DATURA POISONING IN THE MALAY STATES.

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It has long been known that datura fastuosa, datura stramonium, and some other plants of the nightshade family, such as stropholobum and hyoscyamus niger, possess poisonous properties.

Botany of the Daturas.
The species D. fastuosa and D. alba are members of the genus datura which are commonly found in the Federated Malay States. They are wild or semi-wild plants, which grow on the refuse land of our native villages or thrive on the borders of cultivated land, in the kitchen gardens, near stables, and elsewhere. Two of these plants of the Peninsula are identical with the datura fastuosa (Linn.) and the datura

alba (Nees) of India, where they are also found more or less commonly with other members of the same genus.

Datura fastuosa (Linn.), the black datura, is generally taken as a type of the tropical varieties of the daturas. It is a quickly growing herbaceous plant belonging to the natural order Solanaceae, and is characterized by its large, spreading branches and conspicuous trumpet-shaped flowers.

Habitat—Common almost everywhere, especially when protected. Malay name—'keehubong dam' or 'keehubong ulang'; 'tropq punggah' in Borneo.

Distribution.—South-Eastern Asia and Malay Archipelago. Leaves: broadly ovate, about 5 to 10 in. long, 3 to 5 in. wide, and 1 in. broad at the widest, margin rounded, or the more slender, petiole 4 to 6 in. long. Flowers: corolla funnel-shaped, 8 to 10 in. long, with white, purplish, or yellowish-colored flowers, usually 2 to 3, very rarely 4 or 5. Fruit: a capsule, 1 in. or more in diameter, each cell containing a single, small, black, oval seed.

Datura stramonium (Linn.), also known as the thorn apple, is a taller plant than the preceding, with trumpet-shaped flowers, either pure white in colour, or yellowish-white, larger in diameter, and opening in the afternoon. It is found in the lowlands of the Malay Peninsula, where it is considered harmless.

The differences between the two plants, however, are so slight that they can scarcely be classed as being specifically distinct from each other.

Datura alba is the common datura of the Federated Malay States, but in certain districts datura fastuosa is said to be the more common of the two. Both plants are found in the Straits Settlements.

Datura stramonium (Linn.), owing to its wide distribution in Europe and America, as well as in Asia, the best of all the ten or twelve species which have been recognized, is probably the one most commonly used for its poisonous properties. It is generally considered the most poisonous of all the species, proteinides being the red blood cells against which the poison acts. It is also the most responsible for the deaths of those who have been poisoned by the plant.

Popular descriptions of the tropical daturas as black and white kinds has led to a great deal of confusion, it having been often taken for granted, on the authority of the local people, that the black flowered variety is more poisonous than the white, but of the same nature. No proof of this, however, has yet been given. By reference to the colour of the flowers alone no botanical distinction can be made, and it may be remarked that soil and circumstances may modify the colour of the flower or even cause it to change from one to the other.

Description of the Datura Seeds.—The seeds, in which the poisonous property chiefly exists, bear some slight resemblance to those of the common chilies (capsicum), and at times have been mistaken for them.

In many instances the light colour and the pungent taste of the latter are sufficient to make it easy to distinguish between them, especially when they are mixed with food, such as boiled rice, and compared by means of the taste alone. The resemblance is marked in the unripe fruit, which is green, but when fully ripe it is a dull brown, and the green is so faint as to be almost unnoticeable. The fruit is eaten as a vegetable in India, and the seeds are sometimes used as a substitute for pepper.

The fruit is used as a condiment in India, and the seeds are sometimes used as a substitute for pepper.

The description of the datura seed, when placed in the eye, will cause dilatation of the pupil.

The seed of the capsicum is kidney-shaped, a little shorter and wider than that of the datura, pale yellow in colour, uniformly rough, and when

BIBLIOGRAPHY.
7. Radcliffe Crocker, 'Diat. of Sk.,' 3rd ed. also same author's Atlas.
8. Radcliffe Crocker, op. cit.
30. Reves, Studies in Pathology and Medicine, 1879, p. 611, et seq.

The frequency of poisoning and of zoster is mentioned.
Datura Poisoning in the Malay States.

Death from datura poisoning seems to be comparatively rare; but, although the drug has been known medicinally in the East from time immemorial, and is often used by Asiatics for purposes of revenge or for drugging victims with criminal intent; lethal doses are seldom given intentionally. The cases which have recently occurred in Pahang and one in Selangor. It is to be observed that these four cases merely furnish examples of the datura poisoning which is of daily occurrence in India.

**Case 1. Datura Seeds Mixed with Food by Pahang Malays.**—In the month of February, 1903, a warehouseman named Salmon, aged 35, living at Kuala Lipis, Pahang, was caused by means of poison. He pleaded not guilty, but, although the mode of his crime was never actually discovered, he was eventually convicted of having mixed datura seeds in a curry, thereby causing the death of the warehouseman, and the warehouseman's young friend, as well as two men, all of whom happened to eat of the same dish. The symptoms in each case were similar, namely, attacks of giddiness, passing into unconsciousness for a few hours, followed by complete recovery. This group of cases, owing to the fact that one of my colleagues, who appeared for the prosecution, was able to give evidence of a very practical kind. A sample of seeds and powder which had been sent to Dr. H. F. McClymont for identification. He identified to him for the following: the notes of his personal experiment. He says: “I took pinch doses of the sample, which consisted of the bruised seeds, and had the following experience: I felt flushed, giddy, ideas and thoughts seemed to occur to me, and I became hoarse. When I tried to walk I staggered about like a drunken man and got very excited. I then took an emetic of zinc, vomited, and slept for about five hours.” Dr. McClymont is further said by an eye-witness to have been in a delirious state, rolling on the floor, and uttering inarticulate cries.

**Case 2. Datura Seeds Mixed in Tea by Kedah Malay.**—At Kuala Krai, Kedah, some time ago, Kedah were tried at the assizes and found guilty of administering datura to a man who had died. Five different preparations of datura were found in their possession, some of which had been successfully used to produce unconsciousness in three Chinese patients who had been in a stupor produced last appeared for several hours. The Chinese recovered without treatment. They stated that they had suffered from dryness of throat, uncertainty of vision, and “drunkenness.”

**Case 3. Datura Seeds Mixed in Tea by Chinese.**—In January, 1903, a family of Chinese in Kuala Lumpur, consisting of a man and his wife and son of about 10 years of age, were poisoned by datura seeds, which had been administered, as far as could be ascertained, in tea by a Chinese cook. They were indebted to Dr. Travers for the following brief and excellent notes: The man and the woman had flushed faces, bright eyes, dilated pupils, and were extremely restless, hot, and parched in the throat, and had difficulty of vision. The man was unconscious for a time, and kept picking at imaginary objects. Both recovered after the aid of emetics. The effect of the poison on the boy was more severe. A description of the following day: “The man was walking about the floor; he crawled, could not walk without falling. He kept uttering inarticulate cries not unlike the mewing of a kitten, and appeared to be delirious with flushed face and dilated pupils. He could not be induced to swallow, he refused food and water, and finally vomited.” He then fell into violent fits of temper, struck at imaginary objects, and was delirious all day, from 9 a.m., but slept soundly at night, and recovered after two days.

**Modus Operandi.**

The favourite mode of administering the drug for criminal purposes is for the mouth. The seeds are crushed, put into ordinary tea and will result in a mixture of datura and coffee, which is some form of rice curry. Cases are known, however, of the seeds being mixed with other poisons, such as opium (prepared for the pipe) and hemp (Indian hemp), with the addition of a little sugar. In addition, the seeds, which are astringent, are sometimes mixed with other substances which are commonly supposed to be poisonous. For example, one of the exhibits in the Kutan trial (Case III) was a carefully-prepared powder of datura seeds mixed with the fine hair of the young bamboo shoot (Chrysobrotus); kauta tan, a kind of tobacco; gedong gedong (sawahia); and the fruit of the red lion (Sarmento), a climbing plant (Epipremnum giganteum, Schott). These were all in dry powder, and being inedible were in a form calculated to escape observation when mixed with food. In Pahang the seeds are sometimes burnt with gaharu (Aquilaria agallocha), an incense wood well known as lign-aloes, also with Datura natalis, a common local resin, for the purpose of producing lethargy by means of the fumes, and in the Temerloh district I have known of two cases in which this state was successfully produced in the victim with the object of prolifegy or plunder.

**POISONOUS EFFECTS.**

The three most characteristic symptoms of poisoning by datura are the same as those of poisoning by atropine, namely:

1. Paralysis of the salivary nerves, leading to dryness of the mouth.
2. Paralysis of the third nerve, causing dilatation of the pupils, with imperfections of vision.
3. Paralysis of the diaphragm, with the closure of the vagus in the heart, causing sometimes very rapid action of the heart.

Other effects which should be noted are—that when the seeds are given internally (and the professional thief appears to know the exact dose necessary) symptoms of insensibility are early and within a quarter of an hour. The effect of the drug may last for two days, and is more severe as a rule, if it is administered during childhood and old age. Many fatal cases of poisoning by the fruit and young seeds of datura are reported by Chevres, as well as five fatal cases of poisoning by the leaves. They are mostly in children and aged persons.

Excessive dilatation of the pupil may be regarded as a dangerous symptom in datura poisoning. The loss of power of accommodation which is thereby produced, and the hallucinations caused, may explain the disorders of vision which are so common. In the absence of any suspicious circumstances the differential diagnosis of datura poisoning may be difficult. As with atropine, the symptoms of datura poisoning have occasionally been confused with those of rhabdomyolysis, delirium tremens, and mania.

**NATIVE REMEDIES.**

The datura plants are generally recognized as being poisonous. The leaves are almost universally used in the treatment of asthma, but it is significant to note that datura is not often given internally as a remedy by natives. The Malays mix it, with urine, groundpalm, and saffron, and apply them externally for various pains and swellings. They will heat them over a torch until smoked, and then apply them as a poultice over the spleen in intermittent fever. The root is powdered and applied to the gums in order to make a toothache. The flowers are dried, or roughly powdered with or without the leaves and rolled into cigarettes for the relief of asthma.

An instance of alarming narcosis from the application of D. stramonium leaves to an extensive burn is recorded by Chevres, who alluded to this being used as a therapeutic agent for local application. I have never heard of a similar accident in Malaya. It may be of interest to remark that datura is highly prized by Malays, all parts of the plant being used and valued; an infusion is often employed by all classes of the community as a substitute for coffee. A preparation of young padi (rice) plant by insects. The datura, or “devil's trumpet,” is regarded as a good medicine by Tamils, and is often used by them in the Federated Malay States, but generally as an external remedy. They are fond of applying the leaves with cow dung in the form of a poultice to relieve the pain of boils, carbuncles, and piles, and also use them in...
powder, mixed with "ghee" (clarified butter) in their treatment of facial neuralgia and dogbite, or steeped in spirits as a promotor of the growth of the hair. They are said to administer the powdered root in cases of epilepsy and insanity.

The dried flowers of datura alba (called Nai young fa) can be obtained in most Cantonese drug stores, where they are frequently dispensed for the relief of asthma and chronic dry cough, but the use of the seeds seems to be eschewed by the Chinese druggist.

TOXICOLOGY.

So far as is known at the present time the active principle of the datura plants is a mixture of a kind of atropine and hyoscyamine. The term "daturin" has been applied to this mixture, but the true nature of the component alkaloids has yet to be finally determined. Schmidt properly insists on speaking of stramonium atropine as contrasted with belladonna atropine: because, although chemically identical, some difference may be recognized both in their physiological and therapeutic actions.

The medicinal dose of daturin has been given as 3 mg. to 1 mg., or 1/2 gr. to 2 gr., but it is difficult to say from the reports of fatal cases by datura poisoning how much daturin will constitute a fatal dose in any given case.

With regard to clinical experience of poisoning by the closely-related datura stramonium seeds, a child has died in twenty-four hours after swallowing a dose of 16 gr. (1/2oz) seeds, and enough to save and previously didlogued by vomiting, and so by purging.

Luff states that about 100 seeds form a fatal dose, death occurring in seven hours. Taking the mean of the proportion of the total alkaloids stated to be contained in the seeds by Squier, approximately 0.2 per cent., and 0.398 per cent., respectively, this is equal to about 1/2 grain of the alkaloid daturin. The whole plant is said to contain the active principle in the proportion of only 0.2 per cent.

Seventeen or eighteen gr. of the official extract of stramonium seeds (dose, 1/2 gr.) have caused death. Recovery, on the other hand, has occurred after the vomiting of more than 100 seeds.

RECENT CHEMICAL EXPERIMENTS.

Important points to discover are:
(a) The amount of poison which is present in the common daturas of the Federated Malay States.
(b) The relative degrees of strength of the poisonous principle in each variety.
(c) Whether a difference, if any, between the daturin contained in D. stramonium and that contained in D. fastuosa and D. alba.

I have attempted to elucidate this by examining both the fresh plants and the dried seeds. The experiments were made at the Institute for Medical Research at Kuala Lumpur. I am greatly indebted to Dr. John H. McDonald, who has so far been obtained by them, and have much pleasure in expressing my appreciation of the valuable experience which his kindly instruction has afforded me. I was not found that the mixed alkaloids could be easily removed from an ammoniated extract by shaking it out with benzol. In the case of a full-grown datura alba plant which was treated in this way, the refuse remaining after extraction by benzol was found to have no further mydriatic effect on a cat's eye, and had no poisonous effect when given in large doses to a puppy. It was therefore concluded that the whole of the active principle had been removed by means of the benzol. Want of time and opportunity prevent me from making further experiments in this direction, but I hope to resume my investigations on account of the great importance of this branch of the subject.

DUTRA POISONING; TREATMENT.

Cases of poisoning by datura are generally treated by more or less time-honoured methods. It has been proved, however, that implicit reliance cannot be placed on emetics, and the early administration of a purgative is often advisable. Daturin is removed by boiling with any decoction containing tannin, such as tea or coffee, which is strong enough to destroy the active principle, may be of value. Like atropine, it is excreted from the system by means of the kidneys.

Opium administered by the mouth or through the rectum, the various salts of morphine, pilocarpine, and chloroform inhalations have been given successfully in cases of stramonium poisoning, but no chemical antidote by which daturin has been decomposed in the animal economy appears to have been either used or suggested up to the present time.

Nevertheless, there is reason to believe that we possess an efficient antidote in potassium permanganate. Potassium permanganate has the important chemical property of oxidizing the vegetable alkaloids, and has been used with success in stramonium poisoning. I am indebted to Professor J. J. Todd for the introduction of potassium permanganate into the stomach without danger in solutions not stronger than 1 gr. to the oz. Washing out, therefore, by means of a tube with a dilute solution of this strength appears to be indicated so long as any daturin remains in the stomach.

Experience alone can settle the question as to whether the potassium permanganate will be of any therapeutic use after daturin has been absorbed into the system, but as the action of the poison is doubtless prolonged, especially when taken with large quantities of food, we should expect that repeated small doses would be of great value in many cases.

REFERENCES.


EXPERIMENTAL HAEMOGLOBINURIA IN A CASE OF BLACKWATER FEVER.

UNDER THE CARE OF

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INABILITY to take quinine is a bar to residence in highly malarious countries. Therefore, idiosyncrasy in the direction of quinine haemoglobinuria is a definite indication against return to West Africa. When the patient (who is the subject of the following notes) declared that quinine always gave him blackwater fever, and we were requested by his employer as to his future for further service in West Africa, we hesitated to advise such a decision, as he expressed willingness to give a demonstration of the fact, his offer was accepted partly in his own and his employer's interest, and as an object lesson for the students at the London School of Tropical Medicine.

T. aged 25, English, last from the Gold Coast Colony, was admitted on March 19th, 1903.

Previous History.—He went to the Gold Coast in June, 1901; it was not severe, and he was not laid up. He had three similar attacks up to September, 1902, and was always treated with quinine. 1 gr. at a time, and also took this dose regularly at considerable intervals as a prophylactic. In October, 1902, he had an attack of black-water fever; the first symptoms led him to believe that he was about to have an attack of malaria. He took 10 gr. of quinine at 5 p.m. one evening (he cannot remember the date), and about midnight he began vomiting, diarrhoea, and frequent urination. Next morning he was visited by a doctor, who stated that his temperature at one time was 107°. He was in bed three days and was deeply jaundiced. The black water passed off in twenty-four hours, and he was not further attacked in Africa, and arrived in England in March. On his return to the Gold Coast, feeling chilly and feverish, he took 10 gr. of quinine at 7 p.m., and at midnight diarrhoea and vomiting set in, and he began to pass black water. All symptoms disappeared in the morning. He continued to take quinine and was not attacked. We refer to the case of the patient who was observed and experimented with at the Branch Seamen's Hospital in connexion with the London School of Tropical Medicine.

State on admission.—On March 19th, 1903, temperature 99.9°; sanaemic spleen enlarged, and tender. Blood Examination.—No malaria parasites; no pigmented leucocytes. Red corpuscles, 5,540,000; leucocytes, 10,000; haemoglobin (von Ficke), 65 per cent.

Clinical Leucocyte Count.—Polymorphonuclear, 50 per cent.; large mononuclear, 15 per cent.; lymphocytes, 25 per cent.; eosinophiles, 2 per cent.; mast cells, 1 per cent.

On the following day the temperature was normal and he felt quite well.—He remained so until March 29th, when Dr. Manson decided to test his statement that quinine gave him haemoglobinuria. His blood was examined during the day and gave red corpuscles, 5,355,000; leucocytes,