

The Botanical Origins of South American Snuffs

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Introduction

Man in primitive societies the world around has found the most ingenious ways of administering narcotics. Intoxicating plants, or products from them, have been chewed in crude form or variously elaborated and consumed. They have been drunk as decoctions or infusions. A few have been prepared in the form of thick syrups or pastes that are licked or smeared on the tongue or gums. Some have been smoked directly, as in pipes, cigars or cigarettes, or the fumes of them have been inhaled in sundry ways. There are those that have been applied to the skin or membranes in the form of ointments or unguents. Several are known to have been taken as an enema. Snuffing has been the preferred method of using a number of these agents.

The verb *to snuff* (and the corresponding German *schupfen* and Skandinavian *snusa*), stems, of course, from the same Germanic root that has given us the English word *to sniff*. There is a significant difference between the two actions. Whereas one *sniffs* an odour or fragrance—that is, a substance such as an essential oil, smoke or ethereal component of the atmosphere—one *snuffs* actually solid substances variously inserted or drawn into the nostrils.

The snuffing of plant materials for narcotic, especially for hallucinogenic, effects seems to be peculiarly New World. To be sure, sternutation induced by various means is a recognized therapeutic practice in many cultures. In the Middle Ages, European medicine recommended sternutation to draw off bad humours. Hellebore, the German *Nieswurz* and English *sneezewort*, was one of the most favoured therapeutic sternutatory powders taken into the nostrils together with marjoram and other plants to cleanse the brain through sneezing. Sternutation was used even for prophesying and in superstition and magic. A person who sneezed on New Year's morning, for example, would not die during the year. *Snuffing* now refers usually to the use of tobacco. This is true in languages other than English. The German *schupfen*, for example, has been more or less restricted to the snuffing of tobacco and other stimulants since the 17th Century.

It does seem probable, however, that the use of narcotics as snuffs is of American origin and that it went to the Old World with tobacco. The custom of snuffing tobacco, widespread apparently in pre-Conquest America, became common and accepted as a recreational practice devoid of therapeutic intent in Spain during the first quarter of the 17th Century. There is evidence that it was imported directly from the New World and that tobacco snuffing, as well as chewing and smoking, represents one of the most significant culture traits passed on to the western civilisation from the American aborigines.

Principal Sources of South American Snuffs

Undoubtedly the most important snuffing material in pre-Conquest America was tobacco. At least two species of tobacco, possibly several additional ones, are known to have been employed as a narcotic (4). These two are *Nicotiana Tabacum* and *N. rustica*. *Nicotiana Tabacum*, from which comes most of the tobacco that is smoked, snuffed and chewed at the present time, was likewise the source of most of the narcotic in pre-Conquest South America, Middle America and the West Indies. Originally a tropical species, it has been cultivated so long that it is not known in the truly wild state. *Nicotiana rustica*, native to North America, where it is still wild in some localities, is a hardier species thought to have originated in Mexico. It is this species that was smoked and probably snuffed by Indians of Mexico and North America before the arrival of the European. Europeans introduced *Nicotiana Tabacum* from the Old World to North America long after the Conquest, and until this introduction, it was apparently unknown in most of the territory now included in the United States and Canada (9).

Although there are indirect evidences that tobacco may have been taken as snuff in Mexico and other parts of North America, there can be no doubt that in much of South America this was the most widespread method of utilizing the narcotic, especially in the wet, tropical lowland areas, such as the Amazon Valley. So many observations attest to this fact that there would seem to be little if any need for a discussion of the custom, were it not that perhaps confusion as to the source of a number of snuff preparations may have led to the assumption that tobacco snuffing, though widespread, might have been even more widespread than it actually was. Yet botanists and anthropologists have consistently warned against such generalisations. Mason, for example, stated (13) that "the snuff taken throughout . . . most of the Amazon and West Indies . . . is more frequently made from other plants than tobacco." And Cooper owned (4) that "tobacco snuffing . . ." is "not always distinguishable in our sources from *Piptadenia* snuffing."

Garcilaso de la Vega (8) reported that the Inca did not cultivate tobacco or *sayri*, but they are thought to have utilised several varieties native to the Andes, the roots of which were pulverised and used medicinally and as a snuff (15).

Botanists are understandably wont to be somewhat more conservative in ethnobotanical generalisations than are anthropologists. Goodspeed, for

example, in his classic work (9) on the genus *Nicotiana*, wrote that "presumably *N. tabacum* was in pre-Columbian use, doubtless often in cultivation, in the West Indies, much of Mexico, Central America, Colombia, Venezuela, the Guianas and Brazil. Spinden . . . apparently would extend this range to Peru, Boliva, Chile and Argentina, since tubes 'for taking snuff, presumably of tobacco, occur far and wide' in those areas There is, however, considerable doubt that the material snuffed in the tubes so familiar in remains of certain ancient civilisations in the Americas was 'tobacco' obtained either from early races of *N. tabacum* or from progenitors of the species of *Nicotiana* which today are native in the regions concerned. In other words, there is little evidence that *N. Tabacum* was in pre-Columbian use in western North America or in lower South America."

Tobacco in snuffing—whether the source of the snuff be *Nicotiana Tabacum* or some other species of the genus—seems quite generally to have been used alone, although there are occasional reports that it is sometimes mixed with *Anadenanthera*. Amongst the tribes of the Guaporé River in Amazonian Brazil, tobacco snuff was mixed with "crushed angico leaves [*angico* refers to leguminous trees, especially to *Anadenanthera*] and ashes of a certain bark" (12). During my years of field work amongst the Indians of the northwestern Amazon, I witnessed the preparation of tobacco snuff on many occasions and actually employed the snuff myself instead of smoking. The species used was *Nicotiana Tabacum*, and with two exceptions, I never saw the admixture of any other plant to the snuff—that is, other than ashes. These two exceptions were with the Witotos of the Río Igaraparaná and the Yukunas of the Río Miritiparaná of Colombia, where powdered coca (*Erythroxylon-Coca*) is added to the tobacco. It is my belief that the ashes (usually from bark of *Theobroma* or leaves of *Cecropia*) serve mainly or wholly a physical function to help keep the finely pulverised and sifted tobacco particle from absorbing humidity from the excessively wet atmosphere and lumping so that the material could not be used as a snuff.

South America boasts a wide variety of containers and implements for the administration and self-administration of snuffs. Since there is normally, I believe, no relationship between these paraphernalia and the botanical source of the snuffs, I need not here discuss this intricate topic which has already been thoroughly investigated by a more competent specialist (27).

A critical survey of tobacco snuffing in South America, incorporating all of the extensive literature interpreted against the background of intensive field observations, is overdue. I venture to predict that, as such a study unravels the enigmas, we shall see other narcotic snuffs assume greater roles and tobacco find a progresively less important role than it has been given in our ethnobotanical evaluation.

One of the most interesting and enigmatic snuffs of South America is yopo or niopo, prepared from the beans of the leguminous tree *Anadenanthera peregrina*. During its botanical history, this plant has been placed in the related genera *Acacia* and *Mimosa*. It is perhaps best known under the binomial *Piptadenia peregrina*, but recent studies have indicated that it is most appropriately accommodated within *Anadenanthera*(1).



FIG. 1.—Use of the straight bird-bone snuffing-tube for administration of the tobacco-coca snuff of the Yukuna Indians, Río Miritiparaná, Amazonas, Colombia. Photograph by R. E. Schultes.

Of possible significance is the curious fact that *Anadenanthera peregrina* is or has been employed not only in northern South America but probably in the Antilles as well. Tobacco snuffing was a well established custom in the West Indian islands long before the arrival of Europeans, and the snuffing in Hispaniola of a narcotic, vision-producing powder called *cohoba* was no cause for intellectual curiosity, since most early writers assumed that *cohoba* was merely another tobacco snuff. It was the American ethnobotanist Safford who first identified, quite correctly, I believe, the West Indian *cohoba* snuff with the *yopo* of the Orinoco basin of Venezuela and Colombia (16).

There were a number of reports in the literature ascribing the sources

of Amazonian snuffs to various leguminous trees, and it was Bentham who "came to the conclusion that all South American trees . . . referred to as the source of narcotic snuff were probably one species and were identical with Linnaeus' *Mimosa peregrina*, which was first described in 1737 from a seedling growing in the celebrated Clifford Garden in Holland" (16). It seems that one of the most extraordinarily mistaken generalisations in ethnobotany—that all of the narcotic snuffs of the Amazon that were not obviously tobacco must have been prepared from *Anadenanthera peregrina*—has stemmed from Bentham's conclusions. This generalisation, of course, has not been without influence, judging from the state of confusion and lack of clarity encountered in many of the earliest reports of "smoking" and "snuffing." We have no clear distinction, in many early instances, as to whether tobacco or cohoba represented the plant the use of which was being described, since tobacco was snuffed in the Caribbean area at the time of the arrival of the Spaniards.



FIG. 2.—Tanimuka Indian administering tobacco-coca snuff with the V-shaped bird-bone snuffing tube employed for self-administration. Río Miritiparaná, Amazonas, Colombia. Photograph by R. E. Schultes.



FIG. 3.—Yukuna Indian pouring out into the hand from a snail-shell case a quantity of tobacco-coca snuff for insertion into the bird-bone snuffing tube. Río Miritiparaná, Amazonas, Colombia. Photograph by R. E. Schultes.

A recently published map (4), showing the distribution of snuffs made from *Anadenanthera*, includes the entire Orinoco basin and adjacent areas of southern Venezuela to the east; westward across the northern Colombian Andes, much of the Magdalena Valley; down the Andes through Columbia, Ecuador, Peru and Bolivia; the coastal region of Peru, and scattered isolated areas in northern Argentina, and the central and western Amazon Valley. One must remember that this map refers not to one species but to a genus—and there have been suggestions that species other than *Anadenanthera peregrina* have entered the South American snuff making picture. Furthermore, one must recall that Cooper himself cautioned that "our tribal records on which the . . . distribution map . . . is based are probably very incomplete. On the other hand, some of the attributions may not be correct, since in some cases the lack of exact botanical identification makes

it doubtful whether we have to do with *Piptadenia* snuff, tobacco snuff or snuff from some other plant”

When I first went to the northwesternmost Amazon in Colombia—a region the flora of which I investigated in the field from 1941 to 1953—I fully expected to meet with the use of yopo snuff. One of my reasons for choosing this geographical area for my studies was our knowledge that here the aborigines were reported to be using more kinds of narcotic preparations than in any comparable region of the world. Consultation with the sparse literature for this part of the Amazon basin led me to believe that yopo snuff from *Anadenanthera peregrina* was known and employed throughout the area. True, amongst the Witotos, Kubeos, Yukunas, Tanimukas, Tukanos, Makunas and other native groups, I met with the use, oftentimes excessive use, of tobacco snuff. I never met with anything called yopo or niopo, and what was more confusing to me as a botanist was my failure to encounter, wild or cultivated, a single tree of *Anadenanthera peregrina*. This species grows cultivated in the Llanos of Colombia—the Orinoco drainage area of Colombia, northerly adjacent to its Amazon area. Furthermore, from the writings of Spruce (24) and other earlier travellers, as well as from reports of missionaries of the present day, we know that this hallucinating snuff was and is employed extensively and in large amounts by the natives of the Llanos. My later explorations and researches in the Colombian Amazon convinced me that generalisation from reports in the available literature had led to gross error; that, in effect, yopo snuff not only is *not* used but is actually unknown, and that the tree does not occur, at least in the northwesternmost Amazon. Furthermore, since I was resident for three years in country of the Tikuna Indians of the uppermost Amazon River at the point where Brazil, Colombia and Peru join, I was especially interested in the assumption that these natives formerly made snuff from *Anadenanthera* (?). Inasmuch as I met no tree of this species in the area nor did I see the Tikunas (who do make tobacco snuff) prepare snuff from leguminous seeds, I must conclude that this specific instance is also one of the numerous erroneous generalisations.

How can we assume, or justify an assumption, that natives over such a vast area as the Amazon make a snuff from a plant that they do not know, that does not grow in their region, wild or cultivated, the seeds of which they would have to import for many, in some cases, for several thousand miles?

Let us contemplate what is known of the distribution of *Anadenanthera peregrina*. Safford, who apparently concurred with the ideas that such widely scattered Amazonian peoples as the Omaguas of Amazonian Peru and the Murus of the Rio Negro of Brazil prepared snuff from this leguminous tree, truthfully wrote that *Anadenanthera peregrina* “has a most appropriate specific name, for it has a wide geographical range.” He further pointed out that its range had “undoubtedly been increased by human agency.” But, when Safford cites for *Anadenanthera peregrina* a range comprising Hispaniola and Puerto Rico, Venezuela, northeastern Peru, southern Peru, Argentina, Guiana and “many parts” of Brazil, he was including with *Anadenanthera peregrina* two other species of the genus which he presumed to be employed as the source of making snuff. He cites no herbarium voucher specimens,

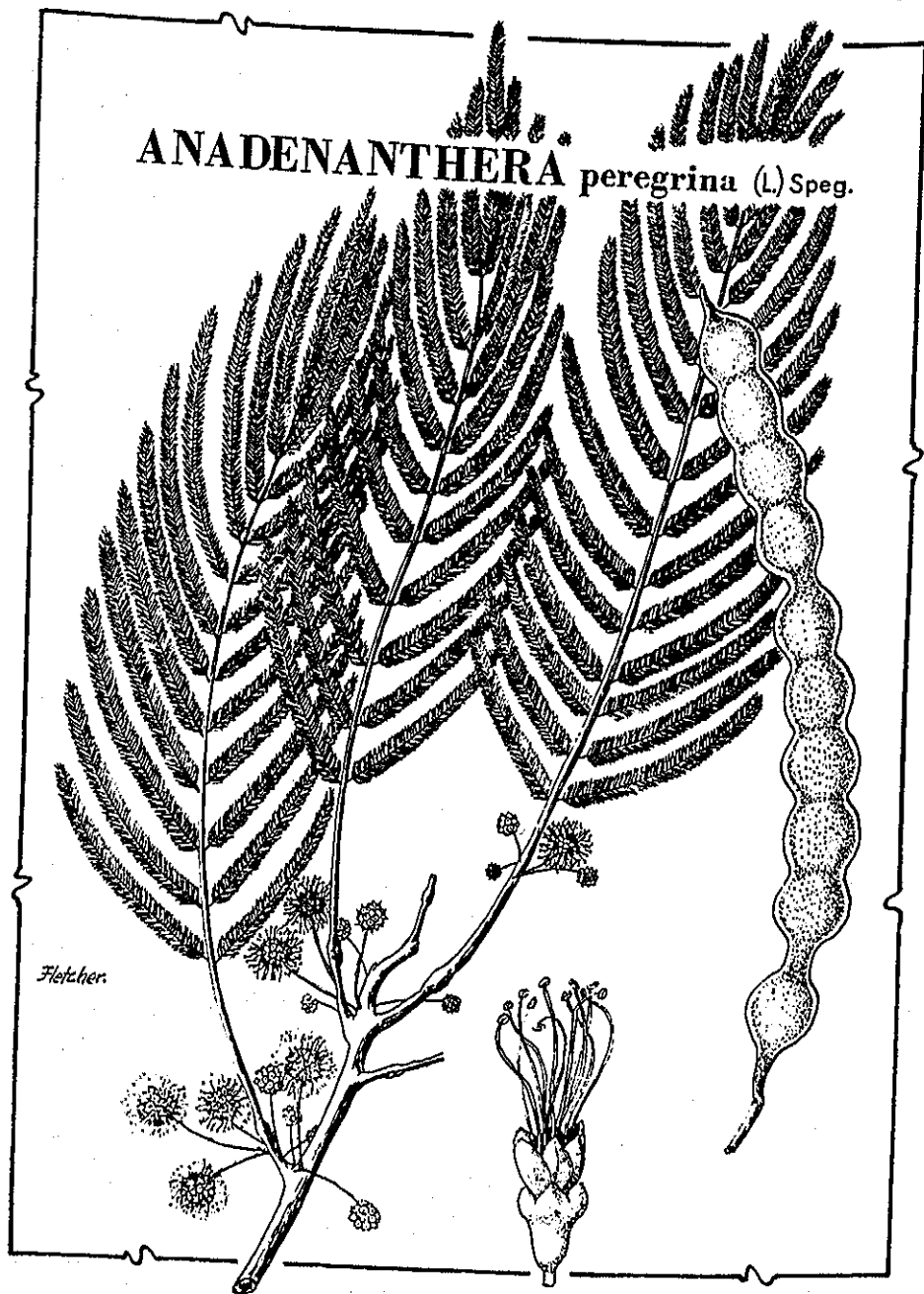


FIG. 4.—*Anadenanthera peregrina* (*Piptadenia peregrina*).

instead giving references to the use of snuffs in the literature and assuming that they did refer actually to snuffs from *Anadenanthera*.

Fortunately, we have several botanical studies of monographic nature that shed light on the distribution of *Anadenanthera peregrina*. It is these data, not "interpreted" literature reports, that must guide any definitive generalisations. Ducke, renowned Brazilian botanist who spent more than half a century studying the Amazon flora in field and laboratory, specialised in the Leguminosae. In his "Leguminosae da Amazonia", he (5) cites all known collections of *Anadenanthera peregrina* (under *Piptadenia peregrina*). If the species had been much commoner in the Amazon, Ducke would have made more collections than those that he cited. More recently, Altschul, in her studies of the genus of the yopo snuff (1, 25), has treated *Anadenanthera* monographically, citing only collections, wild or cultivated, from South America. Thus, we know that, at least in the present century, *Anadenanthera peregrina* is far from common in the Amazon basin.

It is, therefore, somewhat exaggerated to expect us to conclude that many tribes are preparing an important hallucinogenic snuff, and a product often taken in excessive amounts, from a tree that is uncommon or even not found in their environment. Trees of this species are reported in Venezuela as "being forest dominants, belonging to secondary forests, inhabiting savannas, light forests and riversides," in British Guiana confined to "savannas and riverside forests," while in Brazil represented mostly in the *campos* or savannas (1, 6). The distribution of *Anadenanthera peregrina* in the Amazonas of Brazil is, significantly, confined to savanna-like areas, usually in or near the lower Rio Madeira and the Rio Branco basins—significantly, I say, because the Maué and other tribes of the Madeira area have, probably correctly, been reported as using snuff from *Anadenanthera*. I have seen excellent specimens of *Anadenanthera peregrina* recently collected by Mr. Georg Seitz along the Rio Negro, in the vicinity of the mouth of the Rio Branco, in Amazonian Brazil; these were undoubtedly cultivated from material brought in from the savannas of the Rio Branco.

Now, let us contemplate the problems that arise. If *Anadenanthera peregrina* is not the source of a snuff employed over wide areas in the Amazon, what are the sources of the numerous snuff preparations that we know are or have been prepared in isolated localities from the mountains of Venezuela and the Guianas south to the Argentine and from the eastern slopes of the Andes to the Atlantic Ocean? We cannot fully answer this query at the present time, but we can offer several tentative approaches towards a solution.

To begin with, it is very probable that several, if not many, different plants formed the basis for the snuffs employed similarly and for similar purposes over such a vast area. We know very definitely that this is true. We do not, to be sure, know all of the plants involved in this complicated enigma, but we know enough to arrive at an overall picture to guide future research.

It was apparently Safford (16) who first suggested that species of *Anadenanthera* other than *peregrina* may be the source of narcotic snuffs in South America. He identified the *vilca* or *huilca* of southern Peru and Bolivia, and

the *cébil* of northern Argentina, with seeds of what he called *Piptadenia macrocarpa*, now correctly referred to as *Anadenanthera colubrina* var. *Cébil*. Although the evidence is, in my opinion, rather weak, several other species and varieties may have been employed in isolated localities in southern South America. Inasmuch, however, as a paper in the series is devoted precisely to the problem at hand, I shall refrain from considering it at greater length.

When I first went to the northwesternmost Amazon in Colombia, I heard numerous reports of a strongly hallucinogenic snuff made from the bark of forest trees. Known in the area as *yakee* or *paricá*, it was obviously not tobacco snuff nor was it prepared from seeds of *Anadenanthera*.

After eight years of search, I discovered that *yakee* was prepared from several species of *Virola*, *V. calophylla*, *V. calophylloidea* and, perhaps, *V. elongata* of the Myristicaceae (17, 18). The natives strip bark from the trunks before the sun has risen high enough to heat up the forest. A blood-red resin oozes from the inner surface of the bark. It is scraped off with a machete or knife and boiled in an earthen pot for hours, until a thick paste is left. This paste is allowed to dry and is then pulverized, sifted through a fine cloth, and finally added to an equal amount of ashes of the stems of a wild cacao species. The ashes give the snuff consistency to withstand the excessive dampness of the air which might otherwise quickly "melt" the powdered resin-paste to a solid lump.



FIG. 5.—Leaves and flowers of *Virola calophylloidea*, one of the species of *Virola* from which a strongly hallucinogenic snuff is prepared. Mitú, Vaupés, Colombia. Photograph by R. E. Schultes.



FIG. 6.—Puinave Indian preparing yakee-snuff from the red resinous exudate from the bark of *Virola*-trees. Río Apaporis, Vaupés, Colombia. Photograph by R. E. Schultes.

At the beginning of this century, the German ethnologist Koch-Grünberg mentioned (11) an intoxicating snuff prepared from the bark of an unidentified tree by the Yekwana Indians of the headwaters of the Orinoco in Venezuela. There seems to be every reason to believe that this snuff was made from a species of *Virola*. Seitz (23) has identified the *epená* snuff of the Waika Indians (who now live in the Rio Negro basin of Brazil, but who have migrated from the headwaters of the Orinoco) as representing *Virola calophylloidea*.

At one time, I presumed that the active principle in this myristicaceous snuff must be the same essential oil—myristicine—that is common throughout the family and that has been thought to make nutmeg a dangerous narcotic in appropriate amounts. Myristicine may have some effect, but Holmstedt has recently isolated tryptamine derivatives from *Virola*—snuff which itself could account for the hallucinogenic properties of the powder (10).

It may be interesting to append a few observations which I made personally after taking yakee (17). I took about one-third of a teaspoonful in two inhalations, using the characteristic V-shaped bird-bone snuffing tube. This represents about one-quarter the dose that a diagnosing medicine man will take to bring on an eventual state of unconsciousness.

The dose was snuffed at five o'clock one afternoon. Within fifteen minutes, a drawing sensation was felt over the eyes, followed very shortly by a strong tingling in fingers and toes. The drawing sensation in the forehead gave way to a strong and constant headache. Within a half hour, the feet and hands were numb and sensitivity of the fingertips had disappeared; walking was possible with difficulty, as with beri-beri. I felt nauseated until eight o'clock, and experienced lassitude and uneasiness. Shortly after eight, I lay down in my hammock, overcome with a drowsiness, which, however, seemed to be accompanied by a muscular excitation except in the hands and feet. At about nine-thirty, I fell into a fitful sleep which continued, with frequent awakenings, until morning. The strong headache lasted until noon. A profuse sweating and what was probably a slight fever persisted throughout the night. The pupils were strongly dilated during the first few hours of the intoxication.

Though performed under primitive conditions in the jungle by myself, this experiment does, I think, indicate the great strength of the snuff as a psychotropic agent. The witch doctors see visions in color, but I was able to experience neither visual hallucinations nor color sensations. The large dose used by the witch doctor is enough to put him into a deep but disturbed sleep, during which he sees visions and has dreams which, through the wild shouts emitted in his delirium, are interpreted by an assistant. That it is a dangerous practice is acknowledged by the witch doctors themselves. They report the death, about 15 years ago, of one of their number from the Puinave tribe during a yakee-intoxication.

Sources of Snuffs of Lesser Importance

We are aware from the literature of references to narcotic snuffs in South America the botanical identities of which are still uncertain or unknown.

A most mysterious snuff of which we still know almost nothing is said to be prepared from the fruits of the gigantic moraceous jungle tree *Olmeddoperebea solerophylla* (19). It is reputedly employed in the central part of Brazil, especially along the upper Xingú, but is known only by the general Portuguese term *rapé dos índios* ("Indian snuff"). So far as I have been able to ascertain, chemical examination of the fruits of this tree has not yielded substance with psychotomimetic effects.

It would be satisfying to know the plant source of the clear amber-coloured and aromatic resin that is procured from a large forest tree, and that forms part of the sacred accoutrements of every medicine man of the Tukanoan tribes in the Apaporis and Vaupés Rivers of Amazonian Colombia (17, 22).

In particularly difficult cases of diagnosis of disease, divination or other magic practice, minute amounts of this resin, powdered, are snuffed. Although it is said to induce dizziness, it is not reputed to have hallucinogenic properties. Nevertheless, botanical identification and chemical study of this resin-snuff should be made, if only because of the intriguing fact that it is quite generally referred to as *paricá*, the same name that is applied to the highly hallucinogenic snuff prepared from the blood-red resin of the inner bark of several species of the myristicaceous tree-genus *Virola*, by the same people in the same part of the Amazon.

A number of years ago, a missionary working in the headwaters of the Orinoco in Venezuela handed me a partially rotted, matted roll of plant material which he said was the source of one of the narcotic snuffs of the Waika Indians. The condition of the material was very poor, but it seemed to represent a species of *Justicia*. This identification was tentatively corroborated by Dr. E. C. Leonard, the American specialist on the Acanthaceae. I have never been able to visit this region to investigate the problem personally. With the unsatisfactory preservation of the material and the failure of other botanists who had visited the general region to report it (21), I more or less dismissed *Justicia* as a serious contender for inclusion in our list of hallucinogens. I am now, however, convinced that this problem must be investigated thoroughly in the field, for recently, the Brazilian botanist, Prof. João Murga Pires, informed me personally that the Waikas do indeed employ a species of *Justicia*, a species close apparently to *J. pectoralis*, in the preparation of a vision-producing snuff. We know that alkaloids have been reported from several species of *Justicia*, and there has been some question of synonymy of *Justicia* with *Adhatoda*, which is known to contain harman-type alkaloids. Several other genera of the Acanthaceae have been reported as alkaloidal, and this family might well bear an intensive phytochemical study. In this connexion, I might report here that one of the minor fish poisons that I found in use amongst the Taiwanos of the Río Kananarí of Colombian Vaupés is the root of an acanthaceous shrub, the genus of which is as yet phytochemically wholly unknown: *Mendoncia aspera* (22).

There is, apparently, a fertile field for the study of narcotic snuff preparations in the general area of the headwaters of the Orinoco. In fact, this part of South America would seem perhaps to represent the centre of complexity of this curious culture trait.

The Waikas of the upper Orinoco basin have been reported to prepare their yopo snuff from three plants (27). One source enumerates *hisioma*, *Anadenanthera peregrina*, as one ingredient; a second is called *masho-hara* or *yauardi-hena* and is said to be a piperaceous species; a third is a powder known as *bolek-hena*. It is a temptation to wonder whether or not this *bolek-hena* or "leaves of the spirit of death" might be a *Justicia*. Other sources (2, 23, 27, 32) assert that the snuff of the Waikas and of a related tribe, the Samatari, was prepared from the bast of a tree called *epéna-kési* (referrible probably to *Virola*); the ashes of the outer bark of *ama-asita*, which has been identified in the literature as an *Acacia*; and the powder of *mashi-hiri*, a plant of about one foot in height which might conceivably also represent

Justicia. The Surára and Pakidái make their snuff (30) from seeds of *Anadenanthera peregrina*, ashes of *hekurahihená*, the bark of a tree of uncertain identity but possibly representing also this same species, a piperaceous species, *mawarahá*. The Karimé, culturally related to and neighbours of the Waikas, elaborate a snuff powder (30) from leaves of "a small plant called *kokoime*." Again, are we warranted in suspecting that *kokoime* might be the *Justicia*?

The Kashuena of the Rio Trombetas in Amazonian Brazil, are reported by one source to have several kinds of snuff in addition to that made "simply of tobacco" (?). One is prepared by "blending the dried and powdered bark of a tree and a quantity of paricá with other substances taken from kernels or seeds of a variety of wild fruits." A third comprises a mixture of these two kinds of snuff. We are left in the dark about the species of tree from which the bark is taken, although it may possibly be referrible to an *Anadenanthera*, and the "wild fruits" remain unidentified. Could one be the fruits of *Olmedioperebea sclerophylla*?

Final Query

The several attempts to synthesise and summarise our knowledge of the precise botanical identification of plants entering into the preparation of South American snuffs (26, 28) have met with the same difficulties that I find in trying to discuss this topic here. Because of similarities in the tools and methods of snuffing, and especially as a result of the lack of voucher botanical specimens, we are too often reduced to conjecture as to the plants involved. In view of the importance of snuffing in many cultures—past and present—and of the possibility that a number of plants hitherto unknown as ingredients of narcotic snuffs might be uncovered, further field investigation of snuffs in South America is clearly indicated.

In connexion with the possibility of finding new plants as sources of narcotic snuffs, there is one point that has disturbed me for a long time. Why should only several of the narcotic plants be administered as snuff? Snuffing is a widespread New World culture trait. It is a relatively easy method of self-intoxication. It lends itself easily to ritual or ceremonial use. Snuffs usually tend to keep over longer periods, especially in the humid tropics, than infusions or decoctions. Why then are not more narcotics taken in this form? One limiting factor, to be sure, would be the requirements that the active principle must be absorbable through the membranes to enter directly into the blood stream and be active. Nicotine, of course, answers these requirements. Obviously, the active principles of the snuffs from *Anadenanthera peregrina* and *Virola* also satisfy these requirements. But would not the active constituents of other narcotics likewise follow this pattern? Why, for example, have we never found the sundry species of *Datura* powdered and employed as snuffs?

Would snuffs prepared from the bark of *Banisteriopsis* provide the desired psychotropic effects? And what about the narcotic properties of *Ery-*

throwylon Coca—would they be lost if the powdered leaves were introduced into the nostrils as a snuff? The rich variety of toxic plants in the flora of South America—would not many of these species have psychotomimetic effects which would be more controllable or perhaps less dangerous as snuffs than decoctions or infusions of the same plants? All of this leads to two questions that I would leave with you: Was not the snuffing of narcotic powders much more widely practiced in South America than it is at present? Was and is not the number and variety of plants snuffed for their peculiar physiological properties greater than we at present believe? The answer to both questions, I suspect, is "Yes." But only more intensive and extensive search and interpretation of the literature, and more immediate and insistent ethnobotanical field studies can provide us with answers.

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