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PRELIMINARY CATALOGUE
OF
PLANTS POISONOUS TO STOCK.

BY

V. K. CHESNUT, B. S.,
Assistant, Division of Botany, Department of Agriculture.

[Reprinted from the Annual Report of the Bureau of Animal Industry for 1898.]



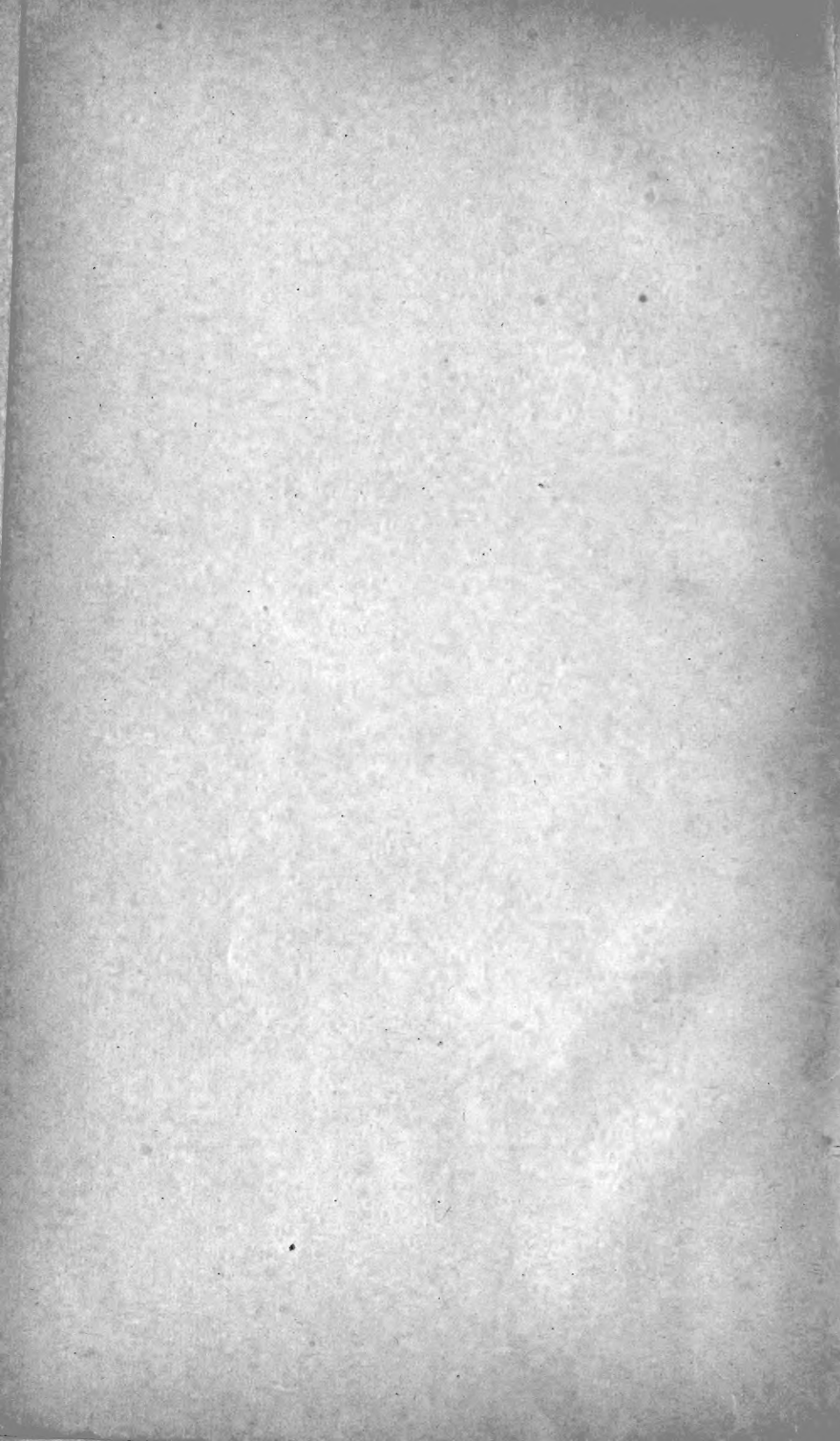


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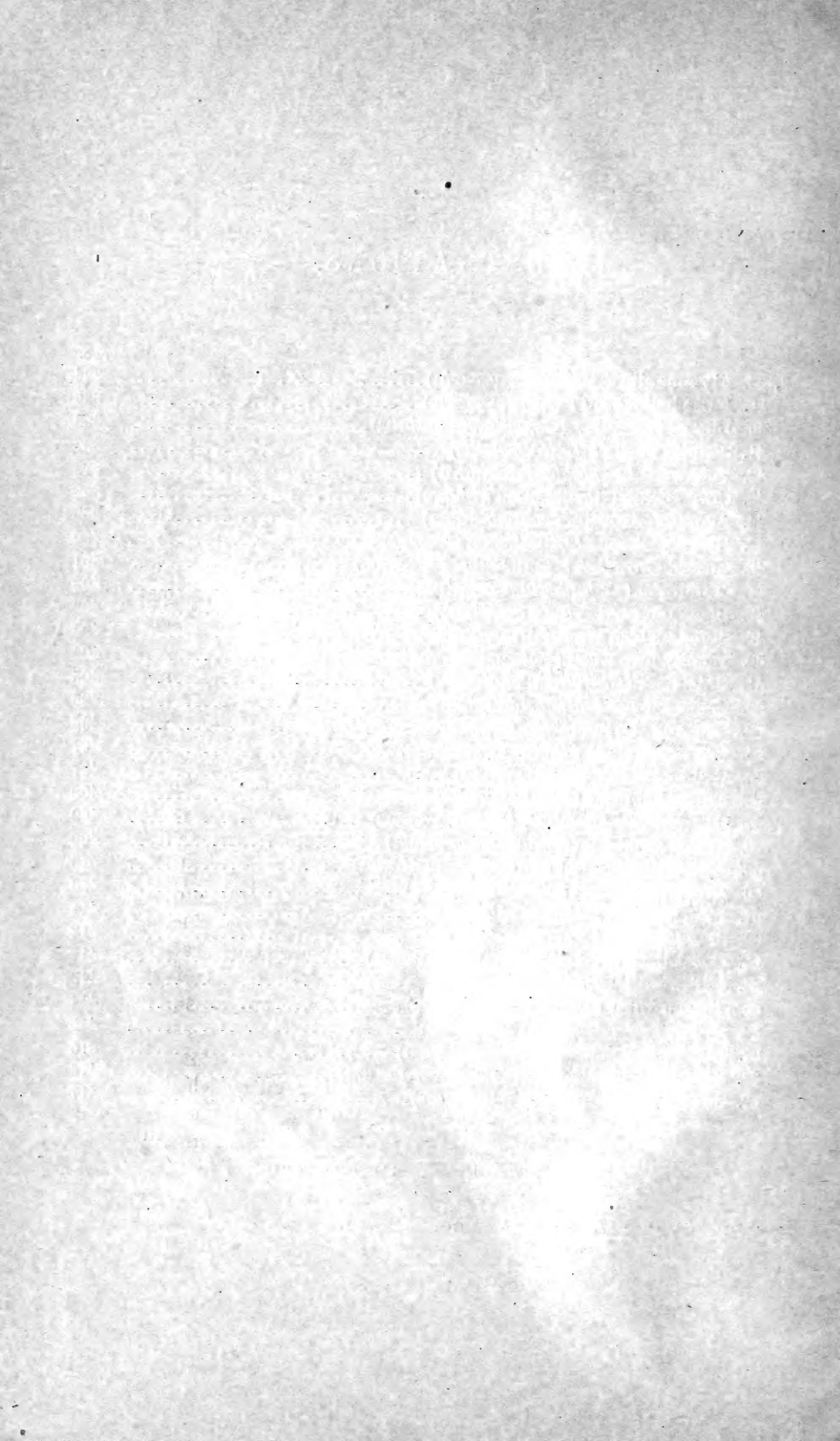
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PRELIMINARY CATALOGUE OF PLANTS POISONOUS TO STOCK.

By V. K. CHESNUT, B. S.,

Assistant, Division of Botany, Department of Agriculture.

In Bulletin No. 20 of the Division of Botany of this Department and in Farmers' Bulletin No. 86, also of this Department, an attempt was made to describe the plants native to the United States which are best known to be poisonous either to man or to domestic animals, and also to give a satisfactory account of their geographical distribution and poisonous qualities. No systematic attempt has as yet been made to study the poisonous plants of our new possessions. In the present catalogue there has been gathered together a few brief notes concerning a very much larger number of plants, mostly introduced or native, than was given in the bulletins named above, all of which have been reported to be more or less poisonous to stock.

Some of the species treated of in the bulletins have been omitted in this catalogue, either because stock are not poisoned by eating them, or because they are not known to have been eaten by stock. The leaves of the various species of poisonous *Rhus*, for example, are eaten by several, if not all, kinds of stock with impunity, and even with considerable relish. On the other hand, stock have not been known to eat the false jessamine. The plants which are well known to cause death in a purely mechanical way are excluded from this account because they are not poisonous. Bacteria and all living plants parasitic on animal organisms have also been excluded.

Those plants which are injurious or fatal in a mechanical way have been called "stock-killers" by Prof. J. H. Maiden, the well-known economic botanist of Australia. These contain no poisonous substances, but operate chiefly by clogging up the intestines, by perforating and inflaming the tissues of the eyes, the nose, or the mouth and intestinal tract, and perhaps by evolving gases which distend the stomach and intestines to such a degree that it is impossible for the lungs and heart to perform their function in aerating and circulating the blood. Instances of bloating are very frequent in stock, as is evidenced by the information contained in Bulletin No. 52 of the State Agricultural Experiment Station at Fort Collins, Colo. Prof. W. W. Cooke cites numerous cases of death in sheep, especially ewes, from bloat caused by eating green alfalfa. He estimates that over 5 per cent are killed by eating it and concludes that it is

not a safe food for stock unless certain precautions are observed. The precautions enumerated are well worthy of careful consideration. While this action in several cases is mechanical, it seems probable that, under certain conditions, poisonous substances may also be formed in the stomach at the same time, and that these may also be a cause of death. Prussic acid may thus be easily formed from amygdaline, a nonpoisonous substance which exists in the leaves of several groups of plants belonging to the rose family.

The annoying or serious and sometimes fatal effect of the sharp barbed awns of certain grasses is especially well known to Western farmers, who experience much trouble from the fox-tail and squirrel-tail grasses (*Hordeum* sp.), which are so abundant in Western meadows. These grasses make excellent fodder when young, but when nearly mature the awns easily separate, and frequently work their way into the mouth and throat, or the eyes and ears and cause such intense suffering that the animal must be killed. The hairs from the crimson clover (*Trifolium incarnatum*) act in a very different manner. In Circular No. 8 of the Division of Botany of this Department Mr. Coville has shown that if the overripe dried plants are eaten by stock the hairs become easily detached from the flower stalks and heads, and, by virtue of their barbed structure, accumulate in the intestines in the form of felt-like balls which gradually increase in size until the intestines become completely clogged. Several instances of death from this cause have been recorded. This is also true of some species of cacti which in Mexico and the southwest serve as food for stock. In the issue of the Transactions of the Academy of Science of St. Louis for November 30, 1897 (Vol. 7, No. 18), Prof. Trelease gave an account of an unusual accumulation of fine cactus bristles which caused the death of a bull at San Luis Potosi in Mexico. The animal being untamable, had been allowed to run wild, its chief food in winter having consisted of five species of *Opuntia*, which grew plentifully in the vicinity. Since the minute bristles had not been scorched or burnt off the plant in any way, they were swallowed with the fleshy part and gradually accumulated in the form of sixteen spherical masses which averaged about 4 inches in diameter and about 7 ounces in weight. A microscopical investigation of these balls showed that they were composed almost wholly of the minute barbed bristles characteristic of the *Opuntias*. Anyone who has attempted to gather the gorgeous blossoms of these species can not fail to remember the ease with which the bristles pierce the flesh and the pertinacity with which they cling to it. When the plants are properly singed, however, they may be used for fodder without danger. When the larger spines only are cut off and the remainder feed to stock, these concretions are to be expected.

At least one representative of the lower orders of fungi, the corn smut (*Ustilago maydis*), appears to be deleterious, and sometimes

even fatal to stock in a mechanical way by virtue of the large quantity of the dry powdery spores which it contains when mature. These probably act by expanding, and thus obstructing the stomach.

In the case of some molds, such as the white mold (*Aspergillus glaucus*), found on corn and oats, it has been proved that the spores will germinate and grow within the tissues of the body. They cause death apparently from a poisonous compound which is produced simultaneously with the mold. Other plants are undoubtedly deleterious to stock on account of their dry, tough, fibrous, or indigestible character. Cases of blind staggers with marked cerebral symptoms have been cited to me by Dr. Albert Hassall, of the Bureau of Animal Industry, which were caused simply by the continued feeding of a large quantity of dry fodder for several days or weeks. The intestines were completely stopped, but when the impacting material was removed the symptoms speedily vanished.

The list as given is provisional for some species, as the reports upon which their reputation is founded are very meager, and sometimes even contradictory. A very interesting and instructive illustration of this was published in the Bulletin of Pharmacy for May, 1899. The chief portion of Mr. Theod. A. Melter's article entitled "When to Gather Plants" [for drugs] is devoted to a consideration of the time in various places in the Southern States, at which to gather the passion flower vine (*Passiflora incarnata*), which is very extensively used by pharmaceutical manufacturers. It is a well-recognized fact that, in order to get a drug of maximum and uniform strength, the plant should be cut off just above the roots when it is beginning to flower. The very interesting observation was made that, while the plant blossomed in March at West Palm Beach in Florida, the blossoms did not appear until April at Jacksonville, Fla., 300 miles northward; nor until May at Montgomery, Ala., and June at Nashville, Tenn., both of which latter places are, respectively, 300 and 600 miles north of Jacksonville. The drug collected at the flowering time at all of these places proved to be of equal potency. The most interesting fact, however, comes in right here. In July, 500 pounds of the drug was collected and offered for sale at Jacksonville. As the plant blossoms here in April, the drug was refused for medical use, but was purchased at a cent a pound to be used for hay. The horse to which it was fed ate it with relish so long as the supply lasted, and even preferred it to hay. No ill results were observed, and in fact the horse became not only very fat, but more high spirited. Eight months later, in March, the author of the article received 50 pounds of the fully potent drug from West Palm Beach, and, by accident or carelessness, his horse got access to it at night and ate over half of the quantity. The animal was found in a very stupid state the next morning, and it remained in this condition, but with loss of flesh, for six weeks when it died. When it is remembered

that the other horse ate 500 pounds and became high spirited, the effect of the varying season on the drug is at once apparent.

Several doubtful plants are here enumerated, not necessarily because it is believed that they are poisonous, but with the view to eliciting more positive evidence either for or against them. Although comprehensive, the list is incomplete, for experience is slowly but constantly adding to the number already known or suspected to be poisonous.

A few plants not poisonous to stock are nevertheless objectionable to stockmen and should be mentioned in this connection. This class includes all of those which, when eaten, taint the milk or impart a disagreeable or more rarely poisonous quality to the animal's flesh. Wild garlic (*Allium vineale*) is a familiar example of a plant which taints milk. It is intended, however, to speak here only of those species which thus indirectly cause poisoning. Mention has been made of a few such plants in the catalogue, the most prominent being the bitterweed (*Helenium tenuifolium*) of the Gulf States, and the may apple (*Podophyllum peltatum*) of the Eastern States. More facts and further investigation are needed in this line of work.

In considering the circumstances under which stock eat this obnoxious vegetation the most stress should be laid upon unfamiliarity. The odor and the taste of the plants which are ordinarily eaten by stock are so varied that it is little wonder that any animal, when placed among plants with which it is unfamiliar, will eat one that is deleterious. Especially when hungry or thirsty such animals are apt to eat anything of the kind placed within their reach. The custom so prevalent in the West of driving large herds of cattle and sheep from one pasture ground over wide areas of barren country to another is especially conducive to severe losses from plant poisoning.

Another very important class of cases is due to a purely artificial cause, and may therefore be remedied by the exercise of due intelligence and care. This cause consists in the use of impure or unclean hay. The seed sown is sometimes contaminated with poisonous weed seeds or with the spores of ergot. Grass or meadow hay is still more apt to contain poisonous plants. These are, of course, generally rejected by all but the most hungry animals, but when the texture happens to be nearly the same as that of the hay itself it is very apt to be eaten by the animal. Bulletin No. 35 of the North Dakota Experiment Station contains an interesting account by Prof. E. F. Ladd of the poisoning of a bull by eating slough hay which was described as being badly contaminated with the water hemlock (*Cicuta maculata*). In the case investigated, evidence of the water hemlock poison was plainly detected in the stomach.

The practice of tempting stock to eat material which is more or less deleterious by cutting it up finely and mixing it with food of superior quality is also open to criticism. There is some question in

regard to the merits of the seeds of the velvet bean as a food plant for stock. The plant is now largely cultivated in the South, but does not mature its seed well except in Florida and the adjacent parts of Georgia and Alabama. The nitrogen content of the seed is very high, but, according to Mr. J. F. Duggar, of the Alabama Station, the verdict of three out of four correspondents is against the use of the seed as a food for man. The fourth man, quoting from Professor Duggar's bulletin on the subject, says: "For human food they are by all odds the richest and best vegetable I have ever tasted. If eaten in large quantities they will nauseate the stomach, not from poison, but from richness." This recommendation is of rather doubtful value, especially when we consider there is one authentic case on record in which nearly fifty people were very badly poisoned by eating the seeds. Stock often refuse to eat the seeds, but as the hull is readily eaten alone, both the hull and seed are often ground up together in order to make the animals eat the seeds, which are considered very nutritious. It is possible, however, that, as in the case of the jack bean (*Canavalia ensiformis*), much of the nitrogen which they contain is in the form of amides, and is, therefore, not available for nutrition. If not absolutely poisonous, it may possibly be deleterious in the assimilation of other food.

Some plants useful for fodder in small quantities are deleterious when fed continuously as hay. In Bulletin No. 35 of the North Dakota Station Professor Ladd has shown that millet hay exercises a very marked action on the kidneys of stock to which it has been fed continuously, and he has succeeded in isolating a poisonous glucocide. Lupines (*L. plattensis* and *L. leucophyllus*) are esteemed as good fodder in Montana, but the enormous fatality which has occasionally attended its use show that it is poisonous under some conditions, probably when the ripe seeds are present in considerable quantity.

The most serious losses of stock due to poisonous weeds have been reported from the western half of the United States. In three cases that occurred in October and November, 1898, over 2,000 sheep are reported to have perished. Smaller fatalities have been reported from all parts of the United States, including Alaska. The money value of this loss can not well be estimated, but it must be a very considerable sum. The loss to one correspondent from loco in one year is estimated at \$2,200, and, as is mentioned in the catalogue, the State of Colorado paid out \$200,000 in bounties to rid itself of this pest. The loss from lupine poisoning in Montana during the fiscal year ending June 30, 1899, is estimated at about \$10,000. The number of eastern cases of animal poisoning investigated by the Division of Botany during the fiscal year ending June 30, 1899, is only six, all of which were of minor importance only. Twenty cases from west of the Mississippi were investigated during the same period.

The information incorporated in the accompanying catalogue has been procured from the most diverse sources. Special treatises, including the works of Kobert, Blythe, Cornevin, Fröhner, Dammann, Millspaugh, White, Van Hasselt, and Rochebrune, have been constantly at hand, and free recourse has been had to the numerous articles found in the various botanical and chemical journals and agricultural bulletins; also the literature indexed in the Catalogue and Index Medicus of the Surgeon-General's library at Washington. Besides some actual experiments made in this Department, an important and most valuable source of information has been the correspondents of the Division of Botany. The letters from farmers and large stock raisers have done much to further our knowledge in these lines. The letters from botanists, chemists, and medical men have been especially esteemed for the more explicit information which they conveyed.

The problem of establishing the identity of a plant which has, or is supposed to have, caused poisoning in the field is not always easy, and it is frequently only by a combined knowledge of the sciences and of a variety of diseases that it can be solved. For the general facts as to the occurrence of losses, the number of animals affected, and the amount of the money loss we must look to those whose interests are immediately affected. The same class can also afford us general data, assisting in the identification of the plant which has inflicted the damage. For the final determination of the injurious plant, however, technical assistance is required, and here the veterinarian, the chemist, and the botanist can be of great service.

When, however, the plant has been identified we still need information concerning the nature of the poison, and need to know of a rational antidote. For this knowledge we must depend upon the chemist and medical man.

The cooperation of chemists and medical men is therefore especially solicited; but at the same time it is still necessary to impress upon others the desirability of their assistance in obtaining the fullest and most accurate information in regard to all the phases of plant poisoning which come under their observation.

CATALOGUE OF PLANTS POISONOUS TO STOCK.

PERISPORACEÆ (Rot-mold Family).

Aspergillus glaucus (L.) Link.—This is the common flocculent WOOLLY MOLD which sometimes develops to a dangerous extent on corn, oats, and other food grains which have either been harvested before full maturity or been stored in a damp place. The moldy growth is pure white at first, but changes with the ripening of the spores to gray and then green. The spores are apparently the cause of the so-called enzootic cerebritis, or "staggers," of

horses, which, during the winter of 1898-99, has been reported as having caused very heavy losses throughout the Missouri Valley, in Illinois, Indiana, Tennessee, and Maryland. Experiments made in 1891 by Dr. N. S. Mayo, at Manhattan, Kans., confirm the results of European investigators, who have shown that the spores of this mold will grow inside of a living animal if they are introduced into the blood in any way. Death is probably caused by some poison which is simultaneously produced with the mold in the body of the animal.

HYPOCREACEÆ (Ergot Family).

Claviceps purpurea (Fr.) Tul.—This, the most common species of ERGOT, infests various species of native and cultivated grasses. It causes great loss of stock, especially in the West, where it is much more common than in the Eastern States.

USTILAGINACEÆ (Smut Family).

Ustilago maydis (DC.) Corda.—The black powdery fungus known as CORN SMUT is common throughout the corn-producing districts of the middle West and is occasionally reported as being fatal to stock. Experiments made in Wisconsin and elsewhere show that it is not a very active poison when eaten in moderate quantity. When fed in gradually increasing amounts up to 2 pounds, no effect was noted, but 4 pounds fed on each of two successive days caused the sudden death of one cow. Since corn smut has been shown to be less fatal when wet, it seems probable that its physical and not its chemical character may be responsible for the death of cattle which have eaten it in considerable quantity.

UREDINACEÆ (Rust Family).

Coleosporium solidaginis (Schw.) Theum.—This is a parasitic growth that is found on some species of golden rod and is possibly responsible for the cause of the so-called golden-rod poisoning in horses. (See *Solidago* sp.)

AGARICACEÆ (Mushroom Family).

Amanita muscaria (L.) Fr.—The well-known FLY AMANITA (FLY FUNGUS; DEADLY AMANITA) may be found from spring to early winter in pine forests throughout the United States. Cows are supposed to be killed by eating it, and almost every year the daily papers chronicle the death of several human beings who were led to eat the fungus through mistake for some edible species. The fresh cap is frequently rubbed up with milk and used to poison flies.

PHALLACEÆ (Stink-horn Family).

Clathrus columnatus Bosc.—In an article published in the Botanical Gazette (vol. 15, p. 45), Dr. Farlow, of Harvard University, gives an account of an investigation of a case of poisoning in hogs which was caused by eating this peculiar fungus. It grows in patches in oak woods and openings, and is quite common throughout the Southern States.



FIG. 38.—Fly amanita (*Amanita muscaria*): a, mature plant; b, top view of cap showing corky patches—both one half natural size.

POLYPODIACEÆ (Fern Family).

Pteris aquilina L.—In July, 1895, nineteen cattle died in Maryland, which were supposed to have been poisoned by eating the common BRACKEN FERN. Very few similar cases are on record, but one European authority cites one in which five horses were killed by eating hay contaminated with this fern, and another states that cases are quite frequent among cattle in England.

EQUISETACEÆ (Horsetail Family).

Equisetum arvense L.—The FIELD HORSETAIL was reported from Connecticut in 1871 as being poisonous to horses. Cases are very

rare, and it is probable that this plant is deleterious only when eaten in considerable quantity and then perhaps only on account of its physical character. Experiments made in Europe show that a similar species (*E. palustre*) is fatal to horses when fed in considerable quantity with hay.

TAXACEÆ (Yew Family).

Taxus minor (Michx.) Britton.—The COMMON YEW, or GROUND HEMLOCK of the northeastern United States, is called POISON HEMLOCK in some places. The leaves of this shrub are probably poisonous to stock, as are those of the European yew. This species is more accessible to stock than the western yew (*Taxus brevifolia*), which grows only in deep canyons.

POACEÆ (Grass Family).

Lolium temulentum L.—The seed of the DARNEL, or POISON RYE GRASS, an introduced annual especially abundant on the Pacific Slope, is considered poisonous to both man and animals.

Stipa robusta (Vasey) Nash.—This is a perennial plant which is known in Arizona and New Mexico as SLEEPY GRASS. It produces a narcotic effect on horses and cattle that feed upon it, but stock bred in that region rarely touch it.

Zea mays L.—The numerous deaths that are frequently attributed to INDIAN CORN are mostly due, not to any poison inherent in the plant, but rather to parasitic or saprophytic fungus growths, as noted under *Aspergillus* and *Ustilago*. The green fodder is very apt to cause severe and even fatal bloating if the animal's diet is not properly regulated. Death has also been attributed to the presence of niter (potassium nitrate) in the growing stalks. It is supposed that in very rich soil this substance will sometimes accumulate in the stalks in considerable quantity during a prolonged drought.

MELANTHACEÆ (Bunch-flower Family).

Chrosperma muscætoxicum (Walt.) Kuntze.—The bulbous portion of the FLY POISON, or CROW POISON, an Eastern plant, is sometimes eaten by cattle with fatal results. The bulbs, when mashed up with molasses, are used to stupefy flies.

Veratrum viride Ait.—The leaves of the COMMON SWAMP HELLEBORE (AMERICAN WHITE HELLEBORE; FALSE HELLEBORE; INDIAN POKE) of the eastern and northern portions of the United States have proved fatal to man and to horses. Sheep eat the young leaves and shoots with apparent relish. The seed is poisonous to chickens.

Veratrum californicum Durand.—The root and young shoots of the CALIFORNIA FALSE HELLEBORE have been reported as being fatal to horses.

Zygadenus venenosus Wats.—The name DEATH CAMAS has been applied to this plant in the Northwest to distinguish it from the true camas (*Quamasia quamash*), which is highly esteemed for food by the Indians. In Oregon it is erroneously called



FIG. 39.—False hellebore (*Veratrum viride*), one-third natural size.



FIG. 40.—Lily of the valley (*Convallaria majalis*), one-third natural size.

“lobelia” by most stockmen and farmers. Horses, cattle, and sheep, as well as man, are poisoned by eating the bulb.

Zygadenus elegans Pursh.—The bulbs, and perhaps the leaves of the *Glaucous zygadenus*, or ALKALI GRASS, are poisonous to cattle.

LILIACEÆ (Lily Family).

Leucocrinum montanum Nutt.—This beautiful little plant is known throughout the Northwest as LEUCOCRINUM. It is supposed in Montana to be very fatal to sheep, especially after the fruit is developed.

Nothoscordum bivalve (L.) Britton.—The bulbs of a plant called CROW POISON were sent to the Department from Texas in March, 1898, with the information that they were suspected of being very fatal to cattle at that time of the year. The mature

plants grown from these bulbs proved to be of the above species. Another common name for the plant is YELLOW FALSE GARLIC.

CONVALLARIACEÆ (Lily of the Valley Family).

Convallaria majalis L.—All parts of the LILY OF THE VALLEY are powerfully poisonous, and are liable to cause damage to cattle and horses.

HÆMODORACEÆ (Bloodwort Family).

Gyrotheca capitata (Walt.) Morong.—This is the RED ROOT, or PAINT ROOT, of the Atlantic Coast and Cuba, so called on account of the red color of its sap. White hogs are supposed, throughout the South, to be particularly subject to the poison contained in the plant.

AMARYLLIDACEÆ (Amaryllis Family).

Atamosco atamosco (L.) Greene.—The ATAMASCO LILY of the southeastern United States is supposed by some persons to cause the disease known as “staggers” in horses.

FAGACEÆ (Beech Family).

Quercus sp.—In Europe the acorns of various species of oaks cause sickness and death in hogs and cattle. This effect may possibly be due to bloating, but may also be due in some way to the tannin or the bitter principle which they contain.

URTICACEÆ (Nettle Family).

Urtica gracilis Ait.—The SLENER NETTLE covers thousands of acres of reclaimed swamp land in Michigan and Wisconsin, which is made nearly worthless by its dense growth, horses refusing to pass through it to cultivate the soil.



FIG. 41.—Slender nettle (*Urtica gracilis*).

CHENOPODIACEÆ (Goosefoot Family).

Sarcobatus vermiculatus (Hook.) Torr.—BLACK GREASEWOOD, or CHICO, is a scraggy shrub which grows in strongly alkaline soil in the southwestern and western portions of the United States. A correspondent in New Mexico states that on one occasion he counted as many as 1,000 sheep that had been killed by eating the leaves of this plant. It is claimed that cows are not affected by eating it at any time and that sheep can eat it quite freely in winter. Death is perhaps due more to the bloating effect rather than to any poisonous substance which the plant contains.



FIG. 42.—Pokeweed (*Phytolacca decandra*), one-half natural size.

PHYTOLACCACEÆ (Pokeweed Family).

Phytolacca decandra L.—The leaves of the common **POKEWEED** (**POKE**; **GARGET**; **AMERICAN NIGHTSHADE**) of the eastern half of the United States is occasionally eaten by cattle with fatal results.

ALSINACEÆ (Pink Family).

Agrostemma githago L.—The common **CORN COCKLE** (**COCKLE**; **MULLEIN PINK**) is an introduced weed from Europe. Poultry and household animals are occasionally poisoned by eating the seeds or the bread made from wheat contaminated with the seeds.

Silene antirrhina L.—The **SLEEPY CATCHFLY**, which is found throughout the United States, was stated to have poisoned sheep in southern Michigan a few years ago, but there is reason to believe that the poisoning was due to another source.

MAGNOLIACEÆ (Magnolia Family).

Illicium floridanum Ellis.—The leaves of this species of ANISETREE are supposed to be poisonous to stock.

RANUNCULACEÆ (Crowfoot Family).

Aconitum napellus L.—The EUROPEAN ACONITE (MONKSHOOD; WOLFSBANE) is very commonly cultivated in gardens and is therefore capable of doing great damage to stock. Horses and cattle have fre-



FIG. 43.—Corn cockle (*Agrostemma githago*).
a, spray showing flowers and seed capsule, one-third natural size; b, seed, natural size; b', seed, four times natural size.



FIG. 44.—Aconite (*Aconitum columbianum*): a, flowering plant; b, seed capsule—both one-third natural size.

quently been poisoned by eating the leaves and flowering tops.

Aconitum columbianum Nutt.—The WESTERN ACONITE, or MONKSHOOD, is native in the northwestern portion of the continent, where it sometimes poisons sheep.

Actæa alba (L.) Mill., WHITE BANE BERRY.—*Actæa rubra* (Ait.) Willd., RED BANE BERRY.—Very little damage is done to stock by these plants, because animals generally refuse to eat them.

Sheep are occasionally poisoned by eating the leaves of a closely related European species (*A. spicata*).

Anemone quinquefolia L.—The COMMON WIND FLOWER which grows throughout most of the United States is extremely acrid and poisonous. Cattle seldom touch it. The plant loses most of its poison in drying.

Delphinium tricorne Michx.—The DWARF LARKSPUR, OR STAGGER WEED, of the northeastern quarter of the United States has been especially reported from Ohio as fatal to cattle in April, when the fresh leaves appear.

Delphinium consolida L.—The seeds of the commonly introduced FIELD LARKSPUR are well known to be poisonous; the leaves are known in Europe to be fatal to cattle.

Delphinium menziesii DC.—The PURPLE LARKSPUR of the northwestern quarter of the United States is very common throughout Montana. In one case of poisoning reported by Dr. E. V. Wilcox of the Montana Experiment Station, over 600 sheep were affected, 250 of which were claimed to have been killed by the weed. An experiment made by Dr. S. B. Nelson, professor of veterinary sciences in the Washington State Agricultural College, shows that it is possible to feed as much as 24 $\frac{3}{4}$ pounds of the fresh leaves to a sheep within a period of five days without



FIG. 45.—Dwarf larkspur (*Delphinium tricorne*), one third natural size.

any apparent ill effect taking place. An experiment made by Dr. Wilcox shows that the extract from less than an ounce of the dried leaves killed a yearling lamb in two hours, the dose having been given by way of the mouth.

Delphinium geyeri Greene.—The WYOMING LARKSPUR is well known throughout Wyoming, Colorado, and Nebraska under the name of POISON WEED. It is reported to be the most troublesome plant to stock in Wyoming, the dark-green tufts of foliage being especially tempting in spring when the prairies are otherwise dry and barren.

Delphinium recurvatum Greene.—This species of LARKSPUR grows in wet subsaline soil in the southern half of California. It has been reported from San Luis Obispo County as fatal to animals.

Delphinium scopulorum Gray.—The TALL MOUNTAIN LARKSPUR of the Rocky Mountains has been reported to the Canadian Department of Agriculture as poisonous to cattle in the high western prairies of Canada.

Delphinium trolliifolium Gray.—This plant is common throughout the coast region of northern California, Oregon, and Washington. In Humboldt County, Cal., it is known as COW POISON on account of its fatal effect on cattle. Its toxic character has been questioned. Perhaps it is not equally poisonous throughout all stages of its growth.

Helleborus viridis L.—The GREEN HELLEBORE is a European plant sometimes found as an escape from our gardens. All of the parts are poisonous. Cattle have been killed by eating the leaves.

Ranunculus sceleratus L.—The CURSED CROWFOOT, or CELERY-LEAFED CROWFOOT, is found throughout the eastern half of the United States and also in Europe. Cattle generally avoid all of the buttercups, but fatal cases of poisoning from this plant are recorded in European literature. When dried in hay, the plant appears to be non-poisonous. The BULBOUS CROWFOOT (*R. bulbosus*) and the TALL CROWFOOT (*R. acris*) are well known to be very acrid in taste, and it is probable that all of the species which grow in water or in very marshy land are poisonous.



FIG. 46.—Cursed crowfoot (*Ranunculus sceleratus*.)

BERBERIDACEÆ (Barberry Family).

Podophyllum peltatum L.—The leaves of the COMMON MANDRAKE, or MAY APPLE, of the eastern half of the United States, are sparingly eaten by some cattle. Cases of poisoning are very rare,

but the experience of one correspondent shows that the milk from a cow that had been feeding on the plant off and on for about three weeks was so extremely laxative as to be positively

poisonous. The incident occurred during babyhood, when cow's milk was the sole source of food. The physiological effect of the milk was precisely like that of mandrake. It was shown that the cow ate the plant, which was abundant in one pasture, and when the animal was removed to a pasture free from the plant the illness stopped at once.

BUTNERIACEÆ (Strawberry-shrub Family).

Butneria fertilis (Walt.) Kearney.—The large oily seeds of the CALYCANTHUS, or SWEET-SCENTED SHRUB, contain a poisonous alkaloid, and are strongly reputed to be poisonous to cattle in Tennessee.

PAPAVERACEÆ (Poppy Family).

Argemone mexicana L.—The MEXICAN POPPY is reputed to be poisonous to stock both in

the United States and in New South Wales. The seeds are narcotic, like opium.

Chelidonium majus L.—The yellow milky sap of the CELANDINE, an introduced weed common in the East, contains both an acrid and a narcotic poison. Both are powerfully active, but cases of poisoning are very rare, as stock refuse to touch the plant.

Papaver somniferum L., OPIUM POPPY, or GARDEN POPPY.—*P. rhœas* L., FIELD POPPY, RED POPPY, or CORN POPPY.—These plants are sometimes found as escapes from our gardens. Both contain acrid and narcotic poisons, and European literature records the death of various animals from eating their leaves and seed pods.

PRUNACEÆ (Plum Family).

Prunus caroliniana (Mill.) Ait.—The LAUREL CHERRY, or MOCK ORANGE, is native in the southeastern quarter of the United

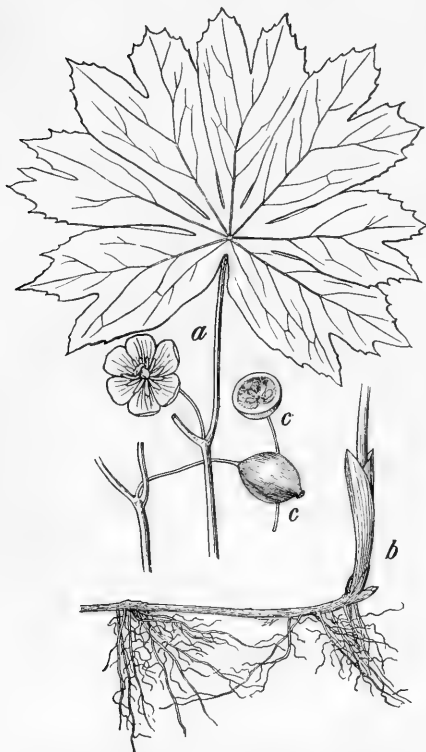


FIG. 47.—Mandrake (*Podophyllum peltatum*).

States, and is there often cultivated for hedges. The half-wilted leaves and the seeds yield prussic acid and are poisonous when eaten by animals.

Prunus serotina Ehrh.—The WILD BLACK CHERRY is a valuable forest tree which ranges throughout the eastern half of the United States. Cattle are killed by eating the partially wilted leaves from branches thrown carelessly within their reach or



FIG. 48.—Black cherry (*Prunus serotina*), one-third natural size.



FIG. 49.—Stemless loco weed (*Aragallus lambertii*): *a*, flowering plant; *b*, seed pod; *c*, cross section of seed pod—all one-third natural size.

ignorantly offered as food. The leaves of various other wild and cultivated cherries are probably poisonous to cattle in the same way.

VICIACEÆ (Pea Family).

Aragallus lambertii (Pursh.) Greene.—The LAMBERT, or STEMLESS LOCO WEED is, next to the following species, the best-known representative of a large group of closely related plants which are native to the western half of the United States, and are known as loco weeds on account of the peculiar crazy condition which they induce in animals that eat of their leaves. Horses and cattle are

both affected, but the chief damage is done to horses. After being permitted to graze on any of these plants the animal acquires an unnatural appetite for them and soon refuses all other kinds of food. It rapidly becomes unmanageable and crazy, and finally dies from the lack of proper nourishment.

Astragalus mollissimus Torr.—This, the WOOLLY LOCO WEED, is perhaps the best known of all the loco weeds. It is the species most abundant in Colorado, where from 1881 to 1885 nearly \$200,000 was paid out in bounties in an attempt to exterminate

it. The plant is still abundant in that State, and reports of the damage done by it continue frequent. Specimens of the three following species of *Astragalus* have been forwarded to the Division of Botany with the information that they were causing great financial loss in the districts noted. It is quite probable that other species are dangerous also.

Astragalus bigelovii A. Gray.—Especially reported from Plainview, Tex.

Astragalus hornii A. Gray.—Stock are affected by this loco weed in the southern part of California.

Astragalus pattersoni A. Gray.—This was especially reported from Flagstaff, Ariz., as poisonous to horses and to sheep.

Crotalaria sagittalis L.—The RATTLEBOX (RATTLE WEED; WILD PEA) is an annual weed which grows on sandy soil throughout most of the eastern



FIG. 50.—Woolly loco weed (*Astragalus mollissimus*); a, whole plant; b, section of pod—both one-third natural size.

half of the United States. In some years it is especially abundant in the bottom lands of the Missouri Valley. Horses and sometimes cattle are killed in this region by eating grass or meadow hay which is contaminated with the plant.

Lupinus leucophyllus Dougl.—This herbaceous shrub is a representative of a very large genus of plants, many of which are widely and abundantly distributed throughout the West, and are generally known as LUPINES. The above species is very abundant

in Montana, where it is said to have caused the death of a very large number of sheep. There is some question whether the animals are killed by a poisonous constituent of the plant or merely by bloat. The seeds of all the lupines are probably deleterious in the raw state. In Europe, however, the seeds of *Lupinus albus*, after the bitter taste has been removed by steeping and boiling, are eaten by human beings as well as by cattle.

Robinia pseudacacia L.—The common LOCUST TREE is native in the central and eastern parts of the United States, and is extensively cultivated for ornamental purposes throughout the Union. The bark and the leaves contain a powerful poison, and persons have been killed by eating these parts.

Sesbania vesicaria Ell.—The curious membranous-sacked seed pods of this annual vine were sent to the Department from South Carolina in November, 1897, with the information that similar seeds were found in the stomachs of cows that had died from eating some poisonous plant. This species was most strongly suspected.

Sophora secundiflora (Cav.) DC.—The beautiful bright red beans of the FRIJOLILLO, or CORAL BEAN, of southern and western Texas contain a powerfully poisonous alkaloid. The plant is said to have poisoned stock in Texas and in northern Mexico.

Sophora sericea Nutt.—The SILKY SOPHORA of the southern Great Plains region has been somewhat vaguely reported as one of the plants that “loco” horses in that region. The seeds contain a very poisonous alkaloid.

Thermopsis rhombifolia (Nutt.) Richards.—This plant is known as the PRAIRIE THERMOPSIS throughout the northern part of the Great Plains region. The seeds have been reported to the Canadian Department of Agriculture as being poisonous to children. Since the plant grows abundantly in pasture lands, it is here mentioned as a plant to be suspected in cases of stock poisoning.



FIG. 51.—Rattle box (*Crotalaria sagittalis*): *a*, whole plant; *b*, cross section of seed pod—both one-third natural size.

LINACEÆ (Flax Family).

Linum rigidum Pursh.—The LARGE-FLOWERED YELLOW FLAX is reported from Pecos Valley, Tex., as poisonous to sheep. An investigation made at this Department showed that the plant is poisonous.

MELIACEÆ (Umbrella-tree Family).

Melia azedarach L.—The CHINESE UMBRELLA TREE is much cultivated for ornament, and sparingly escaped from cultivation in



FIG. 52.—Caper spurge (*Euphorbia lathyris*): a, upper half of plant, one-third natural size; b, seed capsule, natural size.



FIG. 53.—Snow on the mountain (*Euphorbia marginata*): a, whole plant, one-third natural size; b, seed capsule, natural size.

the South. A correspondent from Arizona states that three of his hogs were poisoned by eating the seeds, which were ignorantly offered to them for food.

EUPHORBIACEÆ (Spurge Family).

Euphorbia sp.—There are many species of SPURGE native to the United States, nearly all of which contain an acrid milky juice. Stock generally avoid them, but cattle have been poisoned by drinking water into which the plants have been thrown. The

juice of *E. marginata* and *E. bicolor* is used to some extent in Texas to brand cattle, it being held to be superior to a red-hot iron for that purpose, because screw worms will not infect the fresh scar and the spot heals more readily.

Jatropha stimulosa Michx.—The seeds of the SPURGE NETTLE of the Southern States are extremely poisonous. Stock avoid the plant on account of its stinging hairs.

Ricinus communis L.—The CASTOR OIL PLANT is quite commonly cultivated in the warmer portions of the United States and has



FIG. 54.—Castor oil plant (*Ricinus communis*).



FIG. 55.—Red buckeye (*Aesculus pavia*): a, flowering branch; b, seed—both two-ninths natural size.

escaped from cultivation in the South. The seeds have been accidentally eaten by horses with fatal effect, and they have been strewn on pasture lands in the Northwest for the purpose of killing sheep that were trespassing thereon. A Frenchman has discovered a method of making cattle immune to the effects of the toxalbumin contained in the seeds, so that they may be fed to stock without causing any apparent ill effect.

BUXACEÆ (Box Family).

Buxus sempervirens L.—The leaves of the COMMON BOX, which is cultivated in the Eastern States for hedges, are poisonous to all kinds of stock.

CELASTRACEÆ (Staff-tree Family).

Celastrus scandens L.—The CLIMBING BITTERSWEET, or STAFF-VINE, is native in the northeastern quarter of the United States and in New Mexico. One case on record shows that a horse was badly, though not fatally, poisoned by eating the leaves.

ÆSCULACÆ (Buckeye Family).

Æsculus californica (Spach) Nutt. CALIFORNIA BUCKEYE.—*Æ. glabra* Willd. OHIO BUCKEYE, FETID BUCKEYE.—*Æ. hippocastanum* L. HORSE CHESTNUT.—*Æ. pavia* L. RED BUCKEYE.—

The leaves and fruit of these species are generally regarded as poisonous to stock. The fruit may be easily converted into food by washing and boiling. It is believed that a small quantity of the unprepared fruit of the California buckeye will cause cows to slip their young.

HYPERICACEÆ (St. John's-wort Family).

Hypericum perforatum L.—

The common ST. JOHN'S-WORT is commonly believed to cause disagreeable eruptions on cow's udders and on the feet of white-haired animals. This species and the spotted St. John's-wort (*H. maculatum* Walt.) were brought into the Department by Dr. G. W. Bready, from Norwood, Md., who stated that five horses were poisoned in May, 1898, by eating

meadow hay which contained nearly 50 per cent of these plants. One horse died from the effects of the poison, and two were killed to prevent their further suffering.

APIACEÆ (Carrot Family).

Cicuta maculata L.—This is the WATER HEMLOCK (SPOTTED HEMLOCK; BEAVER POISON; COWBANE) which grows most abundantly throughout the United States. It is one of our best known poisonous plants. Stock are not infrequently killed by eating the fleshy roots or hay with which the plants are mixed.



FIG. 56.—Water hemlock (*Cicuta maculata*), showing section of spindle-shaped roots and lower stem, the leaves, flowers, and fruit, one-half natural size; also fruit and cross section of seed, enlarged five times.

Cicuta vagans Greene.—Cattle are frequently killed in Oregon and Washington by eating the large fleshy rootstocks which have been washed, frozen, or dug out of the soil, or by drinking water in marshes where the roots have been trampled upon. The roots of the other species of *Cicuta* are undoubtedly poisonous, but cases have been reported against one other species only, namely, *C. bolanderi*. It grows in marshy land in California.

Conium maculatum L.—The well-known POISON HEMLOCK, or SPOTTED HEMLOCK of Europe, is an introduced weed

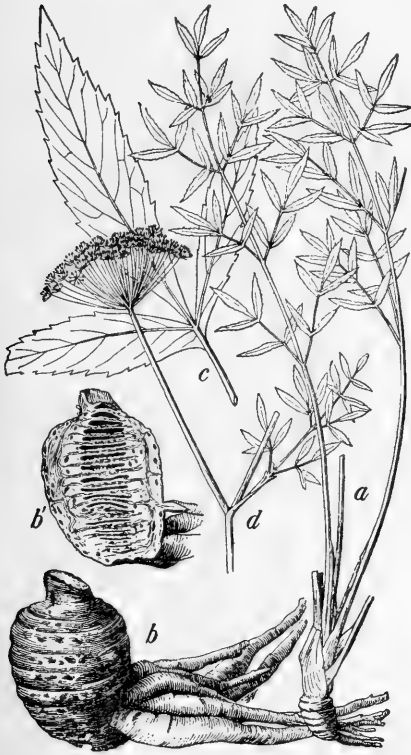


FIG. 57.—Oregon water hemlock (*Cicuta vagans*); *a*, plant with leaves, one-sixth natural size; *b* and *b'*, rootstock and horizontal roots, showing section, half size; *c*, terminal leaflets, one-sixth natural size; *d*, flowering spray, full size.



FIG. 58.—Poison hemlock (*Conium maculatum*), showing upper portion of plant with flowers and seed, one-third natural size.

not uncommon in the northeastern section of the United States and in California. The plant is generally avoided by stock on account of its bad odor, but animals have been killed by eating it in the fresh state. Since the poisonous constituent is volatile the dry plants are not so dangerous.

Oxypolis rigidus (L.) Britton.—The COWBANE is natural in swamps throughout the eastern half of the United States. The leaves and roots are reputed to be poisonous to cattle.

Sium cicutæfolium Gmel.—The leaves of the HEMLOCK WATER PARSNIP, which is more or less common throughout the United States, are said to be poisonous to stock.

ERICACEÆ (Heath Family).

Andromeda polifolia L.—The WILD ROSEMARY, or MOORWORT, is a plant native to the northern regions of Europe, Asia, and America, entering the United States only in the extreme northeast. The leaves, which have been eaten by sheep with fatal effect, contain a narcotic poison known as andromedotoxin. The plant



FIG. 59.—Narrow-leaf laurel (*Kalmia angustifolia*), showing flowering branch, one-third natural size.



FIG. 60.—Broad-leaf laurel (*Kalmia latifolia*); *a*, flowering spray, one-third natural size; *b*, vertical section of flower showing peculiar attachment of stamens, natural size; *c*, fruiting capsules, natural size.

is not very dangerous in its native habitat, because it grows in bogs which are inaccessible to stock.

Azalea occidentalis Torr. & Gray.—The CALIFORNIA AZALEA is very much dreaded by sheep men who drive their flocks into the southern Sierras for pasture. Investigation has shown that the leaves contain a poisonous substance.

Epigæa repens L.—The leaves of the pretty little TRAILING ARBUTUS (MAYFLOWER; GROUND LAUREL), so commonly known as one of the early spring flowers, are reputed to be poisonous to stock. A cow was reported to have been poisoned by the plant in Maryland in the winter of 1897. It contains no andromedotoxin.

Kalmia angustifolia L.—The NARROW-LEAF LAUREL is abundant in

the northeastern section of the United States, where it is also well known as SHEEP LAUREL and LAMBKILL. The leaves contain andromedotoxin, and sheep and calves are quite frequently poisoned by eating them.

Kalmia latifolia L.—The BROAD-LEAF LAUREL is native throughout the greater part of the eastern half of the United States, and is known by a great variety of common names, the most important of which are LAUREL and IVY. The latter name is most commonly used south of Maryland. Scores of cattle and sheep are poisoned annually by eating the plant. It is probably the most dangerous of all the shrubs belonging to the heath family.

Ledum glandulosum Nutt.—The CALIFORNIAN LABRADOR TEA grows at medium elevations in the Sierra Nevada range in California and in the Coast Range northward from Mendocino County. In selecting pasture land and in driving sheep through the mountains sheep men are careful to avoid the plant so far as possible.

Ledum grœnlandicum Cæder.—The LABRADOR TEA is an Arctic plant which may be found in bogs and swamps in the colder regions of the northeastern States. It has a slight reputation as a stock poison.

Leucothœ catesbæi (Walt.) A. Gray.—This is the BRANCH IVY, HEMLOCK, or CALFKILL, of the Allegheny Mountains. It is well known in that region to be fatal to all kinds of stock.

Leucothœ racemosa (L.) A. Gray.—The SWAMP LEUCOTHOË of the Atlantic and Gulf States has been reported from New Jersey as especially fatal to calves.

Pieris floribunda (Pursh.) Benth. & Hook.—The MOUNTAIN FETTER BUSH is native in the mountains from Virginia to Georgia and is sometimes cultivated as an ornamental shrub. Sheep have been poisoned by eating the leaves.



FIG. 61.—Branch ivy (*Leucothœ catesbæi*): a, flowering branch; b, fruiting capsules.

Pieris mariana (L.) Benth. & Hook.—The STAGGER BUSH of the Atlantic Coast region, Tennessee, and Arkansas is quite commonly known to be poisonous to calves and to sheep. The name STAGGER BUSH was applied to the shrub on account of the peculiar intoxicating effect of the leaves.

Rhododendron californicum Hook.—The CALIFORNIA RHODODENDRON is native on the Pacific Slope from San Francisco to British Columbia. The plant is reported from Oregon as poison-



FIG. 62.—Stagger bush (*Pieris mariana*), showing flowering branch, one-third natural size.



FIG. 63.—Great laurel (*Rhododendron maximum*): a, flowering branch; b, fruiting capsules—both one-third natural size.

ous to sheep. It is quite probable that the leaves contain andromedotoxin, but they have not been tested.

Rhododendron maximum L.—The GREAT LAUREL (ROSEBAY; MOUNTAIN LAUREL; RHODODENDRON) is a large evergreen bush or small tree which is quite commonly cultivated for ornament, and is found native in the Allegheny Mountains. The leaves contain andromedotoxin, and they are occasionally eaten by stock with fatal effect.

PRIMULACEÆ (Primrose Family).

Anagallis arvensis L.—The PIMPERNEL is a European plant which has obtained a specially strong foothold in California, where it

grows luxuriantly and is sometimes known as POISON WEED. It is suspected of having caused the death of a horse at Santa Ana. Chemists have isolated a powerfully poisonous oil and a strongly active ferment from the plant.

OLEACEÆ (Olive Family).

Ligustrum vulgare L.—The PRIVET, or PRIM, is a garden shrub, introduced from Europe and Asia, which is much used for hedges in this country, and has escaped from cultivation in western New York and southward to North Carolina. Accidents have been occasioned in children both by the fruit and the leaves. The plant is to be suspected in cases of poisoning in animals.

APOCYNACEÆ (Dogbane Family).

Apocynum androsæmifolium L., SPREADING DOGBANE.—**A. cannabinum L.**, INDIAN HEMP.—These plants are quite generally distributed throughout the United States. Stock generally avoid them in pasture fields on account of their acrid milky juice. When dry they are not so poisonous as when in the fresh state.

Nerium oleander L.—The OLEANDER is a common house plant throughout a large portion of the United States. It grows thriftily out of doors in the Southern and Western States, and has probably escaped from cultivation in some places. It grows wild in northern Mexico. The leaves are well known to be most powerfully poisonous, and stock are occasionally killed by eating them.

ASCLEPIADACEÆ (Milkweed Family).

Asclepias eriocarpa Benth.—This is the plant with broad mullein-like leaves which is known as MILKWEED in California. Several authentic accounts of the poisoning of sheep have been secured against the plant in Mendocino County. It is especially feared on very warm days by sheep men when they are compelled to drive their flocks through dry, barren valleys. It sometimes grows on cultivated land and is cut with hay.

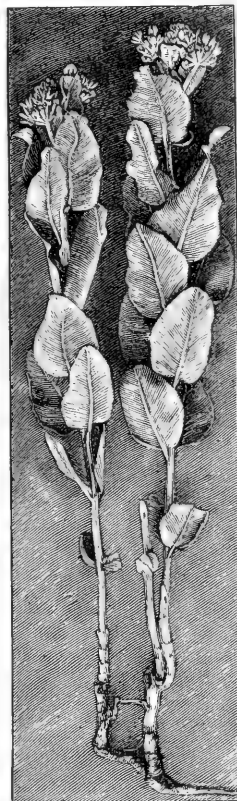


FIG. 64. -- Milkweed (*Asclepias eriocarpa*), one-sixth natural size.

Asclepias mexicana Cav.—This smooth NARROW-LEAF MILKWEED is native in dry ground in California, Oregon, and Nevada. Specimens of the plant were sent to this Department from Hanford, Cal., with the information that sheep and calves were not infrequently poisoned by eating the growing plant, and that cows were poisoned by eating hay which was contaminated with it.

Asclepias syriaca L.—This is the common MILKWEED, or SILKWEED, of the northeastern quarter of the United States. Experiments show that the milky juice so abundant in all parts of the plant is very acrid and poisonous. It is listed among the poisonous plants of Europe.

Asclepias tuberosa L.—The leaves of the BUTTERFLY WEED, or PLEURISY ROOT, of the eastern half of the United States are somewhat suspected of being poisonous to stock.

SOLANACEÆ (Potato Family).

Datura stramonium L.—**D. tatula** L.—These two species very closely resemble each other, and are most commonly known by the name of JIMSON WEED. They are European plants which have become vile weeds in waste grounds and about dwellings throughout the greater portion of the country. One or two instances are recorded in which cattle have been poisoned by eating hay containing the young leaves.

Hyoscyamus niger L.—The BLACK HENBANE is a vile, ill-

smelling plant, a native of Europe, now naturalized in Michigan, and from New York northward. One or two cases are recorded in foreign literature in which stock have been poisoned by eating the plant of their own accord, but there is very little danger from it, on account of its ill odor and harsh texture.

Nicotiana tabacum L.—This is the TOBACCO most commonly cultivated in the United States. It is native to South America and has escaped from cultivation to some extent in the Southern States. According to some authorities stock are not always dis-



FIG. 65.—Jimson weed (*Datura stramonium*): a, flowering spray; b, fruiting capsule—both one-third natural size.

posed to shun this plant on account of its characteristic ill odor and taste, but, on the contrary, will eat a small amount of the leaves with apparent relish, especially when they are somewhat fresh. Stock have, however, been poisoned by eating leaves which were placed within their reach to dry, and also by eating food contaminated with the juice of the leaves. Considerable precaution should be used in applying tobacco juice to fresh cuts or bruises in stock, as the poison is easily absorbed into the sys-



FIG. 66.—Bittersweet (*Solanum dulcamara*): a, flowering spray; b, fruit—both one-third natural size.



FIG. 67.—Black nightshade (*Solanum nigrum*), one-third natural size.

tem and may prove fatal. There are several native species of tobacco in the western half of the United States, all of which are undoubtedly poisonous if eaten even in moderate quantity.

Solanum dulcamara L.—The BITTERSWEET, or CLIMBING NIGHTSHADE, is a European weed, now introduced in the northeastern quarter of the United States. The leaves are suspected of being poisonous to stock.

Solanum nigrum L.—The BLACK NIGHTSHADE (COMMON NIGHTSHADE; GARDEN NIGHTSHADE) is a common weed in cultivated fields throughout the greater portion of the United States. Cattle

seldom eat the plant, but a few cases of poisoning are recorded for calves, sheep, goats, and swine.

Solanum triflorum Nutt.—The SPREADING NIGHTSHADE is a native of the Great Plains, and also a common garden weed from Arizona and Texas to British America.

Complaints of the poisoning of cattle by this plant have been sent to this Department from Nebraska. Experiments show that the berries are poisonous.

Solanum tuberosum L.—The small, immature tubers of the common cultivated potato and those that have turned green from exposure to the sun are slightly poisonous. The green fruit and the white sprouts from mature potatoes are likewise poisonous. In all of these cases the deleterious substance may be removed or destroyed by thorough boiling.

SCROPHULARIACEÆ (Figwort Family).

Digitalis purpurea L.—The PURPLE FOXGLOVE is a common garden plant which has sparingly escaped from cultivation and is naturalized to some extent on Cape Breton Island.

Horses are occasionally poi-

soned in Europe by nipping the plants from gardens or by eating hay contaminated with it.

Gerardia tenuifolia Vahl.—The SLENDER GERARDIA is native to the eastern half of the United States, and has been specially reported as poisonous to sheep and to calves in the Southern States.

Gratiola officinalis L.—The HEDGE HYSSOP of the Southern States contains an acrid poison. The same plant grows in Europe and is there regarded as poisonous to stock.

Pedicularis sp.—The plants of this genus are commonly called LOUSEWORT. In Europe several species are suspected of being slightly poisonous to stock. One of these, *P. palustris*, occurs in Labrador, and there are over thirty species native to the United States, largely Western. They should all be suspected of being poisonous.



FIG. 68.—Spreading nightshade (*Solanum triflorum*), one-third natural size.

CAMPANULACEÆ (Bell-flower Family).

Bolelia sp.—One or more species of this genus are suspected of being poisonous to sheep in California.

Lobelia inflata L., INDIAN TOBACCO.—*L. kalmii* L., BROOK BOLELIA.—*L. spicata* Lam., PALE-SPIKED LOBELIA.—*L. syphilitica* L., GREAT LOBELIA.—All of the species in this genus contain an acrid and usually milky juice and are poisonous. None has been specially reported as poisonous to stock, but the above-named species are to be suspected because they frequently occur in grass and are sometimes found in meadow hay.

AMBROSIACEÆ (Ragweed Family).

Xanthium canadense Mill.—The young seedlings of the American COCKLEBUR are reported from Texas as being rapidly fatal to hogs.

Xanthium spinosum L.—The SPINY CLOTBUR is suspected of being poisonous, but few cases have been definitely recorded against it. The seeds apparently contain a toxic compound.

Xanthium strumarium L.—The young seedlings of the BROAD COCKLEBUR are reported from Georgia as being fatal to hogs. Experiments seem to show that the seed is poisonous.



FIG. 69.—Sneezeweed (*Helenium autumnale*), one-third natural size.

CARDUACEÆ (Thistle Family).

Helenium autumnale L.—SNEEZEWEED (SNEEZEWEED; AUTUMN SNEEZEWEED; STAGGER WEED; FALSE SUNFLOWER) is found throughout the greater portion of the United States, being most abundant in the Southern and Eastern States. Sheep, cattle, and horses that are unfamiliar with the plant are often poisoned by it when driven to localities where it is abundant. Stock avoid it, as a rule, but it is claimed that they sometimes develop a taste for the plant and are killed quickly by eating it in large quantity.

Helenium tenuifolium Nutt.—The FINE-LEAFED SNEEZEWEED has been reported from several of the Gulf States, where it is a troublesome weed, fatal to horses and mules. It is not known to what extent cattle may feed on the plant with impunity, but the bitter principle in milk and meat sometimes met with in the Southern States is quite generally supposed to be due to these plants.

Senecio jacobæa L.—The TANSY RAGWORT, or STAGGERWORT, is a European plant which grows as a weed in ballast about New York and Philadelphia. Farther north, in Nova Scotia, it has become extensively naturalized, and it is there regarded by stock men as poisonous. It is interesting to note that *S. guadalensis* of Mexico is also considered fatal to stock.

Solidago sp.—A species of GOLDEN-ROD growing in Wisconsin is suspected of being very poisonous to horses. The damage is perhaps due to a parasitic growth on this plant. (See *Coleosporium solidaginis*.)

LIST OF PLANTS KNOWN TO BE POISONOUS TO STOCK.

Ergot, <i>Claviceps purpurea</i> (Fr.) Tul.	Coral bean, <i>Sophora secundiflora</i> (Cav.) DC.
Clathrus, <i>Clathrus columnatus</i> Bosc.	Chinese umbrella tree, <i>Melia azedarach</i> L.
Fly poison, <i>Chrosperma muscatoxicum</i> (Walt.) Kuntze.	Spurge nettle, <i>Jatropha stimulosa</i> Michx.
American white hellebore, <i>Veratrum viride</i> Ait.	Castor oil plant, <i>Ricinus communis</i> L.
Slender nettle, <i>Urtica gracilis</i> Ait.	Box, <i>Buxus sempervirens</i> L.
Pokeweed, <i>Phytolacca decandra</i> L.	Staff vine, <i>Celastrus scandens</i> L.
Corn cockle, <i>Agrostemma githago</i> L.	Common St. John's-wort, <i>Hypericum perforatum</i> L.
Aconite, <i>Aconitum napellus</i> L.	Water hemlock, <i>Cicuta maculata</i> L.
Western aconite, <i>Aconitum columbianum</i> Nutt.	Oregon water hemlock, <i>Cicuta vagans</i> Greene.
Dwarf larkspur, <i>Delphinium tricorne</i> Michx.	Poison hemlock, <i>Conium maculatum</i> L.
Field larkspur, <i>Delphinium consolida</i> L.	California azalea, <i>Azalea occidentalis</i> Torr. and Gray.
Purple larkspur, <i>Delphinium menziesii</i> DC.	Narrow-leaf laurel, <i>Kalmia angustifolia</i> L.
Wyoming larkspur, <i>Delphinium geyeri</i> Greene.	Broad-leaf laurel, <i>Kalmia latifolia</i> L.
Green hellebore, <i>Helleborus viridis</i> L.	Branch ivy, <i>Leucothoë catesbeii</i> (Walt.) A. Gray.
Cursed crowfoot, <i>Ranunculus sceleratus</i> L.	Swamp leucothoë, <i>Leucothoë racemosa</i> (L.) A. Gray.
Celandine, <i>Chelidonium majus</i> L.	Mountain fetter bush, <i>Pieris floribunda</i> (Pursh.) Benth and Hook.
Opium poppy, <i>Papaver somniferum</i> L.	Stagger bush, <i>Pieris mariana</i> (L.) Benth and Hook.
Field poppy, <i>Papaver rhœas</i> L.	California rhododendron, <i>Rhododendron californicum</i> Hook.
Laurel cherry, <i>Prunus caroliniana</i> (Mill.) Ait.	
Wild black cherry, <i>Prunus serotina</i> Ehrh.	
Rattlebox, <i>Crotalaria sagittalis</i> L.	
Locust tree, <i>Robinia pseudacacia</i> L.	

Great laurel, <i>Rhododendron maximum</i> L.	Black henbane, <i>Hyoscyamus niger</i> L.
Oleander, <i>Nerium oleander</i> L.	Tobacco, <i>Nicotiana tabacum</i> L.
Milkweed, <i>Asclepias eriocarpa</i> Benth.	Black nightshade, <i>Solanum nigrum</i> L.
Milkweed, <i>Asclepias syriaca</i> L.	Spreading nightshade, <i>Solanum triflorum</i> Nutt.
Jimson weed, <i>Datura stramonium</i> L.	Purple foxglove, <i>Digitalis purpurea</i> L.
Jimson weed, <i>Datura tatula</i> L.	Sneezeweed, <i>Helenium autumnale</i> L.

LIST OF PLANTS PROBABLY POISONOUS TO STOCK.¹

Mold, <i>Aspergillus glaucous</i> (L.) Link.	Mexican poppy, <i>Argemone mexicana</i> L.
Fly amanita, <i>Amanita muscaria</i> (L.) Fr.	Lupine, <i>Lupinus leucophyllus</i> Dougl.
Bracken fern, <i>Pteris aquilina</i> L.	Silky sophora, <i>Sophora sericea</i> Nutt.
Yew, <i>Taxus minor</i> (Michx.) Britton.	Large-flowered yellow flax, <i>Linum rigidum</i> Pursh.
Darnel, <i>Lolium temulentum</i> L.	Spurge, <i>Euphorbia</i> sp.
California false hellebore, <i>Veratrum californicum</i> Durand.	California buckeye, <i>Æsculus californica</i> (Spach) Nutt.
Death camas, <i>Zygadenus venenosus</i> Wats.	Ohio buckeye, <i>Æsculus glabra</i> Willd.
Alkali grass, <i>Zygadenus elegans</i> Pursh.	Horse chestnut, <i>Æsculus hippocastanum</i> L.
Lily-of-the-valley, <i>Convallaria majalis</i> L.	Red buckeye, <i>Æsculus pavia</i> L.
Red-root, <i>Gyrotheca capitata</i> (Walt.) Morong.	Spotted St. John's-wort, <i>Hypericum maculatum</i> Walt.
White baneberry, <i>Actæa alba</i> (L.) Mill.	Cowbane, <i>Oxypolis rigidis</i> (L.) Britton.
Red baneberry, <i>Actæa rubra</i> (Ait.) Willd.	Hemlock water parsnip, <i>Sium cicutaefolium</i> Gmel.
Wind flower, <i>Anemone quinquefolia</i> L.	Wild rosemary, <i>Andromeda polifolia</i> L.
Larkspur, <i>Delphinium recurvatum</i> Greene.	Pimpernel, <i>Anagallis arvensis</i> L.
Mountain larkspur, <i>Delphinium scopulorum</i> Gray.	Milkweed, <i>Asclepias mexicana</i> Cav.
Cow poison, <i>Delphinium trolliifolium</i> Gray.	Potato, <i>Solanum tuberosum</i> L.
Bulbous crowfoot, <i>Ranunculus bulbosus</i> L.	Pine-leaf sneezeweed, <i>Helenium tenuifolium</i> Nutt.
Tall crowfoot, <i>Ranunculus acris</i> L.	Tansy ragwort, <i>Senecio jacobæa</i> L.
Calycanthus, <i>Butneria fertilis</i> (Walt.) Kearney.	Spring clotbur, <i>Xanthium spinosum</i> L.
	Broad cocklebur, <i>Xanthium strumarium</i> L.

LIST OF PLANTS SUSPECTED OF BEING POISONOUS TO STOCK.¹

Cornsmut, <i>Ustilago maydis</i> Corda.	Leucocrinum, <i>Leucocrinum montanum</i> Nutt.
Golden rod rust, <i>Coleosporium solidaginis</i> (Schw.) Theum.	Crow poison, <i>Nothoscordum bivalve</i> (L.) Britton.
Field horsetail, <i>Equisetum arvense</i> L.	Atamasco lily, <i>Atamosco atamasco</i> (L.) Greene.
Sleepy grass, <i>Stipa robusta</i> (Vasey) Nash.	

¹ The following explanation appears on page 388: "The list as given is provisional for some species, as the reports upon which their reputation is founded are very meager and sometimes even contradictory. * * They are here enumerated, not necessarily because it is believed that they are poisonous, but with the view to eliciting more positive evidence either for or against them. Although comprehensive, the list is incomplete, for experience is constantly adding to the number already known or suspected to be poisonous."

- Oak, *Quercus* sp.
- Black greasewood, *Sarcobatus vermiculatus* (Hook.) Torr.
- Sleepy catchfly, *Silene antirrhina* L.
- Anise tree, *Illicium floridanum* Ellis.
- Mandrake, *Podophyllum peltatum* L.
- Lambert loco weed, *Aragallus lambertii* (Pursh.) Greene.
- Woolly loco weed, *Astragalus mollissimus* Torr.
- Loco weed, *Astragalus bigelovii* A. Gray.
- Loco weed, *Astragalus hornii* A. Gray.
- Loco weed, *Astragalus pattersoni* A. Gray.
- Sesban, *Sesbania vesicaria* Ell.
- Prairie thermopsis, *Thermopsis rhombifolia* (Nutt.) Richards.
- Trailing arbutus, *Epigæa repens* L.
- Californian Labrador tea, *Ledum glandulosum* Nutt.
- Labrador tea, *Ledum groenlandicum* Oeder.
- Privet, *Ligustrum vulgare* L.
- Spreading dogbane, *Apocynum androsæmifolium* L.
- Indian hemp, *Apocynum cannabinum* L.
- Butterfly weed, *Asclepias tuberosa* L.
- Bittersweet, *Solanum dulcamara* L.
- Slender gerardia, *Gerardia tenuifolia* Vahl.
- Hedge hyssop, *Gratiola officinalis* L.
- Lousewort, *Pedicularis* sp.
- Downingia, *Bolelia* sp.
- Indian tobacco, *Lobelia inflata* L.
- Brook lobelia, *Lobelia kalmii* L.
- Pale-spiked lobelia, *Lobelia spicata* Lam.
- Great lobelia, *Lobelia syphilitica* L.
- Golden-rod, *Solidago* sp.
- American cocklebur, *Xanthium canadense* Mill.

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