

UNIVERSITY OF IDAHO
AGRICULTURAL EXPERIMENT STATION

DEPARTMENTS OF BOTANY AND VETERINARY SCIENCE

SOME POISONOUS PLANTS
OF IDAHO

BULLETIN No. 86

FEBRUARY, 1916

Published by the University of Idaho, Moscow

UNIVERSITY OF IDAHO

Agricultural Experiment Station

BOARD OF REGENTS

HERMAN J. ROSSI, President.....	Wallace
H. HARLAND, Secretary	Payette
EVAN EVANS	Grangeville
WALTER S. BRUCE.....	Boise
T. A. WALTERS.....	Caldwell
BERNICE McCOY, Superintendent of Public Instruction, <i>ex officio</i>	Boise

EDWARD O. SISSON, Ph. D., Commissioner of Education.....	Boise
--	-------

REGENTS' COMMITTEE ON AGRICULTURAL EXPERIMENT STATIONS AND EXTENSION

H. HARLAND	EVAN EVANS	WALTER BRUCE
------------	------------	--------------

EXPERIMENT STATION STAFF

M. A. BRANNON, Ph.D.....	President, Botanist
J. S. JONES, M.S.(Agr.).....	Director, Chemist
E. J. IDDINGS, B.S.(Agr.).....	Animal Husbandman
J. J. PUTNAM, Ph.D.....	Bacteriologist
*C. L. von ENDE, Ph.D.....	Associate Chemist
N. S. ROBB, B.S.(Agr.).....	Agronomist
E. V. ELLINGTON, B.S.(Agr.).....	Dairy Husbandman
C. C. VINCENT, M.S.(Agr.).....	Horticulturist
M. A. WILLIS, M.S.....	Plant Pathologist
P. P. PETERSON, Ph.D.....	Soil Technologist
PREN MOORE.....	Poultry Husbandman
C. W. HICKMAN, B.S.(Agr.).....	Assistant Animal Husbandman
C. V. SINGLETON, B.S.(Agr.).....	Assistant Animal Husbandman
W. R. WRIGHT, B.S.....	Assistant Bacteriologist
H. P. FISHBURN, M.A.....	Assistant Chemist
C. W. COLVER, M.S.....	Assistant Chemist
RAY E. NEIDIG, M.S.....	Assistant Chemist
*S. J. KROH, B.S.....	Assistant Chemist
O. W. HOLMES, B.S.(Agr.).....	Assistant Dairy Husbandman
W. C. EDMUNDSON, M.S.(Agr.).....	Assistant Horticulturist
G. J. DOWNING, B.S.(Agr.).....	Assistant Horticulturist
C. V. SCHRACK, B.S.(Agr.).....	Assistant Horticulturist
G. W. GRAVES, M.S.(Agr.).....	Assistant Soil Technologist
G. S. RAY, B.S.(AGR.).....	Assistant Agronomist
L. C. AICHER, B.S.(Agr.).....	Superintendent Aberdeen Sub-Station
J. S. WELCH, B.S.(Agr.).....	Superintendent Gooding Sub-Station
G. W. DEWEY, B.S.(Agr.).....	Superintendent Jerome Sub-Station
F. H. LAFRENZ, B.S.(Agr.).....	Superintendent Sandpoint Sub-Station
C. B. HAMPSON.....	Foreman Caldwell Demonstration Farm

* By special arrangement.

SOME POISONOUS PLANTS OF IDAHO

By FLOYD W. GAIL, Department of Botany

SOME SUGGESTED REMEDIES

By A. R. HAHNER, Department of Veterinary Science

INTRODUCTION

Idaho is a mountainous state with heavy forests in the northern half and more open prairies in the southern half. It is one of the best grazing states and, under the above named conditions, it is probable that grazing will always be an important factor in the live stock industry of the state.

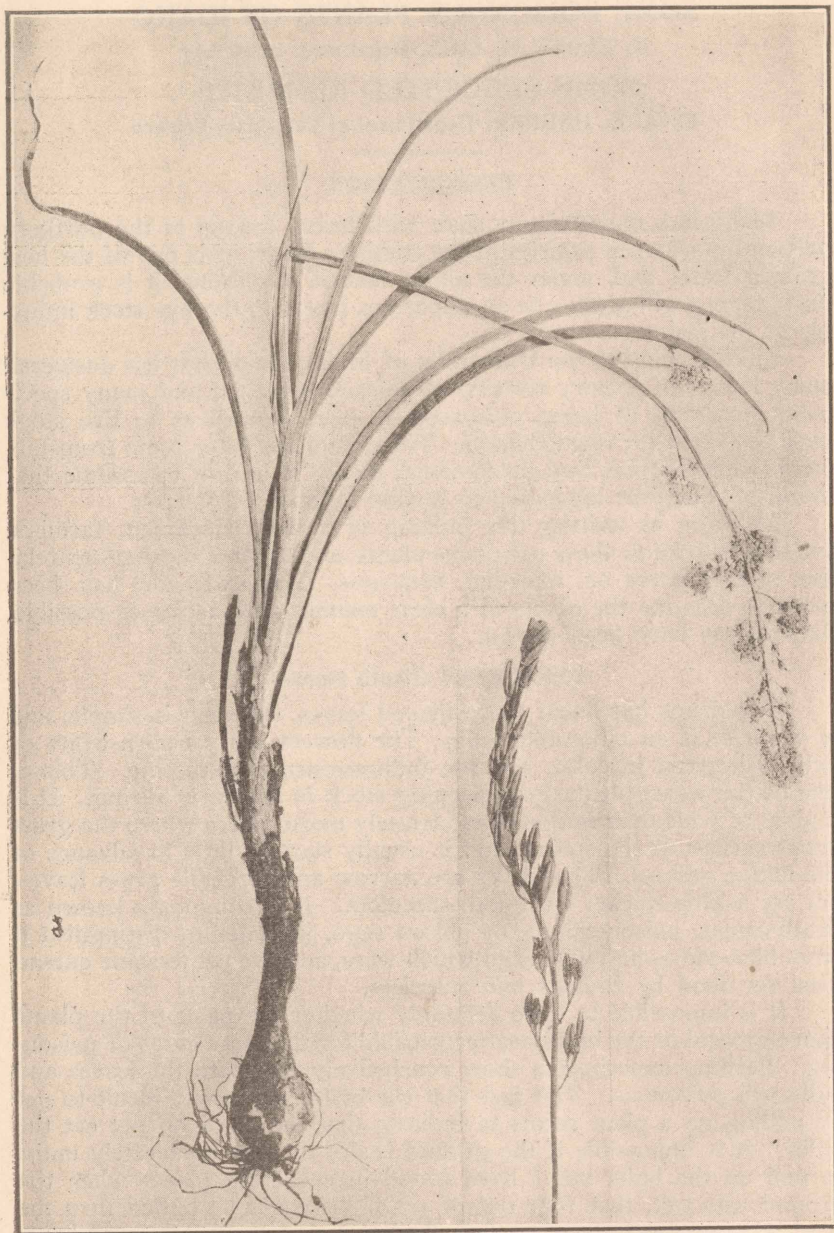
Since coming to the University of Idaho, the author has answered many letters of inquiry relative to poisonous plants, and many specimens suspected of being poisonous to man as well as to live stock have been sent for identification. These inquiries have come from farmers, business men, and professional men. It is safe to assume that the losses last year amounted to several millions of dollars.

The aim in writing this bulletin is to help stockmen, farmers, and others to know these poisonous plants, and to offer suggestions relative to preventive or remedial measures. An endeavor has been made to describe the plants in a clear manner and, as far as possible, illustrations have been shown.

ZYGADENUS (Death Camas)

Zygadenus has linear lance-shaped leaves, the stem is simple, and at the base is an onion-like bulb. The flowers are greenish-white or yellowish-green in color, and the inflorescence is a raceme. This is one of the worst plants for poisoning stock in the early spring. It is a plant of wide distribution in moderately moist places where the grass starts earliest in the spring, and it usually starts a little in advance of the native grasses. The leaves are narrow and resemble grass leaves, but are a little thicker and more succulent. It is commonly known as death-camas, poison-camas, or poison sego, in order to distinguish it from blue-camas and wild sego which were, and are yet to some extent, used for food by Indians and travelers.

It is impossible to state definitely whether the parts of the plants above ground or the bulbs are responsible for the more cases of poisoning. Feeding experiments show conclusively that both the leaves and bulbs are poisonous. The fact that the bulbs are very difficult to get by pulling up a plant seems to indicate that the stock do not eat the bulbs. It is impossible if the ground is dry or only moderately moist to pull up the bulb, but I have found in collecting plants when the ground was wet, that four out of six bulbs could be pulled thru the mud without much care, so that during a wet season it is probable that the stock do eat the bulb. Usually about twenty-one per cent of the animals affected by the plant die. In lambs that are still dependent upon the ewe's milk, there is a much higher percentage of fatality. The spring and summer of 1915 were very bad. One man wrote in May of last year that in four different outfits they had a loss of over

**ZYGADENUS**

1800 sheep, and that he thought it due to two plants which they wished to have identified. One of them proved to be death-camas; the other was in a very bad condition and was impossible to identify. He wrote,

"The symptoms of the poisoning are as follows: The animals are restless and froth at the mouth. In some cases the animal trembles violently. In about four-fifths of the cases death comes on in a few hours, while in others they linger on for two or three days."

Treatment: To prevent poisoning, determine localities where the plant is most abundant from year to year and have the herder keep the sheep away from such areas during the early spring when the plant is succulent and most tempting.

The potassium permanganate mixture has been highly recommended both as a chemical and physiological antidote. It is made by mixing equal parts by weight of potassium permanganate and aluminum sulphate. The dosage for sheep is from 8 to 12 grains, for horses from 30 to 50 grains, and for cows from 60 to 100 grains. These doses are for mature animals, and the dose should be decreased proportionately for small and young animals. The mixture should be dissolved in at least a pint of water shortly before using, and given as a drench. Do not give other medicines by mouth if permanganate has been given.

VERATRUM (Hellebore)

Veratrum is commonly known as false hellebore, swamp hellebore, crow poison, devil's bits, and in Idaho I have heard it called skunk cabbage. This is without much foundation, however, since the real skunk cabbage has a very disagreeable odor, while Veratrum has little or no odor. This is a stout, coarse, perennial varying in height from a foot and a half to eight feet and having a fleshy root. The leaves are large and broad at the base of the plant, becoming smaller toward the top, and large bracts in the inflorescence, which is a compound pannicle. The flowers are green or greenish-white in color, and they blossom in Idaho from June to September. It is found in all the states of the Northwest in wet meadows and along mountain streams.

Chemical analysis shows that about six alkaloids are present in the rhizome, the chief ones being jervine and ceradine. These alkaloids are used in some medicines, and cases of poisoning in man have occurred from overdoses. Accidental poisoning has also occurred. In one case, all the members of the family were poisoned by eating the young leaves which were taken for the leaves of the marsh marigold (*Caltha palustris*). Animals do not relish the plant since it is acrid and burning in the fresh condition, but young animals sometimes eat it with fatal results.

The active poison Veratrin belongs to the narcotic irritant group of poisons and in general produces the following symptoms: great depression of the heart and spinal cord, salivation, muscular weakness, diarrhoea, cold, clammy sweat, dilation of the pupils, and often flatulence and colicky pains. Death results from paralysis of the heart and respiration.

Treatment: Demulcent agents such as raw linseed oil are given to relieve the local irritation. Tannic acid in doses of 2 to 4 grams for sheep, 8 to 12 grams for horses, and 12 to 20 grams for cows is the chemical antidote. Heart stimulants such as alcohol, ammonia, spirits of glonion, and digitalis, and the application of warmth externally are

physiological antidotes. Where pain is great laudanum or chloral hydrate should be given.

CLAVICEPS PUPUREA (Ergot)

Ergot is a parasite on grasses; it is black and resembles kernel-shaped tar spots. It is found on rye, both the cultivated and the wild, (the latter being *Eleusis condensatus*), and also on canadensis, on the canary grass (*Phalaris canariensis*), prairie June grass (*Koeleria cristata*), and on brome grass (*Bromus*). It assumes an economic importance not so much for its destructiveness to grains as from the danger to domestic animals from eating it upon grasses. The chem-



CLAVICEPS

istry of ergot has been the subject of a large number of investigations, but the active principles have been established only by the recent work of Barger, Dale, and their co-workers who have isolated several alkaloids from the fungus. One of these, Ergotinine, $C_{35}H_{39}O_5N_5$, is almost inert, but its hydrate, Ergotoxine, $C_{35}H_{41}O_6N_5$, has a powerful action on tissues in man as well as in domesticated animals. Either alkaloid can be readily transformed into the other, and this may explain many of the discrepancies in the literature of the subject.

Chronic poisoning was formerly not uncommon, and in fact frequently gave rise to widespread epidemics from the use of bread containing ergot, after poor harvest, especially in wet seasons. The symptoms of ergot poisoning are divided into two groups, those of gangrene and those of nervous disorders.

In mammals treated with ergot, restlessness, salivation, sometimes vomiting and purging have been observed. Depression and weakness,

ataxia, and clonic convulsions follow on larger doses, which prove fatal by paralyzing the respiratory center. Gangrene is common in the pig, in which the ears, the extremities, and patches of the skin of the trunk become dry and hard and finally fall off. In pregnant animals abortion is often induced, but not invariably, even when very large doses are given. The most apparent effect upon cattle is gangrene of the legs and tail, with subsequent sloughing of the skin and underlying tissues of the affected parts. A number of cases were observed in horses, due to feeding upon wild hay which was infested with ergot. Symptoms were as follows: difficulty in swallowing (this difficulty became greater and greater until it was impossible for the animal to swallow either hay or water); the respiration and pulse became slow; the sense organs became less responsive than usual; and finally aggressive paralysis came over the entire muscular system. Death followed in a few hours from the time of the first attack. The animal would lie down and get up frequently, but showed no excitement or pain, and death came about in a very gradual manner. The grasses upon which the ergot is found are often cut for hay, so that losses from this course may be easily prevented by avoiding the use of the above mentioned grasses except when they are free from ergot.

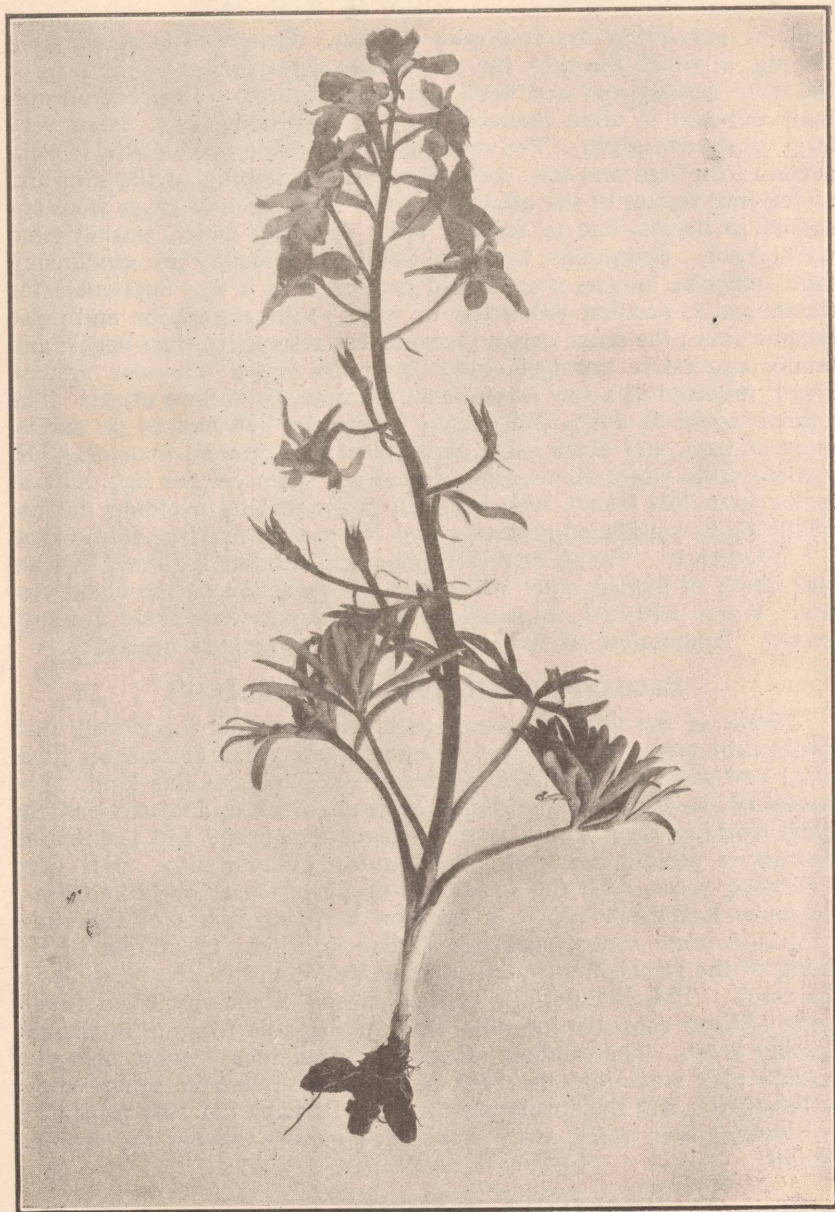
Treatment: Tannic acid is the chemical antidote. Chloral hydrate and spirits of nitrous ether will offset ergot's action on the blood vessels. Warm antiseptic applications to the gangrenous areas are suggested. Amputation of the ears and tail is sometimes necessary.

MECHANICAL INJURIES OF SOME GRASSES

Some of the grasses as well as other plants act injuriously in a mechanical way. Wild barley or squirrel-tail grass (*Hordeum jubatum*) and some of its related species are examples of this kind. The awned heads, when eaten with hay or grass, break up into sections, the awns working their way into the mucous membrane and insinuating themselves around the teeth, thus causing inflammation and deep ulcerating sores, with the formation of pus. Cheat or brome grass (*Bromus tectorum*) which is common in Idaho, parts of Colorado, Utah and other states, produces similar injuries. Ulceration of the lining of the stomach is caused by these awns, and death sometimes is the result. This is especially true of sheep. Some species of needle grass (*Stipa*) enter the intestinal tract, perhaps perforating it, thereby causing death. The sandbur (*Cenchrus tribuloides*), whose spiny involucre may work into the flesh of animals, sometimes brings about inflammation and the formation of pus. Perhaps the only remedy is preventive; keep stock away from such grasses during the fruiting season.

DELPHINIUM MENZIESSII (Larkspur)

The purple larkspur (*Delphinium menziesee*) and other species found thruout the Northwest are very dangerous to stock. The flower is blue, irregular, and has a long spur. Dr. Wilcox fatally poisoned a yearling lamb within two hours by administering the extract made from less than one ounce of the dried leaves. In addition to the common symptoms of poisoning, there are manifest a general stiffness and a



DELPHINIUM

staggering gait, especially in the posterior limbs. The course of the poisoning is quite rapid, and death usually takes place within a few hours.

Treatment: The potassium permanganate mixture is the chemical

antidote. Atrophine sulfate is a good physiological antidote. Bloating, which sometimes occurs, should be relieved with a trocar and canula.

ACONITUM (Monk's Hood)

Another plant in the same family is monk's hood (*Aconitum*). Several species in Idaho are poisonous. Death is caused by the stoppage of respiration. In the case of the horse the animal falls down and is unable to rise.

Treatments Tannic acid is the chemical antidote. Demulcents should be given to lessen intestinal pains. The physiological antidotes include heart and respiratory stimulants, as for example digitalis and belladonna or their alkaloids, given hypodermically. Inhalation of ammonia is also good.

LUPINUS (Lupine)

The lupines constitute a genus of plants belonging to the legume or clover family (*Leguminosae*). The genus is found in nearly every state in the union, but not extensively in the southern states. The plants are usually hairy thruout. The hairs upon the stem and leaves are so long and close together that the plants are given a grayish color which obscures the green to some extent. This varies with the weather and soil conditions. If one reads some agricultural newspapers, he will notice that *Astragalus* is quite commonly called loco or lupine. The loco weed has pinnately compound leaves, while the lupine has palmately compound leaves. The poisonous effects of lupines upon stock and especially upon sheep have been studied extensively in some countries of Europe, especially Germany. The disease is called lupinosis. Last summer I had occasion to witness some sick sheep, whose sickness was probably due to the lupine. The herder in transferring the sheep from one range to another had allowed them to graze for the night in a valley and on a hillside where lupine was very abundant. In the morning he found that about half of the two thousand sheep were sick. They were very uneasy; they would butt their heads into the banks and against one another; they would lie down and get up almost immediately, and the manager claimed he lost about two hundred sheep in this place. The pods on the lupine were quite mature. Dr. Pammel, Professor of Botany at Iowa State College, who has written "A Manual of Poisonous Plants," says, "in all cases of poisoning from lupine that have come to my notice, the plant has been eaten in a mature condition. When the lupine is cut or grazed upon before the ripening of the seeds, it appears not to produce any poisonous effects upon the stock." This agrees with the case of sheep poisoning to which I previously referred. This manager claimed that early in the spring he had the sheep to graze for the night in the same place, that they ate ravenously, and that no sheep were lost.

Cases of poisoning from lupine seed occur after the ground is covered with snow. The short grass and other edible plants of the range are covered by the snow, and only the lupines remain above the snow. An examination of lupine plants during the winter revealed the



LUPINUS

fact that a considerable number of the seeds are retained in the pods, altho the valves of the pod are split apart and twisted to quite an extent. In Germany, alkaloids have been extracted, and the poisonous principles are probably the same here as in Europe.

Treatment: The potassium permanganate treatment is recommended, if given shortly after the hay is eaten. The symptoms would indicate the use of sedatives as chloral hydrate or morphine to relieve the convulsions.



ASTRAGALUS (Loco)

We will next consider the loco or crazy weed (*Astragalus mollissimus*)—a silvery white leaved perennial six to twelve inches high,

with an abundance of soft foliage springing from a central stem close to the ground. It is a legume and has pinnately compound leaves; the flowers are usually purple in color. This plant is perhaps the most abundant in Colorado, but is found to a greater or less extent in several of the western states, and in western Kansas and Nebraska it is almost as plentiful as in Colorado. It is not especially particular about its habitat, as we find it in rocky places where there is little and poor soil, and we also find it in the open and rolling prairies.

Sheep, cattle, and horses are affected by this weed, but the greatest harm is done to horses. This is a slow disease and the animal may linger for six months or more. Sometimes the animal does not die directly from the loco, but the system is so undermined as to make it an easy victim to other troubles. The first stage may last several months, and during this time there will be evidence of defective eyesight, the animal may perform all sorts of antics, and it does not care to eat much except the loco weed for which it is quite ravenous. The second stage is a lingering period of emaciation, characterized by sunken eye-balls, hair without lustre, and feebleness. Finally the animal dies as if from starvation. The poison seems to be due to an alkaloid.

In regard to treatment, the majority of authorities claim there is little to be said. All medicines that have been tried seem to have been of doubtful effect. More can be done by keeping animals away from loco than any other way. As long as there is a plentiful supply of grass, there is little to be feared, but when pastures and ranges run low, stock should be watched.

At the first appearance of trouble the affected stock should be removed to some place where they cannot have access to loco. Good nourishing food should be given. If the disease has gained a strong hold on the animal there is little hope of recovery under the best of treatment, therefore the need of early treatment and prompt removal from the source of the trouble. Loco produces a more chronic form of poisoning than the plants previously mentioned. The symptoms produced are referable to disturbances of the cerebrum, with incoordination of the muscles and partial loss of the special senses. Sudden excitement will frequently produce convulsions. Rapid loss of flesh is quite common.

Treatment: To a large measure this consists in giving stimulants to the central nervous system, as Fowler's solution of arsenic or strychnine. Dietetic treatment is necessary, however. Few animals ever completely recover even under the best treatment.

CICUTA (Water Hemlock)

This plant belongs to the parsnip family (Umbelliferae). It is a tall, smooth, erect perennial herb with pinnate or pinnately compound leaves and serrate leaflets, terminal umbels, white flowers, and acute calyx teeth. It grows in marshes and low grounds in the Dakotas, Nebraska, Kansas, and the Rocky Mountain region generally. It is also found in the East to some extent.

Cases of poisoning by this plant have been reported by many of the states. The plant is frequently eaten by sheep with fatal results.



CICUTA (Water Hemlock)

The stem of the plant is hollow, and that portion of the plant just below the ground is also hollow, but has characteristic layers perpendicular to the sides of the stem, giving an irregular, but very char-

acteristic corrugated appearance in longitudinal section. A portion of this plant was received by the department two years ago accompanied by a letter from the father of a boy who had died three hours after he had eaten some of this portion of the plant. This plant is eaten by stock, especially sheep, when they are transferred from one range to another.

The poison is found in the root, stem and leaves, but more particularly in the root. The poisonous principle is cicutoxine, an amorphous, resinous substance with a disagreeable taste, occurring in an oily aromatic fluid. Very little can be done by way of direct remedy in case of serious poisoning by this plant. Our attention should, therefore, be directed to the eradication of the plant or to the prevention of stock from eating it. Water hemlock grows only along small streams or in marshes, and it would be well to keep stock from these areas until dry weather, when there would be no danger from the plant. Better still would be to cut out these plants. They are not usually very thick and the location is very certain, so that in a short time the location would be rid of them.

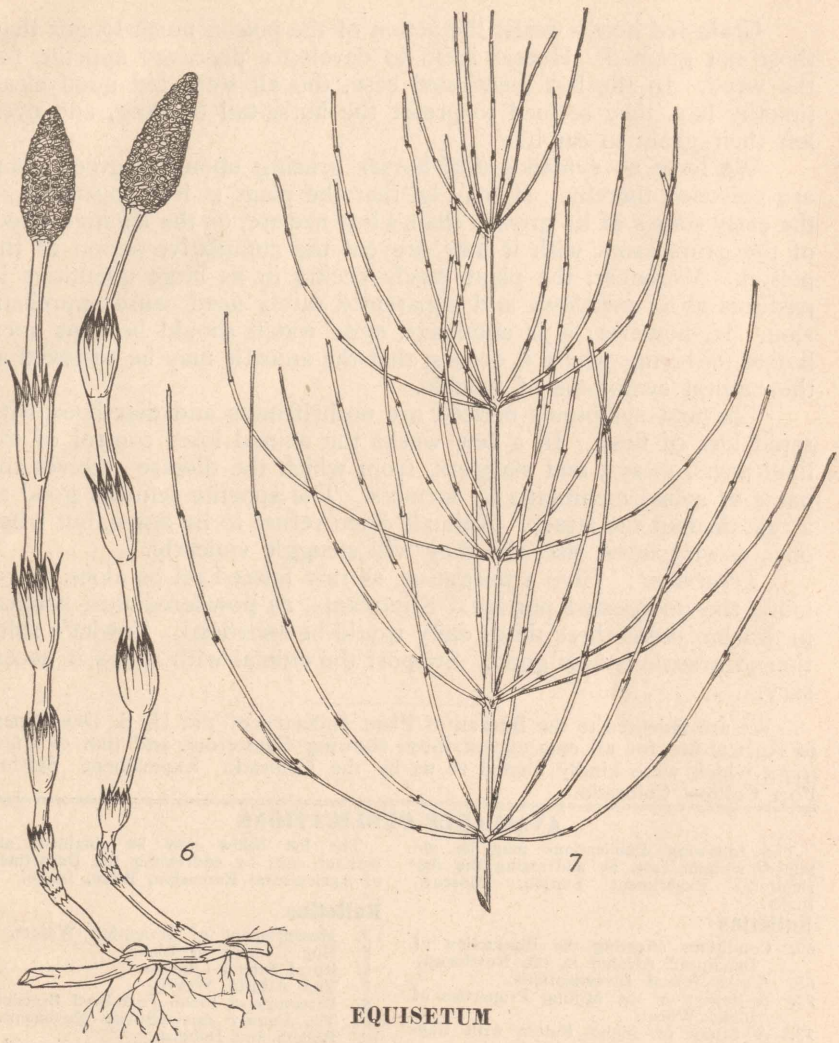
Acute continual abdominal pain is the main symptom noticed. The animal is in great agony, sweats profusely, and the temperature is high. There is frothing at the mouth and great mental excitement. Death takes place during violent convulsions. Post-mortem examination often shows acute gastric and intestinal inflammation. The symptoms are easily confused with those of Hemorrhagic Septicaemia, a bacterial affection.

Treatment: As animals often die in from fifteen to thirty minutes after being poisoned, treatment in such cases would be hopeless. Demulcent agents, such as lard or raw linseed oil would be beneficial, as the poison is a local irritant. Potassium permanganate would be useful if given soon enough. Chloral hydrate or morphine would relieve the pain and tend to quiet the animal.

EQUISETUM (Horse Tail)

Another poisonous plant, but one which is not a flowering plant at all, is the common horse tail (*Equisetum arvense*). It passes under the following popular names: colts tail, pine top, pine grass, meadow pine, jointed rush, snake grass, and horse tail. The last name is the best. It is a common native plant, and without doubt more or less of it is found on many farms in the State. It is also found in many other states, not only in the West, but in the Middle West and East. The plant thrives best in sandy or gravelly soil which is moist during part of the season. I have also observed it growing very rank in sandy bottoms where it is only a short distance down to water, and perhaps where it is overflowed annually. There are two kinds of stems, the sterile, which is much branched and quite like a horse's tail, and the fertile, which is not branched and which bears a cone at the summit which contains the spores. These fall to the ground and produce new plants.

Poisoning of horses by this plant is doubtless of frequent occurrence throuthout this state and other states as well. Dairy men have told me that when "foxtail," as they call it, is in the hay, it has no serious

**EQUISETUM**

effect upon cows. The testimony pertaining to sheep, however, is uncertain, as some say it does harm them, while others say it does not.

Young animals develop symptoms much more quickly and succumb to the equisetum poisoning sooner than the older ones. In one case under observation, a mare eating equisetum hay did not show symptoms until after four weeks, while her colt by her side developed typical symptoms of the poisoning and died in ten days. Nine out of fourteen horses on one farm, all fed alike upon good hay, were bedded with swale hay containing large quantities of this weed. They ate this bedding freely, and within three weeks all nine showed symptoms of poisoning; the remaining five bedded with straw kept perfectly well. The youngest, a three-year-old, was down and died a few days later. The oldest, an old brood mare, showed but slight symptoms, while the other seven, of intermediate ages, all staggered and reeled, altho they recovered.

Grain-fed horses resist the action of the poison much longer than those not grained. Horses seem to develop a depraved appetite for the weed. In the last mentioned case, tho all were fed good clean timothy hay, they seemed to prefer the horse-tail bedding, and even left their grain to eat it.

We have no evidence that horses grazing upon the green plant are poisoned thereby. It may be that the plant is less poisonous in the early stages of its growth than when mature, or the laxative effect of the grass eaten with it may prevent the cumulative action of the poison. Moreover, the plant rarely occurs in as large quantities in pastures as in meadows and apparently rarely need cause apprehension. If, however, it is abundant, close watch should be kept upon horses pasturing where it occurs, that the animals may be removed at the earliest symptoms of trouble.

The first symptoms noticed are unthriftiness and diarrhoea with rapid loss of flesh. In a few weeks the animal loses control of the hind parts, sways, and staggers, from which the disease receives the name of spinal meningitis by farmers. The appetite remains good as a rule throught the attack. Animals often refuse to lie down, but when once down cannot rise, tho they will struggle violently.

Treatment: Give a purgative, as raw linseed oil or aloes, to remove the undigested portion. Stimulants, as powdered nux vomica, in drachm doses three times daily would be beneficial. Fowler's solution of arsenic is also good. Support the animal with slings if necessary.

We are indebted to the Bureau of Plant Industry of the U. S. Department of Agriculture for all cuts except those showing *Equisetum*, and that of *Claviceps*, which were kindly loaned to us by the Colorado Experiment Station, Fort Collins, Colorado.

AVAILABLE PUBLICATIONS

The following Publications may be obtained, without cost, by addressing the Agricultural Experiment Station, Moscow, Idaho.

Bulletins

60. Conditions affecting the Production of Denatured Alcohol in the Northwest.
65. Alaska Wheat Investigations.
72. A Report on the Milling Properties of Idaho Wheat.
73. A Study of Idaho Butter with Suggestions for Improvement.
75. Composition of Irrigated and Non-Irrigated Fruits.
76. Tomato Culture in Idaho.
77. Lamb Feeding and Sheep Husbandry in Idaho.
78. Irrigation Practice.
79. Potato Culture.
81. Soils of the Cut and Burned-Over Areas of North Idaho.
82. Canning Fruits and Vegetables on the Farm.
84. The Annual Report of the Experiment Station for Year Ending June 30, 1915.
85. The Use of Lime-Sulphur as a Summer Spray for Apple Scab.
86. Some Poisonous Plants of Idaho.
87. Insect Pests of the Orchards and Gardens of Idaho, and Their Control.

Circulars

- No. 1. Spray Calendar.
- No. 2. Field Peas.

The list below may be obtained, also without cost, by addressing the Department of Agricultural Extension, Boise, Idaho.

Bulletins

3. Measurement of Irrigation Waters.
5. Hog Cholera in Idaho.
6. Rural School Lunches.
7. The Alfalfa Weevil.
8. Directory of Idaho Pure-Bred Breeders.
9. The County Agriculturist Movement.
10. Batters and Doughs.
11. Third Year Sewing-Girls' Club Work.
12. Instructions for Canning Fruits and Vegetables.
13. First Year Sewing-Girls' Club Work.
14. First Year Cooking—"Bread."
15. General Club Announcement.
16. Meat.

Circulars

1. Weeding Out Poor Orchard Varieties.
9. Hints to Help Chicken Raisers.
10. Home Economics Schools.
11. Farmers' Schools
14. How to Keep Fowls Healthy.
15. Fitting Fowls for Exhibition.

Idaho Farm Hints

20. Help Fight Hog Cholera.
21. Warning. Look Out for Potato Diseases.