

The Search for New Natural Hallucinogens¹

RICHARD EVANS SCHULTES

(Botanical Museum of Harvard University, Cambridge, Massachusetts)

More than a century ago, in 1855, von Bibra published his "Die narkotischen Genussmittel und der Mensch" (52). This book, the first of its kind, considered 17 plant stimulants and narcotics and urged that chemists should undertake assiduous study of a field so promising for research and so fraught with enigmas.

Half a century later, in 1911, Hartwich, in his "Die menschlichen Genussmittel" (16) discussed at length about 30 vegetal narcotics and stimulants and mentioned many others in passing. He pointed out that von Bibra's pioneer work was out of date, that research on the botanical aspects and on the chemical constituents of these plants had, in 1855, scarcely begun but that, by 1911, these studies were either progressing well or had already been completed.

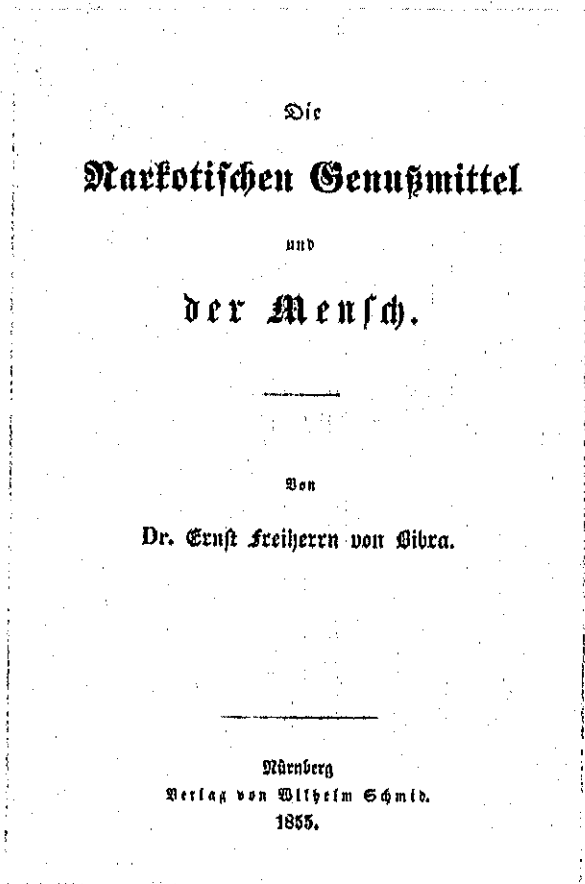


FIG. 1. Title page from von Bibra's little known book "Die narkotischen Genussmittel und der Mensch" of 1855.

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The Role of the Ethnobotanist in the Search for New Medicinal Plants¹

RICHARD EVANS SCHULTES

(Botanical Museum of Harvard University, Cambridge 38, Mass.)

"It is of importance, therefore, to seek out these primitive races and ascertain the plants which they have found available in their economic life, in order that perchance the valuable properties they have utilized in their wild life may fill some vacant niche in our own . . ."

—HARSHBERGER

There has always been a glamour and an awe surrounding the exotic. This is as true in the search for potential new drug plants as it is in other endeavours.

I can imagine that the Greeks held the plant lore of earlier civilizations, like that of Egypt, in awesome respect. We have a superb example of this phenomenon in Europe of the Middle Ages, when the writings of Dioscorides held a tight grip on scholarship for more than 1500 years, until faint but courageous doubt began to rear its head in herbals of the 17th century. And in our own country, we saw the heyday of Indian panaceas only some eighty years ago. As long as a preparation was made from an old North American Indian recipe—or was said to have been—the tonic or cure-all had to be a best seller. Only governmental intervention curbed this abuse which would be rife today were rigid controls to be removed. We have, in fact, witnessed, even in the last decade, the incredible popularity in the United States of pego-palo, an extract of *Rhynchosia*, employed in Caribbean folk-medicine as in aphrodisiac and potency tonic.

This acceptance of the exotic is, I presume, a basic human trait, and we need not dwell on it here. It does, however, behoove us to present an equilibrated appraisal of the potentialities of native remedies as therapeutic agents. It has had an effect, unfortunately, even amongst scientists responsible for planning research. Despite the understanding which primitive peoples do possess of the properties of plants, we must realize that this understanding has often been optimistically exaggerated. As scientists, we should strive to maintain an equilibrium between those on the one hand who would brush aside the superstition of ignorant peoples all native uses of plants as medicine and narcotics and those on the other who would glorify primitive man as a being possessing some uncanny intuition concerning plant properties.

In discussing the role of ethnobotany in our search for new drug plants, we must constantly bear in mind the widespread exaggeration of the usefulness of ethnobotanical data. We cannot afford to pre-judge reports of aboriginal uses of plants simply because they seem to fall beyond our limits of credence. Nevertheless, we must ever keep in mind that there is no reason to presume that, because he does have some knowledge as yet unknown to us, man in primitive societies possesses anything more than a very limited intuition about the properties of plants. It, therefore, behooves us to push forward, along with ethnobotanical investigation, studies on the flora in general. This has been proceeding in a rather desultory manner for eighty years or so, but it has recently been brought into emphasis and elaborated into a scientifically oriented programme by at least one pharmaceutical house. There is much to be expected from such a well directed chemical survey of our floras, undoubtedly more than we may hope to gain through the channels of ethnobotany alone.

¹Presented 11 June 1962 at the Third Annual Meeting, American Society of Pharmacognosy, Morgantown, West Virginia.

The modern ethnobotanist is an interdisciplinary scientist whose studies must have a purpose beyond mere compilation of odd data. Eighty-seven years ago, Powers defined the term *aboriginal botany* as the study of "all the forms of the vegetable world which the aborigines used for medicine, food, textile fabrics, ornaments, etc." In 1895, Harshberger first used the term *ethnobotany*. He did not define it, but he did point out ways in which it could serve scientific investigation. And the meaning of the word was later amplified to apply to all phases of man's relationship to the plant world. To-day, *ethnobotany* is defined usually as the study of the relationships which exist between peoples of a primitive society and their plant environment.

Although there is now general agreement concerning the larger aims of ethnobotany, the field has suffered from lack of orientation and integration. Ethno-



PLATE I. R. Gordon Wasson and his wife, the late Valentina P. Wasson M.D., whose ethnobotanical work on the hallucinating Mexican mushrooms is one of the outstanding ethnobotanical accomplishments of this century.

botanical research has often, of necessity, been done as a sideline issue by botanists untrained in ethnology; by anthropologists lacking any biological knowledge; or by laymen devoid of preparation in both biology and anthropology. As a result, scientists in these two fields who should be promoting such research have often been led to a smug deprecation of ethnobotany, its purposes and its potentialities.

At the same time, interest in the plant kingdom as a source of new drugs fell to an abysmal low. When I was a graduate student, no pharmaceutical house would look at what I thought—and what later proved to be—interesting economic plants from Oaxaca in southern Mexico, such as the hallucinogenic mushrooms and the psychotomimetic morning glories which only now are receiving adequate chemical study following the outstanding ethnobotanical work of the Wassons. The steady procession of new and revolutionizing new drugs of plant origin, some

tierra se emborrachan cō vn humo y dā quāto tienen por el. beuen también otra cola q̄ sacan de las hojas de los arboles como de enzina y tuestanla en vnos botes al fuego y despues q̄ la tienen tostada hiñchen el bote de agua ⁊ assi lo tienen sobre el fuego ⁊ quando ha heruido dos vezes echan le en vna vasija ⁊ está en friandola con media calabaza: y quando esta con mucha espuma beuen la tan caliente quanto pueden sufrir: y desde que la sacan del bote hasta que la beuen están dando bozes diziendo que quien quiere beber. Y quando las mugeres oyen estas bozes luego se paran sin osar se mudar y avnq̄ esten mucho cargadas no osan hazer otra cosa. y si a caso alguna dellas se mueue la deshonrran ⁊ la dan de palos y con muy gran enojo derraman el agua que tienen para beber: ⁊ la que an beuido la tornan a lançar lo qual ellos hazen muy ligeramente ⁊ sin pena algũa. la razon desta costumbre dā ellos y dizen. Que si quādo ellos quieren beber aquella agualas mugeres se mueuen de donde les toma la boz que en aquella agua se les mete en el cuerpo vna cōsu mala y q̄ dēde a poco les haze morir. y todo el tiempo q̄ el agua esta coziendo a de estar el bote atapado Y si a caso esta desatapado y alguna muger passa lo derramā y no beuen mas de aq̄lla agua es amarilla. y están beuiendola tres dias sin comer: y cada día beue cada vno arroba y media della. E q̄ndo las mugeres está cō su costumbre no buscan de comer mas de para si solas porq̄ ninguna otra persona come de lo que ella trae. En el tiempo q̄ assi estaua entre estos vi vna diablu

PLATE II. *The earliest European account of the use of the Black Drink (Ilex vomitoria) by the Indians of southeastern United States was written by Nuñez Cabeza de Vaca and published in 1542 in his "Relación y comentarios . . ."*

of them employed in native medicines—muscle relaxants from curare; antibiotics from fungi; reserpine from Indian snake root; cortisone; to mention a few—focused our attention again on the potentialities of the vegetal world. And this, in turn, helped to direct our thoughts towards ethnobotanical lore.

In the meanwhile, the field of ethnobotany grew, and other terms were created to cover specialized or related studies: *ethnozoology*, *ethnobiology*, *ethnomycology*, and, most recently, *paleoethnobotany*.

A consideration of the ethnobotanists's role in the search for new drugs brings us to the realization that there are few ethnobotanists and even fewer botanical and anthropological institutions maintaining a collection, laboratory, library or museum dedicated to ethnobotanical pursuits. The role is, consequently, limited by these shortcomings.

Ethnobotany provides several approaches in the research for new drug plants: (i) a study of archeological plant remains; (ii) an examination of notes on plant collections in herbaria; (iii) a survey of the literature; (iv) field studies among primitive peoples.

Since the ethnobotanist must work through one or more of these approaches or, better still, through a combination of several, I would like to discuss each of them briefly, hoping thereby to put the ethnobotanist's often misunderstood role into a straiter perspective.

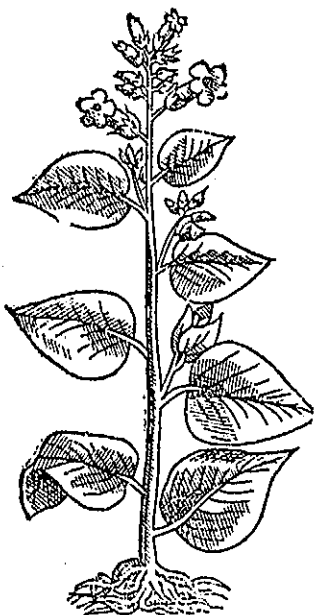
Paleoethnobotany.—The study of plant remains from archeological sites can aid little directly in our search for new plant remedies. Occasionally, however, we find plants which cannot be ascribed to food, spice, textile or other obvious uses, and these may cause us to wonder about their possible significance as medicines or narcotics. One of the most abundant plant remains at the one thousand-year old Lodaiska site near Denver are seeds of *Lithospermum ruderale*, used by American Indians in modern times as a contraceptive and the subject of much research by pharmaceutical specialists. In a recently published work on plant remains in pre-Columbian sites in Peru, Towle has listed several possible medicinal components: *Erythroxylon*, *Andira*, *Mucuna*, *Piper* and an *Ilex*. And we always recall the presence in the Swiss Lake Dweller sites of seeds of the opium poppy.

Herbarium search.—Our herbaria are rich and almost unexplored repositories of ethnobotanical data. Many an herbarium sheet has the collector's annotation of a local use. The information is not only first hand, but the data concerning locality, people and time are precise. Furthermore, unlike most literature citations, there can be no doubt concerning the identity of the plant used, since the information is written on the label of the plant specimen itself. No matter how many years have elapsed since the collection of the specimen, it is always possible to return to the exact locality of that collection for more information or for plant material for chemical study.

Dr. Lily M. Perry has been searching the rich herbarium collections of Indoesian plants in the Arnold Arboretum for her compilation of the medicinal plants of southeastern Asia. Dr. Siri von Reis, under my supervision, has this past half year instituted a specimen by specimen search for medicinal data in the 2,000,000-sheet Harvard University Herbarium. We had no inkling of how many data such an herbarium search might yield, but now, on the basis of an examination of half a dozen families, we are justified in expecting to find notes on native medicinal uses for at least 3700 species of plants. We hope to be able to continue this interesting search. It is an ethnobotanical approach that promises much in our valuation of folk-medicine.

Literature search.—Our ethnobotanical literature goes back some 3700 years to the Code of Hammurabi. Many would think it folly to spend time on such ancient literature. Yet, had we carefully evaluated the writings of the Egyptian papyri, we might not have had to wait until the 1940's for a knowledge of the anti-bacterial activities of certain fungi.

De PYCIELT, seu Tabaco. Cap. LI.



PLANTAM, quam Mexicenses *Pycielt*, seu *Tilt* vocant, ab Haitinis appellatur *Tabacus*, à quibus non ad Indos solos, sed & ad Hispanos id defluxit nomē, eò quod suffumigijs admisceretur, quæ *Tabacos* etiam nuncupare consueverunt. à Brasilianis Perum, ab alijs Herba sacra, à nonnullis Nicotiana dicitur. Non est autem vna huius plantæ species. alij namque tres in hoc antiquo Orbe reperiri affirmant, ac plantam hanc in *Tabacum* maiorem, minorem, & minimum partiuntur. At quia maioris, minorisq; Tabaci differentia pusilla est (consistit enim in magnitudine, & longitudine, ac adhærentia foliorum sine pediculis cauli, vt in maiori obseruatur, in minori verò folium est paulò minus, longo pediculo ramis inhærens, ac florum positura; cumq; id ob causas mutationes in plantis efficientes, latius in proœmio explicatas contingere potuerit) non immeritò duæ

Species?

sunt tantum species, quæ obseruantur in hac noua Hispania. quarum alteram *Pycielt*, alteram verò *Quauhyelt* appellant. *Pycielt* ergo herba est, folia ferens lata, oblonga, ac Personatæ quadantenus similia. caules, quinque pluresvè dracones longos, atque hirsutos, inconditos, striatos, & læues. flores Hyoscyami lutei similes, eisq; decidentibus vascula prædicti Hyoscyami æmula, referta femine pusillo, Papaueris minore, ac ex rufo nigricante. radicem breuem, non admodum tenuem, sed fibratam. *Quauhyelt* verò in magnam assurgens altitudinem, Assyriam Malum, Limonè vocatâ, æquat. Caule recto multos emittente ramos, & in eis folia mali Assyrij longiora, hirsuta, colore viridi dilutiora, vti tota planta diffusa. interdumque folia, foli, & cœli ratione variantur. quandoque enim cubitalem longitudinem, ac pedalem latitudinem assecuta sine pediculo caulem amplectuntur. nonnumquam verò folia minora, pediculis inhærentia ramis conspiciuntur. Flores Campanulæ instar fert, concauos, ac per extremum sex, septemvè angulis distinctos, candicantes, medio verò purpurescentes, ordine per ramulorum longitudinem dispositos. quibus succedunt capitula. Ocymoidi similia, maiora ramè, plena femine pusillo ex cincto

Species I.
Pycielt
herba reginæ.

Species II.
Quauhyelt
Nicotiana.

P 3 rco

PLATE III. One of the richest sources of medicinal information of native peoples was Francisco Hernandez' "Rerum medicarum Novae Hispaniae thesaurus . . .", published in 1651. As in this discussion of tobacco, all ethnobotanical and many botanical aspects of the plants described were considered in detail on the basis of meticulous field work.

There is, I venture to state, still much to be learned from a discerning search of the medieval herbals which we usually are inclined to overlook as having been thoroughly exhausted.

But it is mainly from two sources that we must look for the most help. One of these sources—and its wealth is still underestimated—is the accumulated writings of the early naturalist-physician-herbalist researchers of the 16th and 17th centuries: those intrepid, enquiring, insatiable chroniclers of things and events in new lands. They set down everything, many of them. We can winnow the grain from the chaff in many cases, yet we have not done this important job. We might well learn from Rumphius, the 17th century Dutch botanist whose work is basic to natural history in the East Indies and whose extraordinary writings include notes of folk uses of more than 700 species of plants. Insisting on verifying personally whenever possible what the natives reported, he nevertheless wrote down what he considered fact as well as hearsay, or, as he said, "fables, superstitions and old women's babblings . . . certainly not, as it were, that I put a firm trust in them," but because "in those faery tales always some grain of Truth, some unseen natural virtue lies hidden, and to excite amateurs to diligent search, I assure them that in these lands many secrets of nature are revealed daily erstwhile unknown to Europeans and seemingly unworthy of belief."

The writings of naturalists, missionaries, travellers and explorers of the New World—many still only in manuscript form—are replete with yet unchecked reports of the therapeutic value of plants. In many cases, the identification of the plant is not difficult to make. It would seem that a concerted attack on this repository of first hand data, old as they may be, might profitably be intensified. If you would ask me for one such source, I would cite that incredible treasury; "*Nova plantarum, animalium et mineralium mexicanorum historia*", written between 1570 and 1575 by Francisco Hernandez, physician to the King of Spain.

We should not, however, overlook the second, and probably the more important source: modern ethnobotanical writings. There are more than we suspect. They range from complete studies of the uses of and beliefs about plants in primitive societies to incidental but oftentimes highly significant remarks on one or two species of plants by travellers or explorers. A first step in evaluating and utilizing this scattered information on living cultures would be to gather the sources together in one large bibliography—a seemingly colossal task but actually not incommensurate with the data on folk-medicine which could conservatively be expected to accrue therefrom. Botanists, anthropologists and other investigators have been increasingly aware of ethnobotany, and many major and minor publications on this phase of material culture have accumulated over the past eighty years or so. I believe that we might find that geographically and culturally we have a better coverage, spotty though it undoubtedly is, than we to expect.

But ethnobotany from the literature often has distinct limitations. It is sometimes uncritical botanically, or unsophisticated anthropologically, or deficient from both viewpoints. Seldom are voucher specimens cited to permit our verifying identifications. Especially when we treat of medicinal plants, the diagnosis of diseases is itself open to serious question. Frequently, often when ethnobotanical data are found in floras, no specific tribe or group of people or no accurate geographical location are cited for the uses.

All in all, it would seem to me extremely unwise to base a whole programme of research on literature reports alone, yet some pharmaceutical investigation precisely so founded.

Field work.—Here we come to the great challenge facing us to-day. We do not have enough ethnobotanists for the work to be done with the rapid disappearance of primitive cultures. Botanists usually are too occupied in the vast and exciting essential to their phytogeographic or monographic studies to spend

time in the slow detective work necessary for assembling the pieces of an ethnobotanical puzzle. They often do, however, make observations of far-reaching value in pointing out avenues of approach for later intensive research. The anthropologist, likewise, normally so deeply committed to unravelling obscure or complicated sociological enigmas, is occasionally able to signalize an important point of departure for the ethnobotanist. In fairness, we must realize that the



PLATE IV. *Richard Spruce, whose extensive exploration in South America a century ago greatly enriched both botany and ethnobotany and set a pattern for later work in tropical rain forest areas.*

anthropologist is often discouraged from pursuing ethnobotanical research because of the collection of necessary voucher specimens, a chore which has sometimes been portrayed erroneously as distastefully burdensome.

Since there does not seem to be much immediate hope for the prompt training of any number of men specifically in ethnobotany, we must for a long time to

come expect the botanist and, to a lesser extent perhaps, the anthropologist, realizing how fast time is ebbing out, to take the initiative in our study of the relationship between man and his plant environment—in this case, the use of plants in primitive society as medicines or narcotics.

I am a taxonomic botanist engaged in research on the flora of tropical America, specializing on plants of the Amazon. Yet by training I am also an ethnobotanist. As many of my papers have been ethnobotanical as strictly botanical. In my field methods, I do not—I cannot—separate botanical from ethnobotanical efforts. Probably no two field scientists working on ethnobotanical problems follow the same techniques, and I cannot say that under all conditions I would carry on my investigations in the same manner. Believing that a few words on my field methods may illustrate one way in which a botanist can carry on ethnobotanical research, may I ask your indulgence if I here inject a few personal remarks on my work in the northwest Amazon from 1941 to 1954?

Few botanists, I realize, are fortunate enough to have spent an almost uninterrupted 12 years in the field. Long residence in one region most certainly enhances chances of ethnobotanical discovery through building up a rapprochement with natives, a familiarity with their languages and customs and an intimate knowledge of the flora itself. Few botanists, I realize further, have the good fortune of working in such an ethnobotanically rich and untouched area as the northwest Amazon. And, finally, few botanists might experience so many fortuitous circumstances as those which led me to several of my ethnobotanical discoveries. In such a virgin area as the northwest Amazon, any naturalist of long residence could not but uncover both botanical and ethnobotanical rarities and novelties.

Like most primitive peoples, the Amazon Indian cannot comprehend an interest in plants for interest's sake alone. His only understanding is of their utilitarian or magical properties. I am sure that the botanist who works amongst them is much more readily accepted than anyone else might be. Here is a man who collects plant specimens all day and every day. The native lives closely with his plant environment. Consequently, from the start, the botanist has something in common with the native.

During my years in the Amazon, I collected nearly 24,000 specimens. Naturally, only a small fraction had any ethnobotanical interest. If an Indian helper asked, while I was engaged in collecting, why I wanted a certain plant, the only explanation which he could accept with understanding was that I needed it for a remedy. The very fact that he asked about that particular plant, and no other, indicated to me that perhaps he wanted to see if my use for it coincided with his own. In such a case, I would manage to collect again the next day the same species farther upstream, then follow it up a day or two later, all the while saying nothing about the plant. If it were really a plant of utilitarian importance to the native, he would most certainly, after seeing me collect it several times, begin to discuss it. With this "cat-and-mouse" technique, I learned many ethnobotanical facts which, had I pressed at the start, would never have been divulged.

When I first went into the Colombian Putumayo in 1941, I was anxious to identify botanically yoco, a plant employed by the Indians as a source of a strong stimulant known for years only by its vernacular name. Persistent research for nearly a year failed to uncover a flowering or fruiting specimen of the liana which clambers through the crowns of 100-foot jungle trees. I had alerted Indians far and wide of my need for flowers of yoco. Finally, after eight months, serious leg ulcers from work in inundated forests forced me to go to a small Colombian naval base on the Putumayo to await a hydroplane to civilization. The clean accommodations offered me on a river gun-boat by the officers were so pleasant that when an Indian, who had paddled far downstream in search of me, reported that he had seen a liana in flower, I was reluctant to leave. Yet intuition told me that I should, so back I went two days upstream and a day through flooded swamp-

forest. Locating the liana, the ground under it strewn with minute white flowers, we had to fell seven trees to bring it down. But we were rewarded in being able to establish the identity of the elusive yoco, later shown to be rich in caffeine, as an undescribed species of the sapindaceous genus *Paullinia*. This experience is indicative of the interest and loyalty which I found at all times amongst the Indians of the region. I cannot subscribe to the widespread belief that he regards his plant lore as something secret, to be guarded zealously, and that civilized man must pry it from him by ingenious duplicity.

A sympathetic understanding and tolerance of his beliefs and ways, and participation in his customs do more than anything else to win the Indian's respect and confidence. I naturally learned to chew his coca and, finding it to be not only a pleasant but a most helpful custom, used it for eight years myself. This may explain perhaps why certain Makunas of the Apaporis River, where I spent a total of some three years, told me of a remote and isolated group of Tanimukas who prepared a superior type of coca. Finally, making a trip to investigate this report, I learned of a most ingenious method of infusing into coca powder the acrid incense of the resin of the tacamahaca tree (*Protium heptaphyllum*), one of the few variations ever found in the preparation of this widespread narcotic plant, the source of the alkaloid cocaine.

Anthropological writings indicate (but we now know that they are in error) that the narcotic snuff yopo, prepared from seeds of *Piptadenia*, is employed throughout the upper Orinoco and much of the Amazon basins. I was puzzled, however, by my failure to encounter a single tree of this plant in the northwest Amazon. Yet the witch-doctors there do employ a highly narcotic snuff which was not tobacco. What could it be? Had I been insistent, I might never have known. After nine years, one of my Puinave boys, himself the son of a medicine-man, suddenly said one day: "This is the tree that gives yakee snuff." Controlling my excitement, I showed only mild interest. We decided to prepare snuff from it. From strips of bark, the boy scraped off a reddish exudate, mixed it with water, boiled it down in four hours to a thick syrup which he allowed to sun-dry. The resulting solid, pulverized and mixed with bark-ashes of a wild cacao tree, gave us the snuff. Since I believe in experimenting with these plant products personally in the field, I took one-quarter the dose normally snuffed by a medicine-man to produce the psychotomimetic effects essential for his divination and diagnosis of disease. I was ill in my hammock for several days, so strong was the snuff. Strangely enough, the source of yakee snuff belongs to the myristicaceous genus *Virola* and is, therefore, related to our nutmeg, which has itself been employed as a narcotic. The moral from this experience is that patience will usually pay good dividends in this kind of work.

I might go on and on in a reminiscent vein, telling you how, without my prying or seeking to outwit the Indian, little ethnobotanical discoveries came along with my regular floristic work. I could tell you of the many unexpected circumstances which led me to information about plants employed as styptics, to treat conjunctivitis, as oral contraceptives, to loosen decaying teeth, as snake-bite remedies, in treating burns—not to mention the many everyday uses such as carminatives, febrifuges and purgatives. I could tell you how fascinating detective work with curares uncovered for the first time the use of a species of the family Thymeliaceae as a basic arrow-poison component. Or, I might relate how participation in native dances and rituals has helped me acquire a deeper understanding of the significance and use of the numerous hallucinogenic narcotics of the region, some hitherto unknown botanically, and I could explain how there are still psychotomimetic agents lurking in these forests for some ethnobotanist of the future to identify and study. But a recital of past work will avail us naught, unless we take lessons from it for the more important present and future.

Many of our basic ethnobotanical observations have been made by ists

and anthropologists as by-products, so to speak, of their major programmes of research. Usually men of broad training and interests, they were often quite unaware of the contributions which they were making to ethnobotany.

We find an example in Richard Spruce, the English botanical explorer of the Amazon and the Andes who increased so strikingly our knowledge of Hevea rubber, the quinine tree, narcotics, poisons and other economic plants. A specialist in the Hepaticae, relatives of the mosses, he once wrote: "I like to look on plants as sentient beings, which live and enjoy their lives—which beautify the earth during life, and after death may adorn my herbarium. When they are beaten to pulp or powder in the apothecary's mortar, they lose most of their interest for me. It is true that the Hepaticae have hardly as yet yielded any substance to man capable of stupefying him or of forcing his stomach to empty its contents, nor are they good for food; but if man cannot torture them to his uses or abuses, they are infinitely useful where God has placed them, as I hope to live to show; and they are, at the least, useful to and beautiful in themselves—surely the primary motive for every individual existence."

Are these, you ask me, sentiments conducive to ethnobotanical research into drug plants? I would answer you a very definite *yes*, for they bespeak the deepest love for plants which, after all, must underlie any success in our search for promising new medicines through ethnobotany.

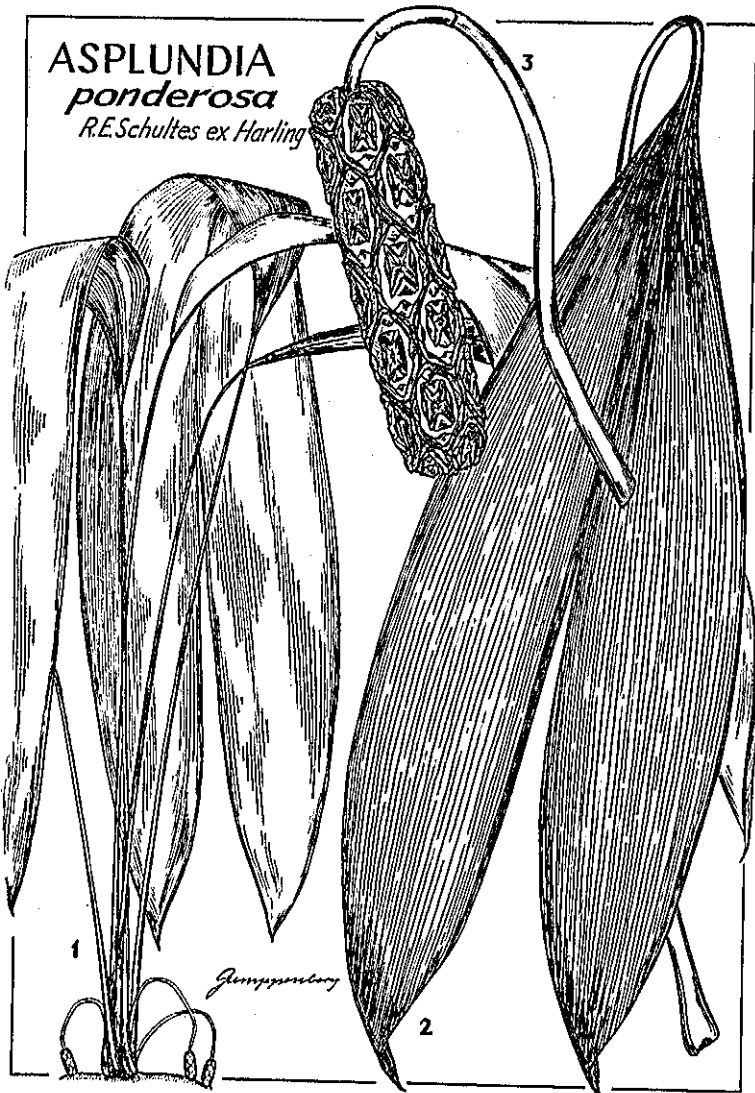


Figure 1. *Asplundia ponderosa* R. E. Schultes ex Harling. 1) Habit, $\times 1/4$. 2) Leaf, \times about $1/3$. 3) Inflorescence, \times about $1\ 1/2$. Drawn by John Gumpenberg.

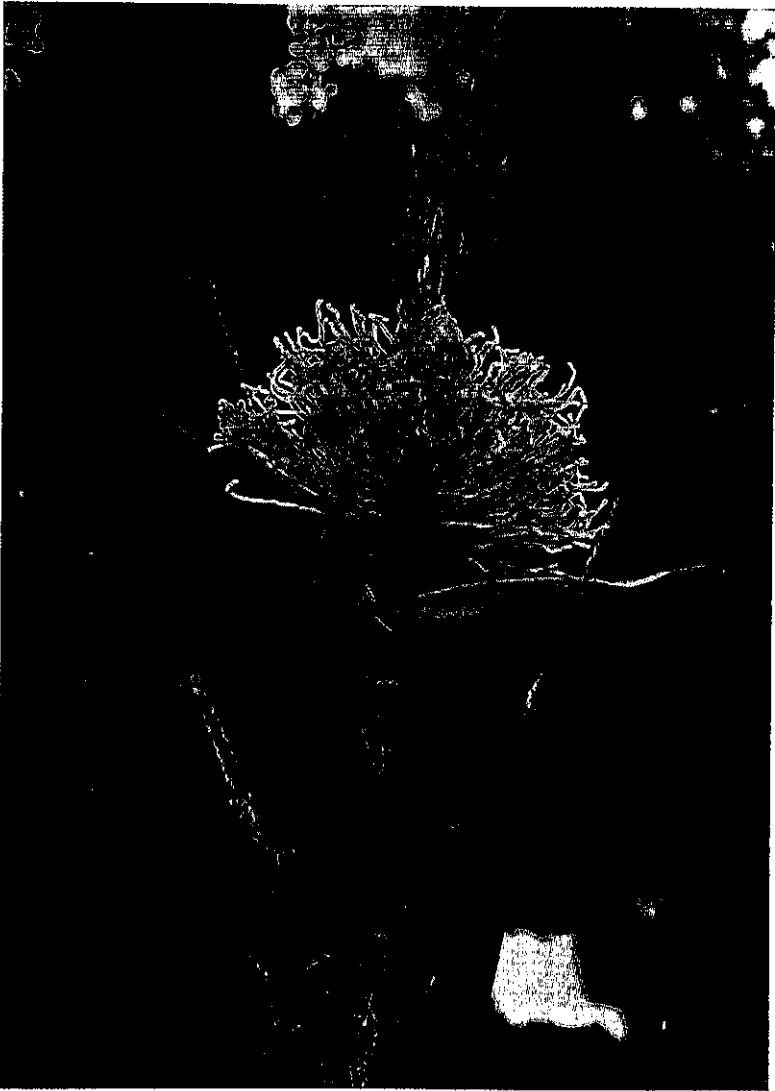


Figure 2. *Asplundia rhodea* R. E. Schultes ex Harling. Inflorescence of *Idrobo et Schultes 938*. Photograph by R. E. Schultes. Plate 1274

Asplundia rhodea R. E. Schultes ex Harling in *Acta Hortii Bergiani* 18 (1958) 214, fig. 57, d-f, t. 34.

COLOMBIA: INTENDENCIA DEL META, Sierra de La Macarena, eastern slope of Mt. Renjifo, alt. 600-1300 m., December 30, 1950 — January 5, 1951, *J. M. Idrobo et R. E. Schultes 933*.

When *Asplundia rhodea* was originally described, techni-



Figure 3. *Asplundia rhodea* R. E. Schultes ex Harling. Roots of *Idrobo et Schultes 933*. Photograph by R. E. Schultes. Plate 1275

cal drawings of floral parts and an illustration of an herbarium specimen were published. Two photographs of *Idroba et Schultes 933* are herewith offered as an aid in understanding the habit of the plant.



Figure 4. *Dicranopygium omichlophilum* R. E. Schultes ex Harling. Habit of the plant at the locality of *Idroba et Schultes 1184*. Photograph by R. E. Schultes.

Plate 1276

Dicranopygium omichlophilum R. E. Schultes ex Harling in *Acta Hortii Bergiani* 18 (1958) 294, fig. 76, a-c, t. 67.

COLOMBIA: INTENDENCIA DEL META, Sierra da La Macarena, Mt. Renjifo, summit and environs, alt. 1800-1900 m., January 6-20, 1951, *J. M. Idroba et R. E. Schultes 1184*.

Dicranopygium omichlophilum is extremely abundant on

moss-covered rocks in the cold streams at the top of the Sierra de La Macarena, where almost perpetual mist creates a dark and constantly wet environment. It covers the rocks in dense colonies together with a beautiful species of *Spathiphyllum*. The flowers of both plants are excessively fragrant.

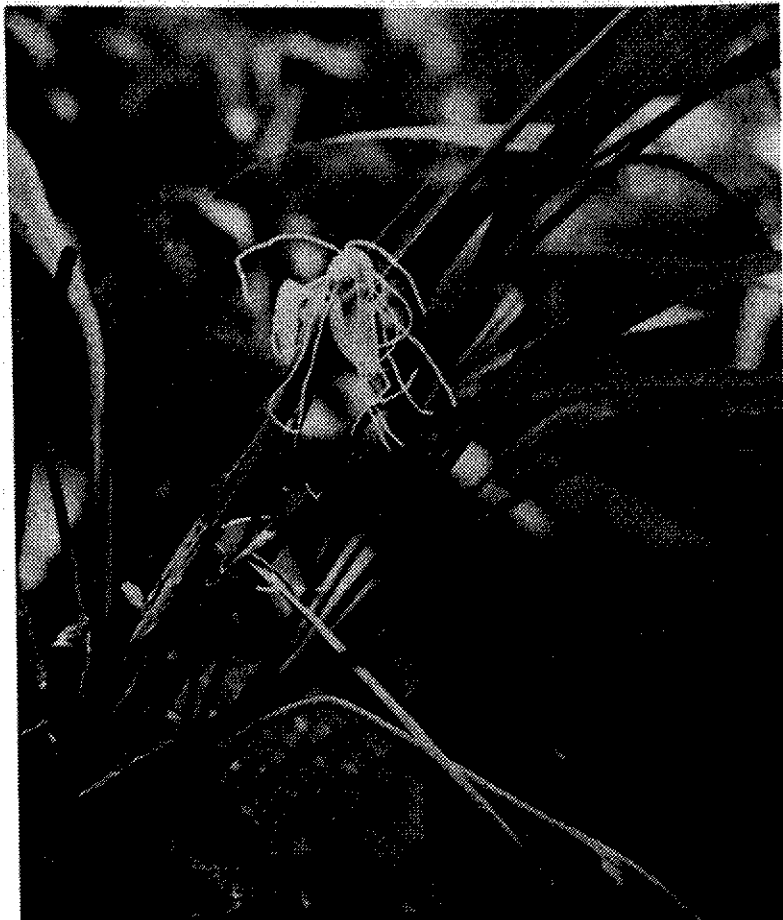


Figure 5. *Dicranopygium omichlephilum* R. E. Schultes ex Harling.
Flower of *Idrobo et Schultes 1184*. Photograph by R. E. Schultes.

Plate 1277



Figure 6. Habitat of *Dicranopygium omichlophilum* R. E. Schultes ex Harling at the summit of La Macarena, Meta, Colombia. Photograph by R. E. Schultes. Plate 1278

The accompanying photographs illustrate the habit of *Dicranopygium omichlophilum* and two views of the habitat of the plant at the summit of La Macarena.

BROMELIACEAE

Pitcairnia mituensis L. B. Smith sp. nov. A *Pitcairnia Maguirei* L. B. Smith atque *P. Wardaeckii* L. B. Smith, quibus maxime affinis, lamina foliorum subtus haud lepidota valde latiore differt.

Florifera ultra 2 m. alta; foliis ad 1 m. et ultra longis; vaginis sub-orbicularibus, quam laminis paulo latioribus, intus castaneis; laminis

linearibus, acuminatis, pungentibus, 7.5 cm. latis, planis, utrinque glabris, spinis atris curvatis 3 mm. longis laxe armatis; scapo erecto; scapi vaginis ignotis; inflorescentia pauciramosa, glabra; bracteis primariis parvis, ovatis, 25 mm. longis, quam basi sterili ramorum multo brevioribus; ramis adscendentibus, ad 6 dm. longis, robustis,



Figure 7. *Pitcairnia mituensis* L. B. Smith. Habit photograph taken at the type locality, near the summit of Cerro de Mitu, Vaupes, Colombia. Photograph by R. E. Schultes.

Plate 1279

viridibus; bracteis florigeris late ellipticis, acutis, ad 20 mm. longis, pedicellos superantibus; floribus suberectis, flavo-viridibus, pedicellis cylindricis, 5 mm. longis; sepalis lineari-lanceolatis, acutis, ad 45 mm. longis, ecarinatis; petalis 6 cm. longis, nudis; staminibus inclusis; ovario ca. 1/2 infero; ovulis late alatis.

COLOMBIA: COMISARÍA DEL VAUPÉS, Río Vaupés, Cerro de Mitú, alt. about 270 m. "Common on bare top of mountain, in clumps on rocks." August 20, 1960, *Richard Evans Schultes 22711* (TYPE in Herb Gray).

Pitcairnia mituensis is a member of the group of species characterized by broadly alate ovules and seeds and ranging through the Guayana Highland from British Guiana to southeastern Colombia.

MARANTACEAE

Calathea acuminata Steyermark in *Fieldiana*, Bot. 28, no. 1 (1951) 161.

COLOMBIA: COMISARÍA DEL VAUPÉS, Río Negro, San Felipe. "Flowers white." December 12, 1947, *R. E. Schultes et F. López 9332*; "Flowers white." *R. E. Schultes et F. López 9337 A*.

The natives of the Río Guainía in Colombia and Venezuela boil the crushed leaves and stems of this (and possibly other) species of *Calathea* with the leaves of a species of *Nectandra* to prepare a poultice or dressing for infected ulcers of the legs and thighs.

BALANOPHORACEAE

Ombrophytum zamioides Weddell in *Ann. Sci. Nat.*, ser. 3, 14 (1850) 184, t. 10.

COLOMBIA: COMISARÍA DEL AMAZONAS, Río Loretoyacu, Isla Zaucudo. "White saprophyte." *R. E. Schultes et G. Black 8615*.

This curious saprophyte, identified by Dr. João Murça Pires of the Instituto Agronômico do Norte in Belem do Pará, has apparently not been reported from the Amazon Valley of Colombia or Brazil. The type was collected in Peru.

MALPIGHIACEAE

Banisteriopsis Caapi (Spruce ex Griseb.) Morton in *Journ. Wash. Acad. Sci.* 21 (1931) 485.

PERU: DEPARTAMENTO DE SAN MARTÍN, PROVINCIA DE LAMAS, San José de Sisa-Nauta, alt. c. 550 m. "Flores rosadas. Trepador voluble (soga) cultivado. *Shimba-ayahuasca*." July 26, 1958, *O. Velarde Nuñez 6577*. (Herb. Morton Arb.; Econ. Herb. Oakes Ames).

DEPARTAMENTO DE SAN MARTÍN, PROVINCIA DE LAMAS, San José de Sisa-Nauta, alt. c. 600 m. "Trepador voluble. Cultivado. Su tronco se usa para preparar una bebida alucinógena. *Ayahuasca legítima*." July 29, 1958, *O. Velarde Nuñez 6586*. (Herb. Morris Arb.).

DEPARTAMENTO DE SAN MARTIN, PROVINCIA DE LAMAS, San José de Sisa-Nauta, alt. 600 m. "Flores rosadas. Trepador voluble. Cultivado. Su tronco se usa para preparar una bebida purgante y alucinógena. N.v. *Cuchi-ayahuasca*." July 29, 1959, O. Velarde Nuñez 6587. (Herb. Morris Arb.; Econ. Herb. Oakes Ames).

It is rare that flowering material of *Banisteriopsis Caapi* is collected in the field. In fact, with the exception of several collections from vines brought to flower in botanical gardens or experiment stations (*Ducke* 25258, 25260; *Murça Pires* 19; *Cuatrecasas et Dryander* 14372), *Banisteriopsis Caapi* has been found in a flowering state only once since Spruce's type — when *Ducke* collected topotypical material from the Río Curicuriari in Amazonian Brazil (*Ducke* 153).

Velarde's two excellent collections (6577, 6587), which are abundantly flowering, come from vines cultivated by natives on the eastern or Amazonian slope of the Peruvian Andes. An examination of the flowers discloses little if any significant variation from the general pattern of the flower of *Banisteriopsis Caapi* (see *Cuatrecasas* in *Webbia* 13 (1958) 506). *Velarde* 6586 is sterile, as are most collections of *Banisteriopsis* cultivated for medicinal or narcotic use, but may safely be referred to *B. Caapi*.

Through the Velarde collections, we are able to cite several new vernacular names. *Velarde* 6586 is said to represent *ayahuasca legitima* or "true ayahuasca"; *Velarde* 6577 is called *shimba-ayahuasca*; and *Velarde* 6587 has the name *cuchi-ayahuasca*.

Banisteriopsis inebrians *Morton* in *Journ. Wash. Acad. Sci.* 21 (1931) 485.

PERU: DEPARTAMENTO DE SAN MARTÍN, PROVINCIA DE LAMAS, San José de Sisa-Nauta, alt. 600 m. "Flores rosadas. Trepador voluble. Su tronco se utiliza como purgante y para preparar una bebida alucinógena. *Purga-juasca*." July 29, 1958, *Octavio Velarde Nuñez* 6585 (Herb. Morris Arb.; Econ. Herb. Oakes Ames).

This collection, in abundant (albeit young) flower, has the very firm-coriaceous leaves which seems to be the principal character separating *Banisteriopsis inebrians* from *B. Caapi*.

Banisteriopsis inebrians, described from the Putumayo of

Colombia, has apparently not hitherto been reported from Peru.

Banisteriopsis Rusbyana (Ndz.) Morton in Journ. Wash. Acad. Sci. 21 (1931) 487.

PERU: DEPARTAMENTO DE SAN MARTÍN, PROVINCIA DE TARAPOTO, Tarapoto, alt. 600 m. "Trepador voluble. Cultivado. Su tronco se utiliza para preparar una bebida purgante y alucinógena. N.v. *ayahuasca amarilla*." August 2, 1958, O. Velarde Nuñez 6589 (Herb. Morris Arb.).

This collection is sterile, but the membranaceous leaves match very closely what we have been accepting as representative of *Banisteriopsis Rusbyana*. Velarde 6589 is, indeed, a very close match for Klug 1971 from the Putumayo of Colombia. The vernacular name *ayahuasca amarilla*, might possibly refer to the colour of the flowers.

The type of *Banisteriopsis Rusbyana* was collected in Bolivia, and the species has hitherto been known only from Bolivia and Colombia.

STERCULIACEAE

A number of collections of *Herrania* have been studied subsequent to the publication of my synopsis of the genus in 1958 (Journ. Arn. Arb. 39 (1958) 216) and are herewith cited since some of them extend known ranges or are the source of interesting taxonomic details.

Herrania albiflora Goudot in Ann. Sci. Nat. Paris, sér. 3, 2 (1844) 280, t. 5, figs. 1-10.

VENEZUELA: ESTADO DE BARINAS, Fundo Paiva, Santa Bárbara de Barinas, February 1953, L. Aristeguieta 1598.

This represents the second Venezuelan collection of a species predominantly Colombian in distribution.

Herrania Cuatrecasana García-Barriga in Caldasia 2 (1941) 57, t. 2.

COLOMBIA: COMISARÍA DEL PUTUMAYO, Río San Miguel, Quebrada de Sipanae, alt. 400 m., December 12, 1940. J. Cuatrecasas 11012.

This collection was inadvertently omitted from the synopsis.

Herrania kanukuensis R. E. Schultes in Caldasia 2 (1943) 11.

BRAZIL: ESTADO DO AMAZONAS, Jarú, Rio Branco. January 1913, J. G. Kuhlmann 3082.

Herrania kanukuensis is known from Brazil through only two collections, both from the Rio Branco. The species is otherwise registered from British and Dutch Guiana.

Herrania nitida (Poepp.) R. E. Schultes in *Caldasia* 2 (1943) 16, t. p. 17.

BRAZIL: ESTADO DO PARÁ, Belem. Cultivated in Museu Paraense, February 4, 1926, A. Ducke 21050. Rio Jary, December 16, 1912, E. Sneathlage 12444. ESTADO DO AMAZONAS, Rio Solimões, San Antonio do Iça, August 26, 1906, A. Ducke 7618; Rio Japurá, November 20, 1904, A. Ducke 14748; São Paulo de Olivença, October 10, 1931, A. Ducke 23977; Rio Tocantins, November 12, 1927; Rio Parintins, January 20, 1936, A. Ducke 35406. Botanical Garden, Rio de Janeiro, ("from Amazonas"), March 31, 1922, Ducke 248. Território do Acre, Seringal Orion, October 23, 1923, J. G. Kuhlmann 702. COLOMBIA: COMISARÍA DEL CAQUETA, Morelia, November 24, 1941, K. von Schneidern A 1368 bis. ECUADOR: PROVINCIA NAPO-PASTAZA, Tiputini-Lagatococha, January-May, 1953, F. Fagerlind et G. Wibom 2283; 2348; Tena, October 18, 1939, E. Asplund 9428; December 30, 1939, E. Asplund 10198; Mera, December 7, 1955, E. Asplund 18720; Canelos, November 15-23, 1958, G. Harling 3171; 3290; 3331.

These newly cited collections, with the exception of Kuhlmann 702 from the Brazilian Acre, do not alter our concept of the range of *Herrania nitida*.

Herrania nitida (Poepp.) R. E. Schultes fma. *sphenophylla* R. E. Schultes in Bot. Mus. Leaflet. Harvard Univ. 14 (1950) 131.

PERU: DEPARTAMENTO DEL LORETO, Iquitos, November 20, 1940, E. Asplund 14780.

This form has previously been cited twice from Amazonian Peru and once from Amazonian Brazil and Colombia.

Herrania Mariae (Mart.) Decaisne ex Goudot in Ann. Sci. Nat., sér. 3, 2 (1844) 233. *Abroma Mariae* Martius in Denkschr. Regensb. Bot. Gesell. 3 (1841) 297, tt. 6, 9. *Theobroma Mariae* (Mart.) Schumann in Martius Fl. Brasil. 12, pt. 3 (1886) 71, t. 15. *Herrania atrorubens* Huber in Bull. Soc. Genève, ser. 2, 6 (1914) 187.

BRAZIL: ESTADO DO PARÁ, Rio Trombetas, Castanhões do Rio Cuminá-mirim, December 12, 1906, A. Ducke 7935.

In my monograph of *Herrania*, I included *H. atrorubens* as a synonym of *H. nitida* (Poepp.) R. E. Schult. An opportunity for me to examine the type of Huber's concept has now arisen, and I find that it is referable to *H. Mariae*. Huber himself, in describing *H. atrorubens*, noted that it differed

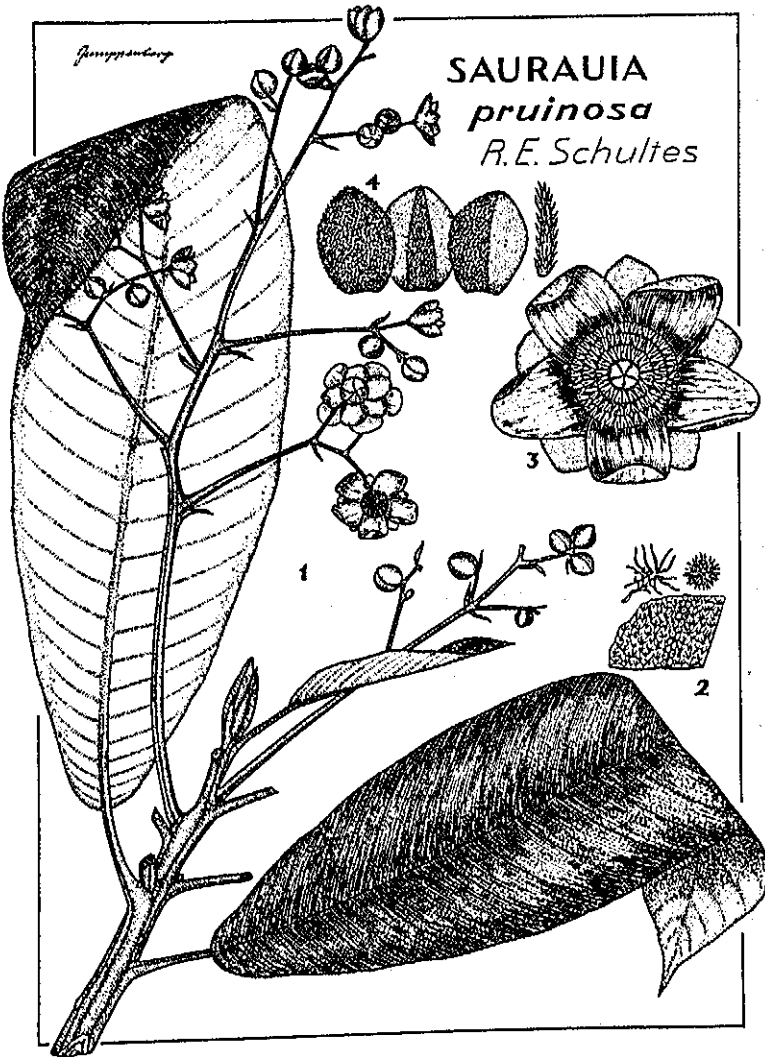


Figure 8. *Saurauia pruinosa* R. E. Schultes. 1) Habit, $\times 1$. 2) Nether surface of the leaf, \times about 10 (single hairs \times about 50). 3) Flower, $\times 3$. 4) Sepals $\times 3$ (single hair \times about 30). Drawn by John Gumpfenberg.

from *H. Mariae* in being smaller and in having dark red flowers.

Herrania pulcherrima Goudot var. *pacifica* R. E. Schultes in Bot. Mus. Leaf. Harvard Univ. 14 (1950) 131, t. 28, low. fig.

ECUADOR: PROVINCIA ESMERALDAS, Río San Miguel, March 28-April 6, 1959, G. Harling 4569.

Harling 4569 represents the second collection of this Pacific coastal variety from Ecuador and the first from Esmeraldas.

DILLENIACEAE

Saurauia pruinosa R. E. Schultes in Bot. Mus. Leaf. Harvard Univ. 16 (1953) 81.

COLOMBIA: COMISARÍA DEL PUTUMAYO, Valley of Sibundoy, Sibundoy, alt. about 2225-2300 m. May 29, 1946. R. E. Schultes et M. Villarreal 7651.

One of the most beautiful of the South American species of *Saurauia* because of the rose-pink hue of the leaf and petiole indumentum, this species has not hitherto been illustrated.

CARYOCARACEAE

Caryocar gracile Wittmack Martius in Fl. Bras. 12, pt. 1 (1836) 350.

COLOMBIA: AMAZONAS-VAUPÉS, Río Apaporis, Jinogojé (at mouth of Río Piraparaná) and vicinity, alt. about 700 feet, lat. 0°15' S, long. 70°30' W. "Small tree, 25-35 feet tall. Flowers yellow. Fruit crushed for barbasco to poison fish. Makuna: *gaw-gě*. Puinave: *ho*." June 8, 1952, R. E. Schultes et I. Cabrera 16668.

Caryocar gracile, known from the Colombian Amazon basin through only several collections, is employed by the Indians of the Vaupés as a fish poison. The fruits are crushed and cast into still water. The oily seeds are sometimes eaten as a food, and the bark is said by the Makunas to be employed like soap in washing.

FLACOURTIACEAE

Mayna muricida R. E. Schultes sp. nov.

A *Mayna amazonica* foliis lanceolatis (non ovatis), subtus grossiuscule sparsissimeque (non molliter denseque) pilosis et supra glabris (non sparse pilosis) atque fructus aliis conspicue crispaturis (non integris) differt.

COLOMBIA: COMISARÍA DEL AMAZONAS, Trapecio amazónico, interior regions of trapecia between Amazon and Putumayo Rivers, alt.

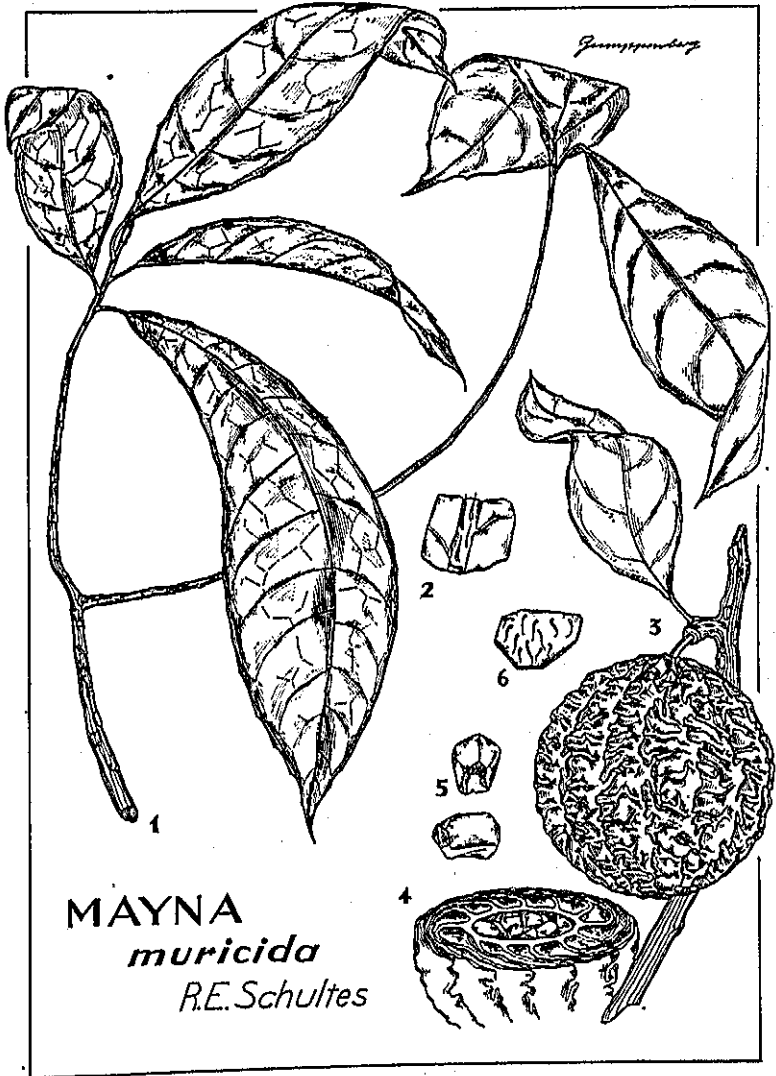


Figure 9. *Mayna muricida* R. E. Schultes. 1) Branch with leaves, $\times 1$. 2) Nether surface of the leaf, $\times 20$. 3) Branch with fruit, $\times 1$. 4) Cross section of fruit, $\times 1$. 5) Seeds, $\times 5$. 6) Surface of fruit, $\times 20$. Drawn by John Gumpfenberg.

slightly over 100 m. "Treelet. 20 ft. tall. Fruit white. Seeds used by Tikunas to kill rats. Tikuna name = *ka-té-bó*. In varial." October 1946, *Richard Evans Schultes 6760* (TYPE in Herb. Gray).

Mayna muricida, so named because the Tikuna Indians gather the seeds to scatter around their houses in the belief that they kill rodents, differs from *M. amazonica* especially in lacking a soft indumentum on the nether surface of the leaves and in having curiously crispate (marginally eroded and curled) wings on the fruit. Both species occur in the light "caatinga" or "varial" forest growing on sterile sand, not, as with most other species, in dense forests; *M. amazonica*, however, in many parts of its range (the western Amazon in Brazil, Colombia, Peru and Venezuela) is a typical jungle tree.

Mayna toxica R. E. Schultes sp. nov.

A *Mayna amazonica* foliis subtus maxime mollissimis pilosis atque fructu chryseo-viride (non atroviride) et sine aliis (aliis ad costas reductis) principaliter differt.

COLOMBIA: COMISARÍA DEL VAUPÉS, Río Vaupés, Tipiaca, (between Mitú and Javareté). "Bark poison for dogs, rats, man. Bush up to 12 ft. tall. Fruit light yellow-green. Desano name = *bé-ra-man-o-hé-ree-gé*." May 14-24, 1953. *Richard Evans Schultes et Isidoro Cabrera 19337* (TYPE in Econ. Herb. Oakes Ames). COMISARÍA DEL AMAZONAS, Río Apaporis, Caño Peritomé, tributary below Raudal Yayacopi, alt. about 750 ft. "Height 12 ft." February 18-20, 1952, *R. E. Schultes et I. Cabrera 15519*. COMISARÍA DEL VAUPÉS, Río Apaporis, Soratama, April 2, 1952, *R. E. Schultes et I. Cabrera 16142*.

Mayna toxica is easily distinguished from related species by its golden yellow fruit which, instead of having conspicuous wings, is armed only with slightly thickened ribs.

The specific name refers to the general belief amongst the natives that the bark (and, according to some, the seeds) are poisonous. It is stated that the rasped bark is employed to kill dogs and rodents. The active principle is not known. A test for alkaloids with modified Dragendorf reagent (see R. F. Raffaui in Econ. Bot. 16 (1962) 171) gave negative results. The fact that at least two species — *Mayna muricida* and *M. toxica* — are similarly employed for their toxic properties by Indians in far-separated parts of the Colombian Amazon suggests that an investigation into the chemical constituents of this genus might be of interest.

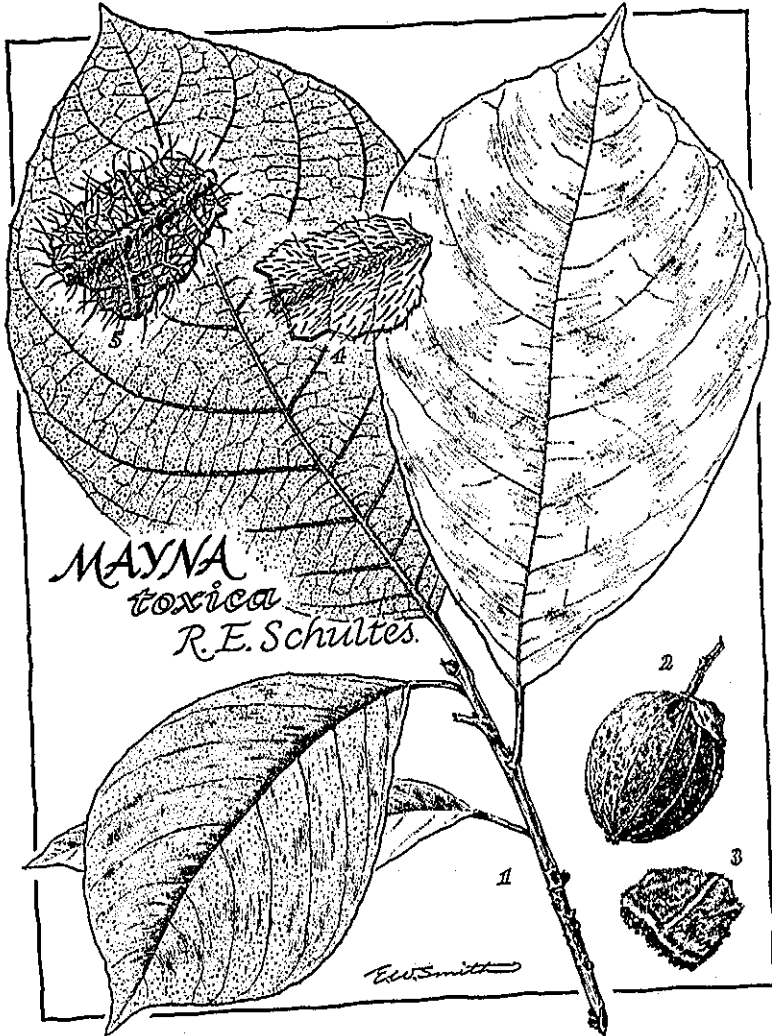


Figure 10. *Mayna toxica* R. E. Schultes. 1) Branch with leaves, $\times 1$. 2) Fruit, $\times 1$. 3) Enlargement of the surface of the fruit. 4) Enlargement of the upper surface of the leaf. 5) Enlargement of the nether surface of the leaf. Drawn by E. W. Smith.

MELASTOMACEAE

The following notes on melastomaceous plants have been submitted by Dr. J. J. Wurdack of the Smithsonian Institution, who writes: "Among the collections thus far studied by me are represented a number of new records of Melastomataceae for Colombia. Dr. Schultes' Vaupés collections have especially emphasized the strong linkage with the flora of Dept. Loreto, Peru."

Adelobotrys barbata Triana in Trans. Linn. Soc. 28 (1871) 68.

COLOMBIA: COMISARÍA DEL VAUPÉS, Río Piraparaná. *R. E. Schultes et I. Cabrera*, March 9, 1952, 15908; May, 1952, 17120; September 19, 1952, 17574.

Limited to the upper Río Negro drainage-area, this shrubby species in a predominantly vining genus, is now well represented from the Colombian Vaupés.

Adelobotrys macrophylla Pilger in Verhandl. Bot. Ver. Brandenburg 47 (1905) 165.

COLOMBIA: COMISARÍA DEL VAUPÉS, Río Piraparaná, Caño Tecmeña, September 4, 1952, *R. E. Schultes et I. Cabrera* 17216; Río Pacoa, February 8, 1952, *R. E. Schultes et I. Cabrera* 15223.

This species previously has been known only from the Department of Loreto in Peru. Branches of this bush are burned and the ashes are added to clay for the manufacture of pottery.

Adelobotrys praetexta Pilger in Verhandl. Bot. Ver. Brandenburg 47 (1905) 167.

COLOMBIA: COMISARÍA DEL VAUPÉS, Río Piraparaná, September 1952, *R. E. Schultes et I. Cabrera* 17127; Río Apaporis, Río Popeyaca, February 25, 1952, *R. E. Schultes et I. Cabrera* 15661.

Adelobotrys praetexta has hitherto been known only from Amazonian Bolivia and Peru.

Bellucia umbellata Gleason in Bull. Torr. Bot. Club 58 (1931) 257.

COLOMBIA: COMISARÍA DEL VAUPÉS, Río Piraparaná, March 9, 1952, *R. E. Schultes et I. Cabrera* 15916; Jinogojé, June 5, 1952, 16628; September 6, 1952, 17349. Río Apaporis, September 1952, *R. E. Schultes et I. Cabrera* 17094.

Hitherto *Bellucia umbellata* has been reported only from Loreto, Peru. The Barasana Indian name of this bush is *teé-ña-mö*.

Graffenrieda candelabrum Macbride in *Field Mus. Publ. Bot.* 13, pt. 4 (1941) 321.

COLOMBIA: COMISARÍA DEL AMAZONAS, Río Miritiparaná, March 2, 1952, *R. E. Schultes et I. Cabrera 15728*.

Known hitherto only from the type collection from the Departamento de Loreto, Peru, this species is now registered from Amazonian Colombia. The bluish fruits are somewhat astringent and are chewed to "heal" bleeding gums. Tanimuka name = *kweé-ma-mě*. Yukuna name = *ko-me-noo-ma-rě* ("bird's spice").

Leandra rhodopogon (DC.) Cogniaux in *Martius Fl. Bras.* 14, pt. 4 (1886) 109.

COLOMBIA: COMISARÍA DEL VAUPÉS, Río Apaporis, Soratama, June 20, 1951, *R. E. Schultes et I. Cabrera 12727*; February 25, 1952, *15695*; August 17, 1952, *16951*; January 1952, *19614*. Río Piraparaná, September 1952, *R. E. Schultes et I. Cabrera 17121*. Río Vaupés, Mitá, *L. Uribe Uribe 2920*; *J. Cuatrecasas 6803*.

Miconia astrotricha (DC.) Triana in *Trans. Linn. Soc.* 28 (1871) 113.

COLOMBIA: COMISARÍA DEL AMAZONAS, Río Popeyaca, February 1952, *R. E. Schultes et I. Cabrera 15603*.

The present collection, which has been compared with the type in Munich, represents apparently the first time the species has turned up since the original Martius material from Amazonian Brazil.

Miconia filamentosa Gleason in *Bull. Torr. Bot. Club* 65 (1938) 579.

COLOMBIA: COMISARÍA DEL VAUPÉS, Río Apaporis, Río Popeyaca, June 10, 1952, *R. E. Schultes et I. Cabrera 16635*; Jinogojé, March 1952, *19825*.

The previously known range of this species included only Amazonian Brazil and Peru.

Miconia fissa Gleason in *Bull. Torr. Bot. Club* 59 (1932) 363.

COLOMBIA: COMISARÍA DEL AMAZONAS, Río Miritiparaná, May 8, 1952, *R. E. Schultes et I. Cabrera 16406*.

Miconia fissa was previously known only from the type collection by Holt and Blake from the Río Maturaca, Amazonian Brazil. The Yukuna Indian name is *hay-wa-lá*, and the orange fruit is employed as a diuretic.

Miconia marginata Triana in *Trans. Linn. Soc.* 28 (1871) 110.

COLOMBIA: COMISARÍA DEL VAUPÉS, Río Apaporis, September 1952, *R. E. Schultes et I. Cabrera 17053*. Río Piraparaná Septem-

ber 10, 1952, *R. E. Schultes et I. Cabrera 17367*; Río Ricapuyá, September 27, 1952, *R. E. Schultes et I. Cabrera 17634*.

Widespread in Amazonian Bolivia and Brazil and in Venezuela and British Guiana, *Miconia marginata* is now registered from Colombia.

Ossaea araneifera *Markgraf* in *Notizbl. 13* (1937) 462.

COLOMBIA: COMISARÍA DEL VAUPÉS, Río Apaporis, Jirijirímo, July 5, 1951, *R. E. Schultes et I. Cabrera 12950*.

This species has been known only from the type collection from Loreto, Peru.

Ossaea cucullata *Gleason* in *Bull. Torr. Bot. Club* 58 (1931) 260.

BRAZIL: ESTADO DO AMAZONAS, Muquentaua, Río Teffé, *R. L. Frões 26299*. COLOMBIA: COMISARÍA DEL VAUPÉS, Río Apaporis, Soratama, July 17, 1951, *R. E. Schultes et I. Cabrera 13096*; August 4, 1951, *13349*; January 1952, *19626*. Río Kuduyari, Cerro Yapobodá, April 1963, *R. E. Schultes et I. Cabrera 20031*.

Previously registered only from Loreto, Peru, this species is now known from Amazonia Brazil and Colombia.

MYRSINACEAE

Conomorpha citrifolia *Mez* in *Pflanzenr.* 4, *Fam.* 236 (1902) 256.

COLOMBIA: COMISARÍA DEL VAUPÉS, Río Piraparaná (tributary of Río Apaporis), Raudal Na-hoó-gaw-he, between lat. 0°15' S, long. 70°30' W and lat. 0°25' N, long. 70°30' W. "Flowers whitish yellow. Small tree along bank. Bark rasped into chicha to give it a peppery taste. Puinave: *yoom-dá-ka*. Barasana: *gáw-hé-ké*." September 1952, *R. E. Schultes et I. Cabrera 17593*.

Conomorpha citrifolia, like the recently described *C. lithophyta* *R. E. Schult.* of the Vaupés and *C. magnoliifolia* *Mez* in Dutch Guiana, is employed as a minor fish-poison. The Barasana Indians of the Río Piraparaná crush the leaves and strew them on the surface of still or very slowly moving water. They also have an interesting use of the bark which is rasped into fermented *chicha* (made of *Manihot esculenta* *Crantz* or any of a number of edible fruits) as a spice to give the beverage a rather peppery taste.

SOLANACEAE

Solanum platyphyllum *Humboldt et Bonpland* ex *Dunal* *Sol. gen. aff. syn.* (1816) 38.

COLOMBIA: COMISARÍA DEL PUTUMAYO, road between El Pepino and Mocoa, alt. about 700 m. "Bush 2 feet. Fl. purplish white. Fr.

ripens red with hairs. Lvs. with purplish cast underneath. Cult. Common name = *uvilla*." July 28, 1960. R. E. Schultes 22556.

This is the second collection of *Solanum platyphyllum* which has come to light from the Colombian Amazon. The difference in altitude between the other collection, *Schultes 6642*, which was from Leticia at 100 m. and *Schultes 22556* at 700 m. is noteworthy. Both collections were taken from bushes cultivated for their edible berries.

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