>J. validus</i> .       |
| 11. Capsule not more than two-thirds as long as perianth.                               | 11. <i>J. brachycarpus</i> .  |
| 11. Capsule equalling or exceeding the perianth.....                                    | 12.                           |
| 12. Seed 0.7-2.5 mm. long, the body tapering at both ends into a white tail.            | 13.                           |
| 12. Seed less than 0.55 mm. long with an abrupt usually dark colored tail.              | 14.                           |
| 13. Capsule scarcely exceeding perianth; plant not rigid..                              | 12. <i>J. canadensis</i> .    |
| 13. Capsule exceeding perianth by about half its length; plant rigid throughout.        | 13. <i>J. trigonocarpus</i> . |
| 14. Capsule exceeding the perianth.....                                                 | 15.                           |
| 14. Capsule about equalling the perianth.....                                           | 14. <i>J. acuminatus</i> .    |
| 15. Capsule dark brown at maturity.....                                                 | 15. <i>J. elliottii</i> .     |
| 15. Capsule straw-colored at maturity.....                                              | 16. <i>J. debilis</i> .       |

1. *J. repens* Michx.—Various provinces over all of our territory, most common in the Coastal Plain, in very acid as well as nearly neutral waters. It has often been found in association with *Anopheles quadrimaculatus*.

2. *J. effusus* L. Soft-rush—Perhaps the most frequent species of the genus in our territory. Shows wide tolerance of acidity and has been found in association with *Anopheles quadrimaculatus*.

3. *J. coriaceus* Mackenzie—Like the preceding ranges over all of our territory, but infrequent and usually confined to springy places.

4. *J. marginatus* Rostk.—Various provinces over all of our territory but noted most frequently near the coast.

5. *J. biflorus* Ell.—Ranges over all our territory. Collected in very acid as well as almost neutral situations.

6. *J. abortivus* Chapm.—Coastal Plain, along margins of ponds, middle Florida to South Carolina.

7. *J. megacephalus* M. A. Curtis—Coastal Plain, Florida to Virginia, mostly in calcareous situations.

8. *J. scirpoides* Lam.—Occurs over all of our Coastal Plain territory, fairly frequent and often in very acid situations.

9. *J. polycephalus* Michx.—Ponds and swamps, Coastal Plain over most of our range.

10. *J. validus* Coville—Should occur only in the westernmost portion of our Coastal Plain; however, the senior author has one collection from South Florida.

11. *J. brachycarpus* Engelm.—Various provinces, Georgia northward and westward. Collected from neutral soil in west Tennessee.

12. *J. canadensis* J. Gay—Various situations, range similar to the preceding.

13. *J. trigonocarpus* Steud.—Acid preferring plant, Coastal Plain, Florida to South Carolina and along the Gulf westward at least to Mississippi.

14. *J. acuminatus* Michx.—Various provinces, Georgia north and west. Seems to show no particular preference as to acidity.

15. *J. elliotii* Chapm.—Coastal Plain, acid swamps or bogs, Florida to North Carolina and westward to the western limit of our territory.

16. *J. debilis* A. Gray—Various provinces over most of our territory.

### SMILACACEAE Smilax family

#### 1. *Smilax* [Tourn.] L.

1. Berries red; leaves not leathery, usually not much longer than broad. 1. *S. walteri*.

1. Berries black; leaves leathery, usually much longer than broad. 2. *S. laurifolia*.

1. *S. walteri* Pursh. Coral Greenbrier—Vine of pineland ponds and swamps, Coastal Plain over most of our territory.

2. *S. laurifolia* L. Bamboo-vine—Non-alluvial, acid swamps, Coastal Plain, Florida northward and westward to the limits of our territory.

### AMARYLLIDACEAE Amaryllis family

#### 1. *Crinum* L.

*C. americanum* L.—Extreme southern Coastal Plain, Florida westward along the Gulf to beyond the limits of our territory.

#### 2. *Hymenocallis* L.

1. Sepals and petals green; stalk terminated by a single flower. 1. *H. palmeri*.

1. Sepals and petals white; stalk terminated by 2 to many flowers. 2.

2. Stalk terminated by 8–16 flowers; crown small, 2.5–3.5 cm. wide. 2. *H. kimballiae*.

2. Stalk terminated by 2–8 flowers; crown at least 4 cm. wide. 3.

3. Filaments arising from a sinus, sometimes very shallow, between the lobes or angles of the crown; filaments not arising from a 2-pronged lobe. 4.

3. Filaments arising from a 2-pronged lobe of the crown with a sinus intervening between filaments. 3. *H. laciniata*.

4. Edge of crown between the filaments erose----- 4. *H. crassifolia*.

4. Edge of crown between the filaments with 3, sometimes 5, teeth. 5. *H. tridentata*.

1. *H. palmeri* S. Wats. Alligator Lily—Found only in the Everglades region of Florida.

2. *H. kimballiae* Small—Known only from swamps around the estuary of the Apalachicola River in West Florida.

3. *H. laciniata* Small—Known from swamps in North Florida.

4. *H. crassifolia* Herb.—Marshes on the Coastal Plain, northeast Florida to North Carolina.

5. *H. tridentata* Small—Known only from swamps along the east coast in Florida.

## IRIDACEAE Iris family

### 1. *Nemastylis* Nutt.

*N. floridana* Small—Swamps and marshes, known only from the northeastern coastal region of Florida.

### 2. *Iris* L.

- |                                                                                                                                                                                                                                           |                            |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| 1. Flowers coppery red.....                                                                                                                                                                                                               | 1. <i>I. fulva</i> .       |
| 1. Flowers violet, lilac, bluish, or white.....                                                                                                                                                                                           | 2.                         |
| 2. Petals present and well-developed, nearly as long as the sepals.                                                                                                                                                                       | 3.                         |
| 2. Petals present but almost rudimentary, much exceeded by sepals.                                                                                                                                                                        | 2. <i>I. tripetala</i> .   |
| 3. Hypanthium 6-angled.....                                                                                                                                                                                                               | 4.                         |
| 3. Hypanthium 3-angled.....                                                                                                                                                                                                               | 7.                         |
| 4. Capsule sharply 6-angled, flowering stalk zigzag.                                                                                                                                                                                      | 5.                         |
| 4. Capsule bluntly 6-angled, flowering stalks nearly straight.                                                                                                                                                                            | 6.                         |
| 5. Style-appendages half-ovate; claw of sepal yellow-green without; foliage yellow-green.                                                                                                                                                 | 3. <i>I. hexagona</i> .    |
| 5. Style-appendages lanceolate; claw of sepal deep-green without; foliage deep-green.                                                                                                                                                     | 4. <i>I. rivularis</i> .   |
| 6. Flowers white, except the yellow crest.....                                                                                                                                                                                            | 5. <i>I. albispirtus</i> . |
| 6. Flowers colored.....                                                                                                                                                                                                                   | 6. <i>I. savannarum</i> .  |
| 7. Capsule and hypanthium sharply 3-angled; rootstock wiry, slender.                                                                                                                                                                      | 7. <i>I. prismatica</i> .  |
| 7. Capsule and hypanthium bluntly 3-angled; rootstock stout and fleshy.                                                                                                                                                                   | 8.                         |
| 8. Petals shorter than the styles; sepals roughened at base of blade with minute bumps, and with a dull yellow spot; outermost bracts with margins darkened and somewhat varnished; seeds regularly pitted and appearing as if varnished. | 8. <i>I. versicolor</i> .  |
| 8. Petals longer than the styles; sepals hairy at the base of blade and with a bright yellow spot; outermost bracts green and soft-margined; seeds irregularly or not at all pitted, dull.                                                | 9. <i>I. virginica</i> .   |

1. *I. fulva* Ker. Wild Iris—Most common in the western portion of our territory, but said to be found east as far as Georgia.

2. *I. tripetala* Walt. Wild Iris—Coastal Plain, North Florida to North Carolina, seeming to prefer acid situations.

3. *I. hexagona* Walt.—Coastal Plain, North Florida to South Carolina. Small has described *I. alabamensis* from marshes in west Central Alabama which is similar to this.

4. *I. rivularis* Small—Coastal Plain, Northeast Florida to the adjoining portion of Georgia.

5. *I. albispirtus* Small—White species, most common on savannas in the lower half of the Florida peninsula.

6. *I. savannarum* Small—Also an inhabitant of savannas of peninsular Florida.

7. *I. prismatica* Pursh—Marshes and swamps, Coastal Plain, Georgia to the northern limits of our territory, often in acid situations.

8. *I. versicolor* L.—Marshes and swamps in our territory from Georgia west to Mississippi and north to the limit of our range.

9. *I. virginica* L.—Range similar to the preceding except also known from North Florida.

## HAEMODORACEAE Bloodwort family

### 1. *Gyrotheca* Salisb.

*G. tinctoria* (Walt.) Salisb. Paint-root—Acid situations, Coastal Plain, Florida north and west to the limits of our territory.

## CANNACEAE Canna family

### 1. *Canna* L.

*C. flaccida* Salisb. Golden Canna—Infrequent plant of swamps and marshes, Coastal Plain, Florida to South Carolina.

## MARANTACEAE Arrowroot family

### 1. *Thalia* L.

1. Flowers closely crowded on the stalk; clusters of bracts and bractlets ovoid. 1. *T. dealbata*.

1. Flowers separated on the stalk; clusters of bracts and bractlets narrowly conic. 2. *T. geniculata*.

1. *T. dealbata* Roscoe—Infrequent in swamps and ponds, Coastal Plain, Florida to South Carolina and along the Gulf to the western limit of our territory.

2. *T. geniculata* L.—Largest-leaved aquatic herb; in fact, the largest-leaved of all native herbs. The plants stand 2 to 3.5 meters high. Its range is restricted to ponds, swamps, and marshes in Florida.



ORCHIDACEAE [aid family

1. Habenaria H.

H. repens Nutt.—Swampy areas, Coastal Plain to North Carolina and westward.

PIPERACEAE [berry family

1. Saururus

S. cernuus L. Hoop-pole—This aquatic plant is well known over all of our area. Its habitat is very variable, but it is never found in truly aquatic areas. It shows a wide acidity tolerance, is found in acid and alkaline regions alike. It is very often associated with Anagallis quadriflorata and in some places constitutes a major problem.

JUGLANDACEAE [nut family

1. Carya

C. aquatica (Michx.) Nutt. Swamp Hickory—River-swamp river-bottoms mostly in the Coastal Plain, Florida north and west to the limits of our territory.

MYRTACEAE [berry family

1. Myrica

1. Fruit 2-3 mm. in diameter; leaves long-petioled to the base, acute at apex.

1. Fruit 3.5-4 mm. in diameter; leaves mucronate to base, apex obtuse.

1. M. caribaea L. Wax Myrtle—Occasional more frequently in non-aquatic situations of Coastal Plain territory.

2. M. carolinensis Mill. Bayberry—Aquatic situation over most of our territory.

SALICACEAE

1. Salix

1. Leaves closely appressed, finely toothed.

1. Leaves with rounded teeth.

2. Leaves glabrous beneath.

2. Leaves pubescent beneath.

3. Twigs brittle.

3. Twigs not brittle.

1. S. intermedia

Mississippi Valley



2. *S. nigra* Marsh. Black Willow—The common swamp willow over all of our territory. It is often found in situations also favored by *Anopheles quadrimaculatus*.

3. *S. harbisonii* Schneider—Swamps in our territory from North Carolina south to Florida. Apparently has been most frequently collected from along rivers. It has been suspected of being a hybrid between the preceding and following species.

4. *S. longipes* Shuttlew.—Swamps and along streams mostly in the Coastal Plain. Its range embraces/all of our Coastal Plain territory. *S. amphibia* Small, described from lakes and swamps in peninsular Florida, should be referred to this species.

### BETULACEAE Birch family

#### 1. *Betula* [Tourn.] L.

*B. nigra* L. River Birch—Swamps of streams over all of our range. Unmistakable because of its reddish, papery bark.

#### 2. *Alnus* [Tourn.] L.

*A. serrulata* Willd. Alder—Swamps along branches, creeks and rivers in various provinces, range covers all of our territory. This species is commonly referred to as *Alnus rugosa* (Du Roi) Spreng.

### URTICACEAE Nettle family

#### 1. *Boehmeria* Jacq.

1. Leaf-blades leathery, finely toothed; petioles much shorter than the blades. 1. *B. drummondiana*.

1. Leaf-blades thin, coarsely toothed; petioles as long as the blades or only slightly shorter. 2. *B. cylindrica*.

1. *B. drummondiana* Wedd. Bog-hemp—Swamps in various provinces, range includes all of our territory.

2. *B. cylindrica* (L.) Willd.—Distribution in our territory about the same as the preceding, but apparently more common.

### ULMACEAE Elm family

#### 1. *Planera* J. F. Gmel.

*P. aquatica* (Walt.) J. F. Gmel. Water Elm—Swamps along rivers, range covers most of our Coastal Plain and Mississippi Valley territory.

### POLYGONACEAE Buckwheat family

#### 1. *Rumex* L.

1. Leaf-blades short and broad, rounded or cordate at base; sepal-wings toothed. 1. *R. fascicularis*.

1. Leaf-blades narrow and elongate, narrowed to the base; sepal wings undulate. 2. *R. verticillatus*.

## ORCHIDACEAE Orchid family

1. *Habenaria* Willd.

*H. repens* Nutt.—Acid swamps and ponds, Coastal Plain, Florida to North Carolina and westward.

## PIPERACEAE Pepper family

1. *Saururus* L.

*S. cernuus* L. Lizards-tail—This emergent plant is well distributed over all of our area. Its habitat is very variable, but it is frequently found in truly aquatic areas. It shows a wide acidity tolerance and is found in acid and alkaline regions alike. It is very often found in association with *Anopheles quadrimaculatus* and in some instances constitutes a major problem.

## JUGLANDACEAE Walnut family

1. *Carya* Nutt.

*C. aquatica* (Michx. f.) Nutt. Swamp Hickory—River-swamps and river-bottoms mostly in the Coastal Plain, Florida north and west to the limits of our territory.

## MYRICACEAE Bayberry family

1. *Myrica* L.

- |                                                                                 |                             |
|---------------------------------------------------------------------------------|-----------------------------|
| 1. Fruit 2–3 mm. in diameter; leaves long-attenuate to the base, acute at apex. | 1. <i>M. cerifera</i> .     |
| 1. Fruit 3.5–4 mm. in diameter; leaves not long-attenuate to base, apex obtuse. | 2. <i>M. carolinensis</i> . |

1. *M. cerifera* L. Wax Myrtle—Occasionally in swamps but is more frequently in non-aquatic situations over all of our Coastal Plain territory.

2. *M. carolinensis* Mill. Bayberry—Acid swamps and other non-aquatic situations over most of our Coastal Plain territory.

## SALICACEAE Willow family

1. *Salix* [Tourn.] L.

- |                                                  |                           |
|--------------------------------------------------|---------------------------|
| 1. Leaves closely and finely toothed.....        | 2.                        |
| 1. Leaves with remote teeth.....                 | 1. <i>S. interior</i> .   |
| 2. Leaves green beneath.....                     | 2. <i>S. nigra</i> .      |
| 2. Leaves glaucous or silvery-white beneath..... | 3.                        |
| 3. Twigs brittle-jointed.....                    | 3. <i>S. harbisonii</i> . |
| 3. Twigs not brittle-jointed.....                | 4. <i>S. longipes</i> .   |

1. *S. interior* Rowlee. Sandbar Willow—Alluvial areas in the Mississippi Valley, aquatic mostly during periods of high water.

2. *S. nigra* Marsh. Black Willow—The common swamp willow over all of our territory. It is often found in situations also favored by *Anopheles quadrimaculatus*.

3. *S. harbisonii* Schneider—Swamps in our territory from North Carolina south to Florida. Apparently has been most frequently collected from along rivers. It has been suspected of being a hybrid between the preceding and following species.

4. *S. longipes* Shuttlew.—Swamps and along streams mostly in the Coastal Plain. Its range embraces all of our Coastal Plain territory. *S. amphibia* Small, described from lakes and swamps in peninsular Florida, should be referred to this species.

### BETULACEAE Birch family

#### 1. *Betula* [Tourn.] L.

*B. nigra* L. River Birch—Swamps of streams over all of our range. Unmistakable because of its reddish, papery bark.

#### 2. *Alnus* [Tourn.] L.

*A. serrulata* Willd. Alder—Swamps along branches, creeks and rivers in various provinces, range covers all of our territory. This species is commonly referred to as *Alnus rugosa* (Du Roi) Spreng.

### URTICACEAE Nettle family

#### 1. *Boehmeria* Jacq.

1. Leaf-blades leathery, finely toothed; petioles much shorter than the blades. 1. *B. drummondiana*.

1. Leaf-blades thin, coarsely toothed; petioles as long as the blades or only slightly shorter. 2. *B. cylindrica*.

1. *B. drummondiana* Wedd. Bog-hemp—Swamps in various provinces, range includes all of our territory.

2. *B. cylindrica* (L.) Willd.—Distribution in our territory about the same as the preceding, but apparently more common.

### ULMACEAE Elm family

#### 1. *Planera* J. F. Gmel.

*P. aquatica* (Walt.) J. F. Gmel. Water Elm—Swamps along rivers, range covers most of our Coastal Plain and Mississippi Valley territory.

### POLYGONACEAE Buckwheat family

#### 1. *Rumex* L.

1. Leaf-blades short and broad, rounded or cordate at base; sepal-wings toothed. 1. *R. fascicularis*.

1. Leaf-blades narrow and elongate, narrowed to the base; sepal wings undulate. 2. *R. verticillatus*.

1. *R. fascicularis* Small—Around ponds and in prairies in peninsular Florida.

2. *R. verticillatus* L. Swamp-dock—Common mostly in swamps of rivers or creeks, various provinces over all of our territory. Larvae of *Anopheles quadrimaculatus* have been found associated with this plant.

## 2. *Polygonum* [Tourn.] L.

- |                                                                                                                            |                                 |
|----------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| 1. Stems armed with prickles; leaves lobed at base.....                                                                    | 1. <i>P. sagittatum</i> .       |
| 1. Stems not armed with prickles.....                                                                                      | 2.                              |
| 2. Stem terminated by a single (sometimes 2) cluster of flowers; no axillary inflorescences present.                       | 2. <i>P. coccineum</i> .        |
| 2. Clusters of flowers axillary as well as terminal, more than 2 and usually several.                                      | 3.                              |
| 3. Ocreae (sheaths on stem just above bases of leaves) not fringed with bristles.                                          | 4.                              |
| 3. Ocreae fringed with bristles.....                                                                                       | 7.                              |
| 4. Flower clusters erect.....                                                                                              | 5.                              |
| 4. Flower clusters nodding.....                                                                                            | 3. <i>P. lapathifolium</i> .    |
| 5. Plant perennial; achene turgid-lenticular; flowers usually white or whitish, with tiny dark dots when viewed with lens. | 4. <i>P. densiflorum</i> .      |
| 5. Plant annual; achene flat; flowers usually pink, not dotted.                                                            | 6.                              |
| 6. Style or stamens conspicuously longer than the perianth.                                                                | 5. <i>P. longistylum</i> .      |
| 6. Style or stamens hidden by the perianth.....                                                                            | 6. <i>P. pennsylvanicum</i> .   |
| 7. Perianth showing tiny dark dots when viewed with a lens.                                                                | 8.                              |
| 7. Perianth not showing tiny dark dots when viewed with a lens.                                                            | 9.                              |
| 8. Achene granular, dull; flower clusters often nodding.                                                                   | 7. <i>P. hydropiper</i> .       |
| 8. Achene smooth, shining; flower clusters erect.                                                                          | 8. <i>P. punctatum</i> .        |
| 9. Flower cluster short, stout, compact.....                                                                               | 9. <i>P. persicaria</i> .       |
| 9. Flower cluster slender, not dense.....                                                                                  | 10.                             |
| 10. Leaves cordate or subcordate at base, sessile; stem and ocreae hairy.                                                  | 10. <i>P. hirsutum</i> .        |
| 10. Leaves narrowed to a petiole at base; stem and ocreae not hairy.                                                       | 11.                             |
| 11. Leaves tapering to both ends from a point well below the middle covered with stiff hairs.                              | 11. <i>P. setaceum</i> .        |
| 11. Leaves with nearly parallel sides usually not hairy...                                                                 | 12.                             |
| 12. Spike loose; the white or pink perianth completely hiding the mature nutlet.                                           | 12. <i>P. hydropiperoides</i> . |
| 12. Spike more dense; the green perianth not hiding the tip of the mature achene.                                          | 13. <i>P. opelousanum</i> .     |

1. *P. sagittatum* L. Rakestraw—Moist places over all of our territory.

2. *P. coccineum* Muhl.—Occurs widely in our territory, but infrequent. Seems to prefer alluvial situations. This and the following 11 species are listed under the genus *Persicaria* by Small.

3. *P. lapathifolium* L.—Most common in alluvial marshes and swamps along rivers, range covering all of our territory. It has on occasion been found in association with *Anopheles quadrimaculatus*.

4. *P. densiflorum* Meisn.—Range includes all of our Coastal Plain. Said to be found in swamps, ponds, and along lake-borders.

5. *P. longistylum* Small—Should be expected only in the extreme western part of our territory.

6. *P. pensylvanicum* L. Smartweed—Distributed over all of our territory, both in aquatic and non-aquatic situations. Most common, perhaps, in alluvial marshes and *Anopheles quadrimaculatus* has been found associated with it occasionally.

7. *P. hydropiper* L. Water-pepper—Ranges over all of our territory, often not truly aquatic. When found in water, generally prefers neutral or alkaline conditions.

8. *P. punctatum* Ell.—Shows a wide acidity tolerance and, like many of this genus, is equally at home in the water and on land. Range covers all of our territory, and breeding of *Anopheles quadrimaculatus* has occasionally been found associated with it.

9. *P. persicaria* L.—Most often found on land, occasionally truly aquatic. Range includes all of our territory.

10. *P. hirsutum* Walt.—Coastal Plain, Florida and Georgia. Collected from acid limesink ponds and other very acid situations.

11. *P. setaceum* Baldw.—This Water-pepper is found over all of our Coastal Plain. The writers have encountered it most frequently in acid situations.

12. *P. hydropiperoides* Michx.—Various provinces over all of our territory. *Anopheles quadrimaculatus* found associated with it at Reelfoot Lake, Tennessee.

13. *P. opelousanum* Ridd.—Various provinces over all of our territory. The writers have not often noted it owing to its similarity to the preceding species.

## AMARANTHACEAE Amaranth family

### 1. *Acnida* L.

*A. cuspidata* Bertero—Huge herb, the largest in our flora, found in marshes and swamps, Coastal Plain, Florida to Louisiana. The stem at the base of the plant sometimes reaches over a foot in diameter.

### 2. *Alternanthera* Forsk.

*A. philoxeroides* (Mart.) Griseb. Alligator-grass—Pestiferous species, naturalized from South America and often found in alluvial areas. Found in a variety of aquatic areas, Coastal Plain, Florida to North Carolina and westward. In the Tennessee Valley it has become introduced and very often harbors larvae of *Anopheles quadrimaculatus*. This species is listed by Small under the genus *Achyranthes*.

## CERATOPHYLLACEAE Hornwort family

1. *Ceratophyllum* L.

1. Achene armed on the edges with spines, long-beaked... 1. *C. demersum*.  
 1. Achene unarmed, short-beaked..... 2. *C. submersum*.

1. *C. demersum* L. Coontail-moss—Various provinces, over all of our territory. Most often found in neutral or alkaline waters, although tolerating some degree of acidity. *Anopheles quadrimaculatus* has been found associated with it. Variety *echinatum* A. Gray is sometimes given specific rank.

2. *C. submersum* L.—Found only in ponds on the southern part of the peninsula of Florida.

## NYMPHAEACEAE Water-lily family

1. *Nuphar* Sibth.

1. Leaf-blades more than twice as long as wide, the sinus less than one-fourth the length of the blade. 2.  
 1. Leaf-blades less than twice as long as wide, the sinus one-fourth to one-half the length of the blade. 3.  
     2. Leaf-blades over 3 times as long as wide, the sinus open. 1. *N. sagittaeifolia*.  
     2. Leaf-blades less than 3 times as long as wide, the sinus closed. 2. *N. ulvacea*.  
 3. Leaves pubescent beneath..... 4.  
 3. Leaves glabrous beneath..... 5.  
     4. Leaf-blade with a closed sinus; stamens in 9-10 rows; flowers about 5 cm. in diameter; seed 4 mm. long. 3. *N. orbiculata*.  
     4. Leaf-blade with an open sinus; stamens in 6-7 rows; flowers about 7 cm. in diameter; seed 6 mm. long. 4. *N. bombycina*.  
 5. Leaf-blades of an orbicular or ovate-orbicular type.... 5. *N. fluviatile*.  
 5. Leaf-blades manifestly longer than wide..... 6.  
     6. Leaf-blades very thin; submersed leaves present. 6. *N. chartacea*.  
     6. Leaf-blades thick; submersed leaves absent.... 7. *N. advena*.

1. *N. sagittaeifolium* (Walt.) Pursh. Cow-lily—Sluggish streams, Coastal North and South Carolina and Virginia. This and the following six species are all listed by Small under *Nymphaea*.

2. *N. ulvaceum* (Miller & Standley) Standley—Sluggish streams in West Florida. Possibly this is what has been recorded as *N. sagittaeifolium* from Alabama.

3. *N. orbiculatum* (Small) Standley—Lakes and ponds from Middle Florida to Southernmost Georgia.

4. *N. bombycinum* (Miller & Standley) Standley—Ponds in the Coastal Plain, North Florida and adjacent Georgia. The senior author has collected it from acid limesinks in South Georgia, near the South Carolina line.

5. *N. fluviatile* (Harper) Standley—Coastal Plain, West Florida to Alabama and North Carolina. Usually occurs in connection with streams or rivers, but may be found in perfectly still water.

6. *N. chartaceum* (Miller & Standley) Standley—Ponds near the Gulf from Florida to Mississippi.

7. *N. advena* Ait. Cow-lily—Most widely distributed and most frequent species of the genus. Range covers all of our States and is often found in alluvial situations. *Nymphaea macrophylla* Small is included in this consideration of *N. advena*.

2. *Nymphaea* L.

- |                                |                        |
|--------------------------------|------------------------|
| 1. Flowers white.....          | 1. <i>N. odorata</i> . |
| 1. Flowers blue or yellow..... | 2.                     |
| 2. Flowers blue.....           | 2. <i>N. elegans</i> . |
| 2. Flowers yellow.....         | 3. <i>N. flava</i> .   |

1. *N. odorata* Ait. White Water-lily—Distributed over all of our territory and very frequent. Shows an extremely wide acidity tolerance, being found in the most acid and the most alkaline waters alike. This and the two following species are listed under *Castalia* by Small's Manual.

2. *N. elegans* Hook. Blue Water-lily—Big Cypress Swamp, Florida, but may be introduced at other points.

3. *N. flava* Leitner. Yellow Water-lily—Known only from lakes, ponds, and slow streams on the peninsula of Florida.

3. *Cabomba* Aubl.

*C. caroliniana* A. Gray. Fanwort—Mat-forming species, distributed over most of our territory, but not frequent in most portions. Perhaps most often found in alluvial aquatic areas.

4. *Brasenia* Schreb.

*B. schreberi* Gmel. Water-shield—Well distributed in a variety of aquatic situations, its range covering all of our territory. Collected from alluvial marshes and swamps, as well as from very acid limesink ponds. Some investigators have found a negative correlation with *Anopheles quadrimaculatus*.

5. *Nelumbo* Adams.

*N. lutea* (Willd.) Pers. Lotus, Water-chinquapin—Well distributed over the Coastal Plain, collected or noted in a variety of situations by the writers. Grows in acid limesinks, alluvial marshes, and other aquatic areas where it is not indigenous (for instance, borrow pits and artesian impoundments). In the Tennessee Valley it is often found



in association with *Anopheles quadrimaculatus*. The pink-flowered *N. nucifera* Gaertn. has been noted as introduced in two localities in Georgia.

## RANUNCULACEAE Crowfoot family

### 1. *Caltha* [Rupp.] L.

*C. palustris* L. Marsh-marigold—May possibly come into our territory in its northern part. Prefers calcareous situations.

### 2. *Myosurus* L.

*M. minimus* L. Mouse-tail—Margins of aquatic areas, various provinces, its range covering all of our territory. Apparently prefers calcareous soils.

### 3. *Ranunculus* [Tourn.] L.

- |                                                                   |                            |
|-------------------------------------------------------------------|----------------------------|
| 1. Leaves cut into many thread-like or ribbon-like divisions.     | 1. <i>R. flabellaris</i> . |
| 1. Leaves entire or lobed but not cut into divisions as above.    | 2.                         |
| 2. Leaves narrow, nearly linear, not lobed.....                   | 3.                         |
| 2. Leaves broad, deeply lobed.....                                | 2. <i>R. sceleratus</i> .  |
| 3. Plants perennial; stems creeping; achene with a subulate beak. | 3. <i>R. ambigens</i> .    |
| 3. Plants annual; stems not creeping; achene beakless...          | 4.                         |
| 4. Petals mostly over 3 mm. long.....                             | 4. <i>R. laxicaulis</i> .  |
| 4. Petals mostly less than 3 mm. long.....                        | 5.                         |
| 5. Achene papillose.....                                          | 5. <i>R. lindheimeri</i> . |
| 5. Achene smooth.....                                             | 6. <i>R. pusillus</i> .    |

1. *R. flabellaris* Raf. Water Buttercup—In our territory only along the Mississippi River Valley in Tennessee and North Mississippi unless possibly in North Carolina. This is the *R. delphinifolius* Torr. of Small's Manual.

2. *R. sceleratus* L.—Introduced species, its range including all of our territory. The senior author has noted it only in alluvial situations in the Mississippi River Valley.

3. *R. ambigens* S. Wats.—Should be expected only in the northern part of our territory. Listed as *R. obtusiusculus* Raf. by Small.

4. *R. laxicaulis* (T. & G.) Darby—Moist places in the Coastal Plain and occasionally other provinces, its range including all of our territory.

5. *R. lindheimeri* Engelm.—Ponds from Alabama westward to beyond our limits.

6. *R. pusillus* Poir.—Wet places over all of our territory.



## MAGNOLIACEAE Magnolia family

1. *Magnolia* L.

*M. virginiana* L.—This tree (sometimes shrub) is found over all of our Coastal Plain and seems to prefer acid soils.

## CRUCIFERAE Mustard family

1. *Rorippa* Scop.

*R. sessiliflora* (Nutt.) Hitchc. Water-cress—Various provinces, Florida north and west to beyond the limits of our territory. The senior writer has collected it from ponds in the Mississippi Valley in Tennessee and Mississippi. This species is listed under *Radicula* by Small.

2. *Neobeckia* Greene

*N. aquatica* (A. Eaton) Britton. Lake-cress—Said to range over most of our territory but noted by the writers only in the western portion.

3. *Nasturtium* R. Brown

*N. officinale* R. Brown. Water-cress—Very variable species, ranging over all of our territory from Georgia north and west, particularly in springy places. This species is called *Sisymbrium Nasturtium-Aquaticum* L. by Small.

## CRASSULACEAE Orpine family

1. *Penthorum* [Gronov.] L.

*P. sedoides* L. Ditch Stonecrop—Swamps and ponds usually in association with streams, over all of our territory.

## ITEACEAE Virginia willow family

1. *Itea* [Gronov.] L.

*I. virginica* L. Virginia Willow—Ranges over most of our Coastal Plain and is occasionally found in the Piedmont, most often in association with creeks or small streams.

## ROSACEAE Rose family

1. *Rosa* [Tourn.] L.

*R. palustris* Marsh. Swamp Rose—Swamps and ponds over almost all of our territory.

## MALACEAE Apple family

1. *Crataegus* L.

*C. aestivalis* (Walt.) T. & G. Mayhaw—Ponds and perhaps along streams, Florida to South Carolina and westward beyond the limits of our region. In Southwest Georgia it is the dominant species in temporary ponds of solution origin.

## LEGUMINOSAE Pea family

1. *Gleditsia* L.

*G. aquatica* Marsh. Swamp Locust—River-swamps, Florida to South Carolina and westward in the Coastal Plain. Very common in the valley of the Mississippi River. May easily be distinguished from the similar *G. tricanthos* L. by the oval, single-seeded pod.

2. *Amorpha* L.

*A. fruticosa* L. Indigo-bush—Common in swamps in non-acid regions, ranging over all of our territory. A glabrous species, *A. nitens* F. E. Boynton, has been described from swamps near Waynesboro, Georgia, and a few of the other species of *Amorpha* may occasionally grow in wet places.

## POLYGALACEAE Milkwort family

1. *Polygala* L.

- |                                                                        |                         |
|------------------------------------------------------------------------|-------------------------|
| 1. Flower clusters compound; that is, made up of several clusters..... | 2.                      |
| 1. Flowers in a single terminal cluster.....                           | 4.                      |
| 2. Flowers yellow.....                                                 | 3.                      |
| 2. Flowers white.....                                                  | 1. <i>P. baldwini</i> . |
| 3. Capsule round, seed about 0.5 mm. long.....                         | 2. <i>P. ramosa</i> .   |
| 3. Capsule 2-lobed, seed about 1 mm. long.....                         | 3. <i>P. cymosa</i> .   |
| 4. Flowers brilliant orange.....                                       | 4. <i>P. lutea</i> .    |
| 4. Flowers lemon-yellow.....                                           | 5. <i>P. rugelii</i> .  |

1. *P. baldwini* Nutt.—Low pinelands and acid pineland swamps, Coastal Plain, Florida to Georgia and Mississippi. This and the four following species are listed under the genus *Pilostaxis* by Small.

2. *P. ramosa* Ell.—Situations similar to the above, but more widespread, ranging north and west in the Coastal Plain to beyond the limits of our territory.

3. *P. cymosa* Walt.—More truly aquatic than the preceding two or the following species. Found in acid cypress ponds and pineland pools over all of our Coastal Plain territory.

4. *P. lutea* L.—Acid moist places, Coastal Plain, Florida north and west to beyond the limits of our territory.

5. *P. rugelii* Shuttlw.—Pineland swamps and ponds only in peninsular Florida.

## EUPHORBIACEAE Spurge family

1. *Stillingia* Garden

*S. aquatica* Chapm.—Low, short-lived shrub with extremely light corky wood. Found infrequently in acid ponds and marshes, Coastal Plain, Florida to South Carolina and Mississippi.

## CALLITRICHACEAE Water Starwort family

1. *Callitriche* L.

- |                                                        |                             |
|--------------------------------------------------------|-----------------------------|
| 1. Fruit longer than broad, lobes keeled.....          | 1. <i>C. palustris</i> .    |
| 1. Fruit as broad as long, lobes rounded on edges..... | 2. <i>C. heterophylla</i> . |
1. *C. palustris* L. Water Starwort—In ponds over all of our territory.
2. *C. heterophylla* Pursh. Water Starwort—Should also range over all of our territory.

## CYRILLACEAE Titi family

1. *Cyrilla* Garden

- |                                                                     |                            |
|---------------------------------------------------------------------|----------------------------|
| 1. Leaves mostly over 5 cm. long; petals 3 mm. long or more.        | 1. <i>C. racemiflora</i> . |
| 1. Leaves mostly less than 4 cm. long; petals less than 3 mm. long. | 2. <i>C. parvifolia</i> .  |
1. *C. racemiflora* L. Titi—Acid swamps over all of our Coastal Plain territory.
2. *C. parvifolia* Raf. Titi—Small-leaved species, found from North Florida westward along the Gulf to beyond our limit.

2. *Cliftonia* Gaertn.

*C. monophylla* (Lam.) Sarg. Titi—Non-alluvial acid swamps in the Coastal Plain, North Florida to Georgia and westward to beyond the limit of our range.

## AQUIFOLIACEAE Holly family

1. *Ilex* L.

- |                                             |                           |
|---------------------------------------------|---------------------------|
| 1. Berry black.....                         | 1. <i>I. coriacea</i> .   |
| 1. Berry red.....                           | 2.                        |
| 2. Leaf-blades linear, 1-4 cm. long.....    | 2. <i>I. myrtifolia</i> . |
| 2. Leaf-blades elliptic, 4-10 cm. long..... | 3. <i>I. cassine</i> .    |
1. *I. coriacea* (Pursh) Chapm.—Acid non-alluvial swamps, Coastal Plain, Florida north and west to beyond the limits of our territory.
2. *I. myrtifolia* Walt.—Acid swamps and acid Cypress ponds, Coastal Plain, Florida to North Carolina and to the westward beyond the limit of our territory.
3. *I. cassine* L. Yaupon—Swamps, usually acid, Coastal Plain, Florida north and west to beyond the limits of our region.

## ACERACEAE Maple family

1. *Acer* L.

- |                                                   |                           |
|---------------------------------------------------|---------------------------|
| 1. Leaves simple.....                             | 2.                        |
| 1. Leaves compound.....                           | 1. <i>A. negundo</i> .    |
| 2. Leaf-blades glabrous or nearly so beneath..... | 2. <i>A. rubrum</i> .     |
| 2. Leaf-blades wooly beneath.....                 | 3. <i>A. drummondii</i> . |

1. *A. negundo* L. Ash-leaved Maple—River-swamps over all of our territory. This species is listed under the genus *Negundo* by Small.

2. *A. rubrum* L. Red Maple—Creek and river-swamps over all of our territory. It and the following species are cited under the generic name of *Rufacer* by Small.

3. *A. drummondii* Hook. & Arn. Red Maple—Perhaps most common in the Mississippi Valley region but also occurring in river-swamps from Florida to Georgia and westward. Sometimes considered as only a variety of the preceding.

## RHAMNACEAE Buckthorn family

1. *Berchemia* Neck.

*B. scandens* (Hill) Trelease. Rattan-vine—Swamps of creeks and rivers, mostly Coastal Plain, Florida north and west beyond the limits of our range.

## VITACEAE Grape family

1. *Ampelopsis* Michx.

*A. arborea* (L.) Rusby. Pepper-vine—Swamps of the larger rivers over all of our Coastal Plain and Mississippi Valley territory.

## MALVACEAE Mallow family

1. *Hibiscus* L.

- |                                                                                 |                             |
|---------------------------------------------------------------------------------|-----------------------------|
| 1. Flowers brilliant red.....                                                   | 2.                          |
| 1. Flowers pink or white.....                                                   | 3.                          |
| 2. Leaf-blades with 5-7 narrow elongate lobes.....                              | 1. <i>H. coccineus</i> .    |
| 2. Leaf-blades merely toothed or with 3-5 prominent but short, broad lobes..... | 2. <i>H. semilobatus</i> .  |
| 3. Leaf-blades glabrous.....                                                    | 3. <i>H. militaris</i> .    |
| 3. Leaf-blades pubescent at least beneath.....                                  | 4.                          |
| 4. Capsule glabrous.....                                                        | 4. <i>H. moscheutos</i> .   |
| 4. Capsule pubescent.....                                                       | 5.                          |
| 5. Capsule beaked.....                                                          | 6.                          |
| 5. Capsule rounded or truncate at top.....                                      | 5. <i>H. lasiocarpus</i> .  |
| 6. Leaf-blades lanceolate to ovate; toothed but not lobed.....                  | 6. <i>H. incanus</i> .      |
| 6. Leaf-blades as broad as long, 3-5 lobed.....                                 | 7. <i>H. grandiflorus</i> . |

1. *H. coccineus* Walt.—Swamps along the coast in Georgia, Florida, and Alabama.

2. *H. semilobatus* Chapm.—Swamps, near the coast, East Florida.
3. *H. militaris* Cav. Rose Mallow—Alluvial swamps over all of our territory.
4. *H. moscheutos* L.—Marshes over all of our territory, especially in alluvial areas.
5. *H. lasiocarpus* Cav.—Swamps, various provinces, Georgia west to beyond the limits of our territory.
6. *H. incanus* Wendl.—Swamps, Coastal Plain, Florida and Alabama north to beyond the limits of our territory.
7. *H. grandiflorus* Michx.—Marshes, Coastal Plain, Florida to Georgia and Mississippi.

## HYPERICACEAE St. John's-wort family

1. *Hypericum* L.

- |                                                                                               |                            |
|-----------------------------------------------------------------------------------------------|----------------------------|
| 1. Petals of flowers pink.....                                                                | 2.                         |
| 1. Petals of flowers yellow.....                                                              | 3.                         |
| 2. Filaments united only near the base; leaves sessile and clasping.                          | 1. <i>H. virginicum</i> .  |
| 2. Filaments united to near the middle; leaves sessile and clasping or narrowed and petioled. | 2. <i>H. tubulosum</i> .   |
| 3. Plants with prominent stolons.....                                                         | 3. <i>H. adpressum</i> .   |
| 3. Plants without prominent stolons.....                                                      | 4.                         |
| 4. Inflorescence without leaves.....                                                          | 4. <i>H. cistifolium</i> . |
| 4. Inflorescence leafy.....                                                                   | 5.                         |
| 5. Leaves clasping at base, ovate to ovate-lanceolate....                                     | 5. <i>H. myrtifolium</i> . |
| 5. Leaves not clasping but narrowed at base.....                                              | 6.                         |
| 6. Leaves conspicuously whorled; leaves very narrow, sometimes needle-like and not revolute.  | 6. <i>H. galioides</i> .   |
| 6. Leaves not conspicuously whorled; leaves usually not needle-like and revolute.             | 7. <i>H. densiflorum</i> . |

1. *H. virginicum* L.—Usually in acid swamps, ranging over most of our territory.

2. *H. tubulosum* Walt.—Consists, in our territory, of two varieties, the typical one and variety *walteri* (Gmel.) Lott. The former has broad based leaves while in the latter the leaves are narrowed to petioles. Both seem to be well distributed over the Coastal Plain in our territory. This and the preceding species are listed under the genus *Triadenum* by Small.

3. *H. adpressum* Bart.—Various provinces, Georgia north and west to beyond the limits of our territory.

4. *H. cistifolium* Lam.—Sometimes found at the margins of acid swamps and ponds, Coastal Plain, Florida north to South Carolina and west to beyond the limits of our territory. This is given as *H. opacum* T. & G. by Small.

5. *H. myrtifolium* Lam. St. John's-wort—Acid ponds, Coastal Plain, Florida north to South Carolina and west to Mississippi.

6. *H. galioides* Lam.—Very common in acid ponds ranging over most of our Coastal Plain territory. Some observers have noted that there is rarely an association of *Anopheles quadrimaculatus* with this plant. This species includes *H. fasciculatum* Lam. of Small's *Manual*.

7. *H. densiflorum* Pursh—Sometimes difficult to distinguish from the preceding and like it found in acid situations. Its range includes most of our area.

### THEACEAE Camellia family

#### 1. *Gordonia* Ellis.

*G. lasianthus* (L.) Ellis. Red Bay—Non-alluvial acid swamps and bays, Coastal Plain, Florida north to North Carolina and west to the limit of our territory.

### LAURACEAE Laurel family

#### 1. *Persea* Gaertn.

*P. pubescens* (Pursh) Sarg. Sweet Bay—Non-alluvial swamps, Coastal Plain, Florida north and west to the limits of our territory. It is listed under the genus *Tamala* by Small.

#### 2. *Glabraria* L.

*G. geniculata* (Walt.) Britton—Rare plant, found around ponds, mostly in acid situations, Coastal Plain, Florida to and beyond the limits of our territory.

#### 3. *Benzoin* Fabr.

- |                                                                            |                               |
|----------------------------------------------------------------------------|-------------------------------|
| 1. Leaves tapering to the base; petioles slender and long                  | 1. <i>B. aestivale</i> .      |
| 1. Leaves rounded or cordate at the base; petioles stout and rather short. | 2. <i>B. melissaefolium</i> . |

1. *B. aestivale* (L.) Nees. Spice-bush—Wet woods and swamps, various provinces over all of our territory.

2. *B. melissaefolium* (Walt.) Nees—Uncommon in swamps and pond margins over all of our Coastal Plain territory.

### MELASTOMACEAE Meadow Beauty family

#### 1. *Rhexia* L.

- |                                                                               |                           |
|-------------------------------------------------------------------------------|---------------------------|
| 1. Neck of the mature calyx tube as long as the body or longer.               | 2.                        |
| 1. Neck of the mature calyx tube much shorter than the body.                  | 3.                        |
| 2. Leaf-blades narrowly linear                                                | 1. <i>R. cubensis</i> .   |
| 2. Leaf-blades elliptic or lanceolate                                         | 2. <i>R. mariana</i> .    |
| 3. Stems and branches round or nearly so                                      | 3. <i>R. lanceolata</i> . |
| 3. Stems and branches sharply angled or 4-winged                              | 4.                        |
| 4. Flowers over 2 cm. across, colored                                         | 5.                        |
| 4. Flowers less than 2 cm. across, white                                      | 6. <i>R. parviflora</i> . |
| 5. Lobes of calyx longer than neck of calyx tube; leaves entire or nearly so. | 5. <i>R. aristosa</i> .   |

5. Sepals shorter than neck of calyx tube or about as long; 6. leaves toothed.

- |                                   |                          |
|-----------------------------------|--------------------------|
| 6. Plant tuberous rooted.....     | 6. <i>R. virginica</i> . |
| 6. Plant not tuberous rooted..... | 7. <i>R. stricta</i> .   |

1. *R. cubensis* Griseb.—Swamps, Coastal Plain, Florida to Georgia and Mississippi.

2. *R. mariana* L. Meadow Beauty—Various situations over all of our range. As treated here it includes *R. nashii* Small.

3. *R. lanceolata* Walt.—Small species occurring in the Coastal Plain, Florida north and west to the limits of our territory.

4. *R. parviflora* Chapm.—Known to occur only in shallow ponds near Apalachicola, Florida, although the senior writer collected specimens which might be referred to this species from a limesink in South-west Georgia.

5. *R. aristosa* Britton—Pineland swamps, Coastal Plain, Georgia north to beyond the limit of our range.

6. *R. virginica* L.—Wet situations over all of our range.

7. *R. stricta* Pursh—Coastal Plain species, supposed to range from Georgia to North Carolina and Mississippi.

LYTHRACEAE Loosestrife family

1. *Didiplis* Raf.

*D. diandra* (Nutt.) Wood. Water Purslane—Infrequent but range includes all of our area.

2. *Ammannia* L.

- |                                    |                          |
|------------------------------------|--------------------------|
| 1. Petals present.....             | 2.                       |
| 1. Petals wanting.....             | 1. <i>A. latifolia</i> . |
| 2. Style long and slender.....     | 2. <i>A. coccinea</i> .  |
| 2. Style very short and stout..... | 3. <i>A. teres</i> .     |

1. *A. latifolia* L.—Limesinks and swamps, South Florida and the Florida Keys.

2. *A. coccinea* Rottb.—Range includes all of our territory, but most frequent in non-acid regions.

3. *A. teres* Raf.—Florida north to beyond the limit of our region. Supposed to differ from *A. latifolia* only in having a corolla. The senior writer has seen it only near the coast.

3. *Rotala* L.

*R. ramosior* (L.) Koehne—Ranges over all our territory, seeming to prefer non-acid situations.

4. *Decodon* J. F. Gmel.

*D. verticillatus* (L.) Ell. Water Willow—Fairly frequent over all of our territory. Shows an extremely wide range of acidity tolerance as it is found in the very acid Okefinokee Swamp and the neutral Reelfoot Lake alike.



5. *Lythrum* L.

- |                                                                         |                            |
|-------------------------------------------------------------------------|----------------------------|
| 1. Stem creeping; leaves mostly opposite.....                           | 1. <i>L. flagellare</i> .  |
| 1. Stem erect; leaves mostly alternate.....                             | 2.                         |
| 2. Leaf-blades rounded or cordate at base.....                          | 2. <i>L. alatum</i> .      |
| 2. Leaf-blades narrowed at the base.....                                | 3.                         |
| 3. Leaf-blades thick, numerous, and less than 1.5 cm. long on branches. | 3. <i>L. lanceolatum</i> . |
| 3. Leaf-blades thin, few, and over 1.5 cm. long on branches.            | 4. <i>L. curtissii</i> .   |

1. *L. flagellare* Shuttlw.—Swamps in lower peninsular Florida.

2. *L. alatum* Pursh—Swamps in various provinces over all of our territory except perhaps Florida.

3. *L. lanceolatum* Ell.—Coastal Plain, Florida north to South Carolina and west to beyond the limit of our area, mostly in alluvial situations.

4. *L. curtissii* Fernald—Known only from muddy and often calcareous swamps, North Florida and the immediately adjacent portion of South Georgia.

## ONAGRACEAE Evening primrose family

1. *Ludwigia* L.

- |                                                                                                                  |                              |
|------------------------------------------------------------------------------------------------------------------|------------------------------|
| 1. Leaves opposite.....                                                                                          | 2.                           |
| 1. Leaves alternate.....                                                                                         | 4.                           |
| 2. Flowers sessile; corolla inconspicuous.....                                                                   | 3.                           |
| 2. Flowers with long stalks; corolla conspicuous.                                                                | 1. <i>L. arcuata</i> .       |
| 3. Calyx tube usually bearing one or more long bracts above base; calyx tube without 4 longitudinal green bands. | 2. <i>L. natans</i> .        |
| 3. Bract, when present, borne basally; calyx tube with 4 longitudinal green bands.                               | 3. <i>L. palustris</i> .     |
| 4. Flowers showy, stalked.....                                                                                   | 4. <i>L. alternifolia</i> .  |
| 4. Flowers mostly not showy, sessile.....                                                                        | 5.                           |
| 5. Petals wanting or minute.....                                                                                 | 6.                           |
| 5. Petals as long as the sepals or longer, showy.....                                                            | 15.                          |
| 6. Capsule 1-3 mm. long, plants sometimes depressed.                                                             | 7.                           |
| 6. Capsule 3-8 mm. long, plants erect.....                                                                       | 8.                           |
| 7. Plant depressed; leaves entire.....                                                                           | 5. <i>L. microcarpa</i> .    |
| 7. Plant ascending; leaves toothed near the apex.....                                                            | 6. <i>L. curtissii</i> .     |
| 8. Capsule about as thick as long, not cylindrical.                                                              | 9.                           |
| 8. Capsule much longer than thick, cylindrical.                                                                  | 7. <i>L. glandulosa</i> .    |
| 9. Foliage and fruit copiously pubescent.....                                                                    | 8. <i>L. pilosa</i> .        |
| 9. Foliage and fruit glabrous or nearly so.....                                                                  | 10.                          |
| 10. Inflorescence terminal.....                                                                                  | 9. <i>L. suffruticosa</i> .  |
| 10. Flowers distributed over plant.....                                                                          | 11.                          |
| 11. Capsules turbinate or obpyramidal but not globular..                                                         | 12.                          |
| 11. Capsule globular.....                                                                                        | 10. <i>L. sphaerocarpa</i> . |
| 12. Capsule with the angles rounded or merely square.                                                            | 13.                          |
| 12. Capsule with the angles winged or at least margined.                                                         | 14.                          |



- |                                                                                               |                            |
|-----------------------------------------------------------------------------------------------|----------------------------|
| 13. Capsule glabrous, the angles rounded; with two bracts adnate to the calyx tube near base. | 11. <i>L. polycarpa</i> .  |
| 13. Capsule puberulent, the angles square; bracts not adnate to the calyx tube.               | 12. <i>L. simulata</i> .   |
| 14. Sepals not quite as broad as long, almost as long as the capsule.                         | 13. <i>L. alata</i> .      |
| 14. Sepals broader than long, only about one-half as long as the capsule.                     | 14. <i>L. lanceolata</i> . |
| 15. Capsule round, cylindric                                                                  | 15. <i>L. linifolia</i> .  |
| 15. Capsule narrowly obpyramidal, tapered from base to apex.                                  | 16. <i>L. linearis</i> .   |

1. *L. arcuata* Walt.—This species is cited by Small as *Ludwigiantha arcuata* (Walt.) Small. Occurs in marshes and ponds, Coastal Plain, Florida to Virginia, often in very acid situations.

2. *L. natans* Ell.—This species exists in our territory in two varieties and includes both *Isnardia repens* and *Isnardia intermedia* of Small. It is a Coastal Plain species and is found from Florida north and west to the limits of our territory.

3. *L. palustris* (L.) Ell.—Also present in our territory in two varieties. More widespread than the preceding and not limited to the Coastal Plain. Range includes all of our territory. It is found over a wide range of acidity. *Anopheles quadrimaculatus* is often found associated with it. This plant is given under the genus *Isnardia* in Small. A related species of *Ludwigia*, *L. spathulata* T. & G., which is a hairy species with the capsule turgid and constricted at the top, is found in ponds in Middle Florida.

4. *L. alternifolia* L.—Low places over all of our territory.

5. *L. microcarpa* Michx.—Coastal Plain, Florida to North Carolina and Mississippi, seeming to prefer non-acid conditions.

6. *L. curtissii* Chapm.—Related to the preceding, but found only on the peninsula of Florida.

7. *L. glandulosa* Walt.—Coastal Plain and occasionally in other provinces, most frequently in alluvial areas along rivers. Range includes all of our territory.

8. *L. pilosa* Walt.—Hairy species, most often found in acid ponds and bays, Coastal Plain, Florida to North Carolina and beyond our limit in Louisiana.

9. *L. suffruticosa* Walt.—Margins of acid ponds, Coastal Plain, Florida to North Carolina.

10. *L. sphaerocarpa* Ell.—Frequent species over all of our Coastal Plain. Commonly observed by the senior author in acid, open limesinks in Georgia.

11. *L. polycarpa* Short & Peter—Not observed in our territory by the writers, but said to be present in Tennessee. Has been seen in aquatic areas along the Mississippi not far north of our areas.

12. *L. simulata* Small—Coastal Plain swamps, Florida to North Carolina.

13. *L. alata* Ell.—Coastal Plain, Florida north and west to and beyond the limits of our territory.

14. *L. lanceolata* Ell.—Coastal Plain aquatic areas, Florida to North Carolina.

15. *L. linifolia* Poir.—Acid pineland swamps, Coastal Plain, Florida to North Carolina and Mississippi.

16. *L. linearis* Walt.—Acid places, Coastal Plain, Florida north and west to beyond the limits of our territory.

## 2. *Jussiaea* L.

- |                                                                        |                             |
|------------------------------------------------------------------------|-----------------------------|
| 1. Plants creeping or floating .....                                   | 2.                          |
| 1. Plants erect .....                                                  | 3.                          |
| 2. Leaf-blades long-petioled; flowers 2-3 cm. across.                  | 1. <i>J. diffusa</i> .      |
| 2. Leaf-blades short-petioled; flowers 3-4 cm. across.                 | 2. <i>J. grandiflora</i> .  |
| 3. Capsule long, narrowly cylindric, more than 3 cm. long.             | 4.                          |
| 3. Capsule shorter, obconic or nearly cylindric, less than 2 cm. long. | 6.                          |
| 4. Calyx of 5 sepals .....                                             | 3. <i>J. leptocarpa</i> .   |
| 4. Calyx of 4 sepals .....                                             | 5.                          |
| 5. Leaf-blades very narrow .....                                       | 4. <i>J. angustifolia</i> . |
| 5. Leaf-blades broad .....                                             | 5. <i>J. scabra</i> .       |
| 6. Fruit winged; leaf-blades sessile and decurrent onto stem.          | 6. <i>J. decurrens</i> .    |
| 6. Fruit not winged; leaf-blades short petioled .....                  | 7. <i>J. peruviana</i> .    |

1. *J. diffusa* Forsk.—Florida westward, mostly in the Coastal Plain, to beyond our limits. Not common in the eastern part of our territory.

2. *J. grandiflora* Michx.—Ranges over all of our Coastal Plain, and is established in some localities northward. Most often found in aquatic areas associated with streams, and often grows well in impoundments. It and the preceding have been found in association with *Anopheles quadrimaculatus*.

3. *J. leptocarpa* Nutt.—Partial to acid places, Coastal Plain, Florida to Georgia and westward to beyond the limits of our territory.

4. *J. angustifolia* Lam.—Southernmost part of our territory, Florida to beyond our western limit, in swamps.

5. *J. scabra* Willd.—Wet places in Florida.

6. *J. decurrens* (Walt.) DC.—Ranges over all of our area in low grounds, most frequent in the Coastal Plain. Often found in weedy habitats.

7. *J. peruviana* L.—Everglades and in swamps, peninsular Florida.

## HALORAGIDACEAE Water milfoil family

1. *Proserpinaca* L.

1. Leaves all nearly alike and all deeply lobed or divided. . . . . 2.
1. Upper leaves (those bearing flowers in axils) toothed . . . . . 1. *P. palustris*.  
but not lobed or divided.
2. Rachis of leaves about as broad as the segments. . . . . 2. *P. pectinata*.
2. Rachis of leaves much broader than the segments or lobes. . . . . 3. *P. intermedia*.

1. *P. palustris* L. Mermaid Weed—This species is found in our region in several varieties, and it includes not only *P. palustris* but also *P. amblygona* and *P. platycarpa* of Small's Manual. The range of the species covers all of our territory, and it is often found in acid situations but shows some tolerance.

2. *P. pectinata* Lam.—Ranges over all of our area, but most common in the Coastal Plain. Found in the same type places as the preceding species.

3. *P. intermedia* Mackenzie—Possibly a hybrid between the two preceding. Rare but known from Georgia north to beyond the limit of our territory.

2. *Myriophyllum* L.

1. Emerged leaves nearly like submerged leaves . . . . . 1. *M. brasiliense*.
1. Emerged leaves definitely different from submerged leaves.  
leaves.
2. Stamens 4; corolla persistent . . . . . 3.
2. Stamens 8; corolla deciduous . . . . . 2. *M. laxum*.
3. Floral (emerged) leaves with ovate, toothed blades . . . . . 3. *M. heterophyllum*.
3. Floral leaves deeply lobed or divided . . . . . 4. *M. pinnatum*.

1. *M. brasiliense* Cambess. Parrot's-feather—Tropical species, introduced in the Coastal Plain, Florida to Georgia and westward beyond the limits of our territory. It is often found in association with *Anopheles quadrimaculatus* and seems to prefer neutral or alkaline waters. This species is listed under *M. proserpinacoides* Gill by Small.

2. *M. laxum* Shuttlw.—Rare species, found only in ponds and lakes in North Florida, South Georgia and South Alabama. The senior writer has collected it from acid, open limesinks in Southwest Georgia.

3. *M. heterophyllum* Michx.—Ranges over all of our territory, but most common in the Coastal Plain. Seems to prefer less acid waters than the following. *Anopheles quadrimaculatus* is often found associated with it.

4. *M. pinnatum* (Walt.) B. S. P.—Should range over all of our territory. It is the impression of the writers that this species is found in more acid waters than the preceding, but owing to the difficulty of identifying the *Myriophyllum* group in the field this impression may be erroneous. It is most common in the Coastal Plain.

## CORNACEAE Dogwood family

1. *Nyssa* L.

1. Fruits solitary, large (3-4 cm. long); stone winged or sharply ridged. 2.
1. Fruits 2 or more together, small (1-1.5 cm. long); stone not winged or sharply ridged. 1. *N. sylvatica*.
2. Fruit purple or blue, stone only sharp-ridged; large straight tree with swollen base. 2. *N. aquatica*.
2. Fruit red, stone winged; small crooked tree----- 3. *N. ogeche*.

1. *N. sylvatica* Marsh. Black-gum—Present in our region in no less than four varieties but variety *biflora* (Walt.) Sarg. is the most characteristically aquatic. Ranges in the Coastal Plain (and occasionally in upland provinces) over most of our territory and, in acid regions at least, is very common. *N. ursina* Small is a copiously branched shrubby species with a globular drupe which is known only from pineland swamps in the Apalachicola River delta in Florida. Our common aquatic Black-gum is listed as *N. biflora* Walt. by Small.

2. *N. aquatica* L. Tupelo-gum—Ranges over all of our Coastal Plain territory, being seen most often in alluvial situations.

3. *N. ogeche* Marsh. Ogeche Lime—Acid situations from around Apalachicola in Florida to extreme southern South Carolina. It has a shrubby variety, var. *acuminata* (Small) Eyles, in pineland swamps near the coast in Georgia.

## UMBELLIFERAE Carrot family

1. *Eryngium* [Tourn.] L.

*E. aquaticum* L. Snakeroot—Moist places along the coast from Florida north.

2. *Hydrocotyle* [Tourn.] L.

1. Leaves peltate----- 2.
1. Leaves not peltate----- 3.
2. Fruit notched at the base and the apex----- 1. *H. umbellata*.
2. Fruit not notched----- 2. *H. verticillata*.
3. Leaves shallowly lobed; flower clusters almost without stalks. 3. *H. americana*.
3. Leaves deeply lobed; flower clusters with long stalks... 4. *H. ranunculoides*.

1. *H. umbellata* L. Water Pennywort—COMMON aquatic species and occurs over all of our area, especially in the Coastal Plain. Found in a wide variety of conditions.

2. *H. verticillata* Thunb.—Should also be found over all of our area but not as commonly as the preceding. Most common in the Coastal Plain.

3. *H. americana* L.—Present in our area in North Carolina and Tennessee.

4. *H. ranunculoides* L. f.—Range includes all of our area. The senior writer has observed it in alkaline waters near the coast.

### 3. *Centella* L.

*C. erecta* (L. f.) Fernald—Shallow ponds and low places, Coastal Plain, Florida north and west to beyond the limits of our territory. Small's *Manual* gives this as *C. repanda* (Pers.) Small.

### 4. *Cicuta* L.

1. Fruit grooved at the junction of the carpels..... 1. *C. curtissii*.  
1. Fruit not grooved at the junction of the carpels..... 2. *C. maculata*.

1. *C. curtissii* Coult. & Rose—Swamps in the Coastal Plain, Florida north and west to beyond the limits of our territory.

2. *C. maculata* L.—Swamps, mostly in the western part of our territory.

### 5. *Sium* [Tourn.] L.

*S. suave* Walt.—Uncommon in ponds, marshes, and swamps over most of our area. Small lists this as *S. cicutaefolium* Schrank.

### 6. *Ptilimnium* Raf.

1. Leaves simple, round..... 1. *P. nodosum*.  
1. Leaves compound, with narrowly linear segments..... 2.  
    2. Fruit 2 mm. long or more; if only 2 mm. long 2.  
        sepals deltoid.  
    2. Fruit 1.5 mm. long or less; sepals lanceolate to 2. *P. nuttallii*.  
        subulate.  
3. Sepals deltoid; fruit about 2 mm. long..... 3. *P. capillaceum*.  
3. Sepals lanceolate to subulate; fruit 3-4 mm. long.... 4. *P. costatum*.

1. *P. nodosum* (Rose) Mathias—Known only from ponds on the Coastal Plain, Southwest Georgia.

2. *P. nuttallii* (DC.) Britton—Swamps in our region from Alabama westward.

3. *P. capillaceum* (Michx.) Raf.—Published range includes all of our area, but probably most common in wet areas along the coast.

4. *P. costatum* (Ell.) Coult. & Rose—Coastal Plain swamps, Georgia to North Carolina.

### 7. *Oxypolis* Raf.

*O. filiformis* (Walt.) Britton—Acid low pinelands and shallow ponds and swamps, Coastal Plain, Florida to South Carolina and westward to beyond the limits of our range.

## CLETHRACEAE White alder family

1. *Clethra* [Gronov.] L.

1. Leaf-blades glabrous beneath or nearly so..... 1. *C. alnifolia*.  
 1. Leaf-blades densely hairy or wooly beneath..... 2. *C. tomentosa*.

1. *C. alnifolia* L. Sweet Pepperbush—Swamps, mostly acid, Florida north and west to beyond the confines of our area.

2. *C. tomentosa* Lam.—Similar situations to the preceding, but distribution more restricted. Found from North Florida to North Carolina and Alabama in the Coastal Plain.

## ERICACEAE Heath family

1. *Leucothoë* D. Don

1. Flower clusters axillary..... 1. *L. acuminata*.  
 1. Flower clusters terminal..... 2. *L. racemosa*.

1. *L. acuminata* (Ait.) D. Don. Fetter-bush—Acid swamps and ponds, Coastal Plain, Florida to South Carolina. The related *L. axillaris* (Lam.) D. Don may perhaps occasionally be found in aquatic situations.

2. *L. racemosa* (L.) A. Gray—Found in two varieties in acid swamps and ponds, Coastal Plain, Florida north and west to beyond the boundaries of our territory. The treatment here includes *Eubotrys racemosa* (L.) Nutt. and *E. elongata* Small of Small's Manual of the Southeastern Flora.

2. *Ampelothamnus* Small

*A. phyllyreifolius* (Hook.) Small—Found usually climbing on cypress in acid ponds and swamps, Coastal Plain, North Florida to Alabama and Georgia in the Coastal Plain.

3. *Desmothamnus* Small

*D. lucidus* (Lam.) Small—Common shrub of acid swamps, ponds, and bays; Coastal Plain, Florida north and west to beyond the limits of our territory.

## PRIMULACEAE Primrose family

1. *Hottonia* L.

*H. inflata* Ell. Featherfoil—Published range includes all of our Coastal Plain, but rare. Seems to be most common in the neutral waters of aquatic areas in the Mississippi Valley.

2. *Samolus* [Tourn.] L.

*S. pauciflorus* Raf. Water Pimpernel—Wet places, usually not acid, over all of our territory.

## OLEACEAE Olive family

1. *Fraxinus* [Tourn.] L.

- |                                                                                   |                            |
|-----------------------------------------------------------------------------------|----------------------------|
| 1. Twigs pubescent; fruit not as below                                            | 1. <i>F. profunda</i> .    |
| 1. Twigs glabrous or, if pubescent, the body of the fruit broadly winged to base. | 2.                         |
| 2. Leaflets usually 5, thick and leathery                                         | 2. <i>F. pauciflora</i> .  |
| 2. Leaflets usually 7, not so thick nor leathery                                  | 3. <i>F. caroliniana</i> . |

1. *F. profunda* Bush—Swamps, Georgia to Alabama and northward.

2. *F. pauciflora* Nutt. Water Ash—Swamps in the lower Coastal Plain, Florida to Georgia and west to the limit of our territory.

3. *F. caroliniana* Mill. Water Ash—Swamps, over all of our Coastal Plain.

2. *Forestiera* Poir.

*F. acuminata* (Michx.) Poir. Swamp Privet—Most frequently in river swamps, over all but the northeastern portion of our territory.

## LOGANIACEAE Logania family

1. *Cynoctonum* J. F. Gmel.

*C. mitreola* (L.) Britton—Occasionally aquatic, found mostly in the Coastal Plain, Florida north and west to beyond the limits of our range.

## GENTIANACEAE Gentian family

1. *Sabatia* Adans.

- |                                                          |                            |
|----------------------------------------------------------|----------------------------|
| 1. Petals usually 4 or 5                                 | 2.                         |
| 1. Petals usually 8-12                                   | 3.                         |
| 2. Sepals foliaceous, broadened near end                 | 1. <i>S. calycina</i> .    |
| 2. Sepals not foliaceous, elliptic                       | 2. <i>S. campanulata</i> . |
| 3. Petals less than 2.5 cm. long, usually acutish at tip | 4.                         |
| 3. Petals more than 2.5 cm. long, usually rounded at tip | 3. <i>S. decandra</i> .    |
| 4. Sepals much shorter than corolla                      | 4. <i>S. harperi</i> .     |
| 4. Sepals as long as corolla or nearly so                | 5. <i>S. foliosa</i> .     |

1. *S. calycina* (Lam.) Heller—Alluvial situations over all of our Coastal Plain.

2. *S. campanulata* (L.) Torr.—Range includes all of our territory. Most common in acid moist places in the Coastal Plain, sometimes in ponds.

3. *S. decandra* (Walt.) Harper—Cypress and perhaps other ponds, Coastal Plain, Florida to Alabama and South Carolina.

4. *S. harperi* Small—Acid swamps and along pond-margins, Coastal Plain, Florida to Alabama and South Carolina.

5. *S. foliosa* Fernald—Coastal Plain in Florida and Alabama.



## MENYANTHACEAE Bogbean family

1. *Nymphoides* [Tourn.] Hill

1. Leaf-blades thick, pitted beneath; petiole purple-glandular. 1. *N. aquaticum*.  
 1. Leaf-blades thin, not pitted beneath; petiole slender and smooth. 2. *N. cordatum*.

1. *N. aquaticum* (Walt.) Kuntze. Floating-heart—Range includes all of our Coastal Plain. Most often seen in rather acid and often open ponds.

2. *N. cordatum* (Ell.) Fernald—Less common than the preceding in most of our territory, but found in similar situations and with roughly the same range. *N. lacunosum* (Vent.) Kuntze is the name given this species in Small's Manual.

## CONVOLVULACEAE Morning glory family

1. *Breweria* R. Brown

*B. aquatica* (Walt.) A. Gray—Found infrequently around shallow ponds. Range includes all of our Coastal Plain.

## HYDROPHYLLACEAE Waterleaf family

1. *Hydrolea* L.

1. Flowers in terminal clusters; styles several times as long as ovary, pubescent at base; filaments as long or nearly as long as corolla. 2.  
 1. Flowers in axillary clusters; styles slightly longer than ovary, glabrous; filaments much shorter than corolla. 3.  
 2. Leaf-blades ovate to elliptic; calyx lobes less than 7 mm. long; flowers paniculate. 1. *H. ovata*.  
 2. Leaf-blades elliptic to elliptic-lanceolate; calyx lobes over 7 mm. long; flowers corymbose. 2. *H. corymbosa*.  
 3. Sepals linear or linear-lanceolate; stem villous above. . . . 3. *H. quadrivalvis*.  
 3. Sepals ovate-lanceolate; stem nearly glabrous above. . . . 4. *H. affinis*.

1. *H. ovata* Nutt.—Ponds and swamps, Coastal Plain, Georgia north and west to beyond the limits of our territory.

2. *H. corymbosa* Macbride—Limited in distribution, Coastal Plain, Florida to South Carolina, mostly in calcareous swamps.

3. *H. quadrivalvis* Walt.—Probably the most frequent species of the genus in our territory. Range includes all of our Coastal Plain, often in acid places.

4. *H. affinis* A. Gray—Swampy places, but in our territory only in its western part in Mississippi.

## VERBENACEAE Verbena family

1. *Lippia* [Houston] L.

*L. lanceolata* Michx. Frog-fruit—Found mostly in alluvial situations, over most of our area. *L. nodiflora* (L.) Michx., a creeping



species, is found in moist places in various parts of our territory, but is not truly aquatic. Small lists these species under the genus *Phyla*.

## LABIATAE Mint family

### 1. *Scutellaria* L.

*S. laterifolia* L. Skullcap—Found over all of our area, apparently most common in alluvial situations.

### 2. *Lycopus* [Tourn.] L.

- |                                                                                                   |                              |
|---------------------------------------------------------------------------------------------------|------------------------------|
| 1. Blades of the lower leaves divided or deeply lobed.....                                        | 1. <i>L. americanus</i> .    |
| 1. Blades of the lower leaves merely toothed.....                                                 | 2.                           |
| 2. Leaf-blades petioled.....                                                                      | 2. <i>L. rubellus</i> .      |
| 2. Leaf-blades sessile and sometimes clasping.....                                                | 3.                           |
| 3. Stems glabrous at least on the lower part; bracts subtending flower clusters narrowed to base. | 3. <i>L. sessilifolius</i> . |
| 3. Stems densely puberulent or finely pubescent; bracts truncate at base.                         | 4. <i>L. pubens</i> .        |

1. *L. americanus* Muhl.—Wet places over all of our territory.

2. *L. rubellus* Moench—Coastal Plain in various situations including river swamps, Florida north and west to beyond the confines of our area.

3. *L. sessilifolius* A. Gray—Distribution almost the same as that of the preceding.

4. *L. pubens* Britton—Coastal Plain in acid pineland ponds, Florida to Mississippi and South Carolina.

## SCROPHULARIACEAE Figwort family

### 1. *Herpestris* Gaertn. f.

*H. rotundifolia* Gaertn. f.—Ponds near the coast, Florida to beyond our limit in the north. Not restricted to tidal habitats as has been supposed.

### 2. *Hydrotrida* Small

*H. caroliniana* (Walt.) Small—Range includes all of our Coastal Plain. Not frequently recorded from some areas, but in Georgia it is common in limesink ponds in the Southern part of the State and has been noted a few times along the coast.

### 3. *Gratiola* L.

- |                                                                                |                           |
|--------------------------------------------------------------------------------|---------------------------|
| 1. Leaves elliptic-lanceolate to ovate; capsule equalling or exceeding sepals. | 1. <i>G. virginiana</i> . |
| 1. Leaves linear-lanceolate; capsule exceeded by sepals...                     | 2. <i>G. ramosa</i> .     |

1. *G. virginiana* L. Hedge Hyssop—Range includes all of our territory, and is occasionally found in truly aquatic areas especially in alluvial situations.

2. *G. ramosa* Walt.—Coastal Plain, Florida north and west to beyond the limits of our territory. Found in aquatic situations mostly in acid pineland swamps or pools.

#### 4. *Micranthemum* Michx.

*M. umbrosum* (Walt.) Blake—Shallow ponds, often acid, Florida to North Carolina and west to beyond our limits in the Coastal Plain.

#### 5. *Mimulus* L.

- |                                              |                        |
|----------------------------------------------|------------------------|
| 1. Leaves not petioled; stem not winged..... | 1. <i>M. ringens</i> . |
| 1. Leaves petioled; stem 4-winged.....       | 2. <i>M. alatus</i> .  |

1. *M. ringens* L. Monkey-flower—Range includes all of our states, occurring mostly along streams. Rare in the Coastal Plain.

2. *M. alatus* Ait.—The remarks concerning the preceding can also be applied to this.

### ACANTHACEAE *Acanthus* family

#### 1. *Hygrophila* R. Brown

*H. lacustris* (Schlecht.) Nees—Lower Coastal Plain, Florida westward but has its best development in the lower Mississippi delta marshes.

#### 2. *Justicia* L.

- |                                                                        |                            |
|------------------------------------------------------------------------|----------------------------|
| 1. Corolla 2-2.5 cm. long.....                                         | 1. <i>J. crassifolia</i> . |
| 1. Corolla about 1 cm. long.....                                       | 2.                         |
| 2. Flowers in head-like spikes.....                                    | 3.                         |
| 2. Flowers scattered along one side of the upper<br>part of stalk..... | 4.                         |
| 3. Leaves linear, mostly shorter than peduncle.....                    | 2. <i>J. americana</i> .   |
| 3. Leaves elliptic, mostly longer than peduncle.....                   | 3. <i>J. humilis</i> .     |
| 4. Leaves remote, reflexed; corolla-tube 5-6 mm.<br>long.....          | 4. <i>J. angusta</i> .     |
| 4. Leaves not remote or reflexed; corolla-tube 8-10<br>mm. long.....   | 5. <i>J. lanceolata</i> .  |

1. *J. crassifolia* Chapm.—Known only from swamps on the Coastal Plain in Florida.

2. *J. americana* (L.) Vahl—Georgia north and west to beyond the limits of our territory. Most common along rivers, and in the Tennessee Valley is often found in association with the production of *Anopheles quadrimaculatus*. This species is listed by Small under the genus *Dianthera*.

3. *J. humilis* Michx.—Swamps, Coastal Plain, Florida north and west to beyond the limits of our territory, often in alluvial situations. This species is called *J. ovata* Walt. by Small.

4. *J. angusta* (Chapm.) Small—Known only from pineland ponds in Florida.

5. *J. lanceolata* (Chapm.) Small—Swamps on the Coastal Plain, Florida north and west to beyond the boundaries of our area.

## LENTIBULARIACEAE Bladderwort family

1. *Utricularia* L.

- |                                                                                               |                           |
|-----------------------------------------------------------------------------------------------|---------------------------|
| 1. Stems erect from base, definitely anchored in substratum; leaves and bladders rarely seen. | 2.                        |
| 1. Stems mostly drifting free in water; leaves dissected and bladder bearing.                 | 3.                        |
| 2. Flowers yellow.....                                                                        | 1. <i>U. cornuta</i> .    |
| 2. Flowers purple.....                                                                        | 2. <i>U. resupinata</i> . |
| 3. Flowers purple.....                                                                        | 3. <i>U. purpurea</i> .   |
| 3. Flowers yellow.....                                                                        | 4.                        |
| 4. Scape with a conspicuous whorl of inflated floats at base.                                 | 4. <i>U. inflata</i> .    |
| 4. Scape without a whorl of floats.....                                                       | 5.                        |
| 5. Scape usually with 5-25 flowers, stout, over 10 cm. high.                                  | 6.                        |
| 5. Scape usually with 1-2 flowers, slender, less than 10 cm. high.                            | 8.                        |
| 6. Leaves forked and each fork 2-3 times divided; flowers 12-15 mm. broad.                    | 7.                        |
| 6. Leaves forked and each fork 4-5 times dissected; flowers 15-20 mm. broad.                  | 5. <i>U. foliosa</i> .    |
| 7. Pedicels recurved at maturity; scapes erect.....                                           | 6. <i>U. vulgaris</i> .   |
| 7. Pedicels straight at maturity; scapes flexuous.....                                        | 7. <i>U. floridana</i> .  |
| 8. Spur equalling or longer than lower lip of corolla.                                        | 9.                        |
| 8. Spur shorter than lower lip of corolla.....                                                | 8. <i>U. gibba</i> .      |
| 9. Spur tapering from base to apex; all leaves bladder-bearing.                               | 9. <i>U. biflora</i> .    |
| 9. Spur conic below and linear near tip; some leaves without bladders.                        | 10. <i>U. fibrosa</i> .   |

1. *U. cornuta* Michx.—As considered here this species includes *Stomosisia cornuta* (Michx.) Raf. and *S. juncea* (Vahl.) Barnh. as cited by Small. The species is primarily of Coastal Plain distribution, although it is known from other provinces, and its range includes all of our territory. It is ordinarily found in acid places. A local species, *U. virgatula* Barnh., occurs also in our territory. It may be distinguished by its very short corolla which is scarcely longer than the calyx.

2. *U. resupinata* B. D. Greene—Shallow water, Florida north to beyond the limits of our territory. Small gives this species as *Lecticula resupinata* (B. D. Greene) Barnh.

3. *U. purpurea* Walt.—Ponds and lakes of varying acidity, its range covering all of our territory. It is listed by Small as *Vesiculina purpurea* (Walt.) Raf. *Anopheles quadrimaculatus* breeding has been found associated with this and other plants of this genus.

4. *U. inflata* Walt.—Coastal Plain over all of our territory, in ponds with wide range of acidity. There is a smaller variety distinguished by Small as *U. radiata* Small.

5. *U. foliosa* L.—Large flowered species, lower Coastal Plain, Florida westward along the Gulf of Mexico to beyond the limits of our territory.

6. *U. vulgaris* L.—This species is cited by Small as *U. macrorhiza* LeConte. Present in our territory only in the northern part. Probably occurs in North Carolina and has been collected in Northwest Tennessee.

7. *U. floridana* Nash—Ponds on the Coastal Plain in Florida and Georgia.

8. *U. gibba* L.—Ranges over all of our area, but probably most common in shallow water of the Coastal Plain.

9. *U. biflora* Lam.—This species is given as *U. pumila* Walt. by Small. Coastal Plain, Florida north and west to beyond the limits of our territory.

10. *U. fibrosa* Walt.—Pineland ponds, Coastal Plain, Florida to Mississippi and north to beyond the limits of our territory.

### RUBIACEAE Madder family

#### 1. *Pinckneya* Michx.

*P. pubens* Michx. Georgia Feverbark—Sandy, acid swamps, Middle Florida to the extreme southern part of South Carolina in the Coastal Plain.

#### 2. *Cephalanthus* L.

*C. occidentalis* L. Buttonbush—Commonest aquatic shrub and is very often found in ponds supporting the breeding of *Anopheles quadrimaculatus*. Shows the widest degree of acidity tolerance, being found in the extremely acid Okefinokee Swamp and neutral or even alkaline limesinks and alluvial swamps. Range covers all of our territory.

### CAPRIFOLIACEAE Honeysuckle family

#### 1. *Sambucus* [Tourn.] L.

- |                                                                   |                           |
|-------------------------------------------------------------------|---------------------------|
| 1. Lateral leaflets merely toothed.....                           | 1. <i>S. canadensis</i> . |
| 1. Lateral leaflets 2-3 times divided, especially the lower pair. | 2. <i>S. simpsonii</i> .  |

1. *S. canadensis* L. Elder—Moist places over all our range except possibly in Florida.

2. *S. simpsonii* Rehder. Gulf Elder—Lower Coastal Plain, Florida to Louisiana, in marshes and hammocks.

### CAMPANULACEAE Bell-flower family

#### 1. *Campanula* [Tourn.] L.

*C. floridana* S. Wats.—Grassy swamps and marshes, East Florida and the peninsula.

## COMPOSITAE Composite family

1. *Sclerolepis* Cass.

*S. uniflora* (Walt.) B. S. P.—Pineland and cypress ponds, Coastal Plain, Florida to Alabama and north to beyond the limits of our territory.

2. *Eupatorium* L.

- |                                                                                          |                              |
|------------------------------------------------------------------------------------------|------------------------------|
| 1. Flowers purple.....                                                                   | 1. <i>E. coelestinum</i> .   |
| 1. Flowers white.....                                                                    | 2.                           |
| 2. Leaf-blades narrowed at the base.....                                                 | 3.                           |
| 2. Leaf-blades broadened at the base.....                                                | 2. <i>E. rotundifolium</i> . |
| 3. Bracts of the involucre acute or acuminate; leaves remotely toothed or nearly entire. | 3. <i>E. leucolepis</i> .    |
| 3. Bracts of the involucre obtusish; leaves sharply toothed.                             | 4. <i>E. semiserratum</i> .  |

1. *E. coelestinum* L. Mist-flower—Includes all of our area. Marshes and along pond margins often in alluvial situations.

2. *E. rotundifolium* L.—The range of this species in all of its varieties covers all of our area, but it is commonest on the Coastal Plain. It is often non-aquatic but is occasionally found in swamps. As used here *E. rotundifolium* includes also *E. verbenaeifolium*, *E. pubescens*, and *E. scabridum* of Small's Manual

3. *E. leucolepis* (DC.) T. & G.—Ranges over all of our Coastal Plain in acid ponds or bogs.

4. *E. semiserratum* DC.—Swamps and ponds in the Coastal Plain, Florida north and west to beyond the limits of our territory.

3. *Mikania* Willd.

*M. scandens* (L.) Willd. Hemp-weed—Swamps, mostly alluvial, over all of our territory.

4. *Pluchea* Cass.

- |                                                          |                          |
|----------------------------------------------------------|--------------------------|
| 1. Plants perennial.....                                 | 2.                       |
| 1. Plants annual.....                                    | 3.                       |
| 2. Outer bracts of involucre acuminate.....              | 1. <i>P. foetida</i> .   |
| 2. Outer bracts of involucre obtuse or merely acute..... | 2. <i>P. imbricata</i> . |
| 3. Leaves not decurrent on stem making it winged.....    | 3. <i>P. petiolata</i> . |
| 3. Leaves decurrent on stem making it winged.....        | 4. <i>P. quitoc</i> .    |

1. *P. foetida* (L.) DC.—Ponds, mostly in the Coastal Plain, Florida north and west to beyond the limits of our territory.

2. *P. imbricata* (Kearney) Nash—Swamps and ponds, Coastal Plain, Florida to South Carolina.

3. *P. petiolata* Cass.—Most often found in alluvial situations, its range covering all of our territory.

4. *P. quitoc* DC.—Naturalized species, known in this country from marshy places in West Florida.

5. *Coreopsis* L.

*C. nudata* Nutt.—Pink-flowered species found in acid ponds and wet pinelands, lower Coastal Plain, Georgia and Florida.

6. *Bidens* L.

- |                                                                                                           |                          |
|-----------------------------------------------------------------------------------------------------------|--------------------------|
| 1. Flowers inconspicuous (ray-flowers wanting)-----                                                       | 2.                       |
| 1. Flowers conspicuous, yellow-----                                                                       | 3.                       |
| 2. Achene long-awned, awns barbed downward---                                                             | 1. <i>B. frondosa</i> .  |
| 2. Achene short-awned, awns barbed upward----                                                             | 2. <i>B. discoidea</i> . |
| 3. Leaf-blades simple-----                                                                                | 4.                       |
| 3. Leaf-blades compound-----                                                                              | 6.                       |
| 4. Achene straight, flat, not strongly keeled, and<br>without pale corky margins; rays 1.5-3 cm.<br>long. | 3. <i>B. laevis</i> .    |
| 4. Achene curved, strongly keeled, and with pale<br>corky margins; rays not over 1.7 cm.                  | 4. <i>B. cernua</i> .    |
| 5. Achene 6-8 mm. long, ciliate-----                                                                      | 5. <i>B. coronata</i> .  |
| 5. Achene 2-4 mm. long, not ciliate-----                                                                  | 6. <i>B. mitis</i> .     |

1. *B. frondosa* L.—Damp soil, often as a weed, over most of our area.

2. *B. discoidea* (T. & G.) Britton—Georgia westward and northward to beyond the limits of our area, in swamps and around pond margins.

3. *B. laevis* (L.) B. S. P.—Range similar to the preceding, but more common in the Coastal Plain. Found in swamps and low woods.

4. *B. cernua* L.—Found mostly north of our territory, but recorded from wet places in North Carolina, Georgia, and Tennessee.

5. *B. coronata* (L.) Britton—Swamps, ranging over all of our territory.

6. *B. mitis* (Michx.) Sherff—Coastal Plain, Florida west to Mississippi and north to beyond the limits of our territory.

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