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PLANT CHEMISTRY. *Concerning* Iboga, *its excitement-producing properties, its composition, and the new alkaloid it contains,* ibogaine. Communication by Messrs. **J. Dybowski** and **Ed. Landrin,** presented by M. Henri Moissan. (Extract).

"During travels in the French Congo, we had occasion to observe that the natives of the territories situated between the mouth of the Ogoué and of the Mayumbé use the woody part of a plant which is known in the Lower Ogoué and the Fernand Naz by the name of *Iboga* and that the Pahouins call *Aboua.*

Its constant use must have contributed to making this species scarce and even rare in certain regions. They claim that absorbing a certain quantity of the plant will give renewed strength and make it possible to withstand fatigue for a long time, doing away with any need for sleep. They also attribute aphrodisiac properties to it.

The men who paddle canoes use it regularly. When we questioned them, they always said that Iboga had the same action as alcohol on them, but without clouding their mind; apparently, this was meant to refer to the excitement-inducing properties of this plant.

These properties were described a long time ago. At the March 6th, 1889 session of the Linnaean Society, Professsor Baillon described Iboga on the basis of the samples brought back from the Cape Lopez region by Griffon du Bellay. In the description he gave, he stated:

> It is suffrutescent in appearance and its branches reach a height of approximately 1.5 meters. They originate from a very large ramified root that has a gray, bitter bark, and that is the part of the plant that the Gabonese eat.
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> ... I am naming this plant *Tabernanthe Iboga,* but I still cannot say whether this type will be classified in the genus *Tabernoemontana* in a section, or whether it will constitute a genus in the *Arduineae* series.

A more thorough study of the fruit shows that the lower part of the ovary is bilocular and that the upper part is unilocular and has a parietal placentation, as has been observed in some *Melodinus* plants where there is a single fruit, not formed by two distinct berries: this is how the fruit in Iboga is formed. It therefore appears that we have reason to believe that Tabernanthe plants are more directly related to the Arduineae, and that this is the series in which they should definitively be classified.

The active ingredient of Iboga does not seem to occur only in the bark, as Baillon indicates, but throughout the wood and principally in the roots that are used particularly by the natives. These roots are what we studied.

Iboga owes its properties to a particular alkaloid that we have been able to isolate and to which we have given the name of *ibogaine.*

Since this alkaloid is not found free in the root, we extracted it by the following process: milk of lime is added to the finely powdered root; the mixture is dried and then stirred with ether. The ether is separated in turn and stirred with water acidified to 1:10 with sulfuric acid which takes up the alkaloids in solution and converts them to sulfate. This treatment is repeated several times to extract the Iboga completely, then the acid liquids are combined and treated with caustic soda in solution that precipitates the crude alkaloids. These are an amorphous alkaloid mixture, whose properties we shall return to later, and a clearly crystallized alkaloid. Since the latter is is far less soluble in alcohol than the former, it is separated by successive purifications in alcohol.

By means of this process, we were able to extract from 6 to 10 g/kg of ibogaine from Iboga, depending on the samples we tested. As we can see, this is a relatively high yield.

The ibogaine thus obtained is a perfectly crystallized substance with a slightly amber color; the crystals are clear-cut, several millimeters in length, they are long transparent prisms with a rectangular base with inclined facets at the end (straight prism orthorhombic system).

Ibogaine is almost completely insoluble in water, very soluble in alcohol, especially when warm. At a temperature of 15°C, 1 g will dissolve in 28 g of 95° alcohol, and, on boiling, in 4 g of alcohol. It is also very soluble in ether, chloroform, benzene, and most solvents.

It melts at a temperature of 152°C to a clear yellow liquid; it has a very particular stryptic taste, somewhat similar to that of cocaine.

It rotates plane-polarized light to the left. The rotation in alcohol solution (95° alcohol) was found to be: $\alpha = -48° 32'$. This determination was performed with a Laurent polarimeter in a 20 cm tube at a temperature of 15°C. The rotation found was 1° 56' per gram of alkaloid in solution in 50 cc of alcohol.

Ibogaine is readily oxidized in air, turning a brownish yellow and appearing to change into an uncrystallizable compound. Its saline solutions are turned to a white precipitate by Mayer's reagent, by tannin (an alcohol-soluble precipitate), by a sublimate and by phosphoantimonic acid. Iodinated potassium iodide gives a brownish red precipitate; bismuth-potassium double iodide gives a golden yellow precipitate.

With sulfuric, nitric, acetic, benzoic acids, ibogaine forms salts that are neutral to litmus paper but uncrystallizable. On the contrary, the hydrochloride crystallizes perfectly, especially in acid solution.

We shall continue with the study of the other chemical properties of ibogaine, to which we propose to return.

After analysis, the average of five combustions led us to assign it the formula $C_{52}H_{66}Az_6O_2$.

Physiological experiments currently in progress have established the energy-inducing action of ibogaine; like that of Iboga, it is exerted in particular on the system of the medulla oblongata, producing a particular excitement at a low dose; at a massive dose, the effects are similar to those of the absorption of an excess of alcohol.