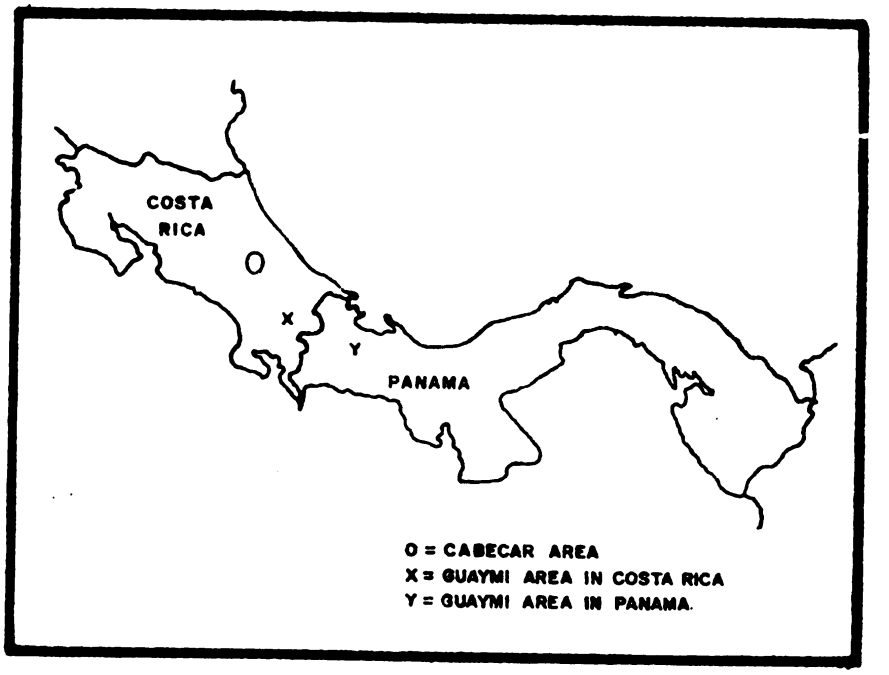
ENDANGERED ETHNOBOTANICAL INFORMATION AND GERMPLASM FROM THE TALAMANCA MOUNTAINS IN PANAMA AND COSTA RICA

Final Report
by
DONALD L. HAZLETT



CATIE
Centro Agronómico Tropical
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Endangered Ethnobotanical Information and Germplasm from the Talamanca Mountains of Panama and Costa Rica

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by

Donald Lavern Hazlett

Submitted to

International Board for Plant Genetic Resources
Plant Production and Protection Division
F A.O., Via delle Terme de Caracalla
00100 Rome, Italy

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INTRODUCTION

This final report includes the results of three expeditions into the Talamanca Mountains of Costa Rica and Panama. These expeditions were supported by the Genetic Resources Unit of the Centro Agronomico Tropical de Investigaciones y Ensenanza (CATIE). Financing was from the International Board of Plant Genetic Resources (IBPGR), a consultative Group on International Agricultural Research, part of the Plant Production and Protection Division of the Food and Agricultural Organization (F.A.O.), of the United Nations in Rome, Italy.

Central America is the center of genetic diversity for several very important groups of agricultural plants. For example, primitive varieties of Phaseolus (beans), and varieties in the squash family (Cucurbitaceae) are still grown in remote areas of Central America. These primitive cultivars may well have been selected for hundreds of years for favorable characteristics such as disease and pest resistence or for increased yield. The concern is that certain genes or combinations of genes present in these cultivar populations could easily be lost, a consequence of changes in land use policy. These expeditions are part of the IBPGR effort to collect these most endangered varieties and to establish them into living collections (germplasm depositories) so that they can be made available for plant breeders.

The utilization of native plants for non-agricultural uses, such as for construction or for medicine, usually has not involved selection to the point where man-selected varieties exist for these plants. Rather, these plants are most often used directly from wild populations and involve species that are not in danger of extinction. However, the empirically obtained information on the method of utilization for a great number of non-agricultural plants is in a very real danger of disappearance.

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I. EXPEDITION PREPARATION AND ITINERARIES

Preparation for the planned Talamanca Germplasm Expeditions involved contacting the following persons to request their opinions and possible participation in regard to the expeditions:

Mr. Gilbert R. Lovell, Coordinator
United States Department of Agriculture
Agricultural Research Service
Southern Region
Regional Plant Introduction Station
Experiment, GA 30212 U.S.A.

Albert E. Kretschmer, Jr.
Agronomy professor
Agricultural Research Center
Ft. Pierce, FA 33450 U.S.A.

Dr. William Burger
Department of Botany
Field Museum of Natural History
Chicago, Illinois 60605, U.S.A.

Prof. Mireya D. Correa A.
Escuela de Biologia
Universidad de Panama
Estafeta Universitaria
Panama, Republic of Panama

Luis Diego Gomez, Museo Nacional de San Jose, C.R.
Jorge Laurito Gomez, Musec Nacional de San Jose, C.R.
Luis Poveda, Museo Nacional y Universidad de Costa Rica, San Jose, C.R.
Rafael Ocampo, Universidad de Costa Rica, San Jose, C.R.

A result of this correspondence was the suggestion by Dr. Kretschmer Jr. to collect the legume genera Calopogonium, Macroptilium, Desmodium, Centrosema, Stylosanthes, Zornia, Teramnus, Aeschynomene, and Vigna. Mireya Correa, an active Panamanian botanist, was interested in sending two students to participate, but at the last minute they could not meet us in Boquete, Panama as planned. A CATIE student and GTZ-CATIE personnel were programed to participate in certain of these expeditions, but other commitments on their part did now allow their participation.

There were numerous logistical chores to attend to. The CATIE-GTZ personnel were helpful in securing the plant import permits for the Panama expedition. The CATIE direction did not allow the proposed per diem allowance, so a long process of contracting persons, including myself, had to be done in order to secure funding for the expedition expenses.

The few Costa Rican organizations that deal with indigenous person affairs were contacted. The main organization of this type is CONAI, the National Commission of Indian Affairs. Topographic maps of the expedition areas were purchased and a literature review was done in preparation for the expeditions.

A. Itinerary of the March 1-7, 1983 Panama Expedition:

March 1 - Leave CATIE, Turrialba at 6:00 a.m. Poveda and Ocampo were picked up in San Jose. Despite border delays we arrived at Boquete, Panama at 7:00 p.m..

March 2 - We contacted Ing. Jorge Mendieta, an agronomist, who gave us information on which farmers to visit in hopes of securing primitive cultivars of Phaseolus. We then drove to Caldera, site of a pumping station for the pipeline. A major hydroelectric dam (La Fortuna) was visitied and we examined the pipeline road, nearly to the continental divide of the Talamanca range. Heavy rains and flooded road sections prevented further entry along the pipeline route. Occasional ethnobotanical interviews were made.

March 3 - We went to David, Panama and consulted with agricultural extension personnel. We were convinced that the Soloy indeginous area was a priority area for us to collect. We drove to Soloy slowly, stopping often to interview the non-indigenous population about plants that were utilized in their home gardens, etc. We arrived late to Soloy and camped there for the night.

March 4 - Poveda and Ocampo hiked into the Guaymí reserve area. I interviewed Guaymí in the Soloy area. Much germplasm collected this day.

March 5 - We returned toward Boquete, Panama, stopping often to conduct interviews. We visitied a large citrus processing plant (CITROPAN) and talked with Lic. Hector Caballero about little used, but potentially important tropical fruits.

March 6 - We returned to Boquete and visted those farmers indicated to us by Jorge Mendieta on March 2. We also interviewed in the town of Porterillos. This was a full day of interviews.

March 7 - The morning was spent in David arranging plant export papers. We returned to Costa Rica, arriving late that evening.

B. Itinerary of the March 23-29, 1983 Cabecar Indian Reserve Expedition:

March 23- Leave CATIE at 7:00 a.m. After a logistic stop in Limón, we arrived at La Fortuna banana plantations at noon. We crossed the Estrella River and walked with full backpacks for 5 hours before camping. Guides were contracted to continue with us into the reserve.

March 24 - Twelve hours of walking toward the Telire area. We camped in Blei, near the Telire River.

March 25 - Houses were interviewed, but houses are scattered (sometimes a four hour walk to the next house), so very few were visitied.

March 26 - Ocampo and I separated during this day to cover more area. I visited houses on the south side of the Telire River, and was able to visit a hot springs that exists in this area.

March 27 - We started back, collecting plants and interviewing along the way. Spent the night in Rangalle.

March 28 - A full day of walking to leave the reserve area. One of the Cabecar persons was contracted to collect beans and corn in remote areas of the reserve and then to call me. He did call and provided us with some good collections.

March 29 - Returned to CATIE, Turrialba and worked with the collections.

C. Itinerary of the July 15-20, 1983 Parque La Amistad Expedition

July 15 - Leave CATIE at 6:00 a.m. Once in the Portrero Grande area we interviewed several farmers, but unfortunately got the vehicle stuck in a dompour and were luck to reach San Vito late that evening.

July 16 - We contacted agricultural extention personnel in San Vito and the collected fruits in the public market. We were fortunate to visit a Guaymí medicine man in the nearby Cote-Brus Guaymí Reserve.

July 17 - We drove to the Parque La Amistad area, conducting interviews and collecting along the route. Interesting taxonomic collections were made, but little collectable priority germplasm was seen or collected.

July 18 - We took side roads into the Talamanca Mountains as accessed from San Vito. Little germplasm of priority value was seen or collected.

July 19 - We left San Vito an drove to Ciudad Neily, interviewing certain farmers along the way. We then drove to San Isidro General and collected fruits in the public market.

July 20 - We visited a "curandero" clinic (José Sanabria) and a intervied a few persons before returning to Turrialba.

II. EXPEDITION PERSONNEL

Many persons were interested in accompanying me during these expeditions. From various applicants I decided to contract Luis Poveda of the Museo Nacional and Rafael Ocampo of the University of Costa Rica. Poveda was selected because of his extensive knowledge of plant taxonomy and because he is the current authority on medicinal plants in Costa Rica. Ocampo was selected because he worked many years in the Teliré and Guaymí Indian reserve areas in Costa Rica and his participation was considered fortunate. Persons who accompanied me on expeditions but who were not contracted were Wlfram Murrillo, a biologist with the Nature Conservancy Project in San Jose, Costa Rica and Christopher Upton, a forester doing special studies at CATIE.

A summary of the personnel that participated in each of the expeditions follows:

1. The Panama Expedition:	Donald L. Hazlett, principal investigator Rafael Ocampo, contracted plant collector Luis Poveda, contracted plant collector
2. The Teliré Reserve Expedition:	Donald L. Hazlett, principal investigator Rafael Ocampo, contracted plant collector Wlfram Murillo, non-contracted participant
3. The Coto-Brus / Parque Amistad Expedition	Donald L. Hazlett, principal investigator Christopher Upton, non-contracted participant

Luis Poveda and Rafael Ocampo were required by contract to assist in the taxonomic identification of collected plant specimens and to submit a report to the principal investigator. They satisfactorily completed these contract requirements and I have incorporated many aspects of their reports into this final report.

III. MATERIALS AND METHODS

A key aspect of plant genetic resource collecting is the selection of the collection areas. Collection areas were selected on the basis of the existence of indigenous populations that were known to cultivate primitive varieties of beans and corn. Once indigenous settlements were reached, residents were questioned about the types of crops they grew and whenever possible we asked to see the types of crops they refered to. A greater effort was made to see and to collect those plants listed as priority crops in the IBPGR bulletins. Whenever possible side roads were taken and houses with extensive gardens or mentioned by pervious interviews as a source of interesting crops were visited first. A tape recorder was purchased and used to record many of the interviews. This tape recorder was especially useful in documenting the Cabecar and Guaymí common names of plants. The tapes were played to persons who best knew the indigenous languages in order to attemp a correct spelling.

Collection times were two expeditions during the dry season and one during the rainy season. The Coto-Brus or rainy season expedition was much less rewarding as far as germplasm collections were concerned. The dry season proved to be the best time of year for collections.

Seed collections were placed in numbered paper bags. Cuttings were tagged, moistened and placed in plastic bags. As soon as collections arrived in Turrialba they were taken to the greenhouse of the Plant Genetic Resource Division and given a CATIE introduction number (Tables 1-3). For each collection the IBPGR plant collection information sheet was filled out. These sheets are sent to Rome with this final report.

Because of the great distances between houses in the Telire Reserve and our limited field time, it was useful to contract a Cabecar man to collect seeds in the houses of the Telire Alto region. He did an excellent job, collecting material from April 11 - 16. He was probably much more effective at requesting and purchasing germplasm than we would have been. In a similar fashion, it was quite useful that Rafael Ocampo could be contracted, since the Guaymí and Cabecar people knew him. I am sure his presence facilitated many collections. It was necessary both in Panama and in Costa Rica to purchase from the people the seeds that we wanted to collect.

Taxonomically valuable collections were made in the Telire Reserve (my collection numbers 5121 - 5215) and in the Parque La Amistad area (Nos. 5216 -5254). These collections are at the National Museum in San Jose, Costa Rica.

IV. LIVING GERMPLASM COLLECTIONS

For all three expeditions 174 different collections were made (Tables 1-3). The Panama expedition introduced 108 collections of 44 different species into the CATIE germplasm depository (Table 1). Only three of these introductions have not survived as of Sept 1, 1983. The Cabecar Reserve expedition introduced 57 collections of 27 different species into the CATIE depository (Table 2). As of Sept. 1, 1983 four of these collections have been lost (Table 2). The Coto-Brus / Parque La Amistad expedition introduced 9 collections of 7 species into the CATIE germplasm depository (Table 3). Only one of the Coto-Brus introductions has not survived as of Sept. 1, 1983 (Table 3).

The material that seemed to be the most valuable was collected in the Guaymí area region around Scloy, Panama and the Telire Alto region in Costa Rica. In specific, the Phaseolus varieties from these areas were very diverse and an evaluation of this material should prove very interesting. I suggest that IBPGR personnel consider the best ways to incorporate germplasm of this type into ongoing plant breeding and evaluation programs.

Table 1. Scientific name, common name, collector's ID number and CATIE's introduction number for collections from western Panama made March 1-7, 1983.

Scientific Name	Common Name	Collector's ID Number	CATIE's ID Number
1. Abelmoschus esculentus Medic.	(ñangu)	13	14259
2. Anacardium occidentale L.	(marañon)	24	14220
" "	"	30	14276
3. Annona purpurea Moc. & Sessé	(anona)	25	14271
4. Annona reticulata L.	"	74	14320
5. Bixa orellana L.	(achote)	2	14248
" "	"	80	14326
6. Cajanus cajan (L.) Huth	(fijol de palo)	37	14283
" "	"	60	14306
" "	"	66	14312
" "	"	76	14322
7. Canavalia gladiata (Jacq.) DC	(haba)	87	14333
8. Capsicum frutescens L.	(ají)	20	14266
" "	"	38	14284
" "	(ají picante)	78	14324
9. Cassia sp.		3	14249
10. Cucurbita sp.	(ahuyama)	40	14286
"	"	69	14315
"	"	89	14335
"	"	91	14337
"	"	92	14338
"	"	105	14351
11. Curcuma domestica Val		72	14318
12. Datura metel L.	(violeta de ángel)	1	14247
13. Dioscorea bulbifera L.	(papa del aire)	96	14342
14. Dioscorea trifida L.f.	(ñampi)	83	14329
" "	"	104	14350
15. Dioscorea sp.	(ñame)	10	14256
"	"	85	14331
16. Dioscorea sp.	(chucúmi)	22	14268
17. Dorstenia sp.		107	14353
18. Erythrina sp.	(poró)	108	14354
19. Gossypium sp.	(algodón)	16	* 14262
"	"	61	14307
20. Jacaranda caucana Pittier	(gualandai)	19	14265
21. Jatropha curcas L.	(coquillo, bola)	14	14260
" "	" "	41	14287
22. Lagenaria siceraria (Mol.)Standl.	(tula)	39	14285
" "	"	73	14319
23. Luffa aegyptiaca Mill.	(trespájo)	71	14317
24. Lycopersicum lycopersicum (L.) Karst. ex Farw.	(tomate)	101	14347
25. Manihot esculenta Crantz	(yuca morado)	27	14273
" "	(yuca blanco)	28	14274
" "	(yuca verde)	29	14275

* Plants that had seed or cuttings that for various reasons died and no longer exist in the CATIE collections.

Table 1 (continued)

	Scientific Name	Common Name	Collector's ID Number	CATIE's ID Number
26.	Marantha arundinacea L.	(sagu)	103	14349
27.	Ocimum aff. micranthum Willd.	(toronjin)	12	14258
	" "	"	26	* 14272
	" "	"	81	* 14327
	" "	"	88	14334
28.	Phaseolus coccineus L.	(haba)	63	14309
29.	Phaseolus lunatus L.		5	14251
30.	Phaseolus sp. (lunatus ?)	(haba)	21	14267
	" "	(haba pintada)	33	14279
	" "	(haba morada)	34	14280
	" "	(haba negra)	35	14281
	" "	(haba)	48	14294
	" "	(haba)	49	14295
	" "	(haba blanca)	55	14301
31.	Phaseolus vulgaris L.	(frijol)	17	14263
	" "	(frijol)	18	14264
	" "	(frijol de conejo)	42	14288
	" "	(frijol)	45	14291
	" "	(frijol chiricano colorado)	50	14296
	" "	(boróto; boróto)	52	14298
	" "	(frijol chiricano)	53	14298
	" "	(fijol chiricano)	54	14300
	" "	(frijol de mantequilla)	75	14321
	" "	(frijol kalima)	79	14325
	" "	(frijol negro)	93	14339
	" "	(frijol de manteca)	94	14340
	" "	(frijol)	95	14341
	" "	(frijol payar morado)	97	14341
	" "	(frijol negro)	98	14344
	" "	(frijol kimboy)	102	14348
32.	Phaseolus sp.	(haba blanca)	56	14302
	"	(frijol)	36	14282
33.	Oryza sativa L.	(arroz negro)	67	14313
34.	Phlebodium sp.	(calaguala)	7	14253
35.	Psidium sp.		23	14269
36.	Rheedia edulis Triana & Planch	(Taroba)	70	14316
37.	Sechium edule (Jacq.) Swartz	(chyote)	100	14346
38.	Theobroma cacao L.	(cacao criollo)	99	14345
39.	Vetiveria zizanoides (L.) Nash ex Small	(valeriana)	9	14255
40.	Vigna umbellata (Thunb.) Ohwi & Ohashi	(frijol miniatura)	16	14252
	" "	" "	86	14332
41.	Xanthosoma violaceum Schott	(otoe morado)	4	14250
41.	Xanthosoma sp.	(otoe rosado)	84	14330
	"	(otoe)	82	14328
	"	(otoe)	62	14308

Table 1 (continued)

	Scientific Name	Common Name	Collector's ID Number	CATIE's ID Number
42.	Xylopia frutescens Aubl	(malagueta hembra)	59	14305
43.	Zingiber officinale Roscoe	(gingibre)	8	14254
44.	Zea mays L.	(maiz)	11	14257
	" "	"	31	14277
	" "	"	32	14278
	" "	"	43	14289
	" "	"	44	14290
	" "	"	46	14292
	" "	"	47	14293
	" "	"	51	14297
	" "	"	57	14303
	" "	"	58	14304
	" "	"	64	14310
	" "	"	65	14311
	" "	"	68	14314
	" "	"	90	14336
	" "	"	106	14352

able 2. Scientific name, common name, collector's number and CATIE's introduction number for collections from the Cuen, Rangalle, Telire regions of Limón Province, Costa Rica. Collected March 23-29 and April 11-15, 1983.

	Scientific Name	Common Name	Collector's ID Number	CATIE's ID Number
.	Acisanthera sp.	"charícri"	162	14584
.	Capsicum sp.	"cha" (beige color fruits)	109	14375
	" "	"cha" (red color fruits)	110	14376
	" "	" " " "	122	14388
	" "	"teshui"	139	14561
	" "	"	157	14579
.	Carica papaya L.	"serpe kicha"	154	14576
.	Cedrela odorata C. & S.	"urúk" / cedro	130	* 14396
.	Chrysophyllum sp.	caimito del monte	129	* 14395
.	Cucurbita sp.	calabasa	153	14575
.	Dioscorea sp.	ñame	134	14400
	" "	"	159	14581
	" "	"	165	14587
.	Dorstenia contrajerva L.	contrayerba	132	14398
.	Erythrina costaricensis N. Mich.	poró	125	14391
.	Fevillea cordifolia L.	cabalonga	160	14582
.	Gossypium sp.	algodón	121	14397
.	Habenaria sp.	"narikape"	133	14399
.	Leguminosae	"octavoria"	158	14580
.	Manihot esculenta Crantz	yuca	116	14382
.	Peperomia sp.		163	14585
	" "		164	14586
.	Phaseolus vulgaris L.	"kani dorrórro"	123	14389
	" "	"kani" / frijol	124	14390
	" "	" "	138	14560
	" "	" "	140	14562
	" "	" "	141	14563
	" "	" "	142	14564
	" "	" "	143	14565
	" "	" "	144	14566
.	Psidium friedrichsthalianum Berth. & Hook	cas	111	14377
.	Persea americana Mill	"ha mo" / aguacate	128	* 14394
.	Pouteria sp.	sapote	119	* 14385
	" "	"	120	14386
.	Ricinis communis L.	higuerilla	161	14583
.	Smilax sp.		135	14401
	" "		156	14578

Table 2. (continued)

Scientific Name	Common Name	Collector's ID Number	CATIE's ID Number
22. Solanum		137	14403
23. Unknown Tree (Fruit with orange pulp. Leaves compound, opposite, without stipules)	"cuiki"	155	14577
24. Vanilla planifolia Andr	vainilla	131	14397
25. Verbenaceae		136	14402
26. Xanthosoma sp.	tequisque	127	14393
27. Zea mays L.	maiz	112	14378
" "	"	113	14379
" "	"	114	14380
" "	"	115	14381
" "	"	117	14383
" "	"	118	14384
" "	"	126	14392
" "	"	145	14567
" "	"	146	14568
" "	"	147	14569
" "	"	148	14570
" "	"	149	14571
" "	"	150	14572
" "	"	151	14573
" "	"	152	14574

* Plants that have died and have no material in the CATIE collections.

Table 3. Scientific name, common name, collector's ID number and CATIE's introduction number for collections from the San Vito / Parque La Amistad area, Puntarenas Province, Costa Rica. Collected from July 15-20, 1983.

Scientific Name	Common Name	Collector's ID Number	CATIE's ID Number
• Bixa orellana L.	achote	209	15357
• Cucurbita sp.	cuero lagarto	200	15349
" "	ayote calabasa	201	15350
" "	ayote zapayo	202	* 15351
• Cucurbitaceae	pepino hybas	203	15352
• Persea americana Mill	augacate	206	15355
• Phascolus vulgaris L.	frijol	205	15354
• Psidium guajava L	guayaba	204	15353
• Zea mays L.	maiz	208	15356

* Plants that have died and have no material in the CATIE collections

V. ETHNOBOTANY IN NON-INDIGENOUS AREAS

As indicated on the expedition itineraries, many non-indigenous persons in Panama and Costa Rica were interviewed. Questions were asked about their use of primitive cultivars of crop plants and about medicinal plant uses in general. Most of the plant use information obtained from these interviews (Table 4), was already reported in either Pittier (1978) or Duke (1972). Previously undocumented information, however, in regard to medicinal plant dosing, mode of medicinal plant application or preparation and plant combinations utilized were obtained. Home gardens were the source of most of the medicinal plant information, since most persons had limited access to native vegetation. The most frequent medicinal plants in home gardens were oftentimes plants that were easily propagated. This suggested that frequent plantings of certain medicinal plants (such as Cassia alata or Ocimum micrantha) may reflect the ease of propagation rather than frequent planting because of an effective use.

A European influence in the use of medicinal plants was definitely present. For example, the use of Ruda (Ruta chalapensis), Sávila (Aloe vulgaris), Manzanilla (Chrysanthemum parthenium) and other exotics was common (Table 4). Many of these exotics were probably introduced centuries ago by Spanish colonizers. Book illustrations of North American plants had led to mis-identifications for certain plants. For example, Chaptalia nutans is similar in appearance to Taraxicum officinale, was even called "diente de león" (dandilion) in Panama, and leaves were being eaten in accordance with the book description for dandilion. Fortunately, Chaptalia leaves are not toxic, although I am surethey are much less palatable than Taraxicum leaves. A similar mis-identification of Pseudoelphantopus spicatus as Cichorium intybus (chicory) and used as Cichorium in a tea was also recorded.

Many native plants have also found a place in Panamanian and Costa Rican home remedies (Table 4). Of the native plant uses described on Table 4, many are also used by Guaymí or Cabecar populations (Tables 5 and 6). One of the clearest examples is "pasmo" (Siparuna sp.). This native plant was one of the most reoccuring medicinal plants in both indigenous and non-indigenous areas of the Pacific slope region near the Panamanian and Costa Rican border. Many indigenous plant uses eventually find their way into home remedies of the general population. This process is a type of natural selection that may (or may not) promote the propagation of those plants that are the most effective remedies. Of special interest are tree products that cannot be propagated in home gardens very easily, but which are often used as a remedy. One of the most interesting plants in this category is "caraña hedionda" (Table 4).

As in the Guaymi and Cabecar populations, there are also "curanderos" (medicine men) in the non-indigenous populations. One such "curandero" was visited in San Isidro General, Costa Rica. This particular "curandero" was named José Sanabria, a man of Indian ancestory. In his make-shift clinic it was necessary to take a number and wait over an hour in order to see this "doctor". Each patient that entered his office carried an empty bottle (there was as house across the streetthat sold bottles in case someone forgot to bring a bottle) and left the clinic with their bottle filled with medicine. José was quite willing to talk with me, perhaps because I mentioned I worked with Luis Poveda (a friend of his) in studying medicinal plants. Instead of utilization of medicinal plants, José purchased generally available health items from pharmacies. He used an essence of rhubarb, essence of mint, a nutmeg based mixture, bicarbonate of soda, mineral water, etc. in specific combinations for different disorders. He admitted that certain of his patients were probably hypochondriacs, but he was convinced his prescriptions for many ailments were effective. He talked of patients who had been completly examined by hospitals and told they were not sick, but they still suffered pain. I could understand how his soothing manner and a prescribed bottle of medicine could improve these patients well being, psychologically if not physically. The clientel of this clinic included many upper and middle class persons.

In general, the ethnobotanical interviews in non-indigenous areas indicated an accute interest in medicinal plants, both in Panama and in Costa Rica. Home remedies may in part be an economic necessity due to increasing costs and scarcity of pharmacy drugs. There is an effort in Costa Rica (Luis Poveda) to promote the use of medicinal plants as an effective alternative to expensive pharmacy druge. Key problems such as the quality control and exact prescription dose are obstacles in the utilization of native plants. Nevertheless, the population is indeed interested in medicinal plants althoughthere are no illustrated medicinal plant books or booklets that include medicinal uses and application techniques for many of the commonly used native plants in Panama and Costa Rica.

Table 4. Plants noted as utilized by non-indigenous populations of: 1) the southern slope of the Talamanca mountains from Boquete to Soloy in Chiriqui province, Panama during the March 1-7 expedition (Pan.). and 2) in the San Vito-La Lucha region of Puntarenas province, Costa Rica during the July 15-20 expedition, 1983 (C.R.).

Scientific Name	Common Name	Plant Family
Abelmoschus esculentus Medic.	ñangu / okra	Malvaceae
Herb. Eaten as a vegetable or seeds roasted and ground with coffee to give a special flavor (Pan.).		
Acalypha arvensis Poepp. & Endl.	meona	Euphorbiaceae
Herb. Entire plant is cooked and eaten for kidney problems. To treat prostrate gland problems this plant is boiled with Stachytarpheta (verbena), Sida rhombifolia (escoba de puerco) and Pseudoelephantopus spicatus (chicoria) branches and a tea is taken (Pan.).		
Acrocomia vinifera Oerst.	coyol	Palmae
Palm. Ocassionally used to produce an alcoholic drink and as a source of heart of palm (Pan. and C.R.)		
Aechmea aff. magdalenae (Andre) Andre ex Baker	cebita	Bromeliaceae
Ground bromeliad. Fiber is extracted from the leaves and is woven into bags (known as "chacras" in Guaymí). Pan.		
Alfaroa costaricensis Standl.	arinillo	Juglandaceae
Tree. Valuable timber species (Pan.).		
Alibertia edulis (L. Rich) A. Rich	madroño	Rubiaceae
Shrub. Small branches are boiled in water and taken to treat certain kidney disorders (Pan.).		
* Aloe vulgaris Bauch	sávila	Liliaceae
Herb. Succulent stems used directly on skin to treat burns. Parts of the leaf are cooked with a type of sugar ("dulce de tapa") and taken to treat sexual impotency or ulcers (Pan. and C.R.).		
* Alternanthera bettzickiana (Regel) Standl.	alcancel	Amaranthaceae
Three branchlets (with leaves) of the red variety are boiled in water and taken to treat fever (Pan.). Shrub.		
Ambrosia sp.	altamisa	Compositae
Herb. Branchlets are boiled and taken in a tea for stomach aches or used to bathe the body to treat rheumatism or colds. Branches are also mixed with Buddleia americana and Aloe vulgaris leaves and placed in a bottle of rubbing alcohol for use in treating rheumatism (Pan. and C.R.).		
Anacardium excelsum (Bert. & Balb.)	espavé	Anacardiaceae
Tree. Valuable timber species (Pan. and C.R.)		
* Anacardium occidentale L.	marañon	Anacardiaceae
Tree. Trees with many ripe fruits during March and April (Pan. and C.R.)		
* Ananas comosus (L.) Merrill.	piña	Bromeliaceae
Ground bromeliad. Planted for the fruit.		
Andira inermis (Swartz) H.B.K.	almendro del rio	Leguminosae
Tree. Valuable timber species (Pan. and C.R.)		
Annona muricata L.	guanábana	Annonaceae
Tree. Edible fruit. Leaves boiled in a tea and taken to treat diarrhea (Pan. and C.R.).		

Table 4. (continued)

Scientific Name	Common Name	Plant Family
Annona reticulata L.	anón, anona	Annonaceae
Tree. Edible fruit (Pan. and C.R.).		
Bauhinia sp.	escalera de mico	Leguminosae
Liana. Stem sections are sold in public markets to treat disorders such as gastritis, high blood pressure and liver problems. Stem is boiled in combination with Quassia amara to treat diabetes (C.R.).		
Bocconia frutescens L.	tabaquillo	Papaveraceae
Shrub. Roots and bark boiled. The tea is taken to treat stomach pains (Pan. & C.R.		
Bombacopis quinatum (Jacq.) Dugand	pochote	Bombacaceae
Tree. Timber species (Pan. and C.R.).		
Bryophyllum pinnatum (Lam.) Kurz.	hoja del aire	Crassulaceae
Herb. Succulent leaves used to bathe or taken in a tea by persons suffering with fainting spells or weakness (Pan.).		
Buddleia americana L.	salvia	Loganiaceae
Shrub. Boiled leaves (3 per cup) are taken for colds and weakness. See Ambrosia sp. (Pan. and C.R.).		
Bursera simaruba (L.) Sarg	indio desnudo/ jiñocuave	Burseraceae
Tree. Bark taken to treat stomach ulcers (C.R.).		
Byrsonima crassifolia (L.) D.C.	nance	Malpigiaceae
Tree. Edible fruit and used for posts and firewood. Bark is put in water to boil and extract is placed (in a towel) onto open wounds (Pan.).		
Calea prunifolia		Compositae
Herb. Branches are soaked in water and watery extract is used to wash lumber to protect lumber from boring insects (Pan.).		
Calophyllum brasiliense (Camb.) var. rekoi Standl.	María	Guttiferae
Tree. Timber species (Pan. and C.R.).		
Canavelia gladiata (Jacq.) D.C.		Leguminosae
Vine. The seed is stripped of the seed-coat and the cotyledon half is placed on swollen or aching gum areas of the mouth (condition known as "corrimiento" in Spanish). Pan.		
Capraria biflora L.	naranjito	Scrophulariaceae
Herb. Branches of this plant plus Anacardium occidentale sprouts are boiled and taken for diarrhea (Pan.)		
Capsicum frutescens L.	aji brujito	Solanaceae
Shrub. Fruit used to spice foods, etc. (Pan. and C.R.).		
"Caraña hedionda"		Burseraceae ?
Tree. A black paste that exudes from the trunk is sold in pharmacias. This tree apparently grows in the "Bocas de Toro" area on the northern slopes of the Talamanca mountains (not visited). Treatment with this paste was seen several times and several other times the treatment was mentioned as quite effective. Used to treat "aire" (low back pains from stress) and for headaches (applied to the temples of the head (Pan.).		
Cassia alata L. & C. reticulata Willd.	laureña	Leguminosae
Shrub. Leaves of both species used to treat constipation and rheumatism (Pan.). Boiled and taken internally as a tea.		

Table 4. (continued)

Scientific Name	Common Name	Plant Family
Chaptalia nutans Polak.	pipita, curalotodo, sanalotodo lengua de buey, diente de león	Compositae

Herb. Leaves and roots are boiled and eaten for liver problems (Pan.). This plant has apparently been confused (is similar in appearance) with book illustrations of Taraxacum officinale (dandelion). In Bocas del Monte, Panama a lady was eatting the leaves, believing Chaptalia to be Taraxicum.

Chrysanthemum parthenium (L.) Bernh. manzanilla Compositae

Herb. Often used in tea (leaves and stems are bolied) to treat colics and to promote good health in general (Pan. and C.R.).

Citharexylum sp. pasmo de sol Verbenaceae

Shrub. Branches are boiled. A cotton or a cloth is soaked in the water and is applied to aching or swolen teeth (Pan.).

Citrus sp. toronja, naranjo, limón Rutaceae

Trees. Often cultivated for the fruits. Lemons are a favorite remedy for colds and influenza (Pan. and C.R.).

Clematis dioica L. Ranunculaceae

Vine. Strong, flexible stems used to tie when other material is not available (Pan.)

Clusia aff. rosea Jacq. copey Guttiferae

Tree. Bark and root solution is used to soak sore feet (Pan.).

Coffea arabica L. café Rubiaceae

Shrub. Leaves are placed on the forehead to relieve headache (Pan.).

Cordia panamensis Riley Boraginaceae

Shurb. Used for firewood (Pan.).

Cornus disciflora DC. mata hombro Cornaceae

Tree. Timber species around Boquete, Panama.

Cornutia grandifolia (Schlecht. & Cham) palo cuadrado Verbenaceae

Shrub. Branches are boiled and water is used for bathing (Pan).

Crescentia cujete L. calabazo Bignoniaceae

Tree. Gree fruits are chopped, boiled, mixed with honey and taken while fasting as a purgative (Pan.). This recipe is given to women three days after giving birth.

Critonia morifolia salvia fusionaria Compositae

Shrub. Branches are boiled and water is used to bath persons with asthma (Pan.).

Croton xalapensis H.B.K. targúa blanco Euphorbiaceae

Tree. Used for living fenceposts and for firewood (Pan. and C.R.).

Cupania guatemalensis Radlk pozolillo (in. C.R.) Sapindaceae

Tree. Used for firewood (Pan.).

* Cupressus aff. lusitanica Miller ciprés Cupressaceae

Tree. Branches are boiled in water and small amounts taken for insomnia (Pan.).

* Cymbopogon citratus (DC.) Stapf. yerba de limón, zacate limón Graminae

Grass. Often boiled to make tea. Mixed with Buddleia americana (salvia), Lippia alba (mastranto), and Annona muricata (guanábana) leaves to make a tea taken to lower blood pressure (Pan.).

* Datura metel violeta de ángel Solanaceae

Shrub. Used as an ornamental (Pan.). A source of the alkaloidal drug scoploamine.

Table 4. (continued)

Scientific Name	Common Name	Plant Family
Desmodium aff. canum Schinz & Thell.	pega-pega	Leguminosae
Herb. The root is boiled and the water taken for kidney problems (Pan.).		
Dioscorea sp.	chukni	Dioscoreaceae
Vine. Edible tubers (Pan. and C.R.).		
Enterolobium cyclocarpum (Jacq.) Griseb.	curutú (Pan.)	Leguminosae
Tree. Timber species (Pan. and C.R.).		
Eugenia sp.	murta	Myrtaceae
Tree. Edible fruits (C.R.).		
Genipa americana L.	guaitil	Rubiaceae
Tree with edible fruit (Pan. and C.R.).		
Gliricidia sepium (Jacq.) Steud.	"bala in guaymí"	Leguminosae
Tree. Used as living fenceposts and for firewood (Pan. and C.R.).		
Guazuma ulmifolia Lam	guácimo	Sterculiaceae
Tree. Fruit used in a drink for diarrhea and wood used for firewood (Pan. and C.R.		
* Hibiscus rosa-sinensis L.	flor de reina	Malvaceae
Shrub. Flowers mixed with rose petals in a tea for colds (Pan.).		
* Hibiscus sabdariffa L.	saril	Malvaceae
Herb. Used to make a fermented drink (calyces are utilized). Said to be a potentially important plant as a colorant (Pan.). Calyces have little flavor and little nutritional value, but do produce a bright red color.		
Hymenaea courbaril L.	guapinol (C.R.)/algarrobo (Pan.)	Leguminosae
Tree. Timber species with edible fruit (Pan. and C.R.).		
Hyptis capitata Jacq.	corrimiento hueco	Labiatae
Herb. Leaves boiled and water extract used to bathe infected areas of skin. Cloth soaked in water and applied to toothaches. A tea taken for weakness that follows bathing after excessive physical activity (Pan.).		
* Impatiens sultani Hock f.	novios	Balsiniaceae
Herb. Succulent stem applied to skin for burns (C.R.).		
Jatropha curcas L.	coquillo, "bóla in guaymí	Euphorbiaceae
Tree. Living fencepost species. Seeds are a source of a quality oil with a potential in agroindustry (Pan. and C.R.).		
* Jasminum officinale f. grandiflorum (L.) Kobuski or Jasminum grandiflorum L.	jazmín	Oleaceae
Vine. Four corollas are soaked in water for 3 or 4 hours and taken as a tranquilizer (Pan.).		
Justicia pectoralis Jacq.	curia	Acanthaceae
Herb. Leaves boiled in water and water used to bathe children (Pan.).		
Lantana camera L.	pasaruín	Verbenaceae
Shrub. New branch sprouts used (boiled in water) as a tea to treat cold. Water extract also used for bathing to treat sinus infections (Pan.).		
* Laurentia longiflora (L.) Pentern. (more recently Hippobroma longiflora (L.) G. Don		Lobeliaceae
Herb. Poisonous, but planted around houses to keep snakes away (Pan.).		

Table 4. (continued)

Scientific Name	Common Name	Plant Family
Lippia alba (Mill.) N.E. Brown	mastranto (Pan.) guanilama (C.R.)	Verbenaceae
Shrub. Entire plant cooked and taken in a tea for intestinal parasites. Three branches taken in a water infusion to lower blood pressure (Pan. and C.R.). See Cymbopogon citratus.		
Lippia dulcis Trevir	mastranto (Pan.) / guanilama (C.R.)	Verbenaceae
Shrub. Used as Lippia alba. Also, leaves are boiled and a tea taken for coughs (Pan.).		
Loranthaceae (Phoradendron sp. ?)	serreno del aire	Loranthaceae
Parasite. Grows in Citrus and many other garden trees. Leaves are boiled and a tea is given to women during childbirth (Pan.).		
Luffa cylindrica (L.) Roem	trespajo	Cucurbitaceae
Vine. Fibery fruit material used as a bathing sponge. Seeds said to be a source of a quality oil (Pan. and C.R.).		
Manihot esculenta Crantz	yuca	Euphorbiaceae
Shrub. Edible rhizomes (Pan. and C.R.)		
* Mentha aff. citrata Ehrh.	hierbabuena	Labiatae
Herb. Cooked and taken to calm, not kill intestinal parasites. Once calmed, a second medicine is taken to eliminate the parasites (Pan.). Other non-native Mentha leaves are also used in teas.		
Momordica charantia L.	pepinillo / balsamina	Cucurbitaceae
Vine. Boiled in water and a tea is taked to lower blood pressure (Pan. and C.R.)		
Neurolaena lobata (L.) R. Br.	gavilana	Compositae
Herb. Cooked and taken as a tea to treat fever and bile problems (Pan.).		
* Ocimum micranthum Willd.	toronjina / albaca	Labiatae
Herb. Leaves are cooked and a tea is taken to treat colds (Pan. and C.R.) Similar to Ocimum basilicum L. (albahaca) and the two are used for similar disorders, principally colds.		
* Passiflora edulis Sims	maracuyá	Passifloraceae
Vine. Edible fruit (Pan. and C.R.).		
Passiflora aff. standleyI Killip	calsoncillos	Passifloraceae
Vine. Leaves boiled to a tea to treat amoebas (C.R.).		
Pedilanthus tithymaloides (L.) Poit.	pie de niño	Euphorbiaceae
Shrub. Succulent stems are boiled (sever sections or leaves per bottle) and taken in small amounts for cough (Pan.).		
Persea americana Mill.	aguacate	Lauraceae
Tree. Three-forths of a leaf (central vein removed) is made into an infusion (leaf placedin boiled water) and taken for 15 days to reduce blood pressure (Pan. Bark and leaves also used to control diarrhea (C.R. and Pan.).		
Petiveria alliacea L.	ocaña	Phytolaccaceae
Herb. Leaves crused and applied to animals or left in the house to keep fleas away (Pan.).		
Phlebodium sp.	calaguala	Polypodiaceae
Fern. Rhizome cooked in a tea and taken for intestinal cancer or for bruises (Pan. and C.R.).		

Table 4 (continued)

Scientific Name	Common Name	Plant Family
Phoradendron undulatum (Pohl.) Eichl.	matapalo de guayabo	Loranthaceae
Parasite. Leaves boiled and water taken as a tea to reduce blood pressure (Pan.		
Piper auritum H.B.K.		Piperaceae
Shrub. Leaves boiled and water used for bathing to treat insomnia (Pan.).		
Plumeria acutifolia Poir.	ceracucha	Apocynaceae
Tree. Flowers (especially the yellow variety) are left to soak in water for one night. The colored water is then used to bathe irritated eyes (Pan.).		
Porophyllum aff. ruderale (Jacq.) Cass	ruda macho	Compositae
Herb. Entire plant boiled in water and used for bathing to treat involuntary muscle spasms of the face and for back stress (Pan.).		
Posoqueria latifolia (Rudge) Roem. K. Schult.	huevo do mono	Rubiaceae
Tree. Edible fruits (Pan. and C.R.). Also an attrative tree as an ornamental.		
Pseudelephantopus spicatus (Juss.) Rohr.	chicoria	Compositae
Herb. The root is boiled and the water is taken in a tea to treat fevers and in children to treat yellow eye disorders (Pan.). Confused with Cichorium intybus		
Psidium guajava L.	guayaba	Myrtaceae
Tree. Bark and flower buds boiled and a tea used to treat diarrhea (C.R.).		
Quassia amara L.	hombre grande	Simaroubaceae
Shrub. Stem is often sold in markets and used for gastritis, to reduce high blood pressure and for liver problems (Pan. and C.R.).		
Rheedia edulis Triana and Planch	tarobá	Guttiferae
Tree. Planted around houses for the edible fruit. Also said to transmit a disease (Pan.).		
Ricinus communis L.	higuerilla	Euphorbiaceae
Shrub. Oil containing leaves are used in a poultice and applied to the skin for mumps (Pan.).		
Roupala sp.	zorillo	Proteaceae
Tree. Still leaves used for durable brooms (Pan.).		
Sanicula		Umbeliferae
Herb. Leaves boiled and taken for amoebas (C.R.).		
Scheelea rostrata (Oerst.) Burret	corozo	Palmae
Palm. Often sold in markets (the edible trunk center). Pan. and C.R.		
Sida rhombifolia L.	escobilla de pureco	Malvaceae
Herb. Used to make brooms and in combination with other species (see Acalypha arvense) (Pan.).		
Siparuna sp.	pasmo, pasmo peludo	Monimiaceae
Shrub. Several species of this genus are utilized over a fairly large area in both Panama and Costa Rica. Usually taken in a tea to treat weakness (such as following an illness or drinking too much cold water when very hot). Also used to bathe when feeling weak and to treat tooth or stomach aches.		
* Solanum quitoense Lam	naranjilla	Solanaceae
Herb. Edible fruit.		
Stachytarpheta aff. frantzii Polak	verbena	Verbenaceae
Shrub. Three sprouts are boiled in water and the tea is taken to calm nerves. Red flower variety is utilized (Pan.).		

Table 4 (continued)

Scientific Name	Common Name	Plant Family

"Taylor's curarina" — curarina Taylor

This powder mixture is available in certain pharmacies. We talked to Mr. Taylor and were told the powder consisted of: 1) Ground stem of hombre grande (probably Quassia amara) 2) Ground stem of guabito del norte (a tree not seen, but said to grow in the Bocas de Toro region of Panama). and 3) Camphor powder. The recipe was 5 thimbles each of components one and two and camphor powder in the amount equivalent to the size of Dr. Ross's pills (approximately 5 mm in diameter). This powder was found in several households and was used for diarrhea with vomiting or for liver problems. Only a small amount on a knife tip is mixed in water or coffee and taken daily for 10-14 days. One household user insisted that tabaquillo (Bocconia frutescens) was also included in the powder. The powder was used externally in a paste for insect bites (Pan.).

Transformer oil

This polychlorophenol cacenogenic oil was actually being used in Porterillos, Panama as a treatment for rheumatism. The oil was rubbed directly onto the skin and was said to give great relief, the users were unaware of the carcenogenic properties of most tranformer oil.

Triumfetta aff. lappula L. — cadillo / mosote — Tiliaceae
Shrub. Used in an infusion (leaves) to treat colds (C.R.).

Verbena litoralis H.B.K. — conchalagua — Verbenaceae
Shrub. Branches boiled and a tea is taken for liver problems.

* Vetiveria zizanoides (L.) Nash. ex Small — valeriana /raiz de violeta — Graminae
Grass. Roots are boiled in water and a tea taken to calm nerves (C.R. and Pan.).

Wedelia sp. ? — pulmonaria — Compositae
Herb. Boiled in water and taken to caln coughs (Pan.).

Witheringia solanacea L. Her. — raiz de La India — Solanaceae
Shrub. The root is boiled and a tea taken for liver problems (Pan.).

Xanthosoma sp. — otoe / otoe morado — Araceae
Herbs. Edible tubers.

Xylopia frutescens Aubl. — malagueta hembra — Annonaceae
Tree. Leaves are crushed, boiled and the tea is taken for stomach aches or for pains associated with menstruation. Seeds (seven) are also ground and taken for stomach aches (Pan.).

Yucca elephantipes Regal — maguey — Liliaceae
Tree. Leaves are mixed with Annona muricata for diarrhea treatment (Pan.).

* Zingiber officinalis Rosc. — jenjibre — Zingiberaceae
Herb. Rhizome is mixed with rubbing alchohol and rubbed on chest for colds and coughs (Pan.).

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* Plants that are not native to either Costa Rica or Panama

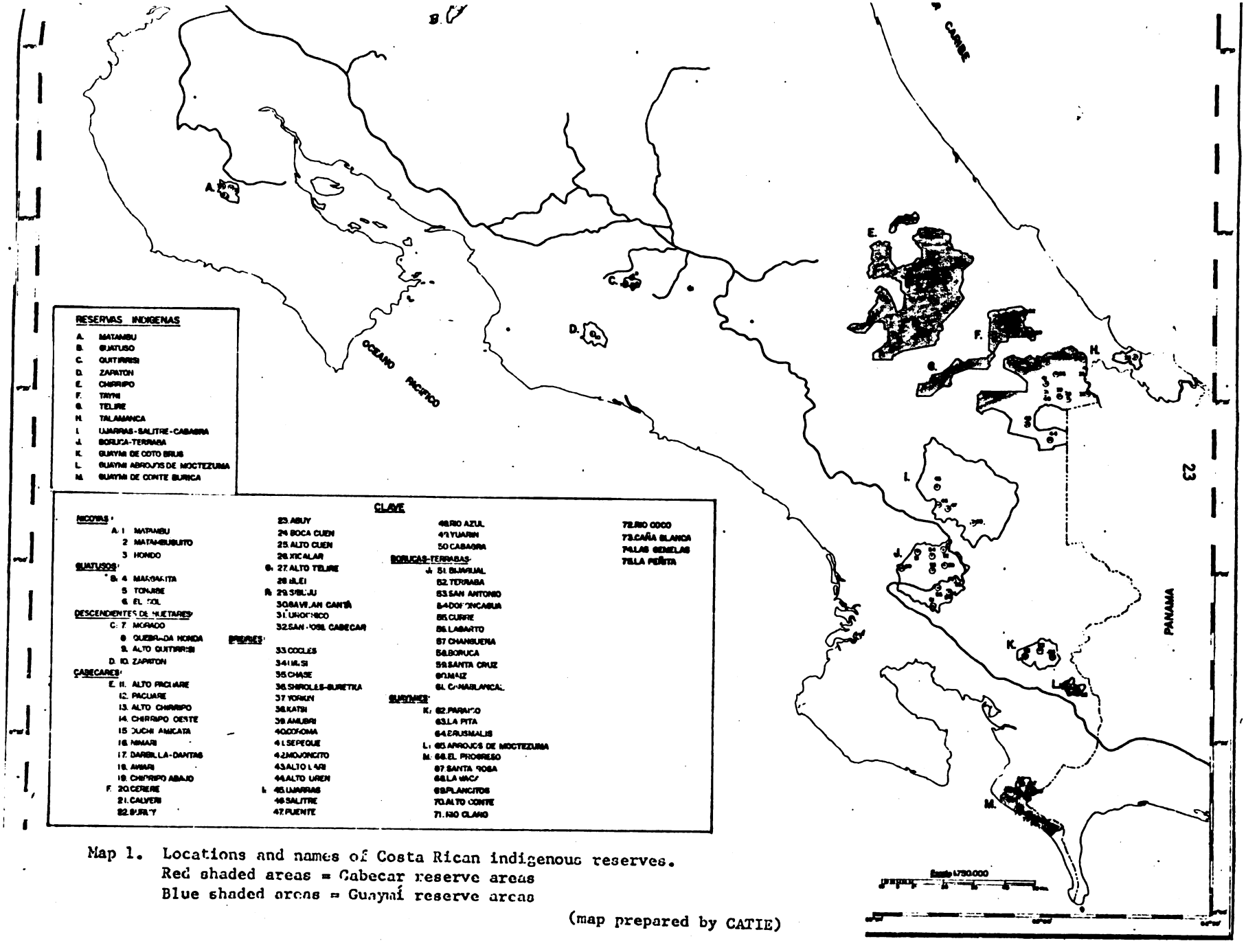
VI. ETHNOBOTANY IN GUAYMÍ AND CABECAR SETTLEMENTS

Guaymí Settlements

Of the Central American Guaymí populations (Maps 1 and 2), the Soloy, Panama and the Coto Brus, Costa Rica were visited during these expeditions. The term settlement is used to designate a general area of occupation, since the Guaymí tend to move residences often. For example, many Guaymí in Panama migrate to the Chorcha and Fonseca Rivers and set up huts by these rivers during the dry season (Feb. - May) and return to their more upland dwellings during the rainy season. Upland residences are scattered. It is not uncommon to walk for an hour te get from one house to the next. Large scale population movement has also occurred among the Guaymí. For example, all of the Costa Rican Guaymí are recent imigrants from Guaymí areas in Panama. This migration from Chiriqui Province in Panama to three areas in Costa Rica apparently occured around 1920 (Ocampo, 1981). Guaymí travelers continue to cross the Costa Rican - Panamanian border without concern or unaware of the political boundaries. Given this migrating population it is understandable that population estimates are difficult. The three major Guaymí settlement area in Costa Rica: The Coto Brus Reserve, the Abrojos de Moctezuma Reserve, and the Conte-Burica Reserve (Map 1), have an estimated population of 315, 310 and 815 inhabitants, respectively (Ocampo, 1981). No figures are immediately available, but the Guaymí population in Panama is considerably larger than that in Costa Rica.

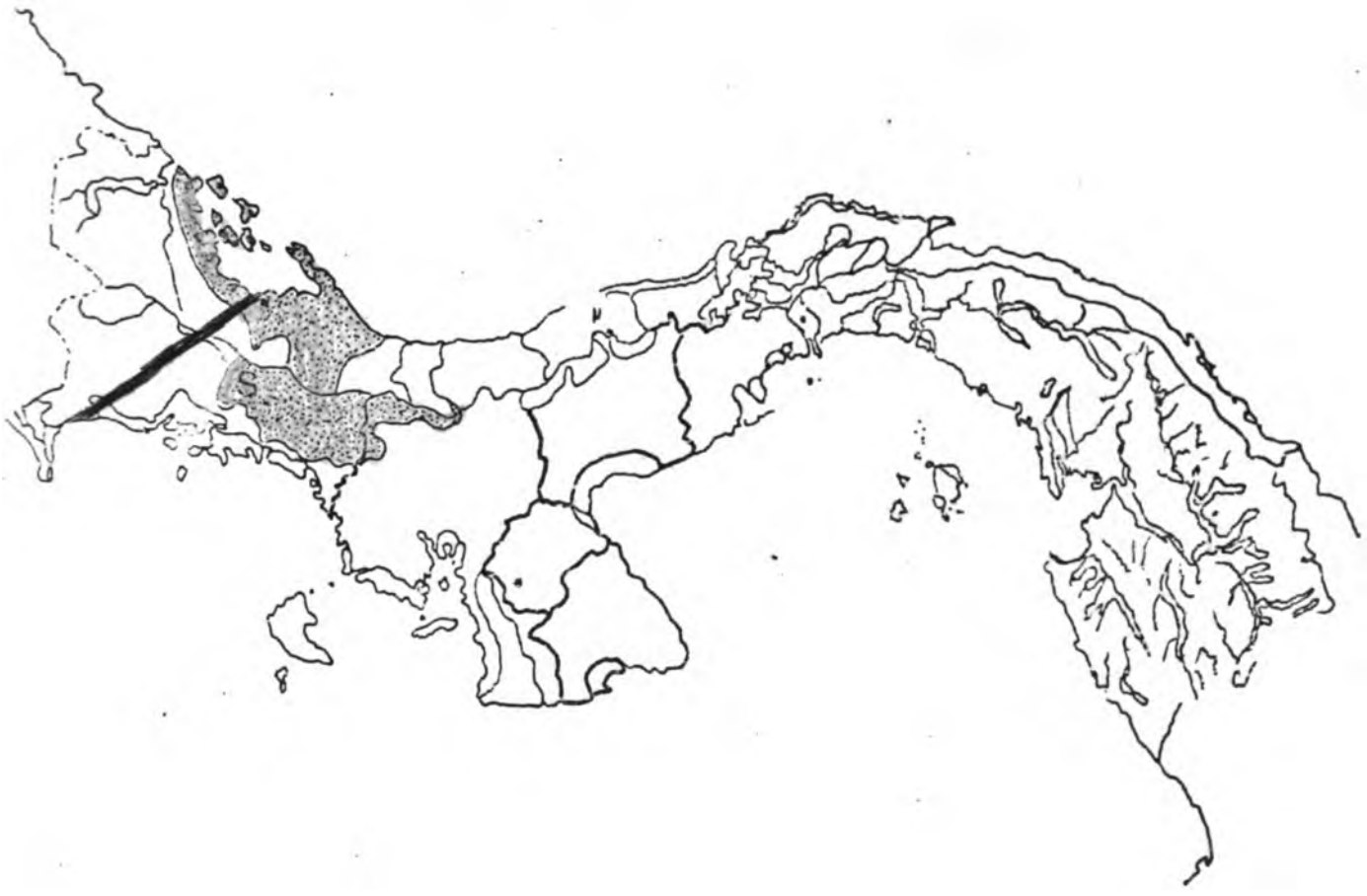
The majority of the Guaymí inhabitants visited in the Soloy area were living in extreme poverty. Their shelter, albeit temporary, were huts that could have been constructed in a day. The children appeared undernurished, elderly persons who were ill lay on the ground beneath their huts unattented and one deaf-mute lady was giving birth to a child under these conditions. The language of these Guaymí is a dialect called "movere" or "sabanereo". The Guaymí in the Coto Brus area of Costa Rica were living in somewhat better conditions, perhaps because they were in an area of greater rainfall and with less contact with non-Guaymi people.

The Guaymí dwellings ("ranchos") were largely constructed of native plant materials. The exception was the use of Hyparrhenia rufa, the exotic "jaragua" grass that has been planted in this area for cattle. House poles of Cordia alliodora and other local wood such as Cecropia peltata were tied together by strong vines from Clematis dioica, Bauhinia sp., and Apeiba tibourbou stems and bark strips. Roofing material included Scheelea rostrata and Hyparrhenia leaves.



Map 1. Locations and names of Costa Rican indigenous reserves.
Red shaded areas = Cabecar reserve areas
Blue shaded areas = Guaymí reserve areas

(map prepared by CATIE)



Map 2. Sketch of the Republic of Panama. Shaded areas are regions inhabited by Guaymí. The letter S indicates the approximate location of Soloy. The solid line across the isthmus west of Soloy is the approximate route of the pipeline.

Plants used in artisan work by Guaymí of the Conte-Burica Reserve in Costa Rica include Apeiba tibourbou, Aechmea magdalenae, Malvaviscus arboreus and Astrocaryum alatum as sources of fiber to weave bags ("kra" or "chácaras" in Guaymí) or hammacks (Ocampo, 1981). Also in the Alto Conte-Burica area, dyes are extracted from Mucuna andreana leaves (black dye), Curcuma longa rhizomes (yellow dye), and Arrabidea chica stems (pink dye). During our visits only Apeiba and Aechmea were recorded as utilized in artisan products.

The shifting agriculture systems of the Guaymí are closely tied to their cultural traditions. The main crops of the Guaymi have traditionally been Zea mays (corn), Phaseolus vulgaris varieties (beans), Dioscorea sp. (yams), Xanthosoma sp.("otoe"), Cucurbita varieties (gourds or "ahuyama), Capsicum varieties (chile or "aji"), and fruit trees such as Annona reticulata (anona), Gneipa americana and Gustavia superba. Old and well extablished exotic intoductions include Citrus (oranges), Musa varieties (both plantain and bananas) and Coffea arabica (coffee). For various reasons, one of which is government programs to incorporate the Guaymí into the development process of Panama, the exotic Cajanas cajan (gandul) has quite recently been extensively planted.

Guaymí Medicinal Plants

Few Guaymí knew or were willing to discuss medicinal uses for native plants. Compared to the Cabecar, Costa Rican inhabitants the Panama Guaymí we talked with knew few medicinal uses for plants. Apparently, most Guaymí believed that the utilization of a plant for medicine without the "magic" provided by their medicine men was ineffective. In Costa Rica, however, we were fortunate enough to visit a Guaymí medicine man or "curandero". He was at first reluctant to explain medicinal plant uses, but he eventually agreed to explain certain uses once a monetary payment for this information was agreed upon. It was fortunate to find this "curandero" at home, since Guaymí medicine men travel extensively and often. An example of the extensive traveling sometimes involved to secure certain plants were references in Boquete of Guaymí that crossed the Talamanca continental divide and entered the Bocas de Toro region in order to collect medicinal plant materials that included "caraña hedionda" and "guabito del norte" (Tables 4 and 6). Further difficultues in obtaining information about plants is the belief that medicinal plants could lose their effectiveness if their mode of use were told to non-Guaymí persons. One of the most interesting plants shown us by this curandereo was a plant he called "guabo" (Table 6). The unique characteristic of this plant was the strong oder of an analgesic balm or "Deep Heat" ointment whenever the leaves were crushed.

Cabecar Settlements

The Telire Indian Reserve (established by governmental decree in 1976), is one of three Cabecar Indian reserves in Costa Rica (Map 1). The other reserves are the Tayni (also known as Estrella) and the Chirripo (known as "Duchi" in Cabecar). The large Chirripo reserve area appears to be separate from the other reserves (Map 1), but in fact these three areas form an unbroken, rugged forest region populated only by Cabecar. An example of this continuity is a group of Moravia de Chirripo travelers (from the Chirripo Reserve) encountered in the Telire Bajo area (Telire Reserve) during march. This group of 10 persons said it was commonplace for their people to travel (camping by rivers) each year during the dry season. We saw this group after they had traveled for a month and we were the first non-indigenous people they had encountered.

No access roads exist into any of the Cabecar reserve areas, but the roads that reach closest to the reserve complex access the Tayni and the Chirripo, not the Telire Reserve. The road closest to the Tayni Reserve ends an an access trail begins at the town of Vesta, an area of commercial banana plantations. This access trail has been used by various persons and organizations to promote development activities in the Cabecar areas. For example, a school has been constructed in Calveri and the CONAI (National Commission of Indigenous Affairs) and the Costa Rican Development Commission have cooperated to construct a foot-bridge over the Estrella River, a bridge that is very useful to travelers in the rainy season. Missionaries occasionally enter the Tayni Reserve and much less frequently the Telire Reserve. The other access road approaches the Chirripo Reserve and ends at the town of Moravia de Chirripo, Cartago Province. This town is reached by leaving Turrialba and continuing on the road past La Swiza, Tuis, Jicotea and Paso Marco. From Moravia few non-Cabecar enter the Chirripo Reserve, with the exception (as in Vesta) of visits by certain missonary groups. During our expedition to the Telire Reserve, the only impact by missionary activites that we noticed was the refusal of certain men to work as guides on Sunday and the talk of a priest who one day preformed numerous marriage ceremonies in the Blei region.

Although the entire Cabecar reserve complex is geographically isolated from the rest of Costa Rica, the Telire Reserve is the most isolated of all Costa Rican reserves. The Telire Reserve is surrounded by rugged Talamanca mountains on all sides with the nearest access road a 10-15 hour walk over muddy and steep terrain. Of special significance as far as retaining traditional customs is concerned is the virtual absence of non-Cabecar persons in the Telire Reserve area. The only mention

of a "ciqúa" (the Cabecar word for a non-Cabecar person) that had lived in the reserve area for any length of time was an archeologist (grave robber ?) who apparently excavated in old burial ground areas and removed artifacts by helicopter. The sudden death of this two year resident in 1980 was a sign to the Cabecar that no one should disturb these burials.

Much of the Telire Reserve is in rugged topography of the Telire River drainage basin. The area begins at Sitio Rangalle near the Karveri River (400 m elevation) and extends up the Telire River in a southwest dirrection for approximately 22 km to the area of Alto Telire near the Sucurí River (1000 m elevation). Annual rainfall was estimated at 2500 to 4000 mm. Ocampo (1981) estimated a total Telire population of 208 persons in 36 families and a total Cabecar reserve complex population of 2000 inhabitants. The distribution of the 36 estimated Telire families is scattered. Many of these families apparently migrated during the last century from the San Jose Cabecar region, an historically important population center of pre-colombian inhabitants (Bozzoli de Wille, 1975). Houses are located on the few level areas near streams or rivers and most are at least a 30 minute walking distance from the next house. Whenever clusters of three or four houses occur, the inhabitants of all houses are usually relatives.

As for general life style, the men usually do the farming and the women tend the household chores. The language is Cabecar, an as yet unwritten language. Spanish is spoken mostly by the men. Many women and children do not understand Spanish. The Cabecar wear no special type of clothes, other than the aquired preference for rubber boots. If fact, the use of clothes is a fairly recent (this century) phenomenon, since all clothes must be purchased and packed in. Artisan products among the Cabecar population are few, perhaps another reason why these persons have been little studied by archeologists. For a Cabecar person to obtain money in an economy where money seldom is exchanged has been possible mainly through the sale of "cacao" beans (Theobroma cacao). Despite the long and difficult transport route to Vesta, cacao plantations were seen in the Rangalle and Blei areas. However, a fruit fungus (probably Monilia) was seen in essentially every cacao tree. Even the fruits of the native Theobroma angustifolia and Theobroma bicolor were nearly completely ruined by this fungus. This cacao fungus has reduced one of the only sources of income for most of the Telire inhabitants, but has not influenced their life style.

Traditional house shapes were round or oval, but most recent houses have conformed to the square or rectangular form. Numerous animals roam freely within and around the "ranchos" (how Cabecar refer to their houses). These animals include a primitivelooking race of pig, turkeys, chickens, dogs and cats. Fish and forest

animals (such as paca and armadillo) are also caught or hunted on an infrequent basis. Of interest in one "rancho" was the use of a dead, but quite colorful, bird as a hanging ornamental piece.

The Cabecar houses were constructed completely of native plant materials. Cordia alliodora and Cedrela odorata were used as foundation posts. The walls were usually made of Gynerium sagittatum (caña brava), a common grass along the Telire River. Other material, such as Cecropia stem sections, were less frequently seen as wall components. Gynerium was also the most common roofing material, although Socratea durrissima leaves and stems, Chamaedora leaves, Calyptrogne sarapiquensis leaves and other roofing materials were sometimes used. A variety of strong, flexible vines (probably Bignoniaceae and/or Araceae) were used to tie house sections together. Special mention must be given to the strength and versatility of the Socratea trunk slats. Trunks of this palm are split into 3-5 cm wide strips (2-5 m long) and are laid loosely across beams. Support beams are spaced 1 or 2 meters apart. These Socratea platforms supported considerable weight and were used to make attic storage platforms, tables, beds and "chicha" funnels.

The food for the self-sustaining Cabecar population is grown largely by shifting agriculture techniques. Food storage, however, is minimal due to mold and rodent problems. In part because of food storage problems the crop planting times, at least for corn, are staggered. For example, during our march visit corn was being planted, we saw meter high corn and we also saw ear corn ready for harvest. Besides corn, other crop plants frequently seen about "ranchos" included several Phaseolus varieties, several Capsicum varieties, Psidium guajaba, Psidium friedrichsthalianum, Musa (both banana and platano), Oryza sativa, Dioscorea varieties, Manihot esculenta, Ipomoea batatas, Cucurbita species and others (Table 5). A nutritious and traditional drink of the Cabecar and Guaymí is a fermented, intoxicati drink known as "chicha". This drink is sometimes prepared in a large funnel of Gynerium or Socratea stems. Stems 1-2 meters long are tied together in the center, spread open to form a funnel shaped recipient above and a similarly shaped support structure beneath. Bracts of Socratea (known as "jaracúe") are placed in the funnel to support the pulp of banana, plantain, purple corn ("icludama"), squash, etc.. The fermentation process takes several days and numerous recipies exist for "chicha" preparation. All members routinely drink "chicha" and on special occasions large quantities are consumed. The Cabecar apparently knew about fermented drinks prior to the Conquest.

Cabecar Medicinal Plants

Unlike the Guaymí, the Cabecar in the Telire Reserve were generally willing to discuss medicinal uses for plants. Observation and questioning about bundles of leaves or stems seen in "ranchos" usually led to a conversation about medicinal plants (Table 5). Certain plants were not applied externally or taken internally. These plants could be considered as "magical". Salazar (1980) reported the frequent presence of "setecue" bags hanging in "ranchos" of the Chirripo Cabecar. These bags contained a combination of vulture feathers, armadillo and iguana skins, tree bark, chicken bones, etc. and were placed in houses for good luck or to cure certain ailments. Another "magical" charm reported from Chirripo ,"muacle", is a type of necklace made by a medicine man ("Jawa" in Cabecar). In the Telire Reserve the only magical use we recorded was the presence in one "rancho" of a bird nest made of finely meshed plant fibers. The nest was know as "machúa" and was used by men to attract a desired female as a mate.

It was of interest to note the existence of the "doctrine of signitures" among the Cabecar and Guaymi populations. This Medieval doctrine maintains that a medicinal plant has in its morphology an indication of a medicinal use for which that plant is effective. For example, several Columnea leaves have two distinct red spots at leaf center. Apparently the Cabecar have interpreted this "sign" as as an indication that these leaves are useful to stop nose bleeds. Another example is the use of Aristolochia leaves to treat snake bites. The triangular shaped head of Bothrops vipers has a shape similar to the leaves of several Aristolochia species. The more similar the leaf shape is to the head shape, including leaf spots where eyes should be, the more effective that leaf is for snake bites. The Coto Brus Guaymí use the bark of a Flacourtiaceae tree with large trunk spines to treat an ailment they described as a spinedor tingling body sensation.

It is often difficult to separate the superstition aspect of plant medicine from plant uses that may in fact havesome application in modern medicine. One approach may be to evaluate in greater detail those medicinal plants that treat disorders that are most problematic. For example, many medicinal uses on Table 5 refer to treatments for diarrhea or intestinal parasites, disorders that have readily availabe and usually quite effective cures in modern medicine. Other plants, however, such as those used to treat mental disorders (Cissus sicyoides), kidney problems (Bocconia frutescens), to treat Leishmaniasis (Erythrina and Montanoa) seem to have a greater chance of offering a useful cure to modern medicine. Plants utilized to treat the most difficult to treat disorders should receive high priority in medicinal plant screening programs.

Although the general Cabecar population was knowledgeable of many medicinal plants, the medicine men, known as "Sukia" or "Jawa", knew many more medicinal uses, some of which were secretive. One can better understand the extent of the knowledge of a "Sukia" when aware that it takes 5-7 years for a Sukia's understudy to accumulate enough knowledge to attain the title of Sukia. This title is given only if the understudy has demonstrated himself as sufficiently knowledgeable. Sukia men travel often effecting cures. Many of the "ranchos" have a small hut closeby. This hut is where a Sukia stays when effecting a cure or ceremony. Chants that accompany certain cures are done only in the early morning hours, a time designated by the Cabecar God "Sibú" as most effective.

In recent years the Cabecar population of Telire Alto has been visited by government helicopters with medical doctors who distribute many types of medication, diagnose disorders and even preform operations. The impact of these visits were noticed in the Blei region, an area at least an eight hour walk from Telire Alto. Perhaps a year's supply of certain pills were seen in one "rancho". Although effective, these modern medicines are greatly reducing the utilization of natural medicines. For example, various plants were indicated to us as effective for headaches (Table 5), but when asked what they took for a headache the answer was aspirin. Presently much knowledge of medical applications for native plants still exists in the Telire Reserve. Hopefully these medicinal plant uses will be documented, a sort of natural heritage, before they are lost. The transister radio is the means by which Cabecar inhabitants become aware of the helicopter visits. Once advised, they converge from the entire Cabecar reserve region to receiv medication. Radios are also used by Cabecar for dance music and familiarizes the population with the sound of the Spanish language. In short, the cultural displacement properties of the transister radio are very great.

Table 5. Scientific, Cabecar and Spanish names for plants utilized by indigenous popluations in the Cuen, Rangalie, Telire Bajo and Telire Alto regions of Limón Province, Costa Rica. Whenever known, plant family and type of utilization are also indicated.

Scientific Name	"Cabecar Name"	Spanish Name	Plant Family
Acalypha sp. (shrub)	"kicha"		Euphorbiaceae
Acisanthera sp.	"charícri"		Melastomaceae
Herb. Stem eaten raw to treat pain during urination.			
Aechmea magdalenae (André) André ex Baker	"jama"	pita	Bromeliaceae
Terrestrial bromeliad. A fiber is extracted from the leaves to weave hammocks ("kipu"), bags ("jamete"), etc.			
Amaranthus aff. dubius Mart. (herb)		bledo	Amaranthaceae
Aristolochia sp.	"kebítiro" / "kabekape"		Aristolochiaceae
Vine. Entire plant is boiled and applied to snake bite areas on skin.			
Asplundia sp.	"kute kicha"		Cyclanthaceae
Epiphytic palm-like vine. Strong, fiberous roots are used to tie poles together in house ("rancho") construction.			
Bactris gasipaes HBK	"diká"	pejibaye	Palmae
Palm. Roots boiled for a tea taken for colic.			
Bauhinia sp. (liana)	"sinakakitu"	escalera de mono	Leguminosae
Begonia glabra Aubl.	"shlucri" / "shucliq"		Begoniaceae
Vine. Stems and leaves are cooked and eaten to treat vomiting and diarrhea.			
Bocconia frutescens L.	"biahbia"	tabaquillo	Papaveraceae
Shrub. Roots and bark cooked & taken in a tea for kidney problems and/or for stomach aches.			
Bromeliaceae (Vriesea sp. ?)	"tis corona"	"tis"-cabecar	Bromeliaceae
" "	"tis rojo"	corona & rojo = Spanish	
Epiphyte. Ornamental, rosette leaves with red and purple variegation. Leaves are eaten to treat side aches.			
Bursera simaruba (L.) Sarq.	"karmári"	jiñocuave indio desnudo	Burseraceae
Tree. Bark is cooked and taken as a tea to treat chills that alternate with fever (malaria?).			
Campelia zanona (L.) H.B.K.	"kabekapí"		Commelinaceae
Succulent herb. Stem and leaves applied directly to skin for burns and for snake bites.			
Capsicum sp.	"teshui"	chile	Solanaceae
"	"cha" / "bacacha"	varieties of chile	
Both fruits and leaves are boiled and the water extract is used to wash wounds.			
Carludovica aff. palmata R. & P.	"see"	chidra	Cyclanthaceae
Palm. A fiber is extracted from the leaves and used to weave baskets, etc.			

Table 5. (continued)

Scientific Name	"Cabecar Name"	Spanish Name	Plant Family
Carica papaya L.	"Pe kitsú"	papaya	Caricaceae
" "	"Serpe kitsú"	papaya del monte	
Cedrela odorata C. & S.	"Urúk"	cedro	Meliaceae
Tree. Wood used to make benches, "pilones"(wooden basins to pound rice kernals) and in house construction.			
Cestrum sp. (small tree)	"juacrí"		Solanaceae
Chamaedorea sp.	"juké"		Palmae
Palm. Leaves used to thatch roofs of houses.			
Chamaedorea sp.	"sirik"		Palmae
Palm. Leaves used in ceremonies preformed by spiritual leaders ("sukia").			
Cissus sicyoides L.	"tabe kicha"	iasú	Vitaceae
Vine. Stem and leaves are cooked at taken for rheumatism or to treat certain types of mental disorders.			
Clidemia setosa (Tirana) Gleason	"búk"		Melastomaceae
Herb with woody base. A type of red dye is obtained by crushing leaves in wate			
Clidemia sp.	"karkesinoclí"		Melastomaceae
Shrub. Leaves are chewed by women to avoid certain mouth diseases and to clean teeth.			
Cocos nucifera L.	"kúku"	coco	Palmae
Columnea purpurata	"picríi"		Gesneriaceae
Columnea aff. sanguinolenta Hanst.	"		"
Epiphytic herbs. Both species have red spots on the leaves. Leaves and root portions (known in Cabecar as "danto") used to stop nose bleeding or headaches.			
Cordia alliodora (Ruiz & Pavon) Oken	"Llewii"	laurel	Boraginaceae
Tree. An often used wood cut into rough boards and poles to constuct houses.			
Costus spicatus (Jacq.) Sw.	"Yokorkerik"	cañagria	Zingiberaceae
Succulent herb. Stem sap applied directly to relieve burns and stems can be cooked to relieve aching bones.			
Diffenbachia seguina (L.) Schott	"bui-bue-ke"	sahinillo	Araceae
Herb. Leaves and part of the stem are gently placed over the affected part of a patient. The belief is that the disease passes to the plant, thus no person is allowed to touch this plant after a curing session.			
Dioscorea sp.	"seri-dé-ue"	ñame	Dioscoreaceae
Dioscorea sp.	"kebetiro kicha"		"
Vines. The first species is eaten. The second (kebetiro kicha) is all boiled and taken internally for snake bites.			
Dorstenia contrajerva L.	"mackape"	contrajerva	Moraceae
Herb. Flower is boiled and placed on navel of newborn children to prevent infection. Boiled leaves also taken for diarrhea.			

Table 5. (continued)

Scientific Name	"Cabecar Name"	Spanish Name	Plant Family
Episcia sp.	"chilukupi"		Gesneriaceae
Herb. No use, but given a name because of ornamental properties.			
Equisetum sp.	"chíra"	cola de caballo	Equisetaceae
Herb. Cooked and eaten for side pains.			
Erythrina costaricensis N. Mich.	"boró"	poró	Leguminosae
Tree. Leaves are boiled and water extract is used to treat wounds and to treat Leishmaniasis (papalomoyo in Spanish).			
Euterpe sp.	"clu"	palmito	Palmae
Palm. Soft stem center is eaten raw or cooked.			
Fevillea cordifolia L. Vine.	"duna wo"	chichimora cabalonga	Cucurbitaceae
Endosperm inside spongy seed coat is scraped into thin slices and only a few of these are mixed with water and taken internally (while fasting) for persistent cases of amoebas or parasites. Used elsewhere in Costa Rica with animals for the same ailment, but in larger doses. Too large a dose can be fatal.			
Gossypium sp.	"de-kuó"	algodon	Malvaceae
Guazuma ulmifolia Lam.	"kudzir"	guácimo	Sterculiaceae
Gynerium saccharoides Humb. & Bonpl.	"uká"	caña brava	Graminae
Grass abundant along rivers. A major construction material for Cabecar houses (or "ranchos" as they are often called). The stem center is sometimes ground to a mulch and applied externally for sores (llagas in Spanish) or for skin fungi.			
Habenaria sp.	"narikape"		Orchidaceae
Ground orchid. Bulbs are sometimes cooked and eaten to control diarrhea.			
Heliconia mariae Hook,fil.	"pó"	platanillo	Musaceae
Herb. Central stem eaten raw or cooked. Leaves infrequently used for sides of houses.			
Heliconia sp.	"sipí"	platanillo	Musaceae
Herb. Leaves used in religious ceremonies.			
Hymenocallis sp.	"bíñak"		Liliaceae
Herb. Bulb used to treat certain types of parasites.			
Hyptis verticiliata Jacq.	"sinacrí"	juanilama mocha	Labiatae
Herb. Mixed with Costus spicatus and kuakuari in a boiled tea for fevers. Used alone as a bathing extract to help reduce fever.			
Inga sp.	"silvó"	guama	Leguminosae
Trees. Pulp around seed is eaten. Bark in boiled for a tea to treat diarrhea.			
Ipomoea sp.	"sek kicha"		Convolvulaceae
Vine. Stem is boiled in water and the tea is taken in small doses for parasites and in large doses to purge.			
Jatropha curcas L.		coquillo	Euphorbiaceae
Tree. Seeds used to treat intestinal parasites. One seed is ground and left to soak in water over night. Water is then drank with an empty stomach. Larger doses can purge or be fatal.			
Mirabilis jalapa L.	"mamahuit"		Nyctaginaceae
Herb. Flowers are gathered and placed in flesh cuts to promote healing.			

Table 5. (continued)

Scientific Name	"Cabecar Name"	Spanish Name	Plant Family
Montanoa sp.	"huasku"		Compositae
Shrub. Leaf extract is applied externally to treat Leishmaniasis.			
Musa sapientum L.	"chimorí"/"chimochichia"	banano	Musaceae
Herb. Terminal bracts (known in spanish as the "chira") is used to make an ext used in bathing for rheumatism or for headaches.			
Neurolaena lobata R. Br.	"kwas kú"	gavilana	Compositae
Herb. Entire plant is cooked and a tea extract is taken for intestinal parasit or for stomach ulcers.			
Oncidium aff. pusillum (L.) Reichb	"dikí"		Orchidiaceae
Epithyte. Small, fan-shaped orchid cooked and taken for colic.			
Passiflora sp. ?	"tirro kicha"		Passiflorace
Vine. Corky, aromatic stem is boiled in water and taken in a tea for fever and headaches. Used for rhumatism in San Jose Cabecar. Also utilized by Cabecar settlements of Tayni, Duchi and by certain Bribri settlements in southern Costa			
Paullinia sp.	"karchote"	barbasco	Sapindaceae
Liana. Leaves and stems ground and thrown into river pools to stun fish and thereby facilitae catching fish.			
Peperomia rotundifolia (L.) HBK	"ninhercri"/"sinuakape		Piperaceae
Epiphyte. Succulent leaves cooked for stomach ache or colic or leaves eaten raw for certain heart conditions or for asma.			
Peperomia sp.			Piperaceae
Epiphyte. Succulent leaves crushed and watery sap is place in the eye for eye problems.			
Persea americana Mill.	"ha mó"	aguacate	Lauraceae
Petiveria alliacea L.	"juacrí"	ajillo/zorrillo	Phytolacac
Herb. Leaves and stem are cooked and applied externally for fever and colds. Small amounts of tea are also taken for the same conditions.			
Phaseolus vulgaris L.	"kani"	frijol	Leguminosae
" "	"kani dorrórro"	frijol	"
" "	"kani cherama"	frijol negro	"
" "	"kani wecherama"	frijol	"
" "	"kani buitichi"	frijol	"
Piper auritum HBK	"pirkúa"		Piperaceae
Shrub. Leaves boiled to produce a tea taken for stomach aches.			
Piper sp. (purple veins)	"sanjurkuri"		Piperaceae
Shrub. Leaves boiled to produce a tea taken for head aches.			
Potomorphe umbellata (L.) Miq.	"kotomo"		Piperaceae
Leaves cooked with P. auritum to make a tea for coughs and colds.			

Table 5. (continued)

Scientific Name	"Cabecar Name"	Spanish Name	Plant Family
Pouteria sp.	"ninhercri"	sapote	Sapotaceae
Protium aff. costaricense (Rose) Engler	"copal"	copal	Burseraceae
Tree. Transparent resin from bark is used in a paste for intestinal parasites and for stomach aches.			
Psidium friedrichsthalianum Benth. & Hook.	"kachurik"	cas	Myrtaceae
Psidium guajaba L.	"shori" / "sori"	guayaba	Myrtaceae
Tree. Bark boiled to make a tea taken for diarrhea.			
Quassia amara L.	"kinina"	hombre grande"	Simaroubaceae
Shrub. Stem boiled in a tea and taken for stomach ache and colic. In non-indigenou areas (such as public markets in major cities) this plant is often sold for high blood presure, gastritis and liver problems.			
Quercus sp.	"kós"	roble	Fagaceae
Renealmia aromatica (Aubl.) Griseb.	"maawei"		Zingiberaceae
Herb. Fruit with no seeds is washed and cooked with meas as a type of flavoring. Seeds are said to be rich in oil and both seeds and fruits have an agreeable aroma.			
Rhipsalis sp.			Cactaceae
Epiphyte. Fleshy stem is eaten raw for stomach aches.			
Ricinus communis L.	"chichugle"	higuerilla	Euphorbiaceae
Shrub. Oil rich seeds are strung on wire and burnt at night for illumination. This variety appears somewhat distinct from the more commonly seed caston bean.			
Saccharum officinarum L	"pa-stu"	caña	Graminae
Sechium edule Sw.	"pís"	chyote	Cucurbitaceae
Socratea durissima (Oerst.) Wendl	"jarra"	maquenque	Palmae
Palm. Stem is cut into slats and used for a variety of support structures in the Cabecar houses. Leaf bracts ("jaracué" in Cabecar) are placed in a funnel recipient of Socratea stems to hold "chicha" (a fermented drink from a banana, corn, peach palm, or other fruit as a base).			
Spathyphyllum friedrichstahalii Schoot			Araceae
Herb. Flower spathe applied externally to the face to eliminate skin discolorations			
Sphaeropteris aterrima	"kinamoracúca"	helecho arbórea	
Tree fern. Woolly frond bases are finely chopped, wettened and place on skin to reduce swelling of bruises.			
Spondias mombin L.	"bara"	jobo	Anacardiaceae
Theobroma bicolor Humb. & Bonpl	"zaperbek"	cacao crillo"	Sterculiaceae

Table 5. (continued)

Scientific Name	"Cabecar Name"	Spanish Name	Plant Family
Theobroma cacao L	"tsiru kurú"	cacao	Sterculiaceae
Trichilia havanensis Jacq.	"bara" /"kuakeu"		Meliaceae
Urera aff. laciniata Wedd.	"kua"	ortiga	Urticaceae
Herb. Leaves (with urticating hairs) are crushed and rubbed on skin areas affected by rheumatism or on bruised areas.			
Virola sp.	"borrok"	sangre	Myristicaceae
Vittaria sp.			
Epiphytic fern. Fronds are boiled to make a tea to treat colic.			
Zamia skinneri Warsc.	"bratucliclu"		Cycadaceae
Cycad. Stem sap is used in wounds to stop hemorrhages.			
Zea mays L.	"whú"	maiz	Graminae
?	"cuiki"		
Tree. Orange pulp of fruit is used for bot fly removal.			
?	"cúk"		Palmae
?	"gedredehút"		
Vine. Used to help cure open wounds			
? (herb)	"jerkeri"		Gesneriaceae
Root portions cooked and taken for stomach aches.			
?	"kokútu"		
Tree. Bark used for certain types of internal parasites.			
?	"kuakuari"		
Herb. Used with Hyptis and Costus in a tea to reduce fevers.			
?	"octavoria"		
Vine. Perhaps a legume, used by "sukia" in curing headaches.			
?	"pitú"		
Herb. Eaten for side pains.			
?	"shap shap"		Rubiaceae
?	"sicrukee"		Polyporaceae
Fungus. Grows out of decaying logs. Is eaten raw or cooked.			
?	"siux"		Rubiaceae
Herb. Cooked and applied externally for sores and itching skin.			
?	"zá"		
Tree. Bark cooked with Zamia stems and taken to "purify the blood".			

Table 6. Scientific, Guaymí and Spanish names for some of the plants utilized in Guaymí settlements in the Soloy, Chiriqui area of Panama (Pan.) and in the San Vito, Puntarenas area of Costa Rica (C.R.).

Scientific Name	Guaymí Name	Spanish Name	Plant Family
Abelmoschus esculentus Medic.		ñangu	Malvaceae
Herb. Seeds ground with coffe for a flavoring (Pan.).			
Annona muricata L.		anona	Annonaceae
Tree. Fruit eaten (Pan. and C.R.).			
Apeiba tibourbou	"majagua"	piene de mico	Tiliaceae
Tree. Bark strips used in house construction to tie poles, etc. together (Pan).			
Asclepias curassavica L.		viborana	Asclepiadace
Herb. Root is cooked and a tea is taken to treat fevers (C.R.).			
Bauhinia sp.		escalera de mico	Leguminosae
Liana. Strong, flexible stems used to tie poles together in house construction (Pan.).			
Begonia glabra Aubl.			Begoniaceae
Vine. Succulent stem and leaf are eaten raw to treat diahrrea (C.R.).			
Besleria sp.			Gesneriaceae
Herb. Stem is boiled with an undetermined plant (called "kugranínigranagra" in Guaymí) to treat epileptics (C.R.).			
Cajanus cajan (L.) Millsp	"mumacriri"	Frijol de palo	Leguminosae
Shrub. An important source of carbohydrate for the Guaymí, especially in the dry season (Pan.).			
Capsicum sp.		ají (Pan.)	Solanaceae
Cecropia peltata L.		guarumo	Moraceae
Tree. Stems split (ants removed) and used for the walls of temporary housing along rivers during the dry season (Pan.).			
Chaptalia nutans Polak			Compositae
Herb. Root is cooked to produce a tea that is taken for fever (C.R.).			
Citrus sp.		naranjo, limón	Rutaceae
Trees. Several species and varieties of naranjo y limones estan cultivados (Pan. and C.R.).			
Clematis dioica L.			Ranunculacea
Vine. Strong, flexible stems are used to tie poles together in house construction (Pan.).			
Curcuma longa L.		camotillo (C.R.)	Zingiberacea
Dioscorea sp.		ñame	Dioscoreacea
Vine. Tubers are cooked and eaten (Pan. and C.R.).			

Table 6. (continued)

Scientific Name	Guaymí Name	Spanish Name	Plant Family
Flacourtiaceae (Xylosma ?)			Flacourtiaceae
Tree. Riparian tree with stout spines along the main trunk. Bark is boiled (in combination with Siparuna) and a tea is taken whenever the body feels "spined" (C.R.).			
Gossypium sp.		algodón (Pan.)	Malvaceae
Gouania lupuloides (L.) Urban			Rhamnaceae
Vine. Stem is boiled (in combination with Hoffmania stems and Siparuna leaves) to make a tea that is taken when one gets thirsty during an illness (C.R.).			
Hoffmannia sp.			Rubiaceae
Shrub. Stems are given to children to chew, a means of calming after excessive crying or perspiration (C.R.).			
Hyparrhenia rufa (Nees) Staph		jaragua	Graminae
Grass. Straw used for roofing of temporary houses along rivers (Pan.)			
Jatropha curcas L.	"bóla"	coquillo	Euphorbiaceae
Tree. Used for living fence posts (Pan.).			
Lagenaria siceraria (Mol.) Standl	"tula"	calabaza	Cucurbitaceae
Vine. Gourds are large (30-50 cm in diameter) and used as recipients for water and for cooking (Pan).			
Cucurbita sp.	"be"	ahuyama	Cucurbitaceae
Vine. Fruits cooked and eaten (Pan.).			
Oryza sativa L.	(Pan. and C.R.)	arroz	Graminae
Phaseolus lunatus L.	"kedeba" (Pan.)	haba	Leguminosae
Phaseolus vulgaris L.	"numa" (Pan.)	frijol	Leguminosae
Peperomia sp.			Piperaceae
Herb. Succulent herb that is cooked and one-forth cup is eaten to treat a burning sensation in the stomach (C.R.).			
Piper auritum H.B.K.			Piperaceae
Shrub. Root is cooked and eaten to treat coughs (C.R.).			
Scheelea rostrata (Oerst.) Burret		corozo	Palmae
Palm. Leaves used for roofing material in house construction. Heart of palm is cooked and eaten (Pan. and C.R.).			
Siparuna sp.		pasmo	Monimiaceae
Shrub. A tea is made from the leaves (10 leaves cited as utilized) to treat weakness associated with an illness or fatigue (Pan. and C.R.).			
Theobroma cacao L.		cacao	Sterculiaceae

Table 6. (continued)

Scientific Name	Guaymí Name	Spanish Name	Plant Family
Vigna unguiculata (L.) Walp		coupi (Pan.)	Leguminosae
Xanthosoma sp.	"ximinra"	tiquisque (Pan.)	Araceae
Zea mays L.	"ii"	maiz (Pan. & C.R.)	Graminae

VII. DEVELOPMENT IMPACT ON PLANT GENETIC RESOURCES IN EXPEDITION AREAS

The southern, Pacific slope region of Chiriqui Province, Panama has various development programs pending or in operation. One of the largest is the trans-isthmi pipeline that stretches 130 kilometers from Charco Azul Bay, near Puerto Armuelles on the Pacific side to the Chiriqui Grande, Bocas de Toro port on the Caribbean side. This 300 million dollar project was undertaken to transport Alaskan crude oil to the eastern part of the United States. The pipeline started pumping an average of 100 thousand barrils per day (maximum of 720 thousand per day) in September, 1982. The pumping itself involves two pumping stations: one at Puerto Armuelles that pumps oil through a 40 inch diameter pipe until Caldera, and the second pump at Caldera that pumps the oil over the continental divide through a 36 inch diameter pipe.

My original proposal included germplasm collections along this pipeline road, but our visit indicated that there were no settlers of any type along the pipeline route. We followed the pipeline road past Cantera, Bonita Creek, and up to Arena Creek (1100 m elevation). At this point heavy rains and high water in streams prevented any further progress. Access to this pipeline road is strictly controlled and to date, there has been no problem with squatters. The pipeline crosses over one of the few remaining large, unpopulated forest areas left in Central America. The pipeline itself was burried and was seen only where streams or rivers were bridged. Since a strip of trees was removed to install the pipe and because heavy rains often wash the soil, an erosion caused pipeline break is a serious concern and a real possibility. The chief pipeline constructor in Boquete is attached to a "beeper" so he can be reached at any time. He told us that where the pipeline crosses over mountainous terrain that there was an emergency shut-of or safty valve every nine kilometers. If in fact the pipeline road is maintained, it is difficult to imagine that more deforestation by settlers will not result as a direct or indirect consequence of this access road. This deforestation will occur in an area that is presently very poorly known floristically.

A second large project in the Chiriqui, Panama area is the Fortuna hydroelectric dam. This project began in 1972. This dam is fed by the same catchment basin where the pipeline is located, but was designed to catch water, not oil. The dam itself is at 1200 meters and a first phase is planned to produce electricity by the end of 1984. An ideal fate for the catchment basin of this dam would be a protected reserve area designation, with continued strict control of the access road.

A final, large agro-industrial operation in the Boquete region is CITROPAN

(Citrico de Panama), a 2000 hectare orange production area. Diversification personnel at CITROPAN mentioned the possibility of developing a fruit drink industry with the exotic Passiflora edulis, Tamarindus indicus or Solanum quitoense. The only native fruit suggested was Anacardium occidentale (cashew or marañon in Spanish). Cashew trees were abundant in the David, Chiriqui area. This suggested an ample supply of germplasm for any selection programs involving this species.

In the Coto Brus area coffee is the main industry, an industry initiated after World War II by Italian immigrants. Natural forest is continually being cut in the San Vito area to plant coffee plantations. Much fuelwood is also cut, although not scarce as of yet, in much of the San Vito area to supply coffee bean processing plants.

A classical example of displacement of a traditional and local variety of an agricultural species by an intrcduced species is occuring in the Soloy, Panama region. Phaseolus varieties are suffering displacement and perhaps a loss of germplasm due to the introduction of the exotic Cajaus cajan (gandul or "munacriri" in Guaymí). Several Guaymí told us they had stopped planting Phaseolus varieties because Cajanus cajan was more resistent to drought and did not have to be replanted each year. When we asked of primitive varieties we were told that some Guaymí in the highlands still cultivated the historically common beans. One of the major trading centers (Elvira's store) was examined and several highland varieties of bean were collected there. However, the store owner attested that certain Phaseolus varieties once commonplace were now entering the store much less frequently.

To further aggravate this "displacement situation government programs to incorporate the Guaymí into the development process of the country have promoted the cattle and coffee industries into this region. These introductions are shifting a crop based culture toward a money based economy of cattle and coffee sales. The cattle were also said to damage the crops (to a lesser extent the gandul) of the few person still working in agriculture. The construction of a school and temple building by missionaries (Bahai) have also shifted traditional religous and social customs. This community is definitely in a transitional phase. Anthropologists, sociologists and polititians can argue the pros or cons of the ongoing transition, but from a plant genetic resource point of view this area is very susceptible to a loss of germplasm of agricultural plant cultivars. This region should be given high priority for further, near-future collections.

The medicinal plants in the Guaymí and Cabecar reserves can definitely be considered a plant genetic resource. However, none of the medicinal plants reported here were in any immediate danger of extinction. In fact most of the medicinal plants were species of the second-growth vegetation and had wide distributions. The endangered aspect of medicinal plants is their mode of preparation, application and dose prescription information. Synergistic properties of medicinal plant combinations is invaluable information that is poorly documented in the Guaymi and Cabecar reserves. Although years of confidence building may be necessary to document much of the secretive information from the medicine men, an effort should be made to continue documenting this information as soon as possible.

VIII. RECOMMENDATION OF PRIORITY COLLECTION AREAS AND PROCEDURES

1. Indigenous areas in general should be given high priority for the collection of both primitive cultivars of agricultural plants and the collection of medicinal plant information.
   a. The continued collection of agricultural cultivars in the Guaymí population of Soloy, Panama should be given the highest priority.
   b. A lesser priority for agricultural germplasm collection should be given to the Coto-Brus region, since much of this area is coffee and few agricultural cultivars are grown.
   c. The Costa Rica Cabecar region is in no immediate danger of losing its agricultural tradition. However, a high priority should be given to the collection of endangered ethnobotanical information of the Cabecar reserve complex.

2. If development is to proceed in the Cabecar reserve area, Macademia integrifolia trees are strongly recommended plantings. This tree would fit well with the gathering tendencies of the Cabecar people and would replace the diseased Theobroma as a minimal source of income.

3. Priority medicinal plant collections should be based on the use a plant is given, not according to a specific list of species or genera to be collected. The following are two examples of the types of guidelines recommended:
   a. Document information and collect specimens of plants used to treat endemic diseases, such as Leishmaniasis is Costa Rica.
   b. Give priority to plant use information said to be effective in the treatment of difficult to treat disorders, such as mental illness and cancer.

4. Financing for the evaluation of germplasm collected during expeditions such as these should be given a high priority. Otherwise expensively obtained collections could be lost or useless collections maintained,

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