ASPECTS OF BANIWA MEDICINAL FLORA AND ETHNO-ECOLOGY

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INTRODUCTION

To report on the use of medicinal plants by an indigenous group living in the caatinga of the Northwest Amazon is our primary objective. Ethno-botanical research on medicinal flora has been conducted recently in various types of Amazonian eco-systems in Brazil. Cavalcante and Frikel (1973) wrote on the pharmacopeia of the Tiriyó Indians who inhabit the high savana and hills of the Tumucumaque Serra on the Surinam-Brazilian border. Branch and de Silva (1983) reported the use of medicinal plants in a caboclo community of the Tapojós, 60 km from the river's mouth where the vegetation is a mosaic of secondary forest and savana. Kerr and Posey (in prep.) have compiled an extensive list of medicinal plants used by the Kayapó of the Xingu River basin, a transitional zone between the mixed tropical forest and the "campo cerrado" of central Brazil. This is the first study devoted specifically to the medicinal flora of a Brazilian indigenous group of the Amazon caatinga.

The Amazon caatinga is one of the most distinctive vegetation types in all Amazonia. Always associated with white sand soils, the Amazon caatinga, of which the Northwest Amazon caatinga forms part in a continuum, is composed of forest and shrubland formations characterized by prounounced sclerophylly, low diversity, and high endemism. Many plant species are restricted to this habitat. In a central Amazon caatinga, Anderson (1978) that 54.5% of the vascular terrestial species occur there exclusively.

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Proceeding southeast to northwest along the Içana River in the Northwest Amazon the vegetation increasingly changes from mixed tropical forest to Amazon caatinga (Projeto Radambrasil 1976). The Içana's banks house approximately 40 villages of Baniwa Indians, a hunter/fisherman/farmer tribe of the Aruak linguistic trunk. Tapira Ponta, a village of 44 persons, is located in the center of Baniwa territory (approx. lat. 1º30'N x long. 68º20'W).

The Amazon caatinga surrounding Tapira Ponta was our field work site. While accompanying informants in search of medicinal plants it became increasingly apparent the Baniwa distinguish a considerable number of eco-zones in their caatinga environment. Posey (1982) defines ethno-ecology as indigenous perceptions of natural divisions in the biological world and of plant-animal-human relationships within these divisions. A good opportunity for ethno-ecological research had presented itself. As a project allied to our original intent, we began to take notes on the Baniwa eco-zones. The statistical data necessary to adequately characterize these indigenous eco-zones was not collected and thus these are preliminary findings.

In the RESULTS section, 16 Baniwa eco-zones are briefly described. In addition, the Indians in Tapira Ponta spoke of five other caatinga eco-zones that we were unable to visit. By contrast, in their closest mapping scale (1 to 250,000), the botanists and phyto-geographers of Projeto Radambrasil (1976, ibid.) identify nine types of Amazon caatinga for the entire Upper Rio Negro region.

METHODS AND MATERIALS

Field work was conducted from June 1 to July 20, 1985. Voucher specimens of medicinal plants were collected working with reliable Indian informants for subsequent identification in the INPA and Goeldi Museum herbariums. At the time of collection, the following information was noted: the indigenous name, medicinal use(s), part of the plant employed, method of preparation, method of application, salient botanical characteristics (habit, color and smell of fruit and flower, etc), area where the plant could be found most readily.

To explain in ecological terms the Baniwa nomenclature for Amazon caatinga eco-zones the following procedure was observed in each area: the soil type was noted, the humus cover thickness measured, the relative density of the understory described, the height of and the shade provided by the canopy estimated. Note was made of the predominant trees in the canopy. In the understory, voucher specimens were taken of those shrubs, herbaceous plants, and vines that were both common and in flower.

RESULTS

The Baniwas regard the Amazon caatinga as a poor region for medicinal flora. Upon asking if they used plants to cure a certain malady, the Indians would frequently indicate they only knew of some that grew in the mixed tropical forest downstream. Hence we made two one-day trips downriver to Santa Rosa, a village with access to the mixed tropical forest. 15% of the plants in TABLE I (marked with an asterisk*), the results of only two days collecting near Santa Rosa, grow principally or exclusively in the mixed tropical forest. That it required the remaining 49 days to obtain the other 85% is indirect confirmation of Baniwa opinion regarding medicinal flora.

TABLE I follows. Listed are 80 species in the Baniwa medicinal flora. Data includes collection number, scientific name, the indigenous name, plant's habit, and the medicinal use(s). Each of these headings requires a brief preliminary explanation:
-Collection Number and Scientific Name: Many plants are identified only to genus. Ignoring good advice, I began field work during

the Northwest Amazonian rainy season. Specimens in flower, essential to complete identification, were correspondingly difficult to obtain.

Voucher material is deposited in the Goeldi Museum herbarium in Belém, Pará. Those specimens already incorporated are listed with the Goeldi Museum herbarium number (MPEG Nº x).
-Indigenous Name: Loriano, Tapira Ponta's Salesian schooled lay leader, wrote down the names of some plants and all the eco-zones. The spellings of the remaining plants are given with Portugese phonetics.

In many cases, the medicinal use of the plant is its Baniwa name. In these instances, the name is translated.
-Plant's Habit: The plant is generally described as found. If later more mature individuals of the same species were seen presenting a slightly different habit the description was corrected.

Following the procedure of Anderson et al. (1975), trees are considered to be woody specimens with a central trunk greater than 5m tall. Further, we arbitrarily define small trees as being individuals 2-5m tall. Non-herbaceous specimens less than 2m tall that do not fall in the categories of vine or bush are denominated small woody plants.
-Medicinal use: This column details the part of the plant used, method of preparation, method of application, and additional observations. For the part used, the following abreviations are employed: lvs, leaves; st, stem; fr, fruit; rt,root; bk, bark; jce, juice. These method of preparation abreviations were used: D, Decoction; M, Mixture (The customary Baniwa technique is to cut the used part into small pieces, grind them, and mix the results with water.);P, Paste (The used part is ground and mixed with just encugh water to form a paste for external applications.) Abreviations for the method of application are: OA, oral application; ED, eye drop (The Baniwa make a funnel with a leaf and let the mixture drip into the eye.); EA, external application,

Listed are some plants, for example the Baniwa poisons, that would not be considered medicinal in any sense by the Indians themselves. Medicinal is used broadly to include all plants of possible pharmacological and phytochemical interest.

Unless otherwise noted, the listed plant grows wild in the Amazon caatinga.

TABLE I: BANIWA MEDICINAL PLANTS

COL. No.	SCIENTIFIC NAME	NAME IN BANIWA	HABIT	MEDICINAL USE (PART OF THE PLANT USED, METHOD OF PREPARATION, METHOD OF APPLICATION, ADDITIONAL OBSERVATIONS)
409	ACANTHACEAE sp.	ape i dapé "medicine for jararaca bite"	tiny herb ±10 cm	jararaca(Bothrops sp.) bite remedy; lvs; M; EA. This was not a local plant. Acquired in trade from relatives in Venezuela.
408	ACANTHACEAE sp.	tiripida	herb ±20 cm	headache; lvs; M; ED.
374	APOCYNACEAE Anacampta sp.	acuru i dapé "medicine for 'bicho do pé'"	herbaceous plant ±1m	to kill the "bicho do pé" flea (Tunga penetrans); rt; M; EA.
370	APOCYNACEAE sp.	takutaku	small tree	toothache; rt; M; apply to the tooth
356	APOCYNACEAE Tabernaemonta ct. angulata Mart. ex. Muell. Arg. MPEG Nº 113630	turane	herbaceous plant ±2m	ointment for skin irritations caused by insect bites; rt; M; EA.
439	ARACEAE Caladium sp.	fero	herb ±30 cm	to kill the "bicho do pé" flea; rt; M; EA.
442	ARACEAE Anthurium sp.	atenichochi	herbaceous plant ± 30cm	to help broken bones reform; bk; P; EA.

No.	SCIENTIFIC NAME	NAME IN BANIWA	HABIT	MEDICINAL USE
340	ARALIACEAE *Gilibertia* sp.	*ape i dapé*	small tree	jararaca bite remedy; bk; M; EA.
382	ARECACEAE *Bactris* sp.	*coliuaipa*	small palm	to control diarrhea; rt; M; OA.
390	BIGNONIACEAE sp.*	*hiritiapo*	climbing vine	to halt convulsions induced by poisoning; rt; M; OA.
342	BIGNONIACEAE sp.	*calipi*	woody plant	eye ailment; rt; M; ED.
415	COMPOSITAE *Melampodium camphoratum* (L.f.) Baker MPEG Nº 113636	*awiteda*	herb ± 30cm	for colds; lvs; D; OA.
355	COMPOSITAE *Mikania* sp.*	*rima*	climbing vine	fortifier and cure-all; lvs; crush the lvs into bath wa
416	COMPOSITAE *Spilanthes acmella* (L.) Murr. MPEG Nº 113637	*nuetsu i dapé* "medicine for toothache"	herb ± 25cm	toothache; lvs; M; apply to tooth.
429	CYPERACEAE *Cyperus* sp.	*ape i dapé*	herb ± 40cm	jararaca bite remedy; rt; M; OA. This was not a local plant. Acquired in trade with relatives in Venezuela. Cultivated.
387	CYPERACEAE *Cyperus* sp.	*cupulira*	herb ±40 cm	stomach cramps; rt; M; OA. Also, not a local plant. Cultivated.
422	EBENACEAE *Diospyros* sp.	*doidaraimape*	tree	to cleanse wounds and cuts; bk; M; EA.
358	ELAEOCARPACEAE *Sloanea* sp.*	*tamarida*	tree	poison; lvs; M; OA. Also used to kill game animals.
434	ELAEOCARPACEAE *Sloanea* sp.	*yocatani*	tree	to ease menstrual cramps; lvs; D. Tea together with the two mararos (LEGUMINOSAE MIMOSOIDEA sp. (435) and QUIINACEAE *Quiina* sp. (436)

No.	SCIENTIFIC NAME	NAME IN BANIWA	HABIT	MEDICINAL USE
432	ERICACEAE *Psammisia guianensis* Kl. MPEG nº 113640	comadene i dapé "medicine for hernia"	small tree	for hernia; rt; P; EA.
352	EUPHORBIACEAE *Croton* sp.	dapobabo	tree	stomachache; st; M; OA.
411	EUPHORBIACEAE *Maprounea guianensis* Aubl.	hipata	erect herbaceous plant ± 4m	to cleanse wounds and cuts; st. The st is ground and and fried until a dry powder is obtained. The powder is applied to the wound or cut to sterilize.
418	EUPHORBIACEAE *Phyllanthus orbiculatus* Rich.	alguapo i dapé "medicinal plant" the Brazilians' "quebra pedra"	herb + 50cm	diuretic; the entire plant; D; also used to alleviate general stiffness and body aches.
389	EUPHORBIACEAE *Senefeldera* sp.*	capopiro	woody plant ± 50cm	headache; rt; M; ED.
430	FABACEAE *Acosmium nitens* Vog. (Yaki)	sari	tree	used as balm for skin irritations; bk; P.
371	FABACEAE *Dalbergia* sp.	noritena	erect herbaceous plant ± 1&1/2m	eye ailments; st; M; ED.
473	FABACEAE *Derris* sp.	isanate i dapé "medicine for cuts"	vine	to cleanse wounds and cuts; st; jc; cut and let drip onto the cut or wound

NO.	SCIENTIFIC NAME	NAME IN BANIWA	HABIT	MEDICINAL USE
377	FABACEAE Derris sp.	coná "fish poison"	bush	fish poison; rt; The rt is cut up and spread on the surface of pond or slow moving creek. Said to be more effective than the Derris urucu sp. below.
363	FABACEAE Derris urucu (Killip & Smith) Macbr.	coná "fish poison"	bush	fish poison; lvs; Lvs are spread on surface of pond.
346	FABACEAE Dipterix sp.	ape i dapé	woody plant	jararaca bite remedy; rt; M; EA.
393	FABACEAE Taralea oppostifolia Aubl.	mahene i dapé "medicine for poisoning"	woody plant ± 2m	poisoning antidote; rt; M; ED. Mix with the ground root of the umapitaca (RUBIACEAE Retiniphyllum martianum M. Arg. (426)
359	FLACOURTIACEAE Casearia sp.*	None of the Baniwa knew the name.	woody plant ± 50cm	headache; rt; M; ED
407	FLACOURTIACEAE Rynia speciosa var. bicolor (DC) Monochino	warecama	robust bush	poison; lvs or rt; M; The Baniwa indicated a 1/2 teaspoon is already a lethal dose.
402	GESNERIACEAE Codonanthe crassifolia (Focke) Morton	petsi i dapé "medicine for colds"	vine	colds; lvs. One makes a tea together with the inflorescence of the maquina (ZINGIBERACEAE Costus scaber R.f. Maas. (431)
367	GESNERIACEAE sp.*	ipikupanate	small tree	sedative; lvs; M; ED. "For when you can't sleep"
383	GUTTIFERAE Clusia sp.	tukwapé	erect herbaceous plant with thick st	headache; leaf latex; cut the petiole and let drip in eyes.
396	GUTTIFERAE Symphonia sp.	muraque	tree	measles; bk; D; OA.

No.	SCIENTIFIC NAME	NAME IN BANIWA	HABIT	MEDICINAL USE
345	GUTTIFERAE Toyomita sp.	yewayapo	small tree	stomachache; rt; M; OA. The rt has a very bitter taste.
378	ICACINACEAE Humirianthera sp.	ape i dapé	woody plant ± 2m	antidote for jararaca bite; rt; M; EA.
407	LAURACEAE sp.	waramana	robust bush	to relieve stiffness and body ache; bk; D; OA.
400	LAURACEAE sp.	marama i dapé "medicine for body ache"	small tree	to relieve stiffness and body ache; rt; D; OA.
435	LEGUMINOSAE MIMOSOIDEA sp.	maroro	small woody plant	to ease menstrual cramps; the entire plant; D; One makes a tea together with the other maroro (QUIINACEAE Quiina sp (436) and the yocatani(ELAEOCARPACEAE Sloanea sp (434).
399	LICHEN Cladonia sp.	werechi	lichen	for wounds and cuts; the entire lichen; One squeezes the juice onto the cut. Said to have a haemostatic effect.
395	LOGANIACEAE Buddleja sp.	cacacenine	small tree	eye ailments; rt; M ; ED.
424	LOGANIACEAE Strychnos sp.	mokuripe	vine	curare; The preparation is rather complicated.
441	MARCGRAVIACEAE Norantea sp.	curuyearu	vine	eye ailments; st; cut st and let jce drip into eye.
381	MALPIGHIACEAE Lophanthera sp.	ape i dapé	woody plant ± 2m	jararaca bite remedy; rt; One chews the rt. In addition, one grinds the rt, mixes with water, and applies to the bite.

No.	SCIENTIFIC NAME	NAME IN BANIWA	HABIT	MEDICINAL USE
404	MELASTOMATACEAE Miconia sp.	manapidumali	small tree	eye ailments; st; cut st and let juice drip in eye.
343	MELASTOMATACEAE Miconia sp.	apezé	ground crawler	fortifier and tonic; lvs; D; OA.
394	MELIACEAE Trichilia sp.	mafiucapo	woody plant ± 2m	stomachache; rt; M; OA.
428	MONIMIACEAE Siparuna sp.	waramana	woody plant ± 1&1/2m	to relieve stiffness and general body aches; lvs; P; EA.
397	MONIMIACEAE Siparuna sp.	mareta i dapé "medicine for malaria"	tree	for malaria; also a febrefuge. lvs; One crushes the lvs into the bath water.
350	MYRTACEAE Myrcia sp. MPEG Nº 113629	ofedomari	small tree	stomachache; bk; M; OA.
371	PASSIFLORACEAE Dilkea acaminata	naritena	small tree	eye ailments; rt; M; ED.
423	PIPERACEAE Piper sp.	ape i dapé	small herb	jararaca bite remedy; st or rt; M; OA.
386	POLYGALACEAE Securidacea sp.	yamaru i dapé "medicine for sting ray bite"	vine	remedy for injury by fresh water sting ray (Potamotrygon hystrix); st; D; One dips the injured foot into the decoction.
391	POLYGONACEAE Coccoloba sp.	mahene i dapé "medicine for poisoning"	vine	antidote for poisoning; st; M; OA. Also used for stomachache.

NO.	SCIENTIFIC NAME	NAME IN BANIWA	HABIT	MEDICINAL USE
388	POLYPODIACEAE *Polypodium* sp.*	*ape i dapé*	epiphytic plant	jararaca bite remedy; lvs; One chews the leaves and then applies the paste to the bite.
436	QUIINACEAE *Quiina* sp.	*maroro*	small woody plant	to ease menstrual cramps; D; One makes a tea together with the other *maroro* (LEGUMINOSAE MIMOSOIDEA sp (435) and the *yocatani* (ELAEOCARPACEAE Sloanea sp.(434).
425	ORCHIDACEAE *Epistephium* c.f. *parviflorum* Lindl. MPEG Nº 113638	*yacuncheenite i dapé* "medicine for acne"	orchid	anti-acne ointment; lvs; P; One crushes the lvs onto the blemishes.
354	ORCHIDACEAE *Vanilla aromatica* SW.	*yacuncheenite i dapé*	terrestrial orchid	anti-acne ointment; lvs; P; One crushes the lvs onto the blemishes.
427	RUBIACEAE *Capirona huberiana* Ducke MPEG Nº 113641	*mapeni*	erect herbaceous plant ± 2m	balm for burns; inflorerscence; One squeezes the inflorescence and uses the juice as a balm.
388	RUBIACEAE *Coussarea* sp.*	*ape i dapé*	woody plant ± 1&1/2m	jararaca bite remedy; rt; M; OA. An obvious example of the "doctrine of signatures". The apical bud is said to resemble a snake's head.
419	RUBIACEAE *Coutarea* sp.	*capé*	bush	for dissenteria; st; M; OA.
403	RUBIACEAE *Geophila cordifolia* Miq. MPEG Nº 113633	*icheduyatita*	tiny ground crawler	eye ailments; ft; One squeezes the fruit juice into a

No.	SCIENTIFIC NAME	NAME IN BANIWA	HABIT	MEDICINAL USE
348	RUBIACEAE Manettia cf. coccinea (Aubl.) Willd. MPEG Nº 113628	tukurere i dapé "medicine for hair"	vine	hair conditioner; lvs. One crushes the lvs and uses the juice as a shampoo. Makes the hair grow thick and strong.
421	RUBIACEAE Remijia hirsuta D. Sucre	tuculena	small tree	to help broken bones reform; latex. One cuts the st and applies the latex over the broken bone.
426	RUBIACEAE Retiniphyllum martianum (M. Arg.) MPEG Nº 113641	umapitaca	erect herbaceous plant 2-3m	antidote for poisoning; rt; M; OA. Mix with ground rt of mahene i dapé (FABACEAE Taralea oppositifolia Aubl.(393).
344	RUBIACEAE sp.	mãeyapo	small woody plant	to stop the woman's loss of blood after childbirth; the entire plant; M; OA.
375	RUBIACEAE Psychotria hoffmanseggiana (Willd. R.cf.S.) M. Arg. MPEG Nº 113631	mahene i dapé "medicine for poisoning"	erect herbaceous plant ± 50cm	antidote for poisoning; rt; M; OA. Also used for eye ailments.
414	RUBIACEAE Psychotria poeppigiana M.Arg. ssp. poeppigiana MPEG Nº 113635	pechihene	bush	eye ailment; inflorescence. One squeezes the inflorescence's juice into the eye.
412	RUBIACEAE Psychotria sp. MPEG Nº 113634	chibote	tree	tonic and fortifier for children; st; D; OA.

	SCIENTIFIC NAME	NAME IN BANIWA	HABIT	MEDICINAL USE
393	RUBIACEAE Psychotria sp.*	yeniyapo	small woody plant	stomachache; rt; M; OA.
341	RUBIACEAE Psychotria sp.	walichipé	small tree	to enable the infertile woman to have a child; rt; M; OA.
362	SAPINDACEAE Serjania sp.	ene i dapé "medicine for spider bite"	herbaceous plant ± 1m	balm for insect bite; rt; P; EA.
357	SAPOTACEAE Micropholis sp.*	mihecupo	woody plant ± 1&1/2m	stomachache; rt; M; OA.
351	SAPOTACEAE Neoxythece sp.	hawaza	tree	for colds; bk; D; OA.
401	SIMARUBACEAE Picramnia sp. MPEG Nº 113632	hawápere	herbaceous plant 1&1/2m	some hardening or irritation of the skin I was unable to understand; lvs; M; EA.
360	VIOLACEAE Amphirrhox sp.*	The Baniwa did not have a name for this plant.	vine	sedative; lvs; squeeze leaf juice into eyes; "to not get too crazy when you drink cane rum"
331	ZINGIBERACEAE Costus scaber R.f. Maas MPEG Nº 113639	maquina	tall herbaceous plant 3-4m	eye ailments; inflorescence; One squeezes the juice of the inflorescence into the eyes.

TABLE II

Breakdown of Plants in TABLE I by Use

Aches and Pains in the Viscera	2
Antidotes for Poisons	6
Cuts and Wounds	4
Eye Ailments	9
Fish Poisons	2
Feminine Problems	6
Insect and Animal Bites	4
Jararaca Bite Remedies	9
Poisons	2
Stomachache and Diarrhea	10
Tonics and Fortifiers	3
Toothache	6
Topical Use	8
Other	13
Total	80

Phytosociological Sketches of the Baniwa Eco-zones

Brief descriptions of 16 indigenous eco-zones follow. They are divided in four sections:

Section 1: These eco-zones are presented arbitrarily in order of the canopy height, from small to large.

Section 2: Eco-zones resulting from indigenous agriculture.

Section 3: Flooded eco-zones.

Section 4: Remaining descriptions.

The collection numbers of understory species are given in parenthesis.

NAME IN PANIWA AND TRANSLATION	DESCRIPTION
hamarape "shrub caatinga"	Wide areas of bare sand. Small islands of vegetation, generally less than $1m^2$, form a ± 10% ground cover. Dominated by lichens and graminoids. No trees. Occasional clusters of stunted woody plants ±2m tall.
hamaraperre "low caatinga" "caatinga"	("Hamaraperre" is the general word for all types of low caatinga. It also refers specifically to the type described here.) Shrub caatinga. Soil sandy and humid. Islands of vegetation sometimes greater than $1m^2$. Large sun penetration combined with humidity of soil conditions contributes to a larger number of species in the understory compared to other caatinga subzones. Species observed: ORCHIDACEAE spp.; BROMELIACEAE Aechmea, Bilbergia, and Tillandsia spp.; MELASTOMATACEAE Tococa guianensis Aubl.(808); SELAGINELLACEAE Selaginella amazonica spring.(810). Very open, sparse tree cover of variable height, generally not more than 6m. Species observed: LEGUMINOSAE CAESALPINOIDEA Aldina discolor Spr. ex. Bth.; LISSOCARPACEAE Lissocarpa Bethami Guerke; EUPHORBIACEAE Pausandra martinii Baill.(813). These trees may form clumps or be distributed individually. They often have a rachitic aspect.

NAME IN BANIWA AND TRANSLATION	DESCRIPTION
morrolima "area of morros" EUPHORBIACEAE Pausandra morrinii Baill.	Another type of shrub caatinga. More or less indistinguishable (to my non-Baniwa eye) from the hamaraperre in soil conditions, litter cover, and underbrush species. The predominating Pausandra species reaches 6-8m.
herridzurolima "area of herridzuros" GUTTIFERAE Caraipa grandifolia the "tamaquaré"	Woodland caatinga. Humus cover 3-5cm thick. Trees and shrubs provide more or less continuous cover, with no exposed areas of bare sand. Understory decidedly more open than areas listed above. Many of the same species observed. The taller trees provide more shade, although the patchy, variable height canopy still permits high sunlight penetration. Used by the Baniwas for secondary uprights in house construction because of its long, straight, medium diameter (15-20cm) trunk, the GUTTIFERAE Caraipa grandifolia specimens near Tapira Ponta were 15-18m tall.
aionholima "area of aionhos" EUPHORBIACEAE Micrandra spruceana	Woodland caatinga. Soil more sandy-loamy than soils of eco-zones listed above. Humus 5-10cm thick. Underbrush more open still. These areas - with tall specimens of EUPHORBIACEAE Hevea rigidifolia, Caraipa grandifolia, Aldina discolor amid the marked predominance of Micrandra spruceana - resemble the high caatinga but are definitely considered part of the greater hamaraperre

by the Baniwa. Used by the Indians for corner pillers in house construction because of its thick, straight trunk (+35cm), the tallest specimens of Micrandra spruceana near Tapira Ponta were not more than 20m.

zowacalima
"area of zowacas"
LEGUMINOSAE CAESALPINOIDEA Eperua leucantha Bth.(814)

Forest caatinga or high caatinga. The Baniwas refer to the wapalima as the "terra firme da caatinga". ("Edzauda" means terra firme.) Both areas rest on topographically higher sites with well drained, sandy-loamy soil. The dark brown ground cover of organic material is thicker (10-15cm vs. 8-10cm) in the wapalima than in the zowacalima. Near Tapira Ponta the Eperua purpurea Bth. was almost always taller than the Eperua leucantha Bth.(not more than 25m vs. 15-20m). Character of underbrush completely different from the low caatinga. Both areas were almost completely lacking in representatives of BROMELIACEAE, ORCHIDACEAE, epiphytic plants in general, and PALMAE. Upper canopy generally uniform and continuous. Intense regeneration of eperuas in the lower strata. Trees observed: Hevea Rigidifolia Bth. M. Arg.; Carapaina grandifolia; FABACEAE Nomopteryx uaucu Spruce.

wapalima edzauda
"area of wapas"
LEGUMINOSAE CAESALPINOIDEA Eperua purpurea Bth.

Section 2

NAME IN BANIWA AND TRANSLATION	DESCRIPTION
hivanmẽ "former garden site"	Areas of secondary growth commonly called "capoeira". White sand woodlands are initially recolonized after a fire by secondary elements such as Cecropia, Vismia, Byrsonima, and Pteridium (Ducke and Black 1954). These former garden sites are important sources of medicinal plants for the Baniwa. 15 % of the medicinal plants in TABLE I were found most readily in former garden sites. Collection numbers: 380, 383, 405, 411, 415, 416, 418, 421, 423, 427, 428, 437.
cowreripelima "area of cowreripes" POLYPODIACEAE Cnemidaria sp.(812)	This is another type of secondary growth in response to human land clearing. The "cowreripe" fern completely covers the ground in these areas which have been burned off but tall (+20m) trees remain to provide shade. A root mat with a lichen cover , which can be pulled off the ground like a rug and gives a springy consistency to the footing, covers the ground. Nothing in the underbrush is taller than +30cm. Common species observed: MELASTOMATACEAE Tococa guianensis Aub.; RUBIACEAE Pagamea coriacea spruce ex. Benth. var. acuta Steyerm.(803); Psychotria sp.(811).

NAME IN BANIWA AND TRANSLATION	DESCRIPTION
tianhalima "area of tiorbas" ARECACEAE Mauritia carana	There are several types of caatinga where a particular water economy is the most striking feature. The tionalimas near Tapira Ponta are under 30-40 cm of water throughout the rainy season. Accompanying them on weekly trips to cut the carana leaf for roofing material, the Indians resolutely insisted these areas hold no medicinal plants. These palm swamps rest on sandy alluvial soils, with shrub cover generally 1/2 to 1&1/2m tall. The common species, which generally sit on moss covered tufts, are: terrestrial BROMELIACEAE Aechmea sp.; ARACEAE Montrichardia sp.(805); APOCYNACEAE Odontodenia sp.(806); MELASTOMATACEAE Tococa guianensis Aubl.(808); GUTTIFERAE Vismia cayennensis (Jacq.) Pers.(804).
arapé backwater creeks or "igapós"	Seasonally flooded river bank areas. The annual rise of the water table floods large areas near the Içana's banks from April to August. During the mid-winter months of our field work period, only the crowns of mid-sized and large trees were above water level. The low topographic position and more varied flora of the black water igapo distinguish it from the caatinga. But for Anderson (1981), the two vegetation types form a continuum. Certainly the Baniwa, who generally spend several hours a day in their canoes, regonize the arapé in their use-oriented perspective as an area with its own characteristics distinct from the caatinga. 15% of the medicinal plants

listed in TABLE I, the Indians alleged, can be found only in the arapé. (Collection numbers: 349, 350, 352, 372, 373, 396, 412, 413, 417, 420, 422, 434)

Section 4

coliuainalima
"area of coliuainas"
PALMAE Bactris sp.(382)

Sparsely treed area on sandy soil that resembles the hamaraperre. Low ground topographically, although not flooded. No trees above 8m. Species observed: MYRISTICACEAE Composinera debilis (A. DC.) Warb(800); RUBIACEAE Pagamea coriacea spruce ex. Bth. var. acuta Steyerm.(803); the medicinal species RUBIACEAE Retiniphyllum martianum M. Arg.(426).

cunélima
"area of cunés"
GUTTIFERAE Palmicida ct. L.C. Rich.(815)

Sandy soil. Ground completely covered with SELAGINELLACEAE Selaginella amazonica spring(810). No trees above 7m. Species observed: ERICACEAE Psammisia guianensis Kl.(432)

Listed finally are 3 indigenous eco-zones near Tapira Ponta on which no ecological data was collected.

halapacali
"sand caatinga"

Sparse, super dissecated vegetation. No trees above 8m. Wide areas of bare sand. Appears to be a degraded area.

drecalima
"area of drecas"
EUPHORBIACEAE Hevea rigidifolia Bth. M. Arg.
the "serengueira"

quinholima
"area of quinhos"
FABACEAE Monorterix uauru spruce
the "uaca"

DISCUSSION

The Baniwa Indians have been in more or less continual contact with Luso-Brazilian society for more than 260 years (Galvão 1959). General knowledge of medicinal plants among both men and women in Tapira Ponta remains high. The isolation of the village contributes to keeping their medicinal plant lore intact. It is a 20-30 day round trip to the nearest doctor in São Gabriel de Cachoeira.

Although the plants listed in TABLE I constitute only a small part of the total caatinga pharmacopeia of the Baniwa, some generalizations can be made:

-The Baniwa plant few species for medicinal purposes. As in many other Amazonian Indian cultures (Anderson and Posey, in press), the Baniwa do not make a hard and fast distinction between cultivated and wild plants. Granted this cautionary note, only six of the plants in TABLE I can be said to be clearly cultigens.

-It is unusual how seldom the medicinal preparation is warmed or boiled. Often the plant is merely ground and mixed with water. Striking, too, is the variety of ailments - snake bite, headache, problems calling for a sedative - treated by using the mixture as an eye-drop.

Three categories listed in TABLE I - Poisons, Antidotes for Poisoning, and Antidotes for Jararaca bite - are singled out presently for special discussion.

Poisons and Antidotes for Poisoning

The Baniwa in Tapira Ponta talk often of poisoning and poisoning incidents. It is an important part of their culture. Two renowned shamans live in Tapira Ponta. The seriously ill are canoed more than a 100 km from up and downriver by their relatives to be treated there. Most of the cases are alleged poisonings.

Among other plant poisons, the Baniwa are commonly held to possess:

-The famed piranha poison that induces uncontrollable vomiting followed by rapid death.

-The vulture poison that makes the victim's hair fall out.

-Various slow acting poisons that induce headache and fever culminating in the victim's death weeks later.

Specific data about poison plants, however, was not easily obtained in Tapira Ponta. This information was the shamans' trade secret. Although I came to conclude a Baniwa shaman typically knows 15-20 plant poisons, only two were reluctantly pointed out to me. One has already been identified as an extremely strong gastric poison. An alkoloid, ryanodine, is the toxic principle (Lewis and Elvin-Lewis 1977) in the roots and leaves of the waracama (Flacourtiaceae Rynia speciosa var. bicolor (DC) Monochino). The Baniwa in Tapira Ponta were less reluctant to show their plant poisons' antidotes, six of which are listed in TABLE I.

Antidotes for the Jararaca's Bite

The Baniwa in Tapira Ponta regard a considerable number of plants as antidotes for the bite of the jararaca snake (the fer de lance, a Bothrops sp.). A plant that actually counteracted the effects - destruction of red blood cells, inability of blood to coagulate, destruction of tissue protein - would merit pharmacological study. Nine plants that allegedly serve as antidotes (ape i dapé means "medicine for jararaca bite") are listed in TABLE I.

Why the Baniwa had so many jararaca bite antidotes remained a puzzle throughout my first weeks in Tapira Ponta. Upon inquery, no one could recall a case of snake bite there. Only later did the connection between the Baniwa costume of trading medicinal plant know-how and their nomadism become apparent.

Historical and social factors have formed a strong nomadic tradition among the Baniwa (Oliveira 1971). The mobility of Baniwa families over an enormous area, including villages where missionary informants described the jararaca as a serious problem, accounts for the number of antidotes out of proportion to Tapira Ponta's apparent needs.

For example, two ape i dapé plants listed in TABLE I (Acanthaceae sp.(409) and Cyperaceae Cyperus sp.(429) were planted in their owners' garden plots. Both had been acquired in trades with relatives in Venezuela.

Baniwa Eco-zones

Parker et al. (1983) examined the ethno-ecological systems of four Amazonian communities (two caboclo and two indigenous). They suggested that folk and indigenous knowledge systems are important sources of information for scientists concerned with typology elaboration, carrying capacity theories, and eco-systemic relationships within and between biotic communities.

A well documented finding of modern folk systematics is that many indigenous groups' classification schemes of their biological universe are highly developed (Berlin 1973). Dependent on the local vegetation for materials for shelter, hunting and fishing, transportation, and medicine, the Baniwa have a large and specific nonmenclature for caatinga eco-zones.

The useful tree found there generally gives an eco-zone its name. An eco-zone dominated by the aionho tree (Euphorbiaceae Micrandra spruceana (384) is an aionholima, that is, an area of aionhos. Usually, the species predominates in its name area. In a 10 ha plot of Northwest Amazon caatinga Klinge and Medina (1979) found that Micrandra spruceana composed 45% of the above ground phytomass, a situation corresponding to the aionholimas near Tapira Ponta. The useful tree is not necessarily predominant in its name area, however. An area receives its name due to the useful tree being found there more than anywhere else and not because of an actual predominance in either phytomass or individuals.

The internal emphasis of this indigenous nomenclature is functional and not descriptive. It is the utility of a given eco-zone, and not its physiognomical features, which generally provide its name.

A caveat is thus necessary. The author is not an anthropologist and does not speak Baniwa. Given that this nomenclature operates within a network of cultural assumptions, only with caution should we try to determine correspondances between Baniwa and scientific typologies.

This reservation stated, we proceed to evaluate the Baniwa system of eco-zones. From an ecological point of view, how valid is this nomenclature which has as its key feature descriptive terms for various stands of Amazon caatinga trees?

A pronounced tendency of Amazon caatinga vegetation, per the literature, is for a few species to dominate in the canopy. In a central Amazon caatinga, Anderson et al. (1975, ibid.) found individual species generally in patches of high concentration. In Northwest Amazonia, Rodriguez (1961) compared the vegetation of a 20m x 25m plot of high caatinga to a same size plot of low caatinga. He observed that a few species tended to dominate in the canopy, being different the dominant species in the low and high caatingas. In Guyana, Richards (1957) studied an area of white sand soils dominated by Leguminsae Caesalpinoideae Eperua falcata. He also noted a tendency for a few species to dominate in the upper tree cover.

Traveling the Içana, it is a simple matter to distinguish areas of mixed tropical forest, sclerophyllic closed forest (high caatinga), woodland (caatinga with a canopy of medium height), and shrubland (low caatinga). It is almost inevitable that an indigenous group like the Baniwa, living in intimate contact with nature, would have developed a series of names for the gradiations in between.

How accurate is this more precise indigenous nomenclature? The change between the hamaraperre (low caatinga) and the edzuada (mixed tropical forest) is often abrupt and clear cut. Rodriguez (1961, ibid.) observed that the species of the immediate adjacent mixed forest did not mix with those of the caatinga, or vice versa. Anderson (1981, ibid.) believed this due to a change

in soil conditions. Caatinga vegetation is limited to soils composed entirely of white sand. Where these soils grade into others containing even 5% or less clay within reach of roots the caatinga gives way to other vegetation types.

Within the greater caatinga itself, how precisely can eco-zones be delimited? Near Tapira Ponta, the change from one type of caatinga to another was often surprisingly clear cut. With the Baniwa there for orientation, caatinga eco-zones with high concentrations of an individual species soon became apparent. The Indians also regonized transitional eco-zones. Walking the caatinga they would explain, for example, that although the present area is still an aionholima (area of Micrandra spruceana) it is becoming more and more a zowacalima (area of Eperua leucantha Bth.).

There are practical limits, of course, to an ecological nomenclature based on phytosociological characterization alone. One may indeed be able to distinguish different phases in caatinga vegetation. But these are only reflections of edaphic factors and drainage patterns. Caatinga vegetation is due to some combination of a particular water regime (perhaps flooding followed by complete dissecation of upper soil levels) with a low availability of soil nutrients (Klinge and Medina 1979). Scientific opinion is divided in assigning the relative importance of soil nutrient versus water deficiencies (Viera and O. Filho 1962; Ferri 1960).

The Baniwa in Tapira Ponta were very observant regarding the type of soil and the amount of flooding in a specific eco-zone. They noted variations in the soil and associate them with specific types of plant life. But they took these associations as given and had neither will nor way to inquire into the causes of same.

This must inevitably emerge as ambiguity and lack of precision in their ecological nomenclature. For example, they consistently translated hanarapeme as low caatinga. In what sense is it low? Is the vegetation of lesser height or is the area on lower ground? Klinge and Medina (1979, ibid.) point out that the low caatinga does not always occupy the lowest ground in an area.

A more persistent, Baniwa-speaking researcher would likely have been able to clarify this. Had they seen fit, the Indians were no doubt capable of describing an eco-zone with various epithets, i.e. a high ground hamaraperre with a tree cover of a certain height. But a descriptive vocabulary of the Amazon caatinga that does not consider the role of edaphic factors and the water regime will retain some imprecision and ambiguity.

The elaborate series of eco-zones the Baniwa recognize in the Amazon caatinga is quite efficient for their own purposes, however. It helps give them, for example, nearly infallible predictive ability regarding where a particular medicinal plant can be found.

CONCLUSION

A part of Baniwa floral pharmacopeia has been presented. Members of a highly nomadic indigenous group, the Baniwa in an Amazon caatinga village, Tapira Ponta, were also familiar with mixed tropical forest medicinals. They regard the Amazon caatinga as poor in medicinal flora in comparison with the mixed tropical forest.

The Baniwa recognize close scale eco-zones in the Amazon caatinga. Their nomenclature is generally keyed to the predominant useful tree found in the eco-zone. It is an interesting and detailed ethno-ecological system which could bear further research.

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ANDERSON, A.F. 197[illegible]. Aspectos florísticos e fitogeográficos das campinas e campinaranas na Amazônia Central. Tese de M.Sc. INPA e FUA, Manaus.

ANDERSON, A.B. 1981. White sand vegetation of Brazilian Amazonia. Biotropica 13(3): 199-210.

ANDERSON, A.B., G.T. Prance and B.W.P. Alburquerque. 1975. A vegetação lenhosa da campina da Reserva Biológica INPA-SUFRAMA. Acta Amazonica (5): 225-246.

ANDERSON, A.B., and D.A.Posey. 1985. Manejo do cerrado pelos índios Kayapó. Boletim do Museu Paraense Emílio Goeldi, Série Botânica, in press.

BERLIN, B. 1973. Folk systematics in relation to biological classification and nomenclature. Annual Review of Ecology. (4): 259-271.

BR[illegible]H,L.C., and M.F. da Silva. 1983. Folk medicine of Alter do C[illegible] Pará. Acta Amazonica 13(56).

CA[illegible]ALCANTE, P.B., and P. Frikel. 1973.A farmacopéia Tiriyó. Pub. Avulsas do Museu Paraense Emílio Goeldi 3(24).

DUCKE, A., and G.A.Black. 1954. Notas sobre a fitogeografia da Amazônia Brasileira.Bol. Tec. Inst. Agron. Norte (29): 1-62.

FERRI, M.G. 1960. Contribution to the knowledge of the ecology of the Rio Negro caatinga. Bull. Res. Coun. Israel,8: 195-206.

GALVÃO, E. 1959. Aculturação indigena no Rio Negro. Boletim do Museu Paraense Emílio Goeldi, Antropologia (7).

KERR, W.E., and D.A.Posey. Kayapó medicinal plants. In preparation.

KLINGE, H., and E. Medina. 1979 Rio Negro caatingas and campinas Amazonas states of Venezuela and Brazil. In, Heathlands and Related Shrublands of the World. Elsevier Scientific Publishing Co. Amsterdam.

LEWIS, W.H., and M.P.F. Elvin-Lewis. 1977. Medical Botany. John Wiley & Sons, New York.

[illegible]LIVEIRA, A.E. 19[illegible]9. Depoimentos Baniwa. Boletim do Museu Paraense Emílio Goeldi, Antropologia (72).

[illegible]ER, E., D.A.Posey, J. Frechione, and L.F.da Silva. 1983. [illegible]ource exploitation in Amazonia: ethnoecological examples from four populations. Annals of the Carnagie Museum 52(8):183-202.

POSEY, D.A. 1982. Indigenous knowledge and development: an ideological bridge to the future. Ciencia and Cultura,35(7): 877-894

POSEY, D.A., J. Frechione, J. Eddins, and L.F. da Silva. Ethnoecology as applied anthropology in Amazonian development. Human Organization, 2:43)

PROJETO RADAMBRASIL. 1976. Folha NS 19 Rio Branco
Levantamento de recoursos Naturais, 2: 1-374.

RICHARDS, P.W. 1957.The Tropical Rain Forest. University Press, Cambridge.

RODRIGU W.A. 1961. Aspectos Fitossociologicos das caatingas do Rio Negro. Boletim do Museu Paraense Emílio Goeldi, 15: 1-41.

VIEIRA, L S., and J.P.Oliveira Filho. 1962. As caatingas do Rio Negro. Bolm. Tec. Ints. Agron. Norte, 42:7-32.

ASPECTS OF BANIWA MEDICINAL FLORA AND ETHNO-ECOLOGY

Michael Doyle

RESUMO

Apresentamos nesta pesquisa 60 espécies da flora medicinal de uma aldeia Baniwa, na região de caatinga amazônica do Rio Içana. A vegetação da caatinga amazônica, com suas características de clima semi-árido e baixa diversidade, é considerada pobre na flora medicinal pelos Baniwa. Os índios Baniwa têm um rico vocabulário para as micro-zonas ecológicas da caatinga amazônica. Esta nomenclatura é analisada do ponto de vista ecológico.