

Plants in treating senile dementia in the northwest Amazon

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The Indians of the northwest Amazon respect age and try to care for those suffering from senile dementia. At least 25 species of plants are employed in treating Alzheimer's disease or similar problems. The plants are administered orally as teas of the leaves or roots and over a period of several days to numerous weeks. The plants are from 15 phanerogamic families. Little chemistry is known of most of the species. In view of the current interest in Alzheimer's disease and related problems these species might profitably be investigated.

Key words: Alzheimer; senile dementia; Indian treatments

Introduction

Only four powerful, naturally occurring cholinesterase inhibitors are known. One is from green mamba snake venom, the other three are from plants. They have been isolated from three plants of unrelated botanical families and from species of widely separated geographical regions, and the compounds are chemically different. These enzyme inhibitors have been found useful in the treatment of Alzheimer's disease and related mental problems.

One hypothesis holds that the lack of the transmitter acetylcholine, which is broken down by cholinesterase, leads to a cholinergic deficiency in the brain. Inhibitors of the activity of cholinesterase are known to improve memory (Holmstedt, 1972; Giacobini and Becker, 1988, 1991).

The three plants are *Physostigma venenosum*, a member of the Leguminosae; *Galanthus nivalis*, an amaryllidaceous favourite in horticulture known as the snowdrop; and *Huperzia serrata*, a club moss of the Lycopodiaceae, known also as *Lycopodium serratum*.

Physostigma venenosum Balfour, the famous Calabar bean of tropical Asia, has long been used by the natives of Nigeria as an ordeal poison to 'establish' the guilt or innocence of a person accused of a crime. It has the indolecholinergic alkaloid physostigmine or eserine. Physostigmine has been employed topically in western medicine to produce

miosis and in the treatment of glaucoma (Holmstedt, 1972).

Galanthus nivalis L. is native to central and southern Europe and western Asia, particularly the Caucasus. It belongs to a genus of 20 species. Its content of the alkaloid galanthamine has been of interest as a cholinesterase inhibitor (Mashkovski and Kruglikova-Lvora, 1951; Domino et al., 1988; Giacobini and Becker, 1991).

Huperzia serrata (Thunb ex Murray) Trevisan, a fern relative, is native to China, where it has had a long ethnopharmacologic history in traditional medicine to alleviate problems of memory loss. Its cholinesterase inhibiting activity is due to the recently discovered alkaloid huperzine which has been reported to improve impaired memory in the aged (Giacobini and Becker, 1988; Zhu and Tang, 1988; Tang et al., 1989; Hanin et al., 1991).

How many more plants may there be in the world's 500 000 species that might have cholinesterase inhibiting compounds — or other compounds of value in the treatment of these mental problems?

During the past five decades, I have conducted ethnopharmacological research amongst Indians in the northern Amazon, especially in Colombia. Of the nearly 1500 species of plants in 596 genera and 145 families that I have recorded as medicines or poisons (Schultes and Raffauf, 1990), there are 25 species in 15 families valued by the natives in treating, usually amongst the elderly, conditions that superficially appear to resemble Alzheimer's disease or related mental problems. There is, to be sure, no reason to suppose that any or all, even if

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proved impossible to synthesize a considerable number of active substances used in to-day's medicine.

There seems also to be an unfortunate and pronounced tendency amongst scientists trying to design various compounds to forget or leave out that they often use natural products as models for their syntheses. In this way the fundamental role played by plants in such research remains unknown to the media and consequently also to the general public.

This tendency has to be counteracted but it appears that up to now ethnopharmacologists have been less apt actively to challenge the distortion caused by some recent trends in pharmacological research. It is obviously high time actively to draw the attention of society to the role of ethnopharmacology in the development of pharmaceuticals. Unfortunately, statements like those of Mangelsdorf in 1972, correcting his 1941 prediction that in another 25 years drugs of plant origin would be of little more than historical interest, or publications like that by Farnsworth and Morris (1976): 'Higher plants — the sleeping giant of drug development' do not reach those who in the first place should be informed.

A policy must be worked out to make the value of plants clearly visible to decision makers and the general public. This could be done by joining forces with botanists, i.e. whole plant botanists, and conservationists, thus safeguarding the conditions for ethnopharmacological research. This would also draw attention to the value of traditional knowledge and assist in the conservation of this knowledge and the plants which may be vital for our survival.

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effective, contain a cholinesterase inhibiting compound. But, in view of the current interest in Alzheimer's disease, it might be worthwhile to subject some of the plants that I shall mention below to technical examination.

The Colombian Amazon is a region of some 70 000 mostly unacculturated Indians belonging to more than 50 ethnic groups. The flora is undoubtedly one of the richest in species and genera of the whole Amazon basin and is extremely diverse (Schultes, 1988).

Amongst the natives, there seems to be two different 'kinds' of medical practice. Many individuals of the general population, both men and women, are usually well versed in knowledge of medicinal plants — knowledge accumulated over millennia by experimentation and passed on orally from generation to generation. The other 'kind' of medical practice is that of the medicine men or *payés* (Figs. 1 and 2), many of whom are extremely well versed in the properties of plants of their ambient vegetation but who also rely mainly on sacred hallucinogenic plants and rituals during which they believe that they can communicate with supernatural forces which in many aboriginal



Fig. 1. Kofán *payé* making darts for curare. Río Sucumbios, Putumayo, Colombia.



Fig. 2. Tikuna woman *payé*. Río Loretoyacu, Amazonas, Colombia.

societies are considered to be the source of misfortune, sickness and death. Very often, when the supernatural manipulations of the *payé* fail to supply them with a 'diagnosis' or a 'cure', they will prescribe one or more medicinal plants (Schultes and Raffauf, 1992).

I have done my field work with both *payés* and with knowledgeable people of the general population. Unless an illness is easily diagnosed, such as malaria, leprosy or advanced tuberculosis, I have, in my notes, put down the exact words of the informant: e.g., 'We make a tea of the bark of this tree for pains in the chest'. I am not a physician, and even a physician without equipment, instruments and laboratory tests, would probably be unable to diagnose some of the medical problems of these natives.

In considering plants that might be scientifically investigated for their potential value for treating senile dementia, it must be pointed out that there are many aged people in the Indian tribes of the Colombian Amazon, notwithstanding the relatively low life span of the population in general (Schultes, 1988). These Indians — like the Chinese — respect age, and, as best as they can, they care for the welfare of the elderly who can no longer

take care of themselves. In considering these plants that they believe help the aged, especially those with mental problems, this deference to age must always be kept in mind.

The plants will be enumerated alphabetically by families and, under the family, alphabetically by genera. In each case, a voucher specimen on which the medicinal observation was based is cited. All of the voucher specimens are preserved in one of the several herbaria at Harvard University and in the Herbario Nacional de Colombia in Bogotá.

ACANTHACEAE (Acanthus family)

Justicia ideogenes Leonard, *Schultes* 3538

The Kofán Indians boil the entire plant and pour the warm decoction with friction over the lower limbs to treat a condition of palsy-like trembling.

Lignans are important constituents of this genus. The naphthalide lignans have been associated with antidepressant activity (Schultes and Raffauf, 1990).

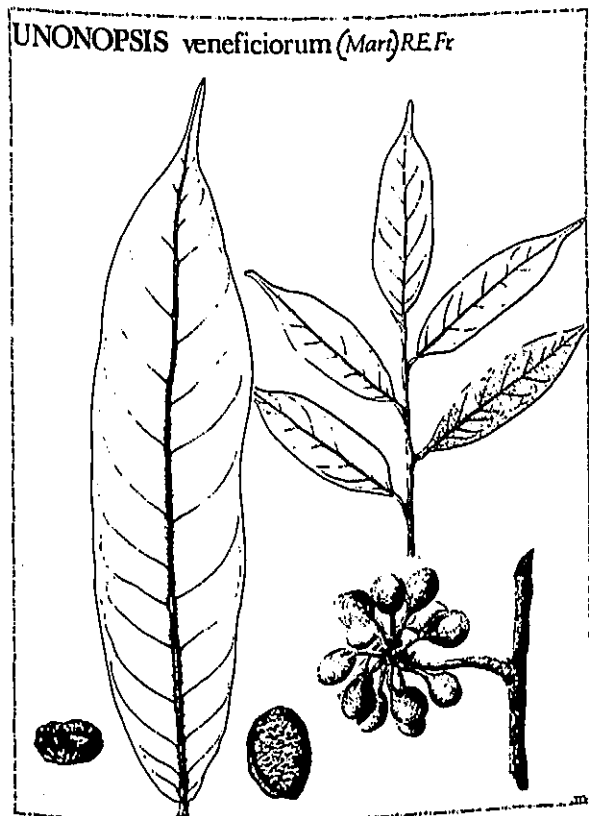


Fig. 3.

ANNONACEAE (Custard apple family)

Unonopsis veneficiorum (Mart.) R.E. Fries (Fig. 3.), *Schultes et Cabrera* 15269

A Puinave payé reported that the leaves of this small tree are dried and mixed with food for 'old people who forget how to talk'.

It is of interest that the principal use of this species in widely separate parts of the Colombian and Ecuadorean Amazon is as the base of an arrow poison or curare. The nomadic Makú of the Colombian Vaupés call the plant *we-wit-kat-ku*, meaning 'no children medicine', and they employ it as an antifertility agent.

Unonopsis stipitata Diels, *Schultes et Cabrera* 12435

The Puinaves pulverize the leaves of this plant and put the powder into the food of elderly people who 'have difficulty speaking'.

APOCYNACEAE (Dogbane family)

Galactophora crassifolia (Muell-Arg.) Woodson, *Schultes et Cabrera* 12368, 17508

Indian medicine men in the Vaupés mix the latex of this plant with warm water sweetened with sugar to give to children who have a condition of uncontrollable shaking of the head.

Mandevilla Steyermarkii Woodson (Fig. 4), *Schultes* 13915; *Schultes, Raffauf et Soejarto* 14322, 26045

This beautiful but morphologically most atypical species of *Mandevilla* is highly endemic, known from granitic mountains in southern Venezuela and the Vaupés of Colombia. Perhaps because of the unusual form and colouration of the flowers more than because of real bioactivity, this vine is considered a veritable panacea by all Indians in the lower Vaupés. One of the many medicinal used is the decoction of the root given to 'the aged and sick'.

Unfortunately, no chemical analysis has been made beyond a Dragendorff spot test on SRS 24322 which was alkaloid negative. Little is known of the constituents of the genus *Mandevilla* beyond the presence in one species of hydrocarbons, lipids and triterpenes (mainly alpha-amyrin) (Schultes and Raffauf, 1990).

Parahancornia amapa (Hub.) Ducke

The abundant white latex of the bark is used 'against general debility' in the Brazilian Amazonas (LeCointe, 1934).



Fig. 4.

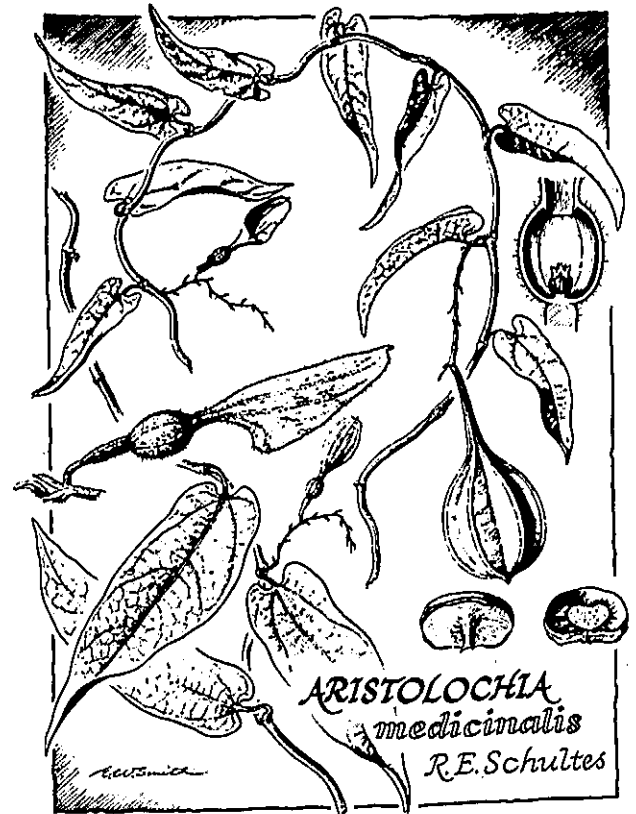


Fig. 6.

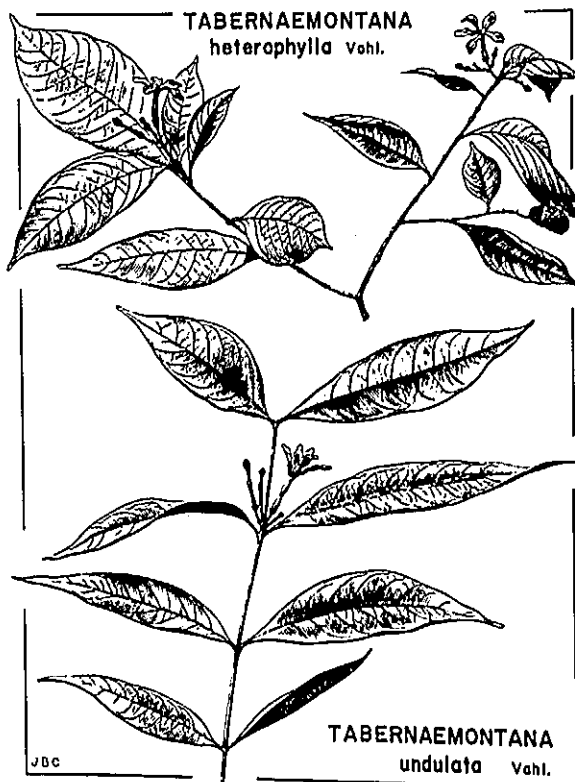


Fig. 5.

Tabernaemontana heterophylla Vahl. (Fig. 5),
Schultes et López 9195

Tukanos in the Brazilian Amazonas prepare a tea of the leaves for 'old people who are slow and forgetful'. The tea is administered daily for 2 weeks.

ARISTOLOCHIACEAE (Birthwort family)

Aristolochia medicinalis R.E. Schultes (Fig. 6).
Schultes et Cabrera 17856

Kubeo payés dry and pulverize the astringent root to prepare a bitter and aromatic tea to treat periodic attacks of an epileptic-like nature, usually amongst the elderly. It should not be used too often or in heavy doses, according to the medicine men, lest it cause permanent mental derangement and occasional muscular paralysis.

The genus has nitrophenanthrene derivatives, aporpine and berberine-type alkaloids plus etherial oils, allantoin and lignans (Schultes and Rafter, 1990).

BIGNONIACEAE (Catalpa family)

Lundia erionema De Candolle, *Schultes et Cabrera* 13319

The leaves are crushed and mixed with oil of *Jessenia*, a palm, to feed the very elderly 'who speak crazily without making sense'. Indian medicine men in the Vaupés say that the treatment often seems to be helpful if used for 2 or 3 weeks daily.

Nothing is known of the chemistry of *Lundia*.

Memora Schomburgkii (DC.) Meirs., *Schultes et Cabrera* 13120b

According to *payés* in the Vaupés, the leaves of this species may be used in the same way and for the same purpose as those of *Lundia erionema*.

Schlegelia macrophylla Ducke, *Schultes et Black* 8332

Tikuna Indians take a tea of the leaves of this vine 'when they refuse to eat and lose appetite'.

The chemistry of this genus is still to be examined.

GENTIANACEAE (Gentian family)

Pagaea recurva (Benth.) Bentham et Hooker fil., *Schultes* 5863

Amongst the Muinane Indians in the vicinity of La Pedrera on the Río Caquetá, a very bitter decoction of the whole plant is prepared and administered in treating 'debilitating forgetfulness' in the elderly.

GNETACEAE (Gnetum family)

Gnetum nodiflorum Brongniart, *Schultes, Raffauf et Soejarto* 24367

Kubeo *payés* boil the fruit and prescribe the decoction for 3-4 days for elderly men 'who cannot walk straight and totter or fall'.

According to Plotkin (pers. commun., 1991), the Wyana Indians of Surinam administer a decoction in treatment of 'physical and mental weakness'.

Little is known of the chemistry of the gymnosperm genus beyond the presence of flavones, stillbenes and lignans (Schultes and Raffauf, 1990). The seed is amongst the Indians an edible nut.

GUTTIFERAE (St. Johns-wort family)

Vismia tomentosa Ruiz et Pavón, *Schultes et Cabrera* 15669

The Yukunas and Makunas of the Ríos Miritipará and Popeyaká consider that the elderly who 'suffer difficulty in understanding instructions' and physical degeneration are helped by a week-long administration of a strong tea of the leaves which temporarily lessens their problems. The decoction is also said to be an excellent diuretic: the Makuna name, *go-ná-yo-ko*, means 'urine tree'.

HAEMODORACEAE (Bloodwort family)

Schiekia orinocensis (HBK.) Meissner, *Schultes, Raffauf et Soejarto* 24325

Amongst the Kubeos on the Río Kuduyarí, the leaves and blood-red roots of this curious plant are boiled to prepare a decoction given to 'old men who shake all over'.

Nothing is known of the chemistry of this monotypic genus beyond its content of the group of red pigments, the alpha-phenylphenalemones, which are not known from any other living organism (Schultes and Raffauf, 1990).

LAURACEAE (Laurel family)

Nectandra acutifolia (R. et P.) Mez, *Schultes, Raffauf et Soejarto* 24373

Two Kubeo *payés* use a decoction of the highly aromatic leaves and bark of this tree as a specially strong stimulant for elderly men who are experiencing excessive fatigue and sleepiness.

Nectandra is alkaloid-rich, and this collection is alkaloid-positive with a Dragendorff reagent (Schultes and Raffauf, 1990).

LEGUMINOSAE (Bean family)

Berberia pinnata (Pers.) Baillon, *Schultes, Raffauf et Soejarto* 24394

The Kubeos know this plant as *ma-tle-toó-ta*, meaning 'urine tree'. Their *payés* prepare a tea of the seeds for elderly men who have various mental problems.

Nothing is known of the chemistry of this monotypic genus.

The seeds are left in chicha (a fermented drink from maize or the manioc root) which is orally administered. The treatment is said not to be long but must be frequently repeated.

Cassia lucens Vogel, Schultes, Raffauf et Soejarto 24334

The major use of this *Cassia* is as an insect repellent, but one informant, a Kubeo, reported (and the information was checked independently) that the dried and powdered leaves, prepared as a drink, 'is good for people who cannot remember'.

This species has apparently not been chemically studied.

Swartzia recurva Poeppig et Endlicher, Schultes et Raffauf 26173a

Country people in the Manáos region of Brazil believe that the fruits are helpful in combating physical debilitation resulting from malaria, age or general infirmity. The pods are boiled to soften and are then added to regular food.

While this species has not been chemically studied, the genus is rich in many types of bioactive compounds with potential medicinal properties (Schultes and Raffauf, 1990).

MENISPERMACEAE (Moonseed family)

Abuta imene (Mart.) Eichler, Schultes et Cabrera 19769

In the Río Negro region of Brazil and the Río



Fig. 7. Liana of *Chondrodendron tomentosum*. Río Apaporis, Vaupés, Colombia.



Fig. 8. *Mauritia minor* growing in the park. Mitú, Vaupés, Colombia.

Japurá, the root of this species, employed primarily as an ingredient of several kinds of curare, is reported to be the source of a tonic for the elderly when the leaves are prepared as a decoction.

The genus is rich in alkaloids of several kinds (Schultes and Raffauf, 1990).

Chondrodendron tomentosum Ruiz et Pavón (Fig. 7)

In the Brazilian Amazon, the root and stem are taken internally, probably pulverised and made into a decoction 'to treat dropsy and madness (Le-Cointe, 1934).

This liana is one of the main sources of curare in the Ecuadorian and Colombian Amazonia.

PALMAE (Palm family)

Mauritia minor Burret (Fig. 8), Schultes 3865

Many Amazonian Indians make a highly nutritious fermented beverage from the fruit of this abundant palm. Amongst numerous other medicinal uses, this chicha de cananguche has the reputation of strengthening those who are weak and who 'no longer are interested in life because of age'.

It is probable that the fruit of other species of *Mauritia* may be similarly used.

PIPERACEAE (Pepper family)

Piper Schultesii Yuncker ex Yuncker et Trelease

The Karijona medicine men of the upper Río Vaupés go to the top of Cerro Chiribiquete to gather leaves and stems to give to the elderly who 'sit without talking all day'. The plant material is allowed to stand for a day in water or may also be put into chicha. The leaves may be kept dried for several months without losing their strong pungency.

There has been no chemical analysis of this species of *Piper*.

Piper sp., *Schultes et Cabrera 15727*

Amongst the Tanimuka and Yukuna Indians of the Río Miritiparaná this aromatic species in a strong decoction is believed to strengthen men who are weary from a long paddling trip and to be efficacious, if administered over a week or 10 days, to help the very elderly 'who sit and stare into space all day'.

RUBIACEAE (Madder family)

Duroia sp., *Piaguaje (for Landon) 6*

Amongst the Siona Indians of the Colombian Putumayo the wood of this *Duroia* is chipped and the resulting juice is mixed with yoco (*Paullinia Yoco*) a caffeine-rich plant, 'to give strength for a sickness causing excessive weakness called papa-din'.

Duroia has apparently never been chemically studied.

Finally, we must always realize that, since modern science has been able to increase the human life span, problems like Alzheimer's disease will undoubtedly grow in number. If only for this reason, it behooves science to examine chemically, pharmacologically and medically every potentially

valuable ethnopharmacological lead from the knowledge possessed by primitive societies before acculturation and westernization forever doom this knowledge to extinction.

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