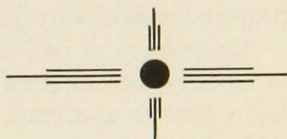


PESKY PLANTS



Identification and Control
of
OBNOXIOUS, IRRITATING
and
POISONOUS PLANTS
of
PARKS, RESORTS
and
BEACHES



Agricultural Experiment Station
UNIVERSITY OF MINNESOTA

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INTRODUCTION

THIS bulletin is intended to give information on the identification, growth habits, and control of certain plants that may menace health, or be undesirable for other reasons. There are plants, poison ivy for example, that can ruin a summer vacation. For this reason it is quite important that guests at summer resorts be given the fullest protection, and that campers and others frequenting the outdoors learn to recognize and protect themselves against possible injury.

Only a small percentage of our population is able to identify the common noxious plants and even fewer know how to eradicate them. Scarcely a year goes by without accounts of poisoning from eating the fruits or other parts of poisonous plants. Children especially should be warned not to eat or handle plants in wild places. The eradication of poisonous plants around children's playgrounds is a necessity.

Not all of the plants discussed herein are poisonous when touched or eaten, but many are undesirable because of thorns or spines that are likely to cause skin wounds or tear clothing. Other plants, especially those growing in water, may contaminate it, foul our sandy beaches, and become a nuisance to bathers.

A discussion of poisonous mushrooms, plants poisoning livestock, and plants causing hay fever or other allergic reactions is beyond the scope of this work. This bulletin is intended primarily for persons interested in the operation and maintenance of summer resorts, summer camps and cottages, bathing beaches, parks, and camp grounds as well as for Boy Scout leaders and all others who wish to derive the fullest measure of enjoyment from the facilities for outdoor recreation afforded by our state.

PESKY PLANTS¹

R. B. Harvey, A. H. Larson, R. H. Landon, and L. C. Erickson²

Irritant or Blister-Causing Plants

Poison Ivy

Rhus toxicodendron

There are two kinds of poison ivy in Minnesota, the common low shrubby form and a rarer climbing form. Other related species that have oaklike leaves are found in the southern and western states. These species are commonly referred to as poison oak, although they are not in any way related to the oaks, none of which are poisonous. None of these latter species of poison ivy grow in Minnesota. The climbing form of poison ivy in Minnesota is limited to only a few places in the southeastern part of the state. Since most of the state is free from this climbing pest, poisoning usually occurs only on the legs and hands of persons coming in contact with the low-growing form.

Neither of these forms of poison ivy should be confused with certain harmless vines such as trumpet creeper, Virginia creeper, or Englemann ivy that are native or are used in decorative plantings, or with moonseed, a low-growing harmless vine that is native throughout the state. The differences in leaf shape and number of leaflets are the best means for differentiating these vines in summer. Moonseed has an undivided but three-lobed leaf, whereas poison ivy has three separate leaflets on each leaf. *Ampelopsis*,

Parthenocissus, and Englemann ivy have five leaflets, and trumpet creeper has seven or more leaflets borne on a common leafstalk.

Poison ivy is a woody plant about 1 to 2 feet in height. It grows mostly in patches from a few square feet to several rods in extent depending on the age of the patch. The upright stems are from a few inches to about 1½ feet tall. There may be a few short upright branches. The bark is greyish and dull. The plant spreads underground by shallow, somewhat thickened horizontal rootstocks. The leaves are compound and always have three leaflets. The leaflets vary in size from about 1¼ inches wide by 2½ inches long to 2½ inches wide by 3½ inches long. The stalk of the middle leaflet is longer than those of the two lateral leaflets.

The leaf outline is oval, somewhat rounded at the base, and tapering to a sharp point at the tip. Leaf edges are usually smooth but may have a few rather shallow coarse teeth. The veins consist of a main vein extending from the base to the tip of the leaflet with several parallel lateral secondary veins branching out at very blunt angles to the midvein. The upper surfaces of new leaves usually glisten, but become a dull green later. The under side is a lighter green and when young may be quite hairy. In deep shade and during

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dry weather the leaves may become lighter green, yellowish green, or red. In the fall the leaves turn yellow and bright red before falling.

The flowers are inconspicuous and greenish yellow. They are borne in compact clusters. The fruits are about $\frac{3}{16}$ to $\frac{1}{4}$ of an inch in diameter, greenish yellow, and are slightly flattened at the ends with many creases extending from stem to blossom end. The fruits persist on the stems over winter. Poison ivy is found throughout Minnesota on dry banks, borders of woodlands, along roadsides, fence rows, etc. It blooms in May and June and has ripe fruit in August.

The climbing form, which grows as a vine, may trail along the ground and climb over fences and up tree trunks, attaching itself by numerous small aerial roots. Its leaves, flowers, and fruits are similar to those of the common poison ivy.

If a person who is known to be immune to ivy poisoning can be found to do the work, the plants can be eradicated by digging the underground rootstocks, or by pulling them out if the soil is loose. Be sure to get all parts of the root system that might grow again. This is the easiest method of eradication; unfortunately, few persons are absolutely immune to ivy poisoning. When leaves are absent in fall or spring, the roots can be dug with comparative safety if the worker is thoroughly protected by gauntlet gloves, long sleeves, and a complete covering of all parts of the body by old clothing that can be discarded when the job is finished.

Since all parts of the plant are poisonous, care must be taken not to let the leaves, stems, roots, or berries touch the skin. Do not get in the smoke of a brush pile on which they are burning. Contact with clothing, tools, or any object that may have touched poison ivy should be avoided as poisoning often occurs in this manner.

It is best to cover hands, arms, legs, neck, and face with a 4 per cent solution of ferric chloride. This can be made by diluting the tincture of ferric chloride which can be bought at any drugstore. Better still is a mixture of 5 parts ferrous sulfate, 5 parts glycerine, 45 parts alcohol, and 45 parts water. Rub this solution over all exposed parts, being careful not to get it in the eyes, ears, or nostrils. No considerable injury can come from this dilute solution even if it should get into the eyes. Allow the solution to dry on the skin and do not remove it by wiping off sweat or dirt, but keep the skin covered until there is no longer danger of poisoning.

After being exposed to poisoning, wash the exposed skin at least twice with naphtha soap or common laundry soap, rinsing thoroughly after each washing. Toilet soaps should not be used as they may not dissolve the poisonous substance, but merely spread it around and carry it into the skin.

It is best to wash the hands thoroughly and clean the fingernails. Do not use a brush. Then with clean hands wash the face and other parts of the body that may have been exposed. This avoids possible spread of poison from the hands to the eyes or other delicate surfaces where severe injury might result. If gloves or clothing have become torn and the skin scratched, it is best to wash thoroughly as above directed and apply at once more ferric chloride solution to the scratches, or better yet, to apply a 5 per cent solution of potassium permanganate. Apply this solution with a cotton swab to scratched or itching spots so as to limit the brown discoloration, which disappears after a few days. Do not use this solution near the eyes or in the ears or nostrils. Consult a physician if it is evident that these surfaces must be treated or if poisoning is extensive. Sodium perborate, 2 per cent in a vanishing cream base, can be prepared by any druggist.

POISON IVY
RHUS TOXICODENDRON



This is recommended by the United States Public Health Service for use as an ointment in treating poison ivy blisters.

On account of the possibility of injury, the best practice for eradicating poison ivy is to spray or sprinkle the plants with a solution of sodium chlorate. Treat an area extending a few feet beyond the patch to kill the root completely. A solution of 1 pound of sodium chlorate in 1 gallon of water should be applied with a power sprayer for best economy, but can be applied successfully with a knapsack sprayer or sprinkling can. Spray across thick stands in one direction with half of the solution to be applied, then cross it in the opposite direction with the remainder to get the best coverage. About 4 gallons per square rod are required as this is the least amount that can be uniformly distributed over a square rod with a sprinkling can when walking rapidly.

The leaves will be killed as soon as the salt penetrates them. The solution applied to the soil will soak in and kill the underground parts. The leaves usually die in a few hours and dry up. Rains following the killing of the plants wash the salt from the dead leaves, but a heavy rain immediately following treatment may wash off the salt before it can kill the leaves. Leaching into the soil and runoff after heavy rains may prevent the chemical from acting. Any of the salt held in the surface layer of the soil will prevent new growth. There is little lasting effect of the chlorate in sandy soil, while in clayey soil the sterilizing effect may remain one year. It is best to treat the plants in dry weather when the salt is most effective and will not be washed away.

There is a fire hazard when the leaves dry with chlorate on them. Such leaves may be set afire by persons or animals walking through the patch when dry, or spontaneously when there is bright sun. The fires may be danger-

ous as they often burn with such rapidity that it may be impossible to run out of the patch quickly enough to avoid being burned. Children should never be allowed to walk through treated areas until several rains have washed the salt into the soil. When there are valuable trees or shrubs in the area to be treated, the solution should not be applied closer than 1½ times the spread of the crown of leaves to avoid the chemical entering the root zone and causing injury.

When treating poison ivy, wear clothing that can be washed or discarded, and do not allow the salt solution to dry on it. Take off clothing and wash at once to remove the chlorate, because when dry a fire may be started by friction. A number of people have been severely burned by explosive fires starting in dry clothing that had been wetted with chlorate. Do not allow chlorates to come into contact with any combustible substance, as fires may be started easily.

The treated areas should be free from growth for one or two seasons. It is desirable to go over the patches several times to see that no rootstocks were missed and to kill small plants that may have grown from seeds. Seed may lie in the soil for several years before sprouting. It is useless to try to grow grass in treated areas until the second or third season after treating.

When working around valuable trees, if the roots of poison ivy plants cannot be dug, spray lightly so as to apply not over 1 pound of chlorate per square rod in the root zone. Sprinkle only the leaves of the poison ivy plants. This will kill leaves only. When leaves appear again, repeat the application. If the leaves of the trees turn yellowish in color, the application of chlorate must be stopped or the trees will be killed.

Sodium chlorate costs about 9 cents per pound in 50-pound drums in normal times. At the rate of 4 pounds per

square rod the expense for material is 36 cents to which the cost of labor must be added. County agricultural agents know the places in their locality where crude grades of chlorate can be purchased. If water is not convenient to the plots, dry chlorate can be scattered over the area, but it is difficult to apply as little as 4 pounds of dry salt uniformly over a square rod. It may be diluted with powdered limestone, air slaked lime, or sand.

On beaches where all vegetation can be killed, crude borax can be applied at the rate of 15 pounds per square rod. This will kill the roots and clear the area of vegetation for a year or more until it is leached out of the soil. Borax should be applied dry. It costs about 3 cents per pound.

If it is desirable to remove poison ivy and then replant grass, sodium sulfamate, a dry crystalline salt, can be scattered around the plants at the rate of 6 pounds per square rod. If the area contains the roots of valuable trees, it is best to dissolve the sodium sulfamate in water and spray at the rate of 2 pounds per square rod onto the ivy leaves.

If an infested area can be plowed and put into black fallow, thus killing all new shoots as soon as they appear, the plants are easily killed. This is especially true if the roots are dragged out with a spring-tooth harrow or duckfoot cultivator.

Some special precautions should be taken when eradicating the climbing form, which, although it does not occur extensively, may be a nuisance when clearing land. If it is known some time in advance of clearing the land that this climbing form grows on the trees that are to be cut, it is advisable to go through the stand with a hand ax and cut off the vines at their bases. This will kill the tops, and if the vines are allowed to dry through the summer, there is little danger of poisoning when cutting, trimming, or sawing the

trees, except from new leaves that may have formed at the bases of the plants. Since such work usually is done in winter, when the leaves are off, there is much less danger of getting poisoned if this simple procedure is followed. The principal danger in winter comes from getting the ivy juice on the hands. The cutting of the vines from trees, stumps, fences, etc., is a desirable preliminary step to any method of eradication, for it lessens the sprouting ability of the roots and decreases their resistance to chemical agents. If the trees are not to be removed, cutting off the new shoots with a brush scythe or weed hook will check vigorous growth and make eradication easier.

Poison Sumac

Rhus vernix

This plant, also known as swamp sumac, poison dogweed, poison elder, poison ash, or thunderwood, is capable of causing poisoning more severe than that of its near relative, poison ivy. Like poison ivy, all parts of the plant are poisonous. Fortunately poison sumac generally grows in places not frequented by many persons unacquainted with its properties. It is usually confined to soil with a high water content such as in bogs and swamps, where tamaracks grow, or along streams and ditches. The harmless sumacs, sometimes mistaken for the poisonous variety owing to a resemblance between the leaves, are not often found in such places but prefer well-drained soil which may even be too dry for many other plants.

Poison sumac grows as a shrub in Minnesota, though in other parts of the United States it may attain the size of a small tree. It may reach a height of 10 to 12 feet with several stems usually growing from the same root system to form a clump. The bark is greyish and the ends of the branches are rather blunt. The leaves are com-

POISON SUMAC

RHUS VERNIX



pound and consist of 7 to 13 leaflets arranged on opposite sides of a main stalk. The leaflets are elliptical in shape with a broadly wedge-shaped base and a sharply tapering tip. Their edges are without any notches or teeth. The surfaces are smooth with the lower a slightly lighter green. In fall the leaves show bright yellow or scarlet autumn colors and are occasionally picked for decorative purposes with unpleasant results. The leafstalks show some red color even in summer.

The green ash, especially when small, may be confused with poison sumac owing to similarities in leaves and color of bark. Green ash, however, has finely toothed leaflets while those of poison sumac have unbroken edges. Furthermore, green ash has only one stem and grows into a tree.

The flowers of poison sumac are borne in loose clusters which originate where the leaves are attached to the branches (leaf axils). They are small and greenish white in color and appear in May and June. The fruits are somewhat like those of poison ivy though smaller and not as regular in shape. Their surfaces are usually smooth and shiny. Unlike the leaves they remain on the parent plants during the winter. The fruits, which are occasionally picked, can cause serious poisoning. The fruits of the harmless sumacs are red in color and are borne in dense clusters at the ends of branches.

On account of its extremely poisonous character poison sumac should be eradicated by chemical means. It is so poisonous that grubbing, even when there are no leaves present, is not advisable. Since the soil in which poison sumac grows is generally quite moist, or wet, the most practical means of killing is to use dry sodium chlorate, or rock salt. Rock salt is cheap, and despite the fact that for equal amounts sodium chlorate has 10 times greater killing power, it can often be used to good advantage. The amount of either

rock salt or chlorate used depends on the size of the plants, the wetness of the soil, and the type of soil. Wet soils require heavier treatment. A safe rule is to apply 8 pounds of sodium chlorate or borax, or 80 pounds of salt, per square rod. If water stands in the area to be treated it is advisable to drain it away if possible before treatment. Keep cattle out of all areas that have been treated with either chlorate or salt until all traces of the salts have disappeared.

When working around poison sumac the same precautions against poisoning as given for poison ivy should be observed. A solution of 5 per cent potassium permanganate is quite effective in neutralizing the poison.

Poisonous Spurges

Snow-on-the-mountain, *Euphorbia marginata*

Coral spurge, *Euphorbia corollata*

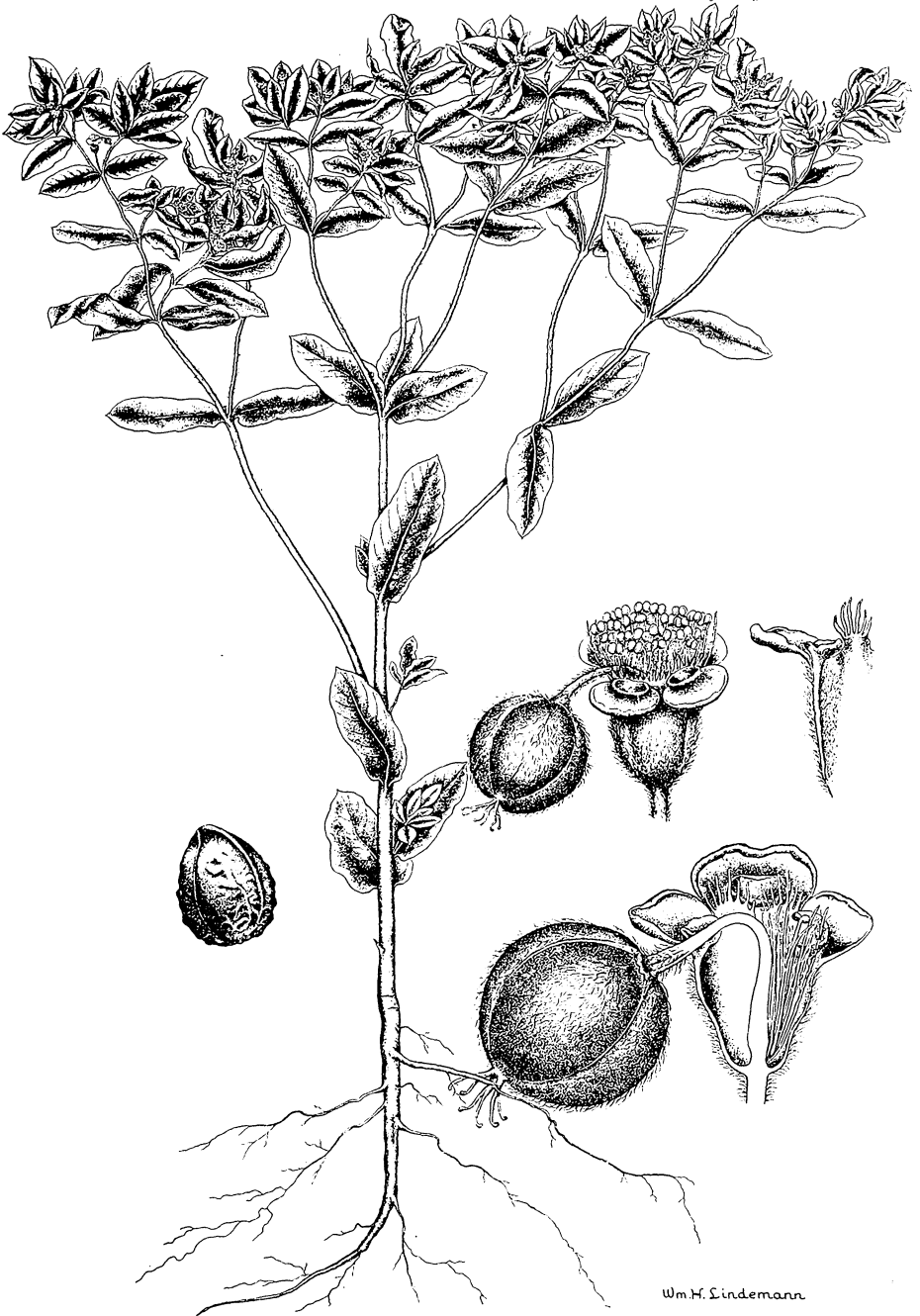
Leafy spurge, *Euphorbia esula*

Graveyard spurge (or Cypress spurge), *Euphorbia cyparissias*

All of the spurge species mentioned above contain a milky juice that is poisonous to many people in that it may cause skin irritation and blistering. The udders of cows may also be affected by it. Since the foliage of certain spurges containing this poisonous juice have attractive leaves they are not infrequently planted around homes and elsewhere. Birds may spread the plants by eating their seeds. It is reported that sheep eat the plants though other livestock generally avoid them.

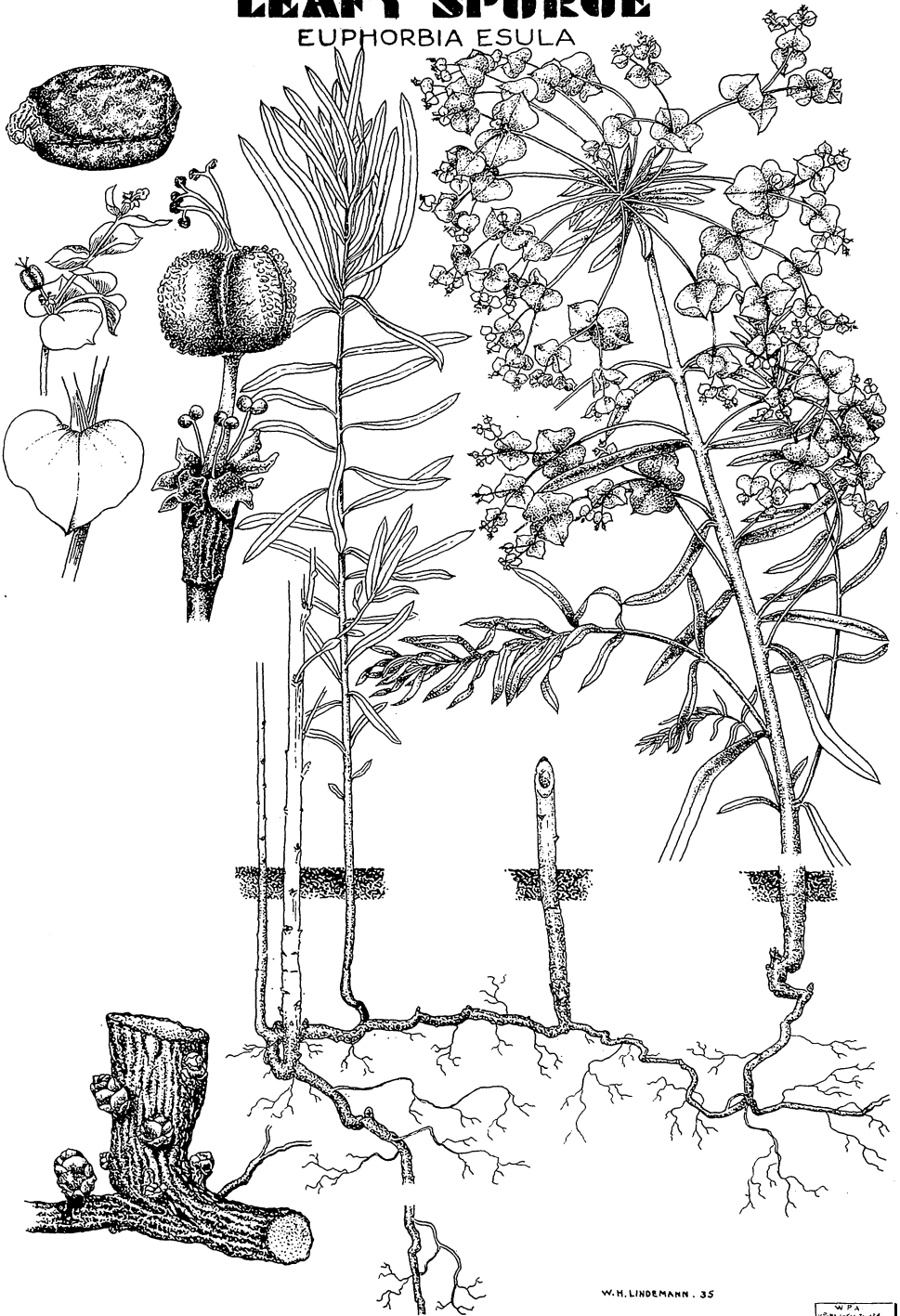
Snow-on-the-mountain is an attractive annual plant. The white margins of the upper leaves give it a pleasing appearance. The plants grow to a height of 2 to 4 feet with erect stems which are usually smooth and may be covered with a waxy bloom. This bloom may be present on the leaves in such quantity that it gives them a

SNOW ON THE MOUNTAIN
EUPHORBIA MARGINATA

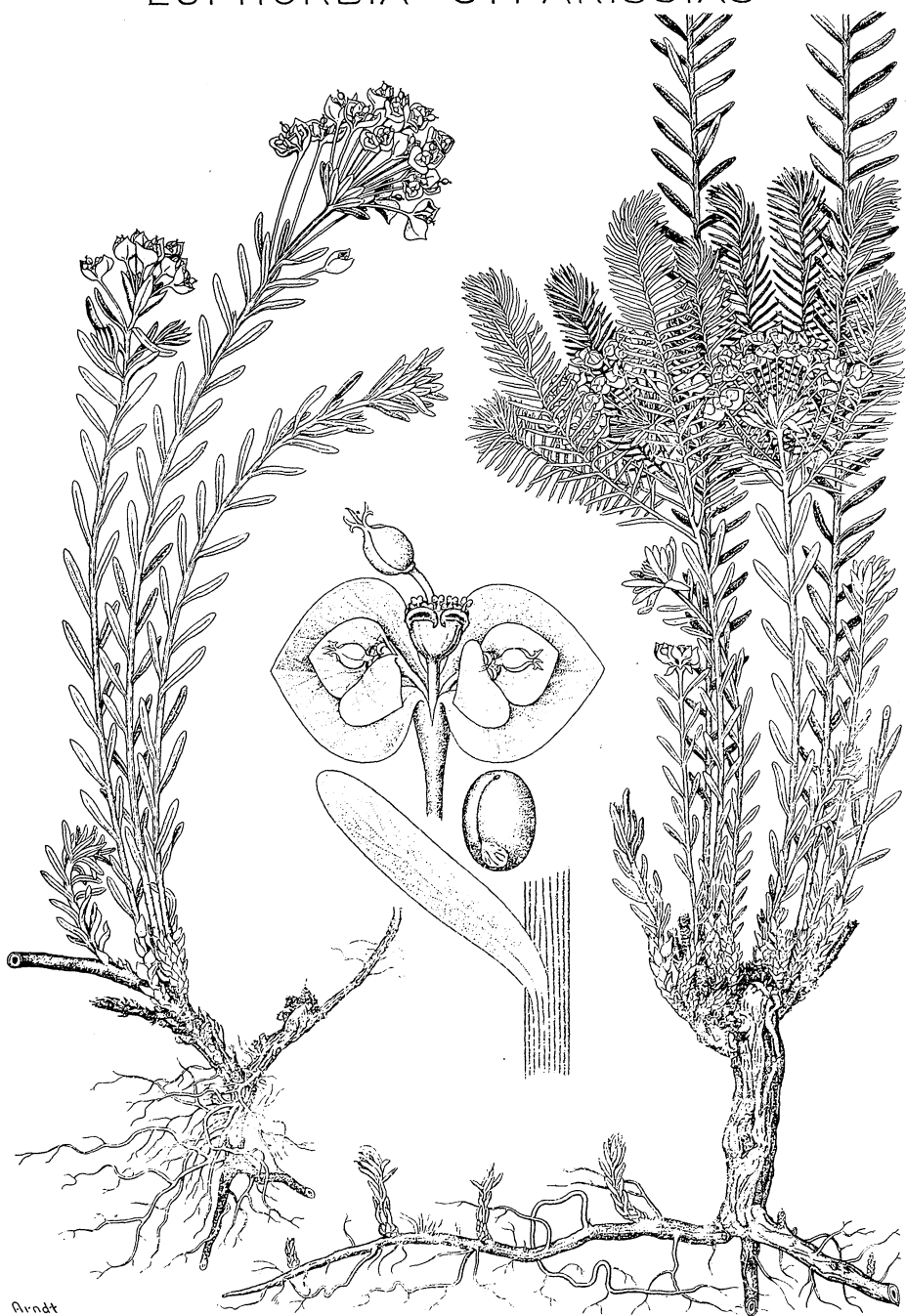


LEAFY SPURGE

EUPHORBIA ESULA



CYPRESS SPURGE
EUPHORBIA CYPARISSIAS



bluish cast. The leaves are oblong with smooth edges, and are about $1\frac{1}{2}$ inches wide by 3 inches long. The flowers are inconspicuous and are borne in small cuplike structures at the ends of branches. The edges of the cups secrete nectar which may be gathered by bees and other insects. The fruit is a three-lobed pod about $\frac{1}{4}$ inch in diameter which shatters when dry to scatter the seeds. The plant has a large tap root. Persons may be poisoned by weeding flower beds containing this plant without suspecting the cause. Honey made from its nectar is said to have a purgative effect or to induce vomiting.

Coral spurge, sometimes called flowering spurge, grows to a height of about $1\frac{1}{2}$ to 3 feet. The lower half of the stem is usually unbranched. The leaves vary from ovate to linear in shape with blunt ends. The flowers are typical of the spurge family, but in this species there are showy white leaflike structures beneath them that look like petals.

Leafy spurge averages about 3 feet in height and is a perennial with a deep root system which grows horizontally and gives rise to new plants. It is frequently found growing in solid stands. The stems are smooth above, scaly below, and may be covered with a waxy bloom. The stems usually branch near the top. The leaves are linear, about $\frac{1}{4}$ inch wide by 2 to $2\frac{1}{2}$ inches long, smooth edged, and have one conspicuous vein. The flowers are borne in clusters at the ends of branches in cuplike structures. Each cluster, or group of clusters, is surrounded by two yellowish-green modified leaves. These may give patches of the weed a characteristic yellowish-green appearance. This species may become a bad weed in cultivated fields.

Graveyard, or cypress spurge, resembles leafy spurge though it seldom exceeds a foot in height. This plant receives its common name from the fact that it is frequently planted in ceme-

teries. The leaves are about $\frac{1}{16}$ to $\frac{1}{18}$ of an inch wide by 1 to $1\frac{1}{2}$ inches long. It frequently grows in solid stands. Spurges can be controlled by digging or by the use of sodium chlorate or borax as recommended for poison ivy. They should never be planted.

Stinging Nettles

Wood nettle, *Laportea canadensis*

Common nettle, *Urtica gracilis*

Stinging nettle, *Urtica dioica*

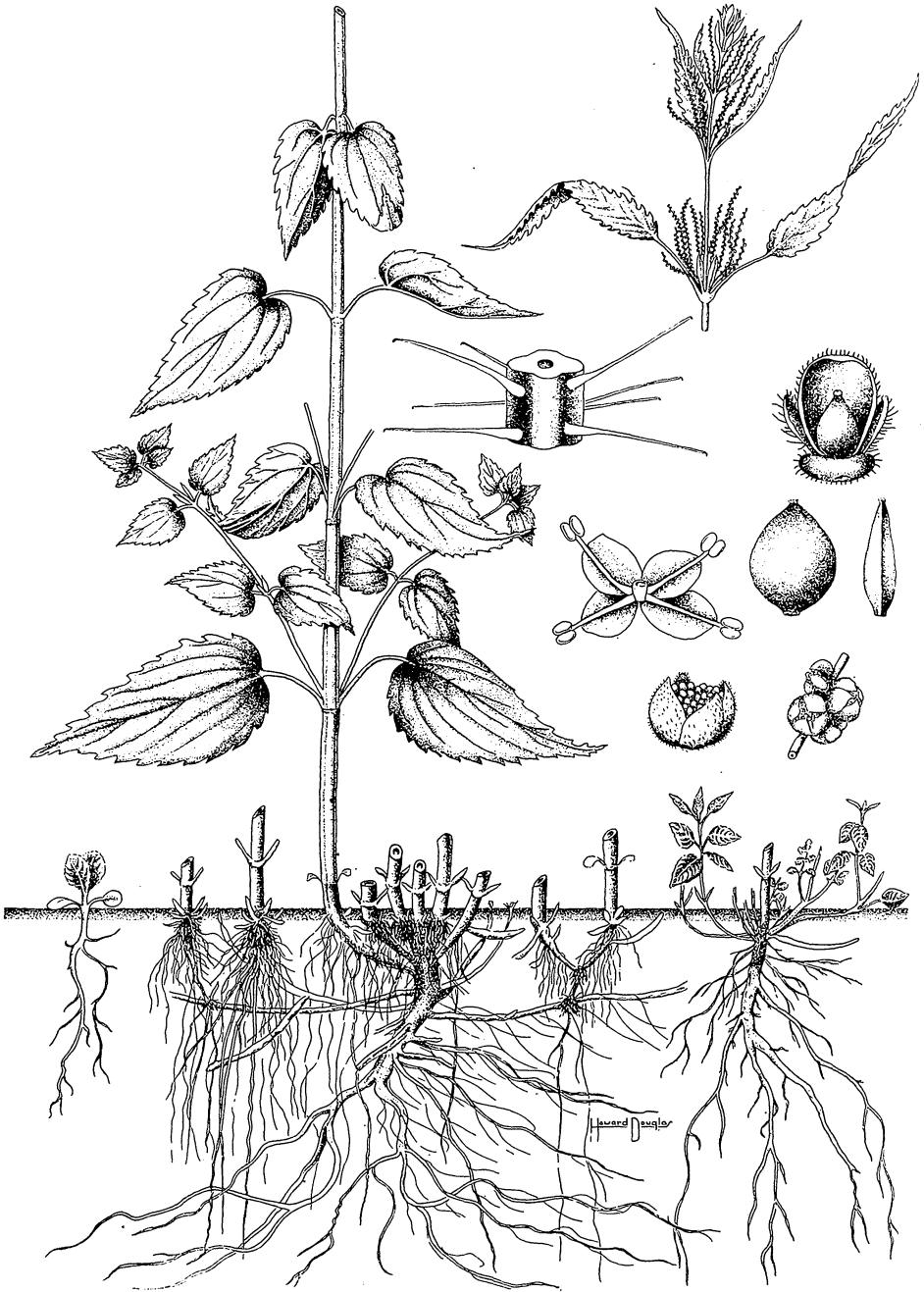
There are two principal kinds of stinging nettles. One grows mostly in deep shade and along streams, lakes, and moist places; the other grows on higher dry ground in full sunlight. The shade plants are generally wood nettles while the nettles of open places are usually the common and stinging species. The common and stinging nettles bear small greenish flowers in the axils of the upper leaves while the floral clusters of the wood nettle are terminal, standing above the leaves. The leaves and stems of these plants are covered with fine stinging hairs. If the plants are brushed against, the sharp hairs penetrate the skin and inject their liquid contents into the puncture. The liquid injected is very irritant and may cause a rash. The stinging hairs are long enough to penetrate silk stockings and other thin clothing.

Nettles have a perennial rootstock and the clumps once established tend to spread into dense patches through which small children cannot walk without danger to face and hands even if the rest of the body is protected. The plants grow to a height of 3 to 4 feet or more in rich, moist soil.

The common nettle grows to a height of 2 to 8 feet. The stems are slender, somewhat four-sided with distinct grooves on each side. The leaves somewhat resemble elm leaves, are borne

STINGING NETTLE

URTICA DIOICA



opposite on the stem, and are about 1½ inches broad by 3 inches long. They are dark green, the veins depressed on the upper side and the edge of the leaf sharply toothed like a hand rip-saw. The leaf is rounded at the base and long tapered at the tip with the leaf stem over half as long as the leaf width. The flowers, appearing in June, are small, inconspicuous, and are borne in hanging clusters from near the bases of the upper leaves. The root system is made up of extensive, rather shallow, fibrous roots. Horizontal underground stems, or rootstocks, give rise to new stems from whose joints the small fibrous roots grow. This species is found throughout Minnesota growing in damp soil. In some peatlands it becomes a very persistent weed.

The stinging nettle grows from 2 to 4 feet tall. It prefers damp shady places and has an extensive creeping underground root system from which new aerial stems arise. The stem is round and the leaves are densely covered with stinging hairs. The leaves are opposite and oval heart shaped, rather thin, deeply toothed along the edge, sharp pointed, and downy on the lower surface.

The wood nettle closely resembles the stinging nettle except that its leaves are alternate, not opposite, on the stem. The individual flowers differ only in small details that are not apt to be seen by the untrained observer. The root system is similar to that of the stinging nettle. It grows in rich, damp, deeply shaded, hardwood forests, especially in nonpastured ravines.

The irritation caused by nettles seldom lasts longer than a few hours. Washing the affected parts with weak alcohol or ammonia water is said to give relief.

Cutting with a scythe clears a path or area temporarily but side branches may later shoot up or growth may start from the perennial rootstocks. Plowing

and cultivating the soil easily kills patches, as the roots are quickly killed by drying when pulled to the surface. Small pieces of underground rootstock will grow, so all fragments should be worked out of the soil and dried. If the area cannot be plowed and cultivated, apply a solution of sodium chlorate in water at the rate of about 2 pounds per square rod. This kills both the tops and rootstocks. Dormant seeds may sprout and reinfest the soil if cultivation is not carried on for more than one year. When sodium chlorate or borax is applied at the rate of 2 to 6 pounds per square rod, seeds and seedlings generally are killed completely.

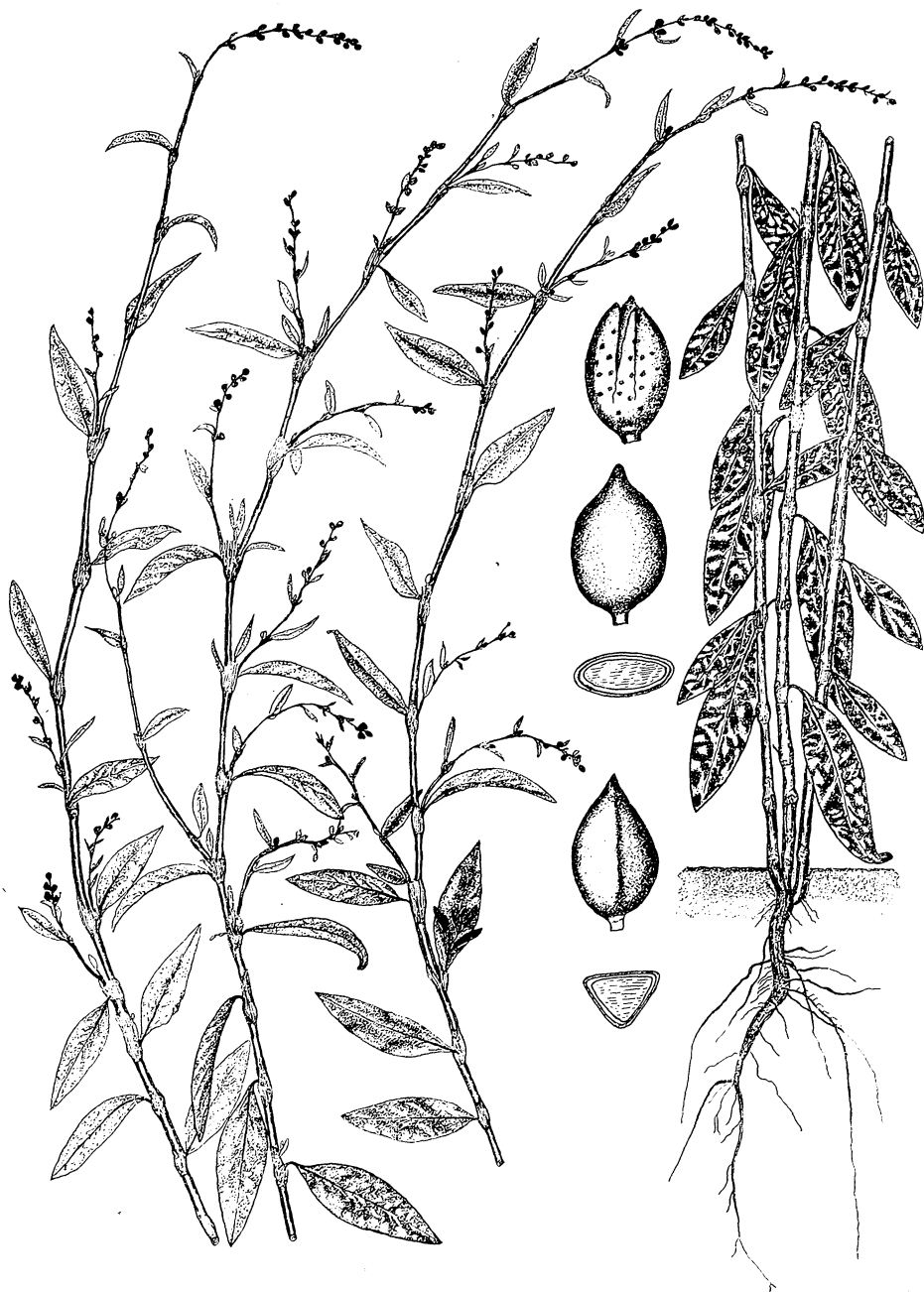
Smartweeds

Polygonum hydropiper

There are several smartweeds that have a more or less irritant juice, but the species that is most irritant is the common smartweed. The juice of leaves and stems of this species contains an irritant substance that produces burning and itching of the skin. The juice, which may get onto the hands when pulling or cutting the plants, may not be very irritating except to the skin between the fingers or on the back of the hand. If hands smeared with juice are rubbed on the face or neck, or if the juice gets onto the handkerchief and this comes in contact with the face, a pronounced smarting and redness of the skin will be produced. Care should be taken not to get any of the juice into the eyes, or on any tender surface. It is difficult to determine if actual contact with juice is required, or whether one may not get enough of the irritant to make the eyes smart from walking through patches of this weed.

Smartweeds grow in moist or wet rich soil as a rule. Some species are rank-growing to a height of 2 to 4 feet. Others are rather weak stemmed and tend to lean against other plants, or

COMMON SMARTWEED
POLYGONUM HYDROPIPER



to lie on the ground. Their stems are usually reddish brown and the joints or nodes are more or less swollen. The leaves are shaped somewhat like those of a willow. The lower part of the leaf-stalk spreads out like a tube around the stem, and the leaf proper grows out from the side of this tubelike sheath. Common smartweed usually grows in mud holes where the water often remains until June or later. It

has a weak stem so its base usually settles back onto the ground. The leaves are about $\frac{3}{4}$ inch wide and $2\frac{1}{2}$ to 4 inches long. When chewed they taste fully as hot as any red pepper. The flowers are usually greenish white. The fruits are somewhat three sided and light brown. It is one of the first plants to be killed by frost in the fall. It is common throughout the state especially in pastures.

Poisonous Plants

Jimson Weed

Datura stramonium

Jimson weed is a poisonous, herbaceous annual plant that in rich soil may grow 6 feet tall and spread out for several feet. Livestock generally will not eat it and hogs do not root it out as it has an obnoxious odor and contains poisonous substances in all parts. Hay containing it may be poisonous. The action of the poison is to produce dryness of the throat, paralysis of the tongue, and dilation of the pupils of the eyes. Children may be poisoned by chewing seeds or flowers. Livestock frequently are poisoned from eating the leaves. The roots do not overwinter, but the many seeds produced may quickly spread the plant around barns and hog lots.

The stem and leaves are smooth and green to purple when full grown. The leaves are thin and oval in outline with irregular coarse teeth or sharp lobes along their margin, 3 to 8 inches long with stems 1 to 4 inches long.

The flowers are white to violet colored, about 4 inches long and trumpet shaped with 5 sharp segments or lobes. The fruit is a capsule about $1\frac{1}{2}$ to 2 inches long and oval in outline, covered with numerous stout spines about $\frac{1}{4}$ to $\frac{1}{2}$ inch long. When ripe it

splits lengthwise into two parts, exposing the flat black seeds that then scatter. In Minnesota it is found mostly in the southeastern part.

Cutting with a scythe before blooming will generally kill the plants. A related species, *Datura metel*, angel's-trumpet, is frequently planted in gardens. It has large, white, trumpet-shaped flowers, and the plants are quite decorative. However, there is such danger from poisoning that it should never be planted. If children may play near it, it should be pulled out of the flower garden.

Water Hemlock

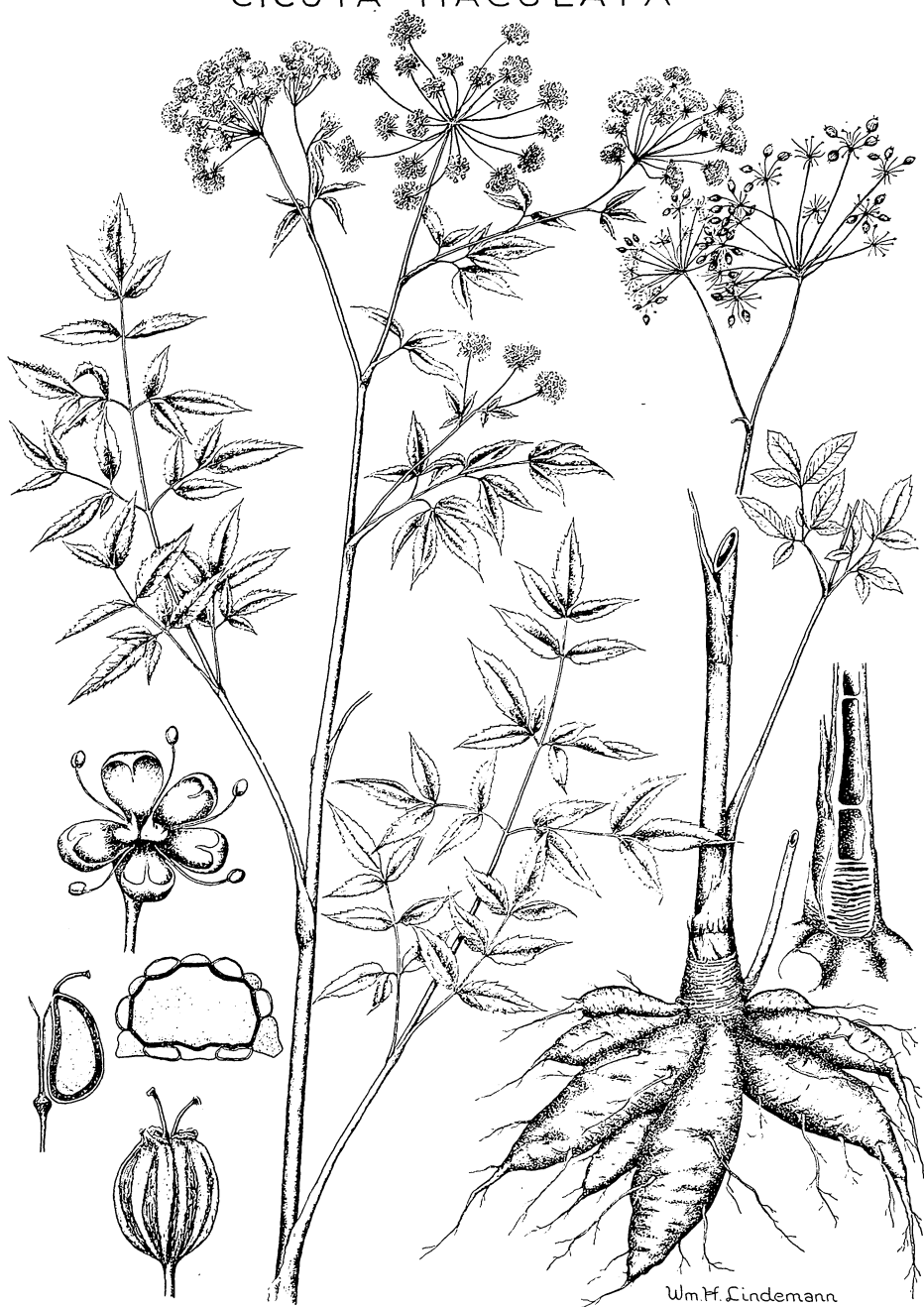
Cicuta maculata

This is the most poisonous plant found in Minnesota. All parts of the plant are very poisonous. Children may come in contact with the poisonous juice by making whistles from the hollow stems, or sucking water through them. The plants prefer a very wet, marshy soil such as is found around springs, rivers, or in bogs. Very small amounts of the juice from stems may be poisonous. The effects are sudden in appearance and death may ensue within a few hours. There is no real antidote for the poison. Vomiting should be induced to remove the stomach con-

JASON WEED
DATURA STRAMONIUM



WATER HEMLOCK
CICUTA MACULATA



tents and a physician should be called at once.

Water hemlock is a perennial growing 2 to 5 feet tall and branching to a width of 2 feet or more. The seed-stalks and flower heads somewhat resemble those of dill, bearing a characteristic flat umbrella-shaped flowering head of small white flowers in which are formed small brown seeds. The flower heads may be 2 to 3 inches across, being composed of several individual clusters that arise from the top of the flower stalk.

The leaves are compound, the leaflets small, mostly 1 inch long by $\frac{3}{8}$ inch wide, pointed, and having definitely toothed edges. The hollow, long, jointed stem arises from a rootstalk to which is attached a group of tuberous roots 1 to 4 inches long and $\frac{1}{2}$ to $1\frac{1}{2}$ inches thick. Cutting the rootstock lengthwise shows many pithy, walled cavities that serve for identification, as other members of this family do not have such a structure.

Water hemlock is easily destroyed by digging out the perennial roots. Camp sites and resort grounds should be gone over carefully and all of the plants destroyed.

Water Parsnip

Sium cicutaefolium

This poisonous plant grows along muddy banks of streams, in shallow water, or in wet bogs. The perennial root sends up a few parsniplike leaves, and in midsummer a branching leafy flower stalk 3 to 6 feet high bearing a flat umbrella-shaped head of small white flowers. The seeds have about the size and appearance of celery seed. Plants growing in shallow water have thin, long, narrow lower leaves. The upper leaves have 3 to 8 pairs of opposite leaflets, narrow lance shaped, 1 to 2 inches long.

The poisonous properties of water

parsnip are much the same as those of water hemlock.

The plants are easily killed by pulling or digging out the roots as soon as the plants can be distinguished in early summer.

Wild Hemp

Cannabis sativa

This poisonous weed is grown sometimes as a smother crop to eradicate persistent weeds such as the deep-rooted leafy spurge and field bindweed. In recent years it has been grown as a crop for seed or fiber. It has escaped along railway tracks and roadsides and thickly covers some abandoned city lots. There are two sexes of the hemp plant. The male plant grows rapidly and produces long feathery spreading flower clusters that produce only pollen. The female plants have more compact flower clusters with the flowers surrounded by small leaves. These female plants persist through the summer, while the male plants die after shedding their pollen. The male plants are generally light green, changing to yellow as they mature and die. The female plants remain dark green, with sometimes a trace of bronzing in the leaves and flower heads. The leaves are hand shaped with seven or more parts radiating like fingers from the end of a common leafstalk.

The female flower clusters and leaves are covered with hairs containing a poisonous substance with an unpleasant odor. This plant should be completely eradicated, especially from city lots. As it is an annual a clean cultivated crop such as corn will generally eradicate it in one or two years if the hemp is pulled out from the corn hills. There may be some dormant seed in the soil so it is desirable to plant a cultivated crop for two successive years to kill seedlings.

In waste land and around buildings,

WATER PARSNIP
SIUM CICUTAEFOLIUM



HEMP
CANNABIS SATIVA



Wm. H. Lindemann

BLACK NIGHTSHADE
SOLANUM NIGRUM



mowing before the plants bloom will keep them in check, and generally will prevent much seed from forming. Wherever the land can be plowed this is desirable, for the rank growth creates a fire hazard after the tops are killed by frost. If the infested area can be burned safely, this will kill many seeds remaining in the flower heads. The spread of this plant pest is often prevented by birds eating most of the seed that forms.

Atropa →
belladonna
ms

Black Nightshade

Solanum nigrum

Black nightshade produces green berries in July and August that may be poisonous if eaten. The berries become purplish black when ripe. It belongs to the same family as the potato and tomato and has white flowers much resembling potato flowers, only smaller. The blooming habit is like that of tomatoes, flowers being produced in clusters hanging in the axils of leaves, not borne erect as on the potato plant. In rich soil, plants may have a spread of 2 to 3 feet. They are annual, growing each season from seed that overwinters in the soil. The seeds are shaped like pepper seeds but are much smaller and smooth. The purplish-black globular fruits are borne in clusters. They are usually about 1/4-inch diameter.

Children may mistake the berries for edible fruits and be poisoned. As

the taste is not repellent a number of fruits may be eaten at one time. The berries and leaves contain poisonous substances which may be present in sufficient quantities to make the berries distinctly poisonous. The plants should be killed wherever found, especially near children's camps. The effects of the poison are to paralyze nerve endings, such as those in the tongue, and to produce dilation of the pupil of the eye. In case of poisoning, or suspicion of it, the child should be taken to a physician as soon as possible. If this will require more than a very short time, an emetic should be given at once. Give a teaspoonful of household mustard in a cup of warm water or tickle the throat with a cotton swab to induce vomiting as quickly as possible. A physician will have much more efficient means of removing the stomach contents, and antidotes to counteract the effects of the poison, but these are not available at home or at camps. Never give the child any liquid containing alcohol as it will merely tend to bring the poison into solution more quickly.

The ripe fruits can be identified in the stomach contents by their black color, but as green berries may be indistinguishable, it is best always to call a physician at once when there is a likelihood that a child may have eaten nightshade berries.

The plants are easily eradicated by pulling out the roots.

Plants with Thorny Fruits

Sandbur

Cenchrus tribuloides

Sandburs are the fruits of a spreading low-growing grass that seldom grows higher than 1 to 2 feet. The stems are usually flattened and reddish, especially at the base. The burs contain two seeds within the spiny parts. They fall off, or are easily brushed off, and adhere to clothing or animals by their sharp recurved barbed spines. The spines are so sharp that it is difficult to remove burs from clothing without injuring the fingers. The barbed spines break off and stick in the skin. Being very small the spines cannot easily be seen by the unaided eye, and may cause infections that are hard to heal, since they tend to work down into the flesh.

To avoid injury from the burs, wet the fingers and be careful in pulling them off clothing. Use sterilized tweezers to pull out the pricklers from the skin, and cover the spot with a deep-penetrating disinfecting solution such as iodine. Mercurochrome does not penetrate deeply enough to sterilize the punctures, and they may become infected after its use.

The plants have leaves much resembling yellow foxtail grass. They are annual in habit and can be easily controlled by clean cultivation. On neglected beaches, the burs may become mixed with the sand and be a nuisance to bathers for more than a year until they finally decay. The plants prefer an acid soil and are almost exclusively confined in this state to sandy beaches and the sandy soils of fields or waste places. In fields or pastures application of lime helps to keep the sandbur in check.

On beaches and picnic sites where it is not practical to lime or cultivate the soil, the best means of control is

to go over the area with a weed burner when the plants and fruits are still green. Burning removes the sharp prickles, making the burs harmless. The flame should be directed onto the fruiting heads until bright flashes of the burning prickles show they have been burned off. Usually the temperature is high enough to kill the seeds in the burs, thus decreasing the likelihood that the area will be infested the next season. The tops usually are killed also so that no more burs are formed. It is necessary to go over the area the following year to kill seedlings. To cut with a scythe after the fruits are formed merely scatters the burs. Cutting with a lawnmower will remove the tops but the stalks grow close to the ground and may produce burs that cannot be cut off.

If beaches or paths can be cleared of all vegetation, it is desirable to apply sodium chlorate or borax at the rate of 2 to 4 pounds per square rod, using the directions given for eradicating poison ivy. Sandbur seeds may float onto beaches or remain dormant in the soil for several years. Once an area is cleared it may be reinfested by burs being carried into it by animals or on clothing. Chlorate applied at the rate of 4 pounds per square rod remains in the soil sufficiently long to kill seedlings unless it is leached out by heavy rains or flooding.

Beggar-Ticks

Bidens species

There are several species of beggar-ticks native in Minnesota. The seeds of this group have sharp barbed awns or spines that stick into clothing or to the hair of animals. The beggar-ticks grow in moist soil around lakes, or partly submerged in water. They

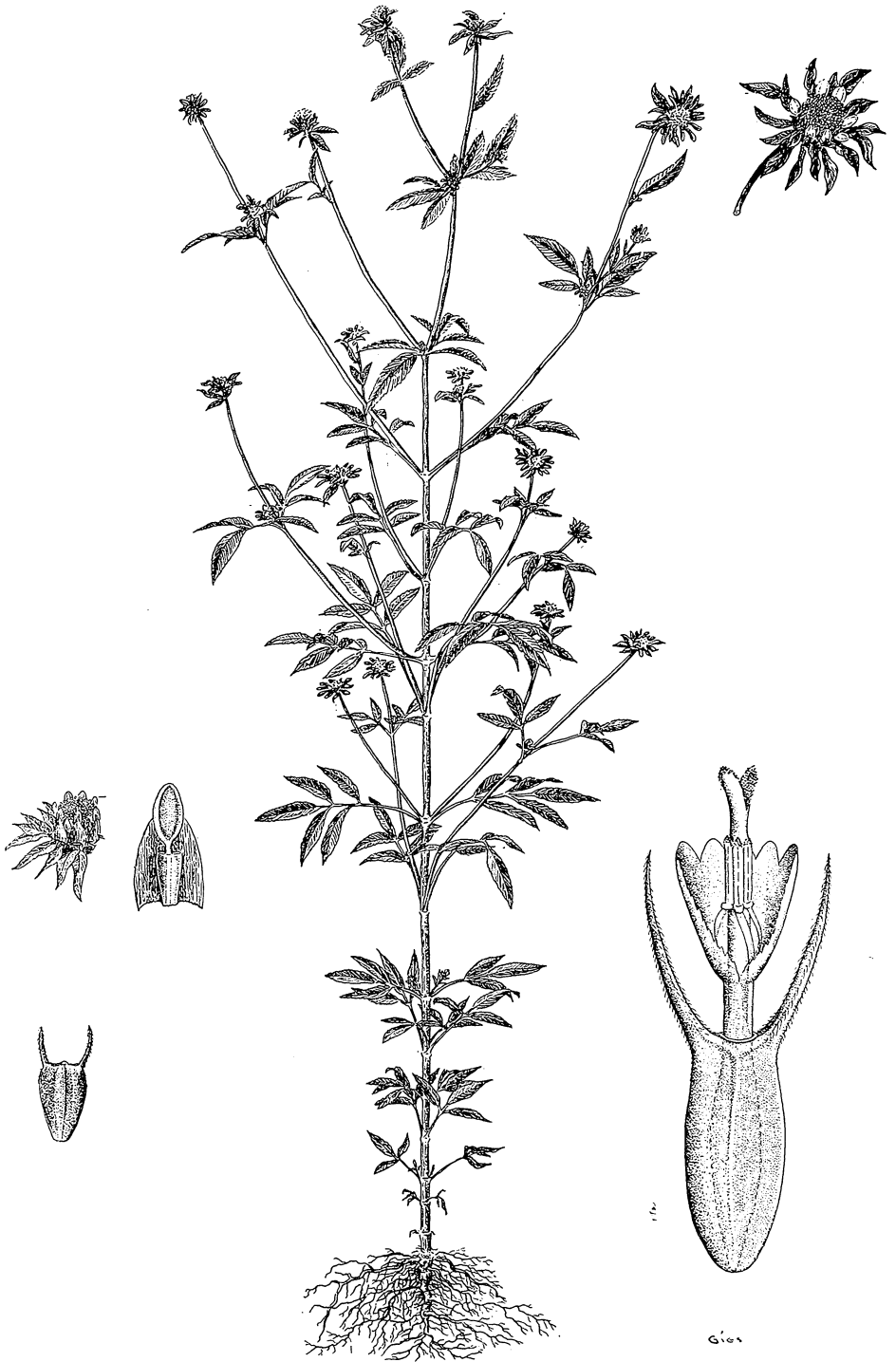
SANDBUR
CENCHRUS TRIBULOIDES



Wm. H. Lindemann

BEGGAR-TICKS

BIDENS FRONDOSA



are erect annual plants 1 to 5 feet tall with a sturdy stem and oppositely arranged leaves and branches. The yellow flower heads are quite conspicuous in some species. The most common species, *Bidens frondosa*, beggar-ticks, grows everywhere but prefers a good soil with only a moderate amount of moisture. It is the species commonly found on farms growing along fence rows and in neglected places around farm buildings. The seeds have two sharp barbed spines at the tip of the flat brown seed. *Bidens cernua*, nodding bur marigold, and *Bidens connata*, swamp beggar-tick, are the species most commonly found in swampy land around lakes and on beaches, where their bases may be slightly submerged in shallow water. The seeds of these two species have four barbed awns and are about half the size of the seeds of the upland species.

The plants are usually killed by the first heavy frost, and the seed heads become dry. The seeds on drying lie loosely in the heads and the projecting barbs stick into clothing. After walking through a patch, one's clothing is often covered with the seeds.

The species are all annuals so are easily eradicated by mowing just before blooming time. Burning dry areas will kill the seeds in the heads. The species that grow in wet places may be difficult to burn. Clean cultivation for a couple of years will clear the land.

Sticktight

Common sticktight, *Lappula echinata*
Virginia sticktight, *Lappula virginica*

The common sticktight usually grows in dry soils in full sunshine, while the Virginia sticktight is adapted to wet soils and grows best in shady places. The first-named species is a native summer annual sometimes becoming a winter annual. The latter species is rather limited in distribution in Min-

nesota and is biennial in blooming habit. The common sticktight forms a small rosette of slender tapering hairy leaves 1½ inches long.

A flower stalk covered with short hairs grows out of the rosette, reaching a height of 1 to 2 feet. Small blue flowers are borne at the bases of the leaves for several inches below the top of the slender erect stem.

The Virginia sticktight may reach a height of 2 to 4 feet. It has larger, broad smooth leaves and pale blue or white flowers. Both species bear four seeds in each compact flower head. The seeds have two smooth sides with the outer surface covered with hooked barbed spines that stick to clothing or to bare skin. Cutting the plants just before blooming prevents seed from setting and eventually kills them. Both the common and the Virginia sticktight are easily killed by cultivation.

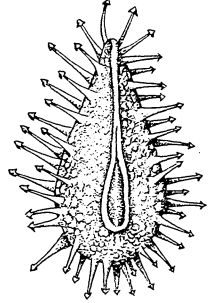
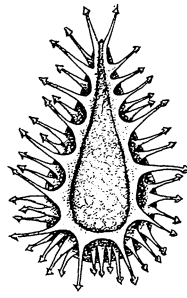
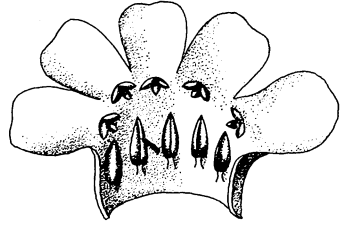
Tick Trefoil

Desmodium species

The flat pods of tick trefoil are covered with short barbed hairs and a sticky secretion that attaches them to clothing or bare skin. The pods are jointed between the seeds and easily break apart into several segments. There are several common species that grow in partial shade in open woods and along streams. The plants grow up to 4 feet tall, having erect stems that branch at the top. The leaves are compound, composed of three slender leaflets that have slender tapering points, and are about the size of bean leaves. The flowers resemble the sweet pea, but are smaller, ½ inch long, bluish purple, and showy. They are borne in clusters along the tops of the upper branches.

The trefoils have perennial roots that live after the plants have fruited. These grow more vigorous each year, and by continual seeding may form

STICKTIGHT
LAPPULA ECHINATA



Howard Douglas '36

thick patches. Plowing and clean cultivation will effect eradication. Mowing does not kill the roots but decreases the vigor of the plants and prevents seeding.

Burdock

Arctium minus

Burdocks are biennial or perennial with broad leaves resembling rhubarb. A rosette of several large leaves is produced from seed during the first year's growth. These are killed off by freezing, leaving only a fleshy root and crown at the soil level or slightly below it. Under favorable conditions in rich soil and sunny exposure these grow into a large rosette of leaves the second summer. Under unfavorable conditions, such as in poor soil or in deep shade, the rosettes may persist for two or three years until there is a sufficient food reserve in the root. The thick leafy flower stalks grow up in June and July, sometimes to a height of 4 or 5 feet, branching profusely. The globe-shaped flower heads are enclosed in a green structure that has many hooks on its surface. The flowers are usually lavender, pink, or nearly white. Numerous seeds are set in each head, which turns light brown and easily breaks off from the stalks. The hooked projections become dry, woody, and very tough and the heads catch onto clothing or hair and are spread by both man and animals.

The growth habit of burdock makes it easy to kill. During the first year seeds are not produced, yet the rosettes are easily found. Digging out the fleshy tap roots to a depth of 6 to 8 inches with a spade generally kills them. Cut-

ting with a spade just before blooming generally kills the plants, but cutting off only the tops from the rosette usually does not kill them. Numerous side shoots will come up from lateral buds and these may produce seed close to the ground level. If the soil is stony or gravelly so that the roots are hard to dig out to a sufficient depth, the rosettes can be killed by salting them with 2 or 3 ounces of common salt, or with a smaller quantity of sodium chlorate or borax. Late fall plowing or spading of patches generally kills the plants by allowing the roots to freeze, unless there is a heavy snow cover.

Hound's Tongue

Cynoglossum officinale

This plant is not a native of Minnesota and has spread only from places where it has been introduced. The seeds are burlike, covered with small hooked spines that may attach them to clothing. They become matted into the hair of dogs and other animals.

The plant is biennial in growth habit, forming during the first summer a rosette of leaves, and sending up a flower stalk the second summer. The whole plant dies after the seeds ripen. The rosette leaves are 6 inches or more long, about 2 inches wide, oblong or lance shaped. The leaves on the flower stalk are much smaller but of the same shape. The leaves, especially on the stalk, are covered with hairs. The flower stalk is 1 to 3 feet tall, branched at the tip, and bears small purple flowers each of which produces four seed burs. Mowing the plants close to the ground prevents spread by seed. The rosettes should be spaded out.

BURDOCK
ARCTIUM MINUS



HOUND'S TONGUE

CYNOGLOSSUM OFFICINALE



Plants with Thorny Stems or Leaves

Prickly Ash

Zanthoxylum americanum

Prickly ash is a shrub that grows to a height of 6 to 8 feet in almost any kind of soil except where water stands occasionally. It grows in very rocky or gravelly soil and in rich moist woods, either in deep shade or full sunlight. The stems, branches, and twigs have thorns up to $\frac{1}{2}$ inch long. The thorns occur in pairs near the bases of the leaves and do not break off easily. They may tear strong cloth and can make deep scratches on unprotected arms and legs. The shrub reproduces vigorously by horizontal roots and is spread also by seeds that are produced abundantly. The seeds may be spread by birds.

When a clump of prickly ash has started, it tends to become a thicket, both by root and seedling reproduction. The bark, twigs, and leaves have a strong burning taste and pungent odor so that animals do not eat enough of the leaves to keep the plants under control even under heavy grazing. The stems are too large to cut with a brush scythe or hay mower after the first year.

A heavy grubbing tool is most useful in clearing land of prickly ash. If the tops are cut off and removed, the crown and rootstocks generally can be cut apart and pulled out so that there is little reproduction except from seed that may have fallen onto the soil. Young seedlings and shoots are eaten by cattle before the thorns get sharp and hard. While grubbing is the most practical means of eradication, sodium chlorate or borax at the rate of 4 to 6 pounds per square rod will kill it. This can be best applied dry around the stems, extending the application a foot or so beyond the outer shoots so as to kill all roots.

Horse Nettle

Solanum carolinense

Horse nettle, already established in the southern states, has recently been introduced into a few places in this state in crop seeds and feeds. It is a low-growing plant with flowers resembling those of the potato. The leaves when crushed have an odor much like that of potato and tomato leaves. The tops grow to a height not over 2 feet in most cases, and spread out like tomato vines. The stems are tough and woody. The leaves have several sharp spines along the lower side of the veins and a few on the upper side. The stems have numerous green or bright yellow spines up to $\frac{1}{2}$ inch long. The tops are killed by the first heavy frost, and the fleshy roots are killed generally to a depth of 1 foot or more depending upon frost penetration. The roots are starchy and brittle, well supplied with stored food, so they may send sprouts to the surface after deep plowing, or from a depth of 2 feet or more. This delays the appearance of the new growth until the first part of June. The deeper roots are perennial, and if undisturbed will send up numerous shoots to reinfest the land and enlarge patches of the plants. The fruits, borne like seed balls of potatoes, are about $\frac{1}{2}$ inch in diameter and green until maturity when they turn yellow and much resemble small yellow tomatoes. Their odor is repulsive when freshly crushed. The seeds are about the shape of pepper seeds, but much smaller, yellow, and smooth. The season in this state is short enough in certain years to prevent the ripening of seeds. In frozen fruits there may be some viable seeds as hard, ripe seeds are not killed by freezing.

Late fall plowing of patches of horse nettle may kill many of the roots, es-

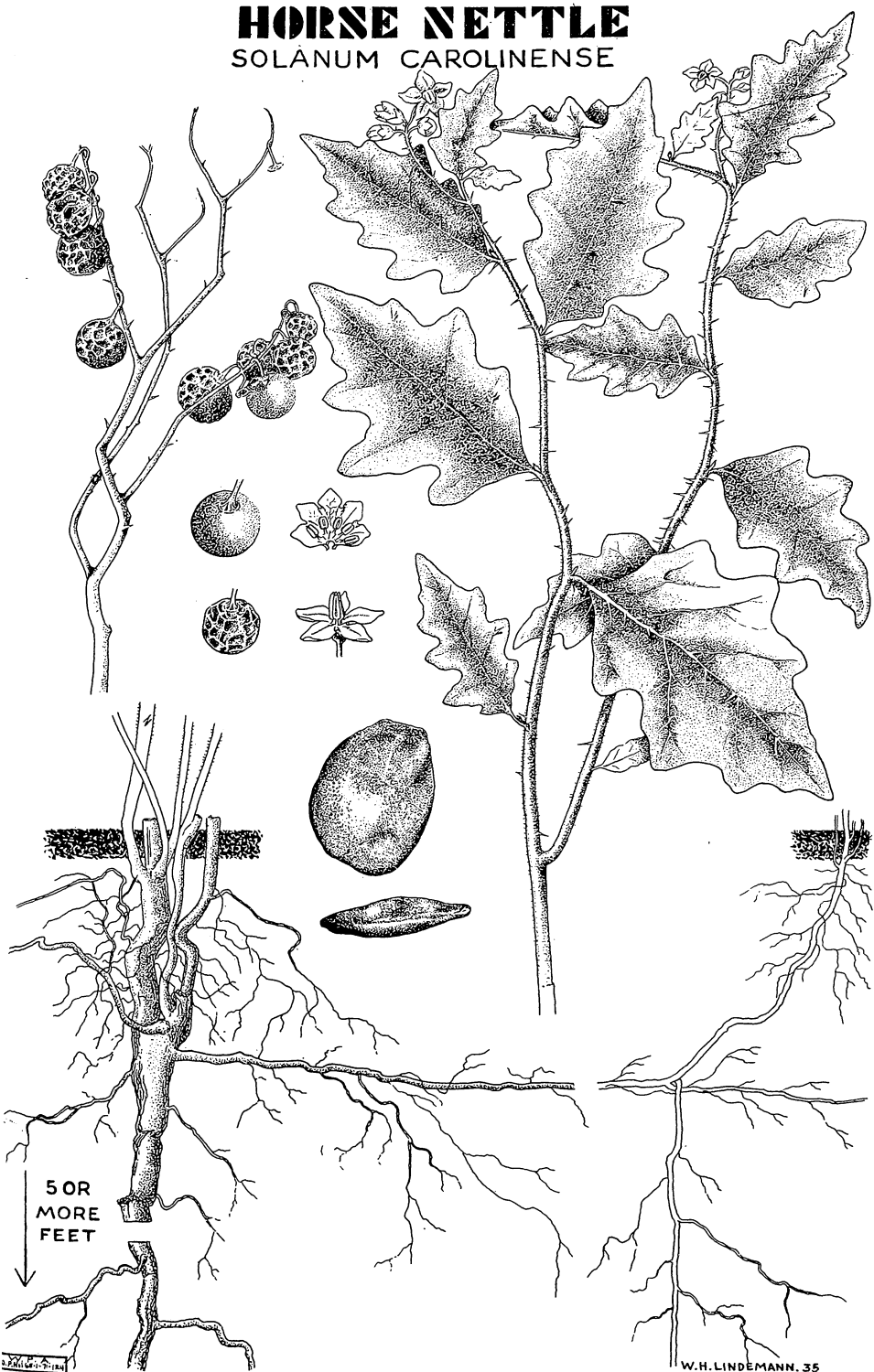
PRICKLY ASH
ZANTHOXYLUM AMERICANUM



Wm. H. Lindemann.

HORSE NETTLE

SOLANUM CAROLINENSE



pecially if the land is allowed to lie loose to promote deep freezing of the soil. Cutting off the tops by deep hoeing will exhaust the roots and make them less resistant to freezing. In thickly infested spots it may be economical to kill the roots with sodium chlorate or borax, dry or in solution, applied as for poison ivy at the rate of 4 to 6 pounds per square rod. In grain fields or alfalfa, cutting the crops will not eradicate horse nettle. In cornfields it is necessary to go over the area after cultivating and hoe off all new shoots.

Thistles

Bull Thistle

Cirsium lanceolatum

The bull thistle is a coarse, stout biennial growing to a height of 3 to 5 feet, with extensive branching, especially near the ground. The leaves are large, dark green, only slightly lighter colored beneath, with coarse lobes or divisions, each of which is armed with a stout yellow spine about $\frac{1}{2}$ inch long. The tips of the modified leaves that surround the flower heads are armed with slender spines. The numerous flowers, borne in heads, are dark purple. Each fruit when ripe has a white brushlike tuft attached to the upper end for dispersal by wind. This brush may easily be broken off, thus allowing the seed to drop to the ground. This plant is a biennial, the first year producing a flat bunch of leaves near the surface of the soil. The second year the upright stem appears. After the fruits ripen, the plant dies.

Roadside Thistle

Cirsium discolor

The roadside thistle, also a biennial, in many ways resembles the bull thistle. However, the stalk does not branch from near the base but only near the top where it forms flowers.

This makes it easily distinguished from the bull thistle. The flowers are light purple to pink. The leaves are more narrowly cut or divided, much lighter colored beneath than on top, and the spines are not so stiff or numerous. The seeds are similar to those of the bull thistle but have a yellow band around the upper end just below where the downlike brush is located. It is far more common than the bull thistle and is perhaps frequently called bull thistle.

Canada Thistle

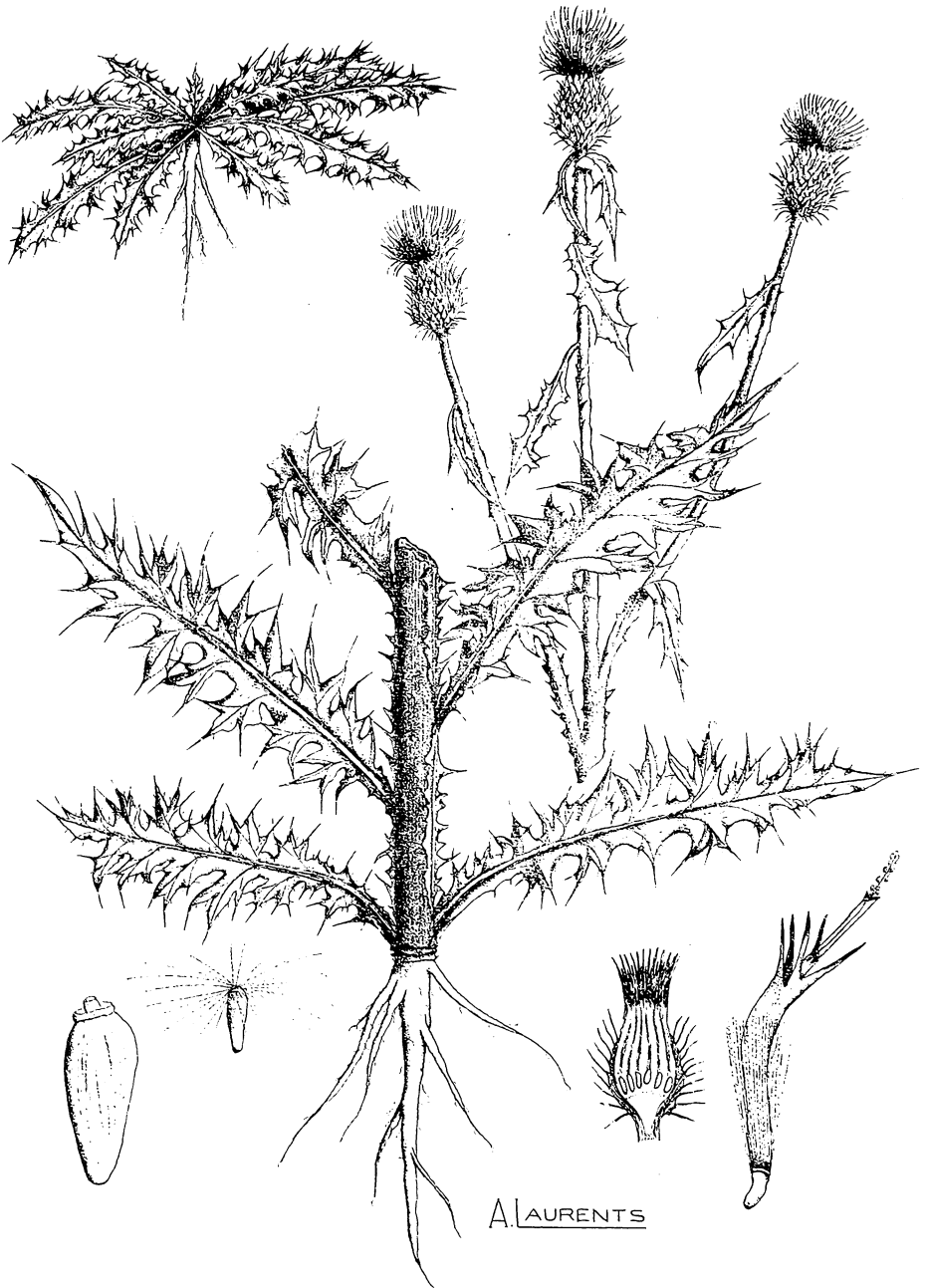
Cirsium arvense

The Canada thistle, or field thistle, differs chiefly from the bull thistle and roadside thistle in being a perennial with an extensive laterally growing root system from which new shoots arise. It is not as large or coarse as the other two thistles described but is far more troublesome because of its perennial habit.

Plants grow to a height of 2 to 4 feet. The stems are ridged and striped lengthwise and branch only at the top. They are nearly smooth. Spines appear more or less irregularly. The leaves are also smooth but are very crinkled and their edges have sharp prickles. The roots penetrate deeply into the soil and at different levels spread horizontally. From these roots new plants arise producing dense stands and making eradication difficult. The flowering heads are about $\frac{3}{4}$ of an inch in diameter and the narrow, modified leaves or bracts, which surround the head like shingles, do not end in sharp spines. The seeds are much smaller than those of either the bull thistle or roadside thistle and are about the same shape but have a seal-brown color.

The thistles are objectionable on account of the sharp prickles covering leaves and stems, although the roadside and bull thistles are rather pretty plants when seen from a distance. They are widely spread by wind-borne seeds.

IBULL THISTLE
CIRSIIUM LANCEOLATUM



A. LAURENTS

CANADA THISTLE

CIRSIUM ARVENSE



These are carried for miles by the wind and may fall in moist places and germinate. In depressions between hills they frequently reinfest the soil every year although the nearest patch in seed may be miles away. The roadside and bull thistles grow in dry places mostly in full sunshine. All of the thistles make a weak growth in deep shade. The Canada thistle prefers rather moist soil but is often found on good farm lands. The roadside and bull thistles are distinctly biennial in habit, forming a rosette of leaves close to the ground during the first year. These may be killed back during the winter to a small cluster of leaves if they have little protective snow cover. The crowns may continue through the second year of growth, if conditions are not favorable for blooming. When they have accumulated a sufficient food reserve within the roots, usually in the second season, they send up a vigorous stalk that produces many thousands of seeds. The crown that produces a seedstalk usually dies, but there may be produced side crowns that will grow up from the old root if growing conditions are favorable.

The Canada thistle has a deep-growing perennial root. In some winters the tops also may be perennial if the snow cover is deep. Shoots are sent up from the thick horizontal and vertical roots to spread the plants that were established during the first year. Blooming is profuse in late June and early July. The plants must be cut before the blooms open, to prevent seed formation. Digging out the crown of the bull and roadside thistles by deep spading generally kills them because reproduction is limited to the crown in these species, but Canada thistles cannot be so easily killed.

The most economical means of eradicating Canada thistles in fields is to plant alfalfa. The alfalfa shades the rosettes of thistles and cutting the crop twice a year so reduces the storage re-

serves of the roots that they die in the second or third season. Black fallow, using a duckfoot cultivator to cut off the shoots as soon as they appear in spring and continuing until time to plant alfalfa, helps to deplete the underground storage reserves and will eradicate most of the plants. If the land is too rough or inaccessible to cultivate, the best means of eradication is to spray the thistles with sodium chlorate solution or sprinkle the dry chlorate or borax 2 to 6 pounds per square rod over and around the patch for a distance of 3 feet. The horizontal roots of Canada thistle reach out a foot or so beyond the rosettes of leaves. In thick patches about 4 pounds of sodium chlorate or borax are required per square rod. It is desirable to go over the patch a second time two months later to see if any roots were missed at the first treatment. In peat soil the killing action of chlorate is much decreased.

If areas along lake shores and in parks have become infested with thistles, a practical method of control that has been generally disregarded is to plant popple or other quick-growing trees that will produce a deep shade. Thistles cannot grow vigorously in deep shade and seldom produce seed in such situations. This is a most desirable procedure for northern resorts where acres of uncultivated land are reinfested on the windward side of beaches every year, or on the borders of lakes where seeds drift onto the shore.

Rice Cut-Grass

Leersia oryzoides

Along many lakes, streams, and river bottoms grows *Leersia oryzoides*, a coarse, cutting grass commonly known as rice cut-grass because it resembles the wild rice. It frequently clogs ditches and small streams. The entire

RICE CUT-GRASS
LEERSIA ORYZOIDES



Wm. H. Lindemann

PRICKLY LETTUCE

LACTUCA SCARIOLA



plant is covered with sharp spines that point downward on the stem and backward on the leaf edges. This causes it to cut like a knife when drawn through the hand. Children often receive deep lacerated cuts that are very painful and hard to heal.

The plant is perennial, grows up each year 1 to 4 feet in length. It has dense, interlocking perennial rootstalks which produce an abundance of shoots that branch profusely at the base. A weakness of the nodes causes it to sprawl over the ground in dense mats with the terminal end holding an upright position. The sheaths are shorter than the internodes. The blades are 6 to 10 inches long, and $\frac{1}{4}$ to $\frac{1}{2}$ inch wide. The one-seeded spikelet is boat shaped and borne in a single row on a loose-spreading paniced head. Control this weed by plowing if this is possible, by burning in the fall if this can be done safely, or by sprinkling on a solution of 1 pound of sodium chlorate per gallon of water, using 2 to 3 gallons per square rod.

Prickly Lettuce

Lactuca scariola

Prickly lettuce is a bad weed on farms and frequently forms dense patches around camps and resorts. The plants are annual in growth habit, producing a cluster of leaves that sends up a tall leafy seedstalk in midsummer. The lower parts of the flower stalks and the leaves have sharp prickles $\frac{1}{4}$ inch long. The leaves have prickles along the midrib. These may be on the lower side. The leaves frequently turn their edges to the sunlight and bring the prickles to the side of the leaf in position to scratch persons coming in contact with them. The leaves can serve as compass guides since most of them are oriented so as to stand with their blades pointing north and south.

The plants when in bloom are 2 to 3 feet tall and bear numerous flower heads with pale yellow straplike corollas over the whole head. The seed resembles that of the black-seeded lettuce of the garden. Each seed is provided with a parachute of white hairs to keep it floating in the wind. They may be carried miles from a seeding patch. The plants will grow in dry, gravelly soil but make their best growth in rich, moist soil around barns and cattle and hog lots.

The spread of this pest can be stopped if care is taken to mow it off before the first flower heads open. Delaying cutting beyond this stage allows the formation of mature seeds from water and food substances in the stalks.

Buffalo Bur

Solanum rostratum

This noxious weed is a native of the southwestern states. It is an annual that propagates only by seeds, blooming from June to frost. The flowers are yellow and similar to those of the tomato. The spiny leaves, resembling watermelon leaves, are light green in color with a slight yellow tinge throughout. Large plants attain a height of 2 feet. Numerous stiff yellowish spines are formed on all parts of the stem, branches, leaves, and fruit. They are so sharp that cattle do not touch the plants. The fruit is about the size of a hazelnut. Plants when mature break off at the surface of the ground and are blown around by the wind. It has been brought into Minnesota in screenings from grains, in poultry feeds, and in hay shipped from the Southwest.

Since it is an annual and propagates only by seeds, prevent all plants from producing seeds. Cut close to the ground and burn all mature plants. If there is only a small patch and conditions permit, spread straw or sprinkle with kerosene, and burn.

BUFFALO BUR
SOLANUM ROSTRATUM



Greenbrier

Smilax hispida

Greenbrier is not very common in Minnesota woodlands. It grows in shaded, moist, rich soil, producing long trailing perennial vines up to 20 feet long that grow over or through other vegetation. The stems are dark green and bear numerous very sharp spines. The vines are smooth near the base where spines have fallen off, but the branches are densely covered with woody, hard black spines $\frac{1}{4}$ to $\frac{1}{2}$ inch long. These may tear clothing and make deep punctures in the skin. The stems arise from a fleshy or woody underground rootstock. This rootstock sends out numerous fibrous roots and short stolons that produce other rootstocks. Climbing is accomplished by tendrils, located one on each side, at the base of each leaf. The leaves are dark green, 3 to 4 inches long and 2 to 3 inches wide. About five prominent veins run from the base to the tip of the leaf.

The flowers are small, greenish, and inconspicuous. The fruits are about the size of wild grapes but firmer and dark purplish brown. They are borne in compact bunches at the ends of short stalks united to a common stem.

Eradication of greenbrier is easily accomplished by grubbing out the rootstocks.

Wild Blackberry

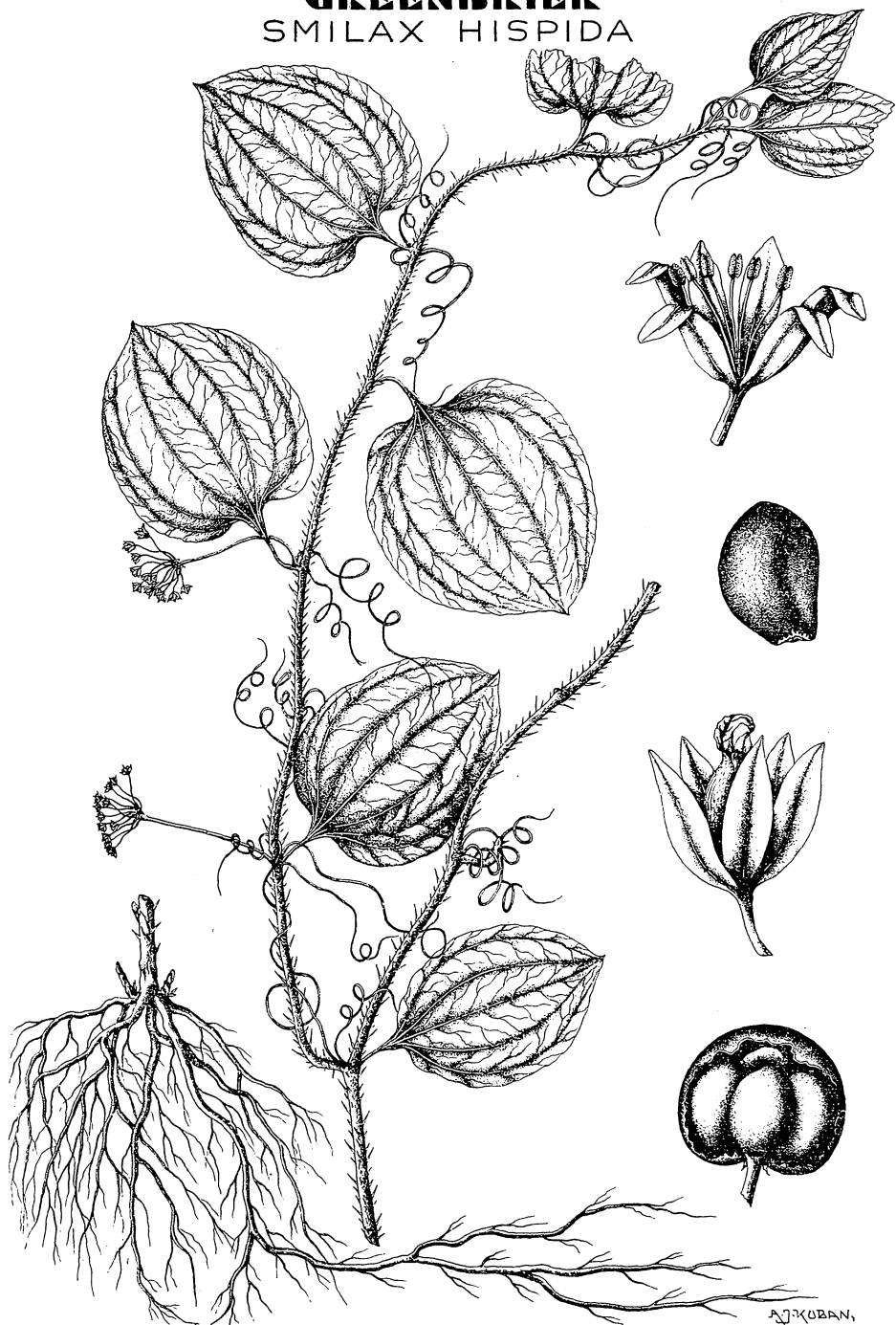
Rubus villosus

There are many varieties of blackberries that may become pests along paths, trails, roadsides, etc., but the most annoying is the wild blackberry.

This is a vigorously growing bush that produces canes up to an inch in diameter and 6 to 8 feet long. It is rank-growing in moist places, but does not grow where water stands. The canes bend over and may take root at the tip, so that it is almost impossible to walk through tangled patches. Spreading is also accomplished by multiplication of canes at the crown, by rootstocks, and by reproduction from seeds. This species of blackberry is of no practical value for fruit as the berries are small and are usually eaten when partly ripe by birds. The hard seeds may pass through their crops. The canes and undersides of leaves and leafstalks have hook-shaped spines up to $\frac{1}{2}$ inch long. These are very stout and sharp and may catch into clothing or tear the skin.

Some thickets of blackberry might best be burned if an area can be cleared around them so that the fire will not spread, and if there is enough dry vegetation present to keep the fire going long enough to kill the canes. This is a recommended practice before attempting to grub out the roots as the canes may be so long and tangled that it is difficult to reach their bases. A weed burner might be used but much fuel is required to consume loose canes, and even if the bases are killed the thorny parts are still difficult to handle. Once the tops are burned off, the roots and crowns can be grubbed out easily. Dry sodium chlorate or borax applied at the bases of the canes will kill them and prevent seeds from growing. Most other species of blackberries are not so thorny and difficult to handle and can be eradicated by grubbing.

GREENIBRIER
SMILAX HISPIDA



Water Plants

The lowering of lake levels in past years, owing to subnormal rainfall, caused a migration of weeds down the lake shore as the water level receded. The deep water plants hold their original position, but now with the lake levels raised, both shallow water or marsh plants and the deep water plants grow along the shore. In addition to the plants given below in detail, water hemlock and wild parsnip, both very poisonous plants, are found together with several species of smartweeds, stinging nettle, poisonous buttercups, several species of Spanish needles, and many others which may add to the discomforts or hazards of those who frequent the beaches.

Some long-stemmed water weeds are objectionable because they wrap around oars, paddles, and the propellers of boat motors. The plants of ponds and lakes are necessary to supply food for the small water organisms on which many fish feed. Wholesale destruction of water plants would place a limitation upon fish life, while uncontrolled growth causes water to become stagnant and makes it unfit for human use and enjoyment. A well-planned balance is necessary to utilize fully our water resources. It is best to clear away the growths around docks and along beaches, or to clear channels through shallow water to permit the passage of boats.

The best way to clear bathing beaches of these water weeds is to cut them off with an underwater mower made from the sickle of a hay mower and operated by a small gasoline engine mounted on a boat or float. Where such equipment is not available, the weeds can be broken off and pulled out onto the beach by a small steel cable or heavy, smooth or barbed wire. The cable is carried out by boat into deep water, dropped, and then dragged to

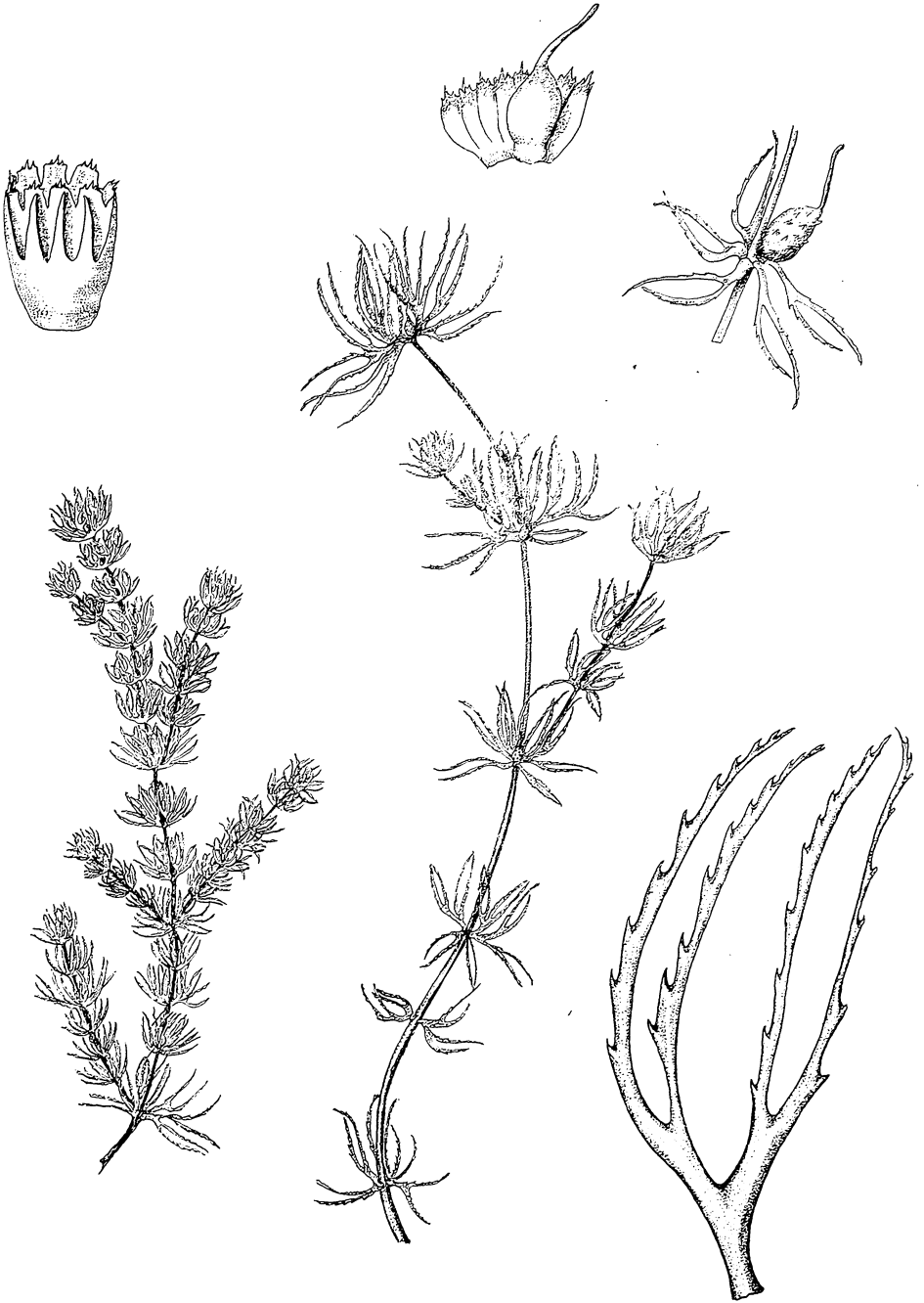
shore by a tractor or horses. Tying one end to a tree or stake, and sweeping the cable across the patch of weeds so as to bring the line to shore will generally break off the weeds so that they can be dragged to the shore, or they will float and later be driven to shore by wave action. If wave action is strong, as during storms, the beach is usually kept clear due to the weed stems being broken and many of the plants washed to shore. If not removed, the plants may decay and cause objectionable odors.

To clear sandy bathing beaches, or beaches where sand can be hauled in, is relatively simple. Raking off the plant remains and burning when dry is the first step. Then haul in 4 to 6 inches of clean sand and spread it over the whole area. Hauling sand onto the ice in winter is the easiest way to spread it in shallow water. When the ice melts, the sand will sink to the bottom and cover up organic debris. Weed anchorage on sandy bottoms is poor so that water plants are easily dislodged by wave action. This is especially true if the sand is coarse grained so that it does not become compacted easily. Sand will make the shore drier as well as retard the growth of many seedlings.

If there is already sufficient sand, but it is covered with undesirable plants such as sandburs, sedges, or Spanish needles, apply 2 to 4 pounds of borax or sodium chlorate per square rod. This can be spread dry, or sprinkled on as solution of 1 pound of borax or chlorate per gallon of water. Select a time when there is not liable to be a heavy rain and when the beach is dry. This makes the application more effective. Usually one well-timed application is sufficient for a season, but if the borax or chlorate is removed by leaching, a second application is desirable especially during the middle of the summer.

COONTAIL

CERATOPHYLLUM DEMERSUM



Raking up plant debris that floats onto shore after storms serves to keep the beach clean and to kill seedlings or to stop germination of seeds. Loosening compacted sand with a cultivator helps to keep the beach sand dry and stops weed growth.

The use of poisonous chemicals to kill weeds in ponds or lakes is prohibited by law owing to the possibility of killing fish and the destruction of fish food.

Hornwort (Coontail)

Ceratophyllum demersum

The most objectionable water plant growing offshore along most beaches is hornwort. This plant removes calcium carbonate (lime) from the lake water and deposits crystals on its stems, giving them a rough surface. Generally the plants grow not more than 2 to 3 feet above the bottom of lakes but occasionally reach a length of 8 feet, coming to the surface in shallow water close to the shore.

Hornwort is particularly irritating to the swimmer because of the rough, scratchy surface of the leaves and stems. It sometimes forms mats that are hard to penetrate, but in deeper water these plants do not ordinarily bother swimmers.

The plant is characterized by 5 to 12 stemlike leaves 1 to 6 inches long, forked 2 to 3 times, and arranged in whorls at the joints along the green stem. The ripe fruiting pod is 1/6 to 1/3 inch long, having a smooth, spurred, or winged beak about as long as the pod.

Pondweeds

Potamogeton species

There are so many species of *Potamogeton*, or pondweeds, native to this area that we must here consider them as a group. They grow up from the

lake bed at depths varying from 4 to 12 feet, sending out long floating branches on or near the surface of the water.

The pondweeds are all perennial, with similar growth habits, but leaf shapes differ according to the species. Many species have two types of leaves; those submerged in the water are slender and grasslike while those floating on the surface are shorter, broader, and oval in form. Ordinarily the plants are solitary, but in sheltered bays they may grow in very dense patches. Wave action breaks off most of the floating branches which live until driven onto shore.

Elodea

Elodea canadensis

Elodea has light green, very leafy shoots 1 to 3 feet long that grow up from the bottom in shallow water. The plants may grow in water up to 6 feet in depth as they are quite tolerant to shading. The thin flat leaves are 1/2 to 1 inch long, about 1/4 inch broad and have a single midvein. Their surface is sticky or slimy and very disagreeable to the bather or swimmer who comes in contact with them. Their easily broken stems float in to add to the debris on the shore, or form new plants, as each piece can develop roots at the joints.

Eel Grass (Ribbon Grass)

Vallisneria spiralis

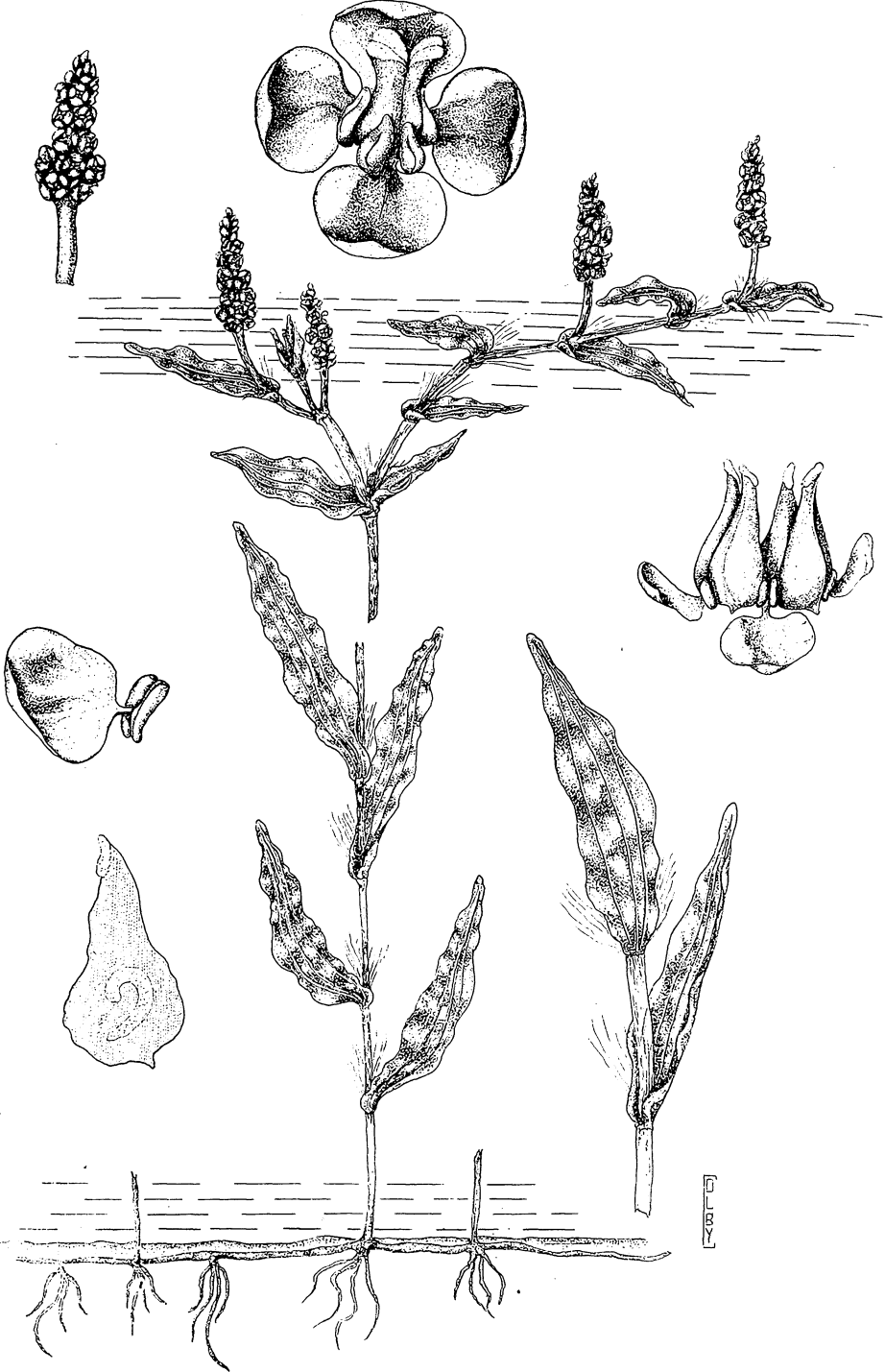
Eel grass sends up long dark-green ribbon-shaped leaves, growing especially in shallow lakes and very slow streams. It is perennial and may form dense stands. The leaves are 1/2 to 1 inch wide, usually 1 to 3 feet long, sometimes reaching 6 feet under favorable conditions. In June small white inconspicuous female flowers borne on a spirally twisted stalk float on the

PONDWEED
POTAMOGETON PECTINATUS

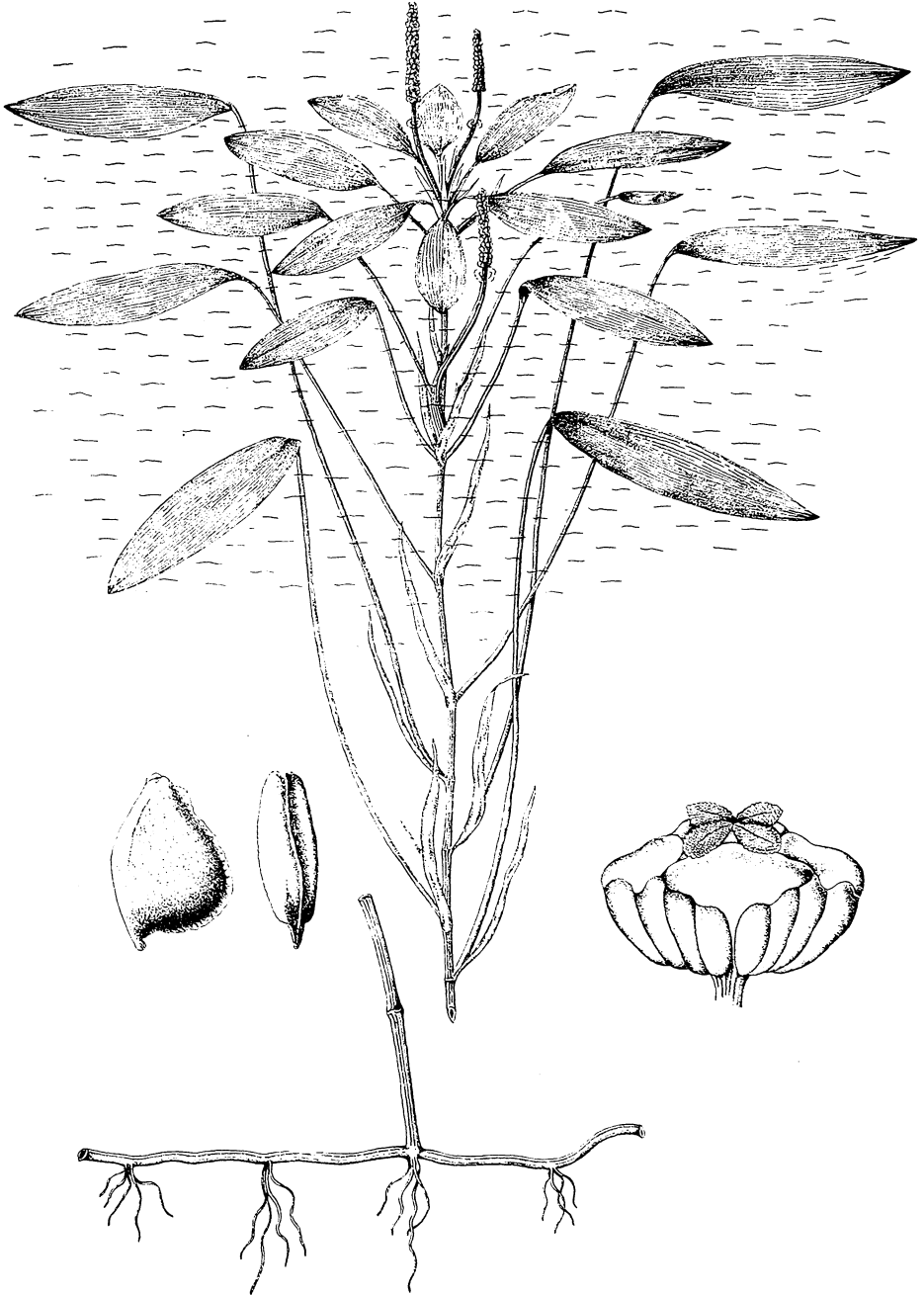


CLASPING-LEAVED PONDWEED

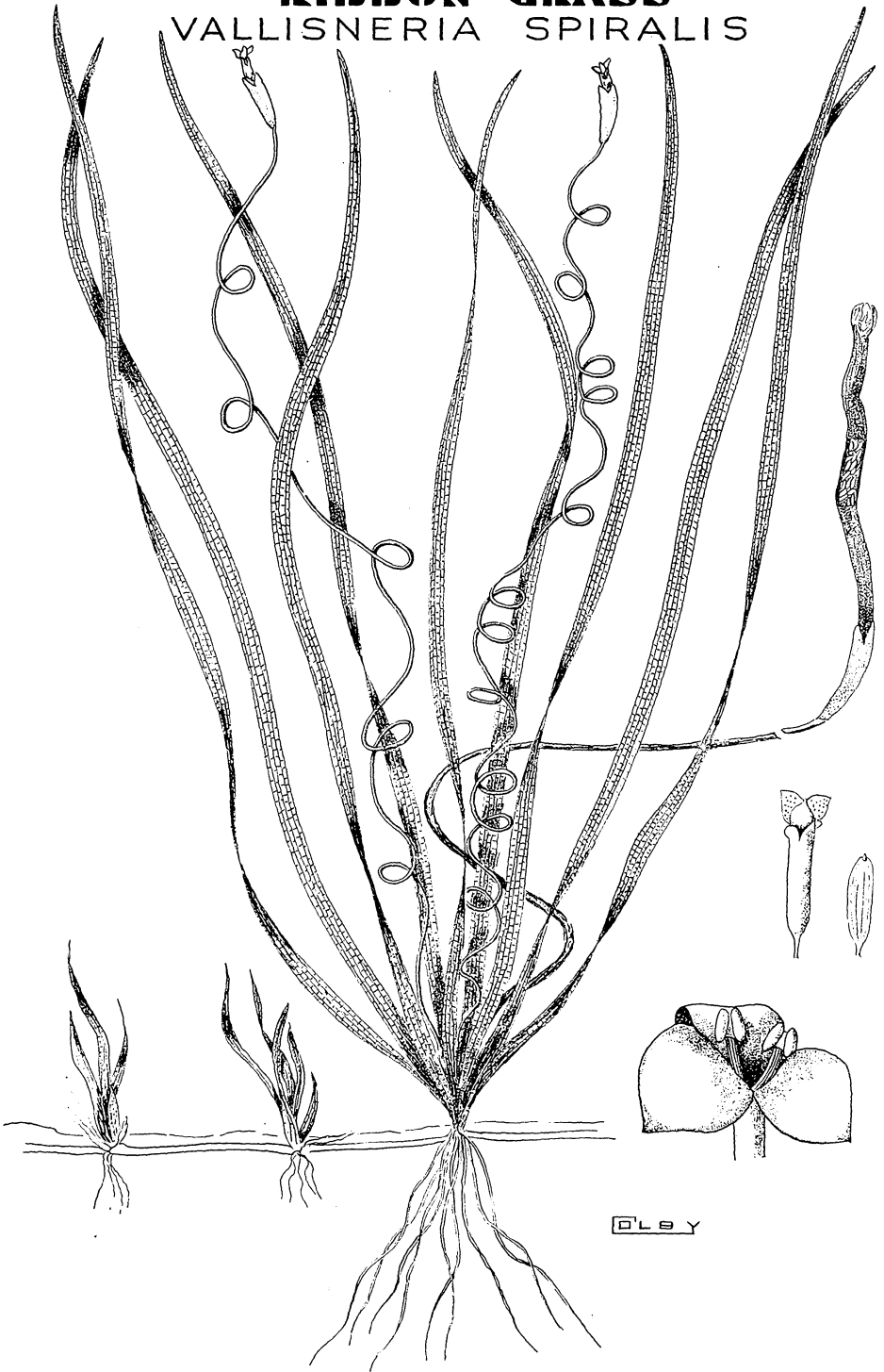
POTAMOGETON PERFOLIATUS



FLOATING PONDWEED
POTAMOGETON NATANS



RIBBON GRASS
VALLISNERIA SPIRALIS



surface of the water. The male flowers are larger, break off under water, and float to the surface, thus coming into contact with the female flower and effecting pollination. Dense stands will make a lake quite unfit for bathing.

Bulrushes

Scirpus species

In shallow water with little wave action a number of rush species may be found. Some are only a few inches tall while others grow to a height of several feet. Floating vegetation may lodge in the rushes and decay, producing objectionable odors, especially in late summer. The odor is due to blue-green algae, sometimes called water bloom, that grow on the decaying plants. Wave action helps to keep down these algae. The common bulrush often grows in water 1 to 2 feet in depth. The round dark green stems grow 1 to 4 feet in height. After midsummer they bear whorls of small greenish-brown flowers. The stems have a white spongy tissue in the center and may be devoid of leaves. The plants may form thick stands by growing from underground rootstocks that live over winter.

Sedges

Carex species

There are about 200 species of sedges in Minnesota many of which grow on wet clayey beaches, or in water a few inches deep. All are perennial having triangular stems and three rows of folded or V-shaped leaves. The leaves are very tough, many having sharp toothed edges that may cause severe cuts. They grow mostly from perennial rootstocks and frequently form dense stands. They are most objectionable in shallow water where they hold organic debris that may produce unpleasant odors on decaying.

Algae

Water Bloom, Green Pond Scums

The algae may be classified into three groups on the basis of their growth habits and distribution in the water. Green surface scum is composed of filamentous forms, or mixtures of these forms with the single-celled algae. Single-celled algae of great variety may be distributed throughout the whole depth of the water and cause it to become green. There are algae that grow at the bottom of bodies of water and these may not be as objectionable as the first two types that float and give the water a green color, or form a scum. Ponds heavily infested with algae may contain substances that are poisonous to livestock drinking the water. Scum-forming algae become noticeable in early summer and increase up to September or October. There are many different species of all these forms. There is usually a succession of different forms at successive periods of the summer. They reproduce rapidly and occur in greater numbers. On decaying they produce foul odors much like those of decaying fish. These odors are usually most obnoxious just before the first frost. Nearly all forms die or go into resting, or spore stages, at the approach of cold weather.

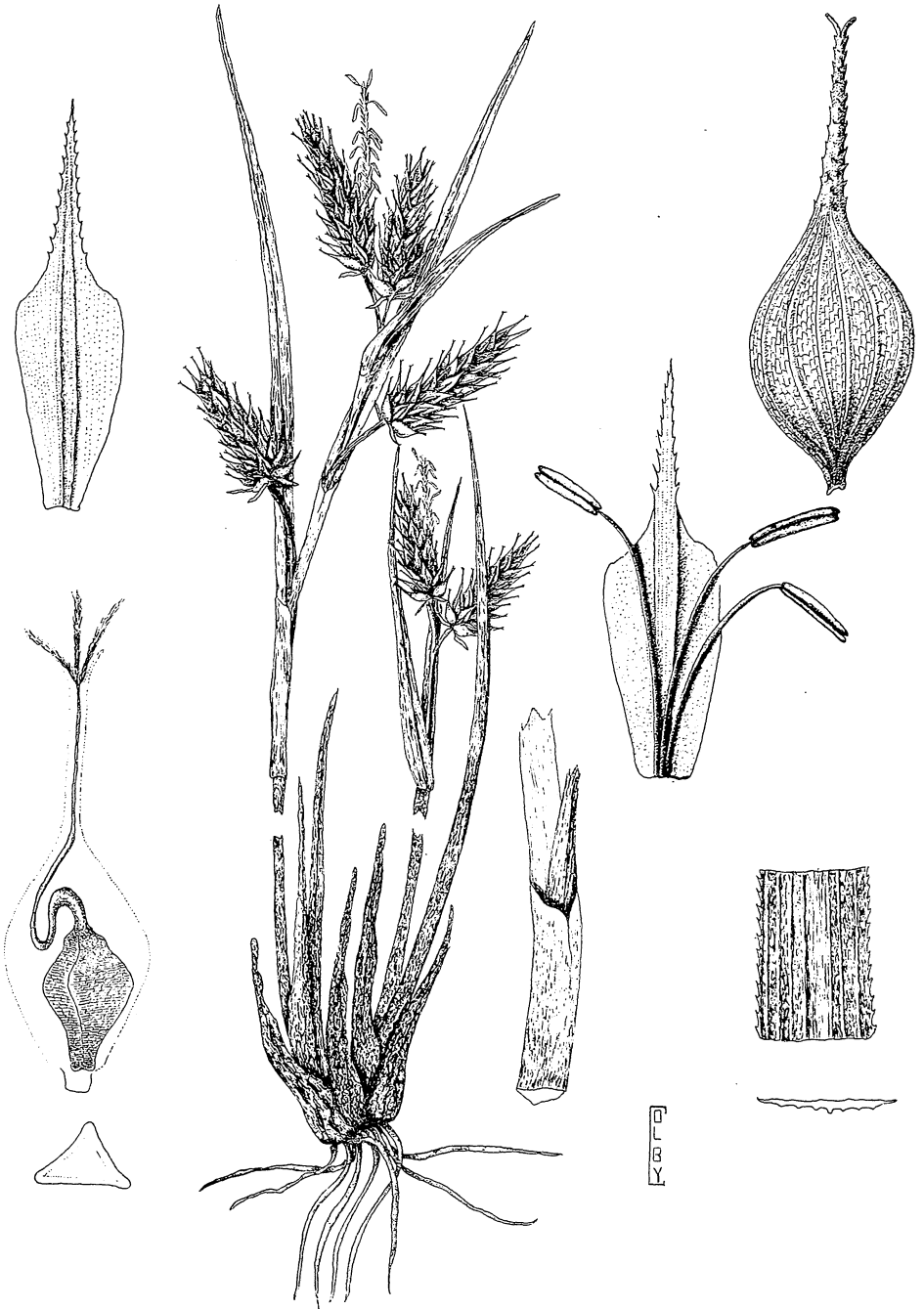
In lakes that supply water for cities, methods have been devised to kill the objectionable algae without injury to fish. Treatment with copper sulfate (blue vitriol) is the most practical method of controlling algae. The volume of the lake or pond should be calculated after making soundings and surface measurements. The copper sulfate crystals should be placed in a burlap sack tied to the stern of a row boat and the boat rowed around and across the pond until all the copper sulfate has dissolved. One pound of crystalline copper sulfate ($\text{CuSO}_4 \cdot 7\text{H}_2\text{O}$) dissolved in 160,000 cubic feet of water (1 pound to 10 million pounds of water)

CYPERUS-LIKE SEDGE

CAREX PSEUDO-CYPERUS



HOP SEDGE
CAREX LUPULINA



will kill practically all forms of algae. After about five weeks, growth may start again and develop very rapidly, but it can be controlled by retreatment. Local treatment of shallow bays is desirable to clear the water. This treatment is most effective when applied at a time when the water is still. On wet boggy shores, or in shallow water where boats cannot go, it is best to spray a saturated copper sulfate solution from a knapsack sprayer, or force pump sprayer, by wading and spraying

across the area. By wading in shallow water much less organic matter is stirred up from the bottom of the pond than by rowing a boat through it. Organic matter reduces the toxic effect of the copper sulfate on the algae. If treated in June before the algae increase, the water may be clear for the entire summer, and control is much easier in the following year because the spore, or encysted stages, of the algae that live over winter are greatly decreased.

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