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Craig, William, 1832-1922.
Medico-Chirurgical Society of Edinburgh.
University of Glasgow. Library

Publication/Creation

Edinburgh : Oliver and Boyd, 1876.

Persistent URL

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NOTE ON JABORANDI.

BY

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*Read before the Medico-Chirurgical Society of Edinburgh, 10th November
1875.*

EDINBURGH: OLIVER AND BOYD, TWEEDDALE COURT.

MDCCCLXXVI.

REPRINTED FROM THE EDINBURGH MEDICAL JOURNAL FOR JANUARY 1876.

NOTE ON JABORANDI.

DR COUTINHO, of Rio Janeiro, has lately introduced to the notice of the medical profession a new drug called jaborandi, which possesses remarkable properties, both as a sialogogue and as a diaphoretic. Jaborandi, the name given by the Indians to this new medicine, is a shrub which grows in the interior of certain provinces of the north of Brazil. The parts used are the leaves and small branches. From these, when bruised, an infusion is prepared which possesses the remarkable properties of the drug. It is now more than a year since a small quantity of this plant was brought to Paris by Dr Coutinho; and Professor Gubler, after experimenting with it at one of the hospitals of Paris, declared that the effects of jaborandi were extremely remarkable, and the evidence irresistible. Owing to the difficulty of procuring this drug, little of it reached this country till the beginning of the present year. It was on the 5th of January that I received my first supply, and I believe I received the first packet that came to Scotland. I lost no time in making an experiment, and found that the drug was possessed of remarkable physiological properties. Since that time, I have received sufficient to enable me to ascertain fully its physiological, and to a certain extent its therapeutic, properties. It is not my intention, in this paper, to detail at length the various experiments I have made with this medicine. I shall merely give the general results, which are sufficiently remarkable to interest the members of this Society.

An infusion, prepared from one drachm of the bruised leaves, when swallowed, produces the following results:—About twenty minutes after the infusion is swallowed, salivation commences, and in a few minutes afterwards the mouth is literally flowing with water. This continues for four or five hours, and during that period, from ten to sixteen ounces of fluid may be easily collected. The infusion is acid, has a peculiar and characteristic odour, a mawkish but not unpleasant taste, and in doses corresponding to one drachm of the leaves, I have never found it produce any nausea. I have invariably used the strained infusion, and am

prepared to show in this paper that the strained infusion possesses all the activity of jaborandi. Notwithstanding the large amount of fluid secreted by the salivary glands, it produces no uneasiness in these glands. Simultaneously with the flow of saliva, the perspiration appears on the forehead and over the whole body; it extends even to the limbs, but is most marked on the trunk. These effects can be produced in a room with a temperature ranging from 54° to 56° Fahr., and without putting the patient to bed. It is not necessary to administer the infusion hot. The effects are produced even when the infusion is administered cold. The sweating continues for several hours.

There can be no doubt that this drug is possessed of remarkable powers as a sialogogue. Certainly I know no medicine, either in the Pharmacopœia or out of it, at all to be compared to jaborandi in this respect. Its power as a diaphoretic is also well established, although in this respect I did not find it so remarkable as I had anticipated from reading the accounts of Professor Gubler's experiments.

It has also been found that belladonna, or its active principle atropia, arrests the salivation produced by jaborandi, thus showing that in certain respects we have a true antagonism between jaborandi and belladonna.

I have not time in this paper to enter into the interesting question regarding the *modus operandi* of this remarkable drug; suffice it to say, it is in no way due to any local action on the salivary glands produced during the action of swallowing. It is well known that many vegetable substances, when chewed, possess the property of increasing, to a limited extent, the flow of saliva; and even jaborandi to a certain degree possesses the same property. The salivation, however, produced by this drug is something altogether independent of any irritation on the salivary glands, produced by being chewed or even swallowed, as the following experiment clearly proves:—I injected up the rectum the infusion prepared from one drachm of the bruised leaves, and found that salivation and perspiration came on as speedily and as effectually as when the same quantity was administered by the mouth, clearly proving that the active principle of jaborandi is first absorbed, and afterwards produces its remarkable physiological effects.

I shall now make some remarks regarding the active principle of jaborandi.

Various chemists have analyzed the leaves, and it is generally believed that its activity is due to an alkaloid, which some have called pilocarpin. The watery infusion of jaborandi is acid, but whatever be the acid contained in jaborandi, its physiological properties are not due to this acid. Neither are they due to the volatile oil contained in the leaves, and to which they owe their characteristic odour. For I have had prepared for me by J. F. Macfarlan and Co. of this city, a substance called pilocarpin,

which undoubtedly possesses the physiological properties of the drug, and yet is not acid, and does not contain the characteristic odour of jaborandi. It is quite possible, for anything I know, that the acid and volatile oil may possess sialogogue or diaphoretic properties, for I am not aware that they have as yet been isolated; but it is clearly proved that there is a substance which can be separated from jaborandi, destitute of acidity and of the characteristic odour of that plant, and which possesses all the activity of the drug. This substance, called *pilocarpin*, is of a semi-fluid consistence, of a yellowish colour, and possessed of an agreeable odour. It is soluble in water, and is very active. One grain of this pilocarpin is nearly as active as one drachm of the leaves. Whatever be the active principle of jaborandi, it is something which is soluble in water, and even the *strained* infusion possesses all the activity of the drug. In this opinion, I differ from others who have experimented with this substance. There are many who believe that to produce the physiological effects of jaborandi, it is necessary to use either an alcoholic preparation, or to swallow the "dregs." The origin of this erroneous view is, I believe, traceable to Rabuteau of Paris, who, as the result of a chemical analysis of the leaves, says that they contain—(1.) A volatile principle; (2.) A part soluble in water, and perfectly flavourless; (3.) A part insoluble in water, but soluble in alcohol, and having a bitter flavour: and that by experiments he has come to the conclusion that it is the last of these three in which all the virtues reside. The same erroneous opinion occurs in an editorial article on jaborandi, published in the *British Medical Journal* for 27th February 1875, where we have these words; referring to the leaves of jaborandi, it is said:—"They contain a volatile principle and a tasteless substance, soluble in water, both of which are physiologically inert, the active properties of the drug residing exclusively in a bitter extractive, soluble in alcohol, but insoluble in water."

Mr Martindale of London fell into the same mistake, and swallowed, in addition to the infusion, what he called the "dregs." These "dregs" consist, to a great extent, of pieces of the stems and leaves, together with the petioles; and on account of the large amount of fibrous tissue contained in these dregs, irritation of the stomach and alimentary canal is caused by their being swallowed. In the *Pharmaceutical Journal* for 16th January, Mr Martindale relates an experiment in which he swallowed about fifty grains of the dregs, in addition to the infusion, and experienced nausea and vomiting. This was but the natural consequence of swallowing such an amount of indigestible materials. In the same article, Mr Martindale uses this sentence:—"The strained infusion, from what I hear, produces but little effect." In the same number of the *Pharmaceutical Journal*, I gave an account of an experiment performed with the *strained* infusion, and found it possessed of very remarkable effects indeed. The whole of my experiments have

been performed with the strained infusion, and this substance called pilocarpin, which I have found to be so active in doses of one grain. It is freely soluble in water. These facts clearly prove that the active principle of jaborandi is soluble in water, and also that the strained infusion possesses all the activity of the drug.

Regarding the effects of this medicine on the temperature, pulse, and vision, experimenters are somewhat divided. My own experience leads me to believe that they are very small and insignificant. I have never found jaborandi affect much either the heart's action or the temperature of the body, and I have watched carefully for the disturbance of vision observed by Mr Martindale and others, but as yet have failed to observe it. I believe that many of the untoward results ascribed to jaborandi are due to the fact that "dregs" have been swallowed in addition to the strained infusion.

I have not had much opportunity of testing the therapeutic virtues of this drug, but I have tried it in several cases of fever, where the tongue was dry and the mouth parched, and by giving small doses of the infusion every few hours, I was enabled to restore the flow of saliva, and to keep the tongue and mouth moist. I believe that in this respect it will prove of considerable benefit in fevers and allied diseases. It has also been efficacious in removing pleuritic effusions. For this disease it will yet prove a most valuable medicine; for in a few hours, in addition to profuse perspiration, twelve or sixteen ounces of fluid may be withdrawn from the blood, with very little disturbance to the general system, which must tend in no small degree to promote absorption of fluid from the pleural cavities. I understand it has been found useful in diabetes. Several cases of this disease have been successfully treated with jaborandi by Professor Laycock.

Regarding the applications of jaborandi to the cure of disease, much clinical observation is still necessary before we can assert positively what are the therapeutic virtues of this remarkable drug.

The following may be regarded as well-ascertained facts regarding jaborandi:—

1. Its leaves are possessed of remarkable sialogogue and diaphoretic properties.
2. Boiling water is capable of extracting the most, if not the whole, of these properties.
3. A strained infusion seldom produces any untoward results.
4. On account of the large quantity of indigestible fibrous materials in the "dregs," these, when swallowed, must produce unpleasant effects.
5. A substance of a semi-fluid consistence, destitute of acidity and the characteristic odour of jaborandi, may be separated, possessing all the activity of the drug, and which is probably an alkaloid.

6. The dose will be found to be $\frac{1}{12}$ to $\frac{1}{4}$ grain of this alkaloid, and of the infusion as much as corresponds to five or ten grains of the leaves.

Before I conclude, I wish to say a few words regarding the botanical source of this remarkable drug—the more especially as, in a recent number of the *British Medical Journal*, Dr Robert Cory of Carlisle, in an article on this plant, mistakes throughout a leaflet for a leaf.

There is still considerable doubt as to the botanical source of jaborandi. Some maintain that it belongs to the Piperaceæ; whilst others, with more probability, that it belongs to the Rutaceæ. I believe that I am correct in stating that the name jaborandi is given by the Brazilians to various plants possessed of stimulating properties, and in a dictionary of Brazilian medicines, in Portuguese, by Dr Chernoviz, published in 1868, jaborandi is mentioned as the produce of *Ottonia anisum*, a plant belonging to the Piperaceæ. Dr Chernoviz states that this plant is possessed of sialogogue properties, and that from the root a tincture is made (one of jaborandi to eight of alcohol). From the parts of the plant I have examined, I may safely say that the jaborandi of Dr Chernoviz is not the drug attracting so much attention in Europe at the present day.

There is a plant at present in the market called “piper jaborandi,” whose virtues I have not yet had time to investigate, but certainly it is not the *true* jaborandi. The leaves of this plant are very different from those of that shrub whose effects I have described in this paper.

I have not yet been fortunate enough to receive those parts of the plant which are sufficient to determine its botanical source; but from the parts of the plant I have received, I have come to the conclusion that it belongs to the Rutaceæ, or an allied order, and may possibly belong to the genus *Pilocarpus*. I have been able to determine the following facts:—

The leaf is compound imparipinnate. The leaflets are in four or five pairs, and are scarcely opposite. They are glabrous, smooth, brittle when dry, and somewhat resemble the leaves of the *Prunus Laurocerasus*. They are elongated, elliptical, emarginate, and slightly unequal at the base. The leaflets vary much in size and form, even on the same leaf; but the foregoing characters are possessed by all. The venation is well marked, and is very beautiful. There is a very prominent mid-rib, on the under surface, running along the entire length of the leaflet; from this mid-rib numerous veins proceed (at an angle of about 45°) towards the margin of the leaflet, and form loops and anastomoses within its margin. The veins are well seen on both surfaces, but are most marked on the under side of the leaflet. The petiole is cylindrical, flattened and thickened at the point of insertion into the stem. The distance from the stem to the first pair of leaflets

varies in the specimens I have seen from two to five inches, the average distance between the pairs of leaflets being about two inches. The leaflets are nearly, but not quite, sessile, and are inserted on the upper surface of the petiole. They are thickly spotted with pellucid dots. These are well seen when the leaflet is held before a bright light.

I have also been enabled to examine specimens of the stems and small branches, and find that the bark peels off loosely, is very brittle, and produces a peculiar sensation when chewed. Between the bark and wood, there is abundance of crystalline matter, but I have failed to find any definite forms of crystals when examined under the microscope.



