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FIFTEEN YEARS OF STUDY OF PSYCHOACTIVE SNUFFS OF SOUTH AMERICA: 1967—1982— A REVIEW*

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Summary

Much has been learned concerning psychoactive snuffs in South America in the past 15 years since I delivered a review paper in the now famous symposium "Ethnopharmacologic Search for Psychoactive Drugs" held in San Francisco in 1967 (Efron et al., 1967; Schultes, 1967). There is still much to be investigated, but it seems that a recapitulation at this time may be warranted.

The advances in our knowledge have come about as a result of field work as well as laboratory research and have been effected by investigators in several disciplines: archaeology, ethnobotany, ethnology and phytochemistry.

MORACEAE

Maquira Aublet

A genus of two species (formerly recognized as a distinct genus, *Olmedioperebea* Ducke) confined to the Amazon Valley and the Guianas.

Maquira sclerophylla (Ducke) C.C. Berg, in *Acta Botanica Néerlandica*, 18 (1969) 463.

In the 1940's, the late American botanist, Mr. George A. Black, informed me (pers. commun., 1946) that he had ascertained that the source of a hallucinogenic snuff of the Brazilian Amazon was the dried fruit of an enormous moraceous tree known at that time as *Olmedioperebea sclerophylla*, now renamed *Maquira sclerophylla*. The snuff, no longer employed but remembered by the elderly as part of an annual ceremony, is now called simply by the Portuguese name *rapé dos indios* ("Indian snuff"). Its area of use was

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the Pariana region in the central part of the Amazon south of the Rio Amazonas (Schultes, 1967).

Unfortunately, no ethnobotanical studies have been carried out to provide a better understanding of the *rapé dos indios*, nor have chemical investigations of the fruit of this jungle tree apparently been published. There is an urgency for field work before all knowledge of the source, preparation and use of this drug passes into oblivion. Carlini and Gagliardi have reported that water and ethanol extracts of the related *Maquira calophyllum* (P. et E.) C.C. Berg had no psychoactive effects, even in high doses, when tested on animals; but these investigators are continuing studies on extracts of *M. calophyllum* and the leaves and flowers of *M. sclerophylla* (Schultes and Farnsworth, 1980).

MYRISTICACEAE

Virola Aublet

A genus of approximately 65 species of the tropical parts of Central and South America.

Virola calophylla Warburg, in *Nova Acta Academiae Leopoldinae-Carolinae*, (1897) 231.

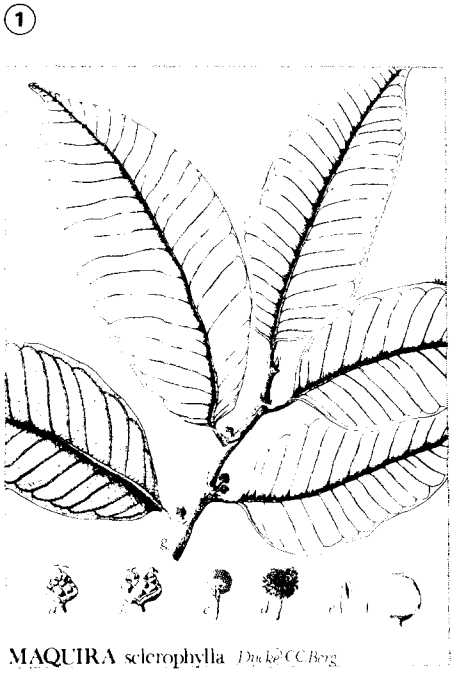


Fig. 1. *Maquira sclerophylla* (Ducke) C.C. Berg.
Fig. 2. *Virola theiodora* (Spr. ex Bth.) Warburg.

Virola calophylloidea Markgraf, in *Repertorium Specierum Novarum*, 19 (1923) 24.

Virola elongata (Spr. ex Bth.) Warburg, in *Berichte der Deutschen Botanischen Gesellschaft*, 13 (1895) 89.

Virola theiodora (Spr. ex Bth.) Warburg, in *Nova Acta Academiae Leopoldinae-Carolinae*, 68 (1897) 187.

Many tribes of Indians of the northwestern Amazon of Colombia and adjacent Brazil as well as certain groups in the uppermost Orinoco of Venezuela prepare a virulently potent hallucinogenic snuff from one of several species of *Virola*. The snuff is variously called *epena*, *nyakwana*, *yakee* or *yato*. The most important species appears to be *V. theiodora* (Brewer-Carias and Steyermark, 1976; Schultes, 1954; 1967; 1978; 1979a; Schultes and Holmstedt, 1968).

The snuff is made in a number of ways from the reddish exudate or "resin" of the inner bark of the *Virola* tree. The finely pulverized material prepared from the bark is employed directly or mixed with additives elaborated from other plants and with ashes from various barks or leaves. The most important additive is the powder made from the dried leaves of *Justicia pectoralis* var. *stenophylla* (quod vide).

It has recently been learned that the Witoto and Bora Indians of the Amazonas of Colombia and adjacent Peru do not employ *Virola* as a snuff but ingest pellets prepared from the reddish resinous exudate of the inner

Fig. 3. Waika Indian Medicine man scraping the red "resin" from the bark of *Virola theiodora* preparatory to the making of snuff. Tototobí, Roraima, Brazil.

Fig. 4. Waika Indians blowing nyakwana snuff (*Virola theiodora*) preparatory to the annual ceremony honouring the dead of the year just passed. Tototobí, Territorio Roraima, Brazil.

bark with no admixture (Schultes, 1969; Schultes and Swain, 1976; Schultes et al., 1978).

The chemistry of this snuff has been examined. The snuff prepared by the Waika Indians of the Rio Tototobí in Brazil contains approximately 11% of tryptamines, 8% of which is 5-methoxy-*N*,*N*-dimethytryptamine (Schultes and Holmstedt, 1968; Agurell et al., 1969; Holmstedt et al., 1980).

A number of other species of *Virola* possess the same or very similar alkaloids and may possibly be employed by Indian groups in the preparation of psychoactive snuffs or pellets (Holmstedt et al., 1980).

LEGUMINOSAE

Anadenanthera Spegazzini

A genus of two species related to *Piptadenia* and distributed in much of South America and apparently introduced in the West Indies.

Anadenanthera colubrina (Vell.) Brenan, in *Kew Bulletin*, 2 (1955) 182.

In the northern part of Argentina and adjacent areas in Peru and Bolivia, the seeds of *Anadenanthera colubrina*, known variously as *vilca* or *huilca* and *cébil*, are the source of a psychoactive snuff. Early reports stated that the Comechingon Indians "took something called *sébil* through the nose..., and the Huarpe Indians chewed a substance called *cíbil* for endurance" (Altschul 1964, 1967, 1972). The term *vilca* often refers to *A. colubrina* in modern Peru, although it is not applied exclusively to this plant. An early

report, dating from about 1571, mentioned that Inca witch doctors prophesied by contacting the devil through an intoxication induced by drinking chicha and a herb called *villca*.

Recent anthropological field studies have definitely established the contemporary use as a narcotic in northern Argentina of a snuff made from the seeds of *Anadenanthera colubrina* (Califano, 1975).

This species is very closely allied to *Anadenanthera peregrina* (quod vide) and undoubtedly the two have a very similar chemical constitution (Schultes and Farnsworth, 1980).

Anadenanthera peregrina (L.) Spegazzini, in *Physis*, 9 (1923) 313.

Not much additional information has been gleaned concerning the snuff, known as *yopo*, prepared from the roasted and powdered beans of this leguminous tree, since the definitive botanical and ethnobotanical studies of Dr. Siri von Reis Altschul (Altschul, 1964, 1967, 1972).

This highly active snuff, containing bufotenine and other tryptamines (Holmstedt and Lindgren, 1967; Schultes and Hofmann, 1980; Schultes and Farnsworth, 1980), is used today mainly in the Orinoco basin of Colombia and Venezuela and adjacent areas of the northernmost parts of the Brazilian Amazon. In pre-Conquest times, it was commonly employed in parts of the

Fig. 5. *Anadenanthera peregrina* in fruit. San Juan, Puerto Rico.

Fig. 6. *Anadenanthera peregrina* (four trunks visible) cultivated near the mouth of the Rio Uneiuxi, basin of the Rio Negro, Amazonas, Brazil.

West Indies, where it was known as *cojoba* and to which region it was undoubtedly introduced by Arawak or Karib invaders from the Orinoco (Safford, 1916).

Prior to recent studies, anthropological literature appeared to assume that, with the exception of tobacco, the source of the powder almost everywhere in South America where snuffing was practiced could be attributed to the genus *Anadenanthera* (= *Piptadenia*), especially *A. peregrina*. Cooper, for example, indicated on his map the whole of the northwestern forested region of the Amazon where *Anadenanthera* is not part of the flora (Cooper, 1949). *Anadenanthera peregrina* is a plant of open grasslands and, unless planted in house sites, is not normally found in forested areas.

In the days of the British explorer, Richard Spruce, 135 years ago, *Anadenanthera peregrina* apparently was frequently cultivated at numerous sites along the Rio Amazonas and the Rio Negro of the Brazilian Amazon (Spruce, 1908). It has almost died out along this river today. I never encountered it, but Dr. Ghillean Prance collected it recently in a house site on an affluent of the Rio Negro, apparently a vestige of once more common plantings.

There are specimens of *Anadenanthera* seeds and snuff collected in isolated localities in the Brazilian Amazon south of the Rio Amazonas. These materials have not yet been sufficiently well studied to ascertain whether or not they are referrible to *A. peregrina*.

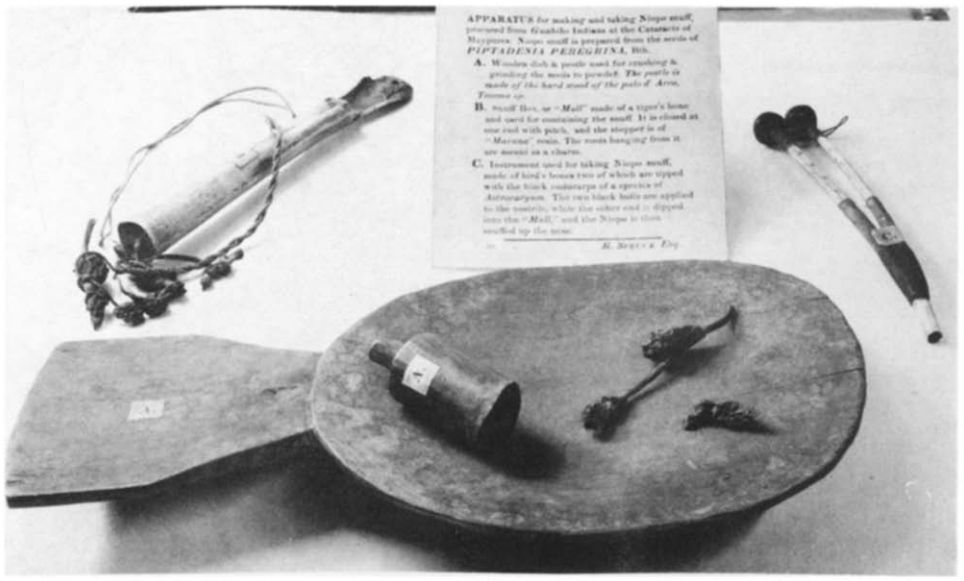
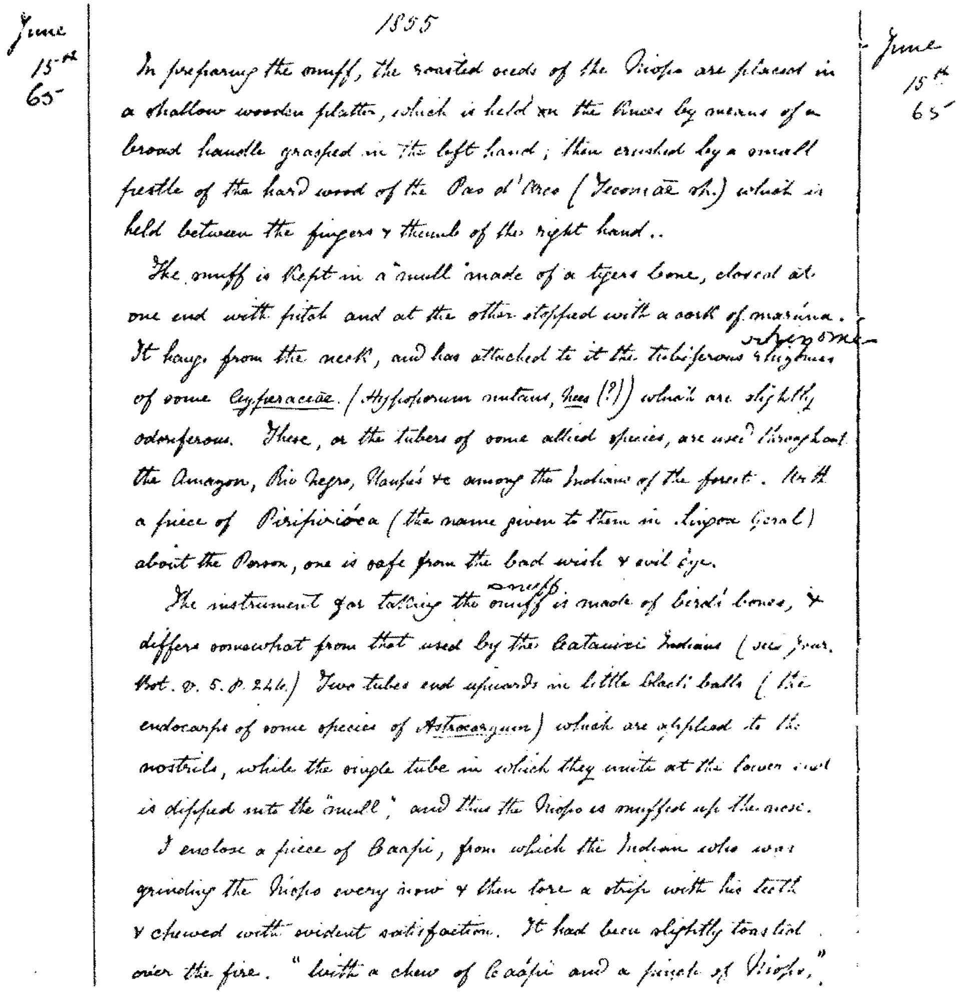


Fig. 7. Paraphernalia for the preparation and use of yopo snuff (*Piptadenia peregrina*) by the Guahibo Indians of the Río Orinoco in Colombia and Venezuela. Collected by Richard Spruce in 1851 and preserved in the Royal Botanic Gardens, Kew. Courtesy of the Director, Royal Botanic Gardens, Kew.



June 15th 55

1855

In preparing the snuff, the roasted seeds of the Niopo are placed in a shallow wooden platter, which is held on the knees by means of a broad handle grasped in the left hand; then crushed by a small pestle of the hard wood of the Pao d'Arco (Tecoma sp.) which is held between the fingers & thumb of the right hand.

The snuff is kept in a "mull" made of a tiger's bone, closed at one end with pitch and at the other stopped with a cork of marima. It hangs from the neck, and has attached to it the tuberiferous rhizomes of some Cyperaceae. (Hypoporum nutans, Nees (?)) which are slightly odoriferous. These, or the tubers of some allied species, are used throughout the Amazon, Rio Negro, Uaupés &c among the Indians of the forest. With a piece of Piripirioca (the name given to them in Lingoa Geral) about the person, one is safe from the bad wish & evil eye.

The instrument for taking the snuff is made of birds' bones, & differs somewhat from that used by the Catauixi Indians (see Jour. Bot. v. 5. p. 246) Two tubes end upwards in little black balls (the endocarps of some species of Astrocaryum) which are applied to the nostrils, while the single tube in which they unite at the lower end is dipped into the "mull", and thus the Niopo is snuffed up the nose.

I enclose a piece of Caapi, from which the Indian who was grinding the Niopo every now & then tore a strip with his teeth & chewed with evident satisfaction. It had been slightly toasted over the fire. "With a chew of Caapi and a pinch of Niopo,"

June 15th 55

Fig. 8. Transcription of field notes of Richard Spruce for June 15, 1855, referring to the preparation and use of niopo snuff (*Anadenanthera peregrina*) in the upper Orinoco. Courtesy: Director, Royal Botanic Gardens, Kew.

ERYTHROXYLACEAE

Erythroxylon **Lamarck**

A genus of some 250 trees of the tropics of both hemispheres.

Erythroxylon Coca **Lamarck var.** ***Ipadu*** **Plowman, in** ***Botanical Museum Leaflets, Harvard University*, 27 (1979) 49.**

This variety of the coca plant is the type cultivated in the northwestern part of the Amazon, where the toasted leaves are finely pulverized and

Fig. 9. Indians gathering leaves of coca (*Erythroxylon Coca* var. *Ipadu*), Comisaría del Vaupés, Colombia.

mixed with the ashes of *Cecropia* leaves for oral use as a stimulant and narcotic (Plowman, 1979).

There have been unconfirmed rumours that on certain ceremonial occasions this coca powder is employed as a snuff and not as an oral quid. I have never witnessed this custom during my field studies, nor have several anthropologists whom I have requested to look into the reports. The most reliable report refers to the several Indian groups — Yukunas, Tanimukas, Matapies — living in the headwaters of the Río Miritiparaná in the Colombian Amazon and was personally communicated to me by Padre Javier, a Capuchin missionary. These Indians snuff tobacco. Padre Javier had lived among the Indians of the Colombian Amazon, including the Río Miritiparaná, for many years. He used coca himself and would hardly have confused coca powder with tobacco snuff.

More field investigation will be necessary to substantiate this report, but there is apparently no pharmacological reason to presume that, when coca is applied nasally, some of the alkaloid content may not be absorbed through the capillaries and into the blood stream.

MALPIGHIACEAE

Banisteriopsis C.B. Robinson et Small

A genus of approximately 100 species of tropical America and the West Indies.

Banisteriopsis Caapi (Spr. ex Griseb.) Morton, in *Journal of the Washington Academy of Sciences*, 21 (1931) 485.

Banisteriopsis inebrians Morton, in *Journal of the Washington Academy of Sciences*, 21 (1931) 485.

In the western part of the Amazon basin, the Indians prepare and have used in magico-religious ceremonies an intoxicating drink made primarily from the bark of lianas of the forest, principally *Banisteriopsis Caapi* and *B. inebrians*. Other plants, especially the malpighiaceous *Diplopterys Cabrerana* (Cuatr.) Gates and the rubiaceous *Psychotria viridis* R. et P., are added as admixtures to alter or strengthen the narcotic effects of the drink (Schultes 1970, 1982; Schultes and Hofmann, 1980).

The basic intoxicating constituents of the narcotic preparation are β-carboline alkaloids: harmine, harmaline and tetrahydroharmine. Various other toxic principles are known to be present in some of the additives: tryptamines, for example, in the species of *Diplopterys* and *Psychotria* mentioned above (Schultes and Hofmann, 1980).

While *Banisteriopsis Caapi* is normally used in the form of a drink, recent inconclusive evidence suggests that it may be employed in the northwest Amazon and the adjacent upper Orinoco area as a snuff. Holmstedt and Lindgren have reported harmala alkaloids from snuff powders said to be prepared from a vine from which an inebriating drink is also made, but voucher material for identification is not available (Holmstedt and Lindgren, 1967): "...some snuffs contain β-carbolines, either in combination with the simple tryptamines or solely. In South American botany, β-carbolines...are usually associated with the species of *Banisteriopsis*, wherefore it is very

Fig. 10. Barasana Indian collecting caapi (*Banisteriopsis Caapi*) from a cultivated plant. Río Piraparaná, Comisaría del Vaupés, Colombia.

likely that this is their origin in the snuffs. Very likely this is an admixture to the snuff, although definite botanical proof for it is lacking at the moment."

Now, 15 years later, no ethnobotanical data have been uncovered to indicate that *Banisteriopsis* may in some form or other be used as an admixture to snuff preparations. It is one of the enigmas which await further field work in this interdisciplinary study.

AQUIFOLIACEAE

Ilex Linnaeus

A cosmopolitan genus of 400 species.

Ilex Guayusa Loessener, in *Nova Acta Academiae Leopoldinae-Carolinae*, 78 (1901) 310.

Numerous species of *Ilex* contain caffeine and are used in the preparation of stimulant beverages. Especially notable are: *I. vomitoria* Ait., source of the so-called *black drink* formerly taken ceremonially in the American Southeast; *I. paraguariensis*, the *yerba maté* of Argentina; and *I. Guayusa*, from which the Jivaros of eastern Ecuador prepare an emetic and stimulant tea (Spruce, 1908; Hudson, 1979; Patiño, 1968; Schultes, 1972, 1978, 1979).

The recently excavated tomb of a shaman of the Tihuanacoid culture in Bolivia has indicated the use 1500 years ago of the leaves of an *Ilex* in the preparation of a snuff. Together with the skeleton were packets of carefully dried and pressed leaves neatly tied with fibre into small bundles, a mortar

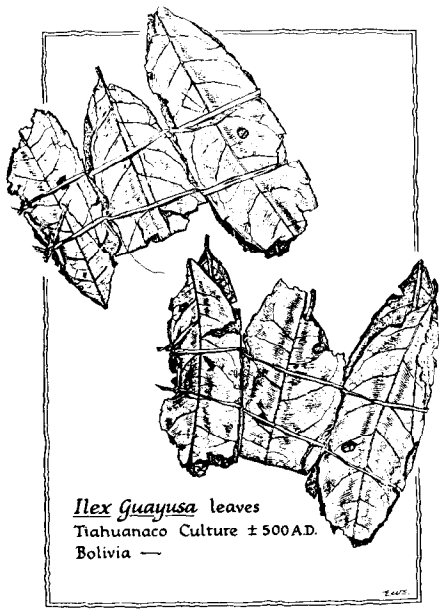


Fig. 11. *Ilex Guayusa* leaves, Tiahuanaco culture, ± 500 A.D., Bolivia.

and pestle with which these leaves could be pulverized and receptacles still holding snuff powder. Because of the near-perfect conditions of the leaves, botanical identification was not difficult (*I. Guayusa*) even though this area is far from the present range of the species. Examination by mass-spectrometer indicated that caffeine was still present in the material (Holmstedt and Lindgren, 1972).

This discovery for the first time establishes the use anywhere in the world of a caffeine-rich plant in a nasally applied preparation. Furthermore, the presence in the same tomb of clysters suggests the possibility that this plant may have been utilized as an enema in an aqueous preparation in the same manner as tobacco in several localities of South America.

Ilex Guayusa was described from sterile material, and, until recently, all collections have been sterile. In 1979, Mr. Melvin Shemluck succeeded in collecting fertile material in Ecuador; as a result, the species is now botanically much better understood (Shemluck, 1979).

SOLANACEAE

Nicotiana Linnaeus

A genus of some 66 species; 21 of Australia and Polynesia, 45 of temperate or highland areas of North and South America. *Nicotiana Tabacum* and *N. rustica* are economically important species.

Nicotiana Tabacum Linnaeus, *Species Plantarum*, (1753) 180.

Tobacco has been utilized for its psychoactive properties in every possible

Fig. 12. Leaves of *guayusa* (*Ilex Guayusa*) on tree in a 200-year old plantation. Alto Afán, Pueblo Viejo, Comisaría del Putumayo, Colombia.

way by American aborigines: smoked; chewed; applied to the gums as a thick liquid; snuffed; and as an enema.

In many parts of the aboriginal areas of tropical America (e.g. the northwest Amazon), the usual way of using tobacco was by snuffing.

While tobacco is definitely psychoactive, the possibility that it should be considered as an hallucinogen has more than once been suggested (Wilbert, 1963, 1972; Janiger and Dobkin de Ríos, 1976).

Much more research in several fields is necessary before we can determine the exact psychoactivity of tobaccos. How is it smoked? How else is it employed? What species or special strains are utilized? Is it used together with other constituents or not?

The fact remains that tobacco is definitely psychoactive in any method of use. The enigma remains as to how, under certain conditions and in various methods of use, *Nicotiana* can have unusually strong psychoactive effects in aboriginal societies.

BIGNONIACEAE

Tanaecium Swartz

A genus of seven species of Central and tropical South America and the West Indies.

Tanaecium nocturnum (Barb.-Rodr.) Bureau et K. Schumann in *Martius, Flora Brasiliensis*, 8, pt. 2 (1896) 186.

In 1977, Dr. Ghillean Prance reported his discovery of a new psychoactive snuff employed among the Paumarí Indians of the Rio Purús of Amazonian Brazil. Known among the natives as *koribo*, the snuff is prepared from a forest liana of the Bignoniaceae: *Tanaecum nocturnum*. This species is widespread in tropical South America but seems to be used as a mind-altering drug only among the Paumarí. The liana is occasionally cultivated by these natives, although usually wild plants are employed (Prance, 1977).

The snuff is taken ceremonially or ritualistically to protect children, especially during puberty rites for girls. The women, who do not take the snuff, drink a tea prepared from the bark of the roots of this liana; the tea produces a period of drowsiness and inability to concentrate.

Preparation of the snuff is simple. The leaves are shredded, roasted, pulverized and sifted. The powder is then mixed with tobacco snuff. The leaves are pungent with the odour of almonds, and psychoactive effects have been felt by field investigators from merely handling the plant.

Preliminary examination has indicated a high percentage of hydrogen cyanide in the fresh leaves. Toasting of the leaves apparently removes or destroys the cyanide but leaves other toxic compounds. Phytochemical study of this interesting plant is indeed warranted.

Other uses of *Tanaecium nocturnum* may be relevant: the Karitianas of the Rio Madeira in the central Amazon take a tea made of the leaves of this

liana mixed with the leaves of an unidentified plant of the Leguminosae to treat diarrhoea; Indians in the Chocó of Colombia consider that the plant has aphrodisiac properties.

ACANTHACEAE

Justicia Linnaeus

A genus of both hemispheres of some 300 species.

Justicia pectoralis Jacquin var. *stenophylla* Leonard, in *Contributions from the United States National Herbarium*, 21 (1958) 615.

There is still appreciable uncertainty that a psychoactive snuff is prepared from *Justicia* in the northwest Amazon.

In the 1940s, a missionary in the headwaters of the Orinoco in Venezuela delivered to me a partly rotted and matted wad of plant material which he maintained was the source of one of the narcotic snuffs of the Waika Indians of the region. Notwithstanding the poor condition of the vegetal sample, it was identified as a species of *Justica*. Later, the Brazilian botanist, Dr. João Murça Pires informed me that the Waika do indeed prepare an inebriating snuff from *Justicia*, "a species close apparently to *J. pectoralis*."

Wassén has reported that Indians of the upper Orinoco prepare their yopo snuff from three plants: *hisioma* (*Anadenanthera peregrina*), *masho-hara* (said to be a piperaceous species) and *bolek-hena* (a powder, called "leaves of the spirit of death") (Wassén, 1965). Could this *bolek-hena* be a *Justicia*? Other sources give as the sources of Waika snuffs a tree called *epena-kesi* (probably *Virola* sp.), the ashes of the outer bark of *ama asita* (*Elizabetha princeps* Schomburgk ex Bentham) and the powder of *mashi-hiri* (*Justicia pectoralis* var. *stenophylla*). Similarly, the Surará and Pakidai make their snuff from *Anadenanthera peregrina* but may add a herb called *maxaraha*, probably a *Justicia*. The Karimé, culturally related to the Waikas and their neighbours, are said to prepare a snuff from "a small plant called *kokoime*, perhaps also a *Justicia* (Wilbert, 1963).

In 1967, Prof. Bo Holmstedt and I were able to visit a group of Waika Indians living in the Brazilian Territorio do Roraima in the settlement called Tototobí. These Indians prepare a potently hallucinogenic snuff from the red "resin" in the inner bark of *Virola theiodora* (quod vide). Snuff from this source is active with no admixture. On occasion, however, the natives dry and pulverize the aromatic leaves of *Justicia pectoralis* var. *stenophylla;* the Indians maintain that the admixture is used "to make the snuff smell better" (Schultes and Holmstedt, 1968).

Preliminary chemical examination indicating the possible presence in the leaves of *Justicia pectoralis* var. *stenophylla* of *N,N*-dimethyltryptamine still lacks corroboration with additional material (Schultes and Holmstedt, 1968; Schultes, 1970).

Recent ethnobotanical studies have tended to suggest that *Justicia* may

indeed be used as the sole source of an inebriating snuff. In 1971, Chagnon and his colleagues stated that several species of *Justicia* were employed alone in preparing a snuff and that tryptamines had been found in these species (Chagnon et al., 1971). Unfortunately, a search for voucher specimens upon which botanical identifications and chemical analyses could be based has not been successful, which immediately tends to raise questions concerning the reliability of the reports (Chagnon et al., 1971). More recently, Caries-Brewer and Steyermark have asserted, obviously with voucher specimens, that the Waika Indians do indeed prepare an hallucinogenic snuff from *Justicia* with no admixture (Brewer-Carias and Steyermark, 1976).

It now seems probable that *Justicia* is the source of an hallucinogenic snuff among the Waika. More ethnobotanical data, however, are desirable and chemical studies based on vouchered and botanically identified material is essential before the problem is definitely settled.

RUBIACEAE

Pagamea Aublet

A genus of 20 species of tropical South America.

Pagamea macrophylla Spruce ex Bentham in *Journal of the Linnean Society*, 1 (1857) 110.

Among the Barasana Indians of the Río Piraparaná in the Colombian

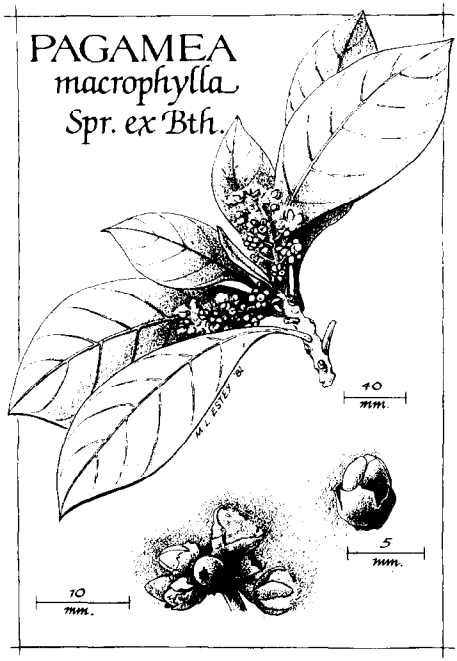


Fig. 13. *Pagamea macrophylla* Spr. Ex Bth.

Amazonia, the leaves of *Pagamea macrophylla* are toasted, pulverized, and the powder is aspirated in the form of a snuff by medicine men during ceremonies of divination. These Indians know the plant as *ma-nu-su-ka-ta*. The nomadic Makú Indians of the same region call the plant *ma-na-shu-ke-ma*. It is also employed medicinally: a hot tea prepared from the leaves and bark is taken to alleviate digestive disturbances attributed to excessive use of coca (Schultes, 1980a).

Little is known of the use of the snuff and of its effects, and nothing is known of the chemical constitution of this genus of some 20 species of tropical South America.

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