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On the Physiological Action and the Therapeutic Use of the Lobelia Inflata.

Perhaps some apology is necessary for speaking of an article of the Matræa Medica, which is considered a well-established remedy of every day use; but considering how many new remedies have been brought before us of late years, have been adopted and again thrown aside as the mere fashion of the day, I have thought that my time and that of others would not be thrown away in my saying a few words concerning this remedy, in order to confirm and to extend its present sphere of usefulness, beyond the ordinary limit assigned to it. It seems presumptuous in one whose medical career has so recently commenced, to speak at all positively concerning
the nature and uses of a remedy, which like all other remedies, requires a length of time and no ordinary amount of perception on the part of the observing experimentalist in investigating or confirming its physiological and therapeutic property. Yet before I had actually embarked upon my medical studies, this plant the Lobelia Inflata had frequently attracted my attention, and ever since it has been an object of particular interest to me and has caused me to direct my observation to its special uses in several diseases which are met with in everyday Practice. The History of this plant seems to me a natural preliminary to the more particular consideration of its action and uses, and especially as its historical interest is closely associated with the latter. First then as to the name which has been given
to it. The Natural Order, to which this plant belongs, is the Lobeliaceae; this name was given to it in honor of the discoverer of it, Mr. Lobel, a celebrated Botanist, who was born at Lisle in 1538 and subsequently became Physician to James I. It must not be supposed however, that Mr. Lobel was the first to investigate the medicinal properties of the plant under discussion, it is not even known if he was at all acquainted with them. The Order furnishes some beautiful herbaceous plants whose corolla is generally blue. The term "inflata" is applied to this plant from the character of its capsule which is inflated or blown out. It is a native of North America and has been known to the American Indians long before we had any idea of its medicinal properties in this country. An American clergyman appears
to have been the first to attract the attention of his countrymen to the plant by making use of it for the alleviation and cure of Asthma from which he himself suffered. Then a noted empiric of the same country experimented upon himself and others, confirming by its operation the emetic properties which it was said it possessed; but at the same time (to the experimenter's disadvantage) proving its dangerous qualities, when administered as rashly as he appears to have done in too many cases. Many alarming examples of its deleterious properties were brought to light by several trials in the American Law Courts, which—although attended by serious and fatal results to his victims, were—yet the means of giving a fresh impulse to the investigation of the properties of this drug.
It was introduced into England on a large scale by an American quack of the name of Coffin, who, together with his followers appears to have administered the drug in the same reckless way which characterised its empirical use in America. Several deaths occurred to patients under the treatment of the Coffinites and inquests were held, which together with the Post Mortem examinations began to throw greater light upon the general and local action of the drug, as exhibited to the Profession and the general public in this country. Although these revelations did much to bring the plant into greater use, yet there was a very strong party feeling against it, owing to the fatal effects seen to ensue from its indiscriminate use, and men were too apt to utterly discard its use, looking only at its
attendant dangers and omitting to pay any regard to the beneficial results arising from a judicious use of it. Of late years however it has been gaining much greater estimation in the hands of the Medical Profession and it is likely, not only to hold its ground so gained, but to increase in popular favour as its true value becomes still better known.

The common name of the plant is the Indian Tobacco or Emetic Weed, the first so called from its resemblance to the Tobacco plant, and the second from its emetic properties. The seeds and leaves are the parts usually employed in the medicinal preparations of the plant, but the whole plant is active, and the root perhaps more so than the other parts. The plant flowers from June to October or November.
Sorbelia Inflata is a biennial, indigenous plant, with a fibrous, yellowish-white root, and an erect, angular, very hairy stem, in the full-sized plant much-branched, and from 6 inches to three feet in height. The leaves are alternate, scattered, sessile, ovate-lanceolate, serrate, veiny, hairy. The flowers are small, numerous, pale blue, on small peduncles, each originating from the axil of a small leaf. The calyx consists of five subulate segments. The corolla is small, tubular, slit on the upper side, and ventricose at the base; the limb bilabiate; tube prismatic; segments spreading and acute; two upper ones lanceolate, three lower ones oval. Anthers united into an elongated, curved body, purplish: filaments white. Style filiform; stigma curved, two-lobed and enclosed by the anthers. Capsule two-celled, ovoid,
inflated, striated, ten-angled, and crowned with the persistent calyx. Seeds numerous, small, oblong, brown. Lindley, Bigelow, Wood. The plant contains a milky, acid, juice. When dried it has a disagreeable odour and a strong, burning, nauseous taste. Hot water, vinegar, Ether and alcohol extract its medicinal properties, but boiling water destroys them. Pareira found the plant to contain a liquid volatile alkaloid Lobeline, to which the narcotic properties were said to be due, Lobelic Acid, a resin, and a volatile oil. Oxide of Iron, salts of Lime and Potash have also been found.

The simple Tincture and the Ethereal Tincture are the preparations generally used, more commonly the latter, and these fulfil almost all the indications required of the drug.
Physiological Action.

A great many properties have been assigned to this plant, it is said to be Emetic, Nauseant, Expectorant, Relaxant, Sedative, and Antispasmodic, secondarily Cathartic, Diaphoretic, and Astringent, some also say Narcotic, but in this I have not at present much belief. In large doses it is a prompt and efficient emetic and in small doses it excites diaphoresis, expectoration and contracts spasmodyc action. Dr. Guy in his Principles of Forensic Medicine speaks of Lobelia as "an active medicine and a potent poison. A teaspoonful or a drachm (he says) is sufficient to destroy life." On the other hand I know a man who has actually swallowed half an ounce, with any fatal result, but only temporary distress arising from
it. There is indeed much discrepancy of opinion as to its action, this is not generally due to the varying condition of the drug itself, but to the impressionability of the subject upon whom it is exhibited. Many patients will tolerate a large quantity of the drug, others again are particularly sensitive to the action of the smallest dose, hence we have to feel our way when administering it for the first time to a patient.

In the year 1849 experiments were made by Dr. Pearson and M'Curtis on the properties of Lobelia Inflata. Hedgehogs and Cats were the subjects of their experiments and the preparations used were the tinctures and aqueous extracts, the former being much more powerful than the latter. The doses given were very large in proportion to the size of the animals operated upon,
they varied in quantity and were equal to from 5 grains to one drachm of the powdered Lobelia; as much as 90 grains were given to a cat. The first experiment was made upon a Hedgehog, which died the second day, after having taken in two doses 27½ grains of Lobelia, death occurring immediately after the second dose. In some cases collapse came on rapidly after the administration of the first dose, but when vomiting ensued the animal quickly regained its strength. Injections per rectum were also tried and very much the same results ensued, vomiting, muscular tremors, small quantity of feces and urine voided, and great depression. The injections were voided almost as soon as given; altogether the effects were not so severe, as when given by the mouth, and death occurred much later.
In all cases upon a section being made after death, there were evident signs of extensive inflammation involving principally the stomach, the mucous membrane of which appeared corrugated and intensely inflamed about the pylorus and upper part, extending also more or less throughout the whole intestinal tract; the mucous coat of the bladder was also inflamed in a greater or less degree, the lungs were gorged with blood, and other parts were also much congested. The experiments on bats gave almost the same results, although the exhibition of the drug appeared to be attended with more purging than was found in its trial upon Hedgehogs. When the decoction of the herb was used, the effects were very much modified, proving that boiling dissipates its properties.
Hypodermic injection of the Extract of Lobelia produced vomiting and depression. The immediate cause of death in the foregoing experiments appeared to be due to congestion of the lungs, together with inflammation of the other tissues. The blood was always found fluid.

In all cases during life, the following physiological phenomena were observed: Respiration was increased sometimes to as much as four times the normal state; muscular energy was invariably diminished; the pupils were dilated; the pulsations of the heart were at first much increased, diminishing as collapse came on.

These experiments give a very fair idea of the action of the drug in large doses, but I must illustrate its action upon the human subject. In 1849 there was a trial at Carlisle of a man named William Tait, who
was charged with the manslaughter of William Sherwitt by administering to him a certain quantity of Sobelia, and it was the opinion of the medical witness, that the deceased had died from the effects of a poisonous irritant causing inflammation of the stomach. During the action of the drug, the senses of the deceased were retained till the last. In the Post Mortem examination the stomach was found to be inflamed and the intestines slightly so. The lungs were congested. Several trials for poisoning by Sobelia took place from year to year; there was another in 1849, which was reported by Dr. Pearson and Mr. Curtis. I will give the result of the Post Mortem examination as detailed by these gentlemen, as it gives a fair specimen of the condition of the various organs usually found in these cases. The Post Mortem
examination made 40 hours after death showed the peritoneal surface of the intestines adherent everywhere, but separable by the finger, of a vascular pinkish and slightly granular appearance; the liver of a bluish colour; the gall bladder moderately filled with inspissated black bile, containing numerous minute needle-shaped crystals. The internal surface of the stomach was greatly inflamed, especially recent at the cardiac orifice, also marked and recent at the pyloric orifice. The great and small intestines were more or less inflamed throughout, but very recently in the duodenum and upper part of the jejunum in which was found a large incipient chronic ulcer. The papillae of the tongue were enlarged; the pharynx and oesophagus congested; the liver slightly congested; the lymphatic glands
congested; both kidneys congested and watery. The bladder was empty; capillary injection at the neck. On opening the chest the contents had a nearly healthy appearance; the lungs however had a slight pink colour. The entire surface of the mucous membrane of the larynx and trachea showed signs of inflammation old and recent and extending throughout the bronchi. In the course of the anterior raphe of the heart was seen an enormously distended lymphatic vessel. The brain and its membranes were greatly congested; there was no fluid in the ventricles. From the experiments which Dr. Pearson and Mr. Curtis made upon animals with this drug, they came to the conclusion that the recent inflammations and congestions had been caused by it,
and that the chronic inflammation in the alimentary canal, peritoneum, bronchial tubes &c. resulted from the same drug or some other irritant given at intervals for a considerable period. What quantity of the drug was given to the patients does not transpire either in this or the preceding trial and this is much to be regretted as it might have accounted for results which were apparent during the life of the patient as well as for those recorded in the Post Mortem examination.

When chewed Lobelia has a strong acid, nauseous taste powerfully affecting the throat and occasions ptyalism and sickness; it reminds me much of the sensation I once experienced after smoking some Cavendish Tobacco, which by the bye I did not try
again. Lobelia acts upon the whole system; the action of the heart is first increased, though by its frequent repetition, or by the administration of a large dose, its action is depressed. Respiration is greatly increased and as shown in the experiments upon animals by Dr. Pearson and Mr. Curtis, the number of respirations was doubled in a short time after the administration of the first dose and is even increased to four times the normal standard. The brain appears to be but little affected unless an indiscriminate use has been made of the drug. Authors appear to differ very much as to its narcotic action: from what I have seen and read of its action I am of opinion that it is not narcotic. Confusion and delirium have however been produced by the stronger preparations (Lobelia and Vit. D.)
Lobelia), Vertigo is also sometimes experienced. The mucous membrane of the stomach and intestinal canal is inflamed and congested when the powder is brought in contact with it, as revealed by the Post Mortem examinations of man and animals, hence this drug has a topical stimulating action as well as a general action on the system. This topical action however does not prove it to be a dangerous narcotic-irritant poison which many have affirmed it to be. On the muscular system it acts when given in excess producing tremors and even convulsions, together with general relaxation and weakness accompanied by a feeling of prostration. It counteracts muscular spasm and its great use in many diseases in which an antispasmodic is indicated. It appears to be taken
up by the absorbent system when inserted beneath the skin, producing the same results as when administered internally. Applied to an open sore, vomesis & also will result.

The cutaneous secretion is only slightly affected, diaphoresis occurring after the administration of small doses. Lobelia is no doubt taken up by the blood and in this way is transmitted to the various parts of the system; its action is not simple, not exerted solely upon one organ, but complex and exerted upon several organs stimulating them (in proper doses) to fulfil the various functions allotted to them. Although acting upon many organs, Lobelia appears to act more particularly upon the respiratory organs than others, causing the lungs to expel the mucous which they may have accumulated in them.
As mentioned before, vomiting results after the exhibition of a moderately large dose, but although the patient may be rendered weak after this action for a time, it is worthy of remark that he frequently feels so much better afterwards, his appetite returning with increased vigour, and his general health improving, that the idea of the drug being a poison is soon dispelled from the sceptical mind. Far from acting injuriously, when given in suitable doses, it seems to exert an anxious influence throughout the whole system. Whether this modus operandi of Lobelia is known for certain or ever will be seems doubtful, but from all I have gathered during my acquaintance with it, I cannot help expressing my opinion as to its direct action upon the sympathetic nerve.
Whether taken up by the absorbent system or through the blood or acting topically though indirectly when introduced into the stomach, it seems that the sympathetic is the nerve acted upon; the general and rapid effects produced throughout the whole system appear to advocate this, the stimulus given to all the functions of the different viscera by the use of moderate doses, and the suspension of that regulating power, whereby the several viscera of the body are controlled in those operations which constitute the economy of the body, appear to speak in favour of this view. When received into the stomach, the impression there made by the drug is quickly conveyed to the different ganglionic centres and by these is reflected to the organs over which they preside, thus
accounting for the general action throughout the system. How and why a predilection is shown for the pulmonary organs I cannot venture to say, but I believe that certain drugs have affinities for certain organs, just as we find affinities constantly existing and showing themselves in the province of Chemistry. In this way the affinity of Lobelia for the pulmonary organs may be conveyed by the gastric flexus, through the solar flexus and the pneumogastric to the thoracic portion of the sympathetic, affecting these nerves in its passage and being again reflected to the sympathetic filaments of the anterior and posterior pulmonary flexuses. Whether there be any truth in this idea or whether it be merely the result of an anatomical chimera, I leave to the indulgence of
my readers and to future time to test and determine. Having now dwelt for some time upon the physiological action of Lobelia Inflata, I now come to speak of its general and though special therapeutic use.

Therapeutic Use of Lobelia Inflata.

Being an indigenous plant of North America, it has been, as might be rightly supposed, submitted to many more trials in different diseases, than has been attempted in this country, and it has been used by the most eminent physicians in the United States, with the most beneficial results that could be expected. It has been used with great success in reducing the morbid sensibility of the eighth pair of nerves and the excessive irritability of the respiratory muscles upon which asthma is so much dependent.
It is then in the treatment of Asthma that I have first to speak of the use of the Lobelia Inflata and it is in this disease that the drug has acquired its chief reputation and rightly so too. As before mentioned it was used a long time ago by a clergyman in North America for the alleviation and cure of this disease from which he himself suffered, and great success attended its employment. In 1829 Dr. Reece was a strong advocate for its use in this malady, and he was very successful in his treatment of it in this country. Dr. Elliotson says it acts like a charm in this complaint and that no other remedies can be compared to it; in ten or twenty minutes after the dose, the paroxysms are perfectly relieved. The sickness often
experienced is actually beneficial, and far from that occurrence being a reason for discontinuing it, an additional inducement is afforded for press ing it until effectual relief is obtained. Dr. Eberle of Philadelphia also speaks of Lobelia in high terms and saying that the most violent paroxysms of spasmodic asthma are completely subdued within thirty minutes by this me dicine. He has also found it to mitigate the difficulty of breathing which occurs in organic disease of the heart and has found the good effects prompt and decisive. I should not myself feel so much inclined to try it in the latter disease, but in asthma I must agree with the favorable opinions I have quoted, although I must confess that I have not treated very many cases for this, yet
in those cases that have come before me, great success has rewarded my efforts. The remedy should be given principally during the paroxysmal stage, in doses of say a drachm every hour until relief is obtained or if this proves too much at a time 10 minims may be given every quarter of an hour or twenty minutes' instantaneous relief frequently follows. Doses of two drachms may frequently be given without any dangerous consequences ensuing. But I would be cautious in those cases complicated with disease of the heart, as the remedy will cause greater irregularity of the heart's action as indicated by the radial pulsations. The dose must also be regulated by the constitution and susceptibility of the patient.
Bronchitis. I have next to speak of the use of Lobelia in Bronchitis, especially in Chronic Bronchitis, it is in this disease more particularly that I have seen so much advantage derived from this remedy. I have treated some patients for this disease who have been far advanced in years, from 60 to 70 and even upwards in age, and the results which have been obtained, were most encouraging and really much surprised myself in the good effects produced, the patients themselves frequently declaring that they have never experienced so much benefit before, and begging that the prescription might be left with them in case of need, if I were about to part from them. I know there has been much discrepancy of opinion as to the use of this drug,
Some say they have found it comparatively useless in this disease, others again praise it; but this apparent disagreement is owing to the difference in the quantity given for a dose and the various susceptibilities of the patients. If caution is required I usually begin with the small dose of five minims repeated three or four times a day, increasing the dose to one or rarely two drachms according to the circumstances of the case, the condition of the discharge from the tubes and the capabilities for reaction in the system.

Together with the Lobelia (Tincture) I usually combine the Carbonate of Ammonia and add sometimes some Tincture of Squill or instead of the Ammonia, Spirit of Chloroform may be used in Decoction of Senega.
The dyspnea met with in capillary Bronchitis in Emphysema may be quickly allayed by Lobelia. Altogether I would say that this remedy might be much more extensively used in Bronchitis with the greatest advantages accruing from it; not that I believe it to be appropriate to every case, many cases will be found either intolerant, or in some way unsuited to its employment, but where it can be well borne by the patient and it seems likely to have a good effect, such the remedy and success will follow.

I have next to speak briefly of its employment in Whooping Cough. Since my appointment as Physician to the St. Pancras and North Dispensary in London, I have made a few trials of Lobelia.
in this disease, and the good results which have followed, give me every encouragement to extend its range of usefulness. In lessening the severity of the paroxysms, it has great power, as well as in reducing the frequency of the attacks. It should be given during the paroxysms. Children about two years old may take from eight to ten minims every hour; in general it will be found that they are more tolerant of the drug than might be expected: five minims may be given to very young children.

In croup it has also been given with success, but in confirmation of this, I cannot add my own experience, not having at present tried it. Some have found it of use in Pneumonia which is contrary to what I should myself have anticipated.
Wherever Dyspnea is found to be present, a trial of Lobelia may be made; so frequently does this arise from perverted innervation of the pneumogastric nerves, that this remedy may prove of great value in cases which have appeared to baffle the ordinary antispasmodics and tonics.

In its capacity of antispasmodic, it has been recommended and used in America in the treatment of Epilepsy, Hysteria, Cramps, Tetanus, Chorea, and Convulsions. In Mideast, it has been used in rigidity of the Os Uteri with considerable success. Where relaxation of the system is required either to subdue spasm or otherwise, probably no remedy is more effectual; hence it has been used as a relaxant in Hernia and Strictures.
also in dislocations it has proved of considerable advantage, by relaxing
the muscles and so facilitating the replacement of the dislocated bones.
Externally it is occasionally used for fomentation; the tincture in some
skin affections and the powder is used in poultices to promote suppuration. Hence we perceive that the use of this drug is multi-
form and yet I believe its true value is scarcely yet known, and certainly not appreciated as much as it deserves, this is
greatly owing to a certain prejudice which many have for it, on account of the poisonous pro-
erties which they attach to it.
I must confess this is but a poor attempt on my part to speak its praises. I hope I have not said too much to excite too great expectations from
this drug, and yet I trust I have said sufficient to promote a greater interest in it, so that others may be induced to make further experiments with it and in that way endorse the opinion of myself and others as to its true value. If in any way I shall thus have induced others to direct their attention to the subject of my Thesis and so promote in some measure (small though it may be) the welfare of my fellow-creatures, and this I take to be the duty of every man, more especially of the Physician, I shall feel thankful in that my words and time have not been in vain.

Finis.

Henry Salt, M. B. C.Mo. F.C.S. F.R.G.S.
May, 1872.