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Solanaceae III: henbane, hags and Hawley Harvey Crippen

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ABSTRACT Hyoscyamus, the henbane, is one of the drugs of the ancients. Initially used both as a poison and narcotic, it was widely adopted by witches, wizards and soothsayers as a component of their hallucinatory and flying ointments. It was also used by notorious poisoners such as Madame Voisin in France. Eventually, in the nineteenth century its active principle was isolated by Ladenburg and called l-hyoscine. It proved to be a tropane alkaloid very similar to atropine. These two alkaloids proved to be very important in the study of the parasympathetic component of the autonomic nervous system, and together with physostigmine, allowed the major neurotransmitter acetylcholine to be isolated and its mechanisms of action to be characterised. The Crippen murder case in 1910 gave hyoscine further fame, indeed, notoriety. The unassuming homeopathic doctor murdered his wife with the alkaloid and then decamped for Canada with his mistress Ethel Le Neve. The case became a worldwide sensation for several reasons: the arrest of the fugitive couple by wireless telegraphy (Marconigram) and the extensive chemical and histological evidence presented by Willcox and Spilsbury. Some authorities claim that this was the beginning of the science of forensic medicine in Britain. Hyoscine is now hardly ever used in modern therapeutics but its history from antiquity to the witches and on to Dr Crippen is both bizarre and fascinating.

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The third member of the Solanaceae family that I wish to consider moves us into the twilight zone of witches, poison and murder. It is the henbane (Latin name *Hyoscyamus niger*) also known as the Stinking Nightshade (see Figure 1).[1]

It is a foul smelling annual (or biennial) herb which grows up to 80 cms high. The generic name is derived from the Greek hyos (the pig) and kyamos (bean) and the species name from niger (black). Its flowers vary from yellow to dull green with purple veins. Indigenous to temperate Eurasia, it has been naturalised to other parts of Europe and North America.[1] Another relative occurs widely in Southern Europe and has irregular bell shaped white flowers (*H.albus*). The characteristic foul smell of the genus is produced by the compound tetrahydroputrescine which is reminiscent of that of rotting flesh and probably attracts pollinating insects.

HISTORY AND HAGS

The henbane was known extremely well to the Greeks and Romans as being potent and poisonous. In the ancient myths of Greece, it was believed that some of the souls of the dead roamed the banks of the river Styx at the entrance to Hades. These wraith-like spirits wore garlands of henbane to warn the living of the dangers of this plant.[2]

Dioscorides, the Greek, widely regarded as the Father of Pharmacy, recognised that the plant could be used, with great care, in the treatment of pain and insomnia. He, together with Celsus, developed an oily salve that could be rubbed into the skin and this proved to be a much safer way to administer the plant than the oral route. It also proved effective as a local anaesthetic.

HAGS AND WITCHES

The word hag is now used commonly to mean an ugly old woman, but in medieval times it meant a witch.[3, 4] It derives from the same etymological root as the 'hedge'. This derivation implies that here was a woman who gathered plants and other material from the hedgerow and used them for her nefarious purposes. Take, for example, the broomsticks.[3] They had both occult and erotic powers. The ash handle protected her from drowning and the birch twigs (of the brush) bind evil spirits together. The birch twigs were held together by strips of willow (osier) as this latter tree was sacred to the goddess Hecate, the archetypal witch. This goddess was also thought to 'own' certain plants such as henbane, belladonna, aconite, mandrake, cyclamen and mint. Armed with her trusty broomstick, the witch would then burn henbane and inhale the fumes which would conjure up the spirits or demons and enable her to carry out spells;

FIGURE 1 *Hyoscyamus Niger.* The Black Henbane. A good source of the alkaloid hyoscine. Courtesy of the Royal Botanic Garden Library, Edinburgh.

incantations and magical acts such as levitation and flying. (see Figure 2).

The most important function of the witch was to provide love potions and flying ointments to supplicants (at a price).[4,5] Henbane was a very important constituent of both of these magical preparations. For example, a typical love potion would contain, henbane, mandrake, marigold, St John's wort, periwinkle, and toad's venom, together with ox bile, urine and even semen!

Flying ointment was thought to confer upon the witches the power of levitation and flight. The witch would undress, cover her skin all over with the ointment, including her anus and genitals. The broomstick would also be smeared with the mixture and introduced as deeply as possible into the vagina. The witch would then ride the stick in a kneading trough with the belief that she was having sexual intercourse with the devil in midair! The axillae were also areas which rapidly absorbed the poison. Acccording to witnesses to these orgies, the skin of the witch became red and it was believed that this hastened absorption of the salve.

FIGURE 2 Goya's 60th Capricho. 'The Practice'. Witches rehearsing flying techniques. Note also the he-goat, the broomstick, the cats, and a skull: the traditional equipment of the 'hag'.

Reginald Scot,[3] writing in 1584, discounted the idea that witches could actually fly but thought that the woman (or other user) became delirious and experienced hallucinations. Scot describes the components of one such ointment as follows: fat from young children, henbane, aconite and bats' blood! The witches, becoming delirious, then enjoyed feasting, dancing and acts of venery.

The witches had one other possession which is worth mentioning in passing. They were given, by the Devil, a minor deity from Hell at their Initiation Ceremony. Known as familiars they included cats, dogs, toads, hares, blackbirds and crows. When a witch was killed by burning or drowning, it was believed that it was essential to kill the familiar also, otherwise the spirit of the witch, warlock or wizard could migrate into the familiar and escape! It was also asserted that the witches fed their familiars with human and other blood together with selected herbs such as alyssum and agrimony.

Witchcraft and the pursuit and killing of witches declined steadily throughout the eighteenth century as the Enlightenment and the age of reason progressed. However, interest in the plants the 'wise women' had used

was never totally lost and this progressed in two main directions: the treatment of toothache (and neuralgia) and the development of an anaesthetic sponge.

TOOTHACHE AND NEURALGIA

In the early and late Middle Ages, fairs were a prominent feature of town and village life. Famous examples included the Goose Fair at Nottingham and St Giles' at Oxford. A popular figure at such gatherings was the travelling quack or mountebank who claimed to 'cure' toothache and other neuralgias.

Briefly, they took the seeds of henbane and charred or steamed them upon an oven. They instructed the sufferer to inhale the smoke or fumes. Temporarily the pain would be assuaged by the hyoscine. Gerard, the celebrated herbalist, noted that 'the drawers of teeth' pretended to cause worms to come forth from the offending molars.[6] In fact the seeds of the plant discharged little white embryos when heated. These were the 'worms' held to be responsible for the toothache or earache! By the time that the narcotic effect of the hyoscine had worn off and the pain recurred, the travelling trickster had moved on to the next fair having fleeced the gullible peasants. As late as the nineteenth century country folk smoked henbane (like a tobacco) to relieve the pain of toothache. Amongst the gypsies, this use of henbane to relieve pain persisted until the 1940s.

HENBANE IN BEER

Solanaceous plants were used from time immemorial to fortify beer in order to potentiate the effect of the alcohol on the brain. Mandrake was used in Egypt and thornapples in Russia for the same purpose. The German name for henbane is Bilsenkraut and there are many place names in Middle Europe that reflect the use of the plant including Bilsengarten, Bilsensee and even Pilsen in Bohemia.[7] Legal action had to be taken. Many countries imposed fines and even imprisonment on brewers who deliberately added henbane to beer.

THE SOPORIFIC SPONGE

From the Roman period onwards (as described in my article on the mandrake), a sponge, which contained the opium poppy, henbane and mandragora (mandrake), had been used to anaesthetise patients.[8] This sponge was kept in close and secret custody by the medical school at Salerno and by the monks at Monte Cassino. However, problems began to appear and two major criticisms were made of this method of narcosis. In his surgical textbook, Guy de Chauliac (1300–1367) describes the soporific sponge but then says it can be dangerous. Asphyxia, congestion and even death may occur. The potency of the plants varies and there was no way of measuring dose. Gabriel Fallopius (1523–1562) concurred saying 'if soporifics are weak they do not help; if they are strong they are exceedingly dangerous.'[8]

The soporific sponge went into long-term decline but then sustained a minor revival in 1847 when Dauriol reintroduced it. This French physician published two papers in 1847 in which he attempted to find a substitute for ether.[9, 10] The plants he used were *Solanum nigrum* (black nightshade), *Hyoscyamus niger* (henbane), *Cicuta minor* (water henbane or water hemlock), *Datura stramonium* (thornapple or Jimson weed) and *Lactuca virosa* (common lettuce). The sponge was activated by soaking in hot water and, on inhalation, the patient passed into a stupor. The patient would be revived by a rag soaked in vinegar. Unfortunately, Dauriol's sponge suffered from the same drawbacks as the Roman equivalent and it did not gain wide acceptance. The problem would be solved by the extraction and identification of the pure alkaloid hyoscine as will be described below.

HENBANE USED AS A POISON

In large doses henbane is deadly and has therefore been used both as a criminal poison and as a means of execution in the penal system. The classic situation was among the upper echelons of French Society in the period 1670 to 1680. Many of the aristocrats were poisoned, and Louis XIV expressed his displeasure at the practice and set up a *Chambre ardente* (or *Cours de poisons*) to investigate the deaths, many of which were caused by the nightshade alkaloids. Between 1679 and 1683, 400 individuals were investigated. In all, 87 people were condemned to death as sorceresses and makers of poisons. The most famous poisoner of the period was Catherine Voisin who was known as the palace deliverer of poisons and love potions. The main vehicles for her devilish activities were henbane, thorn apple, Spanish fly and arsenic. With her execution in 1680 the grand era of poisoning at the court came to an end.

Another use for henbane was by jailers and executioners. Sixteenth century accounts from Lucerne, in Switzerland, show that the town executioner purchased henbane seeds for this purpose. Recently, in Scotland, henbane seeds have been discovered during renovations at the Tolbooth jail in Stirling. Whether the seeds were used to subdue violent prisoners or to sedate them for hanging (or the executioner's block) remains a mystery. However, these discoveries illustrate how well henbane was known in medieval times, together with its narcotic and anaesthetic properties.

THE CHEMICAL AND PHYSIOLOGICAL PROBLEM

The problem with henbane (and the other Solanaceae) was that different plants from different sources varied

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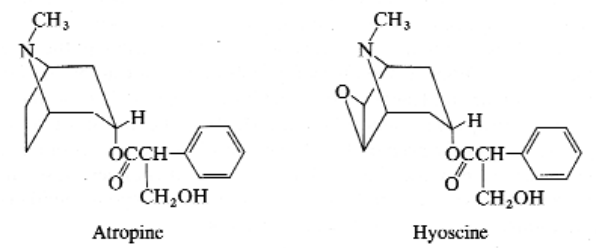

FIGURE 3 The chemical structures of the anticholinergic drugs hyoscine and atropine. Note the additional oxygen atom substituted in the tropane ring of hyoscine which accounts for its more sedative action when compared to atropine.

widely in their pharmacological and poisonous effects. Moreover, no one knew how they worked.

Progress began to be made by the French and German chemists from 1800 onwards. The first major step was made when Mein, a German apothecary, isolated atropine from *Atropa belladonna* in 1831 (see Figure 3). Atropine turns out to be a racemic mixture of d- and l-hyoscyamine.[11] Most of the pharmacological activity resides in the l-isomer but this racemises relatively rapidly on extraction.

However, the henbane seemed to have certain properties which were different from those of dl-hyoscyamine (atropine). In particular, it produced sedation more regularly and reliably than atropine. Rudolf Buchheim suspected that there was another alkaloid in henbane and eventually Alfred Ladenburg, working at the University of Kiel in the 1880s, isolated hyoscine.[11] He also showed that the only chemical difference between hyoscine and atropine was an additional oxygen atom present on the tropane ring (see Figure 3). To complicate matters further, Johann Scopoli working on the plant from Slovenia that came to be known as *Scopolia carniolica* (see Figure 4) showed that it too was a rich source of alkaloids. One of them became known as scopolamine, but it is in fact identical to hyoscine. To this day, American sources and research papers prefer the name scopolamine.

How does hyoscine work? In the nineteenth century this was to prove an intractable problem and would resist analysis until the 1930s, when Sir Henry Dale and his colleagues isolated the transmitter acetylcholine from the skeletal motor ending following Loewi's isolation of the identical substance at the vagal nerve endings in the heart. For a fuller account of this chain of events the reader is referred to Lee's short article on curare.[13]

It then became apparent that both hyoscine and atropine blocked the action of acetylcholine at these so called cholinergic nerve endings, and as a result they are now known as classical anticholinergic drugs. The puzzle had been solved.

FIGURE 4 *Scopolia Carniolica*. From the Slovenian province of Carniola. Named after the famous botanist Scopoli who also gave his name to scopolamine (hyoscine).

One further chemical conundrum had to be solved with hyoscine. As extracted from the plant henbane, the active principle was in the laevorotatory form but it readily isomerised to form a racemic mixture of the laevo and dextrorotatary compounds. In contrast to the l-form, which is sedative, the dextro compound stimulates the central nervous system and can cause hallucinations and convulsions. Accordingly, l-hyoscine is the preferred therapeutic form and that recommended by all the modern pharmacopoeias.

THE PHARMACOPOEIA AT THE TIME OF THE CRIPPEN MURDER (1910)

During the period 1900–1910 l-hyoscine became generally available and it is of interest to examine the pharmacopoeias of that time as to which preparations were in use. There we will find *Hyoscyami folia* (Henbane leaves) although these were going out of fashion in favour of pure l-hyoscine. Hyoscine hydrobromide and hyoscine sulphate were the recommended preparations. These compounds were employed as the treatments of choice for mania, paralysis agitans (Parkinsons disease), and pre-medication (with Omnopon) for anaesthesia and 'twilight sleep' in obstetric labour.[13]

The melting point of the pure laevo salt was confirmed by Jowett as 193°C and this, as we shall see below, became a central point in Willcox's evidence for the nature of the poison in the body of Cora Crippen.

THE INFAMOUS CASE OF HAWLEY HARVEY CRIPPEN[14]

The trial of the American doctor would give hyoscine world wide prominence for a number of reasons. Firstly, it was the most powerful early example of the strength of forensic science to establish the cause of death. These investigations confirmed the identity of both the poison and the victim. Moreover, when Crippen fled to Canada, his pursuit and capture made daily world wide news in the tabloid newspapers of the day. Finally, the use of the Marconigram (or telegram) in the successful apprehension of Crippen (and Ethel Le Neve) helped to make this means of communication a daily event and established its international use.

We must start at the beginning. Hawley Harvey Crippen was born in the State of Michigan in the US in 1862.[15] He obtained a Homeopathic Diploma in Cleveland, Ohio and subsequently another qualification from the Ophthalmic Hospital in New York. He never had a 'proper' medical qualification but always referred to himself as Dr Crippen, which was good for business!

At first, he wandered from State to State practising his arts in a number of the larger cities. His first wife died suddenly and prematurely. He became involved with, and subsequently married, a seventeen-year-old girl, whom he knew as Cora Turner. She aspired to be a singer and dancer. Her real name was Kunigunde Mackamotski but she preferred Cora Turner for her stage appearances (and also used the name Belle Elmore).

Eventually, Crippen decided to move to Britain and he arrived there in 1900. After a period of time he became the manager of a pharmaceutical medicines retailer based in Shaftesbury Avenue, London. Cora Crippen eventually joined him in England where she hoped, somewhat optimistically, to become an opera singer. Of extravagant outlook, she entertained a number of male friends (some with sexual favours) and also adopted a lavish lifestyle. The Crippens moved in due course to 39 Hilldrop Crescent where the famous tragedy would play itself out. Crippen lived a quiet abstemious life but he was constantly short of money as a result of Cora's extravagant habits. He also began a relationship with his secretary Ethel Le Neve, who in due time became his mistress (see Figure 5).

In December 1909, Cora (Belle) came to know of his liaison with Le Neve and threatened to leave him. On 15 December, she gave notice to the bank that she wished to withdraw her savings. A month later, on 15 January 1910,

FIGURE 5 The Ménage a Trois. Belle Crippen (above) the victim; Hawley Harvey Crippen and Ethel Le Neve (below) the suspects. From photographs in newspapers at the time of the trial.

Crippen ordered 5 grains (325 mg) of hyoscine hydrobromide, from Lewis and Burrows' pharmacy in New Oxford Street. This was such a large amount that it had to be ordered specially from the wholesalers! Crippen collected the alkaloid a few days later. On 31 January there were two guests to dinner at Hilldrop Crescent: a retired music hall performer called Martinetti and his wife. The guests departed after midnight. From this time, Cora Crippen was never seen alive again.

On the following day, 1 February, Crippen took a diamond ring and earrings to the pawnbroker and received £80 for them. At the same time, Ethel le Neve moved into number 39. Mrs Crippen wrote to resign her treasureship of the Music Hall Ladies Guild, intimating that she had to leave for America because of the illness of a relative. This letter was later shown to have been a forgery. A month later, Crippen reported that his wife had died suddenly and been cremated in Chicago. A friend of Cora Crippen, a Mr Nash, went to America to try and verify this information but met with no success. When he questioned Crippen, on his return from Chicago, he found him evasive and hesitant. The police were called in.

When Inspector Dew of Scotland Yard first interviewed Crippen, he was taken in completely. Crippen freely

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FIGURE 6 Arrest by Marconigram. Ethel Le Neve (dressed as a boy) and HH Crippen are arrested on the SS Montrose on 23 July 1910 in the St Lawrence River. An impression by an unknown artist.

admitted that he had been lying. The 'true' story was that his wife had left him for America, in particular Chicago, on 1 February and that he (Crippen) had been too embarrassed to admit to it. Dew made an initial search of the house but found nothing. However Crippen panicked, and he and Ethel made a bolt for it. They went first to Antwerp by Cross Channel steamer, and from there they embarked for Canada on the *SS Montrose*.

On learning of the couple's disappearance, Dew took the house at Hilldrop Crescent to pieces. The garden was dug over and the house ransacked. On the third day of the search Dew was exploring the coal cellar with a poker and turned over a few bricks. There, buried in lime was a body which he took to be the remains of Cora (Belle) Crippen.

ARRESTED BY THE MARCONIGRAM[16]

On route to Canada, Captain Kendall of the *SS Montrose* had been alerted by the wireless telegraph to the worldwide search for Dr Crippen and Miss le Neve. He became suspicious about two of his passengers. One resembled Dr Crippen but had grown a beard. The other purported to be an adolescent boy but never left his cabin. On 25 July, at 2 am, he sent the famous telegram to Scotland Yard, via Liverpool, to say that he was convinced that the circulated description of Crippen fitted his passenger 'Mr Robinson' and that this man spoke with an American accent.

Fortunately, the *Montrose* was a fairly slow ship and Dew (and his officers) went immediately to Liverpool and sailed on the much faster *Laurentic* for Quebec and Canada. The daily papers plotted the estimated positions of the two ships on a daily basis and this aroused great excitement! The *Laurentic* arrived in St Lawrence a day earlier than the *Montrose*. Dew and his officers boarded the *Montrose* at Father Point, and the suspicious couple were arrested (see Figure 6) and proved indeed to be Crippen and Le Neve. They were then brought back to London to stand trial.

But for the prompt action by Kendall, the couple would have disappeared into the depths of North America and they probably would never have been seen again. As can be imagined the chase and capture of the fugitive couple captured the imagination of the whole of the civilised world and the sales of the British, American and French papers rocketed! The trial at the Old Bailey in London was eagerly awaited and widely reported.

THE POST MORTEM AND ST MARY'S CAT[17]

When the remains of the body were removed from the cellar at Hilldrop Crescent the investigators, Willcox and Spilsbury, faced a number of significant difficulties. There was no head, nor any long bones. Many of the internal organs had been removed, but fortunately not the liver. This made it difficult to establish whether the body was that of a woman or of a man.

The case for the defence was based on the argument that the body had been buried in the cellar before the Crippens bought the house. It could have been anybody, man or woman, indeed it was not the remains of Cora Crippen. The prosecution was faced therefore with two major tasks; could they prove beyond reasonable doubt that the body was that of Cora Crippen, and secondly, that she had been murdered. If she had been murdered by what means?

In the modern era, DNA evidence would have settled the first question promptly and without difficulty. In 1910, Mrs Crippen's identity was proved by a scar on the abdomen which was that of an ovariotomy that Cora Crippen had undergone previously. To convince the jury, Bernard Spilsbury, that 'incomparable witness', as he came to be known, brought a microscope into court to demonstrate the histological changes.[18] This was probably the first time that this had been done in a British court of law.

Dr William Willcox, the home office toxicologist, carried out an analysis of the hyoscine content of the stomach contents and those in the intestines, kidneys and liver. The total amount of the alkaloid recovered from all these organs taken together was $^{2}/_{7}$ th of a grain (in modern parlance 18·5 mg). This would correspond to a total body load of ½ grain (i.e. 32·5 mg.) This compares with an average lethal dose of 8 to 10 mgms and would have certainly been sufficient to cause death.[14] Moreover Willcox was able to obtain a crystalline preparation of the alkaloid from the pooled material and show that this pure specimen had a melting point of 193°C, which corresponds to that previously established by other

investigators. This demonstration was again a first for forensic science.

The *coup de grace* came when Willcox took some of the pooled hyoscine extract and instilled it into the eye of the St Mary's Hospital cat. The pupil dilated immediately, confirming that it was a mydriatic. Other tests, including that on the melting point, demonstrated beyond peradventure that the alkaloid was hyoscine rather than the closely related atropine. Willcox also said that, in his opinion, the poison had been given by mouth and that its bitter taste could have been disguised by an alcoholic drink.

It will be recalled that Dr Crippen had obtained 5 grains (325 mg) of hyoscine from a pharmaceutical chemist. He had stated to the supplier that he needed it 'for homeopathic purposes'. Certainly Cora Crippen had received more than a homeopathic dose!

The final argument in the case for the defence collapsed when it was established that underneath the corpse was a pyjama jacket which had only been delivered to Hilldrop Crescent in January 1909 when the Crippens were already living there. The prosecuting counsel put the arguments to the jury: who could have buried the corpse in that particular jacket who was living in the house between January 1909 and January 1910? Answer: only one of the Crippens or a servant. Who was missing and could have been buried in that self-same jacket? Only Cora Crippen.

THE OUTCOME OF THE TRIAL

In the face of this barrage of evidence, histological, toxicological and circumstantial, the case for the defence collapsed. Unwisely, Crippen decided to give evidence himself. He proved to be devious, evasive and confused. When the jury retired, they obviously found the combined weight of the evidence overwhelming. Within half an hour they returned a verdict of guilty and Crippen was sentenced to death.

Ethel Le Neve had been charged as an accessory after the fact but she was acquitted. It is interesting to reflect, almost 100 years on, as to how much did she know and when did she know it? Crippen, to give him some credit, maintained that she had no knowledge of his purchase of the poison and that he had told her the same fabricated story of Cora's disappearance. Crippen appealed against his conviction but this was rejected and he was executed by hanging at Pentonville Prison on 23 November 1910. Miss Le Neve disappeared in America and changed her name. The Crippen case was a landmark in the history of British forensic science and became a benchmark for the future.

FINAL REFLECTIONS

In the 2005 edition of the *British National Formulary*, hyoscine barely receives a mention.[19] It can be used in palliative care to suppress hypersalivation and to prevent seasickness. However, as can be seen from the preceding account, it is one of the landmark drugs and should never be forgotten. Its association with witches and their use of it as a flying ointment still holds a fascination. It went on to become a famous medieval poison and this culminated in the early twentieth century in its use in the notorious case of Dr Crippen.

Moreover, together with atropine (and physostigmine), hyoscine was instrumental in unravelling the secrets of the autonomic nervous system. These drugs have also helped to produce our modern classification of the cholinergic and anticholinergic substances. Indeed, they have been instrumental in identifying the important neurotransmitter acetylcholine. In the next and final article in this short series on the Solanaceae, I shall move on to atropine, a chemical cousin of hyoscine. This was the vehicle used by the Edinburgh poisoner Agutter.

Truly, in thinking about hyoscine (and its kaleidoscopic history) with its contrasting powers for good and evil, we can echo the words of the celebrated American author Ralph Waldo Emerson who wrote in his book the *Conduct of life*: 'The Poisons are our principal medicines which kill the disease and save the life.'

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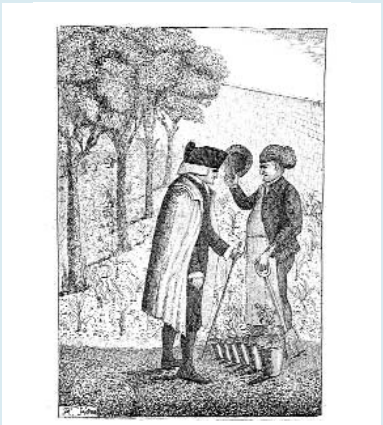

PAST PRESIDENTS

John Hope (1725–1786)

Strange as it may seem to today's doctors, until the latter half of the twentieth century, botany was a compulsory subject in the Edinburgh medical curriculum, at one time taught as part of *Materia Medica,* then, as a result of the work and influence of John Hope, in its own right. Later to become a President of the College, his fame rests on his botanical knowledge and research.

With his grandfather, Lord Hope, a senator of the College of Justice (a High Court judge in Scotland) and his father an Edinburgh surgeon, he might have been expected to train in Edinburgh, but instead he took his MD in Glasgow and did postgraduate work in Paris. It was there that he first heard of the botanist Linnaeus of Uppsala, fuelling his interest in botany. He returned to Edinburgh in 1750, became a physician at the Royal Infirmary and, in 1762, became a Fellow of the College. By this time he had already been appointed Professor of Botany at Edinburgh University, King's Botanist for Scotland, and Superintendent of the Physic Garden, using the now established Linnaean system of classification.

This garden had been started by two of the founding fathers of our College – Sir Andrew Balfour and Sir Robert Sibbald. The first site was near Holyrood House, the Edinburgh residence of the monarch. From there, it was moved to unsuitable, swampy ground where Waverley Station stands today. In 1776, it was moved again, this time to Gayfield Square, off Leith Walk, a site far too small but better than its previous sites. In 1820, it was incorporated into the Royal Botanic Garden being developed at Inverleith, and today regarded as one of the world's greatest such gardens. The miniature Physic Garden built in a courtyard of our College in 1996 is tended by the gardeners of the Royal Botanic Garden.

One of Hope's students, William Roxburgh (1751–1815) FRCP Edin, founded the Indian Botanic Garden in Calcutta. No fewer than eight species of rhododendron introduced into Britain are named after Edinburgh doctors, Roxburgh naming a tree genus *hopea* after his teacher.

Hope was President of the College 1784–1786.

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HISTORY