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THE IDENTITY OF THE MALPIGHIACEOUS NARCOTICS OF SOUTH AMERICA

BY

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> This is all I have seen and learnt of caapi or aya-huasca. . . . Some traveller who may follow my steps with greater resources at his command, will, it is hoped, be able to bring away materials adequate for the complete analysis of this curious plant.
>
> *Richard Spruce*

I

THE New World narcotics to which man has attributed the most extraordinarily bizarre powers of altering the state of his body and mind hid out successfully from prying European eyes and were not discovered and identified botanically until about one hundred years ago. They remain, even to-day, the most poorly understood of the hallucinogens of the Americas and the narcotics whose identification is most baffling. Indeed, we may truthfully say that we stand merely on the threshold of our investigations into the botany, ethnology, history, pharmacology, chemistry and therapeutics of that complex of intoxicants known as *ayahuasca*, *caapi* or *yajé*.

II

The purpose of this paper is to summarize what is known about the identity of the malpighiaceous narcot-

ics and to try to make some order from the rather chaotic state which at present obtains. A survey of the literature has been made, and the information from this source is evaluated in the light of field experience in the northwestern part of the Amazon Valley which seems to be the centre of use of these narcotics. It is noteworthy that such a standard work as Hartwich (29) fails even to mention any intoxicant from the *Malpighiaceae*.

This present study, however, leaves much to be desired. Since references to the malpighiaceous narcotics are widely scattered throughout botanical, anthropological, geographical and travel literature, I can make no claim to completeness of coverage. By far the greatest number of the references in regard to the sources of these narcotics are of limited or doubtful value; nevertheless it has been thought best to cite all that have come to light. I might say categorically, however, that much careful and sustained field work must be done before anything approaching a full understanding of the problem may be attained.

Since this paper is concerned only with the identification of source-species, all discussion of the uses, effects, chemical constitution and ethnological importance of the narcotics themselves has been omitted.

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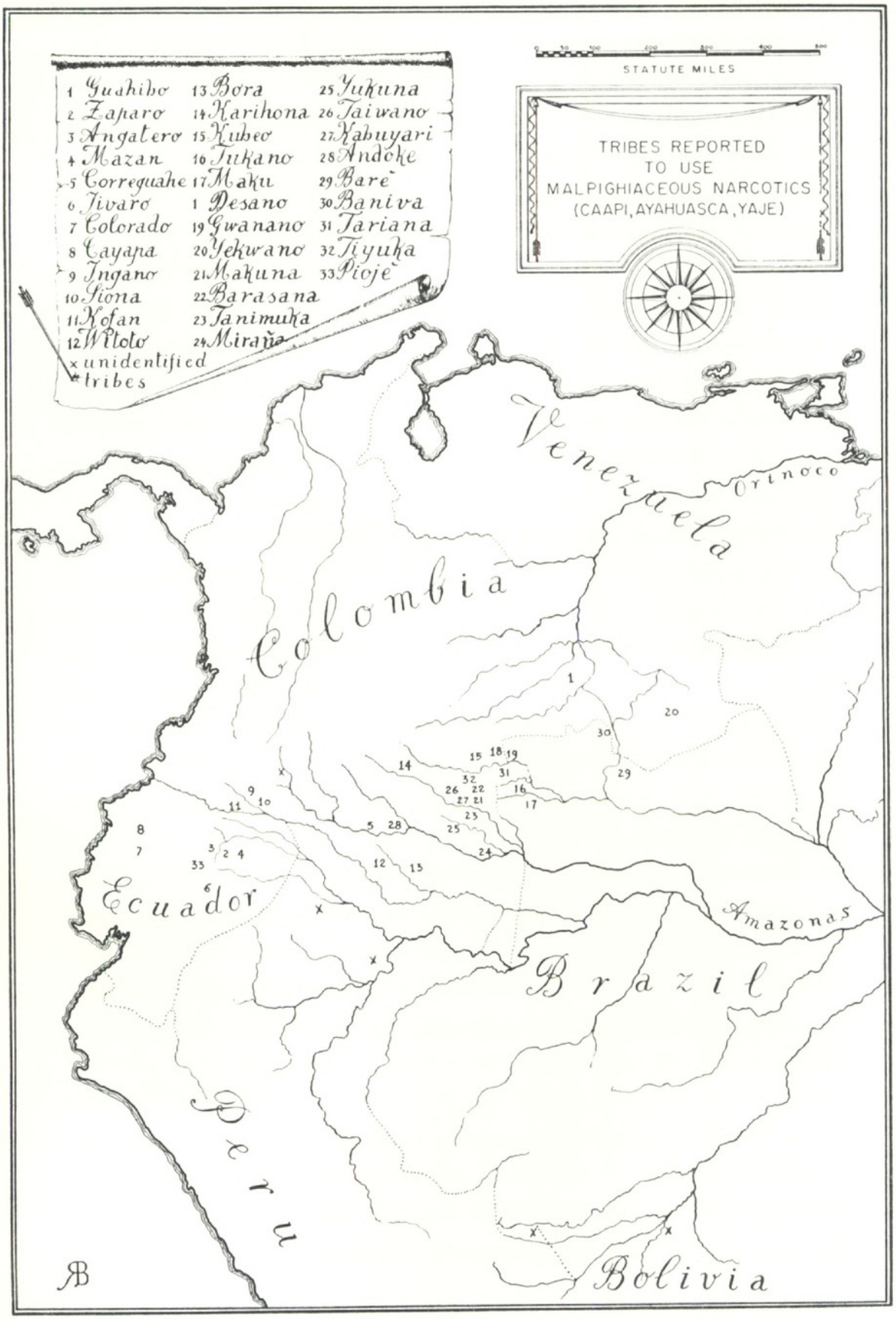
III

When, in 1851, the botanical explorer Richard Spruce penetrated the upper Rio Negro basin in Amazonian Brazil, a new and fertile epoch opened for natural science

Plate I


1 Guahibo
2 Zaparo
3 Angatero
4 Mazan
5 Correguahe
6 Jivaro
7 Colorado
8 Cayapa
9 Ingano
10 Siona
11 Kofan
12 Witoto
13 Bora
14 Karihona
15 Kubeo
16 Tukano
17 Maku
18 Desano
19 Gwanano
20 Yekwano
21 Makuna
22 Barasana
23 Tanimuka
24 Miraña
25 Yukuna
26 Taiwano
27 Kabuyari
28 Andoke
29 Bare
30 Baniva
31 Tariana
32 Tiyuka
33 Pioje
x unidentified tribes
STATUTE MILES
TRIBES REPORTED TO USE MALPIGHIACEOUS NARCOTICS (CAAPI, AYAHUASCA, YAJE)
Venezuela
Orinoco
Colombia
Ecuador
Amazonas
Brazil
Peru
Bolivia
RB

in the New World. Undoubtedly, one of Spruce's greatest contributions to science was his discovery and ethnobotanical study of the curious *caapi*. He found the Tukanoan Indians of the Rio Uaupés and its affluents using *caapi* to induce for prophetic and divinatory purposes a narcosis characterized, amongst other strange effects, by frighteningly realistic colored visual hallucinations and a feeling of extreme and reckless bravery. This contribution included a precise identification, through flowering material, of a source of the narcotic, an hitherto undescribed species of a malpighiaceous liana. The liana, originally named *Banisteria Caapi* Spruce ex Griseb., is now correctly called *Banisteriopsis Caapi* (Spruce ex Griseb.) Morton. Although Spruce's observations were written down in his wonted preciseness in 1852, they were not published until the posthumous account of his travels appeared in 1908 (90). In 1852, finding *caapi* cultivated in quantity on the Rio Uaupés, he noted: "There were about a dozen well-grown plants of *caapi*, twining up to the tree-tops along the margin of the *roça* [a cultivated plot] and several smaller ones. It was fortunately in flower and young fruit, and I saw, not without surprise, that it belonged to the order Malpighiaceae and the genus *Banisteria*, of which I made it out to be an undescribed species and therefore called it *B. Caapi.*" (90)

Two years later, Spruce found *caapi* in use amongst the Guahibo Indians of the upper Orinoco in Colombia and Venezuela. Here the natives "not only drink an infusion, like those of the Uaupés, but also chew the dried stem, as some people do tobacco." Again, in 1857, whilst working in the Peruvian Andes, he encountered the Záparo Indians using a narcotic known as *ayahuasca*. He stated that he "again saw *caapi* planted" in the northeastern Peruvian Andes and that "it was the identical species of the Uaupés, but under a different name." (90)

The earliest published record of the use of any malpighiaceous narcotic of which I am aware dates from 1858, when Villavicencio (95) reported that the drug was employed by the Záparos, Angateros, Mazanes and other tribes of the upper Río Napo in Amazonian Ecuador for sorcery, witchcraft, prophecy and divination. Although apparently no specimens were taken and no reference to a botanical determination was made in Villavicencio's excellent and complete account, which included a report on self-intoxication, the common name *ayahuasca* was used, and the plant was described as a liana. Later work has definitely shown that *ayahuasca* in Peru and Ecuador belongs, in great part, at least, to the same genus as the Brazilian *caapi*. Indeed, as Spruce noted, although "of the plant itself" Villavicencio "could tell no more than that it was a liana or vine," his "account of its properties" coincided "wonderfully with what I had previously learnt in Brazil." (90)

In a list of plant names in the Tupi language of Brazil, the explorer von Martius (98,99) discussed *caapi*, stating that the Indians of the Rio Uaupés prepared from the fruits of the *caapi* plant an intoxicating drink, which they employed in their dance-ceremonies, and identifying it as *Banisteriopsis Caapi*. Since von Martius had never visited the Rio Uaupés, this report must be accepted as an indirect one. He may have seen specimens of the *caapi* sent by Spruce to Europe and knew that Spruce had reported them as the source of the narcotic beverage. The statement that the fruits of the liana are used as the source of the intoxicants must be read with extreme reservation, even with doubt; for none of the reports of travellers and explorers who have seen the plant in use mention the fruits as the part of the plant employed.

The few incidental references to *caapi* or *ayahuasca*

found in travel books have almost invariably neglected the fundamental question of the botanical identity of the source of the narcotic.

Orton, who travelled widely in the Andes in the last half of the last century, reported (61) the narcotic use of *ayahuasca* amongst the Záparos of the eastern slope of the Andes of Ecuador, but he failed to shed any light on the botanical source of the drug.

Writing on his travels in South America, Crévaux reported (15) that, in southeastern Colombia, the Correguahes of the Río Caquetá prepared an intoxicating beverage from the bark of a plant called *yajé*. He likewise noted, as had Spruce, the use by the Guahibos inhabiting the Río Inírida of Colombia of an intoxicating drink prepared from a root called *capi*, apparently unaware that this *capi* and the *yajé* were probably botanically the same. Many years passed before it was known that *yajé* and *ayahuasca* referred to the same intoxicant.

This report by Crévaux injected a new uncertainty into the picture. Was *yajé* from the same source as *ayahuasca* and *caapi*, or was it made from a different plant? Although, as time went on, the belief that the three were at least generically identical became stronger, the problem was not subjected to careful study until the late 1920's.

In 1866, Simson reported (89) that the Piojes of Ecuador, like their neighbors, the Záparos, "drink *ayahuasca* mixed with *yajé*, *sameruja* leaves and *guanto* wood, an indulgence which usually results in a broil between at least the partakers of the beverage." He failed to identify any of the ingredients botanically, but we may safely assume, I think, that *guanto* refers to a tree-species of *Datura*. This report is, however, of great significance in being apparently the earliest to mention the mixture of a number of elements in preparing the *ayahuasca* drink

and the first intimation that *yajé* and *ayahuasca* might be different plants. In relation to Simson's report that the Záparos mix a number of plant materials to make the narcotic drink, we should point out Spruce's definite statement that, so far as he could discover, the *Banisteriopsis* was used alone by these Indians.

Still a further complication arose when, in 1890, Magelli, a missionary who had spent much time in the Pastaza and Bobonaza areas of Amazonian Ecuador, reported (50) an intoxicating drink which the Jívaro Indians called *natema*. Concerning the botanical source of *natema*, Magelli wrote: "*Natema* is a red bark which, when boiled 24 hours, yields a decoction which deprives those who drink it of their senses for three days . . . ." Magelli seems to have confused *natema* with another narcotic —*maicoma*—which he stated is "a little less toxic than *natema*." It would appear from Magelli's notes that he used the term *natema* to refer to a species of *Datura* and *maicoma* to refer to *ayahuasca*. As Reinburg (69) has suggested, Magelli undoubtedly erred and confused two plants whose uses were very similar. Later workers have established the fact that *natema* is actually referable to *Banisteriopsis*, whereas *maicoma* is, in reality, the much employed tree-*Datura* narcotic of the Jívaros.

Tyler (92) reported, in 1894, the use and preparation of *ayahuasca* by the Záparos of the Río Napo area of Ecuador, stating merely that "the beverage is a decoction of a certain species of liana . . ." and giving a description of the effects of the drug.

Writing of the Colorados of Ecuador in 1905, Rivet (73) referred to *nepi* (*nepe*) as a febrifuge, a violent emetic and an intoxicant and stated that its source was a "liana." Later, in a glossary published in 1907 (74), he identified the Colorado *nepe* and the Cayapa *pinde* as *Banisteriopsis Caapi*. We might here note that a more recent work

EXPLANATION OF THE ILLUSTRATION

PLATE II. BANISTERIOPSIS CAAPI (*Spruce ex Griseb.*) *Morton*. Drawing of a specimen of the type collection. 1, flowering branch, about one half natural size. 2, flower, about two and one half times natural size. 3, fruit, somewhat larger than one half natural size.

Drawn by ELMER W. SMITH

PLATE II

on these Indians by von Hagen (96) likewise refers the cultivated *nepe* to *Banisteriopsis Caapi*. It is again doubtful that any of these determinations were made on the basis of botanical specimens.

In 1905, Rocha (77) published an account of his trip to the headwaters of the Ríos Caquetá and Putumayo in Colombia and reported that the Inga and Siona Indians of the region, which to-day is included in the Comisaría del Putumayo, employed as a narcotic a "little bush" or "liana" called *yajé*. He stated that the natives would not allow white men to see the plant and that, for this reason, he did not know it from personal observation. His account of its properties, however, coincided very closely with those described for *ayahuasca*, and it was widely assumed that the two were identical.

In 1907, Rivet (75) wrote on the Jívaros of the Ríos Pastaza and Bobonaza in eastern Ecuador. He indicated that they had a narcotic liana which they called *natema* and which he referred to *Banisteriopsis Caapi*. He clearly distinguished between the narcotics *natema* or *yajé* on the one hand and *maicoma* or *maikoa* (*Datura* sp.) on the other. Rivet's identifications were apparently not based on botanical specimens.

Later, Karsten (35) stated his belief that the *ayahuasca* of the Indians of the Ríos Napo, Curaray, Bobonaza and Pastaza; the *natema* of the Jívaros; the *pinde* of the Cayapas; the *nepe* of the Colorados; and the *caapi* of the Rio Negro are all referable to one species: *Banisteriopsis Caapi*. In a letter to Reinburg (69), Karsten reiterated that he had no doubt that *natema*, *ayahuasca*, *nepe* and *pinde* are identical and may be referred to *Banisteriopsis Caapi*, even though he had available no identifications made on the basis of specimens, and that he could not offer a botanical determination of the "*iáhi*" (*yajé?*), an intoxicating liana which the Jivaros never used alone but

always mixed with *natema*. Furthermore, in 1926 (36) and again as recently as 1935 (37), he set forth his belief that *ayahuasca* and *natema* were the same and were referable to *Banisteriopsis Caapi*.

Early in the present century, Koch-Grünberg, whose extensive travels (1903–1905) and investigations in the upper Río Negro basin and in the Apaporis-Caqueta area are classic, stated that "*kaapi*" was prepared from a malpighiaceous shrub (39). I have been unable to find in our herbaria a specimen collected by Koch-Grünberg. Undoubtedly basing his statement on Spruce's earlier work in the same area, he referred the intoxicant to *Banisteriopsis Caapi*. According to Koch-Grünberg (39), the Tukanos of the Vaupés distinguish two species of *caapi;* but for the second he ventured no botanical determination. He also reported that the Karihonas (Hianákoto-Umáua) of the headwaters of the Apaporis knew *Banisteriopsis Caapi*, calling it *yahe* and *hi(d)-yati(d)yahe*. Since he did not penetrate to the sources of this river, he had to assume the "identification" without specimens. He stated, in a letter to Rivet (69) that, for the *yąjé* of the Hianákoto and the *mihi* of the Kubeos, he unfortunately did not have botanical knowledge and could not say whether it was *Banisteriopsis Caapi* or some other plant, but that he believed them both to be from this malpighiaceous species.

During his studies amongst the Yekwanas of the upper Orinoco basin of southern Venezuela, Koch-Grünberg (40) found these people using two "species" of narcotic vines, one cultivated and one wild. Both were called *kalí*. The stronger narcotic of the two was the cultivated kind. In his letter to Rivet (69) he stated his belief that these both represented *Banisteriopsis Caapi*.

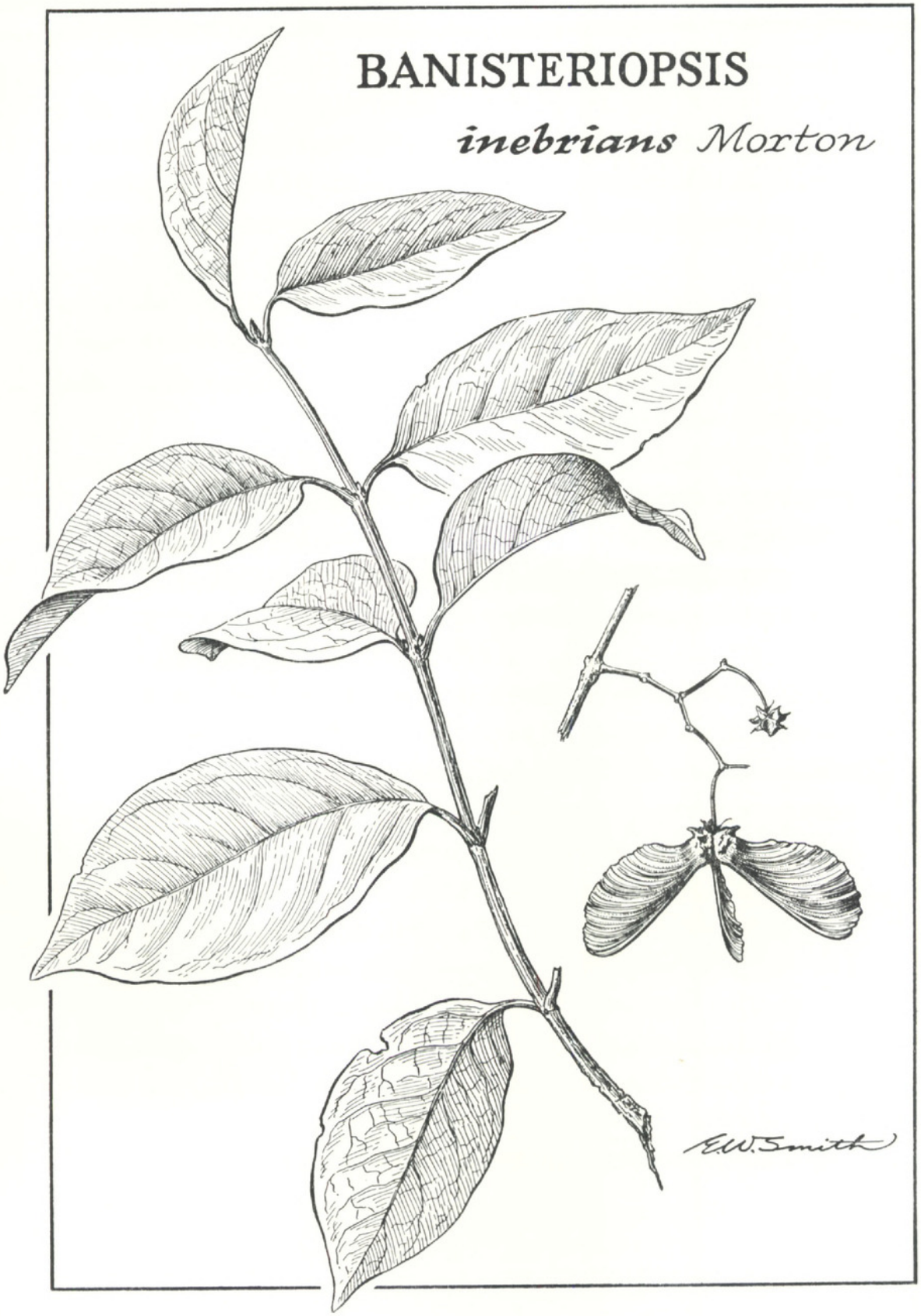
Hardenberg (28) and Whiffen (100), writing on the Colombian region lying between the Ríos Caquetá and

EXPLANATION OF THE ILLUSTRATION

PLATE III. BANISTERIOPSIS INEBRIANS *Morton*. Drawing of the type specimen. Branch and fruit about one half natural size.

Drawn by ELMER W. SMITH

PLATE III



Putumayo, inhabited chiefly by Witoto and Bora Indians, definitely reported the use of the narcotics in this area of the northwest Amazon, but neither was able to offer a botanical determination. Hardenberg stated merely that the liana was called *ayahuasca* or *yajén;* Whiffen, that it was known as *caapi* north of the Caquetá or *ayahuasca* south of this river. Both of these explorers thus intimated that these sundry names referred to one plant.

In 1917, Safford (83), who had devoted much study to New World narcotic plants, referred both *ayahuasca* and *caapi* to *Banisteriopsis Caapi*, after an evaluation of the literature on the subject.

A suggestion that *ayahuasca* and *yajé* might be different plants, however, can be found in Reinburg's study of the tribes inhabiting the region between the Ríos Napo and Curaray in Perú. In 1921, he wrote (69) that the narcotic drink was an infusion of a few fragments of *ayahuasca*, a liana the diameter of a man's thumb, and leaves of *yajé*, "un petit arbuste, de 1m.50 de haut, á feuilles pétiolées (pétiole de 15 mm.) entiéres, ovales, longues de 20 cm., larges de 7 cm., règuliéres et terminées par une pointe de 2 cm." On the basis of specimens collected, he held that *ayahuasca*, the source of which was always, according to his report, a wild, forest liana, and *caapi* were conspecific and represented *Banisteriopsis Caapi.* Still on the basis of specimens, he suggested that the *yajé* of the Curaray in Peru could, with reservation, be referred to the apocynaceous *Haemadictyon* (approaching, in some respects, *H. amazonicum* Benth.) or a related genus.[1]

It was apparently Spruce (90) who first suggested that

[1] The generic concept *Haemadictyon* has been united with *Prestonia*, and the proper name of the plant to which Reinburg referred is now *Prestonia amazonica* (Benth.) Macbride (47).

Prestonia amazonica might enter into the *caapi* picture.[2] He said that the *caapi-piníma* ("painted *caapi*") is "an apocynaceous twiner of the genus *Haemadictyon*, of which I saw only young shoots, without any flowers. The leaves are of a shining green, painted with the strong, blood-red veins. It is possibly the same species . . . distributed by Mr. Bentham under the name of *Haemadictyon amazonicum* n. sp. It may be the *caapi-piníma* which gives its nauseous taste to the *caapi* . . . and it is probably poisonous . . . , but it is not essential to the narcotic effect of the *Banisteria*, which (so far as I could make out) is used without any admixture by the Guahibos, Záparos and other nations out of the Uaupés."

In 1922, *ayahuasca* or *ayawasca* was reported as a narcotic for the first time from Bolivia, from the Río Beni, by White (101), thus greatly amplifying our knowledge of the range of the use of the intoxicant. White definitely identified it as *Banisteriopsis Caapi*. Although he collected material for chemical analysis, it is not clear from his account whether or not his identification was based on an herbarium specimen. Much of White's botanical material is preserved in the Botanical Museum of Harvard University, but a search through the Eco-

[2] However, Spruce's original field notebook, preserved at the Royal Botanical Gardens at Kew, shows a discrepancy, in this regard, with the published report. The field notes say: "2712. *Banisteria Caapi* Mss. From this is prepared an intoxicating drink known to all the natives on the Uaupés by the name of *caapi*. The lower part of the stem, which is the thickness of the thumb swollen at the joints, is the part used. This is beaten in a mortar with the addition of water and a *small* quantity of the slender roots of the Apocynac. (apparently a *Haemadictyon*) called *caapi-pinima* or painted *caapi*, from its lvs. being stained and veined with red . . . Query? May not the peculiar effects of the *caapi* be owing rather to the roots of the *Haemadictyon* (though in such small quantity) than to the stems of the *Banisteria*? The Indians, however, consider the latter the prime agent, at the same time admitting that the former is an essential ingredient. The two plants are planted near all mallocas (villages) . . ."

nomic Herbarium of Oakes Ames at this institution fails to reveal a specimen of *ayahuasca* collected by White.

In his report, White stated that the intoxicant was prepared either exclusively from the stems of *ayahuasca*, an immense liana with greenish white flowers, or else from *ayahuasca* stems boiled with the leaves of the *chaco*, a shrub with small, globose, red-yellow fruits. Leaves of plants locally called *cagna* and *guayavoche* may also be used with *ayahuasca*, but White could not ascertain whether these were other names for the plant known as *chaco* or whether they represented different species. It is unfortunate that so much uncertainty surrounds White's report, but we may feel rather sure (from the common name *ayahuasca*, from his account of the intoxication and from recent plant collections in adjacent areas) that a species of *Banisteriopsis* is likewise the source of the narcotic in this Bolivian locality.

In several reports, the botanist Rusby, who had accompanied White on the Bolivian expedition, detailed the physiological effects of *caapi* and stated that the drug was derived from *Banisteriopsis Caapi* (80,81,82). In a pharmacological report published in 1924, Seil and Putt (88) reported the isolation from Rusby's material of a "fine powder" with at least three alkaloids (both phenolic and non-phenolic), but they offered no botanical determination for the material which they had studied.

In the same year, 1922, the Belgian botanist-explorer Claes, who had gone to the upper reaches of the Río Caquetá, investigated the *yajé* of the Correguahe Indians of this area of southern Colombia (10). He learned that the *yajé*, hitherto usually described in the literature as "a small bush," was an enormous forest liana. Claes argued—I think quite correctly—that those who had described *yajé* as a small bush had seen young, cultivated individuals and not the vine in its wild state (9).

The intoxicating *yaje* of the Correguahe Indians was made by boiling pieces of the trunk itself together with the crushed bark of the trunk, but later the stem and leaves of a plant which the Indians did not permit him to examine were added to the mixture. This brew produced, as Claes witnessed amongst the natives, very definite narcotic symptoms. It is extremely unfortunate that Claes was unable to procure specimens of the leaves and stems which were used together with the liana, for we now know, from the studies of more recent investigators, that the narcotic *yaje* drink of this region of Colombia is sometimes of a more complex preparation than that of other parts of the Amazon; that very frequently a non-malpighiaceous ingredient may be employed.

Claes did not offer a botanical determination of *yajé* (68). He mentioned that, according to De Wildeman, *yajé* "might be" *Prestonia amazonica*. There is no specimen of this species in the Rijksplantentuin in Brussels, and Claes himself states (68) that he did not obtain material for determining *yajé*, adding: "It thus is necessary to leave for others the task of collecting materials of the definitive classification of the plant." Michiels and Clinquart (54), publishing their observations made during pharmacological experiments with Claes' material, suggested that the stems with which they were working appeared to belong to *Prestonia amazonica*. The French pharmacologist, Rouhier, feeling (although apparently with no sound basis) that *yajé* and *ayahuasca* were one and the same thing, but that they might, physiologically, act differently, put forth the suggestion that *ayahuasca* represents *Banisteriopsis Caapi*, whereas *yajé* could represent the unknown plant which Claes saw the Correguahe Indians add to the brew.

A Colombian chemist, Fischer, was apparently the first to isolate a crystalline alkaloid from *yajé* (22).

Fischer admitted that botanical determination of *yaje* had not been made, but he stated that, to judge from anatomic and histologic details, it seemed to be a species of *Aristolochia*. In 1924, shortly after Fischer's work was done, Rouhier (78) accepted this "identification," stating that his specimens "reminded one of a liana, probably a species of the *Aristolochiaceae*." In a subsequent work, however, Rouhier (79) attributed *ayahuasca* to *Banisteriopsis Caapi* but *yaje* to a "liana," the identification of which was still under discussion. He pointed out that in its physiological action and its geographical range, *yaje* was comparable to *ayahuasca*, and he dismissed its reference to *Prestonia amazonica* as "doubtful." At about the same time, Barriga-Villalba (6), a Colombian chemist, and Albarracín (1), a Colombian pharmacologist, actively investigated *yaje*, but neither shed any further light whatsoever on the botanical identity of the drug. Albarracín described the source of his material as a "climbing shrub" and asserted that the natives did not cultivate *yaje* because it abounded in the forests.

Reporting in 1926 on the *caapi* ceremony of the Tukano Indians of the Río Tikié, a Brazilian affluent of the Uaupés, MacCreagh (49) described the intoxicant as "a thin, almost colorless liquid . . . concocted from the leaves of a vine." He, apparently, failed to collect herbarium material of the vine. It is worthy of note that the Rïo Tikié is the same area where Koch-Grünberg had made his observation on *caapi*. It is very near the locality where Spruce first met with the drug (90). Commenting on "*kaapi*," which he had encountered in his travels in the same general region, the English explorer McGovern (53) failed to venture a botanical determination, merely mentioning that the drug was made from "a root."

A rather inclusive survey of what had been accom-

plished up to that date on the botanical identification and chemical constitution of this complex of malpighiaceous narcotics was published in 1927 by two French pharmacologists, Perrot and Hamet (66,67). They pointed out that even more confusion reigned in the chemical field of investigation than in the botanical, principally because pharmacologists and chemists consistently disregarded taxonomic accuracy in identifying the sources of plant materials under study. Perrot and Hamet concluded that (a) *yajé*, *ayahuasca* and *caapi* refer to one species of plant: i.e., *Banisteriopsis Caapi;* and that (b) no apocynaceous plant is at all concerned in the problem of the source of the narcotic known under these three names. Notwithstanding the meritorious efforts of Perrot and Hamet, their review brought little clarification into either the botanical or the chemical picture.

In reply to the article by Perrot and Hamet, the German botanist Niedenzu (59) published several very interesting observations based on herbarium specimens preserved in the Berlin Herbarium. These specimens are, of course, no longer extant, but the notes are of special importance because of the authenticity of the determinations at the hand of an outstanding specialist in the *Malpighiaceae*. The collection *Tessmann 5424* from Yarina Cocha on the Río Ucayali in eastern Peru represented, according to Niedenzu, a mixture: leaves of *Mascagnia psilophylla* (Juss.) Griseb. var. *antifebrilis* (Ruíz & Pav.) Ndz. and, in a paquet attached to the sheet, samaras of *Banisteriopsis quitensis* (Ndz.) Morton; on the label was annotated the vernacular name of *hayawasca* or *ayawasca* and the observation "Stücke der Liane gekocht, dann kalt genommen." Niedenzu further called attention to three specimens of *Banisteriopsis quitensis. Eggers 15485*, from eastern Ecuador, consisted of leaves, scanty flowers and plentiful fruit and had a note that,

from the stems, an intoxicating brew was prepared. Niedenzu stated that the characters of *Eggers 15485* did not seem to correspond very closely with *Banisteriopsis quitensis* as it was described. *Tessmann 4974* and *5325*, from the Ríos Pastaza and Itaya, respectively, were referred without question to *Banisteriopsis quitensis.* Both were called *ayawasca* and were reported to be the source of a narcotic drink employed by witch-doctors. Tessmann identified *Tessmann 5325* as *Banisteriopsis Caapi*, but Niedenzu pointed out that the collection was distinct from this species. In summary, Niedenzu stated that these wild and cultivated plants of *Banisteriopsis* from eastern Ecuador and Peru and the uses reported for them would seem to indicate that yageine, the alkaloid whose source was still in doubt, might well have come from similar species and that, on the basis of his studies, it would seem that three sources of the narcotic "*ayawasca*" ought to be considered: *Mascagnia psilophylla* var. *antifebrilis*, *Banisteriopsis quitensis* and *B. Caapi.*

Another attempt to put some order into the confusion resulting from field observations and fragmentary specimens occasionally gathered by ethnologists was made by Gagnepain, who, in 1930, published his botanical opinions relative to these narcotics (24). He pointed out (a) that, according to Reinburg, *ayahuasca* was "probably" *Banisteriopsis Caapi*, but that *yajé* could not be referable to this species; (b) that *yajé* seemed to approach *Prestonia amazonica;* (c) that fragments received as *yajé* by the chemist Rouhier in 1924 showed the plant to be an "opposite-leaved vine"; (d) that both Rivet and Reinburg sent in material which seemed to represent the same malpighiaceous plant. Later, Gagnepain received, through Rouhier, a specimen from the Departamento de El Valle in Colombia, where the plant was cultivated under the name of *yajé.* The specimen, with leaves and

inflorescence attached, was determined as *Banisteriopsis Caapi*. This led Gagnepain to the rather extraordinary assertion that the *yajé* of Colombia was the same species as the *caapi* of Brazil, but different from the *yajé* of Ecuador. He could state with assurance only that the Ecuadorian *yajé* represented a species of *Banisteria* "near *ferruginea*" and that an exact clarification of the botanical sources of *yajé* was still far from realization.

In 1929 and 1930, the Russian botanist Hammerman (26,27) published a rather complete survey of the problem. His statements were founded on an evaluation of reports in the literature in the light of a study of material gathered in 1925–1926 by G. N. Varonof and S. V. Juzepczuk along the Río Orteguaza, in the Colombian Comisaría del Caquetá. Pointing out that Zerda Bayón's assertion that the Indians of the Caquetá mixed four kinds of leaves to make a brew which they called *yajé*, Hammerman indicated that the material of Voronof and Juzepczuk gave a variety of results when chemically analyzed. He further stated that there seemed to be several species of *Banisteriopsis* involved, even though most of his material apparently was referable to *Banisteriopsis quitensis*. Any one of the species could be a source of the narcotic preparations of the Indians. He was, withal, careful to emphasize that only Spruce had seen in flower an actual vine definitely known to be used to make the hallucinating drink. He intimated that the known variation in preparation, use and effect of the narcotics called *caapi*, *yajé* and *ayahuasca* might be due to differences in composition.

In 1931, Morton (58) described a new species of *Banisteriopsis* from southern Colombia, naming it *B. inebrians* Morton because of its use by the Indians of the Comisaría del Putumayo as an inebriant. Basing his statements on the meticulous field observations of the late Guillermo Klug, a German plant collector who worked

in eastern Peru and adjacent parts of Colombia, Morton indicated that at least three species are employed in this region: *Banisteriopsis Caapi*, *B.inebrians* and *B.quitensis;* and that *Banisteria longialata* Ruiz ex Ndz. and *Banisteriopsis Rusbyana* (Ndz.) Morton may enter certain of the narcotic preparations as additional ingredients.

Several reports on chemical studies of *caapi* published during the late 1920's and the 1930's considered the botanical identification of the intoxicant under investigation.

Reutter, reporting in 1927 (72) that he had isolated yageine and yagenine from the vegetal parts of *yajé* or *ayahuasca*, accepted Rouhier's "identification" as *Prestonia amazonica*, stating that some tribes add to their *yajé* drink *Banisteriopsis Caapi* or "*Datura arborea* L." Lewin, a year later (44), wrote that *ayahuasca* was "a member of the *Malpighiaceae.*"

In 1929, Keller and Gottauf (38) worked with material of *ayahuasca* from Bolivia and Peru, referring it to "a *Banisteria,*" (although they had no leaves nor flowers available) and isolated a harmine-like alkaloid.

Costa and Faria (13,14) held that *yajé*, *ayahuasca* and *caapi* were the same narcotic and were derived from *Banisteriopsis Caapi.* Three years later, Chen and Chen (8) summarized briefly the literature references and indicated their belief that *caapi*, *yajé* and *ayahuasca* represented *Banisteriopsis Caapi*, "a woody climber that attains a height of 3 to 4 metres and attaches itself to the trunks of large trees" or that is "grown in the North-western regions of South America." Chen and Chen identified the alkaloids telepathine, yajeine and banisterine with harmine from *Peganum Harmala*, corroborating experimentally the earlier suggestions of Wolfe and Rumpf (104). The real importance of Chen and Chen's paper, however, lies in the chemical study, apparently for the

first time, of vegetal material which seems to have been identified on the basis of botanical specimens. For the "twigs, leaves and roots of *caapi*" and the "decoction just as used by the Indians" which were subjected to chemical analysis had been collected by the botanist Williams near Iquitos, Peru, and were determined as *Banisteriopsis Caapi* (4,102,103).

For the most part, recent investigators who have devoted critical attention to the study of the South American malpighiaceous narcotics have concurred with Hammerman, Gagnepain and Klug that several species of *Banisteriopsis*, if not of other genera, may be involved in some regions (12).

Nevertheless, some contemporary writers tend to simplify the problem of identification, even though their "determinations" are seldom, if ever, based on specimens. While they are certainly not specialists, they are often quoted uncritically in technical works. Some, as in the case of Reko (70,71), have stated that *ayahuasca*, *pinde*, *natema*, *caapi* and *yaje* are all derived from *Banisteriopsis Caapi.*

In his dictionary of Amazonian plant names, Le Cointe (41) indicated a belief that *ayahuasca* and *caapi* were *Banisteriopsis Caapi* and that *yaje* corresponded to "another plant that enters into the composition of the *caapi*-drink as prepared by some tribes," and he pointed out that some writers identify *yaje* as *Prestonia amazonica.* Von Hagen (96,97) considers both *natema* and *caapi* to be *Banisteriopsis Caapi.*

In 1936, Pardal (62) referred *caapi* to *Banisteriopsis Caapi* and *yaje* to *Prestonia amazonica.* The following year, however, he stated (63) that *caapi*, *yaje* and *ayahuasca* are *Banisteriopsis Caapi.* Maxwell (52), after an evaluation of the literature concerning the identity of *caapi*, concluded that the narcotic was a species of *Ban-*

isteriopsis, that "other vegetable ingredients are sometimes included in the making of the beverage" and that their identity is still in question.

Lewin (42,45,46) identified *natema*, *yagé*, *yahé*, *nepe*, "*kahi*" and *pinde* as *Banisteriopsis Caapi* and enumerated the following Indian tribes as "addicted" to the use of this narcotic species: Guahibo, Tukano, Correguahe, Tama, Záparo, Vaupé, Yekwana, Baré, Baniva, Mandawake, Tariana, Siona, Jívaros, Colorados and Cayapas. Although Lewin held the principal ingredient to be *Banisteriopsis Caapi*, he admitted that it was sometimes used together with other plants. Amongst these plants, he named, as one possibility, *Prestonia amazonica* (43), although he strongly doubted that the name *yajé* referred exclusively to *Prestonia amazonica*. He further indicated that some Indians probably also add tobacco-water to the beverage.

A most interesting note on *ayahuasca* in Peru appeared in 1943 (94) and included a "recipe" for making the intoxicating beverage. Unfortunately, all of the plants employed were indicated with Indian names, with no hint as to their identity. The recipe commonly used in the vicinity of Iquitos has, as its principal ingredient, the liana or "death vine," *ayahuasca*, which is undoubtedly a *Banisteriopsis*. Into the decoction of this vine, the leaves of a species of *muémueti* are put; the name *muémueti* is said to refer to several plants, only one of which is used at a time. According to this account, the *muémueti* is responsible for the visual hallucinations. Also employed in the decoction is an evil-tasting tuber called *katija*. To sweeten up the *ayahuasca* drink, leaves and seeds of a plant known as *pujana* are added.

Herrera (31) listed the *ayahuasca* of Valle de Lares as *Banisteriopsis metallicolor* (A. Juss.) O'Donnell & Lourteig and reported it as a "planta tóxica."

Caller (7), in a consideration of the historical literature on the botanical sources of *ayahuasca*, concluded that the species used to prepare this narcotic drink is *Banisteriopsis Caapi* and that *B. quitensis* is a synonym of *B. Caapi*. Other recent writers on Peru (18,97) attribute *ayahuasca* exclusively to *Banisteriopsis Caapi*.

Padre Plácido, who spent many years as a missionary in the Putumayo of Colombia, did not identify *yaje* botanically (17), but he stated that the Sionas often add to the narcotic drink of this name the *peji* or *yakoborrachero*—the *floripondio* of Mocoa, or, probably, *Datura suaveolens* H. & B. ex Willd.

Sandeman (84) mentioned *yaje* casually, attributing it to *Prestonia amazonica*.

Allen (2), in an excellent description of the *yuruparí* ceremony of the Kubeo Indians of the Río Vaupés in Colombia, indicated *Banisteriopsis Caapi* as the source of the narcotic beverage upon which this frenzied ritual is based. Taylor (91), following Allen, has attributed the malpighiaceous narcotics to *Banisteriopsis Caapi*.

In a recent and authoritative work on plant alkaloids, Henry (30) identified the narcotics known as *yaje*, *caapi* and *ayahuasca* as *Banisteriopsis Caapi*, *B. metallicolor* or *Banisteria lutea* Ruíz ex Griseb.

Manske and Holmes (51) attributed all three to *Banisteriopsis Caapi*. In 1946, Ducke (20) identified the famous narcotic of the natives of the extreme northwest of the Amazon Valley, called *caapi* in the Brazilian part and *yagé* in the Colombian part of the region, as *Banisteriopsis Caapi*. Hesse (32) attributed *ayahuasca* and *yaje* both to *Banisteriopsis Caapi*, and Möller (55) stated that *caapi* was exclusively referable to this species.

Recently, Macbride (48), probably following Morton (58), pointed to *Banisteriopsis Caapi*, *B. inebrians* and *B. quitensis* as the principal sources of the alkaloid vari-

EXPLANATION OF THE ILLUSTRATION

PLATE IV. BANISTERIOPSIS CAAPI (*Spruce ex Griseb.*) *Morton*. Photograph of the plant from which the collection *Schultes & Cabrera 13156a* was made.

Photograph by HERNANDO GARCÍA-BARRIGA

PLATE IV

EXPLANATION OF THE ILLUSTRATION

PLATE V. Cultivation of *Banisteriopsis Caapi* (Spruce ex Griseb.) Morton (*Schultes & Cabrera 17209*) by the Barasana Indians in the headwaters of the Río Piraparaná, Comisaría del Vaupés, Colombia.

Photograph by RICHARD EVANS SCHULTES

Plate V

ously known as telepathine, yageine or banisterine. He stated, however, that it might also be found in "a number of related plants or forms" and quoted Morton in citing *Banisteriopsis Rusbyana* and *Banisteria longialata* as admixtures known by the names of *oco-yagé* and *chagro panga*.

O'Connell and Lynn (60), working on material of *Banisteriopsis inebrians* from the Putumayo of Colombia, found that the stems contain harmine and the leaves "an alkaloid which was partly identified as harmine." The work of O'Connell and Lynn is noteworthy as representing apparently the second chemical investigation carried out on material of *Banisteriopsis* identified through herbarium material.

Mors and Zaltzman published a most interesting contribution in 1954 (56) in which they indicated their opinion, based on chemical examination, that yageine was different from harmine. On the basis of a brief review of the literature, they concluded that *caapi* and *ayahuasca* were referable to *Banisteriopsis Caapi* but that *yagé* was not the same narcotic.

Most recently, Fabre (21) published an historical review of *caapi*, *ayahuasca* and *yajé*, indicating his belief that only one species—*Banisteriopsis Caapi*—is the source of these narcotics, though citing Spruce that, amongst certain tribes, another plant may oftentimes be added in the preparation of the narcotic drink.

IV

Although Morton (57) has convincingly shown why the generic epithet *Banisteria* is not available for the group of malpighiaceous plants which should be called *Banisteriopsis*, in accordance with the lucid arguments of Robinson (76), there is a tendency to persist in the incorrect use of the name *Banisteria*. This tendency is

not always attributable to ignorance or uncertainty. It is frequently the result of a deliberate flouting of the International Rules of Botanical Nomenclature. Its continuation will not lead to standardization or to clarity but to the further beclouding of the exact identity of the malpighiaceous narcotics as well as to confusion in taxonomic and floristic works.

Ducke (19,20), in refusing to use the generic epithet *Banisteriopsis*, stated that his reason was an objection to the multiplication of names in botany. Macbride (48) not only chose to use *Banisteria;* he made the new combination *Banisteria inebrians*, attributing it erroneously[3] to Morton who has been most outspoken against this use of the name *Banisteria.* And recently Baldwin, in an article on the chromosomes of *Banisteriopsis Caapi* (5) chose to use the epithet *Banisteria.*

Non-botanical writers, faced with this lack of standardization in technical papers, often continue to use *Banisteria* instead of *Banisteriopsis* in connection with the narcotic species under discussion (21,30,32,46,51,62,63, 64,91).

An increasing number of technical writers, nevertheless, are employing the correct generic epithet (12,23, 33,34,65,85,93).

V

Although little new information has been published since 1931, a study of material preserved in our herbaria and museums, and recent field observations and collections by several plant explorers have contributed other data which should be made available. It would seem to be especially necessary to do this, since, as the foregoing literature review has shown, little if anything of an ac-

[3] "*Banisteria inebrians* Morton, Journ. Wash. Acad. Sci. 21: 485 (1931)."

curate nature may be looked for from the usual type of anthropological field investigation.

In utilizing data found on herbarium labels, caution must be taken. For a field botanist might jot down "used as a narcotic" on the basis of information supplied by a native and without sufficient checking or without himself having seen the plant thus employed. Nevertheless, such data may be of great value as an orientation in problems as complex as the one at hand.

A further drawback—and a serious one—to the use of sterile specimens for botanical identification is the difficulty, in a genus of such vegetatively similar species, of arriving at a satisfactory determination.

Usually, all we have to work with in studying the malpighiaceous narcotics is sterile material. The cultivated plants seem rarely or never to flower (probably because of constant cutting back), and the forest lianas blossom sporadically and are seldom found in flower by collectors. In one hundred years, for example, we have only one flowering collection of *Banisteriopsis Caapi* from the field (that is, excluding plants brought to flower in experiment stations or botanical gardens), and that is the type collection made by Spruce. My determinations of most of the older specimens concur closely with the identifications made by Dr. C. V. Morton, who specialized in the *Malpighiaceae*. I have identified the numerous sterile herbarium specimens considered below with reserve, even though I have put in more than ten years of field study on the problem. As the result of prolonged study of living plants, one acquires some familiarity with certain of the variations which these species may show under different natural habitats. But I must further point out that this long period of field study in itself has made me rather cautious about drawing categorical and far-reaching conclusions from what herbarium material we have at hand

at the present time. No one can feel more certain than I that we are just beginning our serious taxonomic studies of the complex of malpighiaceous narcotics.

Perhaps the most revealing observation based on botanical material to have been made since Spruce's time has not hitherto been published. I was fortunate in discovering in the Museum of Economic Botany at the Royal Botanic Gardens at Kew several samples of the "*yajé* plant," comprising twigs and leaves (Econ. Mus. Kew 60–1913) from the Caquetá, Colombia. These were sent in 1913 by Percy E. Wyndham, Esq., His Majesty's Minister in Bogotá. The leaves were determined by Dr. T. A. Sprague who wrote, in a communication attached to the specimens, that they represented species of *Malpighiaceae* (possibly *Tetrapterys*) and that "the twigs no doubt belonged to one of them." I have carefully compared the leaves with specimens of the *Malpighiaceae* at Kew and would agree (insofar as it is possible to determine such limited sterile material) with Sprague that they may be referable to *Tetrapterys*. This is the first time that a malpighiaceous genus other than *Banisteriopsis* has been mentioned as the source of a narcotic.

With the Wyndham material at Kew, there are several communications concerning the specimens. It is apparent that Wyndham was moved to gather specimens of the *yajé* plant as the result of interest aroused by a newspaper article (3). This article spoke rather optimistically of *yajé* as a cure for beri-beri, and it published a long letter from Dr. Rafael Zerda Bayón, a Colombian pharmacist, who put forth extraordinary claims concerning the telepathic properties of the vine. No botanical determination was offered. Sprague, in one of the communications with the Kew specimens, wrote: ". . . Dr. R. Z. Bayón says he has deposited specimens of the

'Bejuco de *Yagé*' with the Ministry of Public Works and that he doesn't think it desirable to send the specimens abroad! Apparently, the climber has not been identified."

The collection *Killip & Smith 27385*, from Iquitos, Peru, represents *Banisteriopsis Caapi* and reports the following information: "Ayahuasca. Woody vine. Strong narcotic tea brewed from the leaves and stem produces fanciful dreams; also used as a cure for many diseases and as an intoxicating beverage." *Killip & Smith 29486* and *29825*, from the same region, likewise represent *Banisteriopsis Caapi*, but in connection with these two collections, the botanists made no notes as to their uses. *Ducke 25258* is a flowering collection of *Banisteriopsis Caapi* from a plant gathered in Amazonian Peru and cultivated in the Jardím Botánico in Rio de Janeiro. *Williams 3741* and *8224*, also from the Iquitos area, likewise are referable to *Banisteriopsis Caapi*, and are the basis of Williams' report (103) that "the lower part of the stem and its leaves are crushed and boiled in water. When sufficiently triturated, the infusion is passed through a sieve to remove fibrous material, and to the residue water is added to render it drinkable. The resulting greenish-brown infusion has a disagreeable, bitter taste and is said to contain narcotic properties."

From this wealth of material, we may judge that *Banisteriopsis Caapi* is rather commonly cultivated in Amazonian Peru. Still another collection, *Seibert 2173* (also from the Amazonian basin of Peru but from the Río Tahuamanú in the Madre de Dios, far from the Iquitos area) has been determined as *Banisteriopsis Caapi*, even though its leaves are slightly atypical, due possibly to the fact that the plant was a wild liana in the jungle and not a cultivated shrub in open gardens. The collector reported: "*Ayahuasca*. Liana in forest. Infusion taken

internally and preparation from bark produces illusions. Used by Indians. Narcotic."

It is from the Amazonian regions of Colombia, however, that the greatest number of collections of the malpighiaceous drugs has recently been taken. *Klug 1971* and *Cuatrecasas 10597*, both from the Comisaría del Putumayo, represent apparently *Banisteriopsis Rusbyana*, a species usually characterized by large leaves. The former collection, from the village of Umbria, is reported to be called "*chagro-panga* or *oco-yagé*"; the latter, from near Puerto Ospina on the Río Putumayo, is known amongst the natives as *yageúco* (undoubtedly the same as *oco-yagé*) and is reputedly cultivated by the Kofán Indians who use the leaves in the preparation of the narcotic *yajé*. In 1953, I collected what appears to be *Banisteriopsis Rusbyana* near Mocoa, capital town of the Putumayo, under the name *chagropanga;* the leaves of this plant are reputedly used together with the pounded bark of *B. inebrians* in the preparation of the drink *yajé*.

In 1931, Klug discovered in Umbria what turned out to be an undescribed species of *Banisteriopsis*. Described by Morton (58) as *Banisteriopsis inebrians*, this forest liana, which grows to a length of ninety feet, goes under the epithet of *yagé del monte* amongst the Ingano Indians of the Putumayo. Klug collected ample botanical material of the *yagé del monte* and observed (58): "One of the most interesting plants found in the region of the upper courses of the Ríos Putumayo and Caquetá is the *yagé*. The Indians make a beverage of either the wild or cultivated *yagé*, boiling it in a large earthenware vessel an entire day, until there is formed a sort of liquid, like the syrup of sugar cane. They add to the *yagé* the leaves and the young shoots of the branches of the *oco-yagé* or *chagro-panga* (No. 1971), and it is the addition of this plant which produces the 'bluish aureole' of their visions."

More recently, *Banisteriopsis inebrians* has been reported as the source of a narcotic in the same region. *Cuatrecasas 10598*, collected near Puerto Ospina, apparently represents this species and is cultivated under the name *yagé* by the Indians as the "principal ingredient" of the narcotic drink, the unboiled stem ("tallo crudo") being employed. Likewise, *Cuatrecasas 11061* was taken from a plant cultivated by the Kofán Indians of the nearby Río Sucumbíos. In 1942, I found the same Indians using cultivated *Banisteriopsis inebrians*, called *oofá* in the Kofán language, as the source of a narcotic drink at Puerto Ospina and on the Sucumbíos, and I experimented in both localities with the intoxicant prepared from vines from which the collections *Schultes 3452* (from a cultivated plant) and *3474* (from a wild liana) were made. The collection *Schultes 3346*, likewise apparently referable to *Banisteriopsis inebrians*, was taken from a vine pointed out by the Ingano Indians of Puerto Limón on the nearby Río Caquetá as the plant from which, without admixture, they prepare their *yajé*. From Mocoa, capital town of the Putumayo and centre of the Inganos, still other collections of *Banisteriopsis inebrians* were made (*Schultes & Smith 3037; Schultes & Cabrera 19113*) with the field annotations that they were called *ayahuasca* or *yajé* and *bejuco de oro* ("golden vine"), that they were narcotic and that the leaves were used as a strong purgative. I have found *Banisteriopsis inebrians* to be used with and without the admixture of any other species of the genus, but decoctions of this species had marked narcotic effects each time I drank them, whether or not any admixtures had been used.

What is probably *Banisteriopsis quitensis* was reported by Klug (*Klug 1934*) as *yagé cultivado* (58) in the Umbria region. Later, Cuatrecasas (*Cuatrecasas 10599*) noted that the Kofáns near Puerto Ospina grow this spe-

cies and use it in the preparation of the intoxicating *yajé* drink. He stated that the plant material is boiled to prepare the beverage. Notes with the collection *García-Barriga 4634a*, which has been identified as probably referable to this same species, indicate that the Indians who live between Mocoa and Umbria (Inganos) call the vine *yajé* and prepare an intoxicant from it, with the admixture of two other plants. García-Barriga (25) stated that *Banisteriopsis quitensis* is "cultivated near their dwellings in order to have it at hand during the rainy season" and that "they make with the stems a drink or beverage which they call *yaje*." One of the admixtures, according to García-Barriga, is the amaranthaceous *Alternanthera Lehmanii* Hieron., locally known as *borrachera* or *chicha* (both of which terms refer to "intoxicant" in Spanish); the other admixture could not be determined. *Alternanthera Lehmanii* is said by García-Barriga to be added also to native beers or *chichas* as a condiment to increase their intoxicating properties. A sterile collection which seems to represent *Banisteriopsis quitensis* (*Pérez-Arbeláez 639*) was stated to be used in the region of Florencia on the Río Orteguaza in preparing an inebriating drink. Williams (103) has reported *Banisteriopsis quitensis* to be used in the same way as *B. Caapi* in Amazonian Peru, where it is gathered from both wild and cultivated plants.

The Indians of the Comisaría del Vaupés in Amazonian Colombia have conserved many of their aboriginal customs, such as the use of the malpighiaceous narcotics. Unlike the natives of the Putumayo, at the eastern foothills of the Andes, who use species of *Banisteriopsis* in a concentrated decoction made by boiling the plant material, the Indians of the Vaupés prepare a cold-water infusion of the bark. *Banisteriopsis quitensis* and *B. inebrians* seems to be lacking in the flora of the Vaupés,

but *B. Caapi* and what appears to represent *B. Rusbyana* are cultivated for use as intoxicants. The collections cited below are all sterile and identification is, therefore, not certain, but, in each case, they were taken from plant material which I know, from personal experimentation, to possess narcotic properties.

The Taiwano and Kabuyarí Indians of the Río Kananarí, an affluent of the middle course of the Apaporis, prepare their *kaheé* from two kinds of *Banisteriopsis*, both cultivated. One vine had no leaves at the time of the Baile de la Sabaleta, when *yajé* is drunk, but the stems obviously belonged to a species of *Banisteriopsis*. The other is represented by the collection *Schultes & Cabrera 13156a* and corresponds in all vegetative characters with *Banisteriopsis Caapi*.

Those Makunas who live along the Río Popeyacá, also an affluent of the Apaporis, prepare the drink in two ways: either with one species of *Banisteriopsis* or with two species of this genus, both cultivated. The drink is called *kaheé* by the Makunas. When it is made from one species, *Banisteriopsis Caapi* (represented by *Schultes & Cabrera 15587*) is employed: this species is known in Makuna by the name *reé-ma*. When two species are used in the preparation of the drink, *Banisteriopsis Caapi* is mixed with a vine called *me-ne-ka-heé-ma* ("vine of *ka-heé*") and referable probably to *B. Rusbyana* (*Schultes & Cabrera 15588*). Of *Banisteriopsis Caapi*, only the rasped bark is employed, but of *B. Rusbyana* either the leaves or the bark or both are utilized. With these natives, I took *yajé* twice; once made with bark from *Schultes & Cabrera 15587* and leaves from *Schultes & Cabrera 15588*, and once with bark of *Schultes & Cabrera 15587* alone. Intoxication was induced in both cases, and I was unable to note that one preparation had different or stronger effects than the other. Both of these

preparations are taken by all men of the tribe during dances. When the medicine-man employs the narcotic for purposes of diagnosis or to enable him to work evil on others, he takes a strong preparation of *Banisteriopsis Caapi* alone. The Makunas of the Popeyacá report that, in difficult cases of diagnosis, the medicine man will add a few crushed leaves of a tree which is abundant along the flood-banks of the river: *guay-ee-ga-mó-yoo-ke-reé* ("tree of the gill of fishes"). This tree, represented by *Schultes & Cabrera 15556*, has been determined by Dr. R. W. Woodson as probably *Malouetia Tamaquarina*. The leaves contain an abundance of sticky, white latex and, as the species belongs to the *Apocynaceae*, possibly are poisonous in large doses. Indeed, there are persistent reports in the upper Amazon that the bones of the *pajúl* are, at the time when *Malouetia Tamaquarina* sets fruit (which this bird is said to eat), highly poisonous to dogs which may eat them (86). I have never witnessed the use of *Malouetia* and was not able to corroborate the report with those who understand the properties of medicinal plants either amongst the Makunas or neighboring peoples.

The Indians of the headwaters of the Río Piraparaná cultivate *caapi* in almost every plot around their houses. *Schultes & Cabrera 17209* from a Barasana Indian site on the Caño Teemeeña represents *Banisteriopsis Caapi*. A cold-water infusion of the rasped bark of this plant to which was added water in which dried tobacco leaves (*Nicotiana Tabacum* L.) had been steeped had highly narcotic effects.

Banisteriopsis Caapi is apparently the commonest source of the narcotic *caapi* drink in adjacent parts of Brazil. It was from Ipanoré on the Rio Uaupés near the Colombian boundary that Spruce collected the type specimen of this species. A recent collection, *Ducke 153*,

taken from a plant cultivated in Manáos from material gathered along the Rio Curicuriarí, an affluent of the upper Rio Negro, represents *Banisteriopsis Caapi.*

During a year's stay in the upper Rio Negro and its affluents in Brazil in 1947, I heard, on several occasions, reference to two kinds of *caapi.* As has been pointed out in detail above, it was from this region that Spruce reported a second kind of *caapi*, known locally as *caapi-piníma*, which he suggested might be referable to the apocynaceous vine *Prestonia amazonica* (*Haemadictyon amazonicum*). And it was likewise in this region that Koch-Grünberg found that the Tukanos distinguish two species of *caapi*, for only one of which (*Banisteriopsis Caapi*) he ventured a determination.

It was my good fortune in 1948 to be able to witness the preparation of and to take a narcotic drink amongst the nomadic Makú Indians of the Ira-Igarapé, an affluent of the Rio Tikié which flows into the Rio Negro below Ipanoré. Specimens (*Schultes & Lopez 10184*) taken from the flowering vine, from the bark of which a cold-water infusion was made without the admixture of other plants, were found to represent an undescribed species of a malpighiaceous genus allied to *Banisteriopsis*—*Tetrapterys methystica* R. E. Schultes (87). The beverage prepared from *Tetrapterys methystica* has a yellowish hue, quite unlike the coffee-brown color characteristic of all preparations of *Banisteriopsis* which I have seen or taken. A small amount of stem material for chemical study which I gathered from this wild vine was lost in the overturning of my canoe, so nothing, unfortunately, can be stated concerning the chemical nature of the plant. Two important points, however, should be emphasized in connection with this discovery: (1) *Tetrapterys methystica* may possibly represent the second kind of *caapi* reported by Spruce and Koch-Grünberg, and it might be that the

epithet *caapi-piníma* ("painted caapi") alludes not to "painted leaves but to the unusual yellowish hue of the drink prepared from it; and (2) the tentative identification as "possibly *Tetrapterys*" of the sterile material sent to Kew by Wyndham from the Caquetá of Colombia would seem to be strengthened by the employment, even at such a distance, of a species of *Tetrapterys* in the elaboration of a drink with proven narcotic properties.

Summary

1. The narcotic drink known in the western Amazonian regions as *caapi* (Brazil and Colombia), *yajé* (Colombia) and *ayahuasca* (Ecuador, Peru and Bolivia) is made basically from the same or closely related plants of the *Malpighiaceae*. It is probable that the Indian names *natema*, *nepe* and *pinde* are synonymous with the three more commonly used names mentioned above.

2. The most widely employed species are members of the genus *Banisteriopsis*. The species most frequently used in Brazil, easternmost Colombia and much of the Amazon basin of Peru and Bolivia is *Banisteriopsis Caapi*, but *B. Rusbyana* seems also to be utilized in easternmost Colombia. In the westernmost fringe of the Amazon basin, along the Andean foothills of Colombia, Ecuador and Peru, *Banisteriopsis quitensis*, *B. inebrians* and *B. Rusbyana* seem to be the species most preferred.

3. The closely related genus *Tetrapterys* is employed in Brazil and possibly in Colombia. The only species of *Tetrapterys* definitely identified as the source of the narcotic *caapi* is *T. methystica*.

4. *Mascagnia psilophylla* var. *antifebrilis* has been indicated as one possible source of *ayahuasca*, but this report is open to very serious doubt.

5. The identification of *yajé* as a species of *Aristolochia* is definitely without foundation.

6. *Prestonia amazonica* (*Haemadictyon amazonicum*) of the *Apocynaceae* has frequently been named as the source of *yajé* and *caapi*. There is little or no reliable evidence that this vine is ever employed, at least as the prime ingredient, in preparing the narcotic drink.

7. The species of *Banisteriopsis* and *Tetrapterys* are known to be employed alone and to have narcotic properties when thus used. Two species of *Banisteriopsis* may also occasionally be utilized together.

8. Non-malpighiaceous plants are known occasionally, but apparently not frequently, to be added as admixtures together with *Banisteriopsis* in some areas. *Prestonia amazonica* has been reported to be thus used in Brazil. The solanaceous *Datura* and the amaranthaceous *Alternanthera Lehmanii* have been indicated as an added ingredient in Colombia. The apocynaceous *Malouetia Tamaquarina* may enter into the preparation of the narcotic in the Vaupés of Colombia, but this report could not be verified. Several unidentified plants have been mentioned as admixtures in Bolivia, Colombia and Peru.

EXPLANATION OF THE ILLUSTRATION

PLATE VI. (*Upper*). Makuna Indian witch-doctor gathering stems of *Banisteriopsis Caapi* (Spruce ex Griseb.) Morton (*Schultes & Cabrera 15587*) for preparation of narcotic drink. Río Popeyacá, Comisaría del Amazonas, Colombia.

(*Lower*). *Banisteriopsis inebrians* Morton (*Schultes & Cabrera 19113*) cultivated in an Indian garden near Mocoa, Comisaría del Putumayo, Colombia. The rasped bark of this plant, which is referred to as *yajé*, is added to the leaves of *Banisteriopsis Rusbyana* in the preparation of the narcotic drink.

Photographs by RICHARD EVANS SCHULTES

PLATE VI

EXPLANATION OF THE ILLUSTRATION

PLATE VII. BANISTERIOPSIS RUSBYANA (*Ndz.*) *Morton* (*Schultes & Cabrera 19112*) growing in secondary forest at Mocoa, Comisaría del Putumayo, Colombia. The leaves of this plant, which is called *chagropanga*, are added to the rasped bark of *Banisteriopsis inebrians* to prepare the *yajé* drink in the Mocoa area.

Photograph by RICHARD EVANS SCHULTES

Plate VII

EXPLANATION OF THE ILLUSTRATION

PLATE VIII. Makuna witch-doctor under the influence of caapi prepared in a cold-water infusion of the bark of *Banisteriopsis Caapi* (Spruce ex Griseb.) Morton (*Schultes & Cabrera 15587*) with no admixtures. Río Popeyacá, Comisaría del Amazonas, Colombia.

Photograph by GUILLERMO CABO O.

Plate VIII

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