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Two Hemlocks

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POISONOUS PLANTS • TWO HEMLOCKS

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Hemlock is the common name applied to three genera of vascular plants found in the United States. One of them (*Tsuga*) is a coniferous tree. It can sometimes cause mild skin irritation, but is otherwise not poisonous. The other two (*Cicuta* and *Conium*) are aromatic herbs of the carrot or umbel family (*Umbelliferae* or *Apiaceae*) and are notorious for their potentially lethal properties. Both are widely distributed, well known plants. Both have rather straightforward diagnostic features that appear to have been ignored by the many people who have had terminal encounters with these plants and consumed them by accident.

CICUTA MACULATA • Water hemlock

Also known as spotted hemlock, wild parsnip, snakeroot, beaver poison, and false parsley, *C. maculata* is a tall, aromatic, glabrous perennial herb, with compound leaves and compound umbels of small, white flowers. Its sap has a parsnip-like odor. The plants are found in wet or swampy sites. What sets this one apart is its swollen tuberous stems, at and below the surface, that are divided into chambers. I was involved in a local incident of water hemlock back in the 1970's during the back to Nature movement. The victims were young adults who wanted to collect and prepare a meal from the countryside. The survivors said later they thought they were eating a wild potato. I can't recall ever eating one divided into compartments. Mistaking the plants for Queen Anne's lace and wild celery are commonly reported.

Symptoms. Water hemlock is equally toxic to all classes of livestock and to us. The symptoms that follow will explain why it has been called the most violently poisonous plant on the North American continent. First comes excessive salivation, followed within minutes by tremors and convulsions so violent that the head and neck are turned rigidly back, legs may be flexed as though running, and lateral clamping or chewing motions of the jaw and grinding of the teeth occur. The tongue may be shredded and teeth broken when attempting to pry the mouth open to administer treatment. Gross symptoms resemble those of grand mal epilepsy. Pupils are dilated and temperature is elevated. A common phenomenon in humans is retrograde amnesia of the entire event. A more recent case history adds another dimension. After appearing to recover from the event, the patient had dreams, anxiety attacks, and visual disturbances. Clinical observations indicated severe mental impairment that last for several months.

My favorite recounting is the following:

"When about the end of March, 1670 the cattle were being led from the village to water at the spring, in treading the river banks they exposed the roots of this *Cicuta* (water hemlock), whose stems and leaf buds were now coming forth. At that time two boys and six girls, a little before noon, ran out to the spring and the meadow through which the river flows, and seeing a root and thinking that it was a golden parsnip, not through the bidding of any evil appetite, but at the behest of wayward frolicsomeness, ate greedily of it, and certain of the girls among them commended the root to the others for its sweetness and pleasantness, wherefore the boys, especially, ate quite abundantly of it and joyfully hastened home; and one of the girls tearfully complained to her mother that she had been supplied too meagerly by her comrades, with the root.

Jacob Maeder, a boy of six years, possessed of white locks, and delicate though active, returned home happy and smiling, as if things had gone well. A while afterwards he complained of pain in his abdomen, and, scarcely uttering a word, fell prostrate on the ground and urinated with great violence to the height of a man. Presently he was a terrible sight to see, being seized with convulsions, with the loss of all his senses. His mouth was shut most tightly so that it could not be opened by any means. He grated his teeth; he twisted his eyes about strangely and blood flowed from his ears. In the region of his abdomen a certain swollen body of the size of a man's fist struck the hand of the afflicted father with the greatest force, particularly in the neighborhood of the ensiform cartilage. He frequently hiccupped; at times he seemed to be about to vomit, but he could force nothing from his mouth, which was most tightly closed. He tossed his limbs about marvelously and twisted them; frequently his head was drawn backward and his whole back was curved in the form of a bow, so that a small child could have crept beneath him in the space between his back and the bed without touching him. When the convulsions ceased momentarily, he implored the assistance of his mother. Presently, when they returned with equal violence, he could be roused by no pinching, by no talking, or by no other means, until his strength failed and he grew pale; and when a hand was placed on his breast he breathed his last. These symptoms continued scarcely beyond a half

hour. After his death, his abdomen and face swelled without lividness except that a little was noticeable about the eyes. From the mouth of the corpse even to the hour of his burial green froth flowed very abundantly, and although it was wiped away frequently by his grieving father, nevertheless new froth soon took its place. [Jacobson, C. A. 1915. Water hemlock (*Cicuta*). Nevada Agric. Exp. Stat. Tech. Bull. No. 81]

Toxic Principles. The entire plant is toxic, especially the chambered underground rootstock. The principle toxin is cicutoxin, a long chain highly unsaturated alcohol. It is a yellowish, oily liquid, chemically similar to caratotoxin, in carrots, which has a very low toxicity.

CONIUM MACULATUM • Poison or Spotted Hemlock

Its general description parallels that of water hemlock – tall, aromatic herb with compound leaves and compound umbels of small, white flowers. It resembles the wild carrot (*Daucus carota*). It differs from *Cicuta* and other members of the carrot family in having prominent purple blotches or streaks on its stems. Think of the word immaculate. The im- prefix turns spotted into spotless.

Symptoms. Poisoning appears rapidly, beginning with salivation, nausea, vomiting, and irritation of the pharynx. Later the mouth becomes dry, and the victim suffers from thirst, but is unable to swallow. Ataxia of lower limbs, coldness of extremities, weakened and slowed heartbeat, hypertension, dilated pupils, convulsions (sometimes), coma, paralysis of the skeletal muscles, those regulating the respiratory movements being the last to be affected. Death comes from respiratory failure

Toxic Principles. Plants contain a series of nicotine-like alkaloids, including coniine, n-methyl coniine, conhydrine, pseudoconhydrine, etc., with similar toxicological effects. Various alkaloids dominate at different times in the life of plant. Roots are the lowest in toxins; seeds the highest. In young plants, leaves are the most toxic. Sixty mg will cause toxic effects; 150-300 mg is fatal.

The Death of Socrates. His was not the first reported death from hemlock in ancient Greece. That was the fate of the general and politician Thiramenes in 404 BCE. A few others followed in short order. Socrates was put on trial in 399 BCE. Although he wrote nothing and founded no school, he was found guilty of impiety and the moral corruption of the youth. As was the custom, the jury also sentenced him to death and determined that he would be forced to drink a beverage containing hemlock and opium. I suspect that this may be the most famous plant poisoning in history. Historians note that Socrates was offered two alternatives. He could pay a modest fine or agree to live in exile. He rejected both offers, which has led some to argue that he committed suicide.

Much of what we think we now about the death scene comes from Plato, a student of Socrates, in his *Phaedo*. Plato was not actually present, but relied on the account of one of his students.

“The boy went out, and after spending a long time, came in with the man who was to give the poison carrying it ground ready in a cup. Socrates caught sight of the man and said, ‘Here, my good man, you know about these things; what must I do?’ ‘Just drink it,’ he said, ‘and walk about till your legs get heavy, then lie down. In that way the drug will act of itself.’ ... [H]e put the cup to his lips and, quite easy and contented, drank it up. He walked about, and when he said that his legs were feeling heavy, he lay down on his back, as the man told him to do; at the same time the one who gave him the potion felt him, and after a while examined his feet and legs; then pinching a foot hard, he asked if he felt anything; he said no.

After this, again, he pressed the shins; and, moving up like this, he showed us that he was growing cold and stiff. Again, he felt him, and told us that when it came to his heart, he would be gone. Already the cold had come nearly as far as the abdomen, when Socrates threw off the covering from his face – for he had covered it over – and said, the last words uttered, ‘Crito,’ he said, ‘we owe a cock to Asclepius; pay it without fail.’

... [A]fter a little time, he stirred, and the man uncovered him, and his eyes were still. Crito, seeing this, closed the mouth and eyelids. This was the end of our comrade... a man, as we would say, of all then living we had ever met, the noblest and the wisest and most just.”

And then there is the Neoclassical painting, *La Mort de Socrate*, by Jacques-Louis David in 1787. It also suggests a serene event. But certain liberties were taken. Socrates appears much more youthful than his 70 years. Plato, who was not present, was portrayed much older than his 29 years. Two of the paintings earliest admirers were Thomas Jefferson and Sir Joshua Reynolds. It now hangs in The Metropolitan Museum of Art in NYC, where I have had the great pleasure of seeing it. It was smaller than I thought it would be.

A question remains. Review the list of symptoms. There is much more to coniine poisoning than simple ascending motor

paralysis. It is difficult to reconcile them with the serene and peaceful images of Plato and David. As Ober (1977) has suggested, "The simplest answer is that he [Plato] wanted to preserve the noble image of his friend and teacher... and that he wanted no undignified details to obscure the heroic manner of his death."

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