

and extracted with chloroform as in the determination of the non-phenolic alkaloids. Phenolic alkaloids—0.03 per cent.

The separation of the alkaloids on a larger scale points to the presence of at least three alkaloids in Caapi—first, a phenolic alkaloid; second, a non-phenolic alkaloid forming a difficulty soluble hydrochloride; third, a non-phenolic alkaloid forming a more readily soluble hydrochloride.

None of these has been isolated in sufficiently pure form to report on their reactions and properties at this time, except that the non-phenolic alkaloids in solution either in dilute hydrochloric or sulphuric acids exhibit a beautiful blue fluorescence, very similar to that of quinine. These alkaloids form a golden yellow solution in chloroform and readily crystallize on evaporation of this or other solvents. The separation and properties of the alkaloids are under investigation and will be reported in a future paper.

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### MIRÉ (MEÉ-RAY).\*

BY H. H. RUSBY.

All that is known of this interesting drug is comprised in a few brief statements communicated by the Indians of Central Bolivia, who alone have employed it in medicine. These statements, which I have previously quoted in published references, may be repeated here for the purpose of comparison with the following report by Dr. Thomas S. Githens, of his pharmacodynamic experiments.

I have found no clue to the family relationship of the Miré plant, in the specimens collected, which consist of roots and leafy stems, with no indication of either flowers or fruits. The plant is a small shrub, with alternate estipulate leaves, the latter somewhat resembling those of Manaca. The wood is extremely tough and hard and its structure is like that of some Solanaceae. The Indian method of extraction is by boiling, which does not appear to injure the active constituent. This fact suggests an alkaloidal nature of the latter.

All that the Indians know of its action is that full doses produce the following symptoms and results:

1. There is a paralysis of all voluntary muscles, precisely like that produced by alcoholic intoxication, and which may result fatally, if the dose is large enough.
2. There is no disturbance of sensation or intellect.
3. After a time, there is a profuse perspiration of the cold type, suggesting sympathetic paralysis.
4. This perspiration is capable of destroying all cutaneous parasites, which suggests cutaneous excretion of the active constituent of the drug. This would indicate stimulation of the sweat glands.

It will be observed that the results obtained by Dr. Githens corroborate the first of these statements, that as to muscular paralysis, and the last, as to stimulation of the sweat glands.

It may be added that so far as is now known to the natives of the producing

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\* Scientific Section, A. Ph. A., Asheville meeting, 1923.

region, the plant is so scarce as to present no commercial possibilities, except as a result of cultivation. It is not impossible, however, that future discovery may extend the range and increase the supply.

It would appear from all the evidence at hand that this drug possesses physiological properties distinct from those of any other known.

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### PRELIMINARY REPORT ON STUDIES OF MIRÉ.\*

BY THOMAS S. GITHENS, M.D.

The active principles seem to be completely extracted by hot water, and by various strengths of alcohol from 10 per cent. to 95 per cent. Extraction by ether, chloroform and acetone yields weaker preparations.

Preparations, however made, were similar in action and there was no evidence of two principles differing in the nature of their effect.

The principles were not injured by boiling and were not volatile in steam.

In frogs, full doses bring on a remarkable condition, in which the frog lies extended, incapable of voluntary motion, and without respiratory movements, but twitching all over continuously and violently. All the voluntary muscles seem to be involved in these weak, irregular, spasmodic contractions. This condition may last for several days during which, in spite of the paralysis, the heart continues to beat almost normally. The heart generally stops beating after two to four days, probably as a result of exhaustion, and asphyxia.

The tremors are not influenced by decapitation, nor by section of the cord. If the sciatic nerve is cut before the injection is given, the twitching occurs, but usually less actively than in the intact leg. If the leg is ligated at the hip, leaving the nerve free, no twitching occurs in that leg, although there is loss of voluntary motion.

There is no curare action. The skin shows increased secretion of mucous.

In mice, large doses cause twitching of the leg muscles followed by jerky, irregular respiration, and finally by paralysis of voluntary muscles. Death results from respiratory paralysis, the fatal dose being about 0.3 mg. per gram.

In rabbits, intravenous injections of 2 cc. of a ten per cent. infusion per kilogram caused slowing of the pulse with slight rise of blood pressure, increase of knee jerks and salivation. In certain experiments, increased peristalsis was seen.

These experiments indicate that Miré causes:

Paralysis of voluntary motion by an action on the spinal cord.

A stimulation of the peripheral motor-apparatus, resulting in twitching of the muscles.

A stimulation of the salivary and of the sweat mechanism as seen in rabbits and in frogs.

Slowing of the heart, probably from vagus stimulation.

Stimulation of peristaltic movements may occur.

BIOLOGICAL LABORATORIES,  
H. K. MULFORD COMPANY,  
PHILADELPHIA, AUGUST 28, 1923.

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\* Scientific Section, A. Ph. A., Asheville meeting, 1923.