July 2017

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L. H. Pammel
Iowa State College

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Poisoning from Cow Bane.

*(Cicuta maculata, L.)*

L. H. PAMMEL.

Common names: Water Hemlock, Spotted Cowbane, Musquash, Root or Beaver Poison.

The frequent poisoning from eating the root of Cowbane (*Cicuta maculata, L*) are not infrequent in the state of Iowa and elsewhere. It affects man, cattle and horses. Every now and then, there are accounts of poisoning from "wild parsnips" in our papers. The writer has at various times received communications with specimens of "wild parsnips." The subject is of considerable interest and especially so because the plant is widely distributed in Iowa and a large number of people are not aware of the poisonous nature of the root. Spotted Cowbane is a member of the Carrot family or as it is known botanically, *Umbelliferae.*

The family contains many important plants like the carrot, parsley, celery, valued for their food, while others like the caraway (*Carum carvi*), Lovage (*Ligusticum*), Anise (*Pimpinella Anisium*) Asafoetida (*Ferula Narthex and F. Scorodosma*) Coriandrum seeds (*Coriandrum sativum*) have aromatic properties and are used for culinary and medicinal purposes. Others like Poison Hemlock (*Conium maculatum*) are used in medicine. This plant and our cowbane are deadly poisonous. The former species has been used in medicine for centuries and it is supposed, is the plant mentioned by the Greeks to execute Socrates, Phocion and criminals.

The plant is naturalized in eastern North America but is seldom met with in Iowa. It is a coarse 1 annual with potted stems, large decompound leaves and white flowers.

*The order consists of herbs with alternate mostly compound leaves and flowers in umbels like the common cultivated carrot. The calyx or outer whorl of flowers is wholly adherent to the ovary. The limb of the calyx is obsolete or minutely five beaked. The five petals, inner whirl of the flower and stamens are inserted on the disk that covers the ovary. Ovary, two celled and two ovuled ovary. Fruit compound of two dry seed like carpels.*
SPOTTED COWBANE, MUSQUASH ROOT BEAVER POISON. (*Cicuta maculata*).

It is a smooth marsh perennial 2.5 feet high with pinnately compound leaves 2-5 times pinnate; the leaves have long petioles, the coarsely serrate leaflets are lanceolate to oblong lancolate 1-5 inches long. Stalk of the umbellets numerous and unequal. Flowers white, fruit broadly ovate to oval small 1 1/2 lines long. Grows in marshes and in low grounds. See plate 1. The stems spring from thick fleshy underground roots that taper at the lower end. These usually number from three to five but single specimens are also met with. On cutting the roots a sharp pungent odor is given off, intensified on boiling.

Figure 1—Fascicled roots of Cowbane, slightly reduced. Young stems coming out near the top. At (2) cross section of root. At (3) longitudinal section. Drawn by Charlotte M. King.
MISCRGOSCOPIGRAPHICAL STRUCTURE.

The roots of many umbelliferae have been examined both as to their secretory reservoirs and the structure of their roots.* 

For a study of these see Fluckiger and Hanbury; Pharmacographia, second edition.

A cross section of the root shows without magnification three distinct parts. The outer brown part cork and second a central part of lighter color. The vascular portion, (Central cylinder) part between cork and vascular region, darker than central part from which there may be seen oozing out a yellow resin, this is the Cortex.

A thin section put under the microscope will show that the cork consists of five to ten layers, elongated tabulated cells, the outer layer darker brown in color than the interior. This is the cork. The vascular portion occupies the center. It is white and contains numerous ducts arranged in a radial manner. Medullary rays start from the pitch and radiate outwardly in the central cylinder near the bundle sheath, but they consist

Figure No. 2.—Cowbane. Upper Fig. only of a single layer of cells. The longitudinal cells of Cork below Medullary ray cells. Drawn by L. H. P. Prepared for engraving by Miss King.

parenchyma cells in the vascular portion of the stem are filled with numerous small starch grains. The parenchyma cells in the vascular portion of the stem are filled with numerous small starch grains. The bulk of the root is made up of the cortex. It contains large parenchyma cells with numerous small intercellular spaces. It is also provided with large intercellular spaces in which the resinous product is found. This product is secreted by the surrounding cells which are minutely granular: These canals are either filled or contain large drops of resin. This product is soluble in alcohol, hot water alkalies and acids. The poison exists in this resinous product. Auken† has shown that the active principle is a resinous indifference substance to which he gave the name of Cicutoxin. Bohmg


†These are Schizogenic balsam passages in which cells recede from each other where they meet at an early stage of the development of the plant.

‡Journal Practical Chemistry 1888 p 105-151.

who obtained the principle in a pure condition, *Cicuta virosa*, states that it is a thick tenacious substance with a disagreeable odor. The dry root gives about 3.5 per cent while the fresh 2. Wittstein and Buignet found a volatile alkaloid called cicutine which according to Cimon is not poisonous. On the other hand an alcoholic extract of the dried root operated as a violent poison on animals. The active principle, whatever it may be, is found in resinous product occurring so abundantly in the resin passages of the parenchyma zone.

The parenchyma cells are large with numerous intercellular spaces, these contain minute granules. As determined by the section of agricultural chemistry these granules consist of cane sugar. This accounts for the sweetish taste of the roots. The medullary rays project into cortex and these cells also contain starch.

It may be of interest to review some of the cases which have come to my notice.

In 1893 the writer received from Eugene Brown of Mason City in Cerro Gordo county some root of the so-called “wild parsnip,” which had poisoned three boys respectively five, seven and nine years of age. The cases recovered. The specimens sent me proved to be Cowbane (*Cicuta maculata*). |

The following note by Professor A. A. Crozier is of interest. “Hon. Eugene Secor of Forest City, this state, a member of the Board of Trustees of the Iowa Agricultural College, brought me today a fleshy root of a plant of the water Hemlock, (*Cicuta maculata* L). The circumstances which brought it to his notice were as follows: A neighbor of his by the name of Mr. Oleson, a farmer of about fifty years of age, while dragging some potato ground upon bottom land about two weeks ago discovered one of the fleshy roots of this plant, and supposing it to be an artichoke, ate it and gave a portion of it to his two sons. He soon began to feel queer or “funny” as he expressed it, and went to the house where he was taken with a spasm, followed by two or three others, when he became unconscious and within half an hour, before a physician could be summoned from the village, two miles distant he

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Cowbané (Cicuta maculate), showing leaves, flowers and fruit. From the U. S. Dept. of Agriculture, division of Botany. Slightly reduced.
was dead. The children had probably eaten less of the root and being given an emetic, recovered. The plant is very common in the state and the roots are so pleasant to the taste to make it particularly dangerous. I may add that I ate a piece of the root the size of a filbert with little or no unpleasant effect."

The following from Mr. A. M. Illias:

RUTHVEN, IOWA, Jan. 12:—Prof. J. L. Budd, Iowa Agricultural College, Ames, Iowa. "I mail herewith a small paper box which contain some weed, of which I sent you a specimen last summer. This species of Hemlock as you call it, I picked out of a manger of a stallion, which took suddenly sick this morning. Sickness lasted but a short spell. Do not know whether this had anything to do with his sickness but am terribly prejudiced against it. Another instance a few days ago of a colt taking violently sick all at once, apparently no cause, there being considerable of this weed in the hay, and I had two cows lose their calves a short time ago; cows had access to this kind of hay. This quite frequently occurs hereabouts. On a neighboring farm where this weed abounds they lost nearly all their calves two years ago. apparently no cause, but of course there is a cause some where. I am satisfied some stock will eat, the leaves of this weed. If you can ascertain by this sample whether it will harm stock to eat it, would be pleased to have you answer it either by letter or by your writings in the Register of Des Moines. Of course I do not know whether this weed will harm stock if eaten by it, simply make these suggestions for your consideration."

The specimens were turned over to me and I replied in a short note in Register, mentioned its poisonous qualities.

I also insert the following interesting letter from J. A. Minteer:

EXPERIMENT STATION, AGRICULTURAL COLLEGE, { AMES.

Gentlemen:—I have just had a strange experience with my cattle, having lost a four year old cow and a yearling calf. I think that they were poisoned on some kind of weed root found in the slough. I locate it on a spot where a hay stack stood about two years ago. It had been removed except the spoiled hay in the bottom. Last fall being dry, I pitched it up, dried and burned the old hay, sowed rye and timothy seed, ran the disc harrow over it several times and noticed that we turned out lots of roots like small sweet potatoes, except that they were all connected at the top. I thought they were the root of a weed that

†Iowa State Register Jan. 21st 1891.
grows a stalk similar to a seeded parsnip, have a strangely top similar to an elder berry when in bloom. The stock when mature is hollow. Now I am not certain that I am right about the top as it had been mowed before I discovered the tubers. I never thought of them doing any harm, just thought we had torn them out so they would die and do me no harm, but as the cattle, 17 in number were brought up Sunday evening they appeared to be all right until they came into the barn yard when a cow fell down and seemed to have a spasm. It only lasted a few minutes when she got up walked about 100 feet and fell again, got up and walked about thirty rods, fell again and died in about thirty minutes. The yearling was alright until turned into the lot. In about twenty minutes she was taken in the same way except a little more severe, rose two or three times and died in about fifteen minutes. I was satisfied that they were poisoned, but the cause worried me for a while then I remembered the tubers I saw in the slough, I went next morning before turning the cattle out and found that the cow and yearling had been eating some of the roots. I gathered up nearly one half a bushel of the tubers, turned out the cattle and have had no trouble since. On opening the cows, I found considerable of the tubers in the stomach and the inside of the stomach was very black, and by scraping with a stick, I could scrape the inside of the stomach all off, as though it had been scalded. I will put a small piece of the stomach in the package with the tubers. Please let me know if the tubers I send are the deadly poison that I think they are, and how much of it is necessary to kill a cow. Some fall pigs have eaten some of the stuff from the cows stomach and it seems to do them no harm."

Yours truly,

Hartley, Iowa.

Prof James Wilson informs me that a Mr. Hoover of Traer was poisoned by eating some of the roots of this plant. The following additional observations on a few cases of poisoning may be of interest:

*Darlington says: The mature fruit of this plant has a strong anise odor. The root is poisonous, and the lives of children and others are often endangered and sometimes destroyed by eating it, in mistake of that of the sweet Cicely (Osmorrhiza longistyris, D. C.) The herbage is also said to be destructive to cattle, when eaten by them; all of which serves to know the importance of sufficient botanical knowledge, among the people, to enable them to understand and avoid or extirpate the evil.

*Pflora Cestraca, p 104.
Dr. Erwin F. Smith gives an account of a case of poisoning from this plant. He says as follows: "During the warm days which melted the snow and brought back the birds and gave indications of spring time, some children of a neighborhood on the outskirts of the city gave vent to their feelings by digging and eating some artichokes which grew upon some low ground bordering a brook. Two of these boys were taken violently ill, and one of them eight years old died within an hour after he had eaten the root. Dr. Smith states that upon an examination of the stomach and the root from which he ate it was proven beyond a doubt that Cicuta maculta was the cause of death.

Lindley says:
*A most dangerous poison resides in the roots of this plant; a drachm of the fresh root has killed a boy in an hour and a half; and in America fatal accidents arising from its being mistaken for other apiaceous plants are not uncommon. It has been used as a substitute for conium, with similar effect, except that it is more energetic. A dangerous poison, producing effects similar to those of hydrocyanic acid. It appears to cause true tetanic convulsions in frequent paroxysms, and death on the third day. Christison Haller considered it the conium of the Greeks. It appears to be fatal to cattle.

The following from Rafinesque:† "Several persons searching for Angelica root, sweet flag, sweet sisily (which all have a pleasant smell and taste) have eaten this root by mistake. And some have died in an hour's time. The effects of the poison were violent convulsions, a frothing mouth, a bleeding nose, dilated pupils, etc."

†Robert Bentley, says: "Water Hemlock or Cowbane is another indigenous plant of a highly poisonous nature, — Cicuta maculata, a native of America has very poisonous roots, which, for having been mistaken for other harmless Umbelliferae, have not infrequently led to fatal results."

Dr. Masters says as follows of Cicuta virosa to which our species closely related: "This plant is dangerously poisonous having qualities like those of Conium; indeed it is called water hemlock. It produces tetanic convulsions and is fatal to cattle eating the herbage. In April 1857, two farmer's sons were found lying paralyzed and speechless close to a ditch where they had been working. Assistance was soon rendered but the poor fellows soon expired. A quantity of the Hemlock grew in a ditch where they were employed. A piece of

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*Lindley Flora Medica p 34.
the root was subsequently found with the mark of teeth in it near where the men lay and another piece of the root was discovered in the pocket of one of them, so that there can be no doubt that they were poisoned by eating the root of this plant by mistake for some other. The root of the American *Cicuta maculata* is even more virulent.*

Dr. Vassey† says, concerning this plant:

"It is composed of a number of fleshy, oblong portions diverging from the base of the stem; frequently as long and as thick as a man’s finger. It has a strong penetrating smell and taste. It is often mistaken by children for the wild parsnip, or is supposed by them to be eatable, and every year the papers contain accounts of fatal poisoning from the use of the root. It is highly desirable that information may be diffused respecting this and other poisonous and deleterious plants, so that such accidents may be avoided. The root has been to some extent employed by medical men. Its effects are much the same as the European Hemlock (no way related to the tree called hemlock in the United States) but it is now rarely used."

The following are symptoms from poisoning from spotted cow-bane. Dr. Millspaugh, in his American Medicinal Plants, Fascicle 4, No. 67 has recorded the following observations concerning the physiological action of the *Cicuta maculata*:

"Many cases of poisoning from the root of this species have been reported, all showing, by the symptoms, that Cicuta produces great hyperæmia of the brain and spinal cord. The following case reported by letter to Dr. Bigelow‡ by Dr. R. Hazeltine, (1818) gives all the symptoms noted by observers in all the other cases. A boy had eaten of certain tuberous roots, gathered in a recently plowed field, supposing them to be artichokes but which were identified as the roots of *Cicuta maculata*. His first symptom was a pain in the bowels, urging him to an Inaffectual attempt at stool after which he vomited about a teacupful of what appeared to be the recently masticated root, and immediately fell back into convulsions which lasted off and on continuously till his death. The doctor found him in a profuse sweat and convulsive agitations, consisting of tremors, violent contractions and distortions with alternate and imperfect relaxations of the whole muscular system, astonishing mobility of the eyeballs and eyelids, with wide-dilated pupils, stridor dentium, trismus, frothing at the mouth and nose, mixed with blood and occasionally violent and genuine epilepsy. The convulsive agitations were so powerful and incessant, that the

*Treasury of Botany, Pl. 1, p 284.
†U. S. Department of Agriculture Report, 1884, p. 135.
doctor could not examine the pulse with sufficient constancy to ascertain its character. At the post mortem, no inflammation was observed, the stomach was fully distended with flatus, and contained about three gills of muciform and greenish fluid, such as had flowed from the mouth. This mass assumed a dark green color on standing."

POISONOUS EFFECTS UPON DOMESTIC CATTLE.

The literature upon this part is very limited and unsatisfactory, some authors claiming that the horse, sheep and goat can eat it with impunity, others state that cattle fed were poisoned by eating the fruit, leaves and roots. Some experiments have been made upon the lower animals at the college veterinary hospital, by Dr. E. S. McCord, a graduate of the college. The first experiment was upon a rat which was secured and anaesthised; it was given a hyperdermic injection of one dram of the decoction prepared from the root. In almost one hour the animal seemed to be in more or less pain and shortly afterward appeared in a comatose condition, remaining in that condition for about two hours and after that seemed apparently well. The second experiment was performed upon a dissecting specimen of the equine species at the hospital Sept. 29th. It was given one dram of the decoction hyperdermically without any effect;

Sept. 30th gave the same animal one half ounce of the same root macerated with the feed without any results. Some of the fresh root was obtained a very strong decoction was made of it; on Sept. 31, gave the animal six drams of the decoction hyperdermically. In about ten minutes the animal began to show uneasiness, pulse was full and fast. In a short time the patient laid down and the pulse decreased. The patient seemed to be in a distressed pain, stretching full length on the ground and pointing to side with the nose, pulse at that time hardly discernable, kept moving extremities.
This lasted for about one half hour when the patient began to get better and soon recovered. Another experiment was made on a cat, macerated a portion of the root with some potato, the animal ate it without any disturbance, this was at noon. In the evening it received 20 cc in milk; the animal showed no signs of uneasiness, at about nine o'clock it received a subcutaneous injection of four drams without any effect. Dr. McCord concluded that the cat could eat it with impunity.

Prof. Henry Trimble of Philadelphia writes me that the general opinion of farmers in that locality is that it is very poisonous to cattle, and that one of the students found that the dried root had no effect on a cat, but when administered as soon as gathered it produced great uneasiness and vomiting in five gramme doses. The writer of this paper has eaten small portions of root on several occasions. The effects remained a long time producing numbness in the mouth and pharynx.

TREATMENT: In cases of poisoning from this plant emetics should be given promptly, anaesthetics and narcotics used to control the spasms. Dr. Hemphill of Cerro Gordo county reports to me that large doses of stimulants (whiskey) greatly relieved the patients and aided in recovery. Lene and Falk also report that internal, external stimulants and the hyperdemic injection of morphine aided in recovery. †

†Medical News XI, p. 524,
IS THE CULTIVATED PARSNIP RUNNING WILD POISONOUS?

Public opinion, in the west at least has answered this question in the affirmative. There is diversity of opinion concerning the plant which causes the poisoning. The majority of people attribute the cause to the parsnip running wild and this belief is indeed very wide spread. So wide spread is this belief that it seems quite impossible to dispel it from the minds of some people. I have been particularly fortunate in the cases which are here recorded to identify the specimen in every case which caused the poisoning, and moreover, I have also, to offer good evidence that the cultivated parsnip running wild does not cause poisoning.

The wide spread belief of the poisonous nature of the cultivated parsnip running wild is entertained by a large number of people and also to some extent by the medical fraternity. A few years ago Prof. Frederick B. Power of Passaic, New Jersey, and one of his pupils (Mr. J. T. Bennett) undertook some experiments to determine whether the cultivated parsnip running wild had any toxic properties.*

Mr. Bennett failed to detect the presence of any poisonous principle in the root of the true wild parsnip (*Pastinaca sativa,* and when the boiled roots were fed in considerable amounts to a cat, no symptoms of poisoning were manifest. We may add as a further testimony that Prof. Power† reports that his associate, Dr. Cramers, insisted upon eating one-half of one of the raw roots from Mr. Rynning of West Salem, Wisconsin; which were supposed to cause cases of the poisoning: Dr. Cramers reported no ill effect whatever. One of the largest of the

*Contributions from the department of Pharmacy of the University of Wisconsin, No. 2, 1886, p 99-44. Also Pharm. Rundschau, 1886, p 161.
†Pharmaceutische Rundschau. Vol. IX., July 1891, p 162.
fresh raw roots weighing three and one-half ounces Avoridupois, was chopped fine, mixed with some meat and fed to a small dog. The animal ate it greedily and without disturbance. There were no symptoms whatever of any poisonous action. I have on different occasions eaten the wild parsnip, Pastinaca sativa, without any ill effect, so that the above results are corroborated. I will admit that I had some hesitancy at first and that Mr. Sexton, the foreman of the horticultural department did not expect to see me alive by evening. I must confess also that the roots were somewhat woody and not very palatable.

Dr. J. J. Brown,* Sheboygan, Wisconsin, as quoted by Dr. Power, states that he had prepared and dug enough wild parsnips for a good dinner which he ate and can testify that he could discover but little difference cooked or raw, from cultivated parsnip and those which had run wild for about 50 years.

Danglison† makes a statement that wild parsnip is an irritant poison and has an acid pungent taste with more or less bitterness. It produces excessive heat with dryness of the mouth and throat and violent vomiting continuing after the stomach is empty. Also purging with great pain in the stomach and bowels. The pulse becomes strong and breathing difficult, the pupil of the eye is dilated and insensibility resembling death comes on.

Prof. Power also reports a statement made by Millspaugh‡ who said: "The root is succulent, nutritious, sweet and in this cultivated state very pleasant to many, but when wild or in its second year's growth, it is rank and acid, poisonous causing Emesis and inflammation of the alimentary canal, followed by flatulent colic and Diuresis.

Prof. Power§ also reports of Dr. Pupcke's cases where seven children ate of the cooked wild roots. All labored under delirium tremens. They were in constant motion, talked incessantly without knowing what they saw, fancied they saw objects which had not existed and occasionally had attacks of convulsive laughter and rejected everything offered them and had to be restrained by force.

Dr. Power reports three other cases; 1 and 2, case one in Wisconsin, 2 in Minnesota and case 3 from Dubois, Pennsylvania. All proved to be the cow-bane.

The cases reported by Prof. Power, the writer and others are instructive as showing that in nearly all cases where it was attributed

*Sheboygan Times, May 8, 1886.
†Medical Dictionary, Ed. 1873, p 827.
‡Amer. Medical Plants, Fascicle 4, No. 43.
§Pharmaceutical Journal, 1848, p 184.
to parsnip running wild, the roots sent with specimens indicated that Cowbane had been eaten. Experimentally no better evidence is needed than these where persons have eaten the wild parsnip and no ill effects followed. People should therefore become familiar with the deadly plant described above and throw aside superstitious beliefs. In this very common belief we have another evidence that writers who have attributed the poisoning to cultivated parsnips running wild have not investigated for themselves, they have assumed that the plant is poisonous.