

EXPERIMENT STATION
OF THE
KANSAS STATE AGRICULTURAL COLLEGE,
M A N H A T T A N .

BULLETIN NO. 50—JUNE, 1895.

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FIRST REPORT ON KANSAS WEEDS—THE SEEDLINGS.

During the past three years, numerous notes and observations have accumulated upon the subject of our common and troublesome weeds. In the present bulletin will be brought together such of these notes as concern the germination of weed seeds or the appearance of the seedlings. It is hoped that the notes on scattering of the seeds and descriptions of the various weed seeds can be given in a future bulletin.

WHAT IS A WEED?

A weed has been variously defined. In a broad sense it is any troublesome plant. Wheat in a cornfield or flower garden would be a weed, though a useful plant in its proper place. The term weed, in this sense, could be applied to forest trees in a cultivated field, to parasitic fungi, to algæ in a watering trough, or to water plants in a navigable stream. It is intended in the following account to include only herbaceous flowering plants. Ordinarily in connection with the word weed, one thinks of intrusive plants as cockle-bur, purslane, or Russian thistle. A few plants will be described and figured which are not with us bad weeds, but may become so under favorable conditions. Others are introduced for the sake of comparison.

THE SEED.

A seed is always the product of a flower. Other parts of plants used for propagation are sometimes erroneously called seeds, such as the tubers of the common potato, or the fleshy parts of the sweet potato. These not being the product of a flower are not seeds. A seed contains a small plant often called the germ. This, technically known as the embryo, may have the usual appearance of a plant, with a short stem and one or more small leaves, but frequently it is less developed and may even appear nothing more than a minute cylinder from which later roots and leaves will spring. There is always nourishment stored in the seed for the use of the young plant during its early growth. This nourishment, usually starchy, oily, or albuminous, may be stored around the embryo or may be within it. The latter is the case with the bean and pea in which the two seed leaves are greatly thickened with stored material, and occupy almost the entire seed. The one or two leaves of the embryo are known as the *cotyledons*, and the stem which bears these is called the *hypocotyl*. Sometimes there is a small bud just above the cotyledon which continues the growth of the stem; this is the *plumule*.

GERMINATION.

Under the proper conditions the embryo commences to grow. It absorbs water, swells or elongates and protrudes from the seed coat. This process is called germination. From the time that this process commences till the young plant has produced green leaves and small feeding roots, it is living upon the nourishment stored in the seed. If this nourishment was stored around the embryo, then the young plant retains connection with the seed, absorbing its food by means of a sucking appendage as in the corn or through the long cotyledon, the upper end of which remains in the seed as in the onion. If the nourishment was stored in the cotyledons, these may remain in the seed as in the oak or pea, or they may be withdrawn from the seed coat and carried to the surface of the ground, where they gradually shrink as in the bean. Not infrequently the cotyledons serve as a storehouse for nourishment and then later develop into green foliage leaves, as in the pumpkin.

During the process of germination the root forms at the lower end of the hypocotyl which soon branches and forms the root system. In some cases side roots spring from the hypocotyl and the young stem higher up, as is the case with corn, wheat and other grasses.

When the cotyledons remain in the seed, their bases elongate sufficiently to bring the plumule out, after which by growth above the cotyledons the young foliage leaves are brought to the surface. If the cotyledons are removed from the seed coat, the elongation takes place in the hypocotyl or often in the stalks of the cotyledons. In any case a provision is made to protect the tender portions as they are penetrating the soil. In the corn and other grasses, the first leaf is closed at the apex forming a pointed sheath. When this reaches the

surface, it ceases its growth and the inner leaves break through and soon expand to the light. In seedlings with two cotyledons, there may be a loop formed in the hypocotyl a short distance below the cotyledons. This loop advances through the soil drawing the cotyledons after it. When they are drawn out of the soil into the light, the loop straightens and the cotyledons expand. Sometimes the loop forms in the stalks of the cotyledons if these are long. When the cotyledons remain in the seed the loop forms near the apex of the young shoot. There are many contrivances to aid the seedling in extracting itself from the seed coat, but a discussion of these scarcely comes within the scope of this bulletin.

THE SEEDLING.

When the plantlet has emerged from the seed and has started on its further development, it is termed a seedling. It is the aim of this bulletin to present observations and descriptions concerning the seedlings of our weedy plants. Especial attention will be given to such descriptions as will enable the reader to determine the species in this stage of its existence. It is scarcely necessary to state that it is not an easy task to determine the species at this time, and yet it is often of the utmost importance that this should be done.

If the plant develops its foliage, produces its flowers and seeds and then dies, having finished its cycle during the growing season, it is called an annual. The lamb's quarter and purslane are examples of annuals.

If the plant extends its cycle over two years, producing the flower and fruit the second year, it is called a biennial. Many of our garden vegetables will serve as examples, and among wild plants the thistle and burdock.

Not infrequently the plant commences its cycle of development by germinating in the fall, living over winter, and producing seed the following season. Such plants are known as winter annuals. Winter wheat and shepherd's purse are familiar examples.

Those plants which live more than two years are called perennials. A discussion of the peculiar characters of perennials must be deferred till a later bulletin.

In many cases the future of the plant can be foretold by the development of the seedling. Usually in biennials the seedling does not send up a leafy axis immediately, but develops a rosette of leaves close to the ground. During the succeeding year a flower stalk is sent up which may or may not have foliage leaves. Perennials make some provision during the first year for a continuance of growth, but this frequently cannot be observed in the earlier stages.

DESCRIPTIONS OF THE SEEDLINGS.

The descriptions following will include all the common weeds whose seedlings were obtainable. No seedling could be obtained of a few important perennial weeds. In these cases however, the seedlings are comparatively rare

and consequently descriptions of these are obviously of less importance than descriptions of the full grown plants, which will appear in a later bulletin. These will be mentioned in their proper place in the list. Also a number of less important weeds, together with a few whose seedlings might be mistaken for weeds are illustrated by drawings where space has not been taken for descriptions.

Technical terms have been eliminated as much as possible in the descriptions, yet to save space a few widely used and easily understood terms of this kind have been retained. A farmer would naturally use the terms mould board or neck yoke in speaking of these parts of a plow or vehicle. He is certainly justified in doing this rather than in giving a lengthy description of the parts, although the terms would be unintelligible to a person unfamiliar with the articles. The few technical terms used will be explained.

In order to identify a seedling with certainty it should be examined in a stage to show several leaves and yet not so far advanced that the lowest leaves have disappeared. The *cotyledons* are the first two leaves of the plant and are already formed in the seed. The grasses have but one cotyledon and this never emerges from the seed. A further description of this group will be given under the head of grasses. All the other plants described have two cotyledons. These are in all cases pulled out of the seed and raised to the surface where they expand and act more or less as foliage leaves. The other leaves are numbered in order, the third leaf being the one following the cotyledons. Excepting the grasses as above stated, the cotyledons are always opposite each other. If the following leaves are also opposite, the third and fourth leaves would be referred to as the second pair of leaves.

In describing the shape of leaves, the general outline may be referred to as round or circular; elliptical where the circle is flattened with the petiole at one end; oval when the shape of a slightly flattened circle, that is a short ellipse; ovate or egg shaped when broader below the middle; oblong when about the same width nearly to the ends. The *petiole* is the stalk of a leaf. *Stipules* are little appendages which occur at the base of the petiole in some plants. They are in pairs one on each side.

A *node* is the portion of the stem where a leaf is attached, sometimes called a joint. The portion between two successive nodes is called an *internode*. The portion of the stem below the cotyledons is called the *hypocotyl* and is really the first internode of the stem. The internode above the cotyledons is then known as the second internode. The margin of a leaf may be entire, that is without notches or lobes, or it may be toothed or notched. If the notches are quite deep, the teeth are called lobes. The cockle-bur has a toothed leaf, and the ragweed a lobed leaf.

Especial attention is called to the fact that some parts of a seedling are subject to considerable variation. The hypocotyl particularly varies in length according to circumstances. If it is growing in the shade or if deeply buried,

an attempt is made to reach the light. The cotyledons are quite constant in size and shape, yet frequently these grow after reaching the surface. The measurements given are only approximate and represent what seemed to be an average example. The metric system of measurements has been adopted because of its much greater convenience and the fact that it is so widely used as to be familiar to nearly all. There are ten millimeters in one centimeter. A millimeter, (mm) equals one twenty-fifth of an inch, and a centimeter, (cm) equals two-fifths of an inch.

No attempt has been made to designate the minute differences between the various kinds of hairs occurring on the plant since a lens would be often required. However a few forms of hairiness, easily seen without a lens, have been noted in the descriptions; such as velvety when the hairs are close together and soft to the touch, and glandular when the hairs secrete a fluid and thus present a glistening appearance to the eye or a sticky feeling to the touch.

Almost all plants during the seedling stage produce more or less of a red or purple color in the tissue. This may be to screen the tender, growing parts from too much light, or it may be to aid in accumulating warmth from the sun's rays. The latter is especially noticeable in the leaf-rosettes of winter annuals such as pepper-grass.

This coloring is in many of our weeds so variable in amount that it has not been mentioned in the descriptions except where particularly characteristic of the plant.

The plants will be arranged in the same order that they occur in Gray's Manual of Botany, sixth edition, and the scientific names will be the same as those used in that book.

There is much confusion among the common names of weeds, one weed often having several names, and the same name often being applied to different weeds. The common names adopted here will be those which seem to be most appropriate and most widely used.

LIST OF WEEDS.

1 millimeter (mm) = one twenty-fifth of an inch. 1 centimeter (cm) = two-fifths of an inch.

MEXICAN POPPY (*Argemone platyceras.*) Fig. 2, half natural size.

Leaves in a rosette. Whole plant smooth except the prickles, and covered with a bloom like a cabbage leaf. Juice yellow.

Cotyledons narrow, 1 cm long, 1 mm wide.

Third leaf 1 cm long, few toothed at apex, gradually narrowed into a petiole 1 cm long.

Fourth and fifth leaves similar, but longer and the teeth sharper.

Following leaves becoming several cm long and several lobed along the side, the lobes ending in bristly teeth, the upper lobes again toothed. Some of the upper leaves show bristles on both the upper and under surfaces and also show a mottled appearance on the upper surface.

Young leaves rolled inward at the margins.

Rather common along road sides and in cultivated fields.

GOLDEN CORYDALIS (*Corydalis aurea, var. occidentalis*) Fig. 1, natural size.

Common in gardens and lawns through the eastern part of the state.

The following five species belong to the MUSTARD FAMILY (*Cruciferae.*)

They usually germinate in the fall, live over winter in the rosette stage, and send up a flowering stalk in the spring. During the winter the rosette assumes a dull, purple color. The foliage of this group is characterized by a pungent or peppery taste.

SICKLE-POD (*Arabis Canadensis.*) Fig. 4.

Chiefly in the woods or shaded pastures in eastern Kansas.

TANSY MUSTARD (*Sisymbrium canescens.*) Fig. 5, half natural size.

Frequent in gardens and open or waste places.

HEDGE MUSTARD (*Sisymbrium officinale.*) Fig. 7, half natural size.

Leaves in a rosette.

Cotyledons elliptical, ½ cm long, 2 mm wide: petioles slender, 5 to 10 mm long.

Third leaf roundish or ovate, wavy margined or slightly and irregularly toothed, 2 cm long on a slender petiole 4 cm long.

Fourth leaf long petioled, lobed near the base.

Fifth with larger blade, and one or two lobes more or less separated from upper part of blade.

Later, leaves becoming more deeply lobed, the lobes toothed. Blades and petioles sparsely bristly-hairy.

Common in gardens and waste places.

SHEPHERD'S-PURSE (*Capsella Bursa-pastoris.*) Fig. 3, one and one-half times natural size.

Leaves in a rosette.

Cotyledons oblong, smooth 2 mm long, 1½ mm wide, with a broad petiole 1 mm long.

Third and fourth leaves roundish or oval, 6 mm long, 4 to 5 mm wide; petiole 3 mm long, hairy at base.

Fifth leaf larger, sparsely hairy.

Sixth leaf more hairy, minutely spiny toothed along the margin.

Later leaves becoming more toothed and more hairy. Hairs of two kinds, simple and straight, and shorter and stellate.

Common in gardens and door yards.

PEPPER-GRASS (*Lepidium intermedium.*) Fig. 6, natural size.

Leaves in a rosette. Whole plant smooth.

Cotyledons elliptical, 4 mm long, 1½ mm wide, petiole 1 mm long.

Following leaves similar, longer petioled, finally with longer blades (about the eighth leaf) and slightly toothed; still later with long, deeply lobed leaves spreading out close to the ground.

Common in gardens and door yards.

PURSLANE (*Portulaca oleracea.*) Fig. 14, natural size.

Whole plant smooth and succulent, at first erect but soon prostrate with branches spreading in all directions; color red.

Leaves opposite, the under surface glistening as if moist.

Cotyledons narrowly elliptical about 1 cm long and 2½ mm wide, on short petioles, usually developing branches in the axils.

Second pair of leaves rounded at the tip and gradually narrowed from near the end in a wedge shaped manner to a short petiole 1½ cm long, 6 mm wide. Later leaves similar, becoming larger. Young leaves straight.

Common especially in gardens.

COMMON MALLOW (*Malva rotundifolia.*) Fig. 10, natural size.

Hypocotyl strong, 2 to 3 cm long.

Cotyledons heart shaped, 7 mm long, 6 mm wide, on slender petioles 2 cm long. Blade with three veins, smooth.

Upper internodes short, leaves crowded.

Third leaf round with a heart shaped base, five-nerved from the base, margin scallop-toothed, surface smooth or very sparsely hairy, petiole slender becoming several cm long, provided at base with short stipules: blade becoming 1½ to 2 cm in diameter.

Fourth leaf similar but with seven veins, both petiole and blade minutely stellate-hairy.

Upper leaves similar but becoming larger. Young leaves plaited into as many folds as there are ribs.

Old fields, not common in Kansas.

SIDA (*Sida spinosa.*) Fig. 11, natural size.

Hypocotyl velvety with short, glandular hairs.

Cotyledons round, heart shaped, indistinctly three-nerved, 8 mm long, petiole a little longer, blades almost smooth, petioles velvety.

Third leaf round heart shaped with about five prominent veins radiating from the base; slightly hairy; margin scallop-toothed; blade 1 cm wide, a little longer: petiole shorter than blade.

Later leaves becoming longer and more sharply toothed. Young leaves folded together.

Frequent in eastern Kansas.

VELVET-LEAF (*Abutilon Avicennae.*) Fig. 12, half natural size.

Hypocotyl enlarging slightly upward, clammy-hairy, 2 cm long.

Cotyledons heart shaped, smooth except the margins, three ribbed; lobes at base rounded, the opening between 2 mm wide. Blade 13 mm wide and long; petioles slender, hairy like the stem, 2½ cm long.

Leaves alternate. Third leaf heart shaped, toothed with shallow notches, hairy above, nearly smooth beneath, seven-ribbed, two of the ribs on each side at base weaker, notch at base acute, the lobes closing up the opening; petiole several cm long.

Upper leaves similar but more velvety, and with sharp regular notches; the older leaves have a slender point and minute stipules. Young leaves folded together.

Common in rich soil, barn yards and vacant lots.

BLADDER KETMIA, (*Hibiscus Trionum.*) Fig. 9, half natural size.

Hypocotyl tapering below into the root, velvety.

Cotyledons roundish 7 to 10 mm long, rather fleshy, smooth, obscurely three-ribbed; petioles 1½ to 2 cm long, hairy.

Second internode short, bristly hairy. Following internodes longer, all bristly. Third leaf roundish, five-ribbed, toothed, smooth above, very slightly hairy beneath, 1½ cm long on a hairy petiole 3 cm long.

Fourth leaf similar, longer, provided with short awl-shaped stipules.

Fifth leaf three-lobed, the notch reaching about half way to base.

Sixth leaf more deeply lobed.

Seventh leaf with notches reaching nearly to base, the three lobes being themselves lobed and toothed.

The hairs on the surface are more or less stellately arranged.

Common in cultivated fields. Sometimes called *flower-of-an-hour*

WILD YELLOW FLAX (*Linum rigidum.*) Fig. 15, three fourths natural size.
Western Kansas.

WILD BLUE FLAX (*Linum perenne. var. Lewisii.*) Fig. 13 natural size.
Common in western Kansas.

WILD GERANIUM (*Geranium Carlonianum.*) Fig. 17, half natural size.

WILD TOUCH-ME-NOT (*Impatiens pallida.*) Fig. 16, half natural size.
Damp or springy soil.

WHITE SWEET CLOVER (*Melilotus alba.*) Fig. 20, half natural size.
Hypocotyl short. 2 to 5 mm, smooth, often purple.

Cotyledons elliptical, smooth rather fleshy, blade 5 mm long, 2½ mm wide, often purple beneath; petioles nearly 2 mm long rather slender, united around the stem. At the apex of the petiole is a little joint.

Second internode minutely hairy usually longer than the hypocotyl.

Third leaf triangular-ovate, or roundish, 8 to 10 mm long, 10 to 12 mm wide, on a slender petiole, (10 to 12 mm long) with a joint at apex and base.

The stipules are present as narrow awl-shaped bodies about 2 mm long. Blade obscurely veined, margin somewhat undulate.

Fourth leaf divided into three leaflets, the two lateral leaflets oval, with a blunt apex and toothed margin, 6 mm long, 5 mm wide, connected with petiole by a joint about 3 mm below its apex. Terminal leaflet wedge shaped at base.

Becoming abundant in waste places, especially along roadsides.

DALEA (*Dalea alopecuroides.*) Fig. 22, half natural size.
Common in western Kansas.

LOCO WEED (*Astragalus mollissimus.*) Fig. 23.
Common in western Kansas.

TICK-SEED (*Desmodium Illinoense.*) Fig. 24, half natural size.
Prairie and pastures.

WILD BEAN (*Strophostyles pauciflorus.*) Fig. 25, half natural size.
Common in sandy fields.

PARTRIDGE PEA (*Cassia Chamaecrista.*) Fig. 19, two-thirds natural size.
Common in rather sterile soil.

HOG PEA-NUT (*Amphicarpaea Pitcheri.*) Fig. 19, one-fourth natural size.
Woods and thickets.

DESMANTHUS (*Desmanthus brachylobus.*) Fig. 26, *a* and *b* natural size, *c* half natural size.
Prairie and road sides.

SENSITIVE ROSE (*Schrankia uncinata.*) Fig. 21, half natural size.
Prairie.

EVENING PRIMROSE (*Oenothera biennis.*) Fig. 28, three-fourths natural size.
Leaves alternate, forming a rosette if, as is usually the case, the germination is in the fall, otherwise forming a leafy stem.

Cotyledons ovate, smooth, rather abruptly narrowed about the middle, 4 to 6 mm long, 3 to 4 mm wide. Petiole slender, $\frac{1}{2}$ to 1 cm long.

Third leaf smooth, feather veined. 1 cm long, oval, narrowed into a short, hairy petiole.

Fourth leaf becoming longer and more velvety.

Later leaves becoming several cm long and $1\frac{1}{2}$ cm wide, velvety.

Old fields and pastures.

VELVETY GAURA (*Gaura parviflora.*) Fig. 29, *a* half natural size *b* and *c* one and one-half natural size.

Leaves alternate in a rosette.

Cotyledons roundish, smooth, 6 mm long on a petiole of equal length.

Third leaf oval, feather veined, $1\frac{1}{2}$ cm long, 9 mm wide, velvety with fine hairs, petiole short, 3 mm.

Later leaves larger, all short petioled, velvety and also provided with scattered, long, bristly hairs.

Fields and pastures.

ONE SEEDED BUR CUCUMBER (*Sicyos angulatus.*) Fig. 31, half natural size.

Woods and thickets.

WILD CUCUMBER (*Echinocystis lobata.*) Fig. 32, one-third natural size.

Low ground.

WILD GOURD (*Cucurbita foetidissima.*) Fig. 30, half natural size.

Prairie.

PRICKLY PEAR CACTUS (*Opuntia Rafinesquii*) Fig. 27, half natural size.

Prairie and pastures.

BLACK SNAKE-ROOT (*Sanicula Marylandica.*) Fig. 33, half natural size.

Shady places.

BLAZING STAR (*Liatris scariosa.*) Fig. 64, half natural size.

Prairie and pastures.

GUM WEED (*Grindelia squarrosa.*) Fig. 51, half natural size.

Leaves forming a rosette.

Hypocotyl short tapering into a long tap root.

Cotyledons oval, tapering into a broad flat petiole; blade $2\frac{1}{2}$ mm long, 1 mm wide.

Third leaf gradually narrowed from near the rounded apex into a petiole, slightly roughened with scattered papillae, 5 mm long including petiole.

Fourth leaf larger and more roughened.

Later leaves becoming several centimeters long, notched along the margin, leathery in texture, obscurely veined, all gradually narrowed into a petiole.

Pastures and road sides.

HETEROOTHECA (*Heterotheca Lamarckii.*) Fig. 53,

Western Kansas.

- APLOPAPPUS (*Aplopappus divaricatus.*) Fig. 34, natural size.
Prairie, southern Kansas.
- APLOPAPPUS (*Aplopappus rubiginosus.*) Fig. 35, natural size.
Prairie, western Kansas.
- GOLDEN-ROD (*Solidago Lindheimeriana.*) Fig. 36, one and one-half natural size.
Rocky woods and pastures.
- GOLDEN-ROD (*Solidago serotina.*) Fig. 37, one and one-half natural size.
Road sides and along fences.
- SMOOTH ASTER (*Aster laevis.*) Fig. 38, one and one-half natural size.
Rocky woods and pastures.
- TANSY ASTER (*Aster tanacetifolius.*) Fig. 39, natural size.
Common in western Kansas.
- HORSE WEED (*Erigeron Canadensis.*) Fig. 48, half natural size.
Leaves alternate forming a rosette.
Cotyledons small, oval, 2 mm long including short petiole.
Third leaf roundish or oval, obscurely three-ribbed, narrowed into a hairy petiole.
Later leaves becoming longer, more veiny, hairy especially along the margin, and remotely and sharply toothed, narrowing gradually into a hairy petiole.
Old fields and waste places.
- DAISY FLEABANE (*Erigeron strigosus.*) Fig. 50, half natural size.
Leaves alternate forming a rosette.
First leaves of spring ovate, three-ribbed with a few sharp teeth, velvety, 1½ to 2 cm long, 8 mm wide; petiole flat with a narrow margin, 2 cm long.
Later leaves larger becoming more toothed.
No seedlings could be found showing cotyledons.
Old fields and pastures.
- ENGELMANNIA (*Engelmannia pinnatifida.*) Fig. 40, *a* and *b*.
Western Kansas.
- FALSE SUNFLOWER (*Iva xanthiifolia.*) Fig. 55, natural size.
Cotyledons oval, 2 mm long, 1½ mm wide, narrowed below into a broad petiole, 1 to 2 mm long.
Internodes bristly below, smooth above, striate; leaves opposite.
Second pair of leaves oval or ovate. ½ cm long on slender petioles as long as blade, rough hairy.
Third pair larger sometimes with one or two teeth, slightly three-ribbed.
Later leaves ovate, toothed or soon three-lobed, three-ribbed, and becoming rough hairy, the petioles bristly.
Cultivated fields, common.
- BIG RAGWEED (*Ambrosia trifida*) Fig. 62, half natural size.

Hypocotyl smooth, stout, purple.

Cotyledons smooth oval narrowing into a flat petiole united at base.

Blade three-ribbed, 1 cm wide and about as long as petiole, whole length 3 to 4 cm.

Second internode minutely hairy, striate. Leaves opposite.

Second pair of leaves three-lobed; terminal lobe elliptical, toothed, 2 to 4 cm long, 1½ cm wide; side lobes smaller, surface rough; petiole 2 to 3 cm long with a green margin, hairy along the edge at base.

Upper leaves with three strong lobes and these again lobed or toothed. Young leaves plaited along the lobes.

Cultivated fields, roadsides and waste places especially in bottom land.

LITTLE RAGWEED (*Ambrosia artemisiaefolia*) Fig. 52, half natural size.

Hypocotyl smooth or very minutely roughened.

Cotyledons roundish or slightly oblong, smooth, thickened, narrowed into a broad petiole 3 mm long.

Second internode hairy. Leaves opposite.

Second pair of leaves divided into three lobes, middle lobe toothed or lobed again, petiole green margined, leaf including petiole about 3 cm long, hairy.

Third pair with about three lobes on each side.

Later lobes becoming many lobed.

Common in cultivated grounds and along roadsides.

PERENNIAL RAGWEED (*Ambrosia psilostachya*.) Fig. 63, half natural size.

Similar to the preceding (*A. artemisiaefolia*.)

Second pair of leaves coarsely 3-toothed.

Later leaves not so deeply lobed; whole plant coarser and rougher, the hairs more bristly.

Prairie and pastures.

COCKLEBUR (*Xanthium Canadense*.) Fig. 59, half natural size.

Hypocotyl short, smooth.

Cotyledons smooth, oblong, tapering below into a wide petiole and above from near base of blade gradually to a blunt point, 5 to 6 cm long including petiole, 1 cm wide, rather thick and fleshy.

Upper internodes rough hairy.

Third and fourth leaves opposite, others mostly alternate, oblong ovate, widest near the base and gradually narrowed to a blunt point, about as long as cotyledons, 2½ cm wide; margin toothed, surface rough; three-ribbed with about two smaller ones on each side at base; petioles 1 to 2 cm long.

Upper leaves similar but wider in proportion to length. Young leaves flat against the bud.

Common in cultivated fields.

COCKLEBUR (*Xanthium strumarium*.) Fig. 60, half natural size.

Very similar to the previous species but not so common.

No difference was observed in the seedlings.

OX-EYE (*Heliopsis scabra*.) Fig. 41. *a* half natural size, *b* natural size.

Prairie and pastures.

LEPACHYS (*Lepachys columnaris*.) Fig. 42.

Prairie, especially western Kansas.

COMMON SUNFLOWER (*Helianthus annuus*.) Fig. 46, half natural size.

Cotyledons short, oblong, very blunt at apex, narrowed at base into a flat petiole, surface smooth; blade 1 cm long, 8 mm wide, thick; petiole ½ cm long.

Second internode rough hairy. All the lower leaves opposite.

Second pair of leaves narrowly ovate, three-ribbed, rough hairy, about 4 cm long, 13 mm wide.

Later leaves becoming larger and toothed on the margin, and finally more or less heart-shaped at base.

Common in cultivated land.

NARROW LEAVED SUNFLOWER (*Helianthus Maximiliani*.) Fig. 45, half natural size.

Cotyledons ovate oblong, narrowed below into a very short, flat petiole, smooth, 8 mm long, 4 mm wide.

Internodes rough hairy. Leaves opposite.

Second pair of leaves narrowly elliptical, pointed, narrowed into a short petiole, rough hairy, 1 to 1½ cm long, 3 mm wide.

Upper leaves similar, larger.

Frequent in pastures.

WESTERN SUNFLOWER (*Helianthus petiolaris*.) Fig. 47, half natural size.

Similar to *Helianthus annuus*.

Cotyledons smaller; blade 7 mm long, 4 mm wide.

Second pair of leaves with blade 2 cm long, petiole 1 cm long.

Fourth pair obscurely toothed.

Common especially westward.

ACTINOMERIS (*Actinomeris squarrosa*.) Fig. 43, half natural size.

Low woods.

BEGGAR-TICKS (*Bidens frondosa*.) Fig. 65, half natural size.

Hypocotyl short, dark purple or reddish, tapering into the root below.

Cotyledons oblong, 1 to 2 cm long, 3 to 7 mm wide, one-nerved, tapering into a wide petiole half as long as the blade.

Leaves opposite.

Second pair of leaves 4 to 5 cm long including petiole, 4 to 6 mm wide near the apex, and tapering gradually into a long petiole, margin entire, or with a few notches, or lobed on one side like a mitten, or three-lobed.

Second pair of leaves three-parted, each lobe much like the preceding leaf.

The upper leaves similar or with more divisions and prominently feather-veined.

Stem angled, sparingly hairy, more so at the base of the petioles.

Young leaves folded together.

Common in moist soil.

THELESERMA (*Thelesperma gracile*.) Fig. 44.

Western Kansas.

STINK-WEED (*Dysodia chrysanthemoides*) Fig. 61, half natural size.

Hypocotyl smooth.

Cotyledons oblong, smooth, very blunt at apex, tapering below into a short petiole, blade 4 mm long, 2 mm wide.

Second internode minutely hairy. Leaves opposite.

Second pair of leaves divided into three narrow lobes, middle lobe three-toothed at apex; whole leaf about 1 cm long, two bristles at base of each petiole, surface with scattered orange colored glands which give the plant a peculiar tansy-like odor.

Upper leaves becoming more dissected.

Roadsides and prairie.

BURDOCK (*Arctium Lappa*.) Fig. 58, *a* and *b* one and one-half natural size. *c* half natural size.

Leaves alternate, forming a rosette. Hypocotyl smooth.

Cotyledons oval, smooth, ½ cm long, 8 mm wide, narrowed into a broad petiole 1 cm long, the bases of which are united into a short sheath.

Third leaf ovate, somewhat heart-shaped at base, sparsely hairy, veiny, 2 cm long on a petiole of the same length.

Fourth leaf larger, more heart-shaped at base, blunt at apex, margin with scattered minute teeth, surface more hairy, petiole ribbed.

Upper leaves becoming larger and woolly, especially on under side. Young leaves rolled together.

Waste land and pastures.

HIGH THISTLE (*Cnicus altissimus*.) Fig. 54, natural size.

Leaves forming a rosette.

Hypocotyl short, tapering into a strong tap root.

Cotyledons oval, narrowed at base, but scarcely petioled, smooth, 1 cm long, ½ cm wide.

Third leaf oval, 1 cm long on a broad petiole ½ cm long, surface hairy above with scattered soft hairs, woolly beneath, margin prickly.

Following leaves similar, larger, becoming more prickly on the margins; all conspicuously woolly beneath. Young leaves rolled back at each margin.

Woods and pastures.

PASTURE THISTLE (*Cnicus undulatus*.) Fig. 51, half natural size.

Common in pastures.

DANDELION (*Taraxacum officinale*.) Fig. 66, natural size.

Leaves forming a rosette, whole plant smooth.

Hypocotyl tapering downward.

Cotyledons oblong, rounded at apex, tapering at base into the petiole of about the same length as blade. Blade 5 mm long, 2½ mm wide.

Third leaf roundish, tapering into petiole.

Fourth leaf similar, very slightly toothed.

Fifth longer, more gradually tapering below, more strongly toothed, 2½ cm long including petiole, 8 mm wide.

Later leaves longer and more deeply toothed.

Lawns and grass lands.

PRICKLY LETTUCE (*Lactuca Scariola.*) Fig. 49, one-fourth natural size.

Leaves forming a rosette.

Cotyledons oval, blunt at apex, smooth, 8 mm long, 6 mm wide, narrowed into a short petiole.

Third leaf rounded at apex, gradually tapering from near the tip to a rather long petiole, altogether about 3 cm long and 1 cm wide at tip, obscurely toothed.

Fourth leaf longer, scarcely wider, more distinctly toothed, teeth remote.

Lower leaves narrowed toward base, but with the blade extending along the sides, the base widening next to stem where it clasps by two ears; midrib bristly

Waste land.

WILD LETTUCE (*Lactuca Canadensis.*) Fig. 56, *a* and *c*, half natural size, *b* natural size.

Cotyledons similar to *Lactuca Scariola*. Petioles and lower portion of margin minutely glandular hairy.

Third leaf broader than in *L. Scariola*, ovate, 2 cm long, 1 cm wide, more abruptly narrowed into a hairy petiole, more or less toothed.

Fourth leaf similar but larger.

Fifth more distinctly toothed, blade oval as in the earlier ones. Petiole bristly beneath.

Differs from *L. Scariola* in the shape of the leaves, narrowing more abruptly into a petiole.

Waste places.

DOGBANE (*Apocynum cannabinum.*) Fig. 68, half natural size.

Prairie and pastures, often in cultivated soil.

MILK-WEED (*Asclepias Jamesii.*) Fig. 69, half natural size.

Western Kansas.

ELLISIA (*Ellisia Nyctelea.*) Fig. 70, three-fourths natural size.

Common in damp or shady places, or, in western Kansas, upon dry hills.

HOUND'S TONGUE (*Cynoglossum officinale.*) Fig. 74, *a* one and one-half natural size, *b* natural size.

Leaves forming a rosette.

Hypocotyl strong, tapering into a long tap root.

Cotyledons oval, gradually tapering into a flat petiole, rough hairy, 1 to 2 cm long, 8 mm wide; petiole 8 mm long.

Third leaf elliptical, pointed, on a slender, somewhat bristly-margined petiole.

Fourth leaf larger, 4 to 5 cm long, 2½ to 3 cm wide, velvety, veiny, the blade extending down the sides of the long petiole as a very narrow margin, this bristly below, margin entire.

Pastures and waste ground.

BEGGAR'S- LICE (*Echinosperrum Virginicum.*) Fig. 75, half natural size.

Pastures and thickets.

SMALL BEGGAR'S-LICE (*Krynitzkia Jamesii.*) Fig. 73, half natural size.

Common in western Kansas.

YELLOW PUCCOON (*Lithosperrum angustifolium.*) Fig. 71, natural size.

Prairie and pastures.

FALSE GROMWELL (*Onosmodium Carolinianum.*) Fig. 72, half natural size.

Fields and pastures.

IVY-LEAVED MORNING GLORY (*Ipomoea hederacea.*) Fig. 77, half natural size.

Cotyledons heart shaped, notch at base barely acute, two lobed at apex, each lobe with two large nerves, almost quadrangular or the lobes slightly diverging, 2 to 3 cm long and broad, petiole same length; cotyledons small.

Internodes about 5 mm long, covered with hairs pointing backwards.

Leaves alternate.

First leaf heart shaped, the notch at base obtuse; also a notch on each side of the leaf.

The other leaves becoming more three-lobed and with a more acute notch at the base, petioles longer than those of the cotyledons, hairy like the stem; leaves hairy and lighter green in color than *Ipomoea purpurea* from which it also differs in having the upper leaves three-lobed.

Cultivated soil, common.

COMMON MORNING GLORY (*Ipomoea purpurea.*) Fig. 78, half natural size.

Cotyledons somewhat heart shaped at base and deeply notched at apex so as to be two-lobed, veiny, about 1½ to 2½ cm wide, and as long at the sides. Petiole smooth 2 to 3 cm long.

Upper internodes hairy, the hairs pointing backwards. Leaves alternate.

Third leaf heart shaped, not lobed, pointed at apex, veiny, several ribs from base. Blade about as large as cotyledons or growing larger, smooth above, sparsely hairy beneath; petioles hairy.

Upper leaves similar, more hairy. Young leaves folded together.

Cultivated soil, common.

BUSH MORNING GLORY (*Ipomoea leptophylla.*) Fig. 76, half natural size.

Sandy soil, especially in western Kansas.

COMMON NIGHTSHADE (*Solanum nigrum.*)

Hypocotyl conspicuously glandular hairy.

Cotyledons ovate, pointed, thin, 1 cm long, $\frac{1}{2}$ cm wide, smooth or very remotely hairy along the margin; petiole glandular, slender, 5 to 7 mm long.

Internodes cylindrical, hairy, the lower glandular like the hypocotyl, the upper hairy but not glandular.

Third leaf larger and broader, blunt at apex, with two pairs of veins branching from below the middle of the midrib.

Fourth leaf, similar, larger with three pairs of veins.

Upper leaves frequently more or less toothed, the teeth broad and blunt; surface often sparsely hairy beneath. The blades are sometimes unequal at base.

Cultivated soil and waste places. Seedlings of this were obtained too late for engraving.

BUFFALO-BUR (*Solanum rostratum.*) Fig. 84, half natural size.

Primary root tapering downward, inclined to branch.

Hypocotyl cylindrical, minutely hairy above, purple, 2 cm long, $\frac{1}{2}$ mm thick.

Cotyledons narrow, somewhat narrowed towards the tip, smooth or minutely hairy, petioles rather shorter than blades.

Whole length 2 to $2\frac{1}{2}$ cm, width 3 mm at base of blade.

Second internode very short, hairy, this or the next prickly, with straight, slender, often purple prickles.

Third leaf oval, lobed at base, petiole about length of blade. Blade $\frac{1}{2}$ cm long; 1 cm wide.

Fourth leaf apparently opposite the third but more developed, deeply lobed, a few prickles on the ribs above; veins running out into the lobes.

Fifth leaf larger, more deeply lobed and more prickly. Petiole strongly prickly. Young leaves plaited and folded together.

Cultivated soil, fields, pastures and waste places. This common weed is called Bull Nettle, Texas Thistle, Buffalo Thistle, and several other names.

HORSE NETTLE (*Solanum Carolinense.*) Fig. 86, natural size.

Cultivated soil and pastures.

GROUND CHERRY (*Physalis lanceolata.*) Fig. 79, *a, b* and Fig. 85 half natural size.

Cotyledons ovate-elliptical, pointed, smooth, $\frac{1}{2}$ cm long, including petiole (3 mm long, $\frac{1}{2}$ cm wide.)

Leaves alternate.

Third leaf oval or ovate, narrowed into a margined petiole $\frac{1}{2}$ cm long, 1 cm wide, petiole 1 cm long.

Fourth leaf larger, veiny, somewhat undulated along the margin.

Internodes angled, sparsely and minutely hairy.

Cultivated soil.

Fig. 85 represents a common variety distinguished by larger and more deeply toothed leaves.

WESTERN GROUND CHERRY (*Physalis lobata*.) Fig. 80, natural size.

Western Kansas.

JIMSON-WEED (*Datura Stramonium*.) Fig. 81, half natural size.

Hypocotyl strong, smooth, green.

Cotyledons 4 to 6 mm wide, 4 or 5 cm long including the petiole (1 cm long), tapering abruptly into the petiole and gradually to a point at the apex, one nerved.

Internodes short; leaves alternate.

Third and fourth leaves 2 to 3 cm wide, 5 to 7 cm long, wider below the middle tapering to a blunt point, margins entire, mid-rib with several prominent branches; petiole one-third the length of the leaf.

The other leaves becoming more triangular, with large distant teeth along the edge.

Young leaves folded together, having a few hairs which they lose when older.

Whole plant green, possessing a strong disagreeable odor.

Waste places and neglected fields.

PURPLE JIMSON WEED (*Datura Tatula*.) Fig. 82, half natural size.

Differs principally in having the stem purple colored.

Waste places.

MULLEIN (*Verbascum Thapsus*.) Fig. 88, natural size.

Leaves alternate, forming a rosette.

Cotyledons small, oval, tapering into a broad, flat petiole, about 3 mm long including petiole, smooth.

Third leaf ovate, velvety, petiole 3 mm long; fourth and fifth leaves similar.

Sixth leaf 2 cm long, 13 mm wide, velvety, about three pairs of ribs branching from the midrib, petiole only 2 mm long.

Later leaves becoming much larger, velvety, scarcely petioled.

Waste places and pastures.

CONOBEA (*Conobea multifida*.) Fig. 89.

Fields and pastures.

SPEEDWELL (*Veronica peregrina*.) Fig. 87, one and one-half natural size.

Cotyledons elliptical, narrowed at base, 5 mm long, 2 mm wide.

Leaves opposite: internodes smooth or glandular hairy.

Upper leaves similar to cotyledons, less narrowed at base, slightly larger.

Plant slender and upright, soon flowering and fruiting.

Gardens and open places.

UNICORN PLANT (*Martynia proboscidea.*)

Hypocotyl clammy hairy, distinctly thicker than the root. At the base is a projection which is developed in the early stages of germination for the purpose of helping the seedling to escape from the seed coats and pod.

Cotyledons short-oblong, blunt or very slightly notched at apex, and with two short, acute lobes at base. The blade is about 1½ cm long and 8 to 10 mm wide, purple beneath. These and the 2 cm long petioles like the whole plant clammy hairy.

Second internode about 1 cm long. Leaves opposite.

Second pair of leaves ovate, heart shaped at base, about 3 cm long.

Following leaves similar, larger.

Cultivated soil, especially westward.

HOARY VERBENA (*Verbena stricta.*) Fig. 91, natural size.

Cotyledons ovate, pointed, smooth, 3 to 4 mm long, 1½ mm wide; soon withering; petiole 2 mm long.

Leaves opposite. Internodes hairy.

Second pair of leaves ovate, obscurely veined, minutely and sparsely hairy, 6 mm long, 4 mm wide, tapering into a short petiole.

Third pair larger, oval, prominently veined, few toothed on the margin.

Following leaves with more teeth and surface velvety.

Prairie and especially pastures.

SPREADING VERBENA (*Verbena bracteosa.*)

Cotyledons smaller than in the preceding, (*Verbena stricta.*)

Second pair of leaves entire or with one or two small teeth, petioles bristly.

Third pair oval, conspicuously toothed. Internodes bristly.

Similar to *Verbena stricta*, but more delicate, and the hairs more bristly.

Open ground.

LARGE-FLOWERED SAGE (*Salvia azurea var. grandiflora.*) Fig 53, natural size.

Prairie and pastures.

SMALL-FLOWERED SAGE (*Salvia lanceolata.*) Fig. 94, half natural size.

Prairie, pastures and cultivated soil.

WESTERN HORSE-MINT (*Monarda citriodora.*) Fig. 95. three-fourths natural size.

Western Kansas.

CATNIP (*Nepeta Cataria.*) Fig. 97, natural size.

Hypocotyl velvety.

Cotyledons triangular or semi-circular, notched at apex, wider than long, 3 to 4 mm long; petioles slender, 7 mm long.

Leaves opposite; internodes square.

Second pair of leaves roundish, semicircular, or ovate triangular, scallop-toothed, three-ribbed, veiny, about 1 cm wide; petiole slender, 1 cm long.

Third pair more oblong, prominently veined beneath.

Whole plant velvety.

Waste places.

MOTHERWORT (*Leonurus Cardiaca.*) Fig. 96, *a*, natural size, *b* half natural size.

Waste places.

COMMON PLANTAIN (*Plantago Rugelii.*) Fig. 100, *a* and *b* natural size.

Leaves forming a rosette; whole plant smooth, light green.

Cotyledons oval, tapering into a slender, flat petiole 6 mm long, blade 5 mm long, 4 mm wide. Third leaf similar, larger.

Fourth leaf obscurely three-ribbed.

Following leaves becoming more prominently three-ribbed and longer petioled.

Pastures, door yards and roadsides.

ENGLISH PLANTAIN (*Plantago lanceolata.*) Fig. 99, *a* and *b* natural size.

Cotyledons long and very narrow, thread-like, smooth, 2 cm long.

Leaves forming a rosette.

Third leaf becoming longer, about 3 mm wide, woolly along the lower part.

Fourth leaf three-ribbed, margins with scattered minute teeth.

Later leaves similar, larger.

Meadows and grass lands.

GRAY PLANTAIN (*Plantago Patagonica var. gnaphaloides.*) Fig. 98, natural size.

Leaves alternate in a rosette, narrow, the later three-ribbed, the two side ribs close to the edge, tapering to a sharp point, several centimeters long, 3 to 5 mm wide, woolly with long loose white hairs. No specimens were obtained showing cotyledons.

Sterile pastures and waste places.

WILD FOUR O'CLOCK (*Oxybaphus nyctagineus.*) Fig. 101, half natural size.

Hypocotyl short, smooth.

Cotyledons roundish or broader than long, smooth, thickened, 1 cm long on a petiole 5 mm long.

Leaves opposite. Second internode hairy.

Second pair of leaves ovate, blunt at apex, smooth, very minutely hairy along the margin, about two pairs of veins along the mid-rib; petiole 3 mm long.

Upper leaves similar, larger, more veiny, but in all, the veins are obscured by the fleshy texture of the leaf.

Prairie, pastures and cultivated soil.

GREEN AMARANTUS (*Amarantus retroflexus.*) Fig. 103, natural size.

Hypocotyl short, smooth.

Cotyledons narrow, short petioled, widest near the base of blade, 1 cm long, 2 mm wide.

Second internode short, hairy

Third and fourth leaves apparently opposite, ovate or roundish, smooth. on slightly hairy petioles 3 to 4 mm long, notched at apex, veins three or four on each side of the midrib, prominent beneath. Blade becoming as much as 2 cm long and 1½ cm wide or growing larger and the petiole increasing to 12 mm in length.

Following internodes quite hairy with close down. Following leaves larger and more prominently veined and hairy on the veins beneath.

Young leaves folded together. Hypocotyl and lower surface of leaves usually purple or red.

Common in cultivated ground. One of the so-called "pig weeds."

TUMBLE WEED (*Amarantus albus.*) Fig. 120, natural size.

Cotyledons similar to *Acnida tuberculata* but shorter, about 6 to 8 mm long. Whole plant smooth.

Second and third leaves apparently opposite, blades rounded, notched at apex, 5 to 10 mm long on slender petioles 6 to 8 mm long.

The following leaves are similar to *Acnida* but are shorter in proportion to their length.

Prairie and cultivated soil, especially recently broken prairie.

SPREADING AMARANTUS (*Amarantus blitoides.*) Fig. 104, natural size.

Hypocotyl and cotyledons similar to *Amarantus retroflexus*, the cotyledons often longer.

Internodes all smooth. Second usually longer than in *Amarantus retroflexus*.

Leaves above the cotyledons spatulate, that is, broadest just below the tip and gradually narrowing into a petiole as long as the blade.

Open places.

WATER HEMP (*Acnida tuberculata.*) Fig. 105, half natural size.

Hypocotyl smooth.

Cotyledons oblong, usually wider near the base, 10 to 13 mm in length including the 2 to 3 mm long petiole, 2 to 3 mm wide, smooth. Buds often developing in the axils.

Second internode short, upper internodes soon becoming ribbed.

Third leaf elliptical, blunt or notched at apex, veins prominent beneath, about 2 cm long including petiole.

Following leaves similar but larger. Young leaves folded together.

The hypocotyl and under surface of the leaves usually develop a bright red or purple color.

Cultivated soil. This and the three species of *Amarantus* preceding are quite similar in the earlier stages.

SAND-HILL TUMBLE WEED (*Cycloloma platyphyllum*) Fig. 108, half natural size.

Cotyledons narrow, scarcely narrowed at the base, smooth and fleshy.

Third and fourth leaves apparently opposite, elliptical, narrowed into a petiole 2 cm long and 5 mm wide. Fifth leaf more or less toothed.

Later leaves becoming more deeply toothed, teeth remote and bristle-pointed, the base of the later leaves and the internodes woolly.

Sandy soil.

LAMB'S QUARTER (*Chenopodium album.*) Fig. 107, half natural size.

Hypocotyl reddish, cylindrical.

Cotyledons oblong, blunt at the apex, 1 to 2 cm long, 2 to 3 mm wide, with a petiole about half as long, purple below as also are some of the leaves.

Internodes short, somewhat angled by lines descending from the base of the petioles.

Third and fourth leaves almost opposite, 7 to 10 mm wide at one-fourth the distance from base to apex, about 2 cm long tapering to a blunt apex, and abruptly into a petiole almost as long as the blade; one-nerved or two indistinct side nerves at base; margin entire or a slight notch at the widest part.

Upper leaves a little wider; nerves more distinct, several short teeth along the edge. Young leaves folded together.

Young stems and leaves thickly covered by mealy grains.

Cultivated soil. Another of the so-called "pig weeds."

MAPLE-LEAVED LAMB'S QUARTER (*Chenopodium hybridum.*) Fig. 106, natural size.

Hypocotyl cylindrical, smooth, containing some red coloring matter.

Cotyledons oblong 1½ to 2 cm long, tapering below to a short petiole.

Third and fourth leaves apparently opposite, triangular, slightly sinuate, forming a few distant indistinct teeth along the edge, 2 to 3 cm long, the petioles a little shorter.

Following leaves more and more alternate and the margins with 4 or 5 large teeth on each side.

Stem becoming square above, this and the young leaves with a few mealy grains.

Odor rank.

Cultivated soil.

POKEWEED (*Phytolacca decandra.*) Fig. 109, half natural size.

Whole plant smooth.

Cotyledons ovate, pointed, at first thin, then becoming somewhat fleshy, blade 1½ to 2 cm long, 1 cm wide, tapering into a broad petiole.

Following leaves oval or elliptical, apex with a minute point, midrib with several pairs of side veins. Leaves entire. Stem purple.

Waste places.

ERIOGONUM (*Eriogonum annuum.*) Fig. 110, half natural size.

Western Kansas.

CURLED DOCK (*Rumex crispus*.) Fig. 115, half natural size.

Leaves alternate on slender petioles forming a rosette.

Hypocotyl swollen below the cotyledons.

Cotyledons elliptical, light green, 8 mm long, 3½ mm wide, tapering below into a petiole 6 mm long.

Third leaf roundish or oblong. Fourth more oblong.

Later leaves becoming longer and crinkled on the margin; the base of the petiole is provided with a sheath which envelopes the stem, but this does not appear upon the first few leaves.

Young leaves rolled back from each margin, forming a compact cylinder which emerges from the protecting sheath.

Cultivated ground and waste places.

PALE DOCK (*Rumex altissimus*.) Fig. 116, natural size.

Pastures and moist places.

COMMON KNOTWEED (*Polygonum aviculare*.) Fig. 113, natural size.

Cotyledons narrow, 6 mm long, scarcely 1 mm wide, without petioles.

Third leaf elliptical, 8 mm long, 3 mm wide on a petiole 3 mm long, sheath at base, smooth.

Fourth and following leaves becoming larger, inconspicuously veined.

Whole plant smooth. Stem striate.

Door yards and open places.

TALL KNOTWEED (*Polygonum ramosissimum*.)

Similar to the preceding, (*P. aviculare*) but cotyledons about 1 cm long.

Plant coarser and leaves larger, the sixth leaf about 4 cm long and 1 cm wide.

Roadsides. No figure was drawn of this species.

KNOTTY POLYGONUM (*Polygonum lapathifolium* var. *incarnatum*.) Fig. 111, *a* and *b* half natural size.

Similar to the following, *Polygonum Pennsylvanicum*.

Cotyledons elliptical, 7 mm long, 2 mm wide.

Third leaf broadest about the middle, about 2½ cm long, 4 mm wide.

The cotyledons increase in size and may become 2 cm long in the seedlings with several leaves. This is more swollen at the nodes than is *P. Pennsylvanicum*.

Cultivated soil especially in moist places.

POLYGONUM (*Polygonum Pennsylvanicum*.) Fig. 112, natural size.

Primary root long and slender with few branches.

Hypocotyl smooth, cylindrical, purplish, rather short about 1 cm long.

Swollen just below the cotyledons.

Cotyledons narrow tapering at base, the two joining around the stem, at that point forming a sheath, usually purple beneath, smooth, slightly succulent, 1½ cm long, 3 mm wide.

Third leaf narrowing from a short distance below the tip to a short

petiole, veins indistinct. At the base is a thin sheath enclosing the stem and extending up a short distance from the node. Nodes swollen.

Fourth leaf with a more elliptical blade and more prominent veins. Young leaves rolled back at each margin and emerging from the protecting sheath. Whole plant smooth.

Cultivated soil and moist places.

WILD BUCKWHEAT (*Polygonum Convolvulus.*) Fig. 114, half natural size.

Hypocotyl smooth.

Cotyledons narrow, 1 cm long, 3 mm wide, narrowed at the base, uniting around the stem to form a sheath.

Third leaf arrow-shaped, lobes at base rounded. Blade 1½ to 2 cm long, 12 mm wide, smooth; petiole about as long as blade, minutely roughened; at the base is a stipular sheath enclosing the stem and roughened like the petiole.

Upper leaves similar. Young leaves rolled back from each margin.

Cultivated soil.

SPOTTED SPURGE (*Euphorbia maculata.*) Fig. 118, natural size.

Leaves opposite. Whole plant red, soon prostrate spreading, upper surface of leaves often with a darkened spot. Juice milky.

Cotyledons roundish, oblong, 2 cm, smooth, shortly petioled.

Second pair of leaves somewhat larger, narrowed at the base, sparsely hairy, margin obscurely notched. Third pair unequal at base, minutely notched, hairy.

Later leaves with small stipules.

Cultivated soil.

There are a few other species of prostrate spurges often found in cultivated soil, but they resemble each other closely in the seedling stages (*E. serpens*, *E. glyptosperma*, *E. Geyeri*). They are, however, smooth throughout.

All the plants of the genus *Euphorbia* have a milky juice.

LARGE SPURGE (*Euphorbia Preslii.*) Fig. 117, natural size.

Leaves opposite. Stem unusually rising obliquely; juice milky.

Cotyledons oblong, smooth 4 mm long, 2½ mm wide, shortly petioled.

Second pair of leaves narrowed below; margin with a few notches along the middle, sparsely hairy; blades 6 mm long.

Third pair of leaves unequal at base, notched down the longer margin and with a few notches down the shorter margin. Hairs on surface long, scattered.

Upper leaves similar, becoming larger and provided with small stipules.

Leaves purple, at least below, and often with a dark spot on upper surface.

Cultivated soil and pastures.

SPURGE (*Euphorbia hexagona.*) Fig. 119, half natural size.

Hypocotyl minutely hairy.

Cotyledons oblong, smooth, 1 cm long, 4mm wide, tapering below into a short, flat, hairy petiole.

Second and following internodes six-sided, minutely hairy. Leaves opposite.

Second pair of leaves narrow, 2 to 2½ cm long, 3 to 4 mm wide, smooth above, minutely hairy beneath, short petioled.

Upper leaves similar.

Sterile soil.

SNOW ON THE MOUNTAIN (*Euphorbia marginata.*) Fig. 120, half natural size.

Leaves opposite, internodes hairy, juice of plant milky.

Hypocotyl 3 cm long, colored red for most of the length, smooth, cylindrical, 1½ mm thick.

Cotyledons oval or oblong, narrowed into a very short petiole, somewhat hairy at the base on the upper side, otherwise smooth, 1½ to 2 cm long, 8 to 12 mm wide.

Second pair of leaves tapering gradually to a short petiole from above the middle. Hairy in the axils.

Third pair similar but also slightly hairy below. Young leaves of bud rolled around the inner portions of the bud.

Along road sides and in pastures.

HAIRY SPURGE (*Euphorbia dentata.*) Fig. 121, half natural size.

Hypocotyl cylindrical, slightly hairy above, somewhat tinged with purple.

Cotyledons oblong, abruptly rounded at each end, petioles about the length of the blade. Blade smooth except a very minute hairyness along the edge and near the base, petioles hairy. Blades 1 cm long, 8 mm wide.

Second internode hairy. Buds usually developing in the axils of the cotyledons.

Leaves opposite. Second pair of leaves ovate, somewhat wider below the middle, toothed, hairy, veins pinnately arranged along the midrib, rather prominent beneath. Blade 2 cm long, 11 mm wide, petiole 1 cm long.

Third pair of leaves similar, but veins more prominent beneath.

Bud flat, the leaves merely folded together around the center without overlapping.

Color medium dark green, juice milky white.

Pastures and cultivated soil.

ROUGH CROTON (*Croton glandulosus.*) Fig. 124, half natural size.

Pastures and open ground.

WOOLLY CROTON (*Croton capitatus.*) Fig. 126, half natural size.

Sterile soil.

TEXAS CROTON (*Croton Texensis.*) Fig. 125, half natural size.

Pastures and open places.

THREE-SEEDED MERCURY (*Acalypha Virginica.*) Fig. 123, half natural size.

Cultivated soil and damp places.

THREE-SEEDED MERCURY (*Acalypha Caroliniana.*) Fig. 122, half natural size.

Hypocotyl hairy.

Cotyledons roundish, forked veined, nearly smooth 8 mm long, on slender, minutely hairy petioles 1 cm long.

Second internode glandular hairy. Leaves opposite.

Second pair of leaves ovate, heart shaped at base, sharply toothed, nearly smooth, veiny, three-ribbed at base with several strong side ribs along the midrib, and also along the outer side of the lateral ribs. Blade about 2 cm long, petiole 1 cm long.

Later leaves similar.

Cultivated soil.

STINGING SPURGE (*Tragia stylaris.*) Fig. 127, half natural size.

Dry hills.

HEMP (*Cannabis sativa.*) Fig. 130, natural size.

Waste places.

CLEARWEED (*Pilea pumila.*) Fig. 128, half natural size.

Moist shady places.

PELLITORY (*Parietaria Pennsylvanica.*) Fig. 129, natural size.

Shady places.

SPANISH BAYONET (*Yucca angustifolia.*) Fig. 132, half natural size.

Dry hills and pastures.

GREEN DRAGON (*Arisaema Dracontium.*) Fig. 131, half natural size.

Low woods.

In the GRASSES (*Graminae*) to which the following belong, the germination and the appearance of the seedlings differ somewhat from the other forms mentioned in the list. As previously stated the embryo is provided with but one cotyledon and this remains in the seed during germination, acting as a sucking organ to transfer the nourishment from the seed to the young plant. The second internode elongates until the second leaf is brought to the surface. This internode is slender and thread like usually distinctly smaller than the next internode above. The second leaf is two-nerved, and at first closed at the top, but later is burst open by the third leaf. This second leaf soon withers, never developing into a foliage leaf. The third leaf and all the following are provided with a central mid rib, and usually other small nerves in pairs running parallel with the midrib. The leaves are two-ranked. A root emerges from the seed but the main root-system usually originates at the second node. The seed is almost always attached to the seedling and serves as an aid in identification.

PASPALUM (*Paspalum setaceum.*) Fig. 141, natural size.

Second leaf 5 mm long.

Third leaf 2 cm long, narrow and gradually tapering to a sharp point, velvety.

Fourth leaf with blade 2 cm long, velvety, margin provided also with long bristly hairs.

Sandy fields.

CRAB GRASS (*Panicum sanguinale.*) Fig. 136, twice natural size.

Second leaf small and inconspicuous, soon hidden by the secondary roots which start from the node.

Third leaf oblong, nerved, 5 cm long, 3 mm wide, blade and sheath velvety.

Fourth leaf somewhat wider scarcely longer.

Fifth leaf 8 mm long, 6 mm wide.

Following leaves becoming longer. Internode short giving the seedling a stumpy appearance, velvety throughout.

Cultivated soil.

WITCH GRASS (*Panicum capillare.*) Fig. 134, natural size.

Third leaf sharp pointed, $\frac{1}{2}$ cm long, $2\frac{1}{2}$ mm wide.

Fourth and following leaves becoming longer and wider, all tapering to a sharp point. Sheaths furnished with numerous bristly hairs. Blade of younger leaves less conspicuously hairy, nearly smooth above.

Cultivated soil.

SWITCH GRASS (*Panicum virgatum.*) Fig. 136, natural size.

Prairie land.

PANIC GRASS (*Panicum depauperatum.*) Fig. 133, natural size.

Prairie.

BARNYARD GRASS (*Panicum Crus-galli.*) Fig. 137, natural size.

Stem stocky, flattened.

Second leaf about 4 mm long.

Third leaf with blade about 1 cm long, 3 mm wide.

Fourth leaf $1\frac{1}{2}$ cm long.

Following leaves longer, the whole plant smooth.

Cultivated soil.

GREEN FOXTAIL (*Setaria viridis*) Fig. 139, natural size.

Second leaf thin and papery, 2 mm long.

Third leaf oblong, 6 mm long, 2 mm wide, smooth except at base of sheath.

Fourth leaf about 1 cm long, sheath slightly hairy along the margin.

Fifth leaf becoming longer, sheath with long hairs at the margin.

Cultivated soil.

YELLOW FOXTAIL (*Setaria glauca.*) Fig. 138, *a, b, c*, natural size.

Similar to *Setaria viridis* but smooth on the first few leaves. The third leaf about twice as long as in *S. viridis*.

The seed is usually found attached and furnishes characters for the separation of the two species.

The flowering glume of *S. glauca* is transversely wrinkled while in *S. viridis* it is smooth or at least not transversely wrinkled.

Cultivated soil.

SAND-BUR (*Cenchrus tribuloides*.) Fig. 155, *a, b*, half natural size.

Second leaf short, 4 mm long.

Third leaf nerved, sharp pointed, 12 mm long, 2½ mm wide.

Whole plant smooth; stem distinctly flattened. The bur at the root is sufficient to distinguish this grass.

Cultivated soil.

DROP-SEED GRASS (*Sporobolus cryptandrus*.) Fig. 143, natural size.

Sandy fields.

STINK GRASS (*Eragrostis major*.) Fig. 142, one and one-half natural size.

Second leaf minute.

Third leaf tapering to a sharp point, strongly nerved, about 5 mm long, 1 mm wide, very sparsely hairy.

Fourth leaf larger, glandular, roughened along the edges.

Following leaves larger, all with glandular margins, which is a distinguishing character.

Upper portion of sheath with a small bunch of hairs, slightly hairy otherwise.

This grass has a peculiar foetid odor.

Cultivated soil.

CHESS (*Bromus secalinus*.) Fig. 144, three-fourths natural size.

Grain fields.

WILD BARLEY (*Hordeum pratense*.) Fig. 140, natural size.

Pastures and roadsides.

THE RUSSIAN THISTLE.

This weed has not been included in the descriptions since it is so fully treated in a bulletin entitled, "The Russian Thistle," published by the Kansas State Board of Agriculture.

The cotyledons of the seedling are long and thread-like. The following leaves are also very narrow. At a future time more will be said concerning its distribution. It was found at Manhattan last year and again this year.

OTHER WEEDS.

Several other weeds have not been included in the List of Descriptions of Seedlings for the reason that no seedlings could be found. These when found will be presented. They are all plants perennial by means of underground stems. They spread indefinitely by this means, and are consequently difficult of eradication. For the same reason they seldom produce seedlings.

To this list belong the following:

DAISY (*Chrysanthemum Leucanthemum.*)

Grainfields and pastures.

WHITE MORNING GLORY (*Convolvulus sepium.*)

Cultivated soil.

BIND-WEED (*Convolvulus arvensis.*)

Cultivated soil and pastures. This is a smaller flowered, white morning glory.

PRICKLY NIGHTSHADE (*Solanum elaeagnifolium.*)

Southern Kansas, cultivated soil and pastures.

HAIRY POLYGONUM (*Polygonum Muhlenbergii.*)

Pastures and meadows.

CANADA THISTLE.

We have no specimens of this weed from Kansas. It has been frequently reported but has always proven to be something else. We should be glad of specimens suspected to be this noxious weed.

WORK IN PROGRESS.

The following topics will be discussed in bulletins now in preparation and to be issued in a short time:—

- (1.) The descriptions of the various weeds in their adult stages by means of which they can be determined. Also notes in regard to soil, conditions of growth and kindred topics.
- (2.) Description of weed seeds and methods of seed dispersion.
- (3.) Distribution of weeds in Kansas, and the common names by which they are known in various localities.
- (4.) Methods of eradication.

INFORMATION WANTED.

In order to make the coming bulletins as complete as possible, the station desires information from all parts of the state concerning the distribution of weeds. We would ask every reader of this bulletin in Kansas to send us samples of the weeds of his locality. A small portion of each plant showing a few well developed leaves can be wrapped snugly in paper and sent by mail to the Botanical Department of the Experiment Station, Manhattan, Kansas. Each plant should have a number attached to it but no other writing. In a letter sent separately should be given all the information concerning each number. This information should include the name of the weed in common usage, the abundance, the kind of soil in which it occurs, and any other notes of interest. Upon the outside of the package the sender should in addition to the address, write his own name and address after the word "from." The station will return the postage to any sending weeds in this way. The plants should not be put in a box, nor should they be sent by express.

KEY TO OUR COMMON WEEDS.

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1 Cotyledon one, remaining in the seed, the second leaf scale-like, 2-nerved, leaves 2-ranked..... GRASS FAMILY	44
1 Cotyledons two, both brought to the surface of the ground.....2	
2 Leaves forming a rosette.....3	
2 Leaves on a more or less elongated axis.....17	
3 Later leaves prickly margined.....4	
3 Later leaves entire, toothed or lobed but not prickly..... 5	
4 Plant woolly THISTLE	32
4 Plant smooth, juice milky... MEXICAN POPPY	24
4 Foliage distinctly pungent (peppery) to the taste. MUSTARD FAMILY	24
5 Foliage not pungent although often bitter or sour.....6	
6 Juice Milky.....7	
6 Juice not milky8	
7 Plant smooth..... DANDELION	32
7 Plant more or less bristly..... WILD LETTUCE	33
8 Leaves not hairy9	
8 Leaves more or less hairy11	
9 Leaves rough, finely notched, thick..... GUM WEED	28
9 Leaves smooth and thin.....10	
10 Leaves 3-ribbed..... COMMON PLANTAIN	38
10 Leaves not 3-ribbed, foliage sour..... CURLED DOCK	41
11 Cotyledons thread-like..... WOOLLY-AND ENGLISH-PLANTAIN	38
11 Cotyledons broader, not thread-like.....12	
12 Leaves heart shaped at base BURDOCK	32
12 Leaves not heart shaped.....13	
13 Leaves woolly or velvety, not 3-ribbed.....14	
13 Leaves 3-ribbed, hairy but not velvety or woolly.. DAISY FLEA- BANE AND HORSE-WEED... ..	29
14 Third leaf smooth or minutely hairy..... EVENING PRIMROSE	27
14 Third leaf distinctly velvety15	
15 Cotyledons, including petiole, not more than 3 mm long (three- twenty-fifths of an inch)..... MULLEIN	36

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15 Cotyledons more than 1 cm long (two-fifths of an inch).....	16
16 Cotyledons with blade and petiole each about 6 mm long (six- twenty-fifths of an inch).....	VELVETY GAURA 28
16 Blade of cotyledons 12 mm long (twelve twenty-fifths of an inch) petiole about 8 mm long (eight-twenty-fifths of an inch) HOUND'S TONGUE	33
17 Stem provided with sheaths at base of leaves.....	POLYGONUMS 41-42
17 No sheaths.....	18
18 Juice milky	SPURGES 42-43
18 No milky juice.	19
19 Leaves opposite.....	20
19 Leaves alternate (<i>Xanthium</i> and some others have the third and fourth leaves opposite).....	28
20 Prostrate, fleshy or succulent.	PURSLANE 25
20 Upright ..	21
21 Cotyledons lobed at base.....	UNICORN PLANT 36
21 Cotyledons not lobed at base.	22
22 Upper leaves entire, nearly smooth	WILD FOUR O'CLOCK 38
22 Upper leaves toothed or lobed, hairy	23
23 Upper leaves toothed.....	24
23 Upper leaves distinctly lobed.....	26
24 Cotyledons less than 2 mm (two-twenty-fifths of an inch) wide	VERBENIA 37
24 Cotyledons 4 mm or more wide (four-twenty-fifths of an inch)....	25
25 Second pair of leaves heart-shaped at base, closely and sharply toothed.....	THREE SEEDED MERCURY 44
25 Second pair of leaves narrowly ovate, entire or very obscurely toothed	SUNFLOWERS 31
26 Nearly smooth.....	BEGGAR-TICKS 31
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27 Second pair of leaves not lobed.....	FALSE SUNFLOWER 29
27 Second pair of leaves distinctly three or more lobed..	RAGWEEDS 29-30
28 Cotyledons 2-lobed at apex.	MORNING GLORIES 34
28 Cotyledons not lobed at apex.....	29
29 Fourth and following leaves divided into three leaflets. SWEET CLOVER.....	27
29 None of the leaves compound.....	30
30 Cotyledons heart-shaped at base the MALLOW FAMILY (MALLOW)	SIDA, VELVET WEED, KETMIA) 25-26
30 Cotyledons not heart shaped.....	31
31 Cotyledons at least 5 times as long as wide.....	32
31 Cotyledons broader in proportion to length.....	37

	PAGE.
32 Cotyledons and several of the following leaves narrow, and thread-like.....	46
RUSSIAN THISTLE	
32 Cotyledons narrow but not thread-like, the following leaves broader	33
33 Cotyledons as much as 4 cm long(1 and three-fifths inches).....	34
33 Cotyledons small,not more than 2 cm long (four-fifths of an inch).	35
34 Third and fourth leaves opposite. margin toothed, other leaves alternate.....	30
COCKLE-BUR	
34 Third and fourth leaves not opposite, entire.....	36
JIMSON-WEED	
35 Upper leaves deeply lobed, prickly... ..	35
BUFFALO-BUR	
35 Upper leaves entire or toothed, not deeply lobed.....	36
36 Teeth of upper leaves bristle-pointed..	39
SAND HILL TUMBLE WEED	
36 Teeth of leaves blunt or rounded.....	40
LAMB'S QUARTER	
37 Stem angled with ridges.....	35
GROUND CHERRY	
37 Stem cylindrical not angled.....	38
38 Stem glandular hairy	34
NIGHT-SHADE	
38 Stem smooth or hairy but not glandular. AMARANTUS GROUP	38-39
(AMARANTUS, TUMBLE WEED, WATER HEMP)	

SUMMARY.

The subject is discussed under the following heads:

What is a weed? A weed may be broadly defined as any troublesome plant but is limited here to herbaceous flowering plants.

The seed. A description and definition of the parts of a seed and embryo.

Germination. The process is described as observed in various types. The nourishment for the use of the young plant is stored in the seed leaves or around the embryo. The seed leaves are drawn out of the seed and protected from injury in the passage upward through the soil by a loop in the young stem.

The young plant is called a seedling only when it has started from a seed. A young plant originating in a tuber or an underground stem as is the case with so many of our perennial weeds is not called a seedling. The definitions of the technical terms used are given.

List of weeds. The list includes about 145 species of plants all of which are illustrated by drawings. Of these only 77 are described. The remainder are of less importance. By means of the descriptions and drawings it is hoped that all weed seedlings can be identified.

The Russian Thistle. This has been fully treated in a bulletin published by the Kansas State Board of Agriculture.

Other weeds. A few perennial weeds of importance were omitted because their seedlings could not be obtained. These are Daisy, White Morning-glory, Bindweed, Prickly Nightshade and Hairy Polygonum.

The Canada Thistle. No specimens of this have been seen by us though it has been frequently reported. Information upon this point is desired.

Work in progress. Particular attention is called to the fact that the present bulletin is one of a series upon the subject of weeds and includes only a discussion of seedlings. All other matter is purposely omitted, but will appear in future bulletins. The work in progress relating to weeds may be arranged under four heads.

- (1) Descriptions of weeds in the adult stage.
- (2.) Descriptions of weed seeds.
- (3.) Distribution of weeds in Kansas.
- (4.) Methods of eradication.

Information wanted. To make the future reports as complete as possible, information upon all the above mentioned topics is especially requested. Directions are given for sending samples of weeds.

Key to our bad weeds. The key is based upon easily observed characters. It is hoped that by its aid any weed can be placed in its proper group. A reference to the detailed descriptions will enable the reader to distinguish between closely related species.

EXPLANATION OF FIGURES.

The drawings were made by Geo L. Clothier, Bertha Kimball, Laura McKeen, J. B. S. Norton, C. H. Thompson and Fannie Waugh.

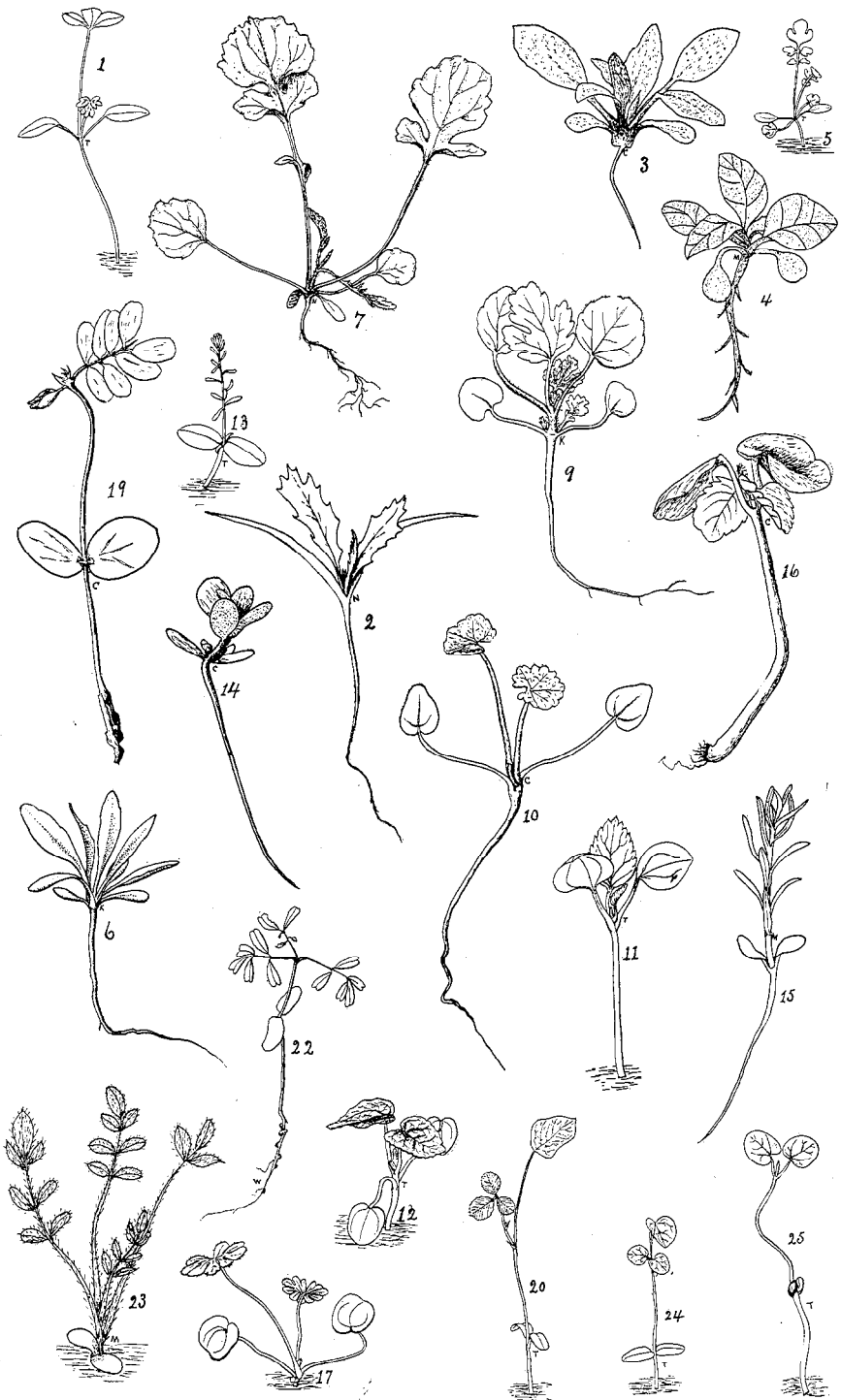
1. CORYDALIS (*Corydalis aurea*) x 1.
2. MEXICAN POPPY (*Argemone platyceras*) x 1/2.
3. SHEPHERD'S PURSE (*Capsella Bursa-pastoris*) x 1 1/2.
4. SICKLE POD (*Arabis Canadensis*).
5. TANSY MUSTARD (*Sisymbrium canescens*) x 1/2.
6. PEPPER-GRASS (*Lepidium intermedium*) x 1.
7. HEDGE MUSTARD (*Sisymbrium officinale*) x 1/2.
9. BLADDER KETMIA (*Hibiscus Trionum*) x 1/2.
10. MALLOW (*Malva rotundifolia*) x 1.
11. SIDA (*Sida spinosa*) x 1.
12. VELVET-WEED (*Abutilon avicennae*) x 1/2.
13. WILD BLUE FLAX (*Linum perenne* var. *Lewisii*) x 1.
14. PURSLANE (*Portulaca oleracea*) x 1.
15. WILD YELLOW FLAX (*Linum rigidum*) x 3/4.
16. WILD TOUCH-ME-NOT (*Impatiens pallida*) x 1/2.
17. WILD GERANIUM (*Geranium Carolinianum*) x 1/2.
18. HOG PEANUT (*Amphicarpaea Pitcheri*) x 1/4.
19. PARTRIDGE PEA (*Cassia Chamaecrista*) x 2/3.
20. WHITE SWEET CLOVER (*Melilotus alba*) x 1/2.
21. SENSITIVE ROSE (*Schrankia uncinata*) x 1/2.
22. DALEA (*Dalea alopecuroides*) x 1/2.
23. LOCO-WEED (*Astragalus mollissimus*).
24. TICK-SEED (*Desmodium Illinoense*) x 1/2.
25. WILD BEAN (*Strophostyles pauciflorus*) x 1/2.
26. DESMANTHUS (*Desmanthus brachylobus*) a, b, c x 1/2.
27. PRICKLY PEAR CACTUS (*Opuntia Rafinesquii*) x 1/2.
28. EVENING PRIMROSE (*Oenothera biennis*) x 3/4.
29. VELVETY GAURA (*Gaura parviflora*) a, x 1/2, b, c x 1 1/2.
30. WILD GOURD (*Cucurbita perennis*) x 1/2.
31. ONE-SEEDED BUR CUCUMBER (*Sicyos angulatus*) x 1/2.
32. WILD CUCUMBER (*Echinocystis lobata*) x 1/3.
33. BLACK SNAKE-ROOT (*Sanicula Marylandica*) x 1/2.
34. APLOPAPPUS (*Aplopappus divaricatus*) x 1.
35. APLOPAPPUS (*Aplopappus rubiginosus*) x 1.
36. GOLDEN-ROD (*Solidago Lindheimeriana*) x 1 1/2.
37. GOLDEN-ROD (*Solidago serotina*) x 1 1/2.
38. ASTER (*Aster laevis*) x 1 1/2.

39. ASTER (*Aster tanacetifolius*) x 1.
40. ENGELMANNIA (*Engelmannia pinnatifida*) a, b.
41. OX-EYE (*Heliopsis scabra*) a x ½, b x 1.
42. LEPACHYS (*Lepachys columnaris*.)
43. ACTINOMERIS (*Actinomeris squarrosa*) x 2.
44. THELESPERMA (*Thelesperma gracile*.)
45. NARROW-LEAVED SUNFLOWER (*Helianthus Maximiliani*) x ½.
46. COMMON SUNFLOWER (*Helianthus annuus*; x ½.
47. WESTERN SUNFLOWER (*Helianthus petiolis*) x ½.
48. HORSE-WEED (*Erigeron Canadensis*) x ½.
49. PRICKLY LETTUCE (*Lactuca scariola*) x ¼.
50. DAISY FLEABANE (*Erigeron strigosus*) x ½.
51. GUM-WEED (*Grindelia squarrosa*) x ½.
52. LITTLE RAGWEED (*Ambrosia artemisiaefolia*) x ½.
53. HETEROHECA (*Heterotheca Lamarckii*).
54. TALL THISTLE (*Cnicus altissimus*) x 1.
55. FALSE SUNFLOWER (*Iva xanthiifolia*) x 1.
56. WILD LETTUCE (*Lactuca Canadensis*) a, c x ½, b x 1.
57. PASTURE THISTLE (*Cnicus undulatus*) x ½.
58. BURDOCK (*Arctium Lappa*) a, b x 1½, c x ½.
59. COCKLE-BUR (*Xanthium Canadense*) x ½.
60. COCKLE-BUR (*Xanthium strumarium*) x ½.
61. STINK-WEED (*Dysodia chrysanthemoides*) x ½
62. BIG RAGWEED (*Ambrosia trifida*) x ½.
63. PRAIRIE RAGWEED (*Ambrosia psilostachya*) x ½.
64. BLAZING STAR (*Liatris scariosa*) x ½.
65. BEGGAR-TICKS (*Bidens frondosa*) x ½.
66. DANDELION (*Taraxacum officinale*) x 1.
67. BLAZING STAR (*Liatris sp.*) x 1.
68. DOGBANE (*Apocynum cannabinum*) x 1½.
69. MILKWEED (*Asclepias Jamesii*) x ½.
70. ELLISIA (*Ellisia Nyctelea*) x ¾.
71. YELLOW PUCCOON (*Lithospermum angustifolium*) x 1.
72. FALSE GROMWELL (*Onosmodium Carolinianum*) x ½.
73. SMALL BEGGAR'S LICE (*Krynitzkia Jamesii*) x ½.
74. HOUND'S TONGUE (*Cynoglossum officinale*) a x 1½, b x ½.
75. BEGGAR'S LICE (*Echinopspermum Virginicum*) x ½.
76. BUSH MORNING-GLORY (*Ipomoea leptophylla*) x ½.
77. IVY-LEAVED MORNING-GLORY (*Ipomoea hederacea*) x ½.
78. COMMON MORNING-GLORY (*Ipomoea purpurea*) x ½.
79. GROUND CHERRY (*Physalis lanceolata*) a, b x ½.
80. WESTERN GROUND CHERRY (*Physalis lobata*) x 1.
81. JIMSON WEED (*Datura Stramonium*) x ½.
82. PURPLE JIMSON WEED (*Datura Tatula*) x ½.
84. BUFFALO BUR (*Solanum rostratum*) x ½.
85. NIGHTSHADE (*Solanum nigrum*) x ½.
86. HORSE NETTLE (*Solanum Carolinense*) x 1.
87. SPEEDWELL (*Veronica peregrina*) x 1½.
88. MULLEIN (*Verbascum Thapsus*) x 1.
89. CONOBEA (*Conobea multifida*).

90. UNICORN PLANT (*Martynia proboscidea*) x ½.
91. HOARY VERBENA (*Verbena stricta*) x 1.
92. SPREADING VERBENA (*Verbena bracteosa*) x 1½.
93. LARGE-FLOWERED SAGE (*Salvia azurea*, var. *grandiflora*) x 1.
94. SMALL-FLOWERED SAGE (*Salvia lanceolata*) x ½.
95. WESTERN HORSE-MINT (*Monarda citriodora*) x ¾
96. MOTHER-WORT (*Leonurus cardiaca*) a x 1, b x ½.
97. CATNIP (*Nepeta Cataria*) x 1.
98. WOOLLY PLANTAIN (*Plantago Patagonica*, var. *gnaphalioides*) x 1.
99. ENGLISH PLANTAIN (*Plantago lanceolata*) a, b x 1.
100. COMMON PLANTAIN (*Plantago Rugelii*) a, b x 1.
101. FOUR O'CLOCK (*Oxybaphus nyctagineus*) x ½.
102. TUMBLE WEED (*Amarantus albus*) x 1.
103. AMARANTUS (*Amarantus retroflexus*) x 1.
104. SPREADING AMARANTUS (*Amarantus blitoides*) x 1.
105. WATER HEMP (*Acnida tuberculata*) x ½.
106. MAPLE-LEAVED LAMB'S-QUARTER (*Chenopodium hybridum*) x ½.
107. LAMB'S-QUARTER (*Chenopodium album*) x ½.
108. SAND-HILL TUMBLE WEED (*Cycloloma platyphyllum*) x ½
109. POKEWEED (*Phytolacca decandra*) x ½.
110. ERIOGONUM (*Eriogonum annuum*) x ½.
111. KNOTTY POLYGONUM (*Polygonum lapathifolium*, var. *incarnatum*) a, b, x ½.
112. POLYGONUM (*Polygonum Pennsylvanicum*) x 1.
113. COMMON KNOTWEED (*Polygonum aviculare*) x 1.
114. WILD BUCKWHEAT (*Polygonum Convolvulus*) x ½.
115. CURLED DOCK (*Rumex crispus*) x ½.
116. PALE DOCK (*Rumex altissimus*) x 1.
117. LARGE SPURGE (*Euphorbia Preslii*) x 1.
118. SPOTTED SPURGE (*Euphorbia maculata*) x 1.
119. SPURGE (*Euphorbia hexagona*) x ½.
120. SNOW-ON-THE-MOUNTAIN (*Euphorbia marginata*) x ½.
121. HAIRY SPURGE (*Euphorbia dentata*) x ½.
122. THREE SEEDED MERCURY (*Acalypha Caroliniana*) x ½.
123. THREE SEEDED MERCURY (*Acalypha Virginica*) x ½.
124. ROUGH CROTON (*Croton glandulosus*) x ½.
125. TEXAS CROTON (*Croton Texensis*) x ½.
126. WOOLLY CROTON (*Croton capitatus*) x ½.
127. STINGING SPURGE (*Tragia stylaris*) x ½.
128. CLEARWEED (*Pilea pumila*) x ½.
129. PELLITORY (*Parietaria Pennsylvanica*) x 1.
130. HEMP (*Cannabis sativa*) x 1.
131. GREEN DRAGON (*Arisaema Dracontium*) x ½.
132. SPANISH BAYONET (*Yucca angustifolia*) x ½.
133. PANIC GRASS (*Panicum depauperatum*) x 1.
134. WITCH GRASS (*Panicum capillare*) x 1.
135. CRAB GRASS (*Panicum sanguinale*) x 2.
136. SWITCH GRASS (*Panicum virgatum*) x 1.
137. BARNYARD GRASS (*Panicum Crus-galli*) x 1.
138. YELLOW FOXTAIL (*Setaria glauca*) a, b, c x 1.
139. GREEN FOXTAIL (*Setaria viridis*) x 1.
140. WILD BARLEY (*Hordeum pratense*) x 1.
141. PASPALUM (*Paspalum setaceum*) x 1.
142. STINK GRASS (*Eragrostis major*) x 1½.
143. DROP-SEED GRASS (*Sporobolus cryptandrus*) x 1.
144. CHESS (*Bromus secalinus*) x ¾.
145. SAND BUR (*Cenchrus tribuloides*) a, b x ½.

BOTANICAL DEPARTMENT.

PLATE I.



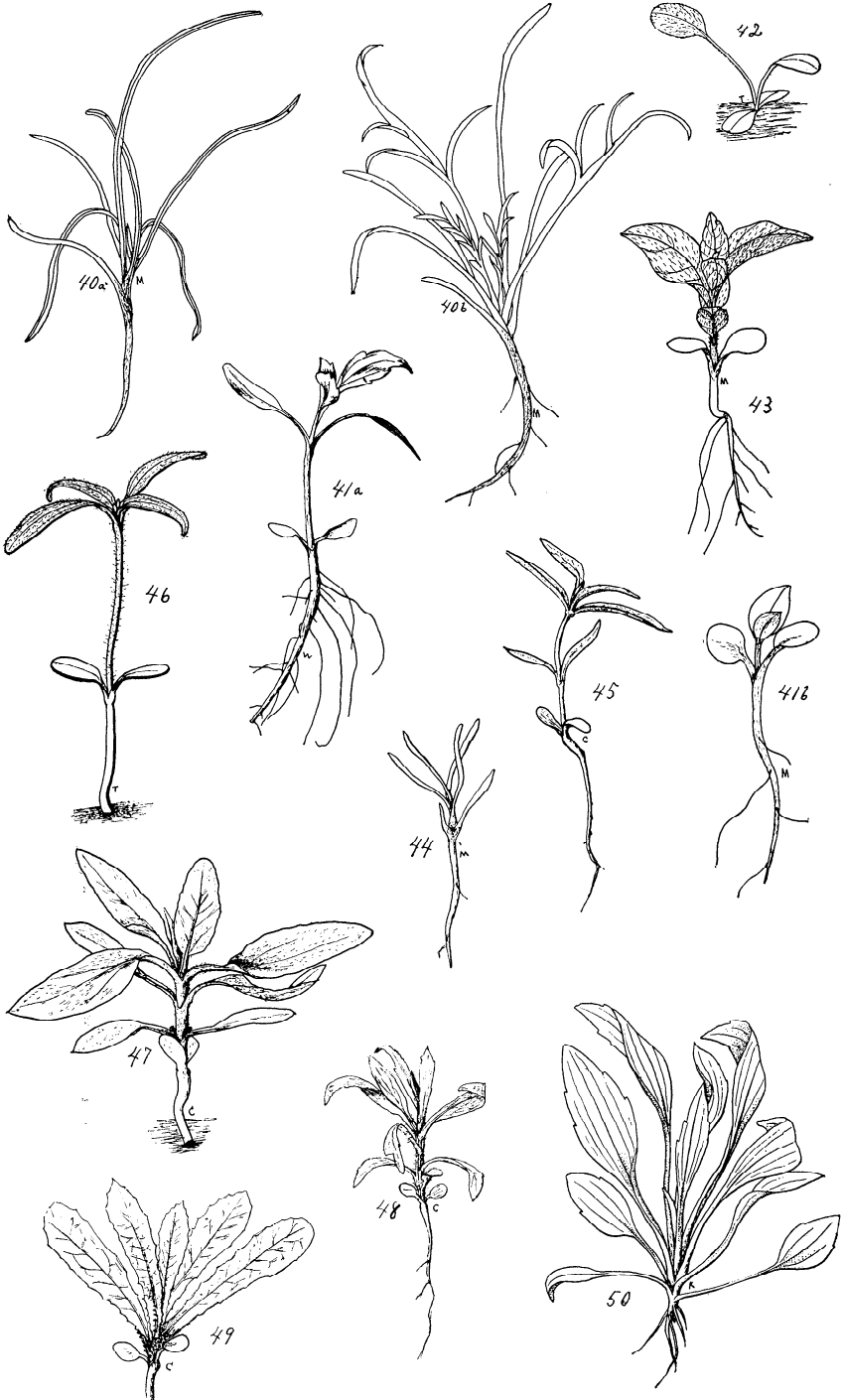
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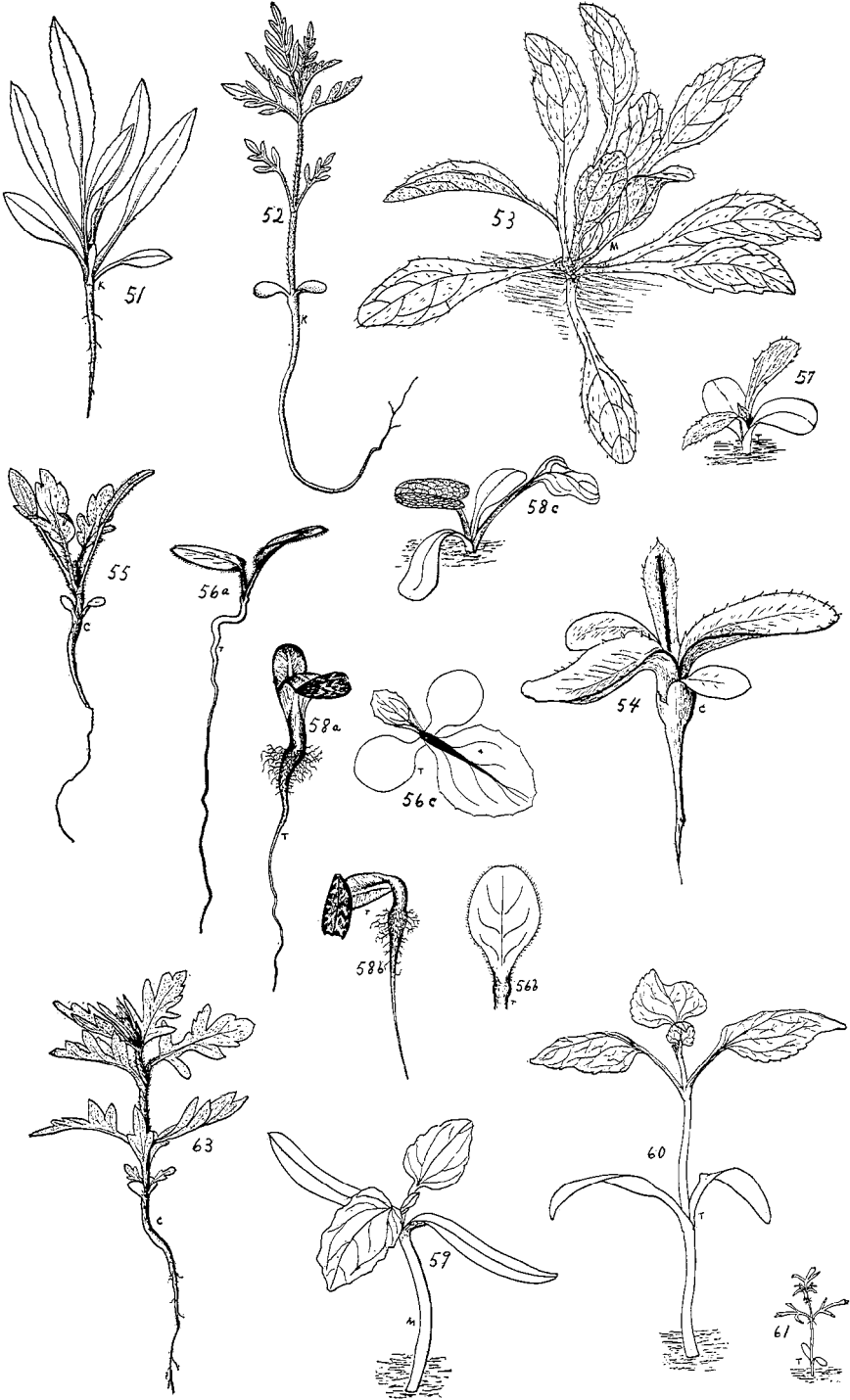
PLATE II.



BOTANICAL DEPARTMENT.

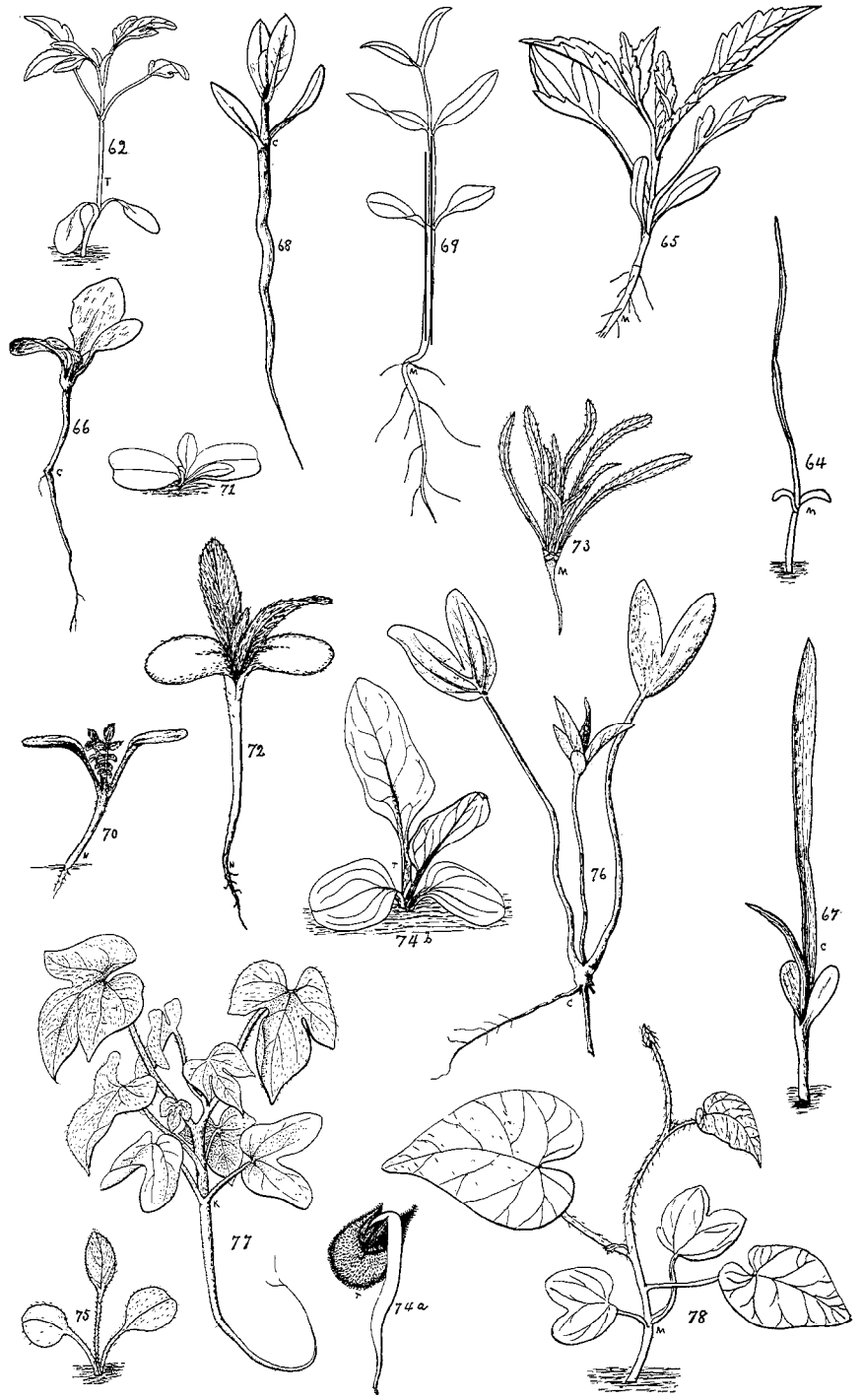
PLATE III.





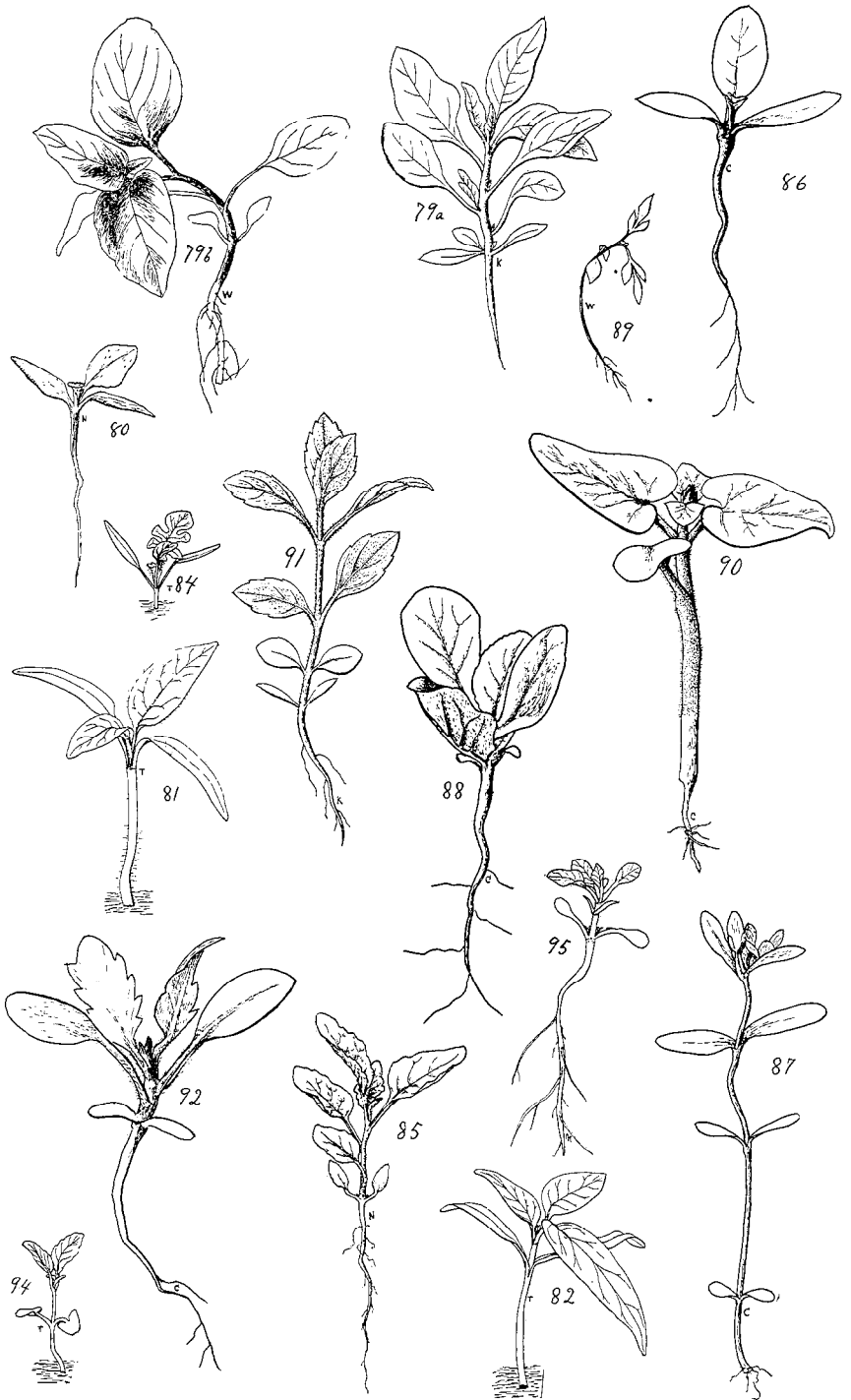
BOTANICAL DEPARTMENT.

PLATE V.



BOTANICAL DEPARTMENT.

PLATE VI.



BOTANICAL DEPARTMENT.

PLATE VII.



BOTANICAL DEPARTMENT.

PLATE VIII.



BOTANICAL DEPARTMENT.

PLATE IX.

