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Poisoning by British Plants

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Abstract

The properties of poisonous plants have been recognised for thousands of years. To-day we see the active constituents of some such plants, accurately determined and concentrated in tablets and mixtures, used in the practice of therapeutics.

Cases of poisoning by plants though now uncommon, do still occur occasionally. Various factors are responsible for the drop in incidence over the last century. The general standard of living has been raised and people no longer require to supplement their diet with roots and fruits on pain of starvation, when mistakes are liable to occur. Better education combined with suspicions as to the wholesomeness of various fruits provides a barrier against reckless indulgence. Farming is carried out intensively and crops are cleaner than before, thus reducing possible contamination of grain. The potential murderer or suicide now has the vast range of dangerous drugs to choose from provided he can obtain them. Many of the plants themselves have now a limited distribution. The using of any available land for grazing or ploughing and the drainage of marshes, burning of scrub and felling of timber has reduced the available habitats.

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POISONING BY BRITISH PLANTS

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The properties of poisonous plants have been recognised for thousands of years. To-day we see the active constituents of some such plants, accurately determined and concentrated in tablets and mixtures, used in the practice of therapeutics.

Cases of poisoning by plants though now uncommon, do still occur occasionally. Various factors are responsible for the drop in incidence over the last century. The general standard of living has been raised and people no longer require to supplement their diet with roots and fruits on pain of starvation, when mistakes are liable to occur. Better education combined with suspicions as to the wholesomeness of various fruits provides a barrier against reckless indulgence. Farming is carried out intensively and crops are cleaner than before, thus reducing possible contamination of grain. The potential murderer or suicide now has the vast range of dangerous drugs to choose from provided he can obtain them. Many of the plants themselves have now a limited distribution. The using of any available land for grazing or ploughing and the drainage of marshes, burning of scrub and felling of timber has reduced the available habitats.

Children are most frequently the victims. Babies are well-known for placing any object in their mouths and young children eat strange fruits to find out how they taste. The sweet berries may be enjoyed and are therefore the most dangerous, whereas the bitter ones will most probably be spat out. Mistaken identity has provided many tragedies. Ignorance is the cause of such accidents. When sections of the community are evacuated from the city to the country during times of strife, such accidents are liable to increase. Mental defectives may chew leaves or fruits being unaware of the dangers, and pregnant women occasionally take too much of a vegetable abortifacient.

The poisons themselves may be divided into two main groups; the ALKALOIDS and the GLYCOSIDES. A third group is that of intensely irritant volatile oils.

The ALKALOIDS are complex basic substances, being the products of plant metabolism. They are extremely potent, producing effects in minute quantities, and are therefore highly dangerous. They act predominantly on the central nervous system and post-mortem appearances are minimal.

HEMLOCK (*Conium maculatum*) contains the volatile alkaloid CONINE which was the first alkaloid to be synthesised in the laboratory. The plant is an umbellifer belonging to the parsley family, and is distributed in waste places throughout the British Isles. It was used as the state poison of Athens, Socrates being a victim. Up to the year 1880, of 17 cases recorded in Britain 12 were due to the accidental eating of the plant. In one case death occurred $3\frac{1}{2}$ hours after the plant was eaten in mistake for parsley. The motor nerve-endings are affected first and finally the central nervous system is paralysed, death occurring from respiratory failure.

COWBANE (*Cicuta virosa*) is very similar to Hemlock but is much rarer, being found only in marshes. The active principle is cicutoxin. The rootstock is especially poisonous in the Spring and is fatal to cattle. Of 31 cases of human poisoning, 14 died. In many cases violent tetanic convulsions occurred, so severe as to resemble strychnine poisoning.

WATER DROPWORT (*Oenanthe crocata*) is another umbellifer containing oenantheotoxin. It is much commoner than the previous plant but has a westerly distribution and is found in ditches. The large root resembles that of a parsnip and the leaves that of celery, so many mistakes have arisen. In Woolwich many years ago, 6 out of 21 convicts died after eating the root and recently in Barrow-in-Furness children died from eating the root which has a not unpleasant taste. Signs of poisoning are those of an initial stimulation and then depression of the nervous system with gastro-intestinal irritation.

TOBACCO (*Nicotiana tabacum*). Though not a British plant, tobacco is grown in Britain and cases of nicotine poisoning have arisen in livestock. It is mentioned here for interest because nicotine was the first pure alkaloid to be used criminally. This occurred in France and the poison was administered forcibly by a Count Bocarme to a M. Fougues. Death occurred in 5 minutes and in order to hide traces of nicotine, the Count poured concentrated acetic acid into the mouth and over the body of the victim. Accidental poisoning has arisen from the application of tobacco-leaf poultices, nicotine being absorbed through the intact skin. The lethal dose is probably about 6 mg. of the purified alkaloid.

OPIUM POPPY (*Papaver somniferum*) is found in waste places and is recognised by its purple flowers and greenish waxy stems and foliage. The milky latex obtained from multiple incisions on the unripe capsule contains the opium alkaloids. Poisoning by the poppy itself is almost unknown in this country though in 1875 a boy of 3½ years died after drinking water in which two poppy heads had been placed. To-day, overdoseage by morphine is the cause of death. The differential diagnosis in the last stages is pontine haemorrhage but morphine poisoning can be distinguished from this encephalic lesion by the usual subnormal temperature compared with the 2-3°F. rise in the latter condition.

MONKSHOOD, WOLFSBANE (*Aconitum napellus*) contains the extremely toxic alkaloid aconitine. The purple hooded flower-spike is very common in gardens being related to the Delphiniums. It grows wild in woodlands, in the southern counties of England. From mammalian experiments it has been found that 1 part aconite in 1½ million parts blood is fatal within a few minutes. The heart slows then becomes quick and irregular, there is dyspnoea, progressive motor paralysis, convulsions, and death occurs from asphyxia. From 87 cases in the European literature, only 2 cases were murder and 7 were suicides, the remainder being accidental. A common mistake is to confuse the root with that of horse-radish. A wife murdered her husband in 1841 by scraping the root over some cooked vegetables and disguising the bitter taste with pepper. The unfortunate man died in 3 hours. About 4 grams of the root were used. The tingling and numbness of the tongue and mucous membranes of the mouth is characteristic. In Germany during the latter part of the nineteenth century a Dr. Meyer treated a patient with aconitine nitrate for neuralgia. The patient soon became very ill and his wife blamed the medicine. She gave her husband a cup of strong tea which almost certainly saved his life by precipitating the alkaloid. To prove to the wife that the medicine could have nothing to do with her husband's illness, Dr. Meyer drank 4 mg aconitine nitrate in some wine. This unfortunate man died in 5 hours showing the terrible results of his aberrant thought.

DEADLY NIGHTSHADE, BELLADONNA (*Atropa belladonna*) has a southerly distribution in the British Isles being rare in Scotland. It is found in woodland thickets and near old buildings, growing up to 6 feet high. It produces glossy-black berries which are sweet to taste and are therefore attractive to children. The fingers are stained purple with the juice. The plant contains the alkaloids, hyoscine, hyoscyamine and atropine in all its parts, and poisoning from the berries gives rise to the signs of atropine poisoning. There is a dry mouth, dysphagia, dilated pupils and loss of accommodation. The skin is a dry and warm and a scarlatiniform rash may be present. As the temperature is often raised, Scarlet Fever may be suspected. The central nervous system is affected and a feature of the usual delirium is the ceaseless picking at real and imaginary objects in the final stages. 5.2 g 11 oz. atropine of the root of *Belladonna* caused the death of a woman, and 14 berries have killed a child. Serious symptoms have occurred from the solution reaching the pharynx by the lacrimal duct and nose.

THORNAPPLE (*Datura stramonium*) is found in waste places in Southern England and extends into Scotland. It is not native to Britain. The fruit is spiked and contains many seeds which were used in the East for criminal poisoning. 100 seeds will produce severe symptoms. The alkaloids are similar to the previous plant.

HENBANE (*Hyoscyamus niger*) is another such plant containing hyoscyamine. It is native to Britain and was used by the old herbalists. It is however rather rare.

LABURNUM (*Cytisus laburnum*) is the tree which produces the masses of yellow blossoms in the late spring and is grown in gardens and parks. The alkaloid cytisine is contained in all parts of the plant and as it has a sweet taste combined with an attractive appearance it has been the cause of many accidents with children. From 150 cases of poisoning of which 120 were accidental only 4 deaths were recorded. Features of poisoning are vomiting, abdominal pain, and convulsive movements of the limbs followed by narcosis.

YEW (*Taxus baccata*) is the plant characteristic of churchyards and which is very slow growing. Some yews are reported to be 2000 years old. The alkaloid taxine is responsible for the poisonous property but traces of prussic acid and ephedrine have been isolated. The scarlet berries consist of a mucilage surrounding the seeds. The mucilage is non-poisonous but the seeds are deadly. The berries therefore should be left alone. From 32 cases of accidental poisoning, 9 were from the berries and the rest from the leaves. The mortality rate was 62.5%. Death occurs rapidly after the onset of symptoms from central respiratory paralysis and cardiac arrest.

AUTUMN CROCUS (*Colchicum autumnale*) is the source of colchicine used in the treatment of gout and in the study of cytology because of its inhibition of the later stages of mitosis. It has not been found to be of any real value in the treatment of cancer. The plant itself grows in grassland in the southern part of England, being absent from Scotland. Prior to 1880, 55 cases were collected from the literature. The mortality rate was 83%. The majority were mistakes in the preparation of the drug and the rest were due to eating the plant, especially the seeds. The main feature of the poisoning is the delayed lethality. In 1941 a woman of 42 years took 60 mg. She lived 8 days. Her blood-picture showed a decrease in circulating leucocytes and platelets and cells in arrested metaphase were observed in the liver, spleen and lymph glands. Charles Darwin experimented with Colchicine, applying it to the leaves of insectivorous plants (*Drosera*) but obtained no conclusive results.

POISONOUS FUNGI. The poisonous fungi have an evil reputation and rightly so but only very few are really toxic. **ERGOT OF RYE** (*Claviceps purpurea*) attacks all members of graminæ (grasses, cereals) and is present in this country today on grasses. The seed-heads are covered by the purplish-black fruiting bodies about $\frac{1}{3}$ " - 1" long. Crops on the continent are still contaminated in some areas with this fungus. In 1770, an epidemic in France affected 600 people of which 16% died. A case occurred in this country at Wattisham in Suffolk in 1762. A labouring family with 5 children lost various parts of their lower limbs from a dry gangrene. They all survived and it was found that wheat crop from which they made bread was contaminated. There are two forms of poisoning from the Ergot alkaloids—the convulsive acute form in which the central nervous system is affected, and the gangrenous, chronic form in which the vessels of the limbs are principally affected.

AMANITA MUSCARIA is the red-capped fungus with white warts on the surface. It contains muscarine. Atropine is the obvious antidote for cases of poisoning. The natives of the Kamchatka peninsula in N.E. Siberia eat the dried fungus to produce a feeling of intoxication. Since muscarine is excreted in the urine, they consider this liquid very precious and confirmed drunkards can keep up a week's debaucherie on a few fungi.

AMANITA PHALLOIDES (Deathcap) is the most deadly of all fungi and is commonly mistaken for the mushroom. *Amanita phalloides*, however, has an olive-yellow cap, white gills, and its stem fits in a socket or cup at ground-level. The mushroom has pink or brown-black gills and has no socket for the stem. In 53 cases of poisoning, 75% were fatal. Phalloedin is the active principle which causes fatty degeneration and necrosis of the kidneys and liver. Symptoms appear from 3 - 48 hours after ingestion and death follows within 12 - 18 hours.

POISONOUS GLYCOSIDES. The poisonous glycosides form the other large group. They are chemical substances which break down on fermentation or by the action of dilute mineral acids to form sugar and compounds which are poisonous.

THE FOXGLOVE (*Digitalis purpurea*) is the well-known source of digitalis. Poisoning from the fresh plant is almost unknown because of the bitter taste of the leaves. The early clinical features of poisoning from overdose are those of anorexia, nausea, vomiting and undue slowing of the pulse.

The **CHERRY LAUREL** (*Prunus laurocerasis*) is a cyanogenetic plant, e.g. one that forms Prussic acid (HCN). It contains the glycoside amygdalin. Bitter Almonds, the kernels of plums, peaches and cherries and the pips of apples all contain HCN , and all have been fatal to children. A maid who ate 72 G ($2\frac{1}{2}$ ozs) of Bitter Almonds died in $1\frac{1}{2}$ hours.

The **POTATO** (*Solanum tuberosum*) is poisonous when green. It contains solanine which acts on the central nervous system and haemolyses red-blood cells producing urinary signs and symptoms. Storage of green potatoes in complete darkness for a fortnight makes them edible, the solanine disappearing during storage.

WOODY NIGHTSHADE or **BITTER-SWEET** (*Solanum dulcamara*) also contains solanine. Its red berries have caused a number of fatalities in children. Black Nightshade (*Solanum nigrum*) has black berries and is abundant as a weed in gardens throughout England.

An example of a plant containing an intensely irritant oil is the **DAPHNE** (*Daphne genkwa*) which is a garden shrub whose pink blossoms appear before its leaves in Spring. 12 of the red berries have caused the death of a child.

There are many other poisonous wild plants which cause gastro-intestinal

symptoms when taken in moderate quantities but which must be taken in very large amounts to produce fatal results. Examples of these are the PRIVET, Ivy and the BRYONIES.

Prompt treatment is necessary in all acute cases of poisoning but particularly so with the vegetable ones because of their rapid action. After general measures have been taken, the removal and inactivation of the poison is carried out by gastric lavage with dilute KMnO_4 until the return is colourless. Tannic acid, tincture of Iodine and activated charcoal when left in the stomach are used to inactivate alkaloidal poisons.

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