



THE BOOK OF

POISONS



GUSTAV SCHENK



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I

The Nature of Poison

AFTER the experiences of the last world war and in comparison with the horrors which the future appears to hold in store, the perils that lurk in nature seem likely to have lost their terror for us. Man seeks, as always, to master the forces and materials of nature and to turn them to his advantage. But, as we know only too well, the principal 'advantage' he is pursuing today is increased ability to bring death to his fellows. If we think of poisons our imagination conjures up frightful and unknown poison gases, loathsome bacterial toxins and even the spread of pestilential radioactivity which, in any future war, might blight the surface of the earth and every living thing upon it. True, all these instruments of human power, all these murderous products of man, are ultimately derived from natural sources. Yet we make a clear distinction between the forces of nature utilized in nuclear physics and atomic research, and what we normally call nature—the seas, deserts, mountains, forests, rivers and prairies, the natural landscapes from which indigenous man used once to derive all he needed for his day to day existence, and nothing more.

This harmonious and beneficent aspect of nature has always been a consolation to man. Nature welcomes him into her domain, when he does not interfere with her. There are many accounts from the last war of fighting men who found solace in a brief escape from the turmoil and the bloodshed to conditions in which they could feel themselves simply creatures on the earth, caught up in the changing of the seasons and the action of the elements.

Nevertheless, man's estrangement from nature is irreversible. Urbanization long ago rendered him incapable of seeing into the

true heart of undisturbed nature. Yet it is as well to remember that even when the harmony of natural conditions is left undisturbed, nature is not always beneficent to man. When we consider the various natural poisons—beginning with those contained in plants—which are capable of acting upon us with sudden and lethal violence, we are looking at nature in her pristine state, where the will and works of man have no part.

We who have grown accustomed to facing weapons of war of immense destructive efficiency—including substances whose toxic effects are derived from cosmic energy—do well to appreciate that, even without human intervention, nature has at her disposal powerful forces to which man is no more immune today than he was thousands of years ago. First amongst these are the plants. Some mysterious common instinct seems to have led all the peoples of the world to discover independently of one another and long before the dawn of history, when there was no way in which knowledge could be transmitted across wide tracts of land or across the oceans, the tremendous potentialities for good or ill that reside in plants. They used these powers sometimes in wisdom for the benefit of the tribe, and sometimes in hate as deadly weapons against their enemies.

For the poisons contained in plants possess this dual character. They can bring healing or death, their effect may be beneficial or lethal.

Nowadays, when we think of harmful or deadly vegetable poisons, our imagination ranges far afield. We recall the arrow poisons of the South American Indians, the magic potions of shamans and medicine men, the plant juices which intoxicate, evoking wild or wonderful hallucinations, and finally bring about the addict's physical ruin. It rarely occurs to us that the vegetable poisons in our immediate environment, in the surrounding meadows and the nearby woods, are capable of equally deadly effects. Nor do we remember that the very same destructive force inherent in poisons is able to cure us when we are sick. It is in the nature of plant poisons that their otherwise deleterious action may protect the human body from damage or destruction by disease. There are few vegetable poisons which cannot also

be used for therapeutic purposes. Even cicutoxin, the bitter principle in water hemlock, is used in extreme dilution as a medication in homoeopathy, although in allopathy cicutoxin is regarded as one of the few substances which is exclusively toxic.

It is always a good thing to face the facts without delay. But we need first to steel our nerves, for the facts we are about to contemplate will place quite a strain upon them.

II

The Vegetable Poisons All Around Us

WE shall never understand the beneficial effects of a poison unless we first consider the havoc it can wreak. Beside the ponds and marshes of Europe grows the Water Hemlock, *Cicuta virosa*, an umbelliferous plant popularly and appropriately known as cowbane or beaver poison. The toxin contained in this plant is so virulent and so horrifying in its effects that the Water Hemlock may well be said to typify the lethal power of plants. Related to it is another umbelliferous plant, the Spotted Hemlock, *Conium maculatum*, which has been known as a source of deadly poison throughout history. Plato gives a very exact description of how Socrates received the hemlock cup from the hands of the State, drank it and died. It is quite clear from Plato's careful account that it was Spotted Hemlock which Socrates took and not Water Hemlock, the effects of which are just the reverse. Socrates died of general paralysis, whereas the active principle in Water Hemlock, cicutoxin, is a typical convulsivant poison.

The pleasant, harmless-looking Water Hemlock fringes the banks of lakes, stagnant pools and marshes. Its white umbellate blossoms with the stellate seed-pods glow in the summer sunshine. The blossom is composed of partial umbels, delicately attached to a practically smooth surface and merging almost indistinguishably in the gently-rounded compound umbel. Here and there one of the detached, fleshy roots floats up against the edge of the pond. Anybody eating one of these roots would notice only that it had a flavour resembling carrot or parsley. They smell like celery, and so well camouflaged is their utterly

lethal nature that it is easy for children or the ignorant to pick them up and use them for food. This plant assumes an even more phantasmal quality when we recollect that it was precisely the stems of Water Hemlock from which, throughout the bucolic period of Ancient Greece and the whole antique world, Pan pipes were made. Thus the selfsame plant that causes man a horrible death provided the musical instrument from which all Western music is derived.

Water Hemlock has not infrequently been confused with edible plants like parsley, parsnip or celery. Reports of such errors may still be read in hospital records. At the same time, the deadly effects of the bitter cicutoxin have long been known, and it has been employed both for suicide and murder. Peoples living close to nature have always been aware that the poison content of Water Hemlock's celery-like juice is highest in spring, and that a single tuber, the rhizome, contains a lethal dose, the virulence of which is not exceeded even by strychnine.

In a book on poisons we must not shrink from the effects these poisons have on the human organism. Of all vegetable poisons none is more terrifying and dramatic in its operation than cicutoxin, which is present in all parts of the Water Hemlock but especially in the tuber.

The first symptoms of cicutoxin poisoning are not long in showing themselves. Twenty minutes, or at the outside an hour, after ingestion the mouth and throat begin to burn. The first abdominal pains occur together with nausea, palpitation and vertigo. Strangely enough, these initial symptoms are accompanied by a feeling of intoxication, betrayed outwardly in a staggering gait, dimming of vision and drowsiness. This initial intoxication is quite different from that brought on by alcohol. The sufferer's helplessness is immediately evident. His general feebleness demonstrates to him unmistakably that he is in the grip of some insidious dark power, from which there is no escape. His will breaks down and his ability to take counter-measures is destroyed. A brief faint brings him temporary relief from his suffering.

But all this is merely a prelude to the real process of destruc-

tion. After the faint the sufferer is seized by the first terrible convulsion, often accompanied by screams and vomiting. Typical of this stage is the way the sufferer seems to become inflated, as though he had not strength enough to open his mouth and release the air stored in his lungs. His torments are by no means over with the onset of the first convulsion, which may last anything from thirty seconds to two minutes. The convulsion involves all the muscles of the body and begins spontaneously, like an epileptic seizure; as with epilepsy, it is accompanied by grinding of the teeth. No one can say whether it is any consolation to know that unconsciousness supervenes during these convulsions: although the patient does not remember them after they are over, the torments of the victim of cicutoxin poisoning—or of the epileptic—are not necessarily less agonizing because they take place beneath the level of consciousness.

The victim of cicutoxin presents a terrifying picture. His pupils are dilated and absolutely rigid. His eyes are turned inwards and downwards. There is a rattling in his throat. His breathing, if it is audible at all, makes a bubbling noise and often stops completely. He foams at the mouth and his pulse is weak. He looks as though he were already in his death agony, but again and again he comes back to life. It is life in the Inferno, however, life in the hemlock hell. For once the first seizure is over the sufferer, choking and groaning, begins to breathe more or less normally once more and consciousness returns, as though some devilish power were giving him back his faculties so that he should experience his agony to the full. The seizures recur time after time at fifteen-minute intervals. If the victim has a strong constitution and a sound heart, his suffering will be protracted. At last total exhaustion brings about another faint, which leads over into death. In the event of a particularly violent convulsion or an attack of respiratory paralysis he may perish of asphyxiation, for the circulation is practically normal. It is true that death generally occurs a few hours after ingestion, but these hours are so full of agony as to appear endless. The torments of hell and the anguish of the victim of hemlock poison are certainly not to be gauged by everyday units of time.

Half the total number of all cases of Water Hemlock poisoning end in death. Where recovery occurs it may take place even after the first catastrophic convulsions.

Another example shows clearly the poison that lurks in our immediate environment, but at the same time demonstrates the surprising fact that a virulent toxin may also assuage pain and bring comfort to the sick. The disasters it can cause, and which we shall first consider here, shrink into insignificance beside its curative properties. Clusters of the big leafless, flesh-coloured, reddish-violet or lilac-pink flowers of the Meadow Saffron or Colchicum, *Colchicum autumnale*, are often to be seen in the fields during September. In some parts of Europe they grow in such profusion that a whole meadow is filled with them. This glorious sight gives no hint of the destructive force latent in the sea of plants and blossoms. Every organ of the Meadow Saffron is laden with a poison whose main active principle is colchicine. The flowers contain the greatest proportion, but it is also present in considerable quantities in the seeds and corm, whereas only a trace of the toxin occurs in the leaves. The leaves are in any case only visible in the spring, for the Colchicum develops in a strange sequence. The flowers grow into fruit in the autumn in the ordinary way, but the whole ovary remains throughout the winter in the root-stock and emerges with the leaves the following spring. The ensuing summer then ripens the seeds in the capsules.

Whereas the cicutoxin of Water Hemlock is a convulsivant poison, colchicine is a clearly-defined cytotoxin or cell poison. Its toxic action on man is very similar to that of arsenic, hence colchicine is often referred to by toxicologists as 'vegetable arsenic'.

The colourful, upright flowers look attractive and harmless, and children are in the habit of playing with the cheerfully rattling seed pods during the hay harvest. Now and again it happens that a child takes out one of the seeds and swallows it, or even eats a flower. Since the toxic principle in Meadow Saffron has long been known as a remedy for gout, quacks and herbalists use it in the preparation of simples, which occa-

sionally contain an overdose of colchicine. Murders have frequently been committed or attempted by adding powdered Colchicum seeds to some strong alcoholic drink. Five grams of the seeds are fatal to adults, and one and a half grams can kill a child.

The symptoms appear a few hours—in rare cases, as long as five days—after ingestion. The mouth and throat begin to burn; the victim suffers unendurable thirst, difficulty in swallowing and a terrible nausea, which leads to frequent and violent vomiting. This condition lasts between twelve and twenty-four hours. Then really serious symptoms set in. The patient exhibits the typical clinical picture of cholera infection—agonizing colics which grow more and more intense and evoke bloody diarrhoea. Paralysis of the central nervous system develops and difficulty in breathing. The patient remains fully conscious until death from primary respiratory paralysis supervenes after about two days—unless a circulatory collapse has brought him an earlier release from his agony.

The action of these two poisons is enough to show what demonic powers can emerge from the silent world of plants as the result of carelessness, confusion of identity, or evil intent. The ghastly effects of vegetable poisons beggar description: they have to be seen to be believed.

The widespread family of Umbelliferae, which embraces over a thousand varieties—most of which grow in the temperate zone and not the Tropics—possesses a dangerous characteristic: the various species look very much alike. Besides Water Hemlock and Spotted Hemlock, the family includes the poisonous Dog's Parsley or Fool's Parsley, *Aethusa cynapium*, as well as the Parsnip and Celery. Hence deaths due to confusion of one species with another are frequent. Accidents apart, however, the toxic properties of these plants were known and used with intent. Socrates was not alone in dying from the hemlock cup, which was a regular method of executing those condemned to death by the Law in the ancient world. A certain humanity in the use of this method of execution can be seen in the practice of mixing opium with the draught of hemlock to reduce the

malefactor's agony. It appears from Plato's description of Socrates's death—which is as exact as that of a modern physiologist—that opium had also been added to the philosopher's cup of hemlock, for the symptoms differ slightly from those of pure hemlock poisoning.

The active principle of Spotted Hemlock is the alkaloid, coniine. The plant in its first year has a much higher coniine content in September than a second-year plant in the same month. In spring the roots contain less coniine than the organs above ground.

Through its appearance, Spotted Hemlock is often mistaken for horse radish, parsnip, parsley, chervil, anise or fennel according to whether it is the roots, leaves or fruits of Spotted Hemlock that are confused with the edible plants. It is a curious fact that symptoms of poisoning have been known to result from eating larks and quails which had been feeding on the fruit of the Spotted Hemlock.

Reference has already been made to the difference between the toxic action of Water Hemlock and that of Spotted Hemlock. The former produces agonizing convulsions, the latter has a paralysing effect.

The first signs of illness appear within a few minutes of taking a lethal dose. The eyes seem to go blind, the saliva flows, the legs become weak and the mouth burns like fire. Immediately afterwards the tongue becomes paralysed and there is a feeling of intense pressure on the head accompanied by attacks of giddiness, nausea, vomiting and violent diarrhoea. The sense of imminent destruction quickly sets in with full force. The victim loses all sense of the position of his body and feels himself to be sinking down into a bottomless void. With paralysis of the central nervous system the limbs grow cold and lose all feeling. This paralysis follows an uncanny course. It rises slowly from feet and legs, grips the arms, reaches the muscles of the face and finally leads to paralysis of the organs of swallowing and speech, so that the voice first grows hoarse and is then lost altogether. We know from Plato's account of the death of Socrates that consciousness is retained for a very long time. In fact the suf-

ferer may remain conscious until death supervenes through paralysis of the respiratory centres, which may take from half an hour to as much as five hours.

The uninitiated reader will be astonished to learn what a multitude of poisonous plants are to be found in the woods and meadows of his own country. Flowers which he has hitherto regarded as lovely and innocent prove in reality to be as deadly as the most poisonous of serpents. The Pasque Flower or Pulsatilla, the Almond tree, Lily of the Valley, Stinking Hellebore or Setterwort, and the sombre Yew tree are just as dangerous as well-known poisonous plants such as the Purple Foxglove and Deadly Nightshade or poisonous fungi like the Fly Agaric and Death Cap.

So far we have only looked at the destructive aspect of vegetable poisons, but it is time to consider the miraculous powers for good which also reside in these selfsame deadly plants. Only then shall we have a true picture of the nature of poison and the almost magical operation of poisonous plants.

The experience of homoeopathic practice has shown that a highly diluted essence prepared from the fresh underground rhizomes of Water Hemlock, gathered at the time of flowering, cures or at least alleviates many cases of psychosis, convulsions and epilepsy.

This is an astonishing and, at first glance, almost incomprehensible fact, for it means that the very symptoms produced by the cicutoxin contained in the tuber of Water Hemlock—terrible convulsions closely resembling those of the epileptic—are cured or mitigated by the same poison. The enigma is not solved by saying that Water Hemlock in large doses kills, while in small doses it cures. Why does it cure or relieve precisely those diseases whose clinical picture is identical with that brought about by cicutoxin?

We will leave this problem for the moment and turn our attention to the healing properties of the second plant whose terrifying toxic effects we studied, Meadow Saffron or Colchicum.

The cytotoxin colchicine, also known as 'vegetable arsenic', is

considered the classic remedy for acute attacks of gout. The treatment with a half to two milligrams of colchicine is certain of effect only when the dose is followed by the initial symptoms of normal colchicine poisoning. If these occur, the pains in the joints immediately disappear. Alleviation of pain may be expected with such certainty that its failure to take place is a sure sign that the diagnosis was mistaken and that the case is not one of gout at all. Treatment with colchicine is all the more amazing because the dose is by no means small or highly diluted; on the contrary, to be absolutely certain of relieving the pain and eliminating the inflammation quite a heavy dose must be administered. In this case, therefore, the toxic action of Meadow Saffron is largely retained in the medicine—and heals. This poisonous flower will hold no more terrors for the victim of gout, who will appreciate the great boon which nature has bestowed upon him in the shape of *Colchicum*.

The therapeutic action of colchicine is still not entirely understood. In our own day it has been found that small doses of colchicine may also alleviate or even completely cure other types of arthritis, including rheumatoid. There is still a wide field for research into the healing properties of the colchicine in Meadow Saffron.

The third plant we discussed was Spotted Hemlock, which once served as a means of executing those condemned to death and was employed for this purpose in Socrates's 'hemlock cup'.

The use of coniine, the active toxin of Spotted Hemlock, was abandoned by allopathic medicine not because it did not cure, but because the drug lost its effectiveness with storage and because the toxic side-effects of coniine are difficult to gauge and still more difficult to control. In the case of the extremely diluted preparations used in homoeopathy, on the other hand, no toxic effects are to be feared from this medicament. Homoeopaths continue to put it to exactly the same uses for which it was employed in the old school of medicine.

An essence made from the freshly flowering top of Spotted Hemlock proves valuable in the treatment of whooping cough, asthma and spasmodic afflictions of the respiratory organs, in-