

Hemlock and hemlock poisoning

John Launer 

The coast of Pembrokeshire in Wales is one of the most beautiful parts of the United Kingdom. It is also full of historical sites, including the bay where Henry Tudor landed in order to seize the crown from Richard III of England and establish the Tudor monarchy. My wife and I were walking close to that historic spot during the summer, when a man coming in the opposite direction warned us urgently not to proceed. The path, he explained, was overhung with a plant called water hemlock that was one of the most poisonous indigenous plants in Britain. A mere touch, he said, might cause serious illness to a walker, and ingestion could be fatal. He seemed to know what he was talking about, so we set off in another direction and decided we should probably supplement our interest in coastal walking and history by refreshing our knowledge of botany.

Water hemlock, it appears, is only one of several poisonous hemlock plants. They belong to the same botanical family as many edible vegetables including carrot, celery and parsley, known as *Apiaceae* or *Umbelliferae*. The latter term refers to the fact that they flower on clusters of short stalks, spreading out like the ribs of an umbrella. Their grouping as a family is somewhat haphazard, based on their appearance rather than any known common ancestor. Some of the inedible members of the family are merely unpleasant in their effects, like giant hogweed (figure 1), also known as giant cow parsley, which causes a phototoxic rash on contact. A genus called *Cicuta* includes several fatal species, including *Cicuta maculata* or water hemlock, the one we almost encountered on our walk (figure 2). Another genus called *Conium* comprises four species which can be fatal, including poison hemlock, similar in appearance to water hemlock although water hemlock actually has a higher concentration of toxins. Another umbellifer, *Oenanthe crocata*, the hemlock water dropwort, is equally dangerous. (The hemlock tree, so called because of the apparent similarity of its smell, is a conifer that is unconnected to any of these and harmless).

FATAL IN TINY AMOUNTS

Hemlock poisoning is common in horses, sheep, cattle and other livestock, where it can also cause teratogenicity.¹ It is less common in humans, although some deaths may be misdiagnosed or go unexplained.² Where cases are identified, it is often because a family or a group of friends are all suffering the same symptoms after eating a salad or stew containing hemlock.³ Usually, someone has confused these with another innocuous herb or root vegetable. Online guides to wild foraging all explain how to tell the difference between edible, inedible and toxic umbellifers, although the more sensible ones advise people never to identify plants from the internet or books alone but to get expert advice.⁴ (The figures in this article are offered with the same warning). Every part of any kind of hemlock is poisonous, including the seeds. The roots can be fatal even in tiny amounts.

Poison hemlock contains alkaloids including coniine, which has a similar structure and effects as nicotine. Water hemlock contains circuitoxin, which acts as a GABA receptor antagonist. The onset of symptoms from ingesting hemlock is dramatic, with gastrointestinal upset, hypersalivation and sweating.⁵ On arrival in hospital patients may have hypoxia,

severe metabolic acidosis, circulatory instability including arrhythmias, rhabdomyolysis and joint dislocations. With poison hemlock this can proceed to respiratory failure, and with water hemlock to prolonged tonic-clonic seizures and coma. Treatment consists mainly of airway management and seizure control, with haemodialysis if there is renal failure. Prompt recognition and admission to intensive care are key, otherwise death is rapid. There is no routine assay for the toxins so diagnosis depends on the history, accompanied where possible by a botanist identifying the species. Patients who regain consciousness stop having seizures within 24 to 48 hours of poisoning, although these may persist for up to 96 hours. Resolution of the main symptoms may take several days, although restlessness, muscle twitching and anxiety may continue for months.

LITERARY AND HISTORICAL CONNECTIONS

Many people will know of hemlock mainly through its literary and historical connections. It figures in innumerable book titles, including crime novels, suggesting that the word holds a strong grip on the public imagination, as well as having a satisfying ring of finality to it. Hemlock appears in the bible: the prophet Hosea refers vividly to idolators entering into legal disputes 'as hemlock in the furrows of a field.'⁶ Its best known appearance in literature is at the beginning of John Keats's 'Ode to a



Figure 1 Giant hogweed, *Heracleum mantegazzianum*

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Figure 2 Water hemlock, *Cicuta maculata*

Nightingale', as memorised by generations of school children⁷:

My heart aches, and a drowsy numbness
pains
My sense, as though of hemlock I had
drunk,
Or emptied some dull opiate to the drains
One minute past...

Considering that Keats was a qualified apothecary, it is surprising that he regarded it as a cause of somnolence rather than hyper-arousal, or that he likened it to an opiate. As one anaesthetist has tactfully pointed out, 'The fact that unconsciousness comes late with hemlock poisoning suggests that Keats's experience was not personal.'⁸

The poet was in good company in the liberties he took with pharmacology. In the plays of Shakespeare, hemlock has three small but symbolic walk-on parts (in the war-torn fields of France in 'Henry the Fifth,' in the witches brew in 'Macbeth', and in the garland that King Lear wears as his crown when he goes insane.) However, it has also been proposed as the active ingredient of 'hebenon', the unknown potion that Claudius pours into the ear of Hamlet's father in order to kill him. Some doctors may ponder whether any poison could be lethal by an aural route, or if Shakespeare would have known that this might just about be feasible via a perforated ear drum and the Eustachian tube.⁹ For the rest of us, 'the willing suspension of disbelief', as recommended by Keats's

friend Samuel Taylor Coleridge, is probably all we need.

HEMLOCK AND SOCRATES

This brings us to the philosopher Socrates, the most famous historical figure to undergo execution by being forced to drink hemlock – a common form of death sentence in ancient Greece and thereafter (figure 3). His follower Plato described what happened as follows:

He walked about until, as he said, his legs began to fail, and then he lay on his back, according to the directions, and the man who gave him the poison now and then looked at his feet and legs; and after a while he pressed his foot hard, and asked him if he could feel; and he said, No; and then his leg, and so upwards and upwards, and showed us that he was cold and stiff. And he felt them himself, and said: When the poison reaches the heart, that will be the end.¹⁰

The account may be the source of Keats's idea of 'drowsy numbness' but is no less puzzling from the medical point of view. Explanations for this include the possibility that the description of a horrible death was sanitised,¹¹ that the drug given was an entirely different one or mixed with opium,¹² or that Socrates was fortunate enough to respond with a kind of non-viral Guillain-Barre syndrome.¹³ If the debate illustrates anything, it may be the clinical limitations of using a retrospectoscope.

To end on a lighter note, I was relieved to find that the severe symptoms of hemlock poisoning cannot occur from skin contact alone. Although guidance aimed at farmers and gardeners warns that handling water hemlock without gloves can cause dermatitis in sensitive people,¹⁴ this scarcely figures at all in the medical literature, where there is more emphasis on the risks of skin contact with hemlock's troublesome but non-lethal cousin, giant hogweed. If my wife and I had done our botanical reading beforehand, we probably could have continued on our walk in Pembrokeshire.



Figure 3 Jacques Louis David: the death of Socrates.

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