

All this information from Colombia has been supplemented by wholly independent observations made in the extreme eastern part of Bolivia by Dr. Orlando E. White of the Brooklyn Botanic Garden. The uses of the drug in the latter region are quite different from those in Colombia, and the drug is known there by the different name, "Ayahasco."

The above reports may be summarized as follows:

In Bolivia, Caapi is used chiefly as a mere exhilarating and stimulating beverage, somewhat like tea and coffee. Its use is very limited and the amount taken at a time is very small. The decoction is always made with the addition of a certain leaf, of which I have specimens, but which I have not as yet identified botanically. There is no information whatever as to the object of adding this leaf.

In Colombia, a leaf is sometimes added, and sometimes not, and I do not know if this is the same leaf that is added in Bolivia. In that country, the object of its use is to give courage and fortitude in facing danger and enduring suffering.¹ The systemic effects of the drug are as follows:

Within a very short time after drinking the decoction, there is a powerful effect on the nervous system and on the circulation. The cutaneous circulation is checked, as manifested by a strong pallor. The subject is restless, and occupies a standing position. There is an intensely anxious or fixed expression to the countenance, and there are convulsive tremors. This condition lasts but a few minutes and is followed by a violent reaction, in which the blood rushes to the surface and the man becomes highly or even violently active. Fear, and even prudence, is entirely destroyed and he becomes extremely active muscularly. He is ready to fight anything and anybody, or any number of enemies and suffering is disregarded. He rushes about and seeks an enemy with the utmost eagerness. This condition lasts for hours, and is followed by more or less exhaustion and somnolence. The nature of this somnolence is in doubt. Some accounts indicate it is a narcotic effect and that there are unnatural dreams and visions. Others indicate that it is the natural reaction following weariness or exhaustion.

Mr. MacCreagh records that he had no desire to fight, and no unusual mental effects beyond that of a powerful stimulation and a desire to dance and otherwise engage in bodily and mental activity. His description suggests the effect of strychnine in some ways.

Dr. Pittenger's preliminary studies will be found to shed some light on the above reports.

THE CHEMICAL EXAMINATION OF CAAPI.*

A PRELIMINARY REPORT.

BY HARVEY A. SEIL AND EARL B. PUTT.

The Caapi for this investigation was obtained from Dr. H. H. Rusby who discovered it and other valuable botanical specimens in the Mulford Exploration of the Amazon Basin. The drug was received in fine powder from the H. K. Mulford Co.

¹ See December *JOUR. A. PH. A.*, p. 1123.

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

Following the methods of the A. O. A. C. a chemical analysis showed:

	Per cent.		Per cent.
Moisture.....	5.20	Other sugars as sucrose.....	1.07
Ash.....	5.02	Crude fiber.....	47.25
Acid-insoluble ash.....	0.65	95% alcohol extract.....	8.60
Chloroform extract.....	1.59	Water extract.....	10.06
Ether extract.....	1.04	Volatile oil.....	0.0042
Petroleum ether extract.....	0.72	Non-phenolic alkaloids.....	1.88
Tannin.....	0.86	Phenolic alkaloids.....	0.03
Reducing sugars as invert.....	0.23		

The volatile oil was determined by steam distillation of a 500-gram sample, saturating the distillate with sodium chloride and extracting with ether. After careful evaporation of the ether 0.021 gram of residue was obtained. It was semi-solid and had a disagreeable, heavy, narcotic odor. On dissolving the oil in petroleum ether and shaking with dilute copper acetate solution, the petroleum ether showed a pronounced green coloration.

The petroleum ether extract, obtained from 5 grams of drug by extraction in a Soxhlet extractor, consisted almost entirely of resin. This resin gave a positive Copper Acetate and Lieberman-Storch reaction. When dissolved in petroleum ether to which an equal volume of acetic anhydride was added, and floated on concentrated sulphuric acid, containing a few vanillin crystals, a pink coloration was obtained, gradually growing deeper and turning bluish. On dilution with methyl alcohol, the alcoholic solution showed a clean blue, while the sulphuric acid became brilliant red, changing to blue on solution in alcohol.

ALKALOIDS.

Fifteen grams of drug and 150 cc. of chloroform were placed in a tightly stoppered flask and thoroughly shaken. After ten minutes 5 cc. of 10% ammonium hydroxide were added and the mixture agitated at frequent intervals, then allowed to stand over night. Five cc. of water were then added to agglomerate the drug, and when the drug had settled clear 100 cc. of the chloroform solution were filtered through cotton into a separatory funnel. This represented 10 grams of drug. The chloroform solution was washed with 10 cc. of water to remove water-soluble material, the wash water was extracted with an equal volume of chloroform and rejected. The chloroform solution was extracted with three 20-cc. portions of Normal KOH solution, washing each extract successively with the wash chloroform obtained above. The combined alkali extracts were acidified with HCl and reserved for the determination of phenolic alkaloids.

The chloroform solution containing non-phenolic alkaloids was extracted with dilute sulphuric acid until free of alkaloid, determined by testing with Mayer's reagent. The combined acid extracts were then made alkaline with ammonium hydroxide and the alkaloids extracted in the usual manner with chloroform. The chloroform extracts were washed with water and filtered into a tared flask. The chloroform was evaporated and the alkaloids dried to constant weight at 100° C. Non-phenolic alkaloids—1.88 per cent. The acid solution of the phenolic alkaloids was made alkaline with ammonium hydroxide and the alkaloids were extracted with chloroform. The chloroform solution was then completely extracted with dilute sulphuric acid, the acid solution made alkaline with ammonium hydroxide

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

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