Plant Identification Process

Renz Weed Science
COLLEGE OF AGRICULTURAL & LIFE SCIENCES
UNIVERSITY OF WISCONSIN-MADISON

Everyone has their own way of approaching plant identification. If you encounter an unknown plant, we recommend following this order:

GROWTH FORM:
Is the plant woody (like a tree or shrub?) or herbaceous? Is it a vine? Is it grass-like?

→

BRANCHING PATTERN:
Does the plant have alternate, opposite, or whorled branching?

→

ADDITIONAL FEATURES:

FLOWERS:
If present, look at color, number of petals, symmetry.

LEAVES:
Simple vs. compound; also consider toothed vs. smooth edges, shape and size of leaves, hairiness, etc.

FRUITS:
If present, look at size, shape, color, and other details

OTHER STRUCTURES:
Does the plant have spines, wings, thorns, or other structures?

More on Growth Form:

Woody plants are characterized by hard stems with a layer of bark. Woody plants can be trees, shrubs, or vines.

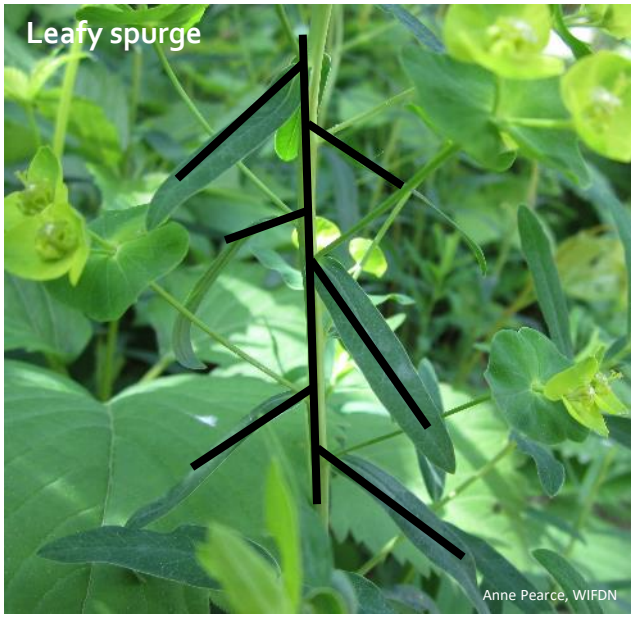
Herbaceous refers to a plant that has non-woody stems.

- **Grasses** are herbaceous plants characterized by jointed stems, narrow blade-like leaves that form a sheath around the stem
- **Forbs** are herbaceous flowering plants other than grasses

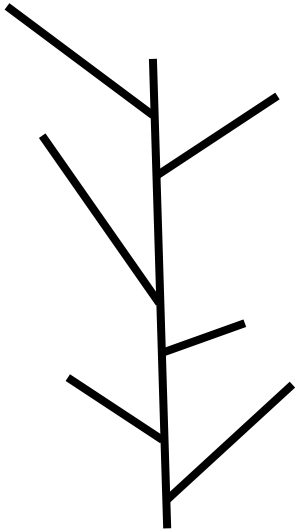
Branching Patterns

Renz Weed Science
COLLEGE OF AGRICULTURAL & LIFE SCIENCES
UNIVERSITY OF WISCONSIN-MADISON

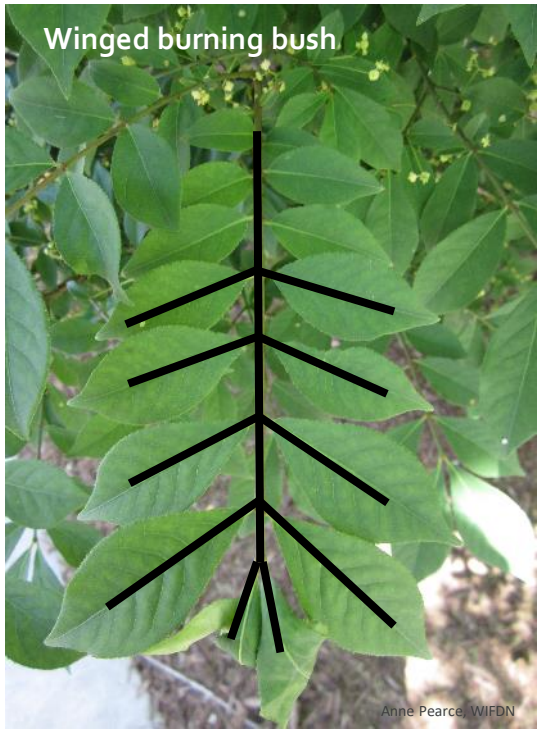
ALTERNATE

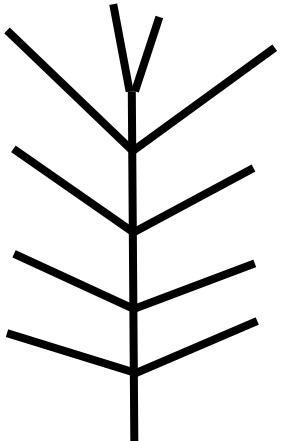


One branch or leaf from a point on the trunk or stem



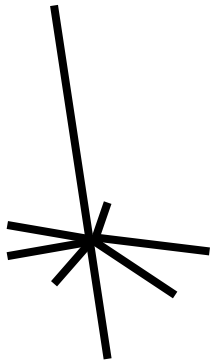
OPPOSITE





Two branches or leaves from the same point on the trunk or stem

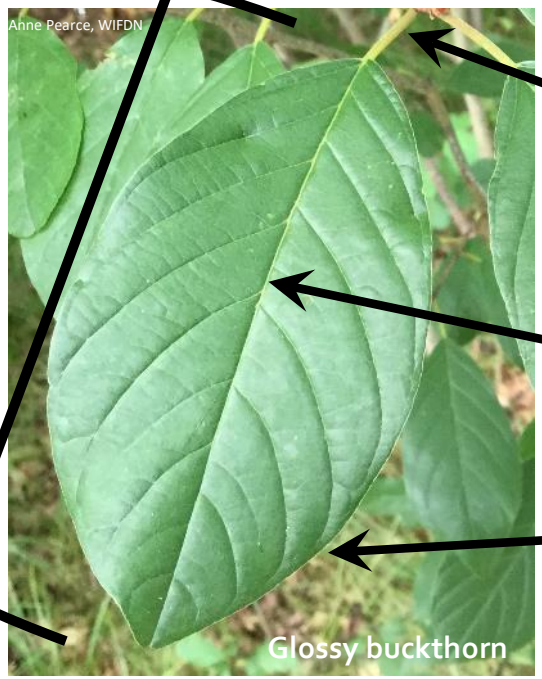
WHORLED



More than two branches or leaves from the same point on the trunk or stem

Leaf Structure

Renz Weed Science
COLLEGE OF AGRICULTURAL & LIFE SCIENCES
UNIVERSITY OF WISCONSIN-MADISON

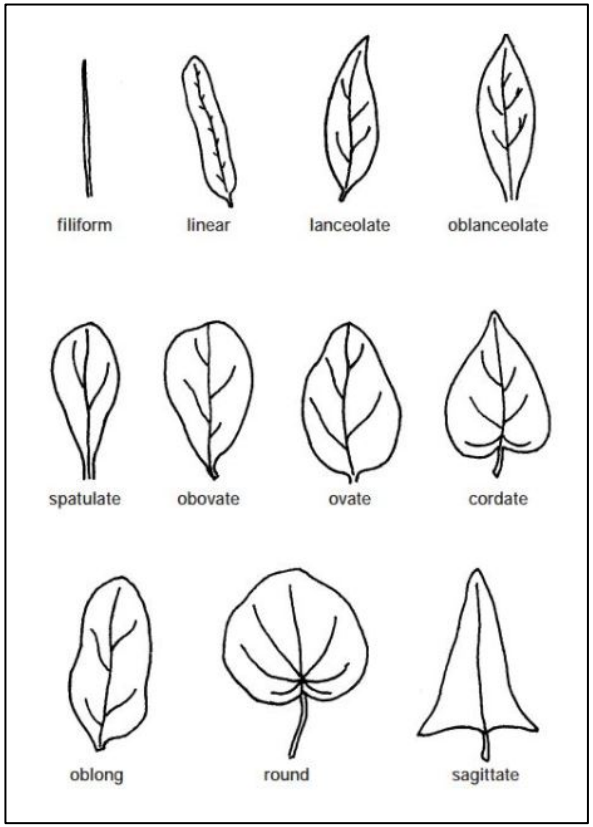


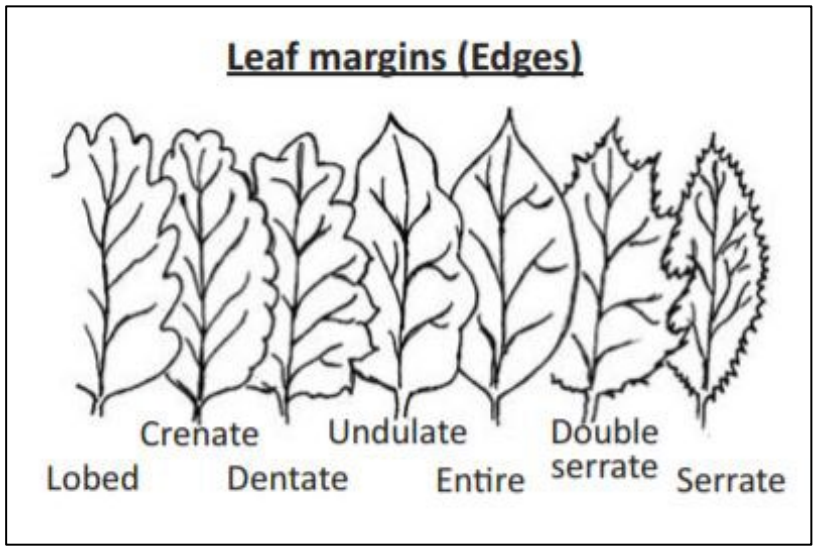
PETIOLE: leaf stem; attaches leaf blade to plant stem/twig

MID-RIB: central/primary vein on leaf

MARGIN: edge of leaf blade

BLADE:





Examples of common leaf shapes (above) and leaf margins (left)

Illustrations by Bernadette Williams, from "A Field Guide to Terrestrial Invasive Plants in Wisconsin"; accessed from: https://dnr.wi.gov/topic/invasives/documents/wi%20inv%20plant%20field%20guide%20web%20version.pdf

Simple vs. Compound Leaves

Renz Weed Science
COLLEGE OF AGRICULTURAL & LIFE SCIENCES
UNIVERSITY OF WISCONSIN–MADISON

SIMPLE

PALMATELY COMPOUND

PINNATELY COMPOUND

TRIFOLIATE

Each circle on this page shows **one leaf**

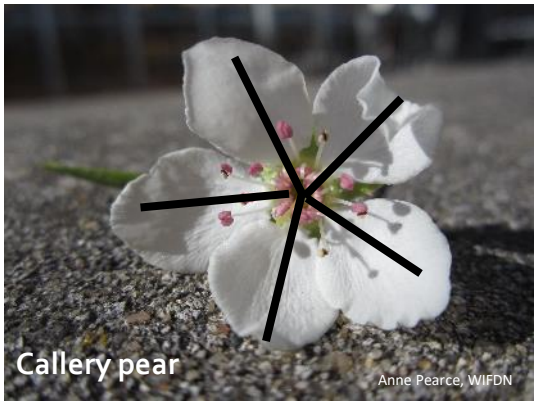
Simple leaves have one blade (leaf) attached to the petiole
Compound leaves have multiple **leaflets** attached to each petiole

Trifoliate compound leaves have 3 leaflets attached to one petiole
Palmately compound leaves have leaflets attached to the same spot on the petiole
Pinnately compound leaves have leaflets arranged in a line along the petiole

Flower Structure

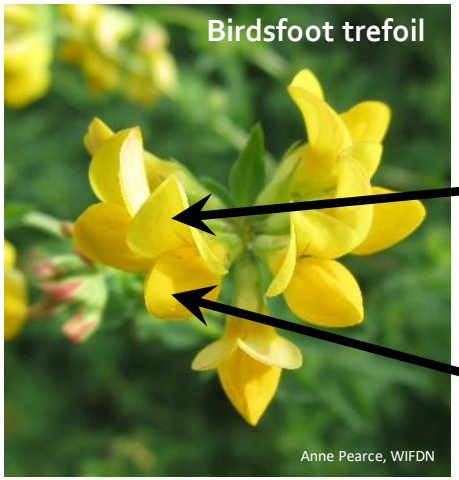
Renz Weed Science
COLLEGE OF AGRICULTURAL & LIFE SCIENCES
UNIVERSITY OF WISCONSIN-MADISON

Individual flowers can be **regular** or **irregular**

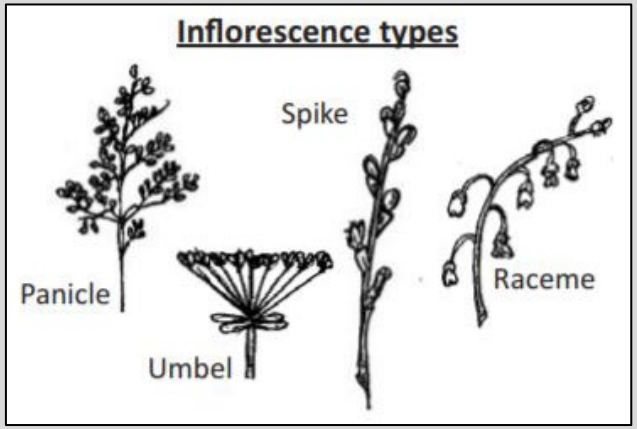


REGULAR: radially symmetrical flower

IRREGULAR: bilaterally symmetrical flower

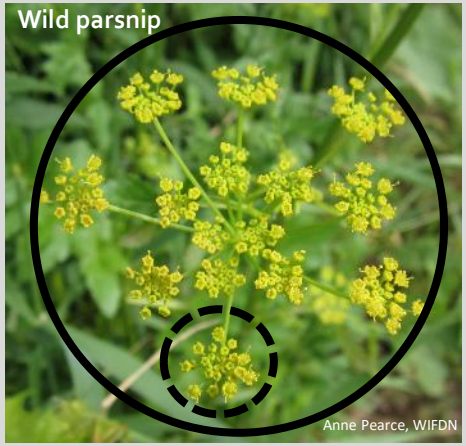


Pea-like flowers are irregular with lower petals that form a **keel** below a **banner**



An **inflorescence** is a cluster of individual flowers. Common inflorescence types are shown above.

A **raceme** bears flowers each with a flower stalk. A **spike** is like a raceme, except the flowers are stalkless. A **panicle** is a branched raceme in which each branch bears flowers with stalks.



An **umbel** has flower stalks of equal length radiating from a single point. The **compound umbel** (solid circle) at left is made of many smaller umbels called **umbellets** (dashed circle).

Illustrations by Bernadette Williams, from "A Field Guide to Terrestrial Invasive Plants in Wisconsin"; accessed from:
https://dnr.wi.gov/topic/invasives/documents/wi%20inv%20plant%20field%20guide%20web%20version.pdf

Fruits

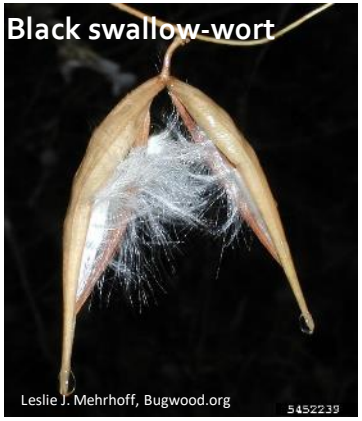
Renz Weed Science
COLLEGE OF AGRICULTURAL & LIFE SCIENCES
UNIVERSITY OF WISCONSIN-MADISON

Fruits can be fleshy or dry. Common fruit types are shown below.

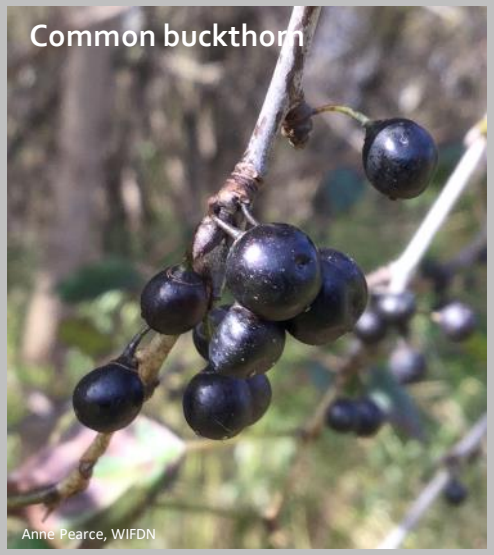
DRY FRUITS: become dry at maturity

LEGUME: like peas, beans. Splits along two seams.

FOLLICLE: like milkweed; splits along one seam.



FLESHY FRUITS: fleshy at maturity; seeds are found within the flesh



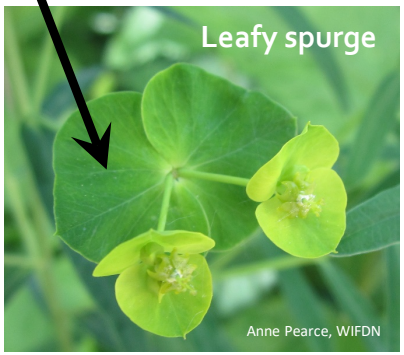
ACHENE: one-sided with seed attached to the fruit wall at one point only; fruit wall easily separable from seed coat

SAMARA: like maples; a winged achene. Samaras can be single winged (left) or double winged (right)

Other Plant Structures

Renz Weed Science
COLLEGE OF AGRICULTURAL & LIFE SCIENCES
UNIVERSITY OF WISCONSIN-MADISON

BRACTS: leaf-like structures associated with flowers or cones

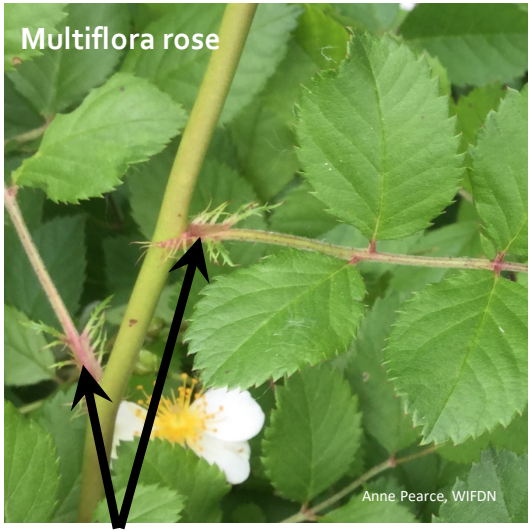


PRICKLE, SPINE, + THORN are often used interchangeably to describe sharp protrusions on plants.

PRICKLE:derived from epidermal tissue; can be found anywhere on plant

SPINE: derived from leaf tissue

THORN: derived from stem tissue



STIPULES: paired leaf-like appendages at the base of leaves. In photo, stipules are fringed.

BULBIL: a vegetative bulb produced in leaf axils; used by plant to spread vegetatively

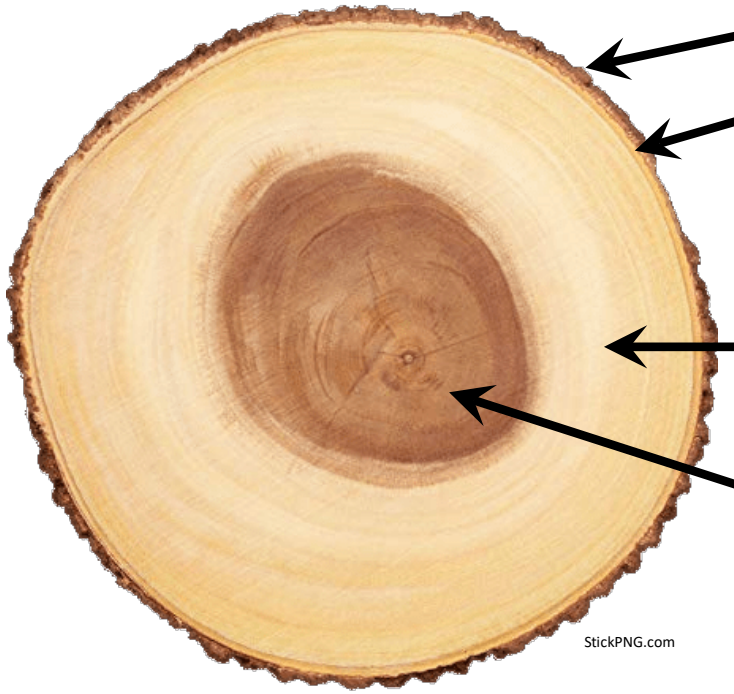
TUBER: underground stem modified for storage of nutrients

Woody Plants

Renz Weed Science
COLLEGE OF AGRICULTURAL & LIFE SCIENCES
UNIVERSITY OF WISCONSIN-MADISON

In addition to plant structures mentioned elsewhere, woody plants can sometimes be identified by presence of lenticels or by colored inner bark or heartwood.

LENTICELS: raised pores on bark that allow for gas exchange. See whitish lenticels on tan bark in photo.



OUTER BARK

INNER BARK: the *phloem*, just inside the outer bark, transports nutrients. The *cambium* layer annually produces new bark and new wood.

SAPWOOD: new wood; live; water transport

HEARTWOOD: old wood; dead

Grasses

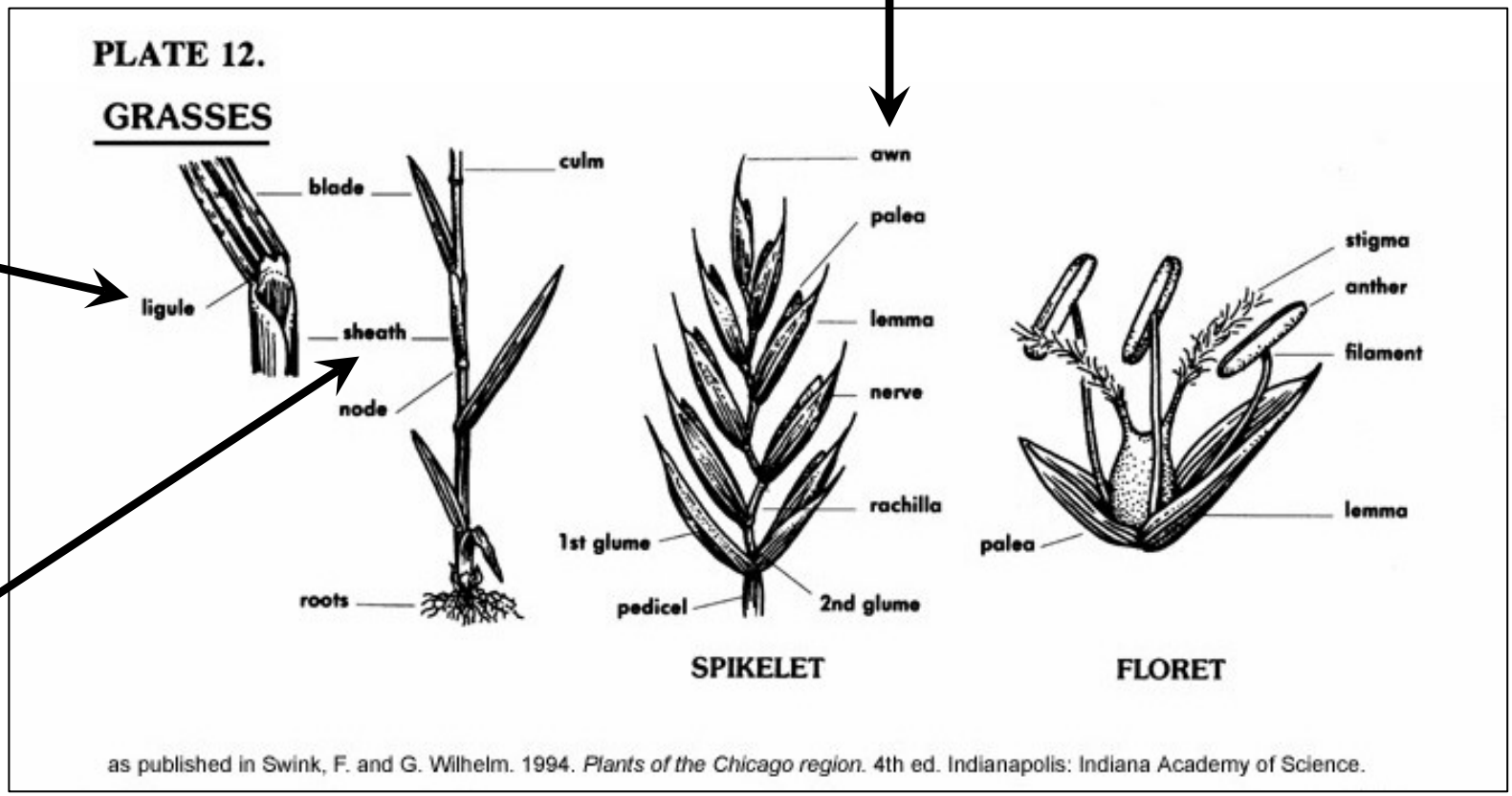
Renz Weed Science
COLLEGE OF AGRICULTURAL & LIFE SCIENCES
UNIVERSITY OF WISCONSIN–MADISON

Grasses have unique structures that aid in identification.

AWN: bristle-like appendage on spikelet parts

LIGULE: a thin outgrowth at the junction of the leaf blade and stalk.

SHEATH: lower portion of the leaf blade; encircles the stem



as published in Swink, F. and G. Wilhelm. 1994. *Plants of the Chicago region.* 4th ed. Indianapolis: Indiana Academy of Science.

SPIKELET: part of the inflorescence made up of individual florets; the inflorescence is comprised of many spikelets