AN ETHNOBIOLOGICAL EXPLORATION OF SENSORY AND ECOLOGICAL ASPECTS OF TREE IDENTIFICATION AMONG THE AGUARUNA JÍVARO

by

KEVIN ARTHUR JERNIGAN

(Under the Direction of Brent Berlin)

ABSTRACT

A year-long ethnobotanical study was carried out in several communities on the Nieva River, in the Peruvian Amazon, to determine how the Aguaruna Jívaro identify trees of their local environment. Eight key informants provided freelists of tree names and, in follow-up interviews, explained how they identify 63 of the named trees chosen for detailed study. Voucher specimens were collected for the 63 taxa. This study made use of the Aguaruna concept of ***kumpají***, glossed as companion, which denotes species thought to be morphologically similar but not subsumed under a shared name. Questions designed to elicit identification methods included asking what distinguishes each tree from other trees informants consider to be its companions.

Analysis of eight key informants' descriptions of the 63 study trees (504 total descriptions) suggests that certain characters are more significant than others for making taxonomic distinctions between trees. Such characters include: fruit color, shape size and dehiscence; outside trunk color and texture; leaf shape, size and color; tree height, trunk thickness and straightness of the trunk; flower color; quantity of branches; bark odor; and sap color.

Informants' comparisons of trees considered to be companions provide additional clues to understanding which characters are most important for differentiating between the folk taxa chosen for this study. Some characters were found to be particularly important for making broad taxonomic judgments (i.e. explaining what features the members of companion sets have in common), while other characters appear to be more important for making finer scale taxonomic judgments (i.e. explaining what features can be used to distinguish between the members of each companion set).

This research also involved observing how informants identified trees in twenty-five 10 m^2 Gentry (1982) plots in a single patch of primary forest. The plots contained a total of 156 trees of 10cm or greater diameter at breast height. Eight key informants went through the plots individually and identified the trees. Informants' names for each tree and actions taken during each identification were recorded.

INDEX WORDS: ethnobiology, identification, Aguaruna, covert categories, Amazonian flora

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DEDICATION

To Kelsey Hannon and to my parents, Wes and Gisela Jernigan.

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INTRODUCTION

The goal of the research described in this monograph was to investigate how the Aguaruna Jívaro of the Peruvian Amazon identify members of the life-form category ***númi***, which can be glossed as 'trees excluding palms.' The work relates to the broader question of how people recognize and identify the living organisms in their local environment. The research took place from January to December, 2004, principally in the Aguaruna communities of Bajo Cachiaco, Kayamas, Tayunts, Alto Pagki and Atash Shinukbau, on the upper Nieva River, in the Peruvian department of Amazonas. This introductory section provides a brief review of literature in ethnobiology and related disciplines pertaining to the process of identifying living organisms. I also cite a few examples of previous work bearing on the more specific issue of identification of woody flora of the Amazon. Lastly, I present the basic hypothesis that frames this research and briefly relate it to the ethnobiological theory.

Identification in the Ethnobiological Literature

In 1974, Berlin, Breedlove and Raven proposed what they believed were the three most basic questions of cognitive ethnobotanical research. These are, to paraphrase the authors (153): 1) What groups of plants do people recognize?, 2) How are these groups organized hierarchically into taxonomies? and 3) How are individual plants recognized and identified? Berlin, Breedlove and Raven noted that, of these three major concerns, identification remained largely unstudied. With a few exceptions (see Carneiro 1978; López Zent 1999; Perdue n.d.), cross-cultural studies of plant identification are lacking even to this day. The ethnobiological literature also contains very few accounts of how people identify animals (but see Diamond and Bishop 1999; Hunn 1975; Ellen 1993).

As taxonomist Tod Stuessy notes (1990:10), the processes of constructing a biological taxonomy and identifying an individual are logically closely related. In an important sense, making an identification is the reverse of constructing a taxonomic hierarchy, since the former involves distinguishing an organism from all others based on a unique set of characteristics, while the latter requires grouping of organisms based on similarities. Nevertheless, understanding how people recognize and identify living organisms is clearly more difficult than eliciting folk taxonomies. Informants may find it difficult to explain all of the nuances of the features that allow them to tell one organism from another in terms of discrete clues. Darell Posey explains the difficulty he encountered when he tried to determine how his Kayapó informants recognize bee species:

> "Frequently the most interesting and revealing cognitive structures and their logical constructions lie submerged in the non-verbal realm of indigenous thought. The noted bee expert of the Gorotire-Kayapó, Kwyrá-ká, for example, was able to separate for us quickly and accurately numerous closely related *Trigona* species, but was unable to verbalize the reasons for his decisions. This is because his knowledge of nature comes from silently observing, rather than verbally analysing. Observations are registered in a gestalt manner, along with a myriad of other information regarding, niche, habitat, ecological zone, geographic coordinates and associated elements in the same ecosystem" (2002:132).

The concept of *gestalt* is borrowed from the discipline of gestalt psychology founded in the early twentieth century. *Gestalt* is a German word meaning 'overall form or shape.' The psychology textbook *Sensation and Perception: An Integrated Approach* characterizes gestalt psychology as follows:

> "In marked contrast to the view of structuralism, the Gestalt psychologists believed that a perception cannot be meaningfully decomposed into its elementary components. Rather, they proposed that the basic units of perception are themselves the perceptions – the 'Gestalts' (or *Gestalten*) *are* the fundamental units. They argued that the attempt to break down and reduce a perception to its presumed elementary sensory units would be to lose sight of the perception itself" (Schiffman 2000: 173).

Roy Ellen (1993) has also argued that gestalts based on cognitive prototypes play a major role in the identification of living organisms. When making an identification, a person compares the gestalt of the organism in question to "a body of knowledge … [consisting] of all the specimens personally known to, or encountered by, that individual, or at least what is *remembered* of them" (Ellen 1993:72). Ellen believes that knowledge of individual distinctive features acquired through "learning from other individuals, through … personal experience, through myths, stories and the like" (ibid.) play a more minor role, and are typically used to confirm the original identification or for difficult cases. However, Ellen does not rule out the possibility that informants may be able to describe some of the discrete sensory characters that pertain to their cognitive prototypes of folk taxa.

Several investigators (Berlin *et al*. 1974; Hunn 1975; Perdue n.d.) maintain that people can often at least explain how they are able to differentiate between folk *species* in the same folk *genus*. Conspecifics are commonly so close in appearance and behavior that they are distinguishable only after careful inspection. Berlin *et al*. (1974:155) argue that folk species within the same folk genus can usually be distinguished by a small number of features. Bearing that in mind, it seems fairly feasible to determine the differentiating features for conspecifics. López-Zent (1999: 295, 296), for example, lists the leaf, fruit, flower, bark, growth habit and ecological habitat characters that she believes allow the Hotï of Venezuela to distinguish between 13 folk species in the genus ***luwe*** ^{h}***yaï*** (*Inga* spp., Fabaceae). Similarly, Hunn (1975), working with five birdwatchers in the San Francisco Bay area, and drawing on his own bird watching experience, found that he could isolate discrete characters that allow him and his fellow bird enthusiasts to distinguish between twelve folk species of gulls (family Larinae) present in the region. Hunn was even able to make flow charts showing the individual decisions he and his informants typically make in the identification process for eight of the 12 folk species. Such detailed analysis was difficult for four of the folk species, because they are distinct enough in appearance to be recognized very quickly.

There is a general consensus in the ethnobiological literature that recognition of folk genera typically happens very quickly. Brent Berlin asserts that a folk genus should be "readily recognizable at first glance, as a single gestalt or configuration" (1992:60). In his study of identification of gulls and gull allies, Hunn (1975) does not attempt to make a detailed analysis of how the related folk genera 'gull', 'tern' and 'jaeger' are recognized. Hunn maintains that the process of recognizing folk genera (and even some very distinctive folk species) happens quite rapidly and is "not consciously mediated" (1975:53). If assignments at the folk genus level are, in fact, made without conscious awareness of the thought processes involved, then that obviously limits the ability of informants to describe in great detail their reasoning in decisions made at that taxonomic level. However, my personal experience leads me to believe that large trees are a special case. A single quick glance is not always sufficient to allow the Aguaruna to identify trees to the folk genus level. I had many opportunities, during a formal test plot experiment and during informal walks through the forest, to observe the actions my informants took as they identified trees. A minority of Aguaruna tree folk genera are polytypic, so many of the identifications I witnessed produced names consisting only of a folk genus. Identification of tall trees typically required two quick glances, one at the trunk and the other up at the canopy. In a significant number of cases, my informants could only produce a folk genus name for a tree after cutting its bark to smell it, look for sap, or observe the color of the inner wood. Bark cutting appears to be particularly important for identifying tall trees, whose leaves (and flowers or fruit, if present) could not be observed in great detail from the ground.

This study focuses on identification as an individual exercise. As Ellen has pointed out (1993), identification can also be a collective process, since groups of people often encounter and discuss the identity of living organisms. Collective identifications involve a process of negotiation between the people present. In the case of disagreements, the status of each person involved will clearly influence whether or in what way the conflict of opinion is resolved. Analysis of the social aspects of collective identification would make an interesting study in its own right, but it is beyond the scope of the present study.

Indigenous Tree Identification in the Amazon Basin

Anecdotal evidence suggests that many indigenous groups of the Amazon Basin can identify tree species simply by observing the visual, olfactory and gustatory characteristics of the trunk and bark (see Berlin 1992:7; Davis 1996:453, Gentry 1993:4). This stands in contrast to the identification methods outlined in Western taxonomic keys that rely heavily on floral, fruit and leaf characteristics to make tree identifications. A notable exception to standard scientific floral key production is seen in the work of the late Alwyn Gentry, one of the foremost neotropical botanists of recent years. He has even commented specifically on the difficulty of identifying neotropical plants by flower or fruit characteristics since there is a high degree of morphological convergence of these structures (1993: 3). In his classic work, *A Field Guide to the Families and*

Genera of Woody Plants of Northwest South America (1993), Gentry presents a key to the woody flora of the upper Amazon based mostly on characteristics of the trunk, bark and leaves. Gentry's key represents a pioneering approach to identifying woody flora of the upper Amazon using sterile characteristics that appears to share something in common with indigenous methods of botanical identification.

A few studies have discussed identification of woody flora by indigenous peoples of the Amazon. In his paper "The Knowledge and the Use of Rain Forest Trees by the Kuikuru Indians of Central Brazil" (1978), Carneiro describes several different methodologies that he used for eliciting tree identifications from his informants. In one experiment, Carneiro took two expert informants through a 1/6 acre test plot where he had marked every tree of at least 1 in. diameter at breast height (DBH). Although he did not record the actions his informants took in identifying each individual tree, Carneiro was able to make a general characterization of their identification process. The informants first looked at the trunk, and if that was not sufficient to provide a name, they would then look up to the canopy for leaves and any flowers or fruits that might be present. Occasionally, the men also cut the bark to examine it more carefully, or to taste it, smell it or look for sap. In another experiment, Carneiro (ibid.) presented a group of Kuikuru men with 153 plant specimens, consisting mostly of seedlings of trees, shrubs and lianas, that he had dug from a 10 ft. by 10 ft. plot in primary forest. To his surprise, the men were able to come to a consensus on the proper name for every one of the specimens. In a final experiment (ibid.), Carneiro presented a group of men with 177 leaves he had collected in a 1 ft. by 1 ft. section of primary forest. The men were eventually able to identify all of the leaves, although some of the more difficult ones required lengthy discussion and consultation of other community members. Carneiro was not able to provide botanical determinations for the plants in his investigations.

Nevertheless, his research highlights the expertise of his Kuikuru informants in identifying tree species in their local environment, even when immature, and even when only one particular part (e.g. the leaf) was present.

López Zent (1999) provides a brief discussion of identification, within the context of describing the ethnobotany of the Hotï of Venezuela. In addition to providing sets of contrasting morphological and ecological characteristics for five Hotï folk genera of trees, López Zent also illustrates the typical process of tree identification for the Hotï. When the Hotï identify woody flora, they first observe the outer trunk. If trunk appearance is not enough to make an identification, the Hotï will cut the bark in order to smell it, look for sap and observe the inner trunk color. If the identity is still uncertain, after cutting the bark, the Hotï will look for fruits and flowers or try to find fallen leaves on the ground.

Related Issues in Ethnobiology

Children's ecological knowledge has been a subject of interest to ethnobiological researchers for several decades (Dougherty 1979; Hatano and Inagaki 1994; Ross *et al*. 2003; Stross 1973; Zarger and Stepp in press). Some studies of children's ethnobotanical knowledge are relevant to the question of how people identify living organisms. Dougherty (1979), for example, describes research done with children in Berkeley, California to investigate how they form a hierarchical classification system through contrast and inclusion based on morphological features. Stross (1973), who studied acquisition of botanical knowledge among Tzeltal Maya children, found that when children mistakenly identify one folk genus with another, this usually corresponds to a covert recognition by adults that the two folk genera in question are morphologically similar. Both examples underscore the importance of perceptual clues in identification.

Other research has investigated the related question of how people identify plants with particular kinds of medicinal activity from the many species growing in their local environment. Glenn Shepard (2002) discusses the clues that the Matsigenka and Yora of the Peruvian Amazon use to recognize medicinal plants. He reports that the Matsigenka make use of taste, smell, and irritation while the Yora mainly rely on olfactory, visual and tactile clues. Lisa Gollin (2004) has investigated the sensory clues, particularly the gustatory, olfactory and tactile ones, that allow Kenyah Leppo` Ke of Borneo to recognize medicinal plants. Leonti *et al*. (2002) report certain visual and chemosensory clues that the Popoluca of Southern Veracruz associate with particular medicinal properties.

Identification in Cognitive Psychology and Evolutionary Biology

Psychology, evolutionary biology and related disciplines have also made significant contributions to understanding issues related to the visual, and chemosensory aspects of identification. Unfortunately, only a very brief discussion of the contribution of these disciplines is possible here. While anthropological studies of identification are very rare, cognitive psychology has made an important contribution in this area, particularly for the visual aspects of identification (Coren *et al*. 2004:319-324 ; Palmeri and Gautier 2004; Palmeri and Noelle 2002). In their review “Visual Object Understanding”, Palmeri and Gautier (2004) attempt to bridge the gap that has traditionally existed between understandings of visual perception and cognitive questions related to identification, recognition and visual memory. The authors are also interested in how visual understanding varies between novices and experts with regard to various domains of visually oriented knowledge. It is important to note that cognitive psychologists define the term identification slightly differently than biologists do. According to plant taxonomist Tod Stuessy, identification is the process of “referring an individual specimen to a previously classified and name group” (1990:10). For psychologists Palmeri and Gautier, however, the assignment of an object to a named class is called *categorization*, while *identification* is “a decision about an object’s unique identity” (2004:1). In this monograph, I use the word identification in same sense that biologists do. Cognitive psychology has not yet carried out much work addressing the categorization and identification of living organisms (but see Atran 1998; Medin *et al*. 1997; Medin *et al*. in press) and cross cultural work in this field is not common (but see Medin and Atran 2004; Medin *et al*. in press; Ross *et al*. 2003). Some authors (Atran 1990; Geary and Huffman 2002) have addressed the issue of whether there exists a specific module in the mind for understanding living organisms.

Research related to machine vision, within the field of artificial intelligence is also potentially relevant to understanding the visual aspects of the identification of living organisms. Samal *et al*. (2005) were able to devise a computational algorithm capable of distinguishing between images of the three gymnosperms Japanese Yew (*Taxus cuspidata*), Hicks Yew (*Taxus* x *media*) and Eastern white pine (*Pinus strobus*). The system was able to recognize Japanese yew, Hicks yew and Eastern white pine in 87%, 93% and 93% of trials respectively, based on the differing textural and other visual features of the species.

Recognition and categorization of tastes and odors has been the focus of some research in cognitive psychology, while evolutionary biology and related disciplines have addressed the adaptive significance of smell and taste recognition in the course of human evolution. A few researchers have addressed cross-cultural differences in odor perception and recognition (Chrea *et al*. 2002; Doty *et al*. 1985; Rabin and Cain 1984). As part of his model of chemical ecology, Timothy Johns’ (1990) describes how both the physiological and the cultural aspects of taste and smell allow humans to maximize the benefits of certain chemical constituents of plants, including basic nutrients such as carbohydrates, proteins, vitamins and medicinal compounds, while avoiding potential toxins. Other authors, including Bermúdez Ratoni (2004) and Wright and Smith (2003), discuss molecular mechanisms and evolutionary significance of taste recognition in animals.

Glenn Shepard (2004) notes that cross-cultural accounts of sensation from anthropology have often ignored the contributions of the biological sciences. Shepard proposes “sensory ecology” as a new theoretical framework for a cross-cultural understanding of sensation. Sensory ecology would seek to draw both from the scientific understanding of the physiology of sensation and the cultural factors that lead interpretations of sensation to vary within those physiological limits. Shepard writes “…[S]ensory ecology would be equally interested in cross-cultural variation and similarities and should incorporate physiological understandings and cultural constructions of sensory perceptions within a broad biocultural model addressing human-environment interactions” (2004:264).

Research Hypothesis

This research seeks to understand how the Aguaruna recognize and identify the trees in their local environment. While keeping in mind that informants may have difficulty expressing some aspects of their thought processes when making identifications, I none-the-less share the optimism of some investigators (Berlin 1992; Ellen 1993; Perdue n.d.) that informants will be able to describe some aspects of the process in terms of discrete clues. Scott Atran has proposed (1999), based on his work with the Itzaj Maya, that small-scale societies tend to use both ecologically-based, as well as morphologically-based arguments for claiming that two organisms are related or predicting which properties they should share in common. The first prediction that frames this research follows, both from the optimism of Berlin (1992) Ellen (1993) and Perdue (n.d.), and from Atran's (1999) emphasis on the importance of both morphological and ecological reasoning in folk biological systems. The prediction is: **The process of tree identification among indigenous peoples involves both sensory and ecological reasoning, at least part of which can be verbalized by informants in terms of discrete clues**. Sensory reasoning here refers to visual, tactile, olfactory or gustatory clues. Ecological reasoning here refers to clues related to plant communities, plant-animal interactions, hydrological features (proximity to a river drainage for example), soil types and topographical features.

As previously stated, Berlin *et al*. argue that folk *specific* taxa within the same folk *genus* should be easily differentiated by "a few obvious morphological features" (1974: 155). It follows that one means of understanding indigenous methods of tree identification would be to ask informants to contrast a particular tree with others in the same folk genus. However, approximately 82% of Aguaruna folk genera are monotypic (Berlin 1976:389), so this method would have limited utility for the majority of tree taxa recognized by the Aguaruna.

The Aguaruna concept of ***kumpají*** 'its companion' denotes organisms thought to be morphologically similar but not necessarily subsumed under a common linguistic label (e.g., 'it looks like a tuliptree', 'it is similar in appearance to a hemlock'). An Aguaruna example of ***kumpají*** are the three trees ***shijíg*** (*Hevea* spp., Euphorbiaceae), ***tákae*** (*Brosimum* spp., Moraceae) and ***barát*** (*Ecclinusa lanceolata*, Sapotaceae), which are grouped together because they all have white latex-like sap, although it is not obvious just from looking at the names that they are related in the folk taxonomy. All the members of a particular polytypic folk genus are automatically considered companions to each other, but the term also allows for the grouping of two or more folk genera into covert categories. The Aguaruna word ***kumpají*** is derived from the similar Spanish word *compañero*, meaning friend or companion. The Aguaruna also employ another term, ***patají***, meaning 'its family member' synonymously with **kumpají**. There is no evidence to suggest that the word ***patají*** is borrowed from another language. Although ***kumpají*** is currently the more widely used term, the existence of the synonym ***patají*** strongly suggests that the concept both terms denote is not borrowed (Jernigan in press).

This research uses the ***kumpají*** concept to further explore the morphological and ecological clues that allow the Aguaruna to identify trees. I have assumed that asking informants to compare and contrast trees that they consider to be companions will help distinguish the characters that allow them to recognize broad membership in groups of related trees, and those that allow them to make finer distinctions between the members of each group.

Chapter Organization

In Chapter 1, I provide an introduction to the ethnography of the Aguaruna and related Jivaroan cultures. Chapter 1 also deals with the history and ecology of the upper Marañón region where the research took place. Chapter 2 describes the methods used for addressing the research hypothesis. In Chapter 3, I provide a detailed description of 63 trees chosen as a sample for the structured interview component of the research, along with a discussion of the significance of the term ***kumpají*** 'its companion' in Aguaruna ethnobotanical classification. Chapter 4 presents and analyzes the results of structured interviews designed to elicit informants' criteria for identifying members of my chosen sample of trees. Chapter 5 details the results of an experiment that involved observing identifications of trees in study plots. In Chapter 6, I describe uses and ecological information that my informants provided for the sample of trees selected for the structured interviews. Chapter 7 is a bilingual description of the study trees in Aguaruna and Spanish that includes their morphological features, ecological characteristics and any traditional uses that informants provided. I plan to distribute copies of Chapter 7 to the communities where I worked. It seems fitting to share the results of this work with the people who helped make the project possible. Finally, Chapter 8 attempts to tie together all of the data from this research and make conclusions and generalizations, where possible.

Notes Regarding Orthography

The orthography used in this monograph for Aguaruna words is borrowed from Uwarai Yagkug *et al*. (1998). Underlined vowels indicate nasalization. Single vowels indicate short vowel sounds, while doubled vowels indicate long vowel sounds. The letter ***e*** represents a sound similar to the Spanish ‘u’, but is made without rounding the lips. The consonant ***g*** is usually pronounced like ‘ng’ in the English word ‘running.’ However, in some words, ***g*** is pronounced like the ‘g’ in the English word ‘get.’ ***Nd*** represents a prenasalized ‘d’, while ***mb*** represents a prenasalized ‘b.’ ***Ts*** is pronounced like the ‘ts’ in the English word ‘cats.’ The consonants ***w*** and ***k*** are pronounced as in English. All other letters are pronounced as in Spanish.

Confidentiality for Informants

Names of all informants mentioned in this monograph are pseudonyms. However, I have used the real names of my field assistants.

Chapter 1

Cultural and Ecological Context of the Study

Introduction

The Aguaruna are one of four ethnic groups in the Jivaroan family. The other three generally recognized Jivaroan groups are the Shuar, the Achuar and the Huambisa. The four groups are considered to be linguistically and culturally closely related. The word Jívaro is Spanish and probably derives from the indigenous word ***shuar***, which means 'people' in all languages of this family except Aguaruna (Harner 1972). Early Spanish accounts use the term Xíbaro rather than Jívaro (see for example Jiménez de la Espada 1965). The ethnic designation ***shuar*** is currently used specifically for the sub-group of Jivaroan peoples living on the Zamora, Upano, upper Pastaza and Morona Rivers, in Ecuador (Figure 1.1). Jívaro is not currently used as a cultural designation to the extent that it was in early ethnographic accounts (see for example Karsten 1935, Mason 1950, Stirling 1938), when the cultural and linguistic distinctions between the Aguaruna, Shuar, Achuar and Huambisa were not as clearly recognized as they are now. One disadvantage in using the word Jívaro is that it has popular associations with certain images, particularly headhunting, that do not do justice to the current complex social and political realities of these indigenous groups. However, the term Jivaroan is still useful to designate the linguistic family and when discussing cultural characteristics that the four sub-groups share in common. I have also chosen to use the word Jívaro as a cultural designation, when referring to the pre-contact and Spanish colonial periods, since it is difficult to apply modern ethnic distinctions that early. The Aguaruna have traditionally called themselves ***áents***, which simply means 'people.' The word Aguaruna is quechua in origin. ***Runa*** means 'people', while the meaning of ***agua*** is somewhat more obscure, but probably refers to 'highlands' (Uwarai Yagkug *et al*. 1998). Currently, many Aguaruna have adopted a form of the quechua name and refer to themselves as 'Awajun.'

This chapter provides a brief summary of the history of the study region and also an introduction to the cultural and ecological context of the study. The first section discusses the Aguaruna language and its placement in the Jivaroan language family. The second section deals with the prehistory, colonial history and more recent history of the study region. Section three introduces the study communities, attempting to place them in the context of larger social and political issues of the region. The fourth section deals with the ecology of the study region, including issues of biodiversity conservation and Aguaruna classification of ecological zones.

The Jivaroan Language Family

Aguaruna, along with Shuar, Achuar and Huambisa are the four generally accepted members of the Jivaroan language family. Figure 1.1 is a map of the geographical distribution of the four linguistic (and cultural) groups. The Aguaruna live in the Eastern foothills of the Peruvian Andes, primarily along the Marañón, Cenepa, Nieva, lower Santiago and upper Mayo Rivers. The Huambisa live on the Peruvian side of the middle Santiago and lower Morona Rivers, while, the Shuar reside in Ecuador, on the Zamora, Upano, upper Pastaza and upper Morona Rivers. The Achuar live mainly along the Pastaza and Tigre Rivers and their tributaries, in Peru and Ecuador (Brown 1984). A fifth group, the Candoshi, speak a language that may be more distantly related to the Jivaroan family, although that is controversial (see Cambell 1997:185). The Candoshi live on the lower Morona and Pastaza (Grimes 1992)

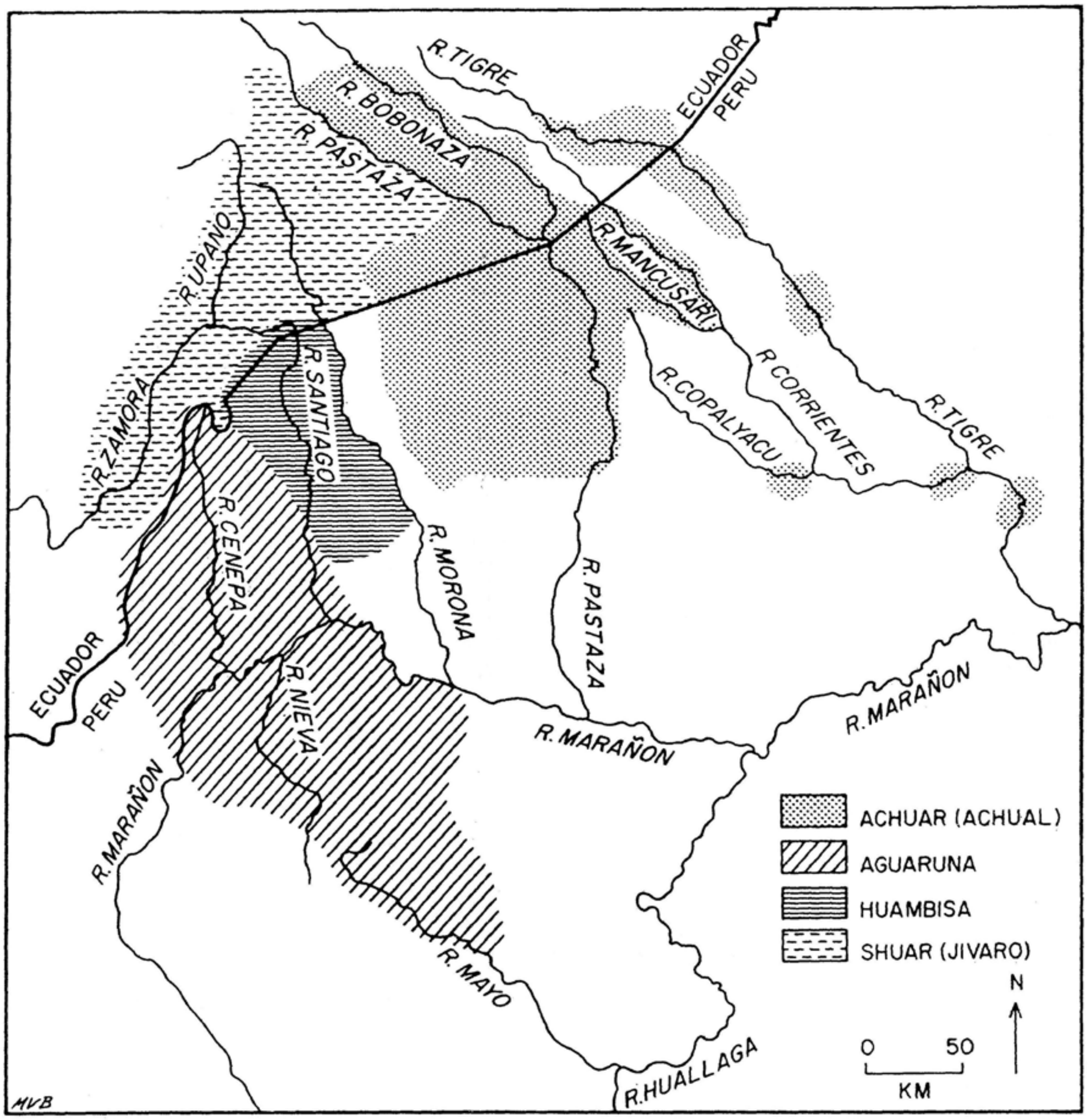

Figure 1.1 – Language map (from Brown 1984).

The four commonly accepted Jivaroan languages are similar enough that some early writings (see for example Mason 1950 vol. 6: 223) suggest that they are actually dialects of a single language. My experience suggests that there is a limited degree of mutual intelligibility between Aguaruna and the other languages. My Aguaruna friends and collaborators told me that they could only partial understand Huambisa and Shuar speakers. Brown (1984: 21) states that his Aguaruna collaborators could understand radio broadcasts from the Federación Shuar with some practice. Aguaruna is the most distinct of the four widely accepted Jivaroan languages (Brown 1984, Fabre 2005). Larson (1957) has recorded typical consonant shifts between Aguaruna and Humabisa. One common example is the tendency for "j" or "g" in Aguaruna to shift to "r" in Huambisa. A good example is found in the words for the number 'two', ***jímag*** (Aguaruna) and ***jímar*** (Huambisa). Aguaruna has a number of Quechua loan words, for example ***atásh*** 'chicken' (Cambell 1997: 12) and ***míshu*** 'cat' (Wipio *et al*. 1996:39). Brown (1984) agues that the distinction between Shuar and Huambisa may be artificial.

History and Prehistory of the Study Region

Very limited archeological work has taken place in the regions of Peru and Ecuador where the Aguaruna and other Jivaroan groups currently live (see Figure 1.1). Stirling (1938) reports that his limited excavations on the Upano and Namangosa Rivers revealed material culture that seems to have more in common with that of the pre-Columbian highlands than with that of the modern Jívaro. Harner's (1972) brief surveys in the Shuar area, in the Upano valley in Ecuador have found pottery with associated charcoal remains providing radio carbon dates of 609 B.C. +/- 440 years and 1041 B.C. +/- 160 years. However, in both cases, the styles of the pottery in question did not resemble present Shuar pottery styles. Guallart (1997) notes that the Aguaruna do not identify stone axes that they find with their ancestors, although early ethnographic reports (Up de Graff 1923) confirm that the Aguaruna did use a form of stone ax before metal tools were introduced. On one occasion, my Aguaruna friends in the community of Wichim, in the upper Marañón region, showed me a large boulder in the middle of a stream with incised geometric and vaguely zoomorphic designs (Figure 1.2). They call the boulder ***Inca Agágbau*** 'writing of the Incas' and were no more able to interpret the meaning of the designs than I was.

Figure 1.2 **–** "***Inca Agágbau***" near Wichim.

According to historical sources, in the mid 15th century, the Inca Emperor Tupac Yupanqui succeeded in conquering the Cañaris, a highland group living to the North of the current territory of the Shuar. However, Tupac Yupanqui did not succeed in conquering the adjacent lowlands (Stirling 1938). The Inca Empire's motive for trying to conquer the region is likely the same one that drove the Spanish conquistadors to later make the same attempt. The region is rich in placer gold deposits. In 1527, the Inca emperor Huayna Capac made an unsuccessful invasion attempt in the lowland Bracamoros region on the Chinchipe River. Some authors (Stirling 1938, Harner 1972, Guallart 1990) have assumed that the Bracamoros were a Jivaroan group, although conclusive evidence appears to be lacking. However, from the accounts of the Inca Empire's failure to extend into the lowlands area of the region, it appears likely that most of the Jívaro never lived under political dominance of the Inca.

The first Spanish explorer to reach the Jívaro was Hernando de Benavente, who entered what he called "tierra e provincia Xíbaro" in 1549 (Jiménez de la Espada 1965). At first, the Spanish and Jívaro maintained a fairly peaceful trading relationship (Brown 1984:22). That relationship changed after the Spanish discovered gold deposits in the Upano, Paute and Zamora Rivers (Figure 1.1 above). The Spanish required workers for the mines and enslaved some men from the local indigenous communities. In 1599, the Spanish governor of Macas levied a widely unpopular tax on the people of his province, both Spaniards and indigenous. The Jívaro leader Quirruba responded by organizing an army of over 20,000 men which easily took control of the colonial town of Logroño. Quirruba and his men killed the governor by pouring molten gold down his throat and largely drove the Spanish out of the region (Harner 1972).

After their rebellion of 1599, the Jívaro became fairly isolated from outside influence and remained free from Spanish political domination for the next two centuries. During that intervening time, the Jesuits made limited attempts at missionary work in the area and there were minor hostilities between the Jívaro and Spanish colonists living near them (Harner 1972, Brown

1984). Even by the time Peru gained independence from Spain in 1821 (*Atlas Regional del Peru Tomo 5: Amazonas* 2004), the Jívaro were still fairly free from outside influence. In the late 19th century, some rubber traders entered the upper Marañón area (Guallart 1990), but their activities there were not as extensive as they were in more accessible parts of the Peruvian Amazon (Brown 1984). Nevertheless, the entry of rubber traders and other outsiders into the upper Marañón region in the late 19th and early 20th century led to conflicts in some cases. On one hand, the Aguaruna desired trade goods such as guns and machetes, but they were understandably concerned about the epidemics that came with increasing contact. Tensions culminated in 1904 when some Aguaruna men from communities on the upper Marañón organized an attack on rubber traders and missionaries in the towns of Nazareth and Wabico (Guallart 1990).

During the first half of the 20th century, more peaceful relations between the Aguaruna and neighboring mestizos began to develop. Missionary activity in the region also greatly increased during this period. A Nazarene mission was founded in 1927 and a group of linguists from the Summer Institute of Linguistics arrived in 1947. The Jesuit order founded a mission in the town of Chiriaco on the upper Marañón in 1949 (Brown 1984). Traditionally, the Aguaruna lived in small widely dispersed settlements, usually consisting of a few families. Houses were sometimes placed on hilltops as a measure to help avoid raids from other Aguaruna or Huambisa groups. However, in the 1960's and 70's several factors led to the development of larger communities, typically located along the major rivers of the region. In the 1950's and 1960's, Catholic missionaries started founding schools and convinced some families to settle around them (Berlin and Markell 1977). The Summer Institute of Linguistics played a similar role in the 1960's (Guallart 1997:74). In 1974, the Peruvian government passed the Ley de Comunidades

Nativas, which recognized the legal rights of indigenous peoples to the lands they had long occupied. However, the process of receiving land titles required that indigenous settlements be concentrated in well defined locations (Guallart 1997:79). The formation of Aguaruna political organizations also facilitated the development of the new communities. The first such organization, the Consejo Aguaruna Huambisa (CAH) was founded in 1977 with the goal of achieving political power for the purpose of improving the education, health and economic situation of the Aguaruna. Opinions varied on how well the CAH was able to achieve its stated goals and soon, other political organizations connected with particular geographic regions followed. The Organización de Comunidades Aguarunas del Alto Marañón (OCAAM) was founded in 1984 (Guallart 1997:80). The communities where I carried out most of the work belong to the Federación de las Comunidades Nativas Aguarunas del Río Nieva (FECONARIN) an organization founded by Martín Reátegui Ipaco in 1988. Currently, there are more than a dozen Aguaruna political organizations (Greene 2004a.).

The Study Communities

The communities where this research took place are located in the department of Amazonas, in Northern Peru, bordering on Ecuador (see Figure 1.3). Peruvian departments (*departamientos*) are roughly equivalent to U.S. states in the Peruvian hierarchy of political organization. A large majority of the Aguaruna live in Amazonas, although some live in the neighboring departments of Loreto, San Martín and Cajamarca as well. The department of Amazonas is further broken up into seven smaller divisions called *provincias*. The Aguaruna

Figure 1.3 – Map of department of Amazonas.

live in the *provincia* of Condorcanqui and all but the Southernmost portion of the *provincia* of Bagua. Santa María de Nieva, the site of two pilot studies for the project, is the capital of the province of Condorcanqui and is situated at an elevation 230 m. above sea level, at the point where the Nieva River joins the Marañón, upstream from the Pongo de Manseriche (*Atlas Regional del Peru Tomo 5: Amazonas* 2004). The population of Santa María de Nieva, including the nearby community of Juan Velasco is listed as 2,252 in the 1993 census (Guallart 1997: 94).

The majority of people who live in Santa María de Nieva are Aguaruna, but there are many Huambisa and mestizo residents as well.

The research took place principally in five communities located nearly 60 kilometers (as the crow flies) upstream from Santa María de Nieva on the Nieva River and its tributary, the Cachiaco. The communities are: Bajo Cachiaco, Kayamas, Tayunts, Alto Pagki and Atash Shinukbau, (see Figure 1.4). The traditional Aguaruna name for the Nieva River was Numpatkaim 'blood colored', referring to the appearance of the water. Aguaruna settlers first came to the Nieva River from the province of Barranca in the department of Loreto. According to my Aguaruna friends and collaborators, the Aguaruna first settled in the upper Nieva in the 1940's. Prior to that time, the Aguaruna avoided the Nieva River since they considered it to be swampy land, full of crocodiles, anacondas and thick vegetation. When Aguaruna settlers did enter the Nieva they found an abundance of game animals and some people decided it was a good place to settle.

Of the upper Nieva communities where I worked, I spent the greatest amount of time in the community Bajo Cachiaco. The community initially formed around an *escuela primaría* (elementary school) built by Catholic missionaries around 1960, at the point where the crystalline waters of the Cachiaco River empty into the red brown waters of the Nieva, at an elevation of 270 m. above sea level (Digital Globe 2006). Due to a change in the course of the Nieva River caused by flooding, the community is no longer located right at the mouth of the Cachiaco, but, rather, a couple kilometers upstream. Prior to the founding of the school, Aguaruna families in the region lived in dispersed settlements. The first Aguaruna to arrive were three brothers named Tamkep, Kuwagkus and Chaawa, who came from Barranca around 1945.

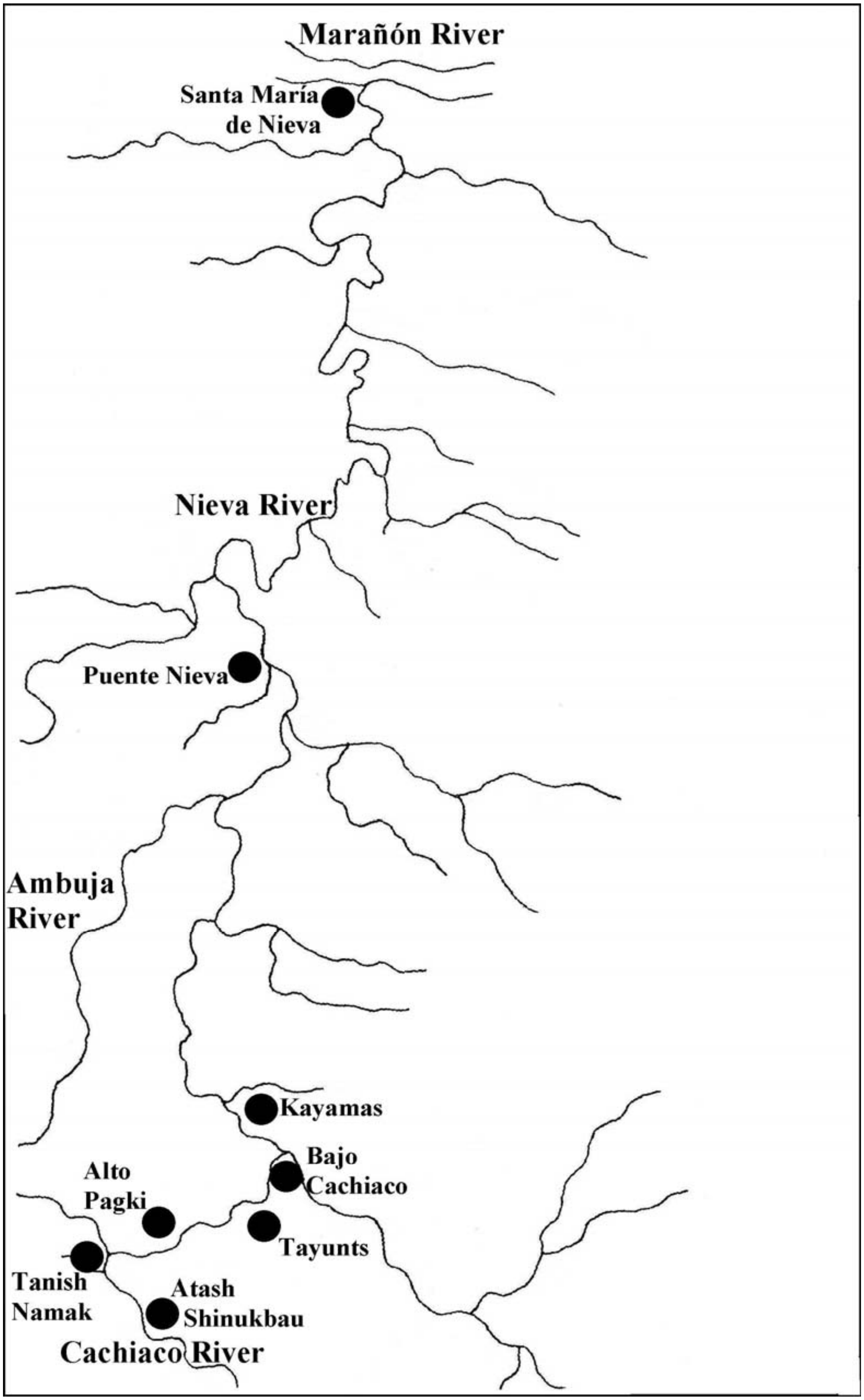

Figure 1.4 – The study region (adapted from Guallart 1997).

The Peruvian governmental agency Instituto Nacional de Estadística e Informática (INEI) lists the population of Bajo Cachiaco as 96 for the 1993 census (2006), but that figure seems low, especially considering that, more than a decade earlier, Guallart (1981) listed the population as 270. My impression is that the current number of residents is closer to 270. Aguaruna is the primary language in Bajo Cachiaco, as it is in the other study communities. Rates of bilingualism are low, especially among older community members. In addition to its *escuela primaria*, Bajo Cachiaco presently has a *colegio* (high school). The *colegio* functions partly as a distance education program, since there are not always enough teachers to staff it. Education currently has a bilingual component, although none of the distance education materials are available in Aguaruna. The nearest road to Bajo Cachiaco passes through the mestizo settlement of Puente Nieva, located on the Nieva River, about halfway between Bajo Cachiaco and Santa María de Nieva. The journey from Bajo Cachiaco to Puente Nieva takes four to six hours in *peke peke* (motorized canoe), depending on the water level and direction of travel. It is possible to paddle downstream to Puente Nieva in seven or eight hours, but the trip back upstream can take up to three days. People from the upper Nieva communities commonly travel to Puente Nieva to buy sugar, matches, clothes and other basic necessities. Community members also sometimes travel to Puente Nieva to sell timber from highly valued trees such as ***séetug*** (*Cedrela odorata*) and ***tsáik*** (*Cedrelinga cateniformis*). However, I was told that buyers in Puente Nieva do not always pay what they originally promise for timber. Despite its relative isolation, Bajo Cachiaco is equipped with several means to communicate with the outside world. A solar panel provides power for a short wave radio, which is the primary means of communication with the outside. There is also a satellite telephone, but it only operates with phone cards that can be purchased in Santa María de Nieva. The solar panel has also been used to power a computer, although it was not functional during my stay in the community. By the time of this writing, however, Bajo Cachiaco already has satellite internet access.

Four communities lie upstream and to the West of Bajo Cachiaco on the Cachiaco River (Figure 1.4). They are Tayunts (elevation 300 m.), Alto Pagki (elevation 360 m.), Tanish Namak (elevation 370 m.) and Atash Shinukbau (elevation 510 m.) (Digital Globe 2006). All the upstream communities are annexes of Bajo Cachiaco, meaning that they all lie within Bajo Cachiaco's land title. In the course of the research, I visited all the communities on the Cachiaco except Tanish Namak. A foot path is the primary means or reaching the upstream communities, although I was told it is sometimes possible to travel as far as Pagki by canoe after heavy rains have caused the water level in the Cachiaco to swell. The nearest community from Bajo Cachiaco is Tayunts, which is located where the creek Tayunts Entsa joins the Cachiaco River. The population of Tayunts is listed as 130 in the 1993 census (INEI 2006). I visited Tayunts on two occasions and interviewed a couple informants there. Alto Pagki lies three hours from Bajo Cachiaco by footpath. Alto Pagki's population was recorded as 137 in the 1993 census (INEI 2006). There is an *escuela primaria*, but no *colegio*. I visited Alto Pagki on two occasions and worked with two informants there. The terrain around Alto Pagki is mountainous. One particular mountain, Jempentsa Mujaji (Figure 1.5), rises to a height of over 900m (Digital Globe 2006) and provides an opportunity to observe certain habitat types, such as elfin forest, that are not found around lower communities. Slightly upstream from Alto Pagki, the Cachiaco River makes a hairpin turn and then continues on in a generally Southward direction (Figure 1.4). The community of Tanish Namak is located near the bend in the river and is well known for its rock salt that can be found on the river's edge.

Figure 1.5 – Jempentsa Mujaji, near the community of Alto Pagki.

The farthest upstream community, Atash Shinukbau, is located to the South of Tanish Namak, near a large mesa-like mountain called Iwanch Ujagmamu 'Devil Song Mountain.' According to legend, the mountain is the site where the Iwanch, a malevolent spirit, sang an ***ujagmámu***, a special song that was traditionally sung after taking head trophies (***tsántsa***) (Uwarai Yagkug *et al*. 1998). Due to the sharp bend in the Cachiaco River, it is possible to get to the community of Atash Shinukbau by a path leading over a mountain pass from Alto Pagki. I took that route, rather than traveling along the river via Tanish Namak. The population of Atash Shinukbau is listed as 76 in the 1993 census (INEI 2006). I visited Atash Shinukbau on only one occasion. It was a strenuous eight hour hike from Bajo Cachiaco, and the journey over the mountain pass from Alto Pagki was especially tiring. I arrived in Atash Shinukbau at nightfall, accompanied by my field assistants, Gregorio and Nestor Reátegui. Some community members were suspicious when they saw me, even though I was accompanied by two Aguaruna guides. People expressed concern that the arrival of outsiders could bring thieves or witches (***túnchi***). On the other hand, night was falling, so we were given the benefit of the doubt and allowed to stay. Tensions eased the following day and I worked with one key informant. During my brief four day stay, I observed a colony of ***táyu*** 'oil birds' (*Steatornis caripensis*) in a nearby canyon and was told of a larger colony about six hours journey from the community. Like Alto Pagki, the land around Atash Shinukbau is mountainous and affords ample opportunities for observing highland ecological zones such as ***éwejush*** 'elfin forest' and ***kampáu*** 'hillside forest with spongy soil.'

The community Kayamas (Figure 1.6) is located on the Nieva River, slightly downstream from Bajo Cachiaco. The population is similar to that of Bajo Cachiaco (266 in the 1993 census) (INEI 2006). Kayamas has a separate land title from Bajo Cachiaco and there have been some disputes over boundaries between the land holdings. However, the relationship between the two communities is generally friendly. Kayamas and Bajo Cachiaco cooperate as members of the recently formed Comité de Productores Indígenas Awajun del Alto Nieva (COPIAAN), an organization concerned with economic development in the region. Kayamas has an elementary school and short-wave radio. I worked with several key informants in Kayamas.

In the course of the research, I also visited two communities in the district of Bagua, along tributaries of the Chiriaco River. I spent three weeks in Wichim, about an hour distance on foot from the highway that connects Bagua and Imaza. In Wichim, I collaborated with Nico Dauphiné on a pilot study of Aguaruna knowledge of ecological relationships between frugivorous birds and the plants they eat (Jernigan and Dauphiné 2005). The community Sukutin is a three hour walk from Wichim along a path that crosses over a ridge into the valley of the Shushunga River, a tributary of the Chiriaco. The word ***sukutín*** means 'hot' (Uwarai Yagkug *et al*. 1998) and, in this case, refers to hot springs located not far from the community on the edge

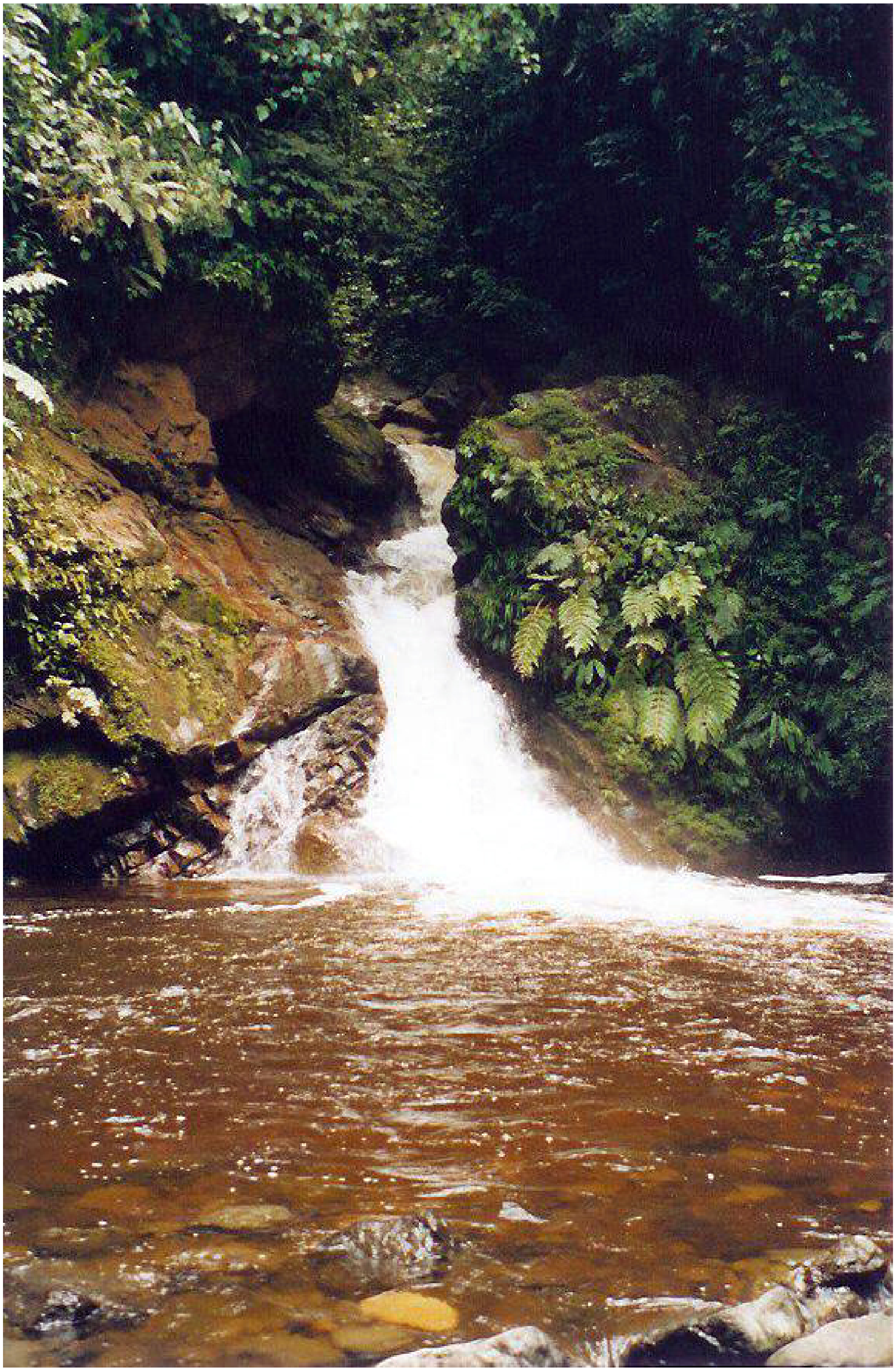

Figure 1.6 – Waterfall near the community of Kayamas.

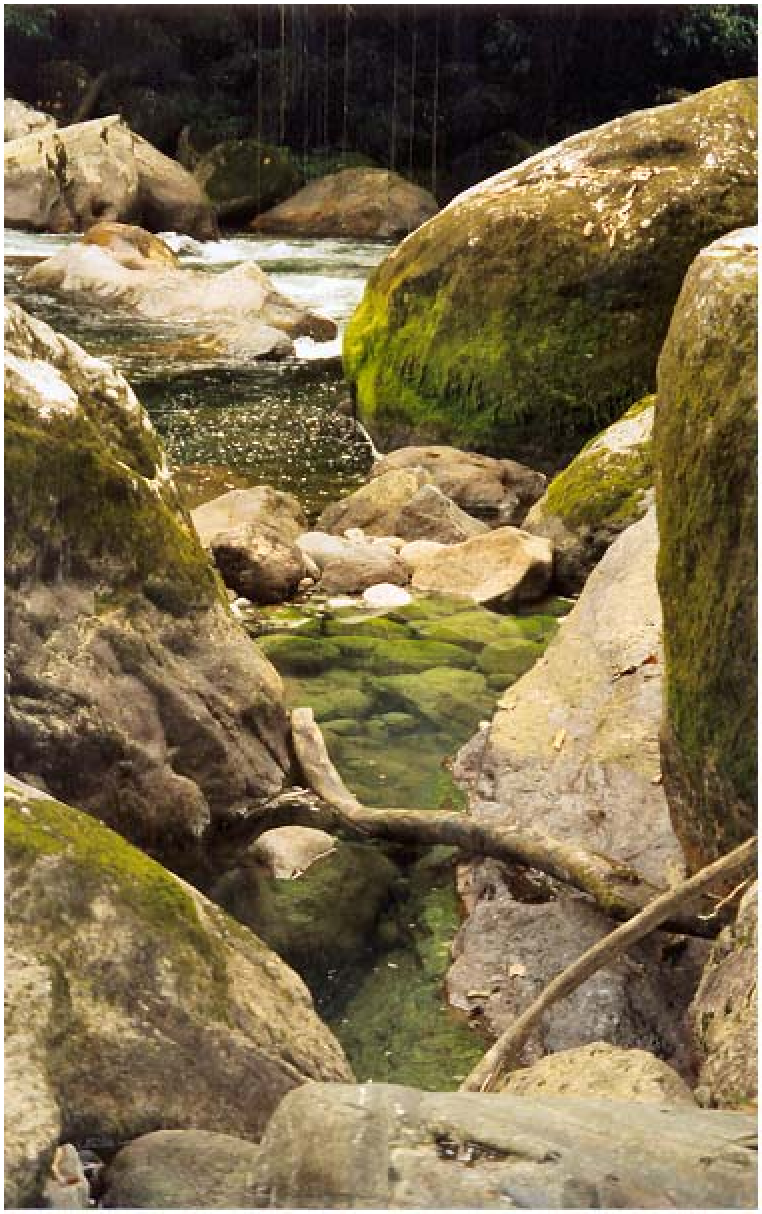

Figure 1.7 – Hot springs near the community Sukutin.

of the Shushunga River. During my single day visit to Sukutin, I conducted a brief ethnoornithological interview with one informant and observed the hot springs that give the community its name (Figure 1.7).

Subsistence

The Aguaruna of the upper Nieva region rely mostly on traditional subsistence practices (Berlin and Markell 1977). They practice swidden agriculture supplemented by wild plant foods and meat from livestock, wild game and fish. Typically, each family has an ***ája*** 'cultivated field' near their home as well as one or more located farther way. ***Máma*** 'manioc' (*Manihot esculenta*) is the staple crop of the Aguaruna diet. ***Pámpa*** 'plantain' (*Musa accuminata* x *Musa balbisiana*) is also a very important source of carbohydrates. Other important root crops include ***idáuk*** 'sweet potato' (*Ipomoea batatas*), ***kégke*** 'yam' (*Dioscorea trifida*), and ***pítuk*** 'taro' (*Colocasia esculenta*). Two minor legume crops, ***dúse*** 'peanut' (*Arachis hypogea*) and ***bíik*** 'beans' (*Phaseolus* spp.) are sources of protein. Fruit trees include non-native cultivated species such as ***najág*** 'orange'(*Citrus* sp.) and ***pína*** 'pineapple' (*Annanas comosus*); semicultivated Amazonian species such as ***wámpa*** (*Inga edulis*) and ***áchu*** (*Mauritia peruviana*) and wild species such as ***akágnum*** (*Theobroma subincanum*) and ***kunchái*** (*Dacryodes* spp.). Berlin and Markell (1977) have identified 138 varieties and 46 species of Aguaruna food plants. Fish species, particularly ***nayúm*** (*Chaetostoma* sp.) and ***kágka*** (*Prochilodus nigricans*) (Guallart 1997), are an important source of protein for the upper Nieva communities. Terrestrial game animals include the mammals: ***káyuk*** 'agouti' (*Dasyprocta* sp.), ***káshai*** 'paca' (*Cuniculus paca*), ***shushuí*** 'armadillo' (*Dasypus novemcinctus*) and ***pabáu*** 'tapir' (*Tapirus terrestris*) (Berlin and Patton 1979) and the bid ***aúnts*** 'Spix's Guan' (*Penelope jacquacu*) (Dauphiné in prep.). The most common domesticated animals are chickens, ducks and pigs. Guinea pigs are rare, but I observed them in one household. In Bajo Cachiaco, a few cows have been introduced.

Outside Influences

Visiting researchers are quite rare in the upper Nieva. The Aguaruna ICBG project (Lewis *et al*. 2000) made a brief visit to Bajo Cachiaco in the 1990's. Peruvian missionaries occasionally visit the upper Nieva communities, although none came while I was there. I found that responses to missionary activity varied greatly among community members. My neighbors in Bajo Cachiaco commonly sang Christian hymns in Aguaruna and once asked me if there are a lot of churches in the United States. When I told them that there are, they responded that it must be a wonderful place. In Kayamas, my friend and knowledgeable informant Ricardo was not sure what to think of the missionaries' message. On one occasion, Ricardo asked me if I could tell him when exactly God would be arriving. I was confused by the question at first, but he explained that a missionary had recently told him that he need not worry about repairing his house or educating his children since God would be coming soon. Ricardo was hoping that I could verify that information.

Anthropological Literature on the Aguaruna

One of the earliest ethnographic accounts of a Jivaroan society is found in explorer Fritz W. Up de Graff's book *Head Hunters of the Amazon: Seven Years of Exploration and Adventure* (1923), which describes the author's experiences with the Antipa Jívaro during his travels on the upper Marañón and Santiago Rivers in 1897. Up de Graff describes typical Antipa dress, body adornment, diet and provides a fascinating description of the process of felling trees with stone axes. His account also notes that the Antipa lived in small widely dispersed settlements. Up de Graff's writing is probably most famous for its description of a raid that the Antipa and Aguaruna carried out on Huambisa communities, and, particularly, for its account of the process of preparing ***tsántsa*** 'shrunken heads' after the raid. Interestingly, the Antipa are not recognized in recent literature as a cultural or linguistic group. The area Up de Graff visited now belongs to the Aguaruna and Huambisa.

Two other important early ethnographic accounts are Rafael Karsten's *The Head-Hunters of Western Amazonas. The Life and Culture of the Jibaro Indians of Western Ecuador and Peru* (1935) and Matthew Stirling's (1938) *Historical and Ethnographic Material on the Jívaro Indians*. Karsten worked mostly with the Shuar in Ecuador, but also visited the Achuar and the Aguaruna of the Apaga River. Stirling also worked mostly in the Shuar area, but visited the Aguaruna of the upper Marañón as well. Stirling considered the Aguaruna, Antipa, Huambisa, Achuar and the Jívaro proper (the Shuar) as subgroups of a single Jívaro language and culture.

Several decades later, Michael Harner published his famous article "The Sound of Rushing Water" (1968) in which he described, among other things, the key role that ***natema*** (*Banisteriopsis caapi*) and other psychoactive plants play in the cosmology of the Shuar. The Spanish Jesuit priest and scholar José María Guallart has written extensively on Aguaruna history and culture (1997, 1990), ethnobiology (1962, 1968, 1969) and the ecology of the upper Marañón region (1997). In the early 1970's, Brent Berlin, Elois Ann Berlin and other collaborators completed a broad ethnobiological study, mainly in and around the Aguaruna community of Huampami, on the Cenepa River. That research led to the collection of extensive data relating to Aguaruna and Huambisa ethnobotany (Berlin 1970, 1976) and ethnozoology (Berlin and Patton 1979; Boster and Berlin 1986), as well as important data on the Aguaruna ethnomedical system, diet and nutritional status (Berlin 1985; Berlin and Markell 1977). I found the ethnobotanical data of Brent Berlin and collaborators to be quite useful as a foundation for this research, particularly an unpublished list of botanical specimens with corresponding scientific and Aguaruna names (Berlin *et al*. n.d.).

Michael Brown's (1984) ethnographic work with the Aguaruna of the upper Mayo River includes valuable discussion of Aguaruna material culture, subsistence and the ethnomedical system. Brown also provides insightful discussion of the political and ecological context of his study, as well as current issues facing the communities where he worked. More recently, Shane Greene has done ethnographic work with Aguaruna communities in the upper Mayo region (2004b.) and has written about the complex political and ethical issues surrounding the Aguaruna International Cooperative Biodiversity Group (2004a.). Walter Lewis and collaborators (2000) have also written about their own experiences in carrying out the Aguaruna ICBG project.

Biodiversity of the Study Region

The upper Nieva region and adjacent areas of the upper Marañón basin appear to be extremely biodiverse in terms of number of plant and animal species present. The Cachiaco River and the upper Nieva are on the edge of high priority areas for bird and plant conservation, that Rodriguez and Young (2000) formulated based on species diversity and endemism. Neotropical botanist Robin Foster has commented that the adjacent Cordillera del Cóndor region of Peru and Ecuador may be more floristically diverse than any similar sized region of the New World (Forsyth 1997:12). Davies *et al*. (1997) describe another adjacent area, the Cordillera de Colán, as a site where high endemism of bird species has arisen due to its relative isolation from other parts of the Andean chain. The upper Marañón has an estimated 500 bird species (Berlin *et al*. 1981) and information about the life histories of many of these is sparse (del Hoyo *et al*. 2002, Parker *et al*. 1996). Emmons and Pacheco (1997) found 121 mammal species during brief surveys on the Peruvian side of the Cordillera de Cóndor, but the authors believe that represents only a small portion of the mammalian diversity present in the region. Guallart (1962) and Berlin and Patton (1979) provide Aguaruna names corresponding to many common mammal species found in the upper Marañón. Information about reptile, amphibian, fish and invertebrate biodiversity in the study region is scare. Limited biological surveys on the Peruvian side of the Cordillera de Cóndor have recorded species of reptiles and amphibians (Reynolds and Icochea 1997), fish (Ortega and Chang) and Lepidoptera (Lamas 1997). Guallart (1968) provides some Aguaruna names for reptiles, fish, insects and mollusks with corresponding scientific names.

The high biodiversity of the upper Nieva and adjacent regions make them potentially very fruitful sites for ethnobiological and ethnoecological research. This is especially true considering the extensive knowledge of the Aguaruna about the local biodiversity (see for example Berlin *et al*. 1981, Boster *et al*. 1986) and the incomplete scientific knowledge of both species composition and interspecies relationships (Del Hoyo *et al*. 2002, Parker *et al*. 1996, Schulenberg and Aubrey 1997) in the region. The Aguaruna possess an impressively high level of knowledge regarding local animal and plant species. For example, the Aguaruna language has more than 500 folk genera for plants (Berlin 1992) , more than 300 folk genera for birds (Berlin *et al*. 1981). Cooperation between indigenous and Western scientific experts is potentially an effective means of documenting ecological relationships in threatened ecosystems (Nabhan 2000). Moreover, the Aguaruna control large amounts of land of high conservation value. (Atlas Regional de Perú: Amazonas 2004). In the broader Amazonian perspective, indigenous areas account for 54% of all reserves by acreage (Peres 1993). Indigenous societies are, in a very literal sense, stewards of half of the Amazon's protected biodiversity. Furthermore, indigenous resource management systems have been proposed as a model for sustainability in the tropics (Rao 2002, Plenderleith 1999). Thus, dialogue and collaboration between conservation biologists and local populations is crucial to the future of Amazonian biodiversity (Chapin 2004).

The idea of indigenous peoples as natural conservationists is not without its pitfalls, however (Oates 1999). The relatively recent concentration of the Aguaruna population in communities that often number in the hundreds of people has caused resources such as game animals, fish, and highly sought after timber species to become scarce in some areas over the last few decades. People in communities on the upper Nieva told me that some animals are scarcer than they used to be and are concerned about this issue. Animals that are now rarer include some game species such as the tapir ***pabáu*** (*Tapirus terrestris*), and large predators such as the jaguar ***ikám yawáa*** (*Felis onca*) (Guallart 1997). Some valuable timber species such as ***káwa*** (*Ocotea floribunda*) are also becoming scarce in the area where I worked. Michael Brown noted that economic and ecological problems associated with agricultural intensification were already an issue for the Aguaruna of the upper Mayo at the time of his field work, from 1977 to 1978 (1984: 219).

Despite increasing scarcity of some forest resources, large scale deforestation is not present in the upper Nieva. I witnessed greater deforestation near larger population centers of the region, including Santa María de Nieva and, particularly Bagua Chica. Additionally, there is a difference in forest management styles between the Aguaruna and at least some mestizo settlers of the region that is particularly evident in places where they live side by side. Figure 1.8 is a scene from the province of Bagua, Condorcanqui, showing the Aguaruna community of Wichim (in the background) and a relatively smaller mestizo settlement (in the foreground), on opposite banks of the stream Wawas Entsa. The degree of deforestation one can see around Wichim is typical of Aguaruna communities I visited, while the degree of deforestation on the foreground, on the other side of the creek is not generally observed around Aguaruna communities.

Figure 1.8 - A hilltop photo shows Aguaruna and mestizo land management practices near Wichim, Bagua, Amazonas, August, 2004.

Ecological Zones in the Study Region

Recently, several researchers have investigated habitat classification in indigenous societies of the Peruvian Amazon (Fleck and Harder 2000; Gilmore 2005, Shepard *et al*. 2001). Fleck and Harder (2000) report the results of an ethnoecological and ethnozoological study with the Matses, a traditionally foraging group living along the Javari River on the Peruvian-Brazilian border. The Matses recognize 18 categories of primary forest based on topological and hydrological features. These 18 types take into account the distinction between floodplain and terra firme forest, proximity to rivers and streams and soil drainage. Twenty-two Matses categories of primary forest are defined by vegetation, including 16 types defined by a single dominant species of palm or hardwood tree. The Matses also recognize seven categories of secondary forest, based on successional stage. Glenn Shepard (2001) carried out a study of habitat classification of the Matsiguenka of the Manu and Urubamba Rivers. Like the Matses (Fleck and Harder 2000), the Matsiguenka give linguistic recognition to a large number of habitat types based on several cross cutting classificatory schemes. The Matsiguenka recognize 20 habitats based on topographical and hydrological features, 69 habitats based on dominant vegetation and nine habitats based on successional stage. The Matsiguenka also have seven named habitat types based on dominant animal species, including three types associated with ant species and two types associated with animal mineral licks.

Although classification of ecological zones was not the focus of my research, I did collected 11 Aguaruna terms for local habitat types. Vásquez and Rojas (2002) also report a number of Aguaruna names of habitat types, based on their botanical and ethnobotanical work on the Cenepa River, including 13 names that I did not encounter. I have divided a total of 24 habitats types from my own research and the work of Vásquez and Rojas (2002) into four categories defined by: 1) successional stage (Table 1.1), 2) density of understory vegetation (Table 1.2), 3) topography or hydrology (Table 1.3) and 4) dominant vegetation (Table 1.4). Although it appears that the Aguaruna do not name as many ecological zones as the Matsiguenka or Matses, that impression may be simply be a result of a lack of thorough research on the subject.

Asáuk 'secondary forest' was plentiful and easily accessible from Bajo Cachiaco and other study communities in the upper Nieva region. Vásquez and Rojas (2002) report a finer distinction between ***yamá asáuk*** 'early secondary growth' and ***duwík asáuk*** 'late secondary growth.' From informants' descriptions and my personal observations, the trees most commonly found in ***asáuk*** include: ***chinchák*** (various Melastomataceae), ***daikát*** (*Vernonia patens*, Asteraceae), ***dapújuk*** (*Inga cayennensis*, Fabaceae), ***kántsa*** (Various Euphorbiaceae), ***séntuch*** (*Schefflera morototoni*, Araliaceae), ***súu*** (*Cecropia* spp., Moraceae), ***tsáagnum*** (*Isertia laevis*, Rubiaceae), ***tsakátska*** (*Jacaranda* spp., Bignoniaceae), ***tséke*** (*Cecropia* spp., Moraceae), ***umpákainim*** (*Carpotroch*e sp., Flacoutiaceae), ***wámpa*** (*Inga edulis*, Fabaceae), ***wáwa*** (*Ochroma* spp., Bombacaceae), ***yanát*** (*Cecropia sciadophylla*, Fabaceae), ***yujúnts*** (various Fabaceae) and ***yujúya*** (*Miconia poeppigii*, Melastomataceae). Vásquez and Rojas (2002) named some additional plants commonly found in secondary forest of the region, including small trees in the genus *Vismia* (Clusiaceae), the shrub *Pollalesta discolor* (Asteraceae) and lianas in the genus *Uncaria* (Rubiaceae).

Table 1.1 – Aguaruna vegetation types defined by successional stage.

Name	**Gloss**
ikám	primary forest in general
asáuk	secondary forest (in general)
yamá asáuk[1]	early secondary growth
duwík asáuk[1]	late secondary growth
katájak dupáku[1]	clearing formed by trees blown over in a storm
ája	cultivated field

[1] Vásquez and Rojas (2002)

The Aguaruna make a distinction between forest with a dense understory (***apiíj***)and forest with little understory growth (***sáat***) (1.2). I collected almost no information indicating what plant species are associated with these categories.

Table 1.2 – Types defined by density of understory vegetation.

Name	**Gloss**
apiíj	dense tangled understory
sáat	sparse understory

The broadest distinction that my Aguaruna informants make for topographically and hydrologically defined habitats (Table 1.3) is that between ***páka*** 'lowlands' and ***múja*** 'highlands.' One of the more specific lowland habitat types, ***namák núgka*** 'seasonally inundated forest', is not present in the upper Nieva region. ***Namák núgka*** is found in lower elevation areas, particularly along some portions of the Marañón and Santiago Rivers (Vásquez and Rojas 2002) (Figure 1.9). My informants noted that some trees tend to grow "***namaká wenín***" 'by the edge of a river', a phrase that appears to be equivalent to ***ikám entsá uwét*** 'forest at the edge of a river or stream', in Vásquez and Rojas (2002). Trees that typically grow on river banks or islands (***ájuntai***) include: ***káka*** (*Trema* spp., Ulmaceae), ***kútsa*** (*Heliocarpus americanus*, Tiliaceae), ***muráina*** (*Guazuma crinita*, Sterculiaceae), ***samík*** (*Pithecellobium longifolium*, Fabaceae), ***satík*** (*Cecropia* spp., Moraceae), ***sejempách*** (*Inga* spp., Fabaceae), ***tsuntsúj*** (*Ficus* c.f. *maxima*, Moraceae), ***wámpushik*** (*Inga* sp., Fabaceae), ***wampúsnum*** (c.f. *Nectandra shomburghii*, Lauraceae), ***wáwa*** (*Ochroma* spp., Bombacaceae) and ***yantsáu*** (*Guarea* spp., Meliaceae). Vásquez and Rojas (2002) report the term ***tágkae wajakú***, which refers to areas where rivers have cut through rock to form steep walled canyons. Plants found in ***tágkae wajakú*** include various mosses and liverworts.

Although I have found that the term ***múja*** is used to denote upland habitats in general, Vásquez and Rojas (2002) believe that the term refers more specifically to terra firme forest that is intermediate in elevation and has soil suitable for agriculture. My informants mentioned three

Table 1.3 – Types defined by topography or hydrology.

Name	**Gloss**
páka	lowland forest
namák núgka[1]	seasonally inundated forest
ikám entsá uwét[1]	forest at the edge of a river or stream
ájuntai	island
múja (also called ***náin***)	upland forest
mújas	swampy upland forest
kampáu	hillside forest with spongy soil
éwejush	elfin forest
tágkae wajakú[1]	rock wall river bank

[1] Vásquez and Rojas (2002)

Figure 1.9 – An example of ***namák núgka*** – 'seasonally inundated forest' near Puerto Linda, Sarameriza, Loreto.

specific upland habitat types: ***mújas*** 'swampy upland forest', ***kampáu*** 'hillside forest with spongy soil' and ***éwejush*** 'elfin forest.' Trees that grow in ***mújas*** 'swampy upland forest' include: ***batút*** (*Ocotea* spp., Lauraceae), ***kunchái*** (*Dacryodes* spp., Burseraceae), ***pantuí***

(*Protium* spp., Burseraceae) ***pegkáenum*** (various Clusiaceae), ***sámpi*** (*Inga* spp., Fabaceae), ***shijíkap*** (*Protium* spp., Burseraceae), ***tínchi*** (Various Lauraceae), ***tsémpu*** (various Myristicaceae), ***wampíshkunim*** (*Macrolobium limbatum*, Fabaceae), ***yakúshnum*** (*Hyeronima alchorneoides*, Euphorbiaceae).

Two Aguaruna habitat terms, ***kampáu*** 'hillside forest with spongy soil' and ***éwejush*** 'elfin forest', correspond to upland areas, on the slopes or summits of hills that are not suitable for agriculture. ***Kampáu*** (Figure 1.10) is a forest type found on steep hill slopes, usually at an elevation of 650 to 1200m. ***Kampáu*** is characterized by well drained quartz or sandstone based soil covered by a thick spongy layer consisting of roots, moss and leaf matter. Trees in this zone average 15 m in height (Vásquez and Rojas 2002). **Kampáu** probably corresponds to 'orange ridge forest' or 'gray-green ridge forest' in Foster and Beltran's (1997) description of habitat types of the nearby Cordillera de Cóndor. The trees most commonly found in ***kampáu***, according to informants' descriptions and my personal observations, include: ***chinchák*** (various Melastomataceae), ***ejému*** (not collected), ***magkúkish*** (not collected), ***pandáij*** (*Ormosia* cf. *amazonica*, Fabaceae), ***samíknum*** (various Fabaceae), ***shijíg*** (*Hevea* spp., Euphorbiaceae) ***újuts*** (*Dacryodes* sp., Burseraceae) and ***wáwa kunchái*** (*Dacryodes kukachkana*, Burseraceae).

The habitat ***éwejush*** 'elfin forest' occurs on the top of ridges, usually above 1000m and is characterized by low, dense shrubby vegetation (Figure 1.11). The soil is sandy and, like ***kampáu***, is typically covered by a mat of roots, leaf matter and moss (Vásquez and Rojas 2002). When I asked my Aguaruna informants to describe ***éwejush***, they told me that they did not often go there and could not think of many names of trees from that zone, except ***újuts*** (*Dacryodes* sp., Burseraceae). ***Éwejush*** is difficult to get to since it occurs on the top of steep hills. Few valuable resources are found in ***éwejush***, although rocky outcrops and caves in this zone are

Figure 1.10 – Example of the ecological zone ***kampáu***, illustrating the thick mat of roots, leaves and moss covering the ground. From near the community of Wichim, Bagua, Amazonas.

sometimes home to ***táyu*** ‘oil birds’ (*Steatornis caripensis*), a highly favored game bird for the Aguaruna. On a couple of occasions, when I traveled to elfin forest near the study communities, I found that even informants who are otherwise quite knowledgeable about trees had great difficulty naming the shrubs that grow there. While traveling with one informant, Miguel, through an elfin forest on Jempentsa Mujaji, near the community Pagki, I asked him to identity a few of the shrubs we encountered. In many cases, Miguel simply called them "***mujayá númi***" 'mountain tree.' Sometimes, when he recognized a resemblance to a familiar folk genus, Miguel would simply add the epithet "***mujayá***" 'mountain' to the genus name (e.g. ***mujayá chinchák*** 'mountain chinchák', ***mujayá kunugkút*** 'mountain kunugkút'). I eventually gave up asking, and when it started to rain, my field assistant Gregorio even jokingly remarked "***Mujayá yúmi yútawai***" 'It's raining mountain rain.' On two visits to ***éwejush*** near study communities, I collected the following species: *Clusia weberbauerii*, Clusiaceae (***éwe***); *Befaria glauca*, Ericaceae (**mujayá kunugkút**); *Macleania* sp., Ericaceae (***kampáunmaya kunugkút***); *Macrolobium* aff. *microcalyx*, Fabaceae (***mujayá tagkám***); *Symbolanthus* sp., Gentianaceae (no name given); *Aniba* sp., Lauraceae (***mujayá wampúsnumi kumpají***); *Godoya* sp., Ochnaceae (***éwejshunmaya páushnum***) and *Retiniphyllum fuchsioides*, Rubiaceae (no name given).

Vásquez and Rojas (2002) list a number of additional plant species they found in ***éwejush***, including species in the genera *Cinchona* and *Pagamea* in the Rubiaceae, species of *Ilex* (Aquifoliaceae), species of *Schefflera* (Araliaceae), a species of *Sphyrosperma* (Ericaceae) and a species of *Phyllanthus* (Euphorbiaceae).

Vásquez and Rojas (2002) report seven Aguaruna names for ecological zones defined by dominant vegetation (Table 1.4). I did not encounter these terms during my own research, although some of them correspond to habitat types that are rare or absent the upper Nieva, and a couple others tend not to include hardwood trees. ***Kuákish tepajú***, a habitat dominated by the palms ***kuákish*** (*Chrysalidosperma smithii*) and ***uwán*** (*Astrocaryum* spp.), is found mostly in the flat alluvial plains of the Santiago River. ***Kapiú ayáu***, gallery forest dominated by the tree ***kapiú*** (*Calycophyllum spruceanum*), occurs on the lower reaches of the Santiago and Marañón Rivers.

Figure 1.11 – An example of ***éwejush***, near the community Atash Shinukbau, Condorcanqui, Amazonas.

Chápi tepajú is a forest type consisting of homogenous communities of the understory palm ***chápi*** (*Phytelephas macrocarpa*), whose leaves are useful for roof thatch and whose fruits are edible. ***Chápi tepajú*** is found in terrace and hill forests with sandstone soil. ***Satík tepajú*** is forest dominated by ***satík*** (*Cecropia* spp.). ***Satík*** does commonly occur on the banks of rivers in the upper Nieva, but large homogenous stands are more common on the floodplains of the Marañón and Santiago Rivers. ***Tagkán ayáu*** is a habitat that occurs on the banks of rivers and streams dominated by the giant cane-like grass ***tagkán*** (*Gynerium sagittatum*). Stands of *Gynerium sagittatum* are common along stretches of the Nieva River between the study communities of Kayamas and Bajo Cachiaco (Figure 1.12). ***Kampának ayáu*** (*Calyptrogyne synanthera*) is a forest type found on hillsides, typically between 600 and 800m and dominated by the understory palm ***kampának*** (*Calyptrogyne synanthera*). ***Kampának*** is the most highly valued palm for making roof thatch in the communities where I worked, since it is said to last the longest without decomposing. I observed a location that I believe could be considered ***kampának ayáu*** on the slopes of a mountain between the communities of Pagki and Atash Shinukbau. ***Jémpe umpuágbau*** refers to a habitat type with an understory dominated by shrubs and herbs of the melastome genera *Clidemia*, *Maieta* and *Tococa* that have ant domitia in the petioles or leaf bases (Gentry 1993:608-610; Vásquez and Rojas 2002). The word ***jémpe*** refers to hummingbirds in general, although it is not clear how the name relates to the plant species in

Table 1.4 – Types defined by dominant vegetation.

Name	**Gloss**
kuákish tepajú[1]	forest dominated by the palm ***kuákish*** (*Chrysalidosperma smithii*)[2]
kapiú ayáu[1]	forest dominated by the tree ***kapiú*** (*Calycophyllum spruceanum*)
satík tepajú[1]	forest dominated by the tree ***satík*** (*Cecropia spp.*)
tagkán ayáu[1]	river edge or island dominated by the plant ***tagkán*** (*Gynerium sagittatum*)
chápi tepajú[1]	forest dominated by the palm ***chápi*** (*Phytelephas macrocarpa*)[2]
kampának ayáu[1]	forest dominated by the palm ***kampának*** (*Calyptrogyne synanthera*)[2]
jémpe umpuágbau[1]	forest dominated by ant plants in the Melastomataceae

[1] Vásquez and Rojas (2002) [2] (Guallart 1997)

question. The Aguaruna consider the berries of many plants in the Melastomataceae (***chinchák***) to be favored food of birds, but they do not seem to consider the flowers of melastomes to provide nectar for hummingbirds. I observed such areas near the community of Bajo Cachiaco, although none of my informants referred to them as ***jémpe umpuágbau***.

Figure 1.12 – Example of ***tagkán ayáu*** (homogenous stand of *Gynerium sagittatum* on Nieva River between the communities Kayamas and Bajo Cachiaco.

Chapter 2

Research Methods

The overarching goal of this project was to determine how the Aguaruna Jívaro of the Peruvian Amazon identify members of the life-form category ***númi***, which can be glossed as 'trees excluding palms.' The basic research methods were structured interviews, unstructured interviews, participant observation, observation of actual identifications of trees in study plots and collection of botanical voucher specimens. The bulk of the data gathered comes from structured interviews.

Research for this project took place in the department of Amazonas, Peru, in three field sessions, from 2002 to 2004. The first two field sessions were pilot studies conducted in the town of Santa María de Nieva, from June to August, 2002 and from June to August 2003, respectively. The third and principal field session took place from January to December, 2004, in five Aguaruna communities on the upper Nieva river, in the department of Amazonas, Peru.

Preliminary Studies

I received funding for the first preliminary study from a National Science Foundation Ethnographic Research Training (ERT) grant, through the department of anthropology at the University of Georgia. In June, 2002, I traveled to Lima, to buy necessary supplies and meet with the Aguaruna leader César Sarasara, who heads the indigenous organization Confederación de Nacionalidades de la Amazonía Peruana (CONAP). Sr. Sarasara provided me with valuable contacts in the study region, advice for conducting the project and a document confirming that I had obtained permission from CONAP to proceed with the research. I conducted the pilot study in the town of Santa María de Nieva, in the province of Condorcanqui, Amazonas, Peru. Santa María de Nieva is the largest population center of Condorcanqui, a province with a total population of approximately 40,000 inhabitants. The population of Santa María de Nieva is 93% indigenous, including members of the Aguaruna and related Huambisa ethnic groups. (Rodríguez Chú 2005). The town is located at an elevation of 230 meters above sea level, in a low, hilly region of humid tropical forest (Atlas Regional del Peru Tomo 5: Amazonas 2004). After arriving in Santa María de Nieva, I made the acquaintance of Martín Reátegui, who kindly let me stay in is house for the duration of the pilot study and who also assisted me with other aspects of the project. At this time, I also began my study of the Aguaruna language with a tutor, Francisco Sarasara.

The first pilot study was designed to test the following hypothesis: **The process of tree identification among the Aguaruna Jívaro involves both sensory and ecological reasoning, at least part of which can be verbalized by informants in terms of discrete clues.** Sensory reasoning here refers to visual, tactile, olfactory or gustatory clues. Ecological reasoning here refers to clues related to plant communities, plant-animal interactions, hydrological features (proximity to a river drainage, for example), soil types and topographical features. I selected four men as key informants based on the recommendation of Martín Reátegui, who acted in the capacity of a field assistant. I explained the goals and procedures of the study to the four key informants and obtained their verbal prior informed consent to take part in the study. I verified the expertise of the four key informants by asking them to freelist as many Aguaruna names as possible of ***númi*** **‘**trees excluding palms.’ This pilot study used real trees as stimuli for eliciting data from informants for the purpose of elucidating methods of identification.

Martín and I chose a patch of terra firme forest near Santa María de Nieva as a study site. We selected the sample of study trees by leading one key informant along the path running through the study site, and asking him to name all the trees that he could. We marked each, as we went, with colored ribbon. When we had marked 50 trees, we stopped. Although this method for selecting a sample of trees is not the most rigorous one imaginable, it was simple, easy and adequate for a pilot study. Forty eight of the study trees were located in primary forest, while two were located in secondary forest. Botanical specimens could not be collected since there had not been opportunity to obtain permission in Lima from the Instituto Nacional de Recursos Naturales (INRENA), the government agency that handles such matters.

Each informant was taken, individually, through the fifty trees and asked the following questions: 1) “***¿Júsha wají numíta?***” ‘What is the name of this tree?’, 2) “***¿Kumpajísh áwak?***” ‘Does it have any companions ?’ and 3) “***¿Wajúk dékame ju numísh?***” ‘How do you recognize this tree?’. Informants typically answered question #3 by referring to parts of the tree without being more specific (e.g. ‘I know this tree by its trunk, its sap and its leaves’) In order to understand their reasoning in more detail, I then asked informants to describe each of the parts of the tree they had mentioned. (e.g. ‘What is the trunk like?’, ‘What is the sap like?’, ‘What are the leaves like?’). These more detailed questions yielded a list of descriptive characters. In the preceding example, the list might be something like:

“***Numíji pushújin***.” ‘Its trunk is grayish.’

“***Puwáji púju***.” ‘Its sap is white.’

“***Dúke wegkájam***.” ‘Its leaves are wide.’

The next step was to walk with each informant through the fifty trees again, this time asking questions that referred to all the sets of companions they had named for the study trees. For each group of companions, I asked: 1) "***¿Wajúk betékaita?***" 'How are they similar?', 2) "***¿Wajúk betékchauwaita?***" 'How they different?'. The purpose of asking informants to compare and contrast trees that they consider to be companions was to begin to distinguish which characters are more important for recognizing broad membership in these groups of related trees, and which characters are more important for making finer distinctions between the members of each group.

Sensory clues of a visual or olfactory nature were named in all of the identifications and all of the companion comparisons, as I had predicted. Trunk characters and leaf characters were most common types of characters provided in identifications. However, ecological characters were named in only 3% of the ***kumpají*** comparisons and none of the identifications.

A second pilot study was carried out in and around the town of Santa María de Nieva from June to August, 2003, with funding from a Tinker Graduate Field Research Summer Travel Award, granted through the Center for Latin American and Caribbean Studies (CLACS) at the University of Georgia. The goal was to test a different methodology for addressing the original hypothesis of the first study, that the process of tree identification among indigenous peoples involves both ecological and sensory reasoning. After obtaining permission to conduct the research from CONAP and permission to collect botanical specimens from INRENA, I traveled to Santa María de Nieva to collaborate once again with Martín Reátegui.

Five key informants were selected, based on the recommendation of Martín Reátegui, and all gave their prior informed consent for participation in the study. I asked each, individually to name all trees that he could. These freelist data served to provide some measure of the expertise of the key informants and also allowed me to make a master list of Aguaruna tree names for the purpose of selecting a sample of trees for the study. Informants were also asked to name any ***kumpají*** for the trees on their freelists.

Thirty eight trees were selected from the freelists that were known by all five key informants. Unlike the previous pilot study, this one did not rely on real examples of the study trees for conducting structured interviews. Instead, I conducted the interviews with each informant, individually, in a room in Martín Reátegui's house. The questions I asked about each tree were similar to those I had asked in the previous pilot study, but, instead of referring to real examples of the trees in question, they referred to informants' ideal mental image of the trees. First, I requested informants to list features that allow them to recognize each tree, then, I requested them to compare and contrast groups of trees considered to be related as companions. This new approach has several theoretical and practical advantages. First of all, it encourages informants to focus only on the features that are essential for inclusion in the category in question. Noticeable variation can be found among individuals of the same biological species. Most Aguaruna tree names encompass multiple biological species, making the potential physical variation even greater. When informants describe an idealized image of a tree, they will focus on the salient aspects of that category and will not be distracted by trivial individual variation. In the first pilot study, for example, some informants pointed out that the trunks of certain trees were green. This color was due to mosses and epiphytes growing on the trunk and is unlikely to be a true diagnostic feature. Collections of a few of the study trees and some other woody flora were made in the vicinity of Santa María de Nieva. Voucher specimens were deposited in the herbarium of the Universidad Nacional Mayor de San Marcos (UNMSM), in Lima.

Sensory clues were named in all of the identifications and all of the companion comparisons, in the second pilot study. As in the first pilot study, the most commonly named characters were trunk and leaf characters. Ecological characters were named in only 10% of the ***kumpají*** comparisons, 2% of the similarities between members of companion sets and 5% of the differences between members of companion sets. A list of tree taxa included in the second pilot study can be found in Appendix 6.

Selecting a research Site for the Principal Field Study

The principal field session for this study took place from January to December 2004, in several communities on the upper Nieva River, in the department of Amazonas, Peru. Funding was provided by a National Science Foundation Dissertation Improvement Grant (#0602011), and a Wenner-Gren Individual Research Grant. I chose to work in the upper Nieva region because of contacts that I established while carrying out my pilot studies in Santa María de Nieva. Martín Reátegui, my friend and field assistant during my pilot studies, was born in the region. Martín also introduced me to his nephew, Nestor Reátegui, who is the founder and head of the indigenous organization COPIAAN (Comité de Productores Indígenas Awajun del Alto Nieva), which includes many communities in the upper Nieva river as members. Nestor suggested to me that I work in his home community of Bajo Cachiaco. As the study progressed, I added four adjacent communities, Kayamas, Tayunts, Alto Pagki and Atash Shinukbau (see Figure 1.4), as additional research sites. All five study communities are located in the Eastern foothills of the Andes, at elevations from approximately 250m to 500m above sea level. In the Holdridge scheme of life zone classification (Holdridge 1967), these communities and the land adjacent to them correspond to tropical wet forest and pre-montane tropical rainforest (Atlas Regional del Peru Tomo 5: Amazonas 2004: 42-43).

Before traveling to the field, I obtained permission in Lima from the indigenous organization CONAP for conducting research in Aguaruna communities and from the government agency INRENA, for collecting botanical specimens. I then journeyed to the town of Santa María de Nieva, where I obtained permission to conduct the research from the Aguaruna political federation FECONARIN (Federación de Comunidades Aguarunas Nativas del Nieva), which includes all five study communities as members. Finally, I headed in *peke peke* (motorized canoe) up the Nieva river, arriving in Bajo Cachiaco on February 14th, 2004.

The fact that Martín and Nestor could vouch for my good intentions helped me to gain access to Bajo Cachiaco and the other study communities. The process of obtaining prior informed consent (PIC) in Aguaruna communities begins with communal meetings that allow for open discussion, debate and negotiation. Before I had even arrived in the upper Nieva, Martín and Nestor had held meetings in Bajo Cachiaco and Kayamas to discuss the nature of my project and what community members could expect, if they chose to participate. Once I arrived in the upper Nieva, I held another meeting in each community where I hoped to work, before starting data collection. With the help of Nestor and his brother, Gregorio Reátegui, I explained that I was a student from the University of Georgia hoping to complete a research project. It was necessary to emphasize that, as a student, I would not be able to donate large sums of money to the community or facilitate the building of a school. I would, however, be able to pay participants a fair wage for their labor and make a nominal monetary donation to each community where I work. It was also important to emphasize, in these preliminary meetings that I would be completing the project in order to fulfill requirements for a degree in my university and not for the purpose of monetary gain. The Aguaruna International Cooperative Biodiversity Group (ICBG) had worked briefly in Bajo Cachiaco in 1997, as part of a large scale bioprospecting project (Lewis et al 2000). I needed to emphasize that my project was different from the ICBG project in both in its scale and its goals. I obtained written permission to carry out the research in the form of an *Acta de Consentimiento Comunal* from the five communities Bajo Cachiaco, Kayamas, Tayunts, Alto Pagki and Atash Shinukbau. Nestor and Gregorio agreed to act as my field assistants for the research.

After obtaining communal consent in each study community, I searched for informants knowledgeable in the domain of ***númi*** 'trees excluding palms.' Because of high rates of illiteracy and the possibility of suspicion of signing written documents, I did not use a written consent form for obtaining individual consent. Instead, with the help of my Aguaruna field assistants, I used an oral consent script emphasizing the following points:

1) I am a student from the University of Georgia in the United States, conducting a research project as part of my degree requirements.

2) The aim of the study is to determine how the Aguaruna identify trees.

3) The procedure of this research involves naming all the trees you know and answering questions about trees. Participants will also look for and discuss trees in the vicinity of the community.

4) Participation is completely voluntary. It is up to you what parts of this study you would like to take part in and you can stop at any time.

5) The study is confidential, unless you specifically requests that your name be used.

Although I had already emphasized points #1 and #2 (above) in the community meetings, I was sure to include that information in the verbal consent process for any potential informants who had not attended the meetings. I also answered any additional questions that potential informants had about the nature of the project.

Structured Interviews

Structured interviews provided the bulk of the data for this phase of the study. The interviews were designed, as in the second pilot study, to elicit information relating to informants' ideal mental images of trees. Key informants were selected in a purposive fashion, based on expertise in the folk biological domain ***númi*** 'trees excluding palms.' I collected freelists of ***númi*** from 23 potential key informants in the five study communities, obtaining prior informed consent from each informant. Eight of the original 23 informants were selected as key informants based on length of freelist, the recommendation of my Aguaruna field assistants and willingness to participate further in the study.

While collecting the freelists, I also asked each informants what other trees, if any, they consider to be the companions of each tree named. Data regarding companion groupings are useful in several ways. First of all, they allow for analysis of the degree of agreement between informants about which trees are companions and for comparison with similar data on Aguaruna covert, suprageneric groupings collected by Berlin and collaborators (1976) in communities on the Cenepa River. Secondly, the data would allow me to ask informants to compare and contrast members of companion groupings, as I had done in the pilot studies. Thirdly, information regarding companion groups proved useful for selecting a meaningful sample of study trees.

Time limitations precluded attempting to study the identification process for all possible trees recognized by the Aguaruna (well over 300 folk genera). Therefore, it was necessary to choose a manageable sample of trees that would give a representative picture of the variety of clues and methods the Aguaruna use in making identifications. The study sample includes 63 trees known to all 8 key informants, each representing a different folk genus. The 63 trees were selected conceptually, in a manner appropriate to the two basic approaches I used for determining how Aguaruna informants identify trees. These approaches follow from the pilot studies and are summarized as follows:

1) Informants were requested to list features that allow them to recognize each tree.
2) Informants were requested to compare and contrast groups of trees considered to be related as companions.

Approach #2 (above) clearly requires including groups of companions in the sample. Forty-nine of the 63 study trees comprised 17 widely recognized groupings. The remaining 14 of the 63 study trees represent folk genera considered by the majority of informants to be unrelated to any other folk genus. Isolated folk genera are not particularly suited to approach #2 (above)[1], but do still lend themselves to approach #1. I included isolated folk genera in the sample in order to widen the botanical range of trees covered in the study, since trees considered to be related by the Aguaruna are often also closely related under Western taxonomy. The 63 folk genera in this study span 48 biological genera in 17 plant families, which clearly represents only a small portion of the biological diversity in the area. The sample was designed to provide enough biological diversity to give a picture of how the most widely recognized folk genera are identified, while still being manageable in size (Jernigan in press).

Using approach #1 outlined above, I went through each of the 63 study trees individually with each of the eight key informants and asked "***¿Wajúk dékame ju numísh?***" 'How do you recognize this tree?.' Typically, informants would answer by describing specific parts or ecological features of the tree in question. For example, an informant might answer: "***Dékajai***

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[1] Some of the folk genera that the majority of informants considered to be isolated were nevertheless considered by a minority of informants to be related to other folk genera. Also some informants recognized more than one folk species of certain isolated folk genera. In those cases, I was able to carry out companion comparisons.

numíji pushújin, saepé kagkígkiju, puwáji púju asámtai" 'I recognize it by its grayish trunk, rough bark and white sap', or "***Wáinjai mujánum tsapáu asámtai***" 'I know it because it grows in the mountains.'

Based on approach #2 (above), I went through each of the 63 trees a second time with each of the eight key informants to ask questions relating to each set of companions that he provided for the 63 study trees. The purpose of these questions was to elucidate the reasoning behind the groupings, by determining how the members of each group are similar to each other, and how they are different. The questions posed were as follows, using the related trees ***kaáshnum*** (*Eschweilera* spp.) and ***shuwát*** (*Eschweilera* spp.) as examples:

1) "***Wágka betékaita shuwát kaashnúmijai***?" 'How are ***kaáshnum*** and ***shuwát*** similar?'

2) "***Wágka betékchauwaita shuwát kaashnúmijai***?" 'How are ***kaáshnum*** and ***shuwát*** different?'

As before, informants answered such questions by describing particular tree parts, or ecological features. Since not all trees were considered to have companions, and not all informants recognized exactly the same groupings, there were a total of 177 ***kumpají*** groupings between the eight informants.

Key informants generally did not have much trouble providing discrete sensory and ecological clues during the structured interviews. A few minor problems that I encountered do deserve mention. On several occasions, toward the beginning of this phase of the project, I conducted interviews in rooms where other people were also present. In such cases, other people in the room, even children, would occasionally try to volunteer answers to the interview questions. When this happened, I requested politely that the interviewee be allowed to answer without help. I quickly decided, however, that structured interviews should be conducted alone with the interviewee, whenever possible. Occasionally, during the structured interviews, informants would try to indicate the size of the fruit or leaves of a particular tree by gesturing with their hands. In such cases, I encouraged informants to convey the same idea with words. Similarly, informants would sometimes describe a particular tree by making a comparison with another tree (e.g. "it's leaves are as big as ***apai***'s leaves", or "it's fruit looks like ***tínchi***'s fruit"). I dealt with this issue by explaining to informants that I wanted them to describe each tree in its own terms. When necessary, I claimed to be unfamiliar with the tree used for comparison. Some informants occasionally found the task of distinguishing between all members of particularly large companion groupings to be a challenge. In such cases, patience and gentle encouragement helped. Data obtained from the structured interviews are presented and analyzed in Chapters 3 and 4.

Observation of Tree Identification in Study Plots

In order to gain a fuller understanding of the kinds of sensory and ecological clues the Aguaruna use to identify trees, it would have been ideal to supplement the structured interviews with observations of identifications of real examples of the 63 study trees. However, that proved unfeasible, since it would have required locating individuals of all 63 study trees and then, showing the same individuals independently to each of the eight key informants. Although all trees selected were known to all eight key informants, some of the trees only occur in very particular kinds of habitat, and were not easily accessible from all five study communities. Furthermore, a few of the study trees are highly valued timber species that have been made rare by selective logging. It would not have been possible to find an actual example of all 63 trees near any single one of the five study communities. Additionally, it would have been impractical to transport key informants from one study community to another in order to make it possible for every informant to respond to the same stimuli. In the course of making botanical collection and taking informal walks through the forest with my informants, I did observe real examples of all of the study trees.

Although observing actual identifications of the taxa from the structured interviews was infeasible, selecting another sample of study trees based on test plots represents an alternate approach to observing the actual identification process. The advantage of using a sample based on test plots rather than one drawn from freelists is that a sample based on test plots would tend to include some less salient trees and trees that are not prototypical members of any named categories. Observation of actual identifications was carried out with 156 trees, in 25 Gentry type study plots (Gentry 1982) located in primary forest near the community Bajo Cachiaco. My Aguaruna collaborators characterized the study site for this experiment as ***mújas***, which corresponds to upland forest, with sandy often waterlogged soil. Informants for the study were eight adult men, all residents of Bajo Cachiaco. Four of the eight informants had also been key informants in the structured interviews. Since it would have been inconvenient for the other structured interview participants who live in adjacent communities to travel to Bajo Cachiaco, the other four participants in the study plot exercise were recruited from Bajo Cachiaco.

The first step in the experiment was to measure out twenty five 10 m^2 Gentry plots along a path running through the study area. I fastened colored ribbons on all trees inside the plots with a diameter at breast height of at least 10 cm. Next, I led each of the eight informants individually through the trees and asked the name of each marked tree. For each identification, I observed the informant’s actions (e.g. looking upwards, cutting and smelling the bark) as carefully as possible.

I also noted the names given for each tree, including any names initially given that were changed based on further observation.

Unstructured Interviews

Unstructured interviews were conducted with key informants during collecting trips and other informal walks in the vicinity of the five study communities. These excursions provided an opportunity to observe real examples of the study trees, for the purpose of verifying my understanding of the adjectives informants used to describe the trees in the structured interviews. I also collected Aguaruna names for the parts of a tree (e.g. flower petal, leaf vein etc.), as well as Aguaruna names for different types of ecological habitats that occur in the vicinity of the study communities.

Botanical Collections

Collections of the study trees were made in the vicinity of the five participating communities. Voucher specimens were deposited in the herbarium of the Universidad Nacional Mayor de San Marcos (UNMSM), in Lima. I attempted to confirm the Aguaruna name for each tree collected with more than one informant, although that was not always possible since some trees were only found in one location. Due the difficulty in locating fertile material in some cases, I was unable to collect three of the study trees. For this reason, I have used specimens collected by Brent Berlin and his collaborators, near Aguaruna communities on the Cenepa river, along with my own data, for determining which scientific names correspond to each Aguaruna name. Voucher specimens collected by Berlin and collaborators are deposited at the Missouri Botanical Garden, in St. Louis, Missouri. Data for these collections have been compiled in an unpublished report by Brent Berlin, Cathy M. Crandall and Walter H. Lewis, entitled: “Taxonomic checklist of plants collected in the department of Amazonas, Peru 1972-1980.” The report lists the Aguaruna name and corresponding scientific name of over 3,500 specimens collected by Berlin and collaborators. The collecting trips also provided an opportunity to train my field assistants in standard botanical collection techniques.

Chapter 3

The Study Trees

Organization of This Chapter

Section I. provides an introduction to the 63 trees chosen as a sample for the structured interview portion of the study. I delineate the biological range covered by each taxon, using my own collections or collections made by Brent Berlin and his collaborators in the 1970s (Berlin *et al.* n.d.), on the Cenepa river. In section II., I present a detailed description of the sets of ***kumpajį́*** 'companions' chosen for this study. For each group, I will list the folk genera included and any widely recognized folk species for any genera that are polytypic. I review the biological range covered by each taxon and also discuss any cases where my own collections and those of Berlin *et al*. appear to disagree regarding the botanical referent of Aguaruna folk taxa. I will also describe which features informants commonly cited to justify the grouping and which features they typically used to distinguish between the members of the group. Following the description of each group is a figure showing the correspondence of the various folk and biological taxa included, using the graphic conventions of Berlin (1992:47). In section III, I provide a similar description of the 14 trees chosen for the study that correspond to isolated folk genera; those not considered to be related as companions to any other folk genera.

After discussing all the folk taxa chosen for this study, I will attempt to address some broader issues. In section IV., I will briefly explore the role of utilitarian factors in the formation of some groups. I will also discuss issues of prototypicality in these groupings and how that relates to informant agreement. In section V., I will discuss the biological relatedness of trees grouped together as ***kumpají***. Section VI. will explore whether it is possible to predict which biological genera will correspond to isolated folk genera and which will correspond to folk genera that are grouped with others as ***kumpají***. Finally, section VII. will discuss which tree parts (e.g. trunk, leaves, fruit etc.) and which aspects of those parts (e.g. color, size, smell etc.) were cited most often by informants, in their explanations of what the trees in each grouping have in common and in their descriptions of the differences between the individual members of each group.

Introduction

Table 3.1 shows the botanical range for all Aguaruna trees included in this study. I have arranged the Aguaruna tree names to show which ones informants grouped together as companions and which were considered to have no companions. The tree names listed in Table 3.1 that are comprised of two words, correspond to polytypic folk genera. For example, Table 3.1 shows that group 3 contains the trees ***wáwa kunchái*** (*Dacryodes kukachkana*) and ***újuts*** (*Dacryodes* sp.). The folk genus ***kunchái*** is polytypic, since many informants also recognize the existence of three other folk species, ***númi kunchái*** (*Dacryodes peruviana*), ***tsáju kunchái*** (*Dacryodes nitens*) and ***múun kunchái*** (*Dacryodes kukachkana*). In cases such as this, I chose only one species from each folk genus for my study sample, in order to include a wider range of biological diversity. Much cross cultural evidence supports the idea that members of a polytypic folk genus often correspond to botanically related species (see for example Berlin 1992: 102–133).

Many of the folk taxa listed in Table 3.1 correspond to more than one botanical species, within a single genus. Some Aguaruna names correspond to species in more than one genus of the same botanical family, while one Aguaruna name, ***pítuuk***, appears to correspond to species in two different families, specifically, *Perebea xanthochyma* and *Trophis racemosa*, in the Moraceae and *Agonandra silvatica,* in the Opiliaceae. In some cases, the botanical ranges for Aguaruna names overlap. For example, in group 17, the names ***awánu*** and ***séetug*** both refer to the species *Cedrela odorata* L. Although this would appear to make the terms synonyms, the Aguaruna do not consider them to be the same tree. Part of this ambiguity is likely due to slight disagreement between informants as to the exact range of some tree names. The disagreement is surely heightened by the fact that collections used to determine the botanical range (see Table 3.1) come from slightly different times and places. I made my own collections in 2004, on the Nieva river, while Berlin and his collaborators (1976) made their collections on the Cenepa river, in the 1970s.

Berlin *et al*. (n.d.) collected many voucher specimens for trees that I did not collect, and, similarly, I collected voucher specimens of some folk taxa that do not appear in their records. For those tree folk taxa represented in both my collections and the collections of Berlin *et al*. (n.d.), the botanical referent is compatible in 83.8% of 111 cases. In many instances, slight disagreement between the two data sets appears not be significant, since many Aguaruna tree names correspond to multiple botanical species. For example, my own collection for the Aguaruna tree ***shijíg*** corresponds to the species *Hevea guianensis*, in the Euphorbiaceae, while Berlin *et al*. (n.d.) list *Hevea pauciflora* for this name. In this case, I assume that the name ***shijíg*** refers to the entire genus *Hevea***,** so there is no real disagreement.

Table 3.1—Aguaruna names and corresponding scientific names for members of the ***kumpají*** groups and isolated folk genera in the study.

Aguaruna name	**species**	**family**	**voucher** [i]
***Kumpají* Groups:**			
group 1			
úchi dáum	*Couma macrocarpa*	Apocynaceae	J188
úchi táuch	*Lacmellea oblongata*	Apocynaceae	J199, K432, K490
group 2			
wampúush	*Ceiba pentandra* L. (Gaertn.)	Bombacaceae	J266
	Ceiba samauma (Mart.) K. Schum.	Bombacaceae	B1624, K1236
ménte		Bombacaceae	J122, J123
group 3			
wáwa kuncháí	*Dacryodes kukachkana* L.O. Williams	Burseraceae	J58
újuts	*Dacryodes* sp.	Burseraceae	J48
group 4			
shijíkap	*Protium* sp.	Burseraceae	J54
chípa	*Protium fimbriatum* Swart	Burseraceae	J70, K264, B930, B1502
pantuí	*Protium grandifolium* Engl.	Burseraceae	J49
	Protium sagotianum Marchand	Burseraceae	A163
	Protium nodulosum Swart	Burseraceae	A26
	Protium robustum (Swart) D.M. Porter	Burseraceae	K384
shíshi	*Protium grandifolium*	Burseraceae	J64
	Protium spruceanum (Benth.) Engl.	Burseraceae	A427

Aguaruna name	**species**	**family**	**voucher** [i]
group 5			
wayámpainim	*Garcinia madruno* (Kunth) Hammel	Clusiaceae	J275
pegkáenum	*Garcinia macrophylla* Mart.	Clusiaceae	J119, K321
group 6			
putsúu sámpi	*Inga* sp.	Fabaceae	J60
wámpa	*Inga edulis* Mart.	Fabaceae	J63, K1179
	Inga striata Benth.	Fabaceae	BO99
buabúa	*Inga multinervis* T.D. Penn.	Fabaceae	A10
	Inga cf. *multinervis*	Fabaceae	J71
	Inga urabensis L.Uribe	Fabaceae	K193
sejempách	*Inga marginata* Willd.	Fabaceae	J212
	Inga semialata (Vell.) Mart.	Fabaceae	A1500
	Inga punctata Willd.	Fabaceae	K817
group 7			
samíknum	*Macrolobium acaciifolium* (Benth.) Benth.	Fabaceae	J82
	Macrolobium sp.	Fabaceae	A510
	Pithecellobium basijugum Ducke	Fabaceae	B749, H232
wampíshkunim	*Macrolobium limbatum* Spruce ex Benth.	Fabaceae	J56
group 8			
pandáij	*Ormosia* cf. *amazonica* Ducke	Fabaceae	J114, J115
tajép	*Ormosia* cf. *coccinea* (Aubl.) Jacks.	Fabaceae	J72

Aguaruna name	**species**	**family**	**voucher** [i]
group 9			
tigkíshpinim	*Tachigali* sp.	Fabaceae	J261
ugkuyá	*Tachigali formicarum*	Fabaceae	J264
wantsún	*Tachigali* cf. *bracteosa* (Harms) Zarucchi & Pipoly	Fabaceae	J270
	Tachigali chrysophylla (Poepp.) Zarucchi & Herend.	Fabaceae	A1242
	Tachigali rugosa (Mart. ex Benth.) Zarucchi & Pipoly	Fabaceae	A275, H654, H514
group 10			
káwa tínchi	*Nectandra olida* Rohwer	Lauraceae	J268
	Ocotea floribunda (Sw.) Mez	Lauraceae	A212
káikua	*Licaria* sp.	Lauraceae	J196
	Ocotea costulata (Nees) Mez	Lauraceae	K663
wampúsnum	cf. *Nectandra schomburgkii* Meisn.	Lauraceae	J53
takák	*Ocotea gracilis* (Meisn.) Mez	Lauraceae	J272
batút	*Ocotea floribunda*	Lauraceae	A472, A138, B875
	Ocotea cf. *wachenheimii* Benoist		H483, K335
máegnum	*Ocotea floribunda*	Lauraceae	A343
káwa	*Ocotea floribunda*	Lauraceae	A170
group 11			
kaáshnum	*Eschweilera gigantea* (R. Knuth) J.F. MacBr.	Lecythidaceae	J102, B783
	Eschweilera tessmannii R.Knuth	Lecythidaceae	K568
shuwát	*Eschweilera* sp.	Lecythidaceae	J217
	Eschweilera andina (Rusby) J.F.Macbr.	Lecythidaceae	A1295

Aguaruna name	species	family	voucher [i]
group 12			
tseék	*Miconia ternatifolia* Triana	Melastomataceae	J75
	Ossaea bullifera (Pilg.) Gleason	Melastomataceae	T577
	Miconia decurrens Cogn.	Melastomataceae	K391
	Miconia vittata (Linden & Andre) Cogn.	Melastomataceae	K839
ukuínmanch	*Miconia lourteigiana* Wurdack	Melastomataceae	J267
	Miconia serrulata (DC.) Naudin	Melastomataceae	A729, K909
	Miconia tomentosa (Rich.) D. Don ex DC.	Melastomataceae	A169
antumú chinchák	*Miconia* sp.	Melastomataceae	J216
	Leandra secunda (D. Don) Cogn.	Melastomataceae	A553
	Leandra longicoma Cogn.	Melastomataceae	B1505
	Miconia paleacea Cogn.	Melastomataceae	A1202, B1753
	Miconia subspicata Wurdack	Melastomataceae	H571
	Triolena pluvialis (Wurdack) Wurdack	Melastomataceae	A1514
chijáwe	*Miconia bulbalina* (Don) Naudin	Melastomataceae	J112, A477
	Miconia serrulata	Melastomataceae	K941
group 13			
yantsáu	*Guarea macrophylla* ssp. *pendulispica* (C. DC.) T.D. Pennington	Meliaceae	J52
	Guarea guidonia (L.) Sleumer	Meliaceae	K60, A1476, H546, K1456, KU78, KU436
bíchau	*Guarea macrophylla* ssp. *pendulispica*	Meliaceae	J74
	Trichilia pallida Sw.	Meliaceae	KU53

Aguaruna name	species	family	voucher [i]
group 14			
satík	*Cecropia engleriana* Snethl.	Moraceae	J206
	Cecropia membranacea Trécul	Moraceae	K805
súu	*Cecropia engleriana*	Moraceae	J273, KU132
	Cecropia ficifolia Warb. ex Snethl.	Moraceae	K442
	Cecropia marginalis Cuatrec.	Moraceae	T16
	Cecropia membranacea	Moraceae	K680
	Cecropia sciadophylla Mart.	Moraceae	K213
group 15			
ejésh	*Iryanthera tricornis* Ducke	Myristicaceae	J80
	Virola pavonis (A. DC.) A.C. Sm.	Myristicaceae	K197
úntuch tsémpu	*Iryanthera juruensis* Warb.	Myristicaceae	J55, B1606
	Virola elongata (Benth.) Warb.	Myristicaceae	K665
group 16			
shijíg	*Hevea guianensis* Aubl.	Euphorbiaceae	J84
	Hevea pauciflora (Spruce ex Benth.) Müll. Arg.	Euphorbiaceae	A99
tákae	*Brosimum parinarioides* Ducke	Moraceae	J86
	Brosimum multinervium C.C. Berg	Moraceae	K996
shijigká sáei	*Clarisia racemosa* Ruiz & Pav.	Moraceae	J258
barát	*Ecclinusa lanceolata*	Sapotaceae	J197
group 17			
awánu	*Cedrela odorata*	Meliaceae	J83
séetug	*Cedrela odorata*	Meliaceae	J67
tsáik	*Cedrelinga cateniformis*	Fabaceae	J271, K410, A18

Aguaruna name	species	family	voucher [i]
Isolated Genera:			
shikiú	*Erythrina* sp.	Fabaceae	J249
	Erythrina ulei Harms	Fabaceae	K887
chikáunia	*Myroxylon balsamum* (L.) Harms	Fabaceae	J207
tagkáam	*Parkia multijuga* Benth.	Fabaceae	B742
shishíim	*Couroupita subsessilis* Pilg.	Lecythidaceae	J68
apái	*Grias peruviana* Miers	Lecythidaceae	J57, B884, T5
	Grias neuberthii J.F. Macbr.	Lecythidaceae	H488, H41
shína		Moraceae	J105
	Brosimum rubescens Taub.	Moraceae	[ii]
pítu	*Batocarpus orinocensis* H. Karst.	Moraceae	J42, A100
magkuák	*Cespedesia spathulata* (Ruiz & Pav.) Planch.	Ochnaceae	J87, A111
uwáchaunim	*Calycophyllum megistocaulum* (K. Krause) C.M. Taylor	Rubiaceae	J281, K263

Aguaruna name	species	family	voucher [i]
bukún	*Chimarrhis glabriflora* Ducke	Rubiaceae	J92
	Chimarrhis hookeri K. Schum.	Rubiaceae	A504
	Macrocnemum roseum (Ruiz & Pav.) Wedd.	Rubiaceae	K59
súwa	*Genipa americana* L.	Rubiaceae	J43, H261
tiík	*Zanthoxylum valens* (J.F. Macbr.) J.F. Macbr.	Rutaceae	J251
páunim	*Vochysia elongata* Pohl	Vochysiaceae	J262
	Vochysia braceliniae Standl.	Vochysiaceae	BO47, A202, B812
	Ruizterania trichanthera (Warm.) Marc.-Berti	Vochysiaceae	H1140
pítuuk	*Perebea xanthochyma*	Moraceae	J252
	Trophis racemosa	Moraceae	K107
	Agonandra silvatica	Opiliaceae	H1500

[i] Collection numbers preceded by J indicate my own collections, which are deposited in the herbarium of the Universidad Nacional Mayor de San Marcos, in Lima, Peru. Other letters indicate collections from Brent Berlin and his collaborators, as follows: A = Ernesto Ancuash, B = Brent Berlin, Bo = J.S. Boster, H = Victor Huashikat, K = Rubio Kayap, Ku = Kujikat, T = Santiago Tunqui. All material collected by the above collaborators is deposited at the Missouri Botanical Garden, in St. Luis Missouri.

[ii] Collected by Walter Lewis, Memory Elvin-Lewis, Rogerio Castro and Genaro Yarupait, collection #17322, Missouri Botanical Garden

Introduction to Folk Taxonomy

Brent Berlin (1976, 1992, 1999) has devised a scheme for describing the hierarchical nature of folk taxonomies of living organisms and has presented extensive cross-cultural evidence in support of his approach. Berlin argues that the folk genus is the most salient level in any folk taxonomic system. Folk genera are typically labeled by a single word, and correspond to conceptually intuitive basic kinds. Some examples of folk genera in English are: 'horse', 'cat', 'oak' and 'clover.' In any folk taxonomic system, a minority of particularly salient folk genera are divided into two or more named categories called folk species. Folk species are typically indicated with a descriptive word that modifies the folk genus name. Folk species of the English folk genus 'oak' include: 'red oak', 'white oak' and 'water oak.' In rare instances, folk species are further divided into folk varietals. The English folk species 'red oak' can further be divided into 'Northern red oak' and 'Southern red oak.' When folk varietals do occur, it is usually with cultivated or highly culturally significant species.

Folk taxonomic systems typically incorporate a small number of 'life-forms' that group folk genera based on gross morphological features. Plant life-forms in English include 'tree', 'shrub', 'vine' and 'herb.' The Aguaruna recognize the plant life-forms: ***númi*** 'trees excluding palms', ***shígki*** 'palms', ***dáek*** 'vines and lianas and ***dúpa*** 'herbs.' In this study, I have chosen to focus only on a subset of Aguaruna folk genera that fall within the life-form ***númi***. Interestingly, the Aguaruna have no single word equivalent to 'plant' in English. Cross-cultural evidence suggests that kingdom level categories (i.e. plant and animal) are unlabelled in many languages (Berlin 1999:190). When kingdom level taxa are unlabelled, that should not necessarily be taken as evidence that concept of kingdoms does not exist. As Berlin has pointed out (1992:191) the fact that the Aguaruna language has specialized vocabulary such as ***dúka*** 'leaf', ***púwaj*** 'sap' and

yagkúj 'flower' (see Table 4.1) implies that the Aguaruna do covertly recognize a grouping similar to that denoted by the English word 'plant.'

Some folk biological systems have named categories that are intermediate between the folk genus and life-form level in the hierarchical classification scheme. Such intermediate groupings unite a small number of folk genera considered to be similar, usually based on morphological, ecological or behavioral considerations. When intermediate categories are named, the name often comes from the folk genus that is considered most prototypical for the group. In the English language it is easier to think of examples of a labeled intermediate taxa for animals, than for plants. The intermediate level category 'parrot' encompasses the folk genera 'macaw', 'parakeet' and 'parrot.' A strong argument can be made (Berlin 1992) that unlabelled intermediate taxa are fairly common in many ethnobotanical systems. For instance, most people in the Southeastern United States would recognize that the trees 'hickory' and 'walnut' are related, based on their morphological similarity, even without the botanical training necessary to know that both trees are in the family Juglandaceae. In the next section, I will discuss how it is possible to know which folk genera of trees the Aguaruna consider to be related.

The *Kumpají̱* Concept

Based on cross-cultural evidence, Berlin (1992, 1999) has proposed that folk biological systems in general do not give linguistic recognition to all biological species present in the local environment. My own experience leads me to believe that the Aguaruna folkbiological system fits this generalization. In a few instances, I encountered trees that my informants found difficult to fit into their classification scheme in any meaningful way. On one occasion, for example, I asked a generally very knowledgeable informant to identify some shrubs growing in elfin forest at the top of a steep hill adjacent to one study community. As it turned out, he could provide no name for many of the shrubs in that life zone except for the generic ***mujayá númi*** ‘mountain tree.’ Such extreme examples are rare, however. Usually, when the Aguaruna encounter a plant that does not fit neatly into a named terminal taxon (i.e. folk genus or species), they make an explicit comparison to the most similar plant they can think of that does have a name. The Aguaruna typically use the word use the word ***kumpají̱*** ‘its companion’ when they encounter a plant that cannot be precisely assigned to any named category, but which has an obvious affinity to a named folk genus or folk species. For example, an Aguaruna woman who comes across a tree while walking on the edge of a river that is quite similar to ***shishíim*** (*Couroupita* spp., Lecythidaceae), but clearly a different tree, would likely say that the tree in question is ***shishimá kumpají̱*** ‘***shishim***’s companion.’ Berlin (1999) has discussed how the Tzeltal Maya use the phrase ***kol pahaluk sok*** ‘it is somewhat similar to’ in an analogous manner to deal with species they encounter that do not quite fit into a named folk genus or species.

The Aguaruna also use the term ***kumpají̱*** ‘its companion’ in another related but distinct way that is relevant to their ethnotaxonomic system. The word ***kumpají̱*** is also used to describe named taxa, at the folk genus or folk species level, that are considered to be similar, primarily on the basis of morphology. All folk species in a polytypic folk genus are automatically considered companions to each other. In other words, ***múun*** ‘large’ ***sámpi*** and ***pustúu*** ‘white’ ***sámpi*** (*Inga* spp., Fabaceae) are automatically companions just by virtue of the fact that they are both types of ***sámpi***. The term also allows for the grouping of two or more folk genera into (mostly) covert intermediate level categories. For example, the three folk genera ***shijíg*** (*Hevea* spp., Euphorbiaceae), ***tákae*** (*Brosimum* spp., Moraceae) and ***barát*** (*Ecclinusa lanceolata*, Sapotaceae) are said to be ***kumpají*** because they all have white latex-like sap.

The Aguaruna term ***kumpají*** is derived from the similar Spanish word *compañero*, meaning friend or companion. The Aguaruna also employ another term, ***patají***, meaning 'its family member' synonymously with ***kumpají.*** There is no evidence to suggest that the word ***patají*** is borrowed from another language. Although the word ***kumpají*** is currently used more often, the existence of the synonym ***patají*** strongly suggests that the concept both terms denote, that is, likening one living organism to another, is not borrowed.

The present study uses the ***kumpají*** concept for illuminating Aguaruna covert suprageneric taxa within the life-form category ***númi*** 'trees excluding palms.' This chapter will discuss 17 of the most commonly recognized of these intermediate level tree groupings, hereto referred to as '***kumpají*** groups.'

The Kumpají Groups

Group 1

This group consists of the folk genera ***dáum*** and ***táuch***. These correspond to the botanical genera *Couma* and *Lacmellea* respectively, in the Apocynaceae. The feature most often cited by informants that unites ***dáum*** and ***táuch*** is the presence of sticky white sap in the trunk and fruit. Another important shared feature is the round sweet edible fruit. Interestingly, a few informants place ***dáum*** with members of group 16 (see below), a group that include trees from several botanical families that are similar in having profuse white latex. The group seems to be limited to those two folk genera and does not extend to other folk genera corresponding to woody flora in the Apocynaceae. This is clear from the fact that other widely known trees such as ***kúnakip*** (*Tabernaemontana* spp.) and ***shipítna*** (*Himatanthus sucuuba*) are not included. ***Kúnakip*** and ***shipítna*** also possess white sap, but their fruits differ from those of ***táuch*** and ***dáum***.

Informants typically recognize two folk species of ***táuch***, ***úchi*** 'small' ***táuch*** (*Lacmellea oblongata*) and ***múun*** 'large' ***táuch*** (*Lacmellea peruviana*). ***Úchi táuch*** is distinguished by its smaller growth habit, long thin leaves, and smaller more spherical fruit. ***Múun táuch*** grows to a larger size, has rounder, more oval shaped leaves and a larger more ellipsoid fruit. Some informants consider that ***múun táuch*** has a spiny trunk, while one informant said that it is actually not ***múun táuch***, but instead, a third folk species, ***mujáya táuch***, that has a spiny trunk. Although I did not collect any specimen of ***táuch*** with a spiny trunk, Gentry reports that some members of the genus *Lacmellea* do have trunk spines (1993:240).

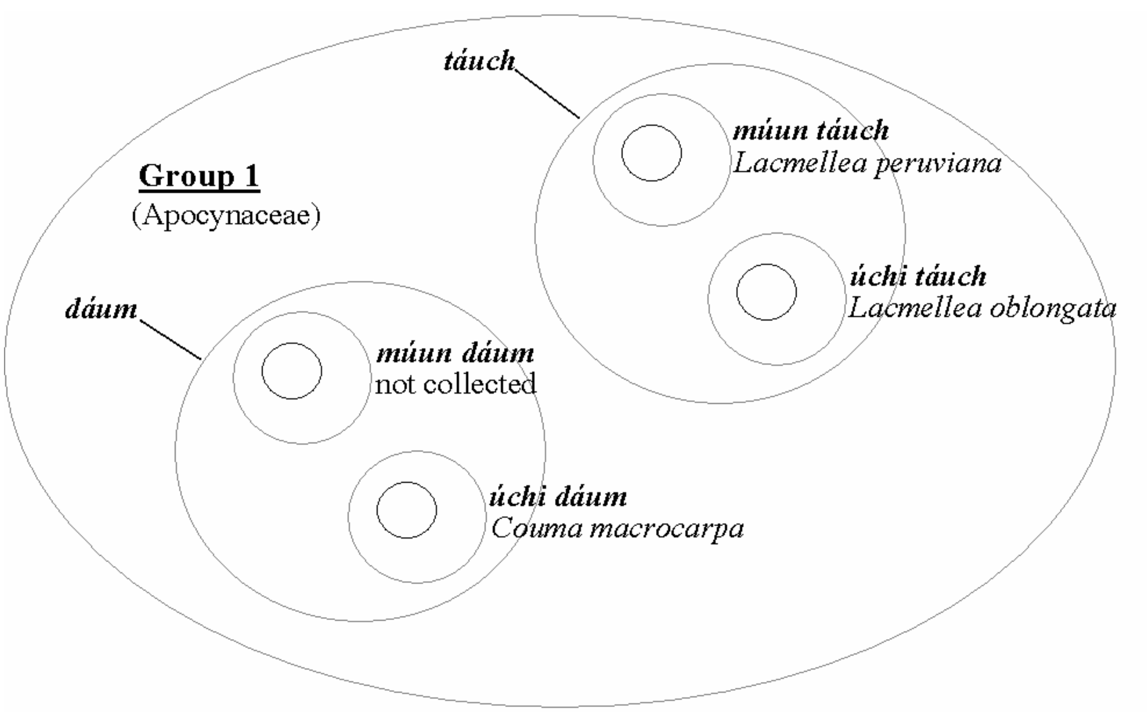

Figure 3.1 – Group 1.

Most informants also recognize the existence of both ***úchi dáum*** and ***múun dáum***. ***Úchi dáum*** corresponds to *Couma macrocarpa*, while ***múun dáum*** was not collected. In general, ***dáum*** tends to have larger fruit than ***táuch*** and its sap has a distinctly sweet taste. Informants distinguished ***úchi dáum*** from ***múun dáum*** by its smaller growth habit and rougher trunk. One informant reported that ***múun dáum***, does not occur in the study area, only at lower elevations.

Group 2

This group includes the trees ***ménte*** and ***wampúush***, both corresponding to species in the Bombacaceae. Collecting, fertile specimens for these very large trees proved difficult. I did come across some examples of both ***ménte*** and ***wampúush*** in flower and made field observations. I did collect one specimen of ***wampúush***, corresponding to *Ceiba pentandra*. Berlin et al. (n.d.) report *Ceiba samauma* for ***wampúush***. For ***ménte***, I only managed to collect fruits fallen on the ground and assignment of this specimen to genus, was not possible. The most common features named by informants that unite this group are: large emergent growth habit, the presence of kapok (cottony material) in the fruit, palmately compound leaves and the presence of thorns, especially in young individuals. From those common features listed by informants and from my own field observations, it is possible to make a reasonable guess that ***ménte*** likely corresponds to the genus *Chorisia* or *Ceiba*, in the Bombacaceae (see Gentry 1993: 288). Guallart (1997) lists ***ménte*** as *Chorisia* sp., but does not reference a corresponding voucher specimen. Berlin and collaborators made a collection for ***númi ménte***, identified as *Eriotheca macrophylla* ssp. *sclerophlla*, in the Bombacaceae (n.d.). This species is likely a peripheral member of the category ***ménte***, since species in the genus *Eriotheca* have fairly small fruits and flowers (Gentry 199:286) compared to the individuals of ***ménte*** that informants showed me in the field. A few informants include another tree, ***wáwa*** (*Ochroma* sp.), in this group. **Wáwa** shares the characteristics of dehiscing fruit, containing kapok and soft heart wood, although it does not have trunk spines and its leaves are entire. The genus *Ochroma* is also in the Bombacaceae.

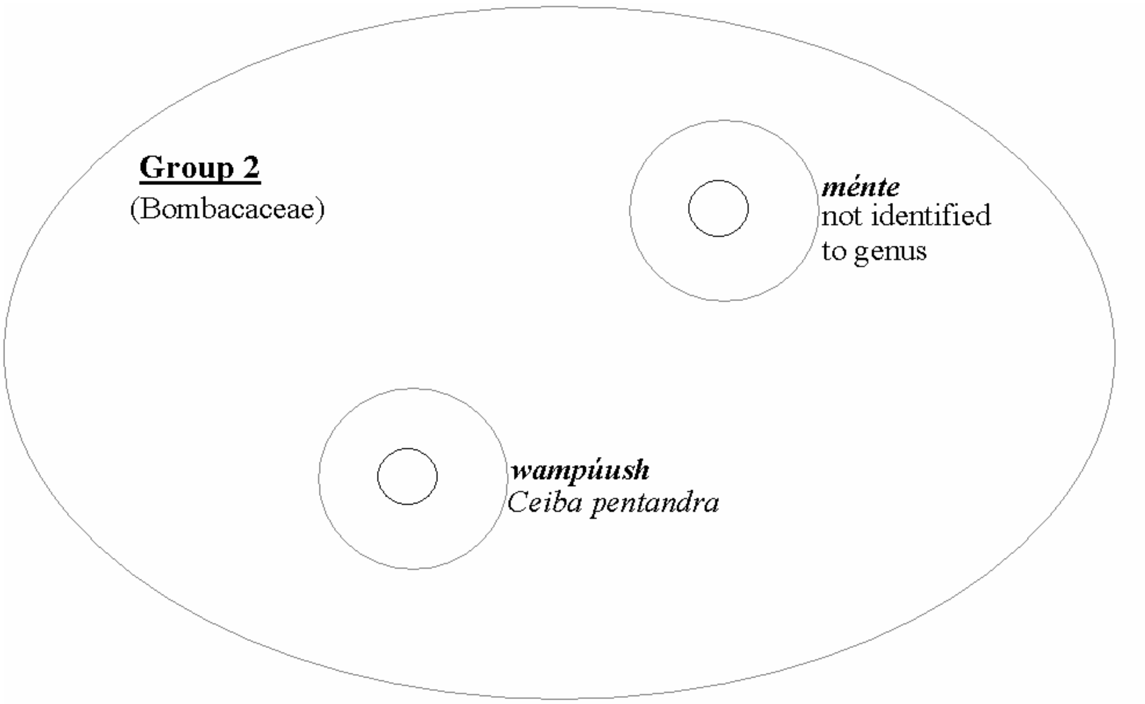

Figure 3.2 – Group 2.

In distinguishing the members of this group, informants noted that ***ménte*** tends to have fewer trunk and branch spines than ***wampúush***, although both trees also have a tendency to be more spiny when they are immature. Also, ***wampúush*** has a more ellipsoid fruit, while ***ménte***'s fruit is more spherical. Finally, the fruits of ***wampúush*** have a kapok that is harder and stays together better than that of ***ménte***'s fruit. This property makes ***wampúush***'s kapok more effective to use as a kind of fletching on the end of darts ***(tséntsak***) for blow guns (***úum***).

Group 3

This group consists of the folk genera ***kunchái*** and ***újuts***. The group, as a whole, corresponds to the genus *Dacryodes*, in the family Burseraceae. The most noteworthy feature shared by all members of this group is the oblong black fruit, with a single large hard seed and a thin, edible mesocarp. All members of this group also share a distinctive aromatic odor in the trunk and twig bark, as well as the sap and fruit. I find the odor to be similar to frankincense and copal, and also reminiscent of freshly cut dill. The genus ***kunchái*** has four widely recognized folk species, ***númi kunchái*** (*D. peruviana*), ***wáwa kunchái*** (*D. kukachkana*), ***tsáju kunchái*** (*D. nitens*) and ***múun kunchái*** (*D. kukachkana*). The genus ***újuts*** (*Dacryodes* sp.) is monotypic.

Tsáju kunchái is distinguished from the other members of the folk genus by having fruit with a harder mesocarp. This makes it less favored as a food than the other members of this group. ***Tsáju kunchái*** also has smaller leaves and fruit than some other members of this group. ***Múun kunchái*** grows larger than other members of this group. It tends to be found in upland areas. Its leaves are small and it tends to form balls of sap ***(shijíkap***) on the trunk, which can be harvested and burned as a light source. ***Wáwa kunchái*** and ***númi kunchái*** both have larger fruit than other members of this group. ***Wáwa kunchái*** has a larger growth habit than ***númi kunchái*** and is found more at higher elevations. ***Númi kunchái*** is found more at lower elevations and has fruit that are more highly clustered together than those of ***wáwa kunchái***. ***Újuts*** is distinguished from the other members of this group by its much smaller, almost shrub-like growth habit, smaller leaves and smaller fruit. It is only found at high elevations, in ***éwejush*** (elfin forest) or ***kampáu*** (cloud forest with spongy soil).

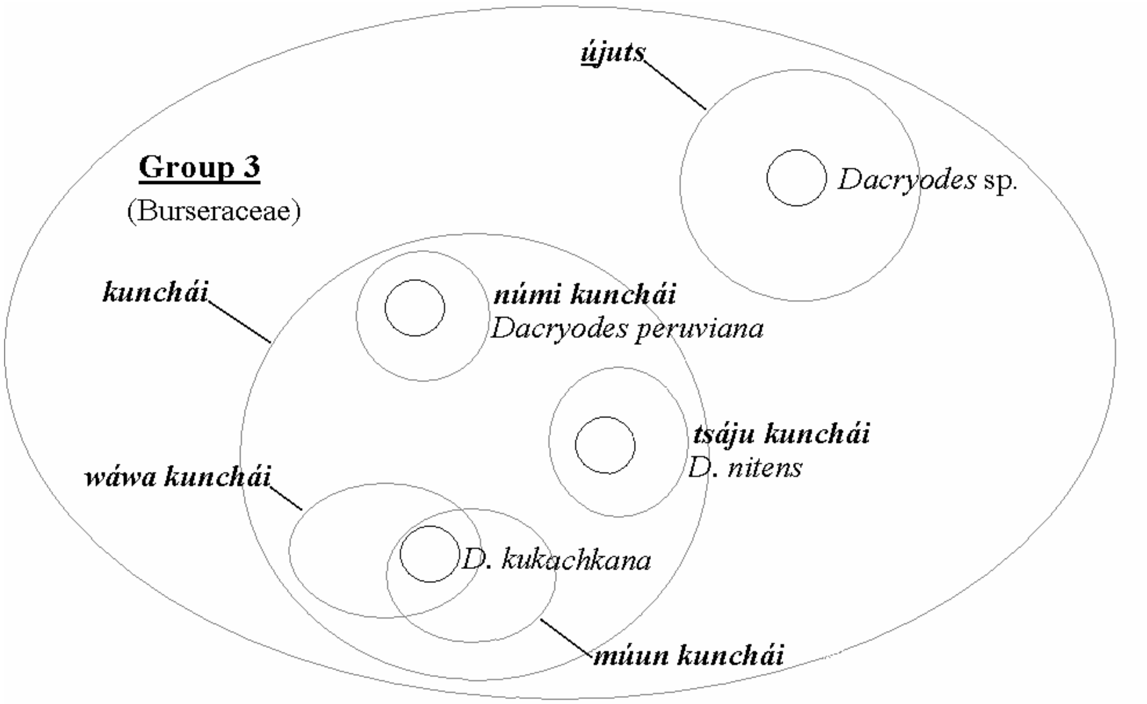

Figure 3.3 – Group 3.

Group 4

Group 4 contains the folk genera ***shijíkap***, ***pantuí, chípa*** and ***shíshi***, all of which correspond to various species of the genus *Protium*, in the Burseraceae. All four of these folk genera are monotypic. ***Chípa*** corresponds to *Protium fimbriatum*, while ***pantuí*** encompasses *P. grandifolium*, *P. sagotianum*, *P. nodulosum* and *P. robustum*. ***Shíshi*** corresponds to *P. grandifolium* and *P. spruceanum*, while ***shijíkap*** corresponds to an undetermined species of *Protium*. The trees in this group are united by the aromatic odor of their bark, sap and fruit. The characteristic odor of this group is very similar to that of group 3 (above). Although groups 3 and 4 both correspond to trees in the Burseraceae, it is noteworthy that only one key informant placed any of the trees in these two groups together. One likely reason most informants keep groups 3 and 4 separate is that the characteristic fruit of each is quite distinct. All members of group four have a fruit that dehisces to reveal a soft white aril (Gentry 1993: 302) surrounding a single hard seed. Fruits of group 3, however, are indehiscent. The color of the mature fruit exocarp varies within group 4. ***Shijíkap*** and ***pantuí*** mature to a greenish color, ***chípa*** to yellow and ***shíshi*** to bright red. In contrast, all members of group 3 have fruit that are black when mature. Finally, group 3 fruits are edible for people, while group 4 fruits are not. Some informants also include the an additional folk genus ***chunchuína*** (*Tetragastris* sp., Burseraceae) in group 4. It's fruit are dehiscent like the rest of this group and are dark reddish green on the outside when mature.

In addition to the fruit features discussed above, a few other important characters separate the various folk genera in this group. ***Pantuí*** and ***chípa*** have larger leaves, while, ***shijíkap*** and ***shíshi*** have smaller leaves. ***Pantuí*** is also distinct in having stilt roots and larger fruit than other

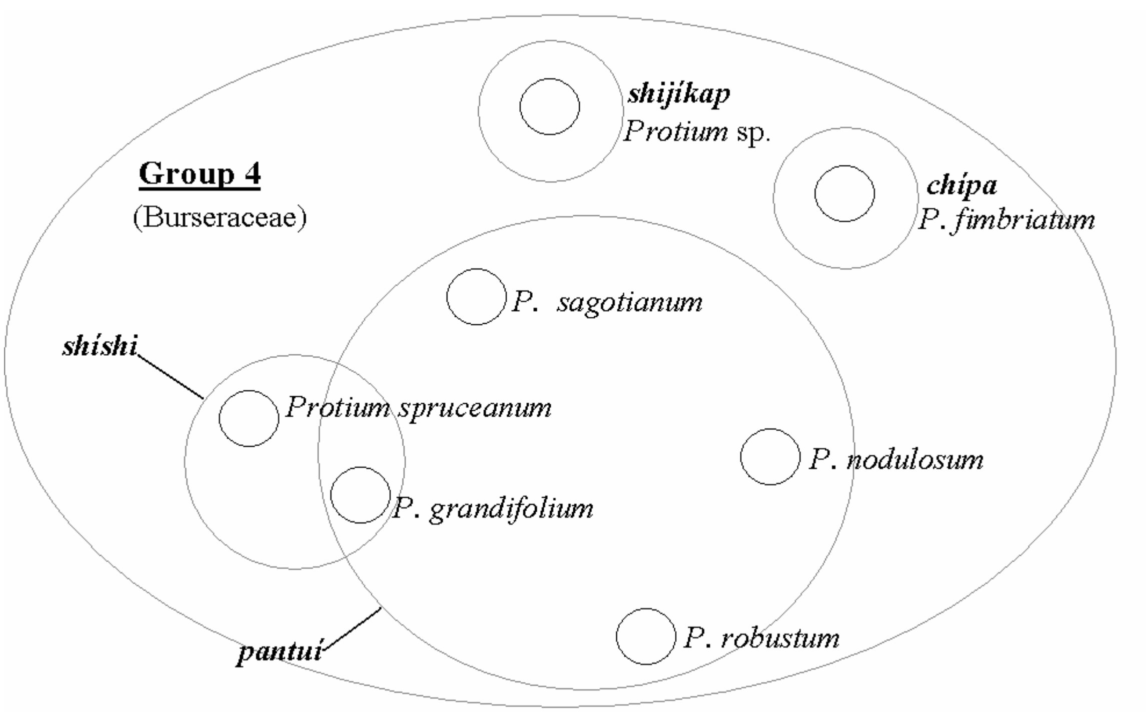

Figure 3.4 – Group 4.

members of this group. ***Shijíkap*** is found especially in moist swampy areas (***mújas***), and has a greater tendency than other members of this group to form hard balls of sap on its trunk. The sap ball itself is also called ***shijíkap*** and can be used to provide illumination at night, by wrapping it in a large leaf and burning it. ***Chípa*** tends to grow at higher elevations and its bark has a weaker odor than the others. ***Shíshi*** and ***chunchuína*** also tend to be found more at higher elevations.

Group 5

This group includes the folk genera ***pegkáenum*** and ***wayámpainim***. Both correspond to species of the genus *Garcinia*, in the Clusiaceae. The single most important feature uniting members of this group is opaque yellow sap. This feature is one that is very rarely found in trees outside this group. ***Wayámpainim*** is monotypic, and corresponds to *Garcinia madruno*. ***Pegkáenum*** has several commonly recognized folk species, including ***shíig pegkáenum*** (*G. macrophylla*), ***úum pegkáenum*** (not collected) and ***wáshi pegkáenum*** (also *G. macrophylla*). ***Shíig*** means 'genuine' and is used to indicate prototypical taxa. The word ***úum*** means 'blow-gun' and refers to the fact that the sticky sap of this species is used as a tarry adhesive in blow-gun construction. The word ***wáshi*** corresponds to one or more monkey species, likely from the genus *Ateles* (Guallart 1962), but it is unclear whether the tree is so named because it is considered to be a favored food of that monkey or simply as a means of distinguishing it from the more prototypical ***shíig pegkaenum***. Some informants also recognize the existence of ***saáwi pegkáenum***, but this was not collected. ***Shíig pegkáenum*** is also referred to as ***bukuntái*** 'edible' ***pegkáenum***, since it is commonly eaten by people. The term ***bukuntái pegkáenum*** is actually a bit ambiguous, since ***wáshi pegkáenum*** and ***saáwi pegkáenum*** (along with

wayámpainim) also have edible fruit. It does, however, clearly exclude ***úum pegkáenum*** whose fruit are not edible for people.

The scope of this group seems to limited to the genus *Garcinia*, as other trees in the study area with biological ranges in the Clusiaceae are not included. For example ***yampiánim*** (*Vismia* sp.) a common secondary growth tree with bright orange sap is excluded. ***Yagkíp,*** a folk genus with a focus on *Chrysochlamys weberbaueri* does not belong either.

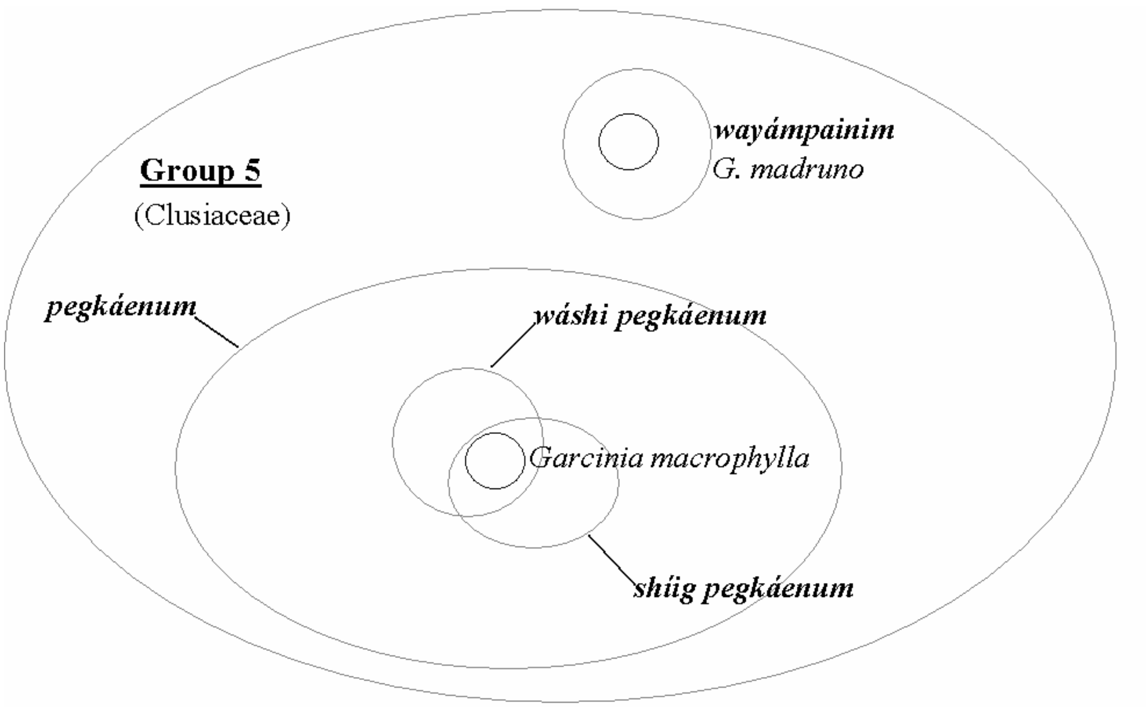

Figure 3.5 – Group 5.

Both ***shíig pegkáenum*** and ***wáshi pegkáenum*** have large leaves and large smooth fruit. ***Shíig pegkáenum***, however, has thicker leaves and tends to grow at lower elevations, while ***wáshi pegkáenum*** has thinner leaves and tends to grow at higher elevations. ***Saáwi pegkáenum***, ***úum pegkaenum*** and ***wayámpainim*** all have smaller leaves. ***Saáwi pegkáenum*** tends to grow at high elevations. ***Úum pegkáenum*** is distinct in having the smallest leaves and a larger growth habit than other members of this group. ***Wayámpainim*** tends to found at higher elevations and has a fruit with rough bumps on it, a feature unique in this group.

Group 6

This group includes the large and economically important folk genus ***sámpi***, along with the related folk genera ***wámpa***, ***sejempách***, ***buabúa*** and ***dapújuk***. All of these folk genera share in common a long green fruit, with a white, sweet edible mesocarp. All members of this group correspond to species of the genus *Inga* in the Fabaceae. The folk genera ***wámpa***, ***sejempách***, ***buabúa*** and ***dapújuk*** are monotypic. ***Wámpa*** corresponds to *Inga edulis*. Berlin *et al*. (n.d.) also list a specimen identified as *Inga striata* under the name ***wámpa***. However, in my study area, the name ***wámpa*** only refers to the very morphologically distinctive species *Inga edulis*. ***Sejempách*** includes the species *Inga semialata*, *I. punctata*, and *I. marginata*. ***Buabúa*** refers to *Inga multinervis* and *I. urabensis*, while ***dapújuk*** corresponds to *Inga cayennensis* and *Inga thibaudiana*. Some informants include additional folk genera in this group, such as ***náji***(*Inga capitata, I. ruiziana*), ***katámankamat*** (*Inga* cf. *umbellifera*) and ***wámpushik*** (*Inga ruiziana, I. nobilis*).

The most commonly recognized folk species of the genus ***sámpi*** are ***yakúm sámpi*** (*Inga pruriens, I. japurensis*), ***yuwícham sámpi*** (*I. leiocalycina*), ***ímik sámpi*** (*Inga tocacheana, I. tessmannii*, *Inga* cf. *densiflora*), ***putsúu sámpi*** (*Inga* sp.) and ***múun sámpi*** (*Inga ruiziana*).

Clearly distinguishing between all the members of a group as large as this one is not completely straightforward, especially since there is some disagreement between informants as to the salient features of the taxa included. The following analysis offers a as clear a picture as possible of the features that differentiate the members of this group. A couple of members, ***sejempách*** and ***wámpushik*** are found exclusively on river or stream banks. Both of these have small fruit. ***Wámpushik*** has a smaller, almost shrub-like growth habit, while ***sejempách*** grows larger. Several other members, ***buabúa***, ***dapújuk*** and ***ímik sámpi*** tend to grow, more generally, in lower elevation areas. ***Dapújuk*** has a small growth habit, small leaves and a small, twisted fruit. ***Buabúa*** grows larger, has bigger leaves and a bigger fruit that is bent slightly in a crescent shape. ***Ímik sámpi*** also grows larger, has larger leaves, fairly small fruit and unusually soft wood for this group. ***Yakúm sámpi*** and ***múun sámpi*** are both found at higher elevations. ***Yakúm sámpi*** has a small growth habit, and dark trunk. ***Múun sámpi*** grows larger than other members of group 6 and has the largest fruit of any member. ***Múun sámpi*** also has a small amount of red sap, a feature shared by only one other member of group 6, ***putsúu sámpi***. Members of this group not associated with a particular ecological zone include ***wámpa,*** ***yuwícham sámpi*** and ***putsúu sámpi***. ***Wámpa*** is easily distinguished from other members by it large straight ridged fruit. ***Yuwícham sámpi*** has a symbiotic relationship with ants (***yuwícham***) that give it its specific name. ***Putsúu sámpi*** shares the presence of red sap with ***múun sámpi***, but has smaller leaves and fruit.

Interestingly, there is also a widely known tree called ***íwanch sámpi*** (*Zygia latifolia*). Most informants did not consider this to be a true member of this group however. Unlike true members of group 6, ***íwanch*** 'devil' ***sámpi*** fruits have a hard inedible mesocarp. Despite it's name, most people do not consider ***íwanch sámpi*** to be a real member of the folk genus ***sámpi***. The word ***íwanch*** effectively negates its membership in that category, suggesting a perverse sort of affinity, in this case that its fruits look like they could juicy and edible but are in fact hard and

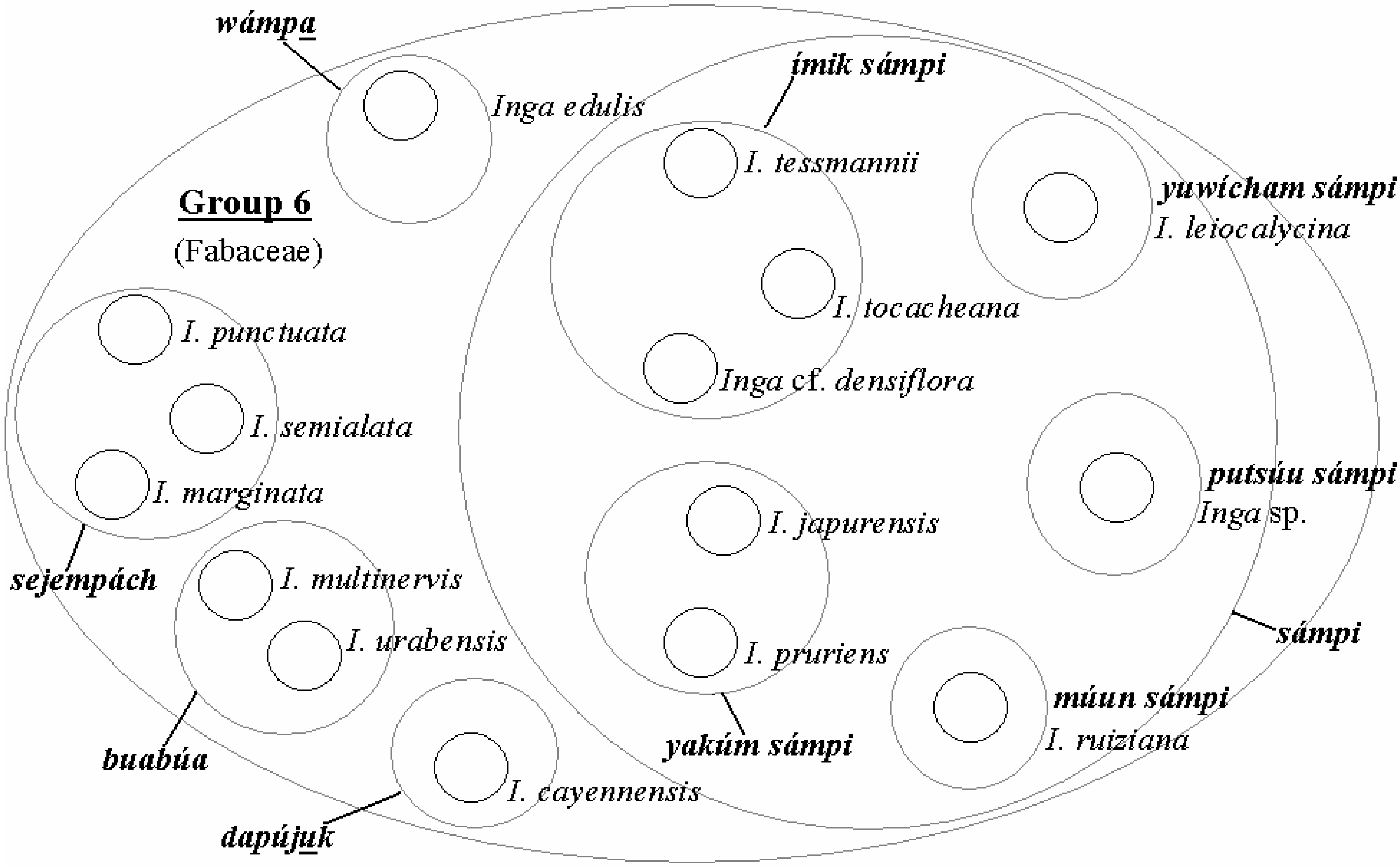

Figure 3.6 – Group 6.

inedible. The fact that it is not included also makes sense biologically, since, unlike all other members of this group, it is not an *Ing*a.

Group 7

This group contains the folk genera ***samíknum*** and ***wampíshkunim*** which correspond to the genera *Macrolobium* and *Pithecellobium* in the Fabaceae. Informants commonly listed hardness and heaviness of wood as features these trees share in common. ***Wampíshkunim*** is a monotypic folk genus, and corresponds to the species *Macrolobium limbatum*. The biological range of the folk genus ***samíknum*** includes species in *Macrolobium* and *Pithecellobium*. Interestingly, Berlin *et al*. (n.d.) report both *Pithecellobium basijugum* and an unidentified species of *Macrolobium* under the name ***samíknum***. Informants in my study area consider ***shíig*** 'true'

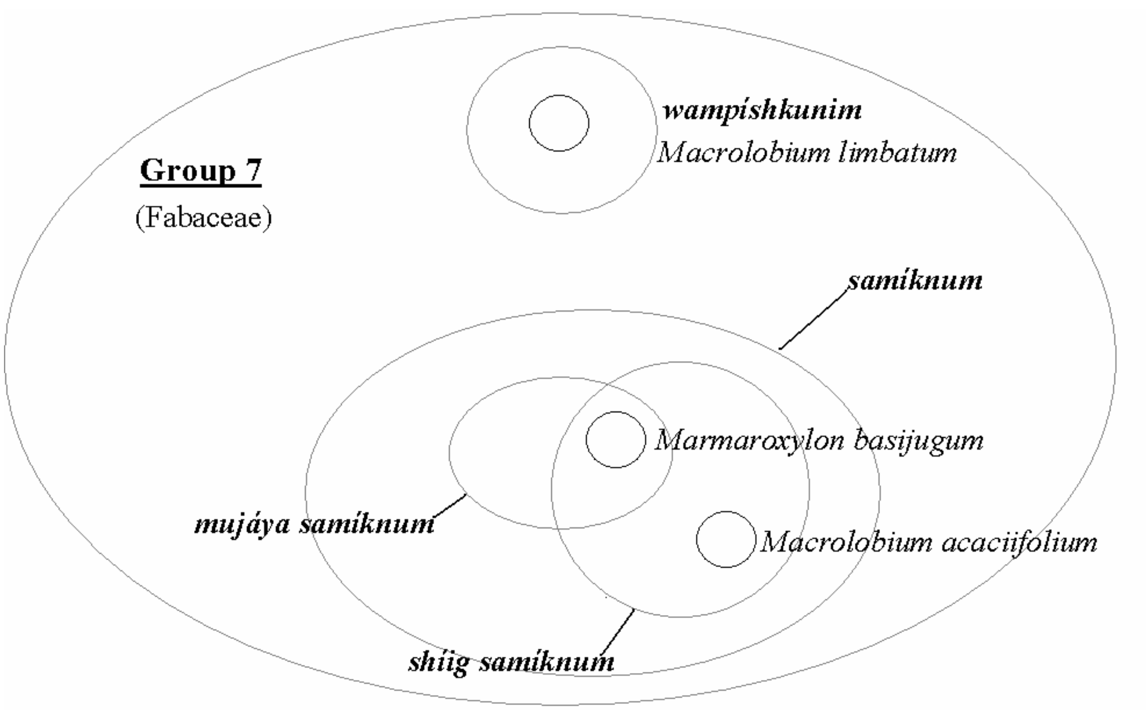

Figure 3.7 – Group 7.

samíknum to be *Macrolobium acaciifolium*, while *Pithecellobium basijugum* was called ***mujayá samíknum***. A few informants also included another tree, ***samík***, which corresponds to *Pithecellobium longifolium* in the Fabaceae.

Leaf size was the most commonly named distinguishing feature for ***wampíshkunim*** and ***samíknum***. The former has much larger leaves than the latter. ***Samíknum*** also has a darker trunk and a considerable smaller fruit than ***wampíshkunim***.

Group 8

This ***kumpají*** group is made up of the monotypic folk genera ***tajép*** and ***pandáij***, both of which correspond to the genus *Ormosia*, in the Fabaceae. A specimen collected for ***tajép*** was identified as *Ormosia* cf. *coccinea*, while another collected for ***pandáij*** was identified as

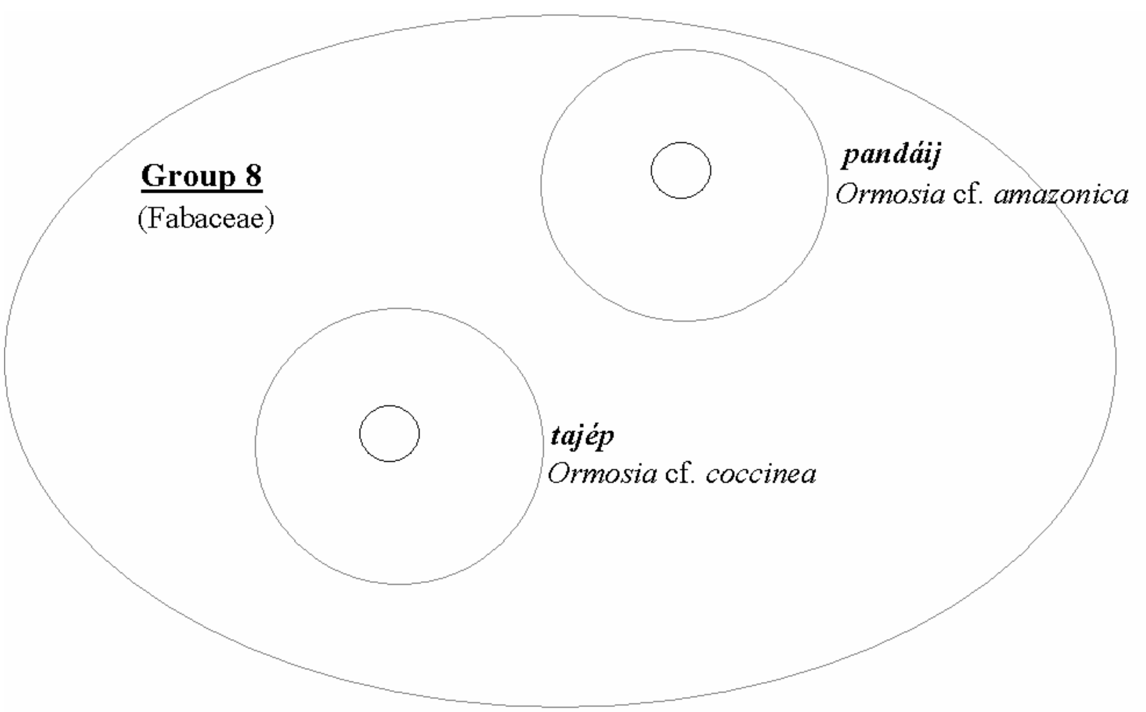

Figure 3.8 – Group 8.

Ormosia cf. *amazonica*. Both ***tajép*** and ***pandáij*** have hard red oblong seeds that can be used for making necklaces. ***Pandáij*** has a larger seed colored red with a black splotch, while ***tajép*** has a smaller seed that is pure red. A few informants also recognize a third member of this group, ***étse*** (not collected), which has a black and red seed that is smaller than ***pandáij***'s seed. The word ***étse*** is also sometimes used as a general term for the seed of any member of this group.

Group 9

This group includes the folk genera ***wantsún***, ***tigkíshpinim*** and ***ugkuyá***. These correspond to the genus *Tachigali*, in the Fabaceae. All of these folk genera are monotypic. ***Wantsún*** appears to have the widest range. Specimens collected correspond to the species *Tachigali chrysophylla*, *Tachigali rugosa* and *Tachigali* cf. *bracteosa*. The single specimen collected for ***tigkíshpinim*** corresponds to the genus *Tachigali*, but could not be identified to species. ***Ugkuyá*** corresponds to the species *Tachigali formicarum*. All key informants agreed that the names ***wantsún*** and ***tigkíshpinim*** refer to two related but distinct trees. However, there is no wide agreement on exactly what the distinction between them is. Some informants distinguish ***wantsún*** and ***tigkíshpinim*** by noting that one of them has leaves with a reddish underside, while the other has leaves with a green underside. However, there is disagreement as to which tree has which characteristic. ***Ugkuyá***, however, is a better defined category. All key informants described ***ugkuyá*** as being distinct from the others in that it possesses a large quantity of fierce stinging ants that live in holes in its trunk and branches. One informant claimed that ***wantsún*** and ***tigkíshpinim*** also have stinging ants, but only a small quantity in the ends of branches. Gentry (1993:512) confirms that many *Tachigali* species have a swollen leaf rachis inhabited by stinging ants.

A few key informants included another tree, ***tagkána***, in this group, while a few placed ***tagkána*** and ***ugkuyá*** together in a separate group. Like ***ugkuyá***, ***tagkána*** has hollow stems inhabited by large quantities of stinging ants. ***Tagkána*** is considered distinct from ***ugkuyá*** in having red indehiscent fruit and in growing at lower elevations. ***Tagkána*** is biologically unrelated to the rest of this group, and refers to the genus *Triplaris* in the Polygonaceae. The name ***tagkána*** is likely borrowed from the Peruvian Spanish name *tangarana*, which according to Gentry (1993: 512, 694), refers to the genera *Tachigali* and *Triplaris*. Clearly, the presence of stinging ants is a highly salient feature which also unites these genera for non-indigenous Peruvians, even though they come from two distinct botanical families.

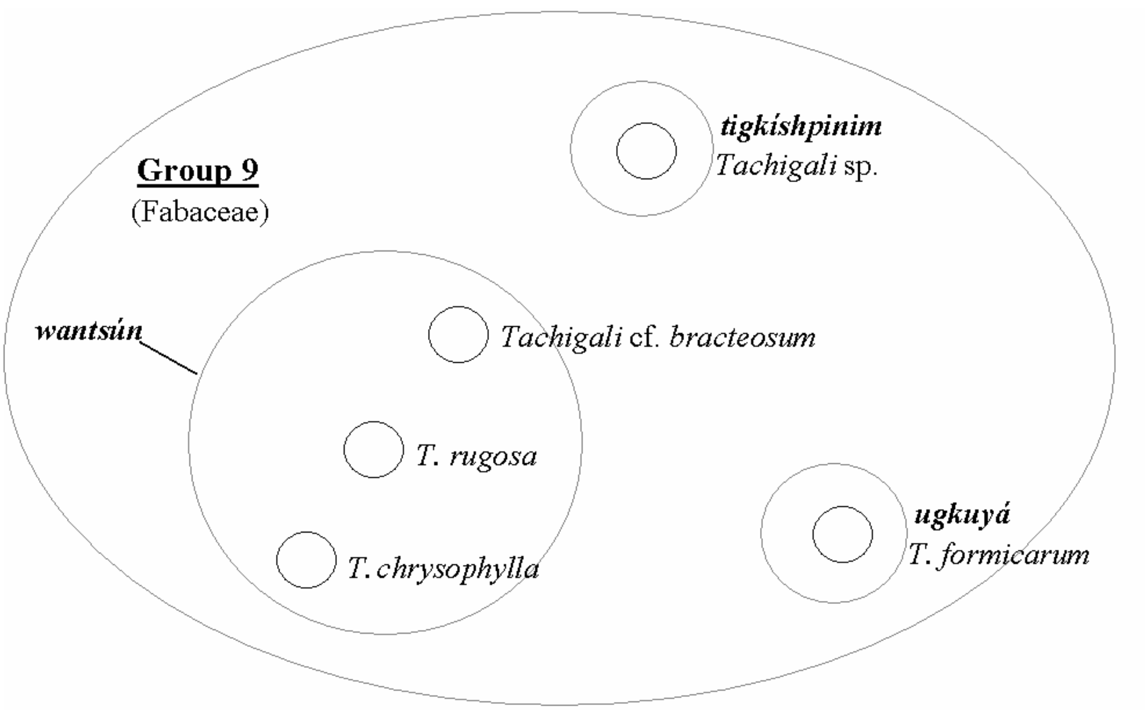

Figure 3.9 – Group 9.

Group 10

This large and complex group contains the folk genera ***tínchi***, ***káwa***, ***máegnum***, ***batút***, ***káikua***, ***wampúsnum*** and ***takák***. The group as a whole seems to correspond fairly well to the family Lauraceae. The most important feature uniting this group is the distinctive aromatic odor of the bark and fruit. Gentry also notes that many Lauraceae have a characteristic leaf or bark odor due to the presence of essential oils (1993:40). Members of this group also tend to have fruit that mature to a dark color and are commonly eaten by certain birds, particularly, toucans, doves and guans. The term ***tínchi*** is used in two distinct ways. First of all, it refers to a particular polytypic folk genus in this group. Secondly, it is a more general term for any member of this suprageneric grouping.

The genera ***máegnum***, ***batút***, ***káikua***, ***wampúsnum*** and ***takák*** are monotypic. ***Máegnum*** refers to *Ocotea floribunda*, while ***batút*** refers to *Ocotea floribunda and O. wachenheimii*. ***Káikua*** corresponds to *O. costulata* and *Licaria* sp. ***Wampúsnum*** corresponds to cf. *Nectandra schomburgkii*, while ***takák*** is *O. gracilis*. ***Máegnum*** has large leaves and fruit. It is distinct from other members of this group, in having yellowish viscous sap. ***Batút*** has large fruit, rounded leaves and its bark has an odor that is similar to the other members of this group, but is more rank. ***Batút*** tends to grow in upland, slightly swampy areas (***mújas***). ***Wampúsnum*** has small fruit, rounded leaves and does not grow as tall as most members of this group. It grows on the banks of rivers and streams. ***Káikua*** has large fruit and long leaves. It's bark flakes off in small plates and the bark odor has a particularly rich perfume-like smell. ***Takák*** has large fruit, long leaves and a light colored trunk. It has a symbiotic relationship with ants that live in the twigs. ***Takák*** is found in lower elevations. Some informants also recognize another member of this group, ***tuntuínim***. ***Tuntuínim*** is similar to ***máegnum*** in its large leaves and fruit, but, unlike

máegnum, it does not have yellowish viscous sap. No voucher specimen for ***tuntuínim*** was collected. An additional member recognized by some informants is ***mantagá***. A collection for ***mantagá*** in my area corresponds to the species *Nectandra cuneatocordata*. Collections in the Cenepa area correspond to the species *Pleurothyrium bifidum* and *P. cuneifolium*, in the Lauraceae. ***Mantagá*** is distinguished by its large light colored leaves, and its light colored trunk.

Commonly recognized folk species of the genus ***tínchi*** include ***tuntúu*** 'dark' ***tínchi*** (*Ocotea longifolia*, *Ocotea argyrophylla*) and ***ká̲wa tínchi*** (*Ocotea floribunda*, *Nectandra olida*). ***Ká̲wa tínchi*** bears a strong affinity with the folk genus ***ká̲wa***, but tends to grow at higher elevations. ***Ká̲wa tínchi*** and ***tuntúu tínchi*** have smaller leaves, and smaller fruit than many other members of group 10. Both have yellow heartwood. ***Tuntúu tínchi*** differs from ***ká̲wa tínchi*** in its smaller growth habit and darker trunk.

Many informants recognize the existence of more than one folk species in the genus ***ká̲wa***. Commonly recognized folk species include ***yuwích ká̲wa***, ***kapiú ká̲wa*** and ***shíig*** 'true' ***ká̲wa***. All of these trees are very large when mature, and unfortunately I could not make collections of any of these. Berlin *et al*. (n.d.) report *Ocotea floribunda* for ***ká̲wa***, but do not mention ***yuwích ká̲wa*** or ***kapiú ká̲wa***. The name ***ká̲wa*** may be related to the Spanish *coaba*, but Gentry (1993: 617) writes that *caoba* refers to the genus *Swietenia* in the Meliaceae. ***Ká̲wa*** in general is similar to ***tínchi*** in its small leaves, small fruit and yellow heartwood. ***Ká̲wa*** grows tall and thick. It has thick bark which possesses a smell similar to other members of this group, but stronger than that of most others. ***Yuwích ká̲wa*** is distinct from ***shíig ká̲wa*** in having a symbiotic relationship with the ants (***yuwícham***) that give it its name. ***Kapiú ká̲wa*** has harder wood than the other two kinds. ***Kapiú*** corresponds to the species *Calycophyllum spruceanum* (Rubiaceae) in the lowlands. I did not have an opportunity to collect ***kapiú*** in the upper Nieva region. However, the trees that my informants in the upper Nieva communities named as ***kapiú*** did not appear to be *Calycophyllum spruceanum*.

It is worth noting that the taxa ***máegnum***, ***batút***, ***ká̲wa*** and ***ká̲wa tínchi*** all include the species *Ocotea floribunda*. Nevertheless, Aguaruna informants do not consider any of the above four names as synonyms. Clearly, more voucher specimens are needed to clarify the exact botanical range of these folk taxa.

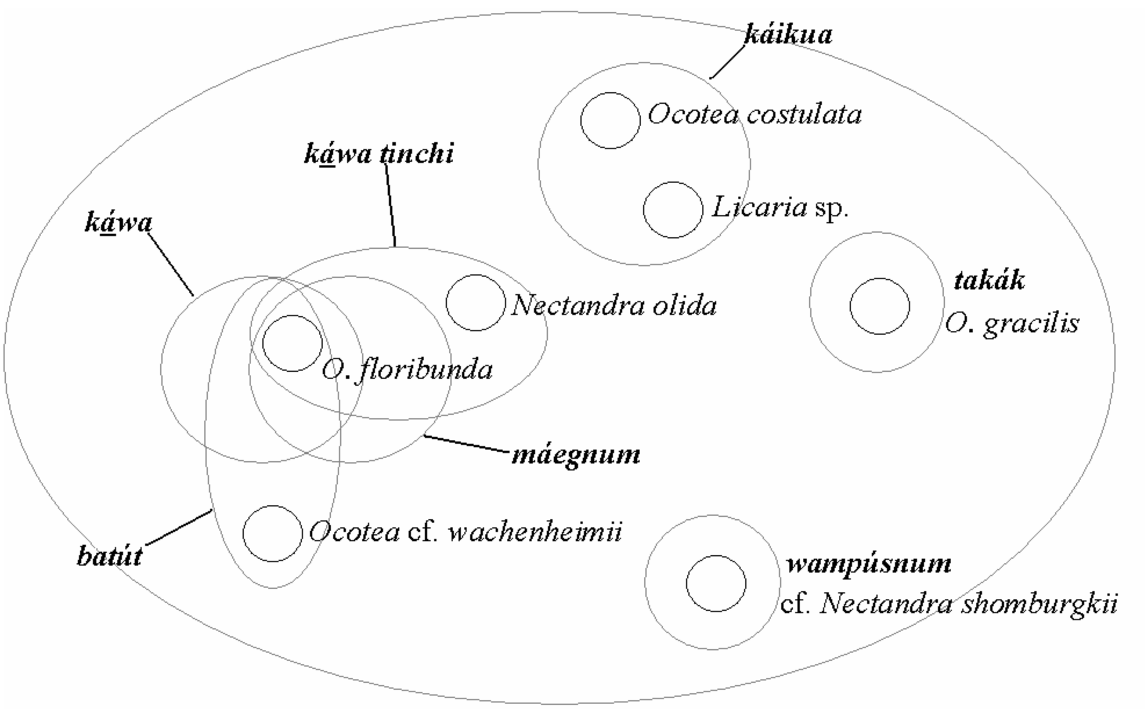

Figure 3.10 – Group 10.

Group 11

This is a straightforward grouping consisting of the folk genera ***kaáshnum*** and ***shuwát***, both generally considered to be monotypic. ***Shuwát*** and ***kaáshnum*** correspond to species of the genus *Eschweilera* in the Lecythidaceae. ***Kaáshnum*** encompasses *E. gigantea* and *E.*

tessmannii, while ***shuwát*** corresponds to *E. andina* and an unidentified *Eschweilera* species. The most commonly cited feature uniting this group is strong fibrous bark. ***Kaáshnum*** is considered to have a larger more spherical fruit that does not dehisce. ***Shuwát*** has a smaller longer dehiscent fruit. ***Shuwát*** has smaller leaves, but a larger growth habit than ***kaáshnum***. ***Kaáshnum*** has white flowers, while ***shuwát*** has red flowers.

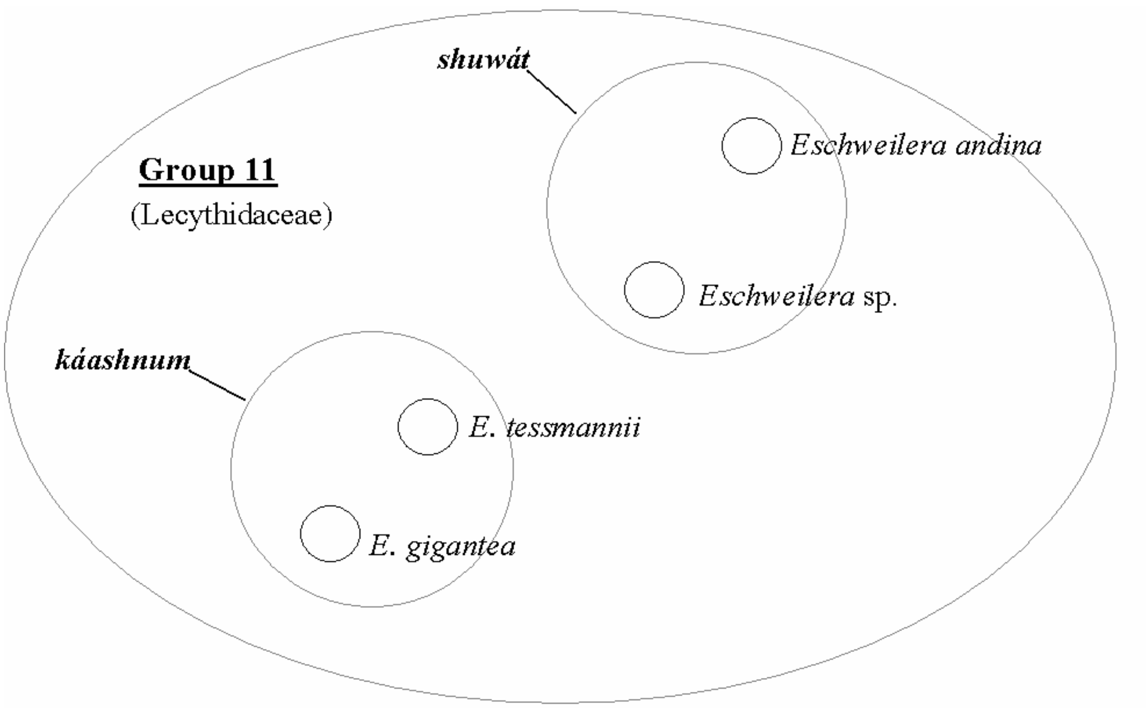

Figure 3.11 – Group 11.

Group 12

This group includes the folk genera ***chinchák***, ***tseék***, ***ukuínmanch*** and ***chijáwe***. Altogether, the group corresponds fairly well with the family Melastomataceae. Members of this group have clusters of round fruit that tend to be black when ripe and are commonly eaten by various bird species. The term ***chinchák*** refers to a particular folk genus in this group, but is also used in a wider sense as a general term for any member of this group, especially members that do not easily fit into one of the other named domains. In the study region, many species from the Melastomataceae occur, particularly in the genus *Miconia*. Berlin *et al*. (n.d.) collected 62 total specimens from this family, including 30 species of *Miconia* in their work with Aguaruna collaborators on the Cenepa river. Of the 62 specimens, 36 (58%) were named simply ***chinchák***, rather than a particular kind of ***chinchák***, or as one of the other folk genera mentioned above.

Commonly recognized folk species of ***chinchák*** include ***kapantú*** ‘red’ ***chinchák***, ***sáu*** ‘foam’ ***chinchák***, ***antumú*** ‘low growing’ ***chinchák*** and ***kugkuím*** ‘turtle’ ***chinchák***. Voucher specimens collected for ***kapantú chinchák*** include the species *Miconia amazonica*, *M. paleacea*, *M. serrulata*, *M. triplinervis* spp. *exalluvia* and *M. vittata*. Specimens collected for ***sáu chinchák*** correspond to *Adelobotrys adscendens*, *A. boissieriana*, *A. klugii*, *A. multiflora*, *Bellucia* cf. *pentamera*, *Graffenrieda* sp., *Miconia* sp., *M. nervosa* and *M. prasina*. ***Antumú chinchák*** includes the species *Miconia paleacea*, *M. subspicata*, *Leandra secunda*, *L. longicoma* and *Triolena pluvialis*. Note that, in the interest of readability, the biological species corresponding to the folk taxa ***kapantú chinchák***, ***sáu chinchák*** and ***antumú chinchák*** do not appear in Figure 3.12 (below). Finally, one specimen, *Ossaea* sp., was collected for ***kugkuím chinchák.*** Informants distinguish ***Kapantú chinchák*** from other members of group 12 by its large, long leaves that are red on the reverse side. It grows larger than most members of this group. ***Sáu chinckák*** is also considered to grow fairly tall and has large, rounded leaves. Its fruit grow on the trunk and lower part of the branches. ***Antumú chinchák*** is a low-growing shrub with small thin leaves. ***Kugkuím chinchák*** has a small growth habit and thin, glabrous leaves. The folk genus ***tseék*** is very closely allied with ***chinchák***. ***Tseék*** is distinctive in having a smallish rounded leaf and smooth dark trunk. Specimens collected for ***tseék*** include *Miconia ternatifolia*, *M. bullifera*, *M. decurrens* and *M. vitata*.

The folk genera ***unkuínmanch*** and ***chijáwe*** are both monotypic and have a partially overlapping biological range. ***Unkuínmanch*** includes *Miconia serrulata*, *M. lourteigiana* and *M. tomentosa*, while ***chijáwe*** includes both *M. serrulata* and *M. bulbalina*. Informants always placed ***ukuínmanch*** and ***chijáwe*** together, but only five out of eight key informants agreed that these two genera truly belong with ***tseék*** and ***chinchák***. Unlike ***tseék*** and ***chinchák***, both ***ukuínmanch*** and ***chijáwe*** are said to have very hard heartwood and bark that easily flakes off. ***Ukuínmanch*** has a light colored trunk, while ***chijáwe*** has a dark trunk. The reverse side of ***chijáwe***'s leaf is reddish, while the reverse side of ***ukuínmanch***'s leaf is gray.

It should be noted that there are a few representatives of the Melastomataceae present in the study area that most informants do not place in this group. One, ***yujúya***, is a canopy tree common in secondary growth in the study area. I did not collect ***yujúya***, but Berlin *et al*. (n.d.) list *Miconia poeppigii* for the similarly named ***yujáya***. Since all other members of this group are shrubs or small trees, ***yujúya***'s larger size is likely the reason most informants did not consider it to belong. Another tree, ***yujách***, is also not considered by most informants to be a true member of this group, since it's fruit is larger than most other members and matures to a yellow color rather than black. ***Yujách*** is focused on the genus *Bellucia* and also includes *Loreya*. Voucher specimens collected for ***yujách*** are *Bellucia pentamera* and *Loreya spruceana*.

Another interesting aspect of group 12 is that it incorporates members that do not belong to the life-form ***númi***. The term ***dáek*** 'vine' ***chinchák*** encompasses scandent members of the melastome genera *Adelbotrys*, *Blakea* and *Clidemia* (Berlin *et al*. n.d.). The Aguaruna clearly

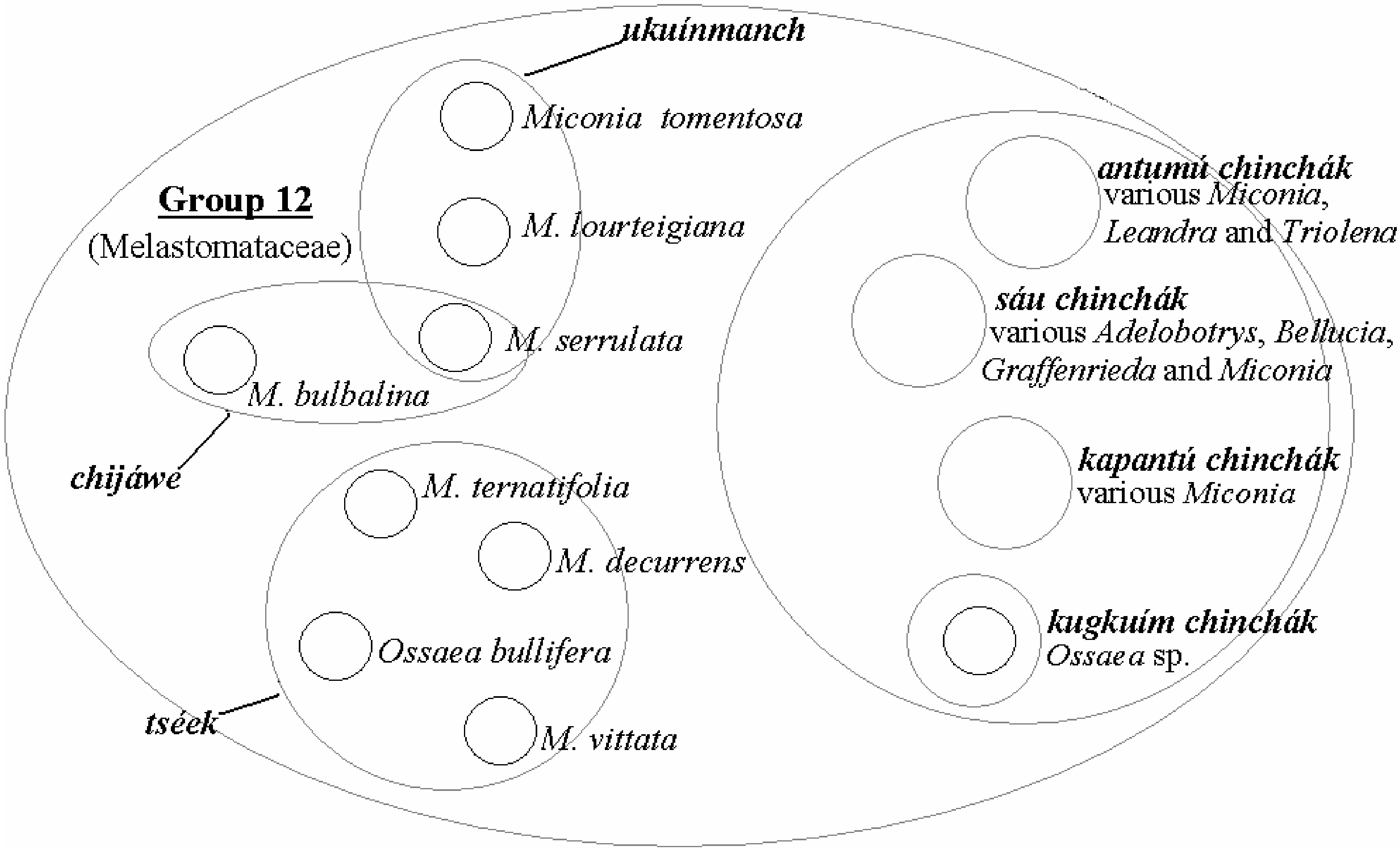

Figure 3.12 – Group 12.

recognize morphological similarities between these plants and other members of the folk genus ***chinchák***.

Group 13

This group contains the folk genera ***yantsáu*** and ***bíchau***, both of which are monotypic. These trees share a fruit that dehisces to reveal a red seed inside. Both also have white flowers and a similar aromatic bark odor. Voucher specimens collected for ***bíchau*** correspond to *Guarea macrophylla* ssp. *pendulispica* and *Trichilia pallida* in the Meliaceae. Specimens collected for ***yantsáu*** correspond to *Guarea macrophylla* ssp. *pendulospica* and *G. guidonia*. According to informants, the major difference between ***yantsáu*** and ***bíchau*** is overall size. The latter is a small understory tree, while the former is larger and has buttressed roots. ***Yantsáu*** also has

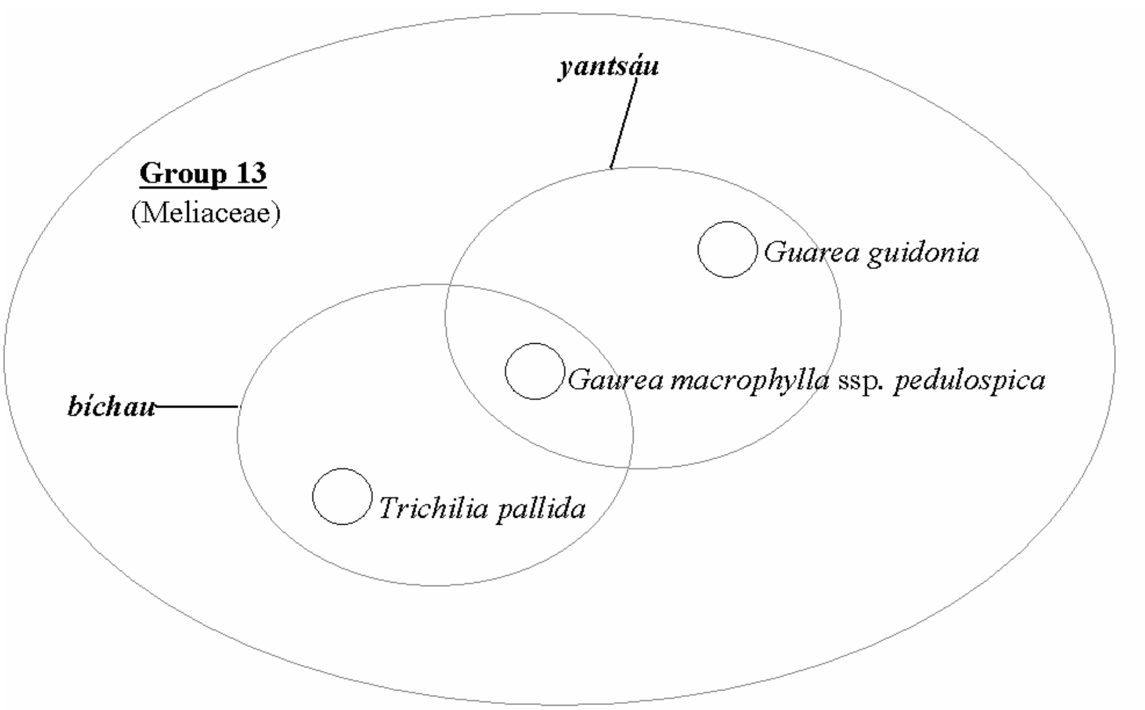

Figure 3.13 – Group 13.

bigger leaves than ***bíchau*** and tends to grow on the edges of rivers and streams. Some informants also include the folk genus ***mamántunim*** in this group. It has larger fruit than either ***yantsáu*** or ***bíchau*** and also differs in being cauliflorous. I did not collect a voucher for ***mamántunim***, but Berlin *et al*. (n.d.) list the species *Cabralea canjerana* in the Meliaceae and *Spondias mombin* in the Anacardiaceae.

Group 14

This group includes the folk genera ***súu***, ***satík*** and ***tséke***. The group as a whole corresponds well to the genus *Cecropia* in the Moraceae. Members are united by their deeply radially lobed leaves, and branched fruit clusters (see Gentry 1993:628), which are also a food source for certain birds and animals including Oropendulas, guans, toucans, the kinkajou (*Potos flavus*) and the *zorro negro* (*Eira barbara*) (Berlin and Patton 1979). ***Súu*** appears to be a more general term for this group, as its botanical range overlaps with ***satík*** and ***tséke***, which, have more restricted ranges. ***Satík*** includes *Cecropia membranacea* and *C. engleriana*. The name ***satík*** very likely comes from the Peruvian Spanish *cetico*, which is used for members of the genus *Cecropia* (Gentry 1993: 628). ***Tséke*** encompasses *C. engleriana* and *C. putumayonsis*. Specimens collected for ***súu*** include *C. engleriana, C. ficifolia, C. marginalis, C. membranacea, C. sciadophylla*. Some informants also recognize another member of this group, ***yanát***. I did not make a collection of ***yanát***, but I did observe it and make a field identification of *C. sciadophylla*. Berlin *et al*. (n.d.) collected a voucher specimen listed with the Huambisa name of ***yanát***, also identified as *C. sciadophylla*.

According to informants, two members of this group, ***tséke*** and ***satík*** have biting ants living in the hollow branches. Both these trees also have smaller leaves than the other members of this group. ***Satík*** grows on the banks of rivers and streams, while ***tséke*** is a secondary growth species at higher elevations. ***Súu*** and ***yanát*** share an absence of biting ants. ***Súu*** has fairly large leaves, but ***yanát*** has the largest leaves in this group and its leaves also have the longest petioles. Another difference is that ***súu***'s leaves are covered with little hairs (***suisuímatu***), while ***yanát***'s leaves are smooth.

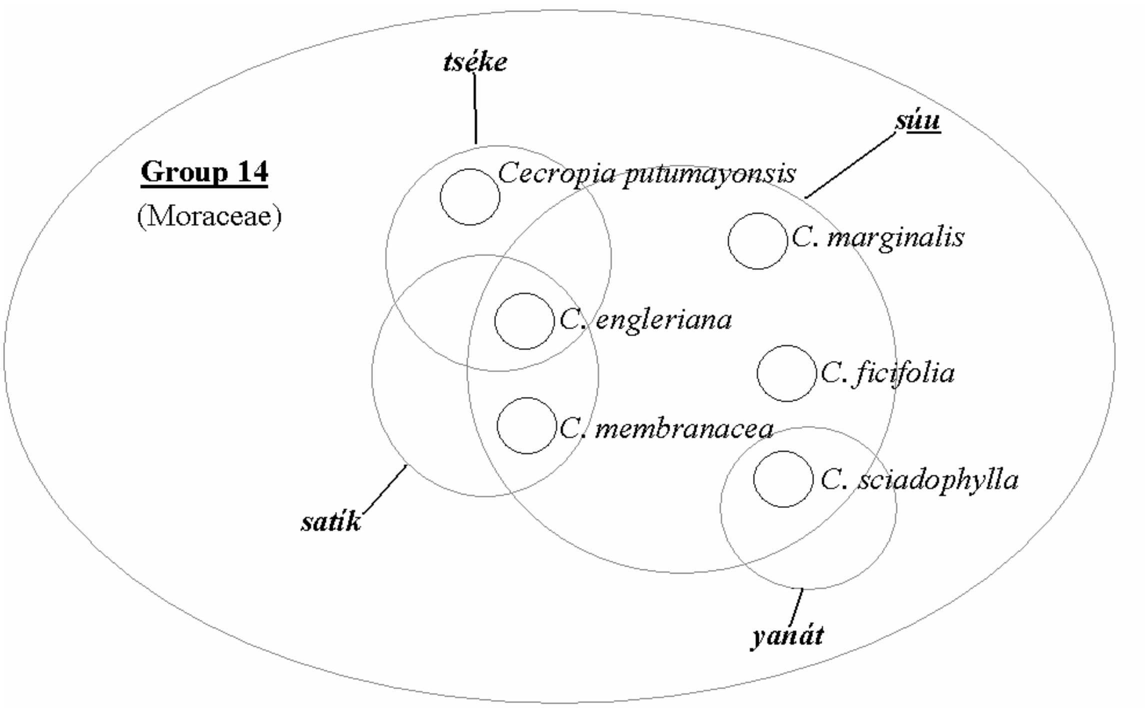

Figure 3.14 – Group 14.

Group 15

This group contains the folk genera ***tsémpu***, ***ejésh*** and ***chikúm***. The whole group corresponds fairly well to the family Myristicaceae. The most important feature uniting members of this group is fruit that dehisce to reveal a seed covered by a red aril (see Gentry 1993: 638). Additionally, all members of this group have bark with a similar aromatic odor and all have colored latex, although the color varies between them, and latex in ***ejé̲sh***, it is almost clear. ***Chikúm*** and ***ejé̲sh*** are usually regarded as monotypic, while ***tsémpu*** is polytypic. Voucher specimens for ***chikúm*** include *Virola peruviana* and *Otoba glycicarpa*. I also collected two specimens named by informants as ***namakiá chikúm***. These specimens both correspond to *Virola calophylla*. Vouchers for ***ejé̲sh*** include *Iryanthera tricornis* and *Virola pavonis*.

Commonly recognized folk species of ***tsémpu*** include ***takáikit tsémpu***, ***kadáit tsémpu*** and ***úntuch tsémpu***. The word ***takáikit*** refers to a bird, the gilded barbet (*Capito auratus*) (Nico Dauphiné n.d.; Berlin and O'neill n.d.), which is considered to be fond of the fruit of this species. ***Takáikit tsémpu*** corresponds to *Virola* sp. The word ***kadáit*** means oar and refers to the fact that the wood of this species is valued for making oars. ***Kadáit tsémpu*** was not collected. ***Úntuch*** means belly button. The name refers to the fact that this folk species of ***tsémpu*** has bumps on its trunks where it fruits form and these bumps resemble a belly button. Voucher specimens for ***úntuch tsémpu*** were identified as *Iryanthera juruensis* and *Virola elongata*. I collected another specimen from a tree named by an informant as ***mujayá tsémpu***. The specimen corresponds to *Compsoneura capitellata*.

Informants distinguished members of group 15 as follows. Three members of this group, ***kadáit tsémpu***, ***úntuch tsémpu*** and ***chikúm*** have distinctly red sap. ***Kadáit tsémpu*** has larger leaves than other members. ***Chikúm*** is distinct from the other members in having buttressed roots. ***Úntuch tsémpu*** has a large fruit and is unique for this group in being cauliflorous. ***Takáikit tsémpu*** has yellowish red sap and small leaves. ***Ejé̲sh*** has very light, almost clear sap and small leaves.

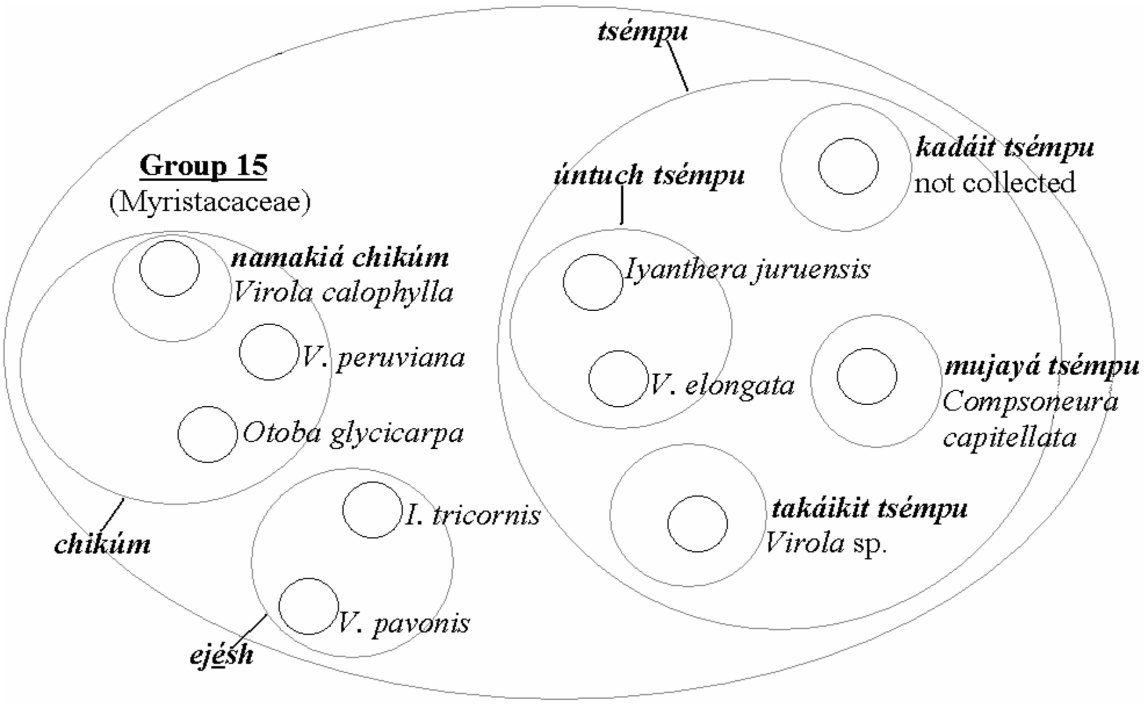

Figure 3.15 – Group 15.

Group 16

This group includes the folk genera ***shijíg***, ***tákae***, ***shijigká sáei*** and ***barát***. Although these correspond to species in several different botanical families, they share in common the presence of sticky white sap in the trunk and branches. ***Shijíg*** corresponds to the genus *Hevea* in the Euphorbiaceae. Voucher specimens collected for ***shijíg*** include *H. guianensis* and *H. pauciflora*. The name ***shijíg*** surely comes from the Peruvian Spanish name *shiringa*, which refers to the genus *Hevea* (Gentry 1993:409) ***Tákae*** corresponds to the genus *Brosimum* in the Moraceae. Specimens collected include *B. parinarioides* and *B. multinervium*. ***Shijigká sáei,*** a name that literally means brother in law of ***shijíg***, refers to *Clarisia racemosa* in the Moraceae. ***Barát*** corresponds to the species *Ecclinusa lanceolata*, in the Sapotaceae. Berlin *et al*. (n.d.)

report a voucher specimen collected with the Huambisa name ***marát***, identified as *Chrysophyllum sanguinolentum* ssp. *balata*, in the Sapotaceae. Gentry (1993:776) also lists the Ecuadorian Spanish name *balata* under the genus *Chrysophyllum*. Considering the proximity of Ecuador to the study region, it is quite possible that the Aguaruna name ***barát*** is borrowed from Spanish and that it also refers to the genus *Chrysophyllum*.

Several features distinguish the members of this group. ***Shijíg*** has rounded leaves (actually leaflets from a botanical standpoint) clustered in groups of three. ***Shijíg*** has a large, very hard, three chambered fruit and is common on steep hill slopes in the ecological zone known as ***kampáu*** (hillside forest with spongy soil). ***Tákae*** has large rounded leaves and a round fruit that is reddish when mature. ***Shijigká sáei*** has small leaves, round, black fruit and a grayish trunk. ***Shijigká sáei*** is more common at higher elevations. ***Barát***, has large, long leaves a round reddish fruit and a dark colored trunk. ***Barát*** is found in upland swampy areas (***mújas***).

Interestingly, two trees that are considered to be related by most informants, ***tsáchij*** and ***tákit*** are also considered by some informants to have an affinity with ***shijíg***. The three trees have a three chambered fruit. ***Tsáchij*** refers to the genus *Senefeldera*, in the Euphorbiaceae, while ***tákit*** corresponds to the genus *Mabea* in the same family. Specimens collected for ***tsáchij*** are identified as *S. macrophylla* and *S. inclinata*. Specimens collected for ***tákit*** are identified as *M. maynensis*, *M. klugii*, *M. macbridei* and *M. occidentalis*. ***Tákit*** and ***tsáchij*** are not considered to be related to any member of group 16 other than ***shijíg***. Botanically, it makes sense to group ***shijíg*** with ***tákit*** and ***tsáchij,*** since they all fall within the Euphorbiaceae.

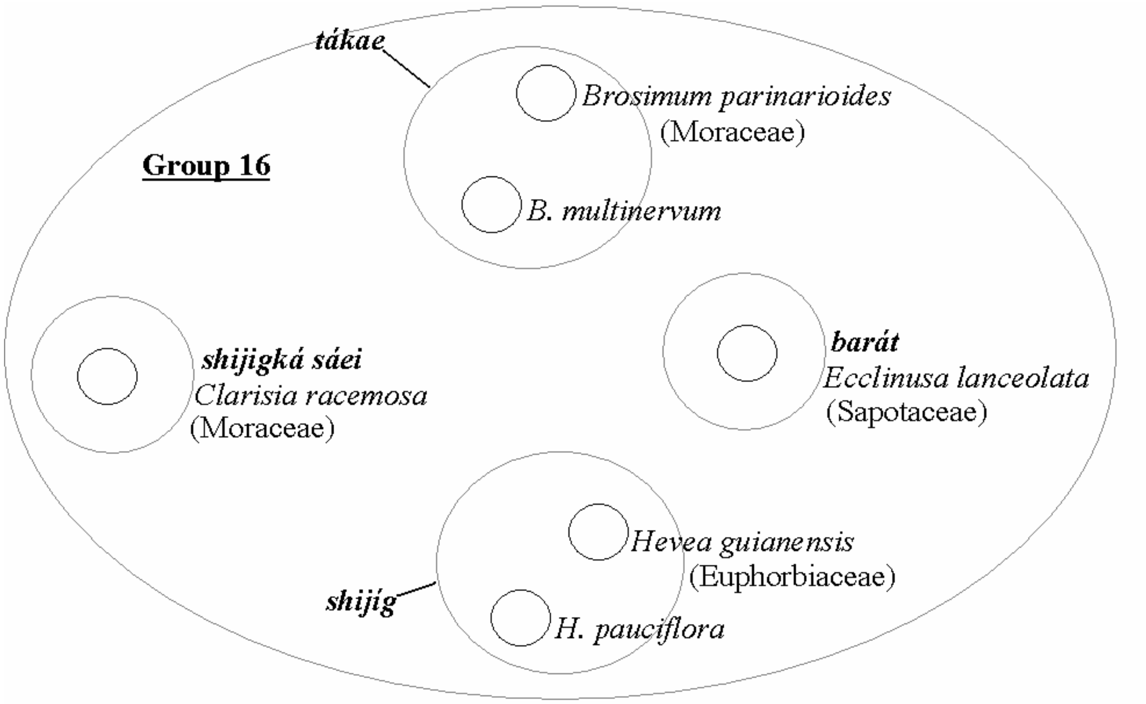

Figure 3.16 – Group 16.

Group 17

This group includes the folk genera ***áwanu***, ***séetug*** and ***tsáik***. All trees in this group have rough ridged bark, small leaves and can grow to be quite large. They are also all highly valued timber species. ***Séetug*** corresponds to the species *Cedrela odorata* in the Meliaceae. It seems quite likely that the Aguaruna word ***séetug*** is borrowed from the Peruvian Spanish *cedro* which Gentry (1993:617) lists for the genus *Cedrela*. The voucher specimen that I collected for ***áwanu*** also corresponds to *Cedrela odorata*, but there is some uncertainty in the identification. Another informant saw the specimen as I was preparing it, and identified it as ***séetug***, rather than ***áwanu***. The name ***áwanu*** is almost certainly related to the Peruvian Spanish *águano*. According to Gentry (1993:617), the Peruvian Spanish *águano* corresponds to the genus *Swietenia*, which is closely related to *Cedrela* (Gentry 1993:616). Guallart (1997) lists the species *Swietenia* *macrophylla* for the name ***awán***, but he does not reference a corresponding voucher specimen. ***Tsáik*** corresponds with the species *Cedrelinga cateniformis*, in the Fabaceae. All eight key informants placed ***áwanu*** and ***séetug*** together, but only five agreed that ***tsáik*** fits with the other two members. This is not surprising, considering that ***tsáik*** corresponds to a different botanical family.

According to informants, ***séetug*** and ***áwanu*** both have bark, leaves and fruit with the same strong, pungent, almost garlic-like odor. These two trees also both have an ellipsoid fruit which opens to release small winged seeds. ***Séetug***'s trunk has a reddish color, while ***áwanu***'s trunk is lighter, almost white. ***Séetug*** is found more at lower elevations and ***áwanu*** is more common in

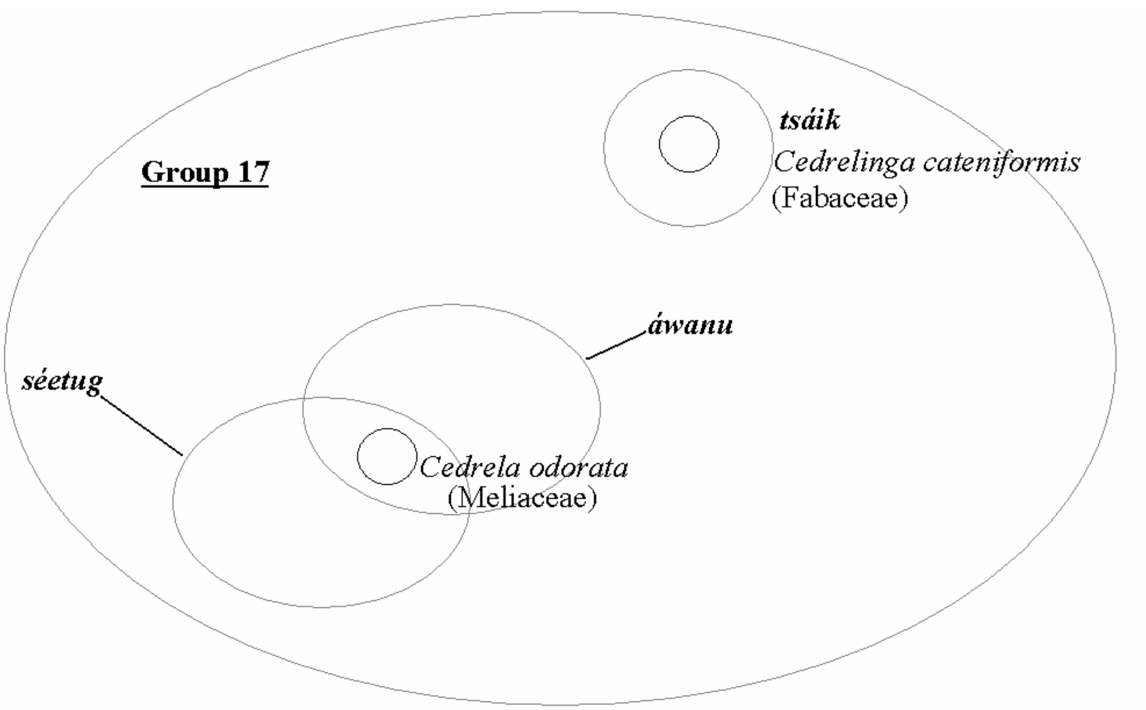

Figure 3.17 – Group 17.

the uplands. ***Tsáik***'s bark has a slight smell, similar to the fish poison producing plant ***tímu*** (*Lonchocarpus utilis*) and its fruit is flat.

Trees from Isolated Folk Genera

Shikiú

The folk genus ***shikiú*** corresponds to the genus *Erythrina* in the family Fabaceae. Specimens collected for ***shikiú*** were determined as *Erythrina ulei* and an undetermined *Erythrina* species. ***Shíig*** 'true' ***shikiú*** is a tall tree with a spiny trunk, that grows near river banks. The leaves are trifoliate with rounded leaflets. ***Shikiú*** produces red flowers after the tree has lost its leaves. It's fruits are long and green. I also encountered an introduced *Erythrina* species determined as *Erythrina* cf. *poeppigiana*, that the Aguaruna refer to as ***apách*** 'mestizo's' ***shikiú***. ***Apách shikiú*** grows only to the size of a shrub or small tree of several meters and is not spiny. ***Apách shikiú*** has orange flowers.

Chikáunia

The folk genus ***chikáunia*** corresponds to the species *Myroxylon balsamum* in the Fabaceae. The folk genus is widely regarded to be monotypic. The trunk is light in color, the leaves are small and the heartwood is very hard. The flowers are white. The fruit is flat, green when immature and whitish when dry. The seed is round and has a slightly oily texture. The most salient feature of ***chikáunia*** is the very distinctive perfume like odor of its bark and seeds. A few people noted that even the leaves have a perfume-like odor. Women use the seeds as body adornment.

Tagkáam

The folk genus ***tagkáam*** refers to the species *Parkia multijuga* in the Fabaceae. There are no widely recognized folk species in this genus. ***Tagkáam*** has small leaves, hard heartwood and wide flat black fruit that dehisce when dry. The fruit are edible to some animals, including the rodents ***káshai*** (*Cuniculus paca*) and ***káyuk*** (*Dasyprocta* sp.) and ***yugkipák*** (*Tayassu tajacu*) (Berlin and Patton 1979). A couple informants recognized a folk species ***kapiú tagkáam***, distinct from ***shíig*** 'true' ***tagkáam***. The descriptive term ***kapiú*** refers to a tree that I did not collect. I was told that ***kapiú tagkáam*** is harder than ***shíig tagkáam*** and that the former is found in forest with dense undergrowth (***apiíj***), while the latter is found in areas with sparse undergrowth (***sáat***). Unfortunately, I was unable to collect ***kapiú tagkáam***. On a plant collecting trip to a patch of elfin forest (***éwejush***) near the community Atash Shinukbau, I collected a voucher specimen of ***mujáya tagkáam***, determined as *Macrolobium* aff. *microcalyx*.

Shishíim

The folk genus ***shishíim*** corresponds to the genus *Couroupita* in the Lecythidaceae. The folk genus is widely regarded as monotypic. Perhaps the most striking feature of ***shishíim*** is its very large round fruit that hang on woody stems from the trunk (Gentry 1993:501). The flowers are yellow and red and have a pleasant odor. The fruit, however, has a decidedly rank smell when cut open. ***Shishíim***'s leaves are small and it near edge of rivers and streams. ***Shishiím*** appears to be rare in the upper Nieva region and more common in the lowlands in Loreto.

Apái

The folk genus ***apái*** refers to the genus *Grias*, in the Lecythidaceae. Two very salient features of ***apái*** are its single trunk and its short stature. The fact that of ***apái*** is cauliflorous also appears to be a very important diagnostic feature for the Aguaruna. The flowers are a very light yellow color and have a sweet, pleasant odor. The fruit are oblong and brownish on the outside, when mature. The inside is orangish and considered edible. The leaves are long and wide.

Shína

The folk genus ***shína*** refers to the species *Brosimum rubescens* in the Moraceae, according to a collection made by Collected by Walter Lewis, Memory Elvin-Lewis, Rogerio Castro and Genaro Yarupait. One of the most salient features of ***shína*** for the Aguaruna is its reddish heartwood whose hardness makes it valuable for making the upright posts of houses. ***Shína*** has small leaves and its twigs contain white sap. Fruits are roundish and red when mature. ***Shína*** appears to be fairly rare in the study region, as I only encountered one example, and my informants did not know it as intimately as some of the other study trees. For example, some informants could not describe the fruit, or were not aware that the tree has white latex. Unfortunately, I was not able to collect fertile material for a more precise botanical determination.

Pítu

The folk genus ***pítu*** corresponds to the species *Batocarpus orinocensis* in the Moraceae. ***Pítu*** has small leaves, white sap and a segmented fruit that matures to a tannish color. The seeds are edible. Most informants consider the folk genus ***pítu*** to be unrelated to any other folk genera, also of few people place it with other trees with white sap such as ***tákae*** (Brosimum spp., Moraceae). One informant recognizes two folk species of ***pítu***, ***ipáag*** 'a variety of manioc' ***pítu*** and ***sháa*** 'corn' ***pítu***. Of the two, ***ipáag pítu*** is considered to be ***shíig*** 'true' ***pítu*** and that is the one I collected. Unfortunately, I was unable to determine whether ***sháa pítu*** refers to a botanically distinct species. I was told that the primary difference between the two folk species is that ***sháa pítu*** has smaller fruit than ***ipáag pítu***. The Aguaruna also refer to the breadfruit tree (*Artocarpus atilis*) (Berlin and Markell 1977), which has been introduced in the area as ***kistián*** 'mestizo's' ***pítu***. In some ways, *Artocarpus atilis* has a very different appearance from *Batocarpus orinocensis*, even though they are both in the Moraceae. For example, *Batocarpus orinocensis* has fairly small entire leaves while *Artocarpus atilis* has large distinctively lobed leaves. However, both trees have similar edible seeds.

Magkuák

The folk genus ***magkuák*** corresponds to the species *Cespedesia spathulata*, in the Ochnaceae. The folk genus is generally regarded as monotypic. ***Magkuák*** has large, long leaves. The flowers are yellow. The fruit is small, long, and dehisces when dry. The tree has slightly buttressed roots. The outside trunk tends to have an off-white color and the bark is fibrous.

Uwáchaunim

The folk genus ***uwáchaunim*** refers to the species *Calycophyllum megistocaulum*, in the Rubiaceae. ***Uwáchaunim*** is most distinctive in its very smooth brown bark, that peels off periodically to reveal a greenish trunk underneath. Leaves are large and rounded. Fruits are small and flat. The seeds are wind dispersed. Some informants were not familiar with the fruit of ***uwáchaunim***, but that is not surprising due to their small size. In any event, it is quite easy to recognize simply by looking at the trunk. ***Uwáchaunim*** tends to grow in hill slopes. It is interesting that only one informant named the tree ***kapijúna*** (*Calycophyllum spruceanum*)(Guallart 1997) as a companion of ***uwáchaunim***. One factor is that ***kapijúna*** appears to be very rare in the study area. ***Kapijúna*** is found on river banks in lowland rainforest. During the second pilot study, in the town of Santa María de Nieva, where kapijúna is more common, I found that a larger proportion of informants consider ***uwáchaunim*** and ***kapijúna*** to be companions.

Bukún

The folk genus ***bukún*** refers to various species in the genera *Chimarrhis* and *Macrocnemum*, in the Rubiaceae. Voucher specimens collected for ***bukún*** include *Chimarrhis glabriflora*, *Chimarrhis hookeri* and *Macrocnemum roseum*. **Bukún** is distinct in its hard heartwood and light colored flaky bark. The leaves are fairly large and flowers are small and white. Fruits are small and seeds are wind dispersed. Informants did not mention the opposite leaves or interpetiolar stipules of this tree, both features that are diagnostic of the family Rubiaceae (Gentry 1993: 718).

Súwa

The folk genus ***súwa*** corresponds to the species *Genipa americana*, in the Rubiaceae. Perhaps the most distinctive feature of ***súwa*** is its large round fruit, whose pulp and juice turn black after the fruit is cut. The juice is used as a dye for body decoration. ***Súwa*** is also known for its smooth outer trunk. As with other Rubiaceae in the study, informants did not appear to value the opposite leaves or interpetiolar stipules as a diagnostic feature.

Tiík

The folk genus ***tiík*** corresponds to the genus *Zanthoxylum*, in the family Rutaceae. The most salient feature of ***tiík*** is that it possesses spines protruding from bumps on the trunk and spines on the branches, as well. The leaves (actually leaflets) are small and narrow. The flowers are greenish yellow. The fruit are small, round, green when immature, and darker when mature. The single seed is hard and black. ***Tiík*** tends to have a straight trunk that is off-white on the outside.

Páunim

The folk genus ***páunim*** appears to correspond to the genus *Vochysia* with an extended range including the genus *Ruizterania*, both in the family Vochysiaceae. Collections made for this taxon include *Vochysia elongata*, *Vochysia braceliniae* and *Ruizterania trichanthera*. ***Páunim*** grows to a large size. The trunk is grayish. Leaves are long and thin but slightly rounded. The leaves are not flat but rather wavy. The flowers are yellow. The fruits are flat and dehiscent. The seeds are wind dispersed. The heartwood is hard, but light.

Pítuuk

The folk genus ***pítuuk*** refers to one or more species in the Moraceae, although the precise botanical range remains somewhat unclear. A voucher specimen that I collected for ***pítuuk*** was identified as *Perebea xanthochyma*, in the Moraceae. However, Berlin et al (n.d.) report that most of the specimens of *Perebea xanthochyma* that they collected were named as ***sugkách*** by Aguaruna informants. My voucher specimen for ***pitúuk*** was a sapling, so it is quite possible that my informant misidentified that individual. Voucher specimens that Berlin et al (n.d.) collected for ***pítuuk*** were identified as *Trophis racemosa*, in the Moraceae and *Agonandra silvatica* in the Opiliaceae. I find it unlikely that people in the upper Nieva region would consider a species in the Opiliaceae to be **pitúuk**, since white sap is a character that my informants emphasized for this taxon. Of all collections made for this name, *Trophis racemosa* seems most plausible. In addition to white sap, the most salient feature of ***pítuuk*** is its reddish trunk bark and roots. ***Pítuuk*** has small leaves and fruit that mature to a red color. It is found mostly in upland areas.

Utilitarian Arguments

The 17 ***kumpají*** groupings chosen for this study share two important features. First, they are recognized by a majority of key informants and secondly, their basis is largely morphological rather than utilitarian. The first requirement makes sense for this study, since it would be difficult to arrange trees whose affiliation is widely disputed into discrete groups for discussion and analysis. The second requirement also makes sense since very few ***kumpají*** groupings listed by informants appear to be based solely on utilitarian concerns. In most cases where similarities in use appear, they seem to play a minor role compared to perceptual similarities. Nevertheless, in the interest of presenting a fuller picture of the role of these covert categories in Aguaruna folk taxonomy, some examples will be given of groupings based primarily on utilitarian factors and of folk genera whose group affiliation is widely disputed.

Ten of the 17 ***kumpají*** groups in this study have an associated cultural use common to all members. These are shown below in Table 3.2. A strong argument can be made, however, that the cultural uses are not the primary bases of these groups. For example, there is clearly no single group formed from all trees with edible fruit. In addition, to members of groups 1, 3 and 6, shown below, there are many other trees with edible fruit that do not appear in any of the groups selected for this study. Furthermore, some trees with edible fruit, such as ***apái*** (*Grias* spp.) and ***pítu*** (*Batocarpus orinocensis*), are generally considered to not have ***kumpají***. For most of the other groups listed in Table 3.2, there are examples of other trees used in the same way, but not considered to be related. An exception would be group 2, made up of the trees ***ménte*** and ***wampúush*** (Bombacaceae), which both have fruits containing kapok that can be used to make fletching for darts. There are no other unrelated trees with this property. It is important to keep in mind, however, that the common use for members of group 2 is a result of their similar morphology, which, in turn, is a consequence of biological relatedness. The same point can be made for all other groups shown in Table 3.2, except group 17. It is not surprising, for example,

Table 3.2 – Uses associated with some ***kumpají*** groups.

group number	**biological range**	**use**
1	*Lacmellea*, *Couma* (Apocynaceae)	edible fruit
2	(Bombacaceae)	kapok of fruit is used for darts
3	*Dacryodes* (Burseraceae)	edible fruit
4	*Protium* (Burseraceae)	dried sap is burned as a light source
6	*Inga* (Fabaceae)	edible fruit
7	*Macrolobium*, *Pithecellobium* (Fabaceae)	firewood
8	*Ormosia* (Fabaceae)	seeds used to make necklaces
11	*Eschweilera* (Lecythidaceae)	fibrous bark used in construction
13	*Guarea*, *Trichilia* (Meliaceae)	bark used for digestive ailments
17	*Cedrela* (Meliaceae), *Cedrelinga* (Fabaceae)	valuable timber trees

that both ***tajép*** and ***pandáij*** (group 8) have similar hard, brightly colored seeds, since both correspond to species of the same genus, *Ormosia*. This morphological fact also makes the seeds of both trees useful for making necklaces.

The trees ***ipák*** and ***súwa*** constitute a rare example of a ***kumpají*** grouping without any apparent morphological basis. ***Ipák*** corresponds to *Bixa orellana* in the Bixaceae, while ***súwa*** corresponds to *Genipa americana*, in the Rubiaceae. Those informants who grouped ***ipák*** and ***súwa*** as ***kumpají***, based this grouping on the fact that both trees yield dyes used for face painting. No similarity in leaves, fruit, etc. was cited. The seeds of ***ipák*** produce a bright red color, while ***súwa*** produces a black color from the juice of its fruit. ***Súwa*** and ***ipák*** are also associated in Aguaruna folklore. They are said to once have been human sisters who had a series of misadventures that got them into increasingly serious trouble, until they finally decided they would be better off turning themselves into trees. It is worth noting that, despite this strong association in cultural use and in folklore, only a few informants consider ***ipák*** and ***súwa*** to be ***shíig*** 'true' ***kumpají***. Most informants said that ***súwa*** and ***ipák*** have no true ***kumpají***.

Agreement for *Kumpají* Groups

For some Aguaruna folk genera, there is no wide agreement regarding which other folk genera, if any, should be considered their ***kumpají***. An examination of folk genera mentioned in at least half of key informants' expanded freelists (see Chapter 2) reveals that 20 % cannot be conclusively classified as either belonging to a particular ***kumpají*** group or being an isolate. An example of such a folk genus is ***dúpi***, which refers to various species in the Linnaean genus *Pouteria*, in the Sapotaceae. Table 3.3 illustrates the wide disagreement among the eight key informants in this study as to what companions, if any, this tree has. Trees listed as possible companions of ***dúpi*** correspond to a variety of botanical families. Only one informant lists a companion (***yáas***) that definitely corresponds to the same botanical family, the Sapotaceae. Many of the trees listed as companions of ***dúpi*** do have superficial morphological similarities with it. One companion, ***pítuuk***, corresponds to one or more species in the Moraceae. Gentry (1993:626,778) confirms that the genus *Pouteria* and many members of the family Moraceae are characterized by white milky sap. One day, when I collected a voucher specimen of ***íwaiwaig*** (*Duroia hirsuta*), I had the opportunity to show the specimen to a number of different informants. A couple of informants mistakenly identified the small branch I had cut as ***dúpi***. Another more knowledgeable informant assured me it was actually ***íwaiwaig*** and pointed out that both trees have fairly large round fruit (see Gentry 1993:738,778).

Table 3.3 – Disagreement over companions of ***dúpi***.

informant #	**Companions listed for *dúpi*** (*Pouteria* spp. - Sapotaceae)
1.	***kuwái*** (*Guarea pubescens* - Meliaceae)
2.	***pítuuk*** (one or more species Moraceae)
3.	***íwaiwaig*** (*Duroia hirsuta* - Rubiaceae)
4.	***námukam*** (various Rubiaceae), ***táuna*** (*Faramea* sp. - Rubiaceae)
5.	none
6.	***yáas*** (*Sarcaulus braciliensis* - Sapotaceae)
7.	***sáka*** (various Myrtaceae, Melastomataceae, Monimiaceae, Rubiaceae and Sapotaceae)
8.	***uyáinim*** (not collected), ***sáka*** (various Myrtaceae, Melastomataceae, Monimiaceae, Rubiaceae and Sapotaceae)

Prototypicality

For some polytypic Aguaruna folk genera, it is possible to say that certain members are more prototypical than others. In some cases, the most prototypical member of a polytypic genus is clearly indicated by the descriptive modifier ***shíig*** which can be glossed as ‘real’ or ‘genuine.’

Many other languages have terms for marking a prototypical member of a folk genus (Berlin 1992:110). In the Tzeltal language of highland Chiapas, for example, the word ***bac'il***, also means 'genuine' (Berlin, Breedlove and Raven 1974:42), and is used in the same way that the Aguaruna use the word ***shíig***. In ***kumpají*** group 5 (discussed above), ***shíig pegkáenum*** is clearly the prototypical member of the folk genus ***pegkáenum***, while ***wáshi***, ***saáwi*** and ***úum pegkáenum*** are clearly more peripheral. Many polytypic Aguaruna folk genera do not have a member designated as the ***shíig*** version, although it is still possible, in some cases, for informants to indicate which named species is the most truest one.

For ***kumpají*** groupings, it would be difficult to directly ask informants which folk genus is the ***shíig*** member, since most of these groups are not linguistically recognized. I make the assumption, however, that it should be possible to judge the prototypicality of a particular member of a ***kumpají*** group by examining the relative number of informants who include the member in the group. In other words, a member that every informant includes should be considered more prototypical than a member that only half of the informants include.

A new kind of diagram has been devised for illustrating how informant agreement about group membership can yield information about prototypicality. Figure 3.18 (below) illustrates both the central and the peripheral members of group 16. The number next to each line joining a pair of folk genera indicates how many key informants consider those two genera to be ***kumpají***. In Figure 3.18, it is clear that, ***shijíg***, ***tákae***, ***shijigká sáei*** and ***barát*** form the core of group 16, while ***tsáchij***, ***tákit***, ***náam***, ***pítu*** and ***wápae*** are more peripheral members. It is really more accurate to say that the extended version of group 16, presented below, actually represents two related covert groupings, each of which has a distinct rational for its formation. The core members of group 16, along with ***pítu*** and ***wápae*** all share sticky white sap in the trunk and branches. ***Shijíg***, ***tsáchij***, ***tákit*** and ***náam***, on the other hand, all share a three valved fruit, which is a common characteristic of the family Euphorbiaceae (Gentry 1993: 404), to which all members of this second grouping belong. ***Shijíg*** is the one member shared in common between the two groups.

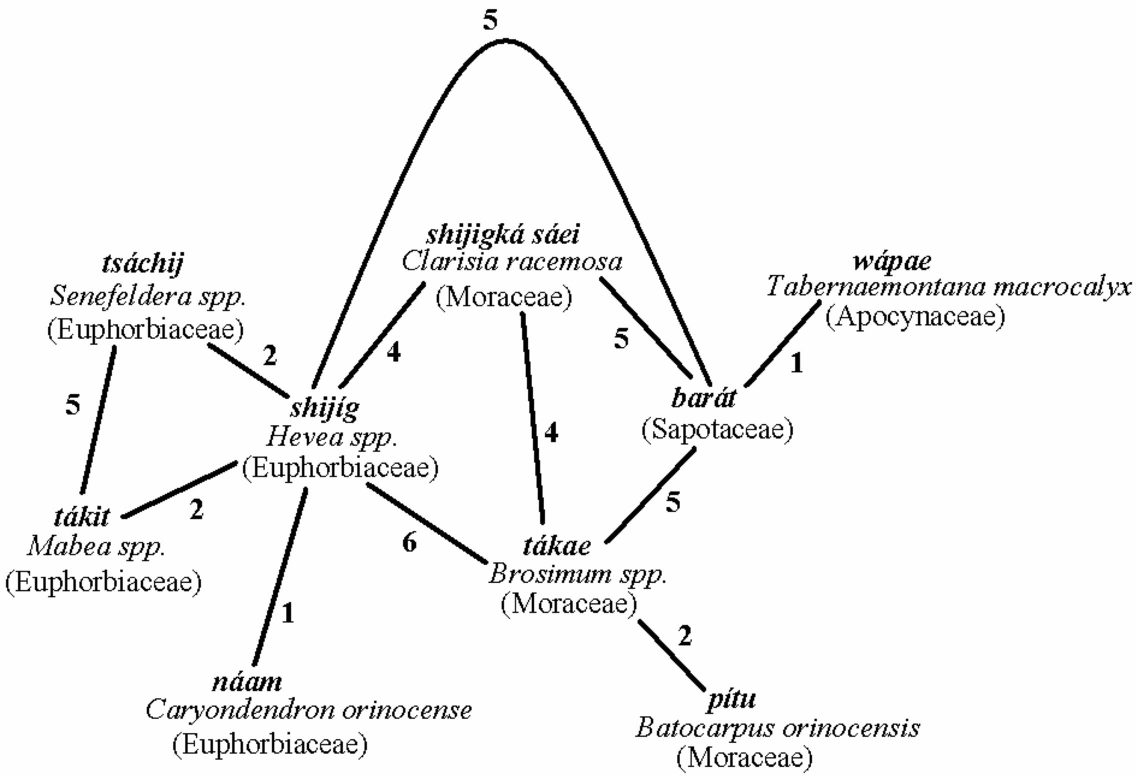

Figure 3.18 – The Extended Range of Group 16.

Group 12 (discussed above) corresponds fairly well to the Linnaean family Melastomataceae. A connectivity diagram of the kind used in Figure 3.18 reveals an interesting fact about the fine structure of this group. Figure 3.19 (below) clearly illustrates that group 12 has two distinct subgroups within it. One subgroup is formed by the genera ***ukuínmanch*** and ***chijáwe***, which are considered to be related by every key informant. All four trees in group 12 share fruit that ripen to a black color and are favored by a variety of bird species. However, ***ukuínmanch*** and

chijáwe also share the additional features of very hard heartwood and flaky bark. The other subgroup is made up of ***tseék*** and ***chinchák***. These two trees lack flaky bark, have soft heartwood and do not grow quite as large as ***ukuínmanch*** and ***chijáwe***.

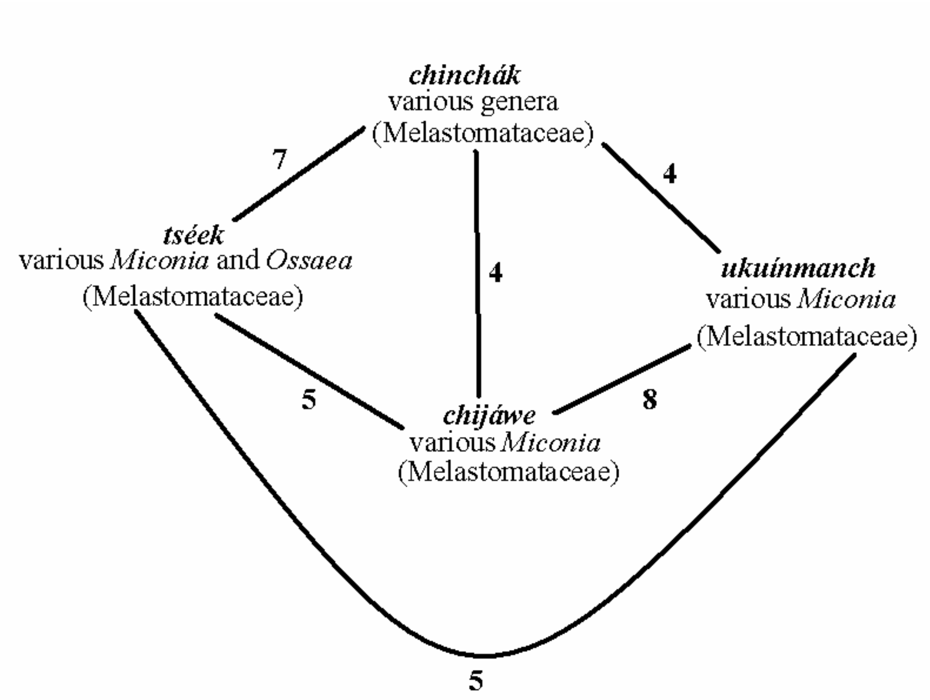

Figure 3.19 – A more detailed look at group 12.

Biological Relatedness of *Kumpají* Groups

A minor prediction of this research was that folk taxa grouped together as ***kumpají*** will tend to be of the same botanical family. This prediction was successfully tested, using specimens collected in this study, in combination with ethnobotanical data collected by Brent Berlin and collaborators for the Aguaruna (1970, n.d.).

Of the 63 trees chosen for the study, 14 are considered by a majority of informants to have no companions. The other 49 make up 17 groups of companions recognized by at least 50% of informants. For 15 of the 17 groups (88%), all members come from the same botanical family. Two of the groups (12%) have members from multiple botanical families (see group 16 and 17 above). Some ***kumpají*** groups seem to correspond to a particular biological genus. For example, Group 4 (Figure 3.4) appears to correspond fairly well to the genus *Protium* in the family Burseraceae. Other groups correspond to several biological genera within a single family. Group 1 for instance, includes the genera *Couma* and *Lacmellea* in the Apocynaceae.

In the two cases of ***kumpají*** groups with members from more than one family, the members do, nevertheless, show distinct morphological similarity. Group 17 contains trees from the genus *Cedrela*, in the Meliaceae and *Cedrelinga*, in the Fabaceae which both have thick ridged bark. Indeed, even the scientific names imply morphological similarity. Group 16 (Figure 3.16) includes species from the genera *Brosimum* and *Clarisia* in the Moraceae, the genus *Hevea* in the Euphorbiaceae and the genus *Ecclinusa*, in the Sapotaceae. Although this grouping does not hold together biologically, it makes sense to the Aguaruna, since all of the trees involved have sticky white sap. Overall, the data support the idea that the Aguaruna group trees together as ***kumpají*** in a way that is often consistent with Linnaean taxonomy.

Three of the Aguaruna suprageneric groupings in this study correspond fairly well to Linnaean families. The three families are Lauraceae, Melastomataceae and Myristicaceae. It is worth noting, however, that the features the Aguaruna use to justify these groupings do not correspond exactly to the ones that would be obvious to a Western botanist. Group 12 (see above), for example, maps fairly well to the Linnaean family Melastomataceae. For the Aguaruna, this group is based on common fruit shape, color and clustering, as well as the fact that fruit of all of these trees are an important food source for many kinds of bird. In contrast, Gentry observes that the family Melastomataceae "is one of the easiest of all plant families to identify in sterile condition, thanks to the very characteristic opposite …leaves with one to four pairs of longitudinal veins arcuately subparallel to the midvein and with finer cross hairs connecting these perpendicularly" (1993: 595). Aguaruna informants never cited the distinction between opposite and alternate leaves as a salient feature for group 12, or for any of the other groupings in this study. When I specifically pointed out this feature, my informants naturally did know what I was referring to. However, this feature, so important to Western botanists, appears to be much less important to the Aguaruna as a diagnostic character. Similarly, my informants did not mention the distinctive melastome veination as a diagnostic feature.

It should not be surprising that some Aguaruna suprageneric groupings correspond to botanical families. The ancient Greek writer Theophrastus (370-285 B.C.) recognized a few of the currently accepted botanical families, including Umbelliferae, the carrot family and Labiatae, the mint family (Stuessy 1990). On the other hand, it should also come as no surprise that some currently recognized botanical families are not recognized by the Aguaruna. This makes sense for two reasons. First of all, not all botanical families are equally well defined or widely agreed upon. For example, some botanists prefer to divide the family Fabaceae into three distinct families, Papilionaceae, Caesalpiniaceae and Mimosaceae, based on differing flower type (Gentry 1993:504; Heywood 1993). Secondly, as I have already pointed out, the characters that are important to Western botanists are not always the same ones that are important for the Aguaruna. This is particularly true of floral characters.

The Rubiaceae provide a good example of a botanical family not recognized by the Aguaruna. This is one of the most important neotropical families, both in terms of number of taxa and prevalence. The Aguaruna, however, do not recognize the Rubiaceae as a unified group. Nor are there any widely recognized ***kumpají*** groups uniting individual folk genera that fit within this family. For instance, the four Aguaruna folk genera, ***shuípiu***, ***shamíkua***, ***ukúshnum*** and ***yúsa patámkamu*** all include species from the genus *Psychotria* in the Rubiaceae. Nevertheless, all four of these folk genera are widely regarded as isolates. For Western botanists, the family Rubiaceae is vegetatively "extremely easy to recognize…on account of its entire opposite leaves and interpetiolar…stipules" (Gentry 1993:718). When I specifically asked one informant to provide me an Aguaruna name for 'stipule', he told me they are called '***duká kaké***.' However, no Aguaruna informant ever spontaneously mentioned stipules when describing a tree, or explaining the similarities and differences between trees considered to be ***kumpají***. Apparently, this is another character that is very critical to botanists, but not given much importance as a diagnostic character for the Aguaruna. The example of the Melastomataceae above demonstrates that there can be more than one way of inducing the relatedness of a particular group of plants. However, there is apparently no other feature common to all Rubiaceae that is particularly salient for the Aguaruna.

Predicting Which Trees Will Be Considered to Have Companions

This section examines whether it is possible to explain why the Aguaruna group some folk genera together as ***kumpají***, while they consider others to be isolated, that is, unrelated to any other folk genus. This question can be addressed using Berlin's (1992) fundamental assumption that folk systems of classification are based mainly on morphological similarities. If this is the case, one would expect the isolated Aguaruna folk genera to be more morphologically distinctive than the folk genera that are members of ***kumpají*** groups. It should be possible to test this prediction by assuming that phylogenetic isolation represents a good proxy for morphological distinctiveness. It would be difficult, however, to compare the phylogenetic isolation of all Aguaruna folk genera, since they do not all correspond to similarly sized chunks of biological reality. Some folk genera correspond to a subset of species from a single biological genus. For example, ***pantuí***, ***shijíkap***, ***chípa*** and ***shíshi*** (in ***kumpají*** group3) all correspond to species of *Protium*, in the Burseraceae. Other folk genera correspond fairly neatly to a single biological genus. The folk genus ***tsáagnum***, for example, corresponds well to the genus *Isertia* in the Rubiaceae. Still other folk genera correspond to biological species in more than one genus of the same family, or even, in one case, species in several botanical families.

While it is difficult to compare the biological range of all folk genera recognized by the Aguaruna, it is possible to say something about which biological genera are more likely to form the basis for ***kumpají*** groups and which are more likely to correspond to isolated folk genera in the Aguaruna folk taxonomic system. It is important to note that when the Aguaruna break a biological genus into multiple folk genera, those folk genera are nearly always considered to be ***kumpají***. In other words, by this principal, one would only have to know that ***pantuí***, ***shijíkap***, ***chípa*** and ***shíshi*** (group 3) all correspond to various species of the genus *Protium* to be fairly certain that they will all be considered ***kumpají*** by the Aguaruna. On the other hand, when a biological genus corresponds in a one to one fashion with a particular Aguaruna folk genus, that folk genus will usually be considered not to have any companions. If ***kumpají*** groups are formed based on morphological similarities, one would expect the botanical genera that form the basis of ***kumpají*** groups to be more speciose than those that map onto only one Aguaruna folk genus.

Using my own data and that of Berlin et al (n.d.), I have recorded 25 biological genera that the Aguaruna partition into two or more folk genera considered to be companions and 28 biological genera that each correspond to a single Aguaruna folk genus considered not to have companions (Table 3.4). To test whether one group of genera tends to be more speciose than the other, one would ideally have exhaustive botanical surveys of the study region. Unfortunately, no such exhaustive survey exists for the study area. Brent Berlin and collaborators made extensive general ethnobotanical collections on the Cenepa river, near the site of the present study (see Appendices 2-4) from 1972-1978. These are the best data available for giving an idea of the diversity of the biological genera I have chosen for this comparison, although their ethnobotanical focus biases them, since they only includes species with Aguaruna names. The number of species collected from each genus by Berlin and collaborators is shown in the fourth column of Table 3.4. Biological genera that encompass multiple folk genera have an average of 9.4 members, while those corresponding to a single folk genus have an average of 2.4 members. Results of an unpaired t-test for the two groups gave a two tailed P value of 0.0021, which is very statistically significant. One problem with applying a t-test to these data is that they are not normally distributed (see Table 3.4) and the variance of the two samples is quite different. The t-test is fairly robust to violations of these assumptions when the size of each sample is greater than 25 and the sample sizes are fairly equal (Diekhoff 1992). To be certain however, I performed another t-test on the data after first transforming them by taking the base ten logarithm of all data points. The resulting P value of the new t-test was less than 0.0001, which is considered extremely statistically significant. The data support the idea that biological genera corresponding to multiple folk genera do tend to be more speciose than biological genera corresponding to only one folk genus.

Table 3.4 – A comparison of biological genera.

	Family	**Folk Genera**	**# Berlin *et al.***	**# Gentry**
Companions				
Rollinia	Annonaceae	***yugkuánim***, ***anúna***	6	45
Dacryodes	Burseraceae	***kunchái***, ***újuts***	2	22
Protium	Burseraceae	***chípa***, ***pantuí***, ***shijíkap***, ***shíshi***	10	90
Garcinia	Clusiaceae	***pegkáenum***, ***wayámpainim***	1	200
Inga	Fabaceae	***sámpi***, ***sejempách***, ***buabúa***, ***wámpa***	33	350
Macrolobium	Fabaceae	***samíknum***, ***wampíshkunim***	4	60
Ormosia	Fabaceae	***tajép***, ***pandáij***	1	50
Tachigali	Fabaceae	***tigkíshpinim***, ***wantsún***, ***ugkuyá***	6	24
Nectandra	Lauraceae	***wampúsnum***, ***mantagá***	5	120
Ocotea	Lauraceae	***batút***, ***káwa***, ***máegnum***, ***takák***	7	350
Eschweilera	Lecythidaceae	***kaáshnum*** , ***shuwát***	6	83
Gustavia	Lecythidaceae	***inák***, ***inakuám***	3	40
Miconia	Melastomataceae	***chijáwe***, ***ukuínmanch***	37	1000
Guarea	Meliaceae	***bíchau***, ***yantsáu***	14	35
Siparuna	Monimiaceae	***mejégkach***, ***tsúna japimágbau***	10	120
Cecropia	Moraceae	***súu***, ***satík***, ***tséke***	7	100
Ficus	Moraceae	***tsuntsúj***, ***wámpu***	6	150
Perebea	Moraceae	***kawít***, ***sugkách***	2	9
Pourouma	Moraceae	***shuíya***, ***tugkápna***	7	25
Pseudolmedia	Moraceae	***chími***, ***shagkuína***	2	9
Virola	Myristicaceae	***tsémpu***, ***chikúm, ejésh***	9	40
Piper	Piperaceae	***untuntúp***, ***ampágpag***	46	2000
Calycophyllum	Rubiaceae	***uwáchaunim***, ***kapiú***	3	6
Theobroma	Sterculiaceae	***akágnum***, ***wakám***	3	22
Urera	Urticaceae	***súku***, ***nája***	4	35
Isolated				
Tapirira	Anacardiaceae	***papágnum***	3	15
Himatanthus	Apocynaceae	***shipítna***	1	7
Tabernaemontana	Apocynaceae	***kúnakip***	4	33
Schefflera	Araliaceae	***séntuch***	5	-
Pollalesta	Asteraceae	***yukát***	1	24
Jacaranda	Bignoniaceae	***tsakátska***	2	49
Bixa	Bixaceae	***ipák***	2	5
Jacaratia	Caricaceae	***númpi***	1	6
Caryocar	Caryophyllaceae	***dusenés***	1	15

Caryodendron	Euphorbiaceae	***náam***	1	3
Croton	Euphorbiaceae	***ujúshnum***	3	400
Hura	Euphorbiaceae	***bákaij***	1	2
Erythrina	Fabaceae	***shikiú***	2	75
Myroxylon	Fabaceae	***chikáunia***	1	2
Parkia	Fabaceae	***tagkám***	1	40
Pterocarpus	Fabaceae	***timúna***	1	-
Carpotroche	Flacourtiaceae	***umpákainim***	3	11
Couroupita	Lecythidaceae	***shishíim***	1	3
Grias	Lecythidaceae	***apái***	2	6
Batocarpus	Moraceae	***pítu***	1	3
Neea	Nytaginaceae	***kátsau***	8	70
Cespedesia	Ochnaceae	***magkuák***	1	6
Genipa	Rubiaceae	***súwa***	2	6
Isertia	Rubiaceae	***tsáagnum***	2	25
Zanthoxylum	Rutaceae	***tiík***	1	100
Clavija	Theophrastaceae	***yampák***	5	55
Apeiba	Tiliaceae	***shimút***	2	6
Trema	Ulmaceae	***kaka***	2	-

The fifth column in Appendix 1 shows the number of species in each biological genus for the trees in this study reported by Gentry (1993) for Northwestern South America (Colombia Ecuador and Peru). Gentry did not list the number of species found in Northwestern South America for some of the genera in question. Gentry's data have the advantage of not being biased toward species that are named in the Aguaruna folk taxonomic system. However, its disadvantage is that it covers a geographic area much larger than the study area. Genera that are relatively speciose on that scale could, in some cases, have relatively few representatives at the local level. On this scale, biological genera encompassing multiple folk genera have 199.4 members on average, while those corresponding to a single folk genus have 40.8 members on average. Results of an unpaired t-test for the two groups gave a two tailed P value of 0.0707, which is not quite statistically significant. Once again, however, it makes sense to transform the data to correct the non-normal distribution and the large difference in variance between the two samples. A t-test applied after taking the base ten logarithm of the data yields a two tailed p value of 0.002, which is considered to be extremely statistically significant.

Clearly, more data from extensive botanical surveys of the study area are needed to conclusively address whether the Aguaruna ***kumpají*** groups make sense biologically. Data currently available suggest that relatively speciose botanical genera have a disproportionate tendency to form the basis for Aguaruna ***kumpají*** groups. This supports the idea that these Aguaruna intermediate level covert groupings reflect objective phylogenetic and morphological discontinuities.

Conclusions

In this chapter, I have given detailed descriptions of 17 of the most commonly recognized suprageneric groupings within the Aguaruna life-form category ***númi***, which encompasses trees excluding palms. Each description lists the generic taxa involved and any widely recognized folk species for genera that are polytypic. I have also detailed the characters that form the rational of each group, as well as the characters that distinguish between the various members. Most of the suprageneric groups chosen for this study are covert, but a few are labeled with a name that also corresponds to the principal folk genus in the group. Labeled groups include group 10 (***tínchi***), group 12 (***chinchák***), group 14 (***súu***) and group 15 (***tsémpu***).

The large majority of suprageneric groupings formed using the ***kumpají*** concept have a morphological basis. Some groups have a common use associated with all members, but, in such cases, the common use almost always follows from common morphology. For roughly 20% of Aguaruna folk genera in the life-form ***númi***, lack of informant agreement makes it difficult to say with much certainty what other trees, if any are considered ***kumpají***. The issue of prototypicality in the ***kumpají*** groups is difficult to address directly, especially for the covert ones. I have assumed that relative agreement between informants about the membership of a particular tree in a particular group can serve as an indication of the prototypicality of that member in the group.

Seven of the 17 (41%) of the groups in this study are limited to a single botanical genus. Fifteen of the 17 (88%) of groups in this study are limited to a single botanical family. Only 2 of the 17 (12%) groups span multiple botanical families. These data support the notion that Aguaruna folk botany and Linnaean botanical taxonomy recognize the relatedness of local trees in a way that is largely consistent. The major distinction is that both systems place a different emphasis on different sized chunks of the existing biodiversity. Three of the ***kumpají*** groups studied have a nearly one to one correspondence with Linnaean families. These families are Melastomataceae, Lauraceae and Myristicaceae. However, even when Aguaruna categories match Linnaean ones, that does not mean that Aguaruna experts and Western botanists will necessarily emphasize the same features for identifying membership in those categories.

This chapter has also examined whether it is possible to predict which biological genera will correspond to isolated Aguaruna folk genera and which will correspond to grouped folk genera, with the life-form ***númi***. Naturally, this analysis is complicated by the fact that there is often not a one to one correspondence between Aguaruna folk genera and biological genera. However, I have shown that relatively large botanical genera have a disproportionate tendency to be broken up into multiple folk genera in Aguaruna folk taxonomy and to form the basis of ***kumpají*** groups.

In this chapter, I have also provided a qualitative analysis of the frequency with which various tree parts and characters (e.g. outside trunk appearance, growth habit, leaf color etc.) are cited by informants for explaining both what unites each ***kumpají*** group and what distinguishes the members of each group. Certain tree parts and characters appear to be relatively more important for explaining the unity within groups and others more important for explaining the variety within groups. Features that are more important for holding groups together include sap color, bark odor and fruit color, dehiscence and clustering. Features that are more important for making the finer distinctions between group members are growth habit, leaf characters in general, trunk outer appearance and peeling bark.

Chapter 4

Data from the Structured Interviews

Introduction

Structured interviews were the major instrument of this study and provide the bulk of the data. As described in Chapter 2 “Research Methodology”, the structured interviews used two distinct but related approaches for eliciting informants’ criteria for judging membership in each of 63 folk genera chosen for the study. First of all, informants were requested to describe how they recognize each of the 63 study trees. Secondly, informants were requested to compare and contrast those study trees considered to be companions. The major assumption of this approach is that the characters informants list when describing a tree will tend to be the same ones that are important in the actual process of identifying a real tree. In Chapter 8 “Conclusions” I will come back to this assumption and re-address whether it is reasonable in light of the data and analysis presented in the intervening chapters. All structured interviews were conducted in Aguaruna. A field assistant bilingual in Spanish and Aguaruna was also present during most interviews to provide assistance when I encountered a word I did not understand.

Informants responded to requests to describe the study trees or to compare and contrast companions by giving freelists of salient features, including physical qualities of specific tree parts (e.g., ***saepé kapántui*** ‘the bark is red’, ***dúke dupájmai*** ‘the leaves are thick’), assessments of overall growth habit (e.g., ***shíig kampújam tsakátsui*** ‘it doesn’t grow very tall’), or ecological qualities, such as typical habitat and association with animals or plants (e.g. ***múnji numínum***

pujáu 'stinging ants live in its trunk', ***júu numínum atsáwai*** 'the trunk doesn't have moss growing on it').

Organization of this Chapter

The first section of this chapter discusses Aguaruna terms for parts of a tree. This is important background information for the discussion of the structured interview data that appears in following sections. Next, I discusses aspects of Aguaruna sensory terminology relevant to tree identification. In the third section, I present data from key informants' descriptions of the 63 study trees, including all sensory and ecological characters mentioned by informants. The section following similarly provides a summary of the ecological and morphological characters that informants mentioned in the companion comparisons. I also point out which characters appear to be more important for making broader and finer scale taxonomic judgments. The fifth section discusses a hierarchical cluster analysis using character states from informants' tree descriptions. The purpose of the analysis was to test whether the resulting clustering will group together trees that the Aguaruna consider to be companions. In the sixth section, I present additional evidence from descriptive terms in folk species names of trees that bears on the question of the relative importance of morphological and ecological reasoning in Aguaruna folk taxonomy and identification. The final section attempts to synthesize all the data presented in the chapter, making generalizations where possible and addressing the major hypothesis of this research that the process of tree identification among the Aguaruna involves both sensory and ecological clues, at least some of which can be verbalized by informants in terms of discrete clues.

The Parts of a Tree

Table 4.1 shows Aguaruna terms for the parts of a tree. Informants referred to most of the terms in Table 4.1 during the structured interviews. A few that informants mentioned only during informal interviews are shown in parentheses. Some terms make metaphorical reference to the human body. The obverse side of a leaf, for example, is called ***duká wakentí*** 'the leaf's stomach', while the secondary veins are called ***duká pagáe*** 'the leaf's ribs.' The word ***númpa*** 'blood' is a synonym for ***puwáj*** 'sap.' The word ***iyásh*** 'body' is sometimes used to refer to the color or texture of the outside trunk. Berlin (1992:191) lists a few additional Aguaruna terms for plant parts that did not appear in my structured interview data. These terms are: ***susují*** 'underground root', ***jíi*** 'bud', ***kuijí*** 'terminal growing tip' and ***sakúti*** 'inner node.' ***Susují*** means literally 'its beard' and seems to apply only to herbaceous plants. Presumably, these last features do not play a significant role in tree recognition, at least for the folk genera included in this study.

Most of the terms listed in Table 4.1 have a straightforward English gloss but there are two important cases of ambiguity that deserve mention. During the structured interviews and informal tree identification walks, I came to realize that the Aguaruna terms ***númi*** 'trunk' and ***sáep*** 'bark' overlap in meaning. When informants described bark thickness, odor, or taste, they consistently used the word ***sáep***. When informants talked about the trunk hardness or the color of the heartwood they exclusively used the word **númi**. However, informants used the words ***sáep*** and ***númi*** interchangeably to describe the color or texture of the outside surface of a tree, potentially causing ambiguity. Actually, a similar ambiguity exists in English for the words 'bark' and 'trunk.' Most English speakers would understand the expressions 'That tree has rough bark' and 'that tree has a rough trunk' to be equivalent. Observations of actual examples

Table 4.1 – Aguaruna terms for parts of a tree.

númi ***numí anentái*** ***numí saepé*** ***íshi***	trunk heart wood bark bumps (on trunk)
púwaj	sap
kanáwe ***kanáwe titíji***	branch branch end
kágkap	buttressed root
dúka ***duká tuntupé*** ***duká wakentí*** ***duká kagkají*** (***duká tagkijí***) (***duká pagáe***) (***duká wení***) (***duká kaké***)	leaf obverse side of a leaf reverse side of a leaf leaf petiole leaf mid vein leaf secondary vein leaf border stipule
yagkúj (***yagkujá pushúji***)	flower flower petal
néje ***néje saepé*** ***jigkái***	fruit fruit peel seed
jágki	thorns (on trunk, branches, fruit etc.)

of the study trees helped resolve any potential ambiguities (for example, confusing outside trunk color and heartwood color) resulting from the overlap of the terms ***sáep*** and ***númi***.

The second potential ambiguity involves the term **jigkái** which can mean either ‘fruit’ or ‘seed’, depending on context. The word ***néje***, whose primary meaning is ‘meat’ is also commonly used to mean ‘fruit’, but not ‘seed.’ Berlin (1992) states that the word ***néje*** can also refer to underground tubers. Once again, observations of actual examples of the study trees helped to resolve any ambiguities in informants' use of the word **jigkái** in the structured interviews.

A few other specialized vocabulary terms for describing aspects of a tree's life cycle deserve mention here. The Aguaruna call seedlings ***numí uchijí*** 'trees' young.' The word ***úchi*** 'young' is also used for animals young and even human babies. The verb ***tsapát*** 'to sprout' is used when describing preferred habitats for trees. For example, ***mujánum tsapáwai***, literally means 'it sprouts in the uplands.' The verb ***tsakát*** 'to grow' is used to describe growth habit, for example, ***múuntan tsakáwai*** 'It grows large.' The Aguaruna use the verb ***tsamát*** 'to mature' to indicate the maturity of fruit, for example, ***néje kapántuchi tsamáwai*** 'the fruit matures to a red color.' The ***verb takíat*** 'to burst' is used to indicate the opening of flowers and the dehiscing of fruit. Informants used a different verb, ***ukuíniat*** 'to come apart' (Uwarai Yagkug *et al*. 1998: 133), for describing the dehiscence of the operculate capsules (Gentry 1993:497) of the trees ***shuwát*** and ***kaáshnum*** (both *Eschweilera* spp., Lecythidaceae). The Aguaruna do not appear to place much emphasis on leaf arrangement (i.e. opposite, alternate or whirled). The word ***tsegkétskeju*** is used to describe leaves that are palmately compound or palmately lobed. Pinnately compound leaves are rarely described as ***tsegkétskeju***, and there is no separate term to indicate a pinnate arrangement.

Aguaruna Sensory Terminology

This section briefly discusses Aguaruna sensory terminology, particularly those aspects that are most relevant to informants' descriptions of the 63 study trees. A list of descriptive words used for tree characters appears in Appendix 5. The Aguaruna verb ***wainát*** 'to see' also means 'to know', 'to find' and 'to identify' (Wipio *et al*. 1996:137). Vision clearly plays a paramount role in the process of tree identification. Not surprisingly, many terms that my informants used to describe trees contain visual information. Color words, for example, are purely visual, while words describing size, length, and shape can be interpreted as primarily visual, at least in the context of tree identification. Most Aguaruna words for describing dimensions of objects have a fairly straightforward English gloss. For example, common words for size include ***múun*** (or ***ápu***) ‘large’ and ***puyái*** (or ***píipich***) ‘small.’ Common words for describing length (of fruit, branches etc.) or overall tree height included ***esájam*** ‘long/tall’ and ***sútaj*** ‘short.’ Words describing shape (of leaves, fruit, flowers etc.) were very common in informants’ descriptions of the 63 study trees. Most Aguaruna shape terms that I encountered also lend themselves fairly easily to English glosses. For example, the word ***tenté*** ‘round’ is commonly used for roughly two dimensional objects such as leaves. On the other hand, the Aguaruna use either ***tenté*** or ***nenéntu*** ‘spherical’ to describe three dimensional objects such as fruit.

The Aguaruna language does not have a single abstract word equivalent to ‘color’ in English. Berlin and Berlin found that they could use the question “***Wají jakitíyaita ?***” ‘What stain does it have?’(1975: 66) to elicit Aguaruna color terms for both natural and non-natural objects. Berlin and Berlin (1975) report that the majority of Aguaruna informants they interviewed had a stage IIIa system with four basic color terms: ***púju*** ‘white’ , ***kapántu*** ‘warm’, ***wígka*** ‘grue’ and ***shuín*** (or ***bukúsea***) ‘black.’ However, a significant minority of informants used one or two additional basic color terms, probably due to Spanish influence. Some informants had a stage IV system including the original four terms and ‘yellow’, which was designated by a variety of words including ***yagkú*** and ***páuj***. Other informants had a stage five system which included both ‘yellow’ and ***samékbau*** ‘green.’ In the course of my research, I interviewed some people who still used the color terms in their more conservative sense, referring to all warm colors as '***kapántu***', or referring to both green and blue as ***wígka***. However, many informants, especially younger ones, appeared to use the words ***kapántu*** and ***wígka*** in the more restricted 'modern' sense described above. In addition to the basic color terms already mentioned, secondary color terms are also commonly used to describe trees. For example, the color term ***yamakái*** 'reddish purple' refers to the color of a dye made from the leaves of a tree with the same name (not collected). ***Yamakái*** can also be used to describe other objects of the same color, including the flowers of some trees.

The Aguaruna verb ***ántiit*** means 'to touch' or 'to feel' (Uwarai Yagkug *et al*. 1998). A number of descriptive terms came up in the structured interviews that clearly relate to the sense of touch. The sap of some trees was described as ***ajatín*** 'sticky', or ***tamén*** 'greasy', for example. When informants described the wood of certain trees as ***katsújam*** 'hard' or ***púkuts*** 'soft' that is also clearly a tactile property. Some kinds of descriptive terms suggest tactile information, but can also be apprehended visually. For example, informants were usually able to describe the trunks of trees as ***pujús*** 'rough' or ***pinuí*** 'smooth' simply by looking at them.

The Aguaruna verb ***kugkúut*** means both 'to smell', 'to taste' and 'to kiss' (Uwarai Yagkug *et al*. 1998: 71). Just like the verbs 'to smell' and 'to taste' in English, ***kugkúut*** is used to describe both the production of an odor or taste and the perception of an odor or taste. For example, if one of my informants cut a piece of bark from the tree ***tínchi*** (various Lauraceae) and held it out for me to smell he might say "***Yatsujú, kugkwásta***" 'Brother, smell it.' Assuming I was able to correctly identify the odor, I would respond: "***Yatsujú, tínchi tínchi kugkúawai***" 'Brother, it smells like ***tínchi***.' The verb ***mejéet*** 'to reek' means specifically to produce an odor, particularly an unpleasant one (Uwarai Yagkug *et al*. 1998: 78). I was not able to find any abstract Aguaruna terms for types of odor other than the very general ***pégkeg*** 'good' and ***pégkegchau*** 'bad.'

Informants commonly described the odor of trees in a self referential fashion. In other words, if I were to ask what the tree ***tínchi*** smells like, the most likely answer would be simply 'Brother, it smells like ***tínchi***.' Clearly, the lack of abstract smell terms creates a problem for cross-cultural understanding. The only way to adequately communicate what ***tínchi*** smells like to a person who has never smelled it would be either to cut a piece of bark as an example, or, perhaps, to extract the essential oils and make a scratch and sniff sticker (Berlin personal communication). Informants did sometimes compare the odor of one tree to another tree. A few people, for example, said that the tree ***batút*** (*Ocotea* spp., Lauraceae) smells like ***tínchi***. For the most part, informants only compared the odor of trees that they consider to be ***kumpají***. In a few cases, informants likened the odor of a tree to the odor of some other substance. One informant described the odor of the bark of many trees in the family Fabaceae, saying: "***séj séj mejéawai***" 'It smells like blood.' When I asked another informant to describe the smell of the bark of the tree ***shishíim*** (*Couroupita subsessilis*), he replied "***Íki íki mejéawai***" 'It smells like farts.'

The Aguaruna verb ***dekapét*** means 'to taste', 'to try' and 'to test' (Uwarai Yagkug *et al*. 1998: 37). My informants occasionally mentioned the taste of the fruit, bark or sap of the study trees. I collected some abstract taste terms, including ***yumímitu*** 'sweet', ***yapáu*** 'bitter', ***chujuín*** 'sour' and ***tajáu*** 'spicy.' One Aguaruna-Spanish dictionary (Uwarai Yagkug *et al*. 1998:100) also lists the word ***sákam*** 'tasteless.'

Although it appears unlikely that sound plays a significant role in the actual process of tree identification, informants did describe sounds made by the study tree in a few cases. One informant described the dehiscence of the fruit of the tree ***shijíg*** (*Hevea* spp.) by saying: "***Kagajá takíau tashít***" 'When it is dry, it bursts with the sound '***tashít***.' Another informant described the bark of the tree ***uwáchaunim*** (*Calycophyllum megistocaulum*) by saying: "***Saepé chiút chiút ajápnawai***" 'The bark peels with the sound '***chiút***.'

Analysis of the Descriptions

Eight key informants provided descriptions of the 63 study trees, yielding a total of 504 descriptions. The first step in data analysis was to go through all 504 descriptions coding the characters into meaningful categories (e.g. flower color, bark odor, preferred habitat). Coding the data in this way allows for an understanding of the relative importance of various characters as criteria for membership across the sample of 63 folk genera chosen for the study. Figures 4.1 – 4.11 show the frequency of mention for sensory clues. Each figure corresponds to a particular tree part (e.g. trunk branches etc.). The total number of mentions for each tree part is shown at the top of each figure [e.g. 'fruit (total)', 'growth habit (total)']. In order to resolve potential ambiguity, characters involving the terms ***sáep*** and ***númi*** have been divided into three categories, based on context. The first category, 'trunk outer appearance', refers to the appearance or texture of the outer surface of a tree. The second, 'bark', refers to the thickness, odor, consistency, or hardness of the bark itself. The third, 'inner trunk', encompasses the hardness of the tree and the inner color of the heartwood.

Fruit characters are well represented in the tree descriptions; the most important are color, shape, size and dehiscence. In the interest of readability, Figure 4.1 leaves out a few fruit characters mentioned in a very small percentage of identifications. All fruit characters are listed in Appendix 5. Outside trunk appearance (Figure 4.3) is also quite salient, particularly color and texture. The most salient leaf characters (Figure 4.2) include shape, size and color. Informants also mentioned growth habit quite often (Figure 4.4), particularly tree height and trunk thickness and straightness. Other very salient characters include flower color (Figure 4.6), quantity of branches (Figure 4.5), bark odor (Figure 4.7) and sap color (Figure 4.9).

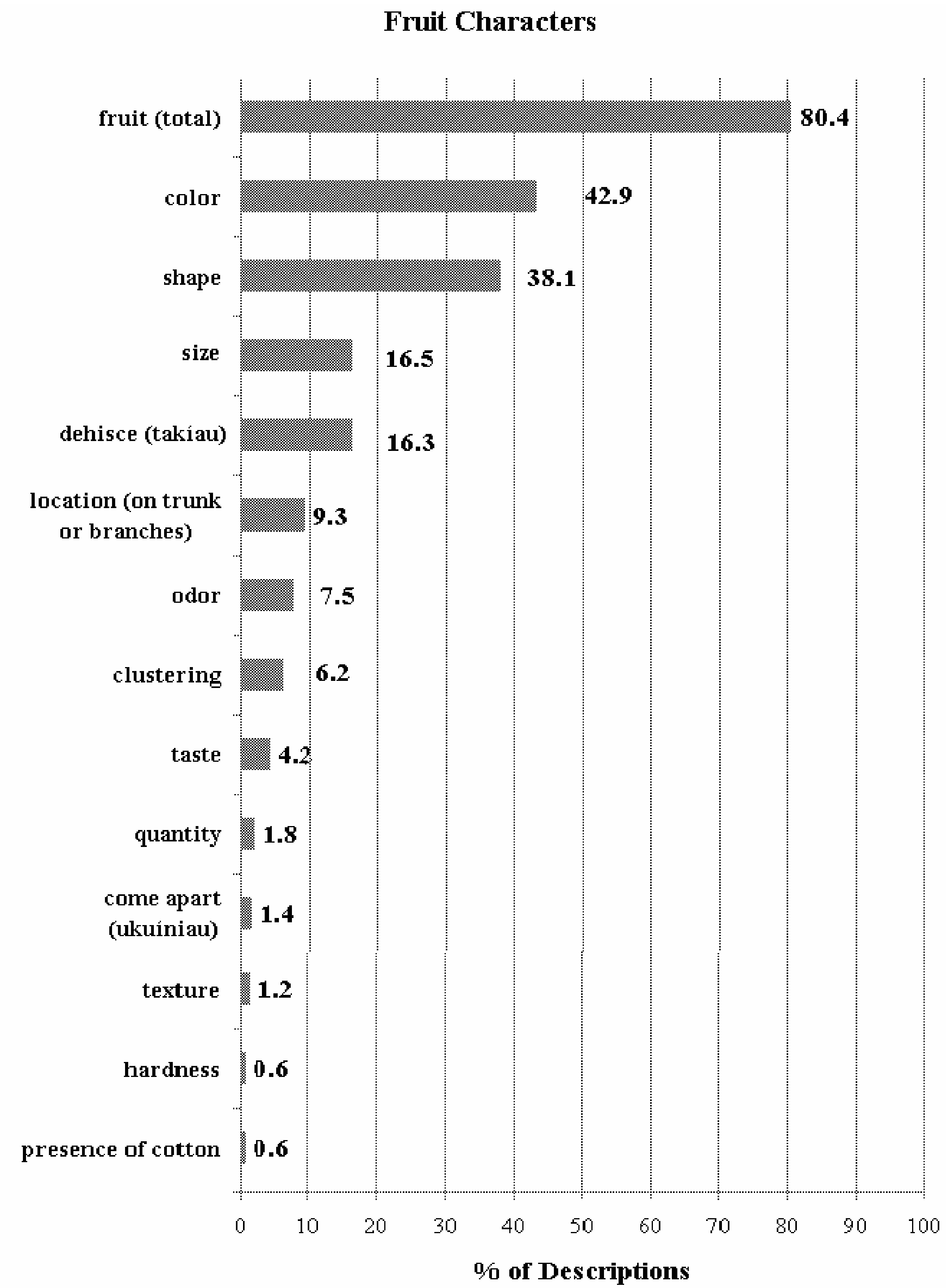

Figure 4.1 – The most common fruit characters from informants' descriptions of the study trees.

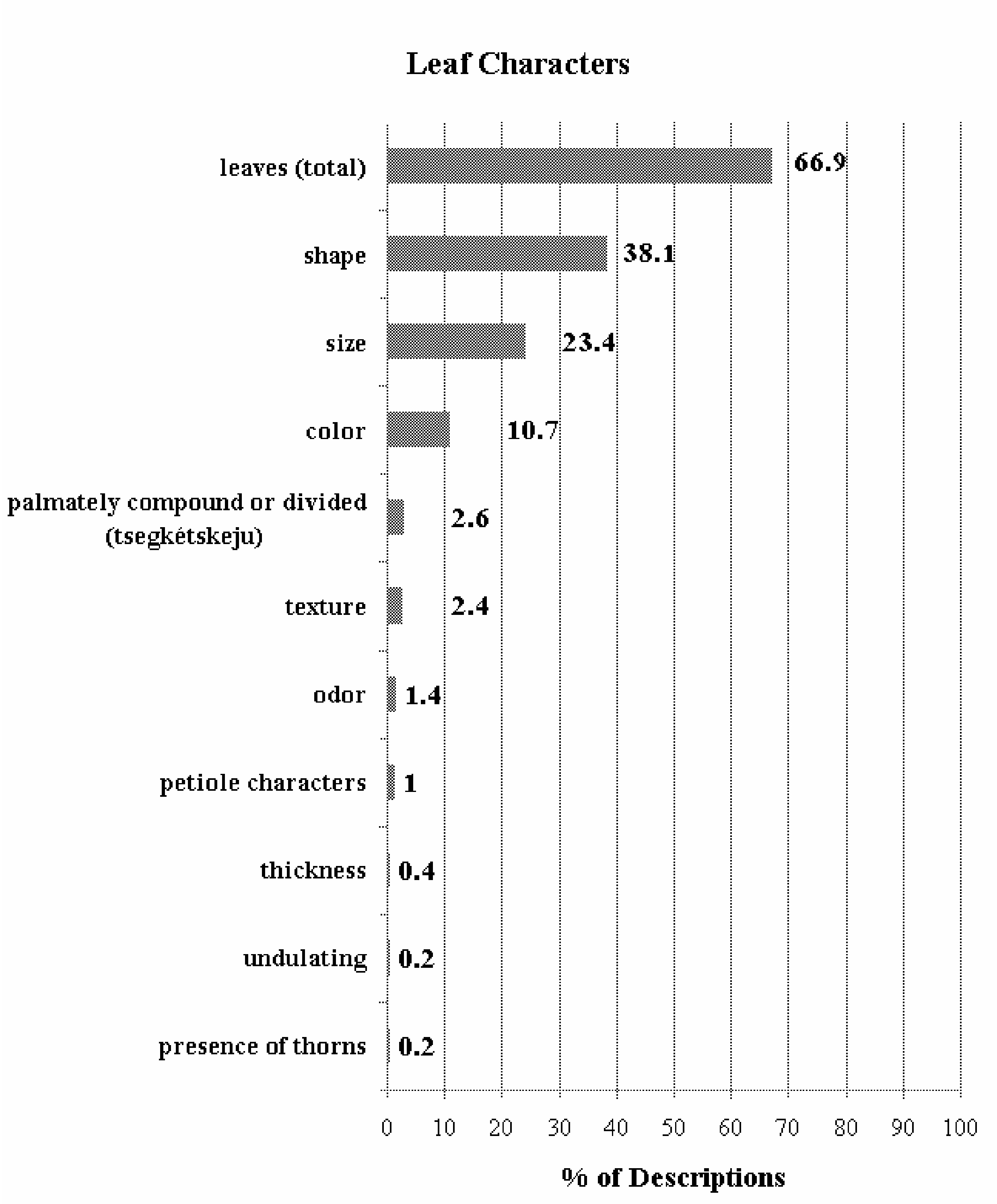

Figure 4.2 – Leaf characters from informants' descriptions of the study trees.

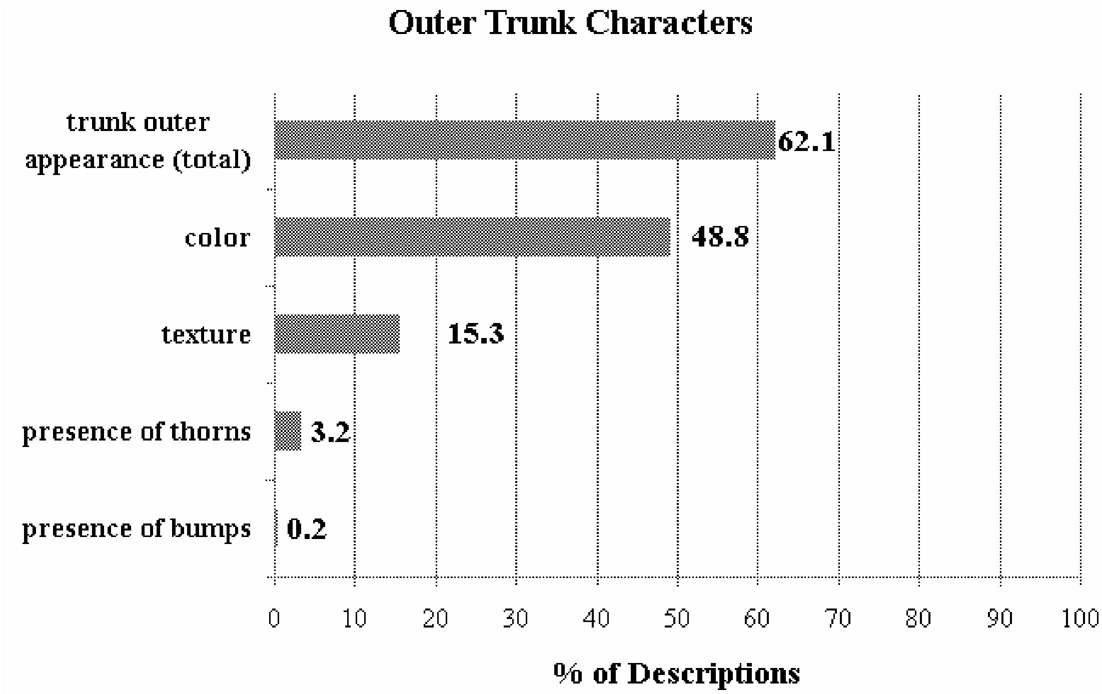

Figure 4.3 – Outer trunk characters from informants' descriptions of the study trees.

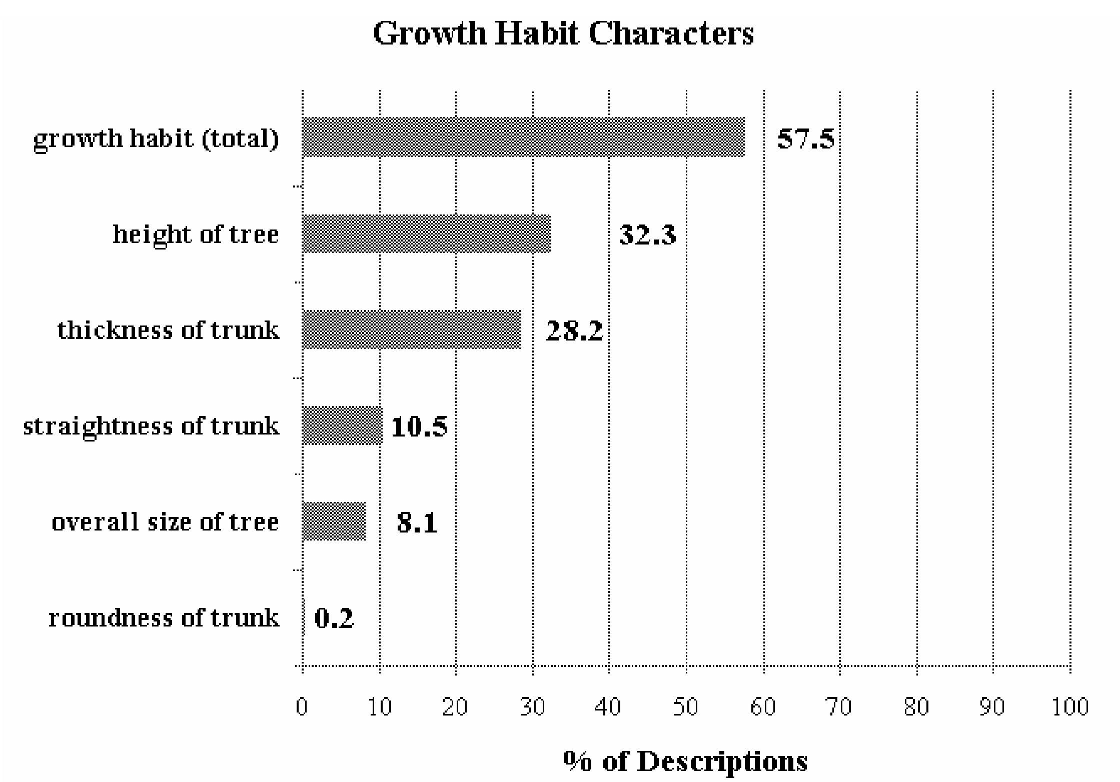

Figure 4.4 – Growth habit characters from informants' descriptions of the study trees.

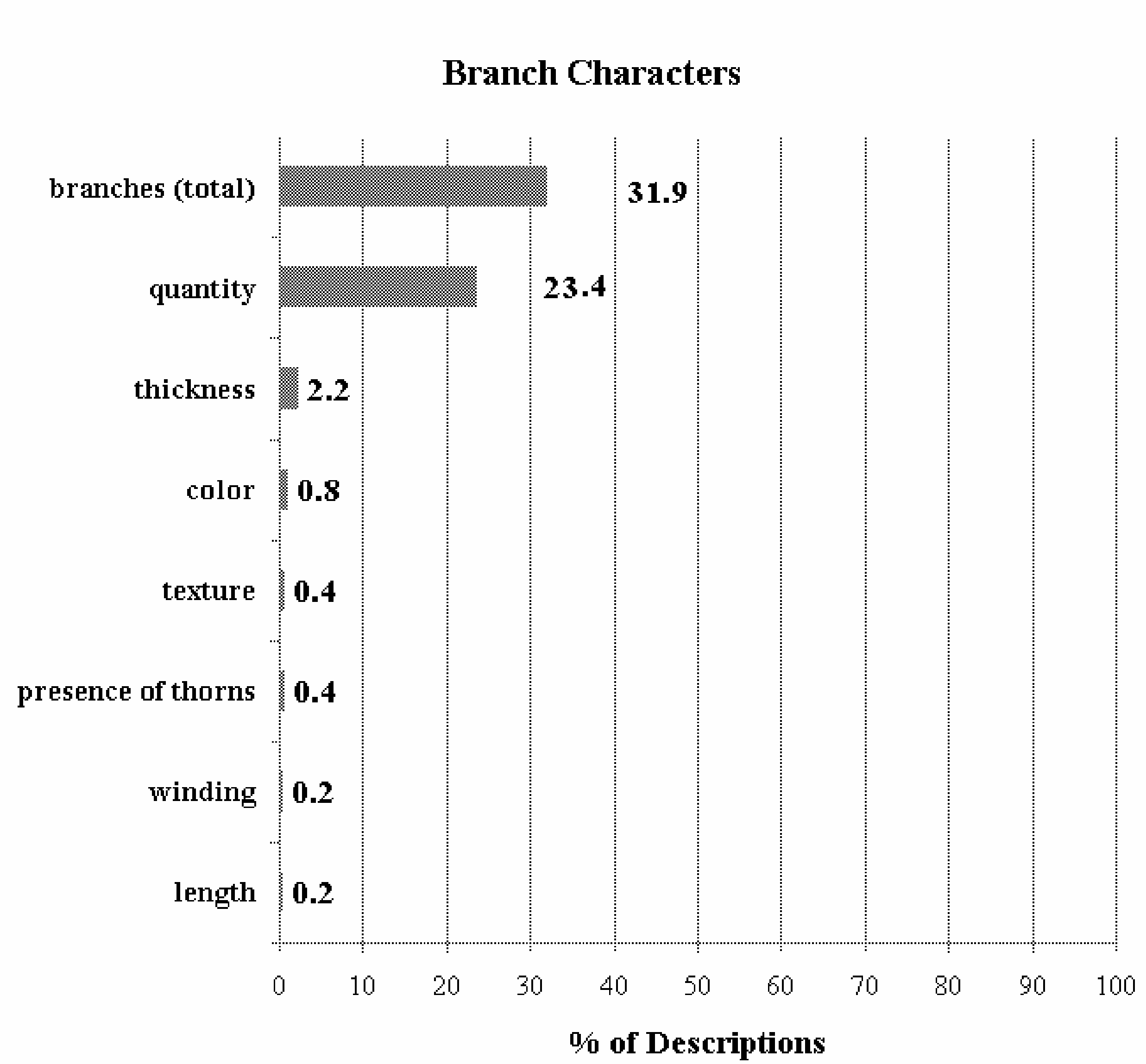

Figure 4.5 – Branch characters from informants' descriptions of the study trees.

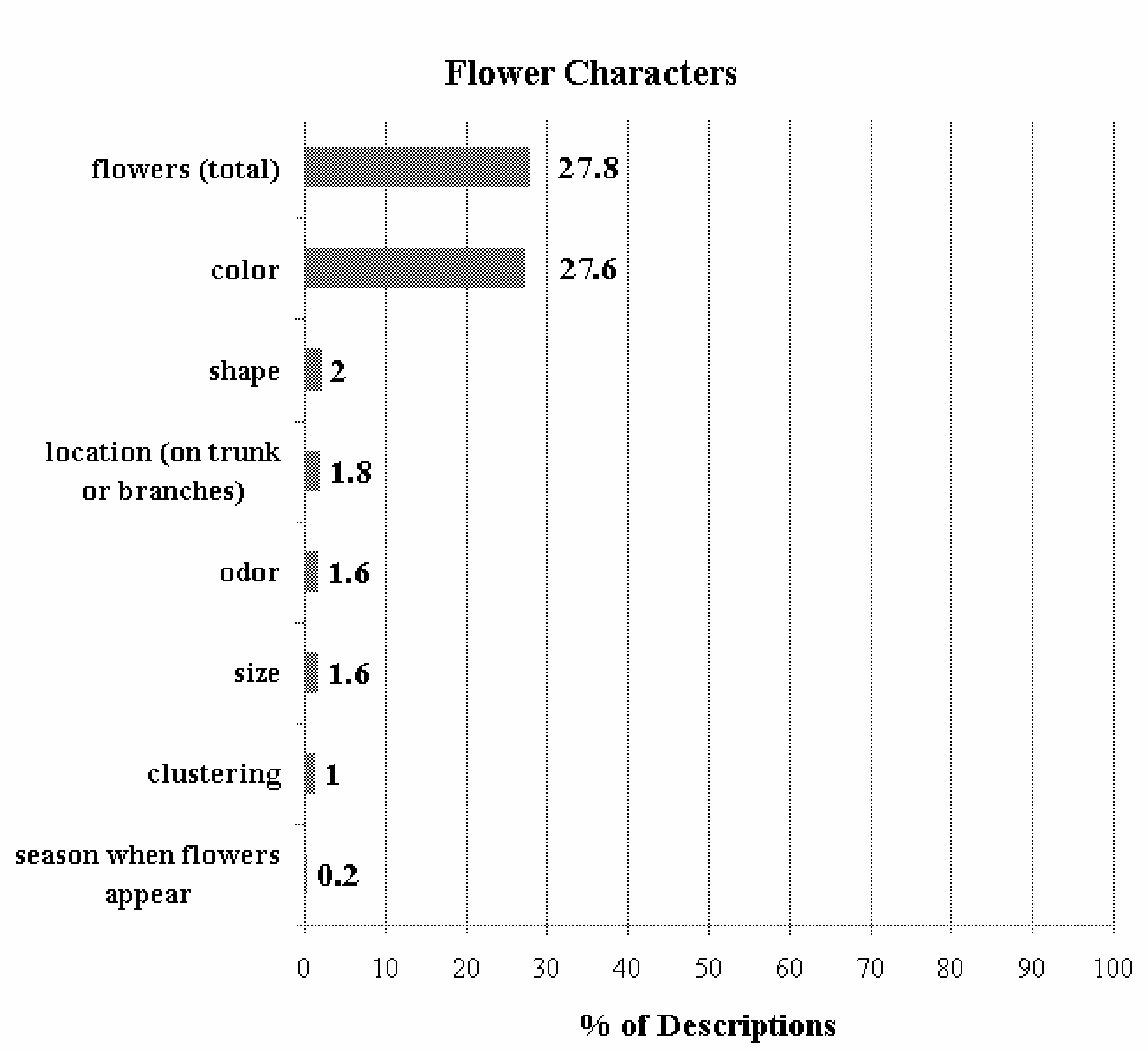

Figure 4.6 – Flower characters from informants' descriptions of the study trees.

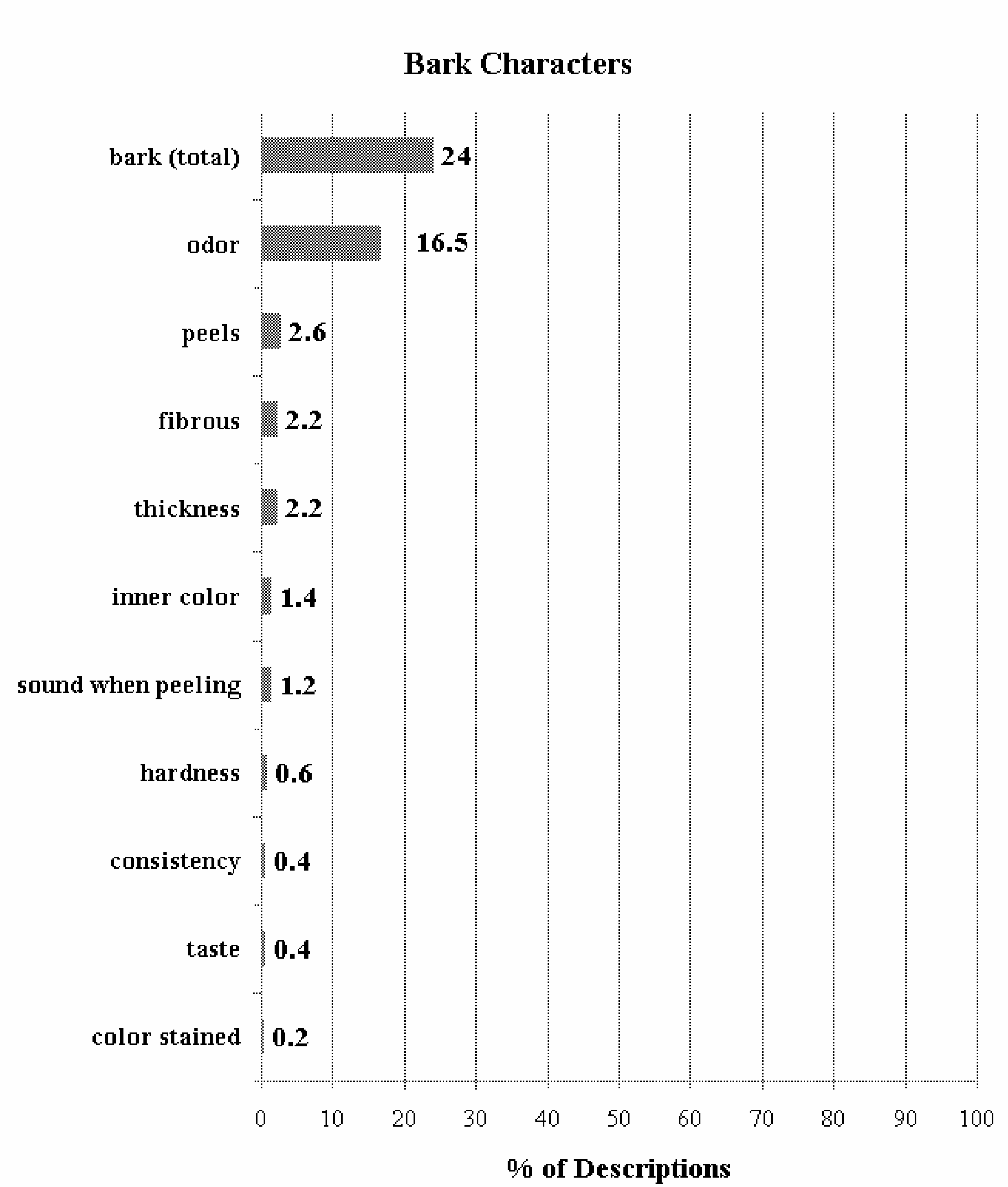

Figure 4.7 – Bark characters from informants' descriptions of the study trees.

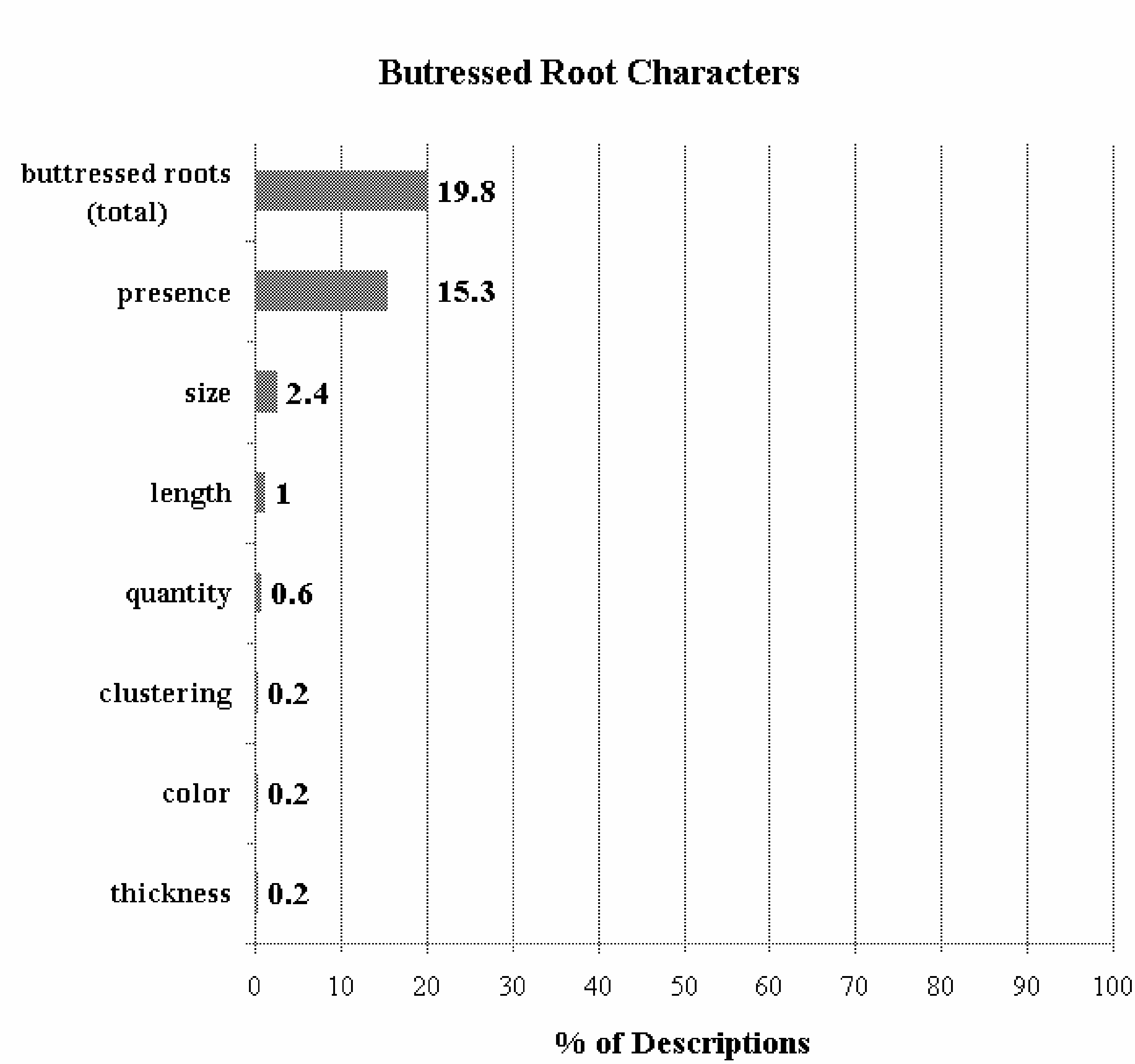

Figure 4.8 – Buttressed root characters from informants' descriptions of the study trees.

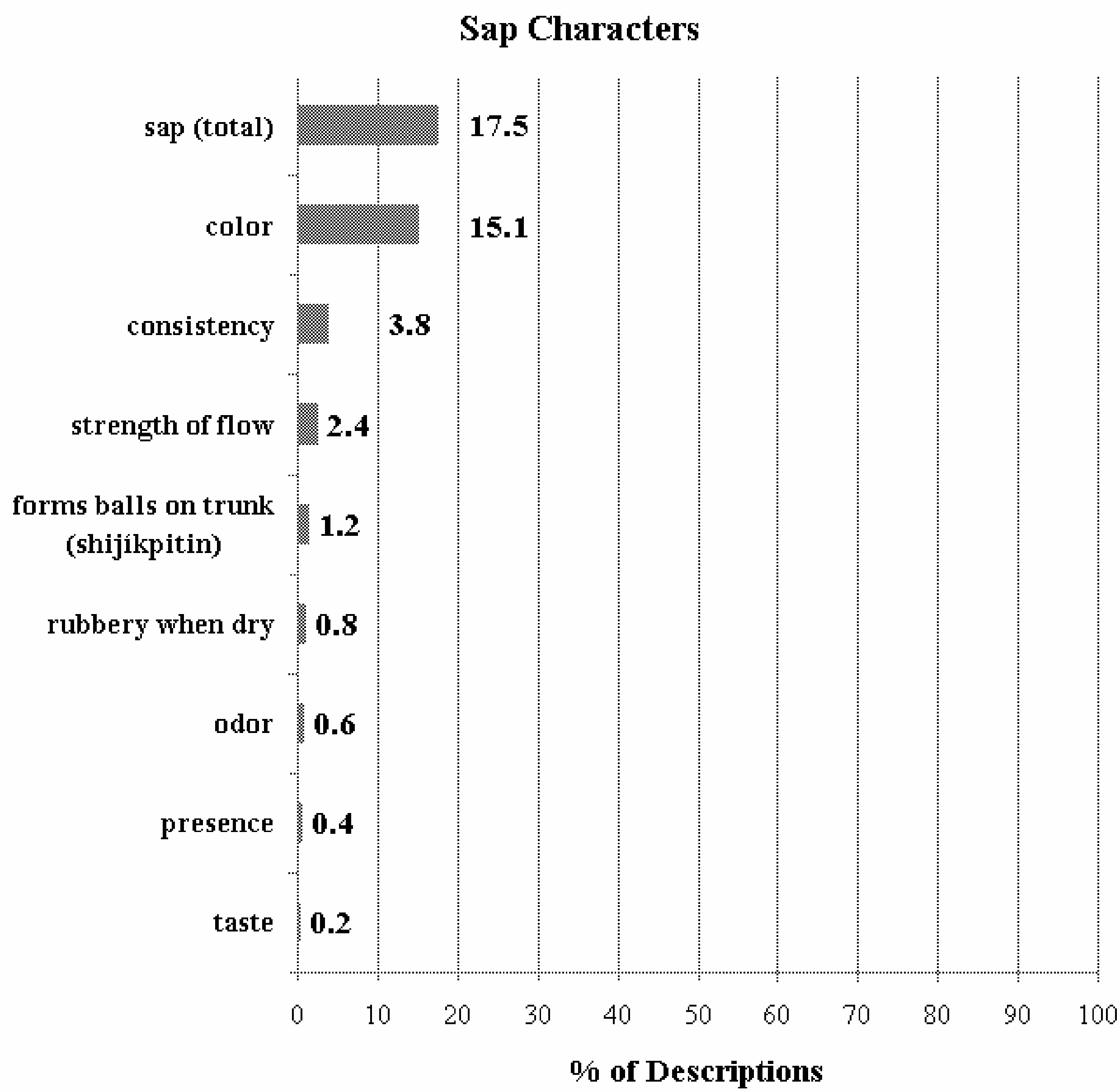

Figure 4.9 – Sap characters from informants’ descriptions of the study trees.

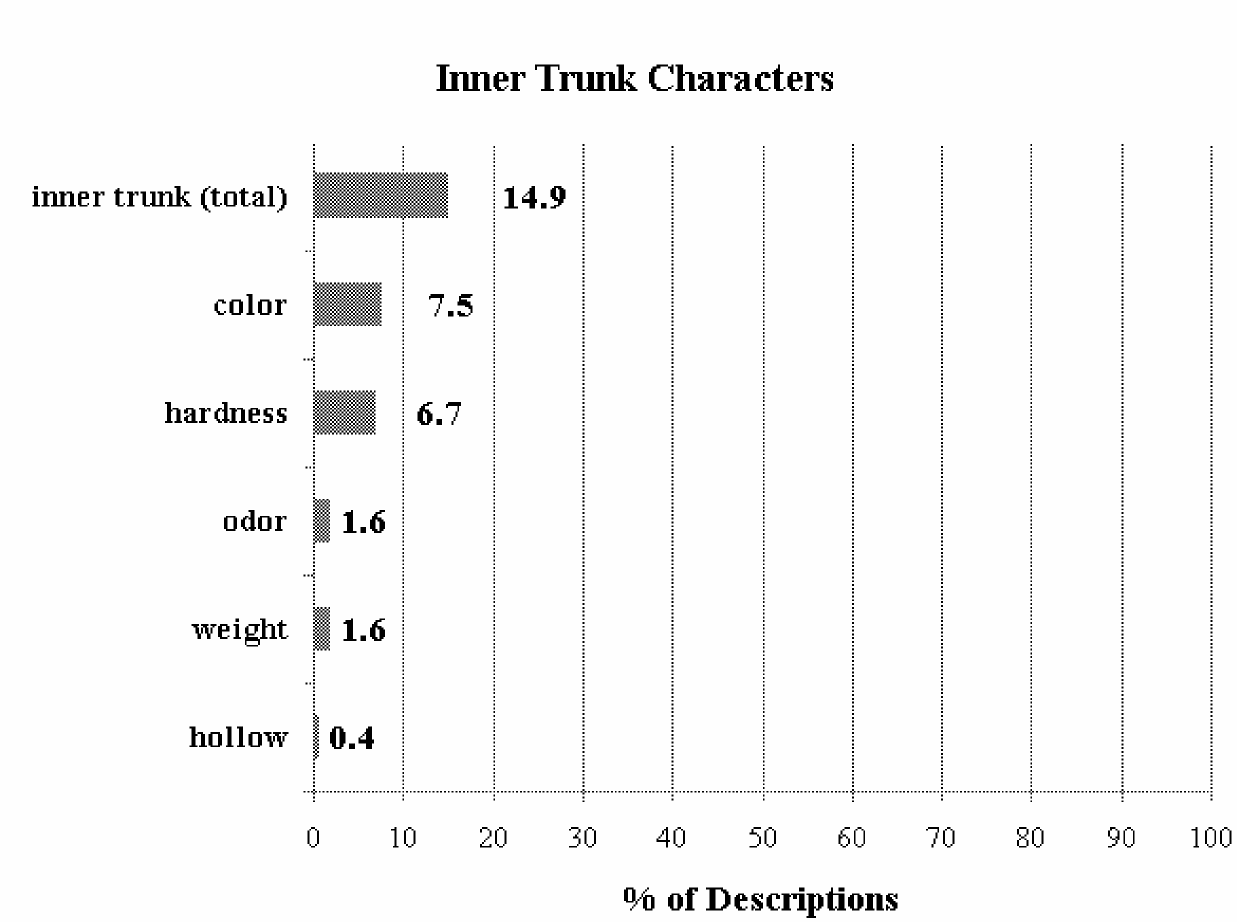

Figure 4.10 – Inner trunk characters from informants' descriptions of the study trees.

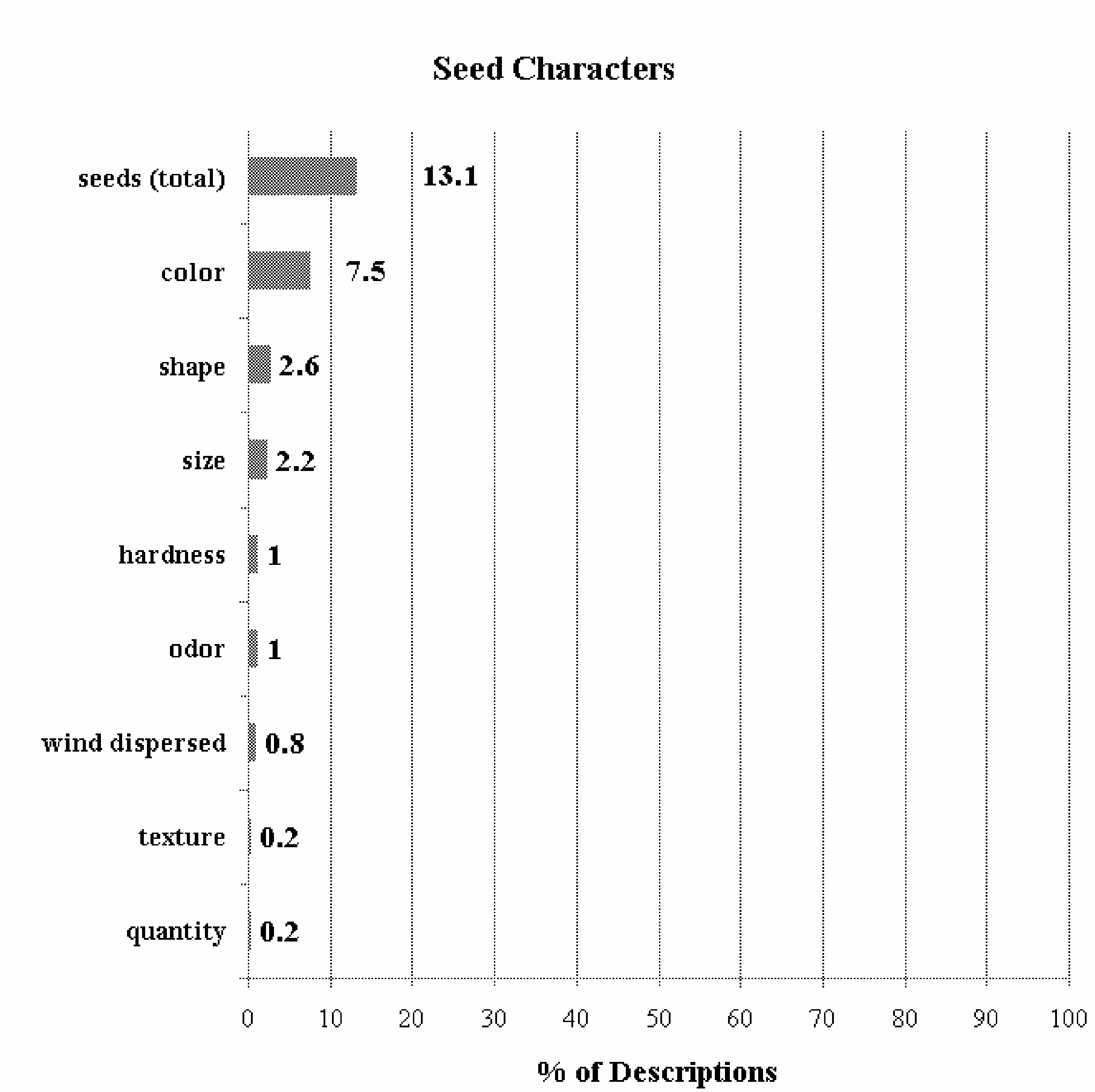

Figure 4.11 – Seed characters from informants' descriptions of the study trees.

Figure 4.12 shows the frequency of mention for various ecological clues. The figure is divided into sections corresponding to association with birds, association with mammals, association with insects, association with fish, association with other plants and preferred habitat. Association with bird species appears to be the most salient of the categories, followed by association with mammal species and preferred habitat. During the course of the research, I recorded many names of mammals and birds that informants say feed on the fruit, seeds or flowers of particular trees. A complete discussion of which particular birds and mammals feed on which trees is beyond the scope of this monograph. Chapter 6 provides these richer details for a few culturally important groups of birds and mammals. A brief discussion of ecological habitats recognized by the Aguaruna can be found in Chapter 1. Three informants mentioned the presence of stinging ants living in hollow stems of ***ugkuyá*** (*Tachigali formicarum*). Two informants said that biting ants live in the hollow stems of ***satík*** (*Cecropia* spp.), while one informant mentioned the presence of ants in the hollow stems of ***takák*** (a couple genera, Lauraceae). I did unfortunately have an opportunity to personally confirm the presence of stinging ants on the trunk of **ugkuyá** as well as biting ants on the stems of ***satík***. I observed hollow stems in a specimen of ***takák***, but did not see the ants. No determination could be made of the ant species associated with those three trees. Two informants mentioned that an insect called ***chiáchia*** kills the tree ***wantsún*** (*Tachigali* spp.). One explanation is that the ***chiáchia*** eat the roots of ***wantsún***. Another is that the ***chiáchia*** harm ***wantsún*** through witchcraft. On several occasions, informants have pointed out to me ***chiáchia*** nests near individuals of ***wantsún***. The nests included a hollow, cylindrical portion, about a foot high and also extended into the ground. I was not able to observe the insect itself so no guess as to its identity is possible. One informant said that fish (***namák***) eat the fruit of ***satík*** when they fall in rivers and streams, but he did not specify which fish. Interestingly, informants only referred to two ecological zones in their descriptions, ***múja*** ‘uplands’ and ***asáuk*** ‘secondary forest.’ Only in one instance, did an informant mention an ecological associations between one of the study trees and

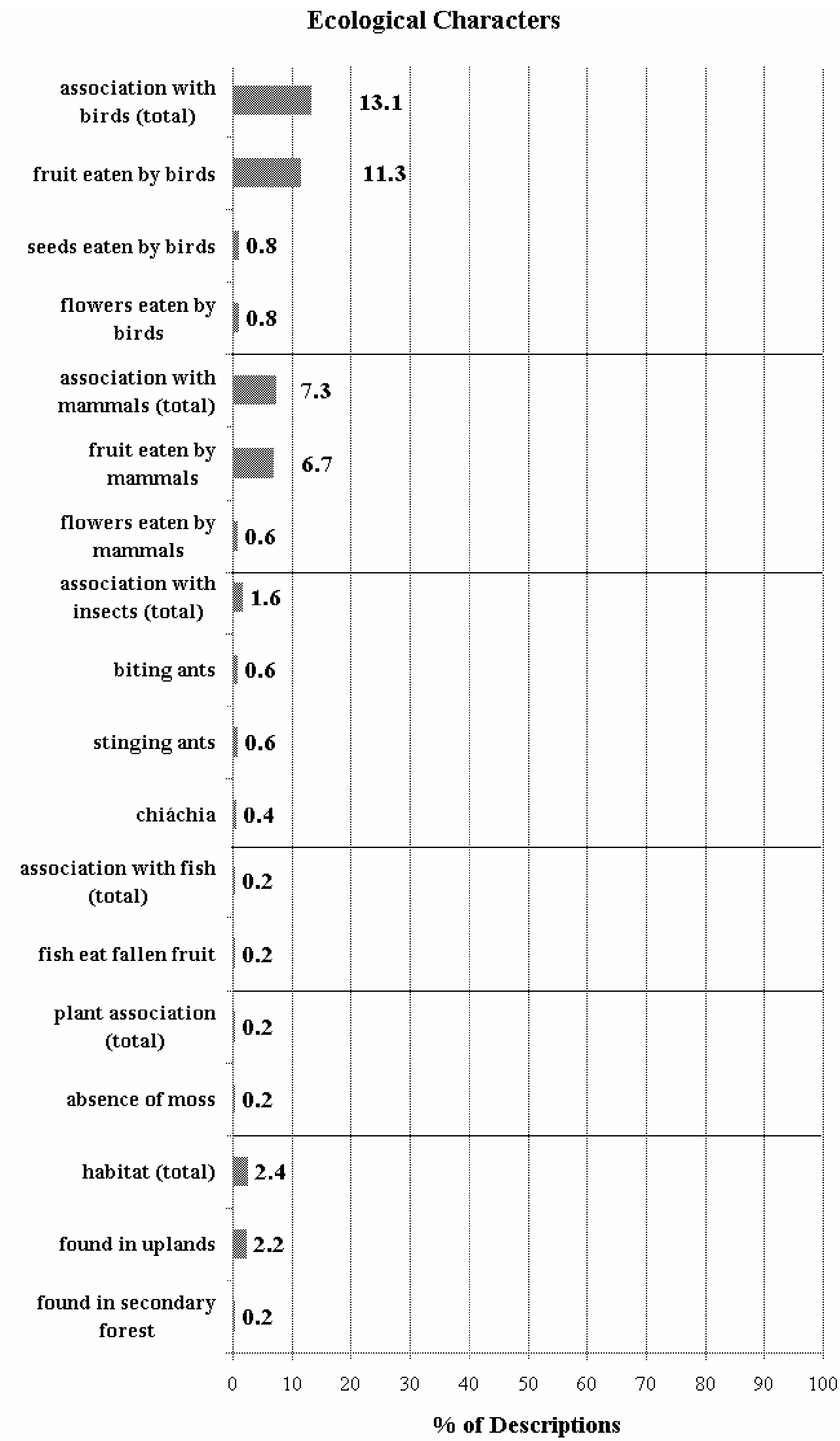

Figure 4.12 – Ecological characters from informants' descriptions of the study trees.

another plant. Specifically, one informant said that the tree ***uwáchaunim*** (*Calycophyllum megistocaulum*) does not have ***júu*** 'moss' growing on the trunk.

The data presented in Figures 4.1 – 4.12 (above) give a good general picture of the relative frequency of mention for various sensory and ecological clues over all eight key informants' descriptions of the 63 study trees. It is worth noting, however, that the frequency of mention for certain clues varied significantly between individual informants. In order to give some idea of this variation, I provide, in Table 4.2, a comparison of frequency of mention over the 63 study for clues that were mentioned in at least 10% of descriptions overall. Numbers in each column represent percentages of tree descriptions (out of 63) that include each character. For certain characters, such as tree height and trunk thickness, there is a relatively wide range in emphasis

Table 4.2 – Inter-informant variation in descriptions of the 63 study trees.

Character	**Key Informant**								**Mean** (%)	**Standard Deviation**
	#1 (%)	**#2** (%)	**#3** (%)	**#4** (%)	**#5** (%)	**#6** (%)	**#7** (%)	**#8** (%)		
outer trunk color	39.7	44.4	60.3	46.0	81.0	54.0	50.8	14.3	48.8	18.9
fruit color	46.0	61.9	46.0	15.9	60.3	54.0	34.9	23.8	42.9	16.8
leaf shape	15.9	17.5	57.1	33.3	46.0	25.4	52.4	57.1	38.1	17.3
fruit shape	27.0	25.4	52.4	47.6	25.4	25.4	68.3	33.3	38.1	16.2
overall height of tree	28.6	14.3	42.9	1.6	0.0	39.7	41.3	90.5	32.3	29.2
thickness of trunk	69.8	14.3	66.7	1.6	0.0	6.3	34.9	31.7	28.2	27.9
flower color	31.7	39.7	34.9	36.5	36.5	9.5	7.9	23.8	27.6	12.6
leaf size	9.5	27.0	22.2	14.3	31.7	14.3	34.9	33.3	23.4	9.8
quantity of branches	28.6	1.6	33.3	12.7	0.0	38.1	61.9	11.1	23.4	21.1
animal association	19.0	12.7	4.8	34.9	0.0	55.6	27.0	4.8	19.8	18.7
bark odor	3.2	20.6	63.5	27.0	0.0	4.8	12.7	0.0	16.5	21.4
fruit size	25.4	25.4	11.1	9.5	1.6	19.0	9.5	30.2	16.5	10.0
fruit dehiscence	12.7	27.0	14.3	23.8	14.3	20.6	12.7	4.8	16.3	7.1
outer trunk texture	6.3	14.3	19.0	38.1	14.3	9.5	20.6	0.0	15.3	11.4
sap color	7.9	14.3	25.4	20.6	11.1	15.9	15.9	9.5	15.1	5.8
leaf color	1.6	6.3	9.5	17.5	12.7	19.0	19.0	0.0	10.7	7.6
straightness of trunk	19.0	4.8	15.9	20.6	0.0	0.0	23.8	0.0	10.5	10.3

from one informant to another. For other characters, such as sap color and fruit dehiscence, there is relatively little variation in emphasis between informants.

Companion Comparisons

Figures 4.13 – 4.23 (below) show the sensory characters informants mentioned in explaining similarities and differences between members of companion groups. One interesting aspect of these data is that there are certain characters that appear significantly more often when informants describe what unites ***kumpají*** groups and certain characters that appear significantly more often when informants make the finer distinctions between the members of each group.

Characters that are more important for uniting ***kumpají*** groups include sap color, fruit color, dehiscence of fruit, clustering of fruit, bark odor and odor and taste in general. Sap color was cited in 19.2% of informants' descriptions of similarities in companion groups, but only in 4.5% of differences between group members (Figure 4.20). Fruit color was mentioned in 32.8% of similarities and 12.4% of differences. Dehiscence of fruit figured in 15.3% of ***kumpají*** similarities and only 2.3% of differences. Clustering of fruit was mentioned in 5.6% of similarities and 1.1% of differences (Figure 4.13). Bark odor was mentioned in 13.6% of ***kumpají*** similarities and 2.3% of differences (Figure 4.19). It is also clear that odor in general (whether of bark, fruits, sap or leaves) is a more important character for defining ***kumpají*** groups than for distinguishing between members of these groups. Overall, odor was mentioned in 14.7% of similarities and 2.8% of differences. Taste in general (mostly of fruit) was also more often mentioned as a uniting character. Taste (usually of fruit) was mentioned 4.0% of similarities and 0.6% of differences.

A number of characters are clearly more important in making the finer distinctions between members of ***kumpají*** groups. These include growth habit, leaf characters in general, trunk outer appearance, peeling of bark and size in general. Growth habit was mentioned in 36.7% of differences between group members and only in 8.5% of similarities (Figure 4.16). Leaf characters in general were mentioned in 48.6% of differences and 22.0% of similarities (Figure 4.14). Trunk outer appearance (including trunk color and texture) was cited in 39.5% of differences, and 26.6% of similarities (Figure 4.15). The tendency of bark to peel off was listed in 5.1 % of differences and 0.6% of similarities (Figure 4.19). Size overall (whether of leaves, branches, fruit etc.) was mentioned much more often for making fine distinctions. Size in some form was mentioned in 56.5% of differences, but only 10.7% of similarities.

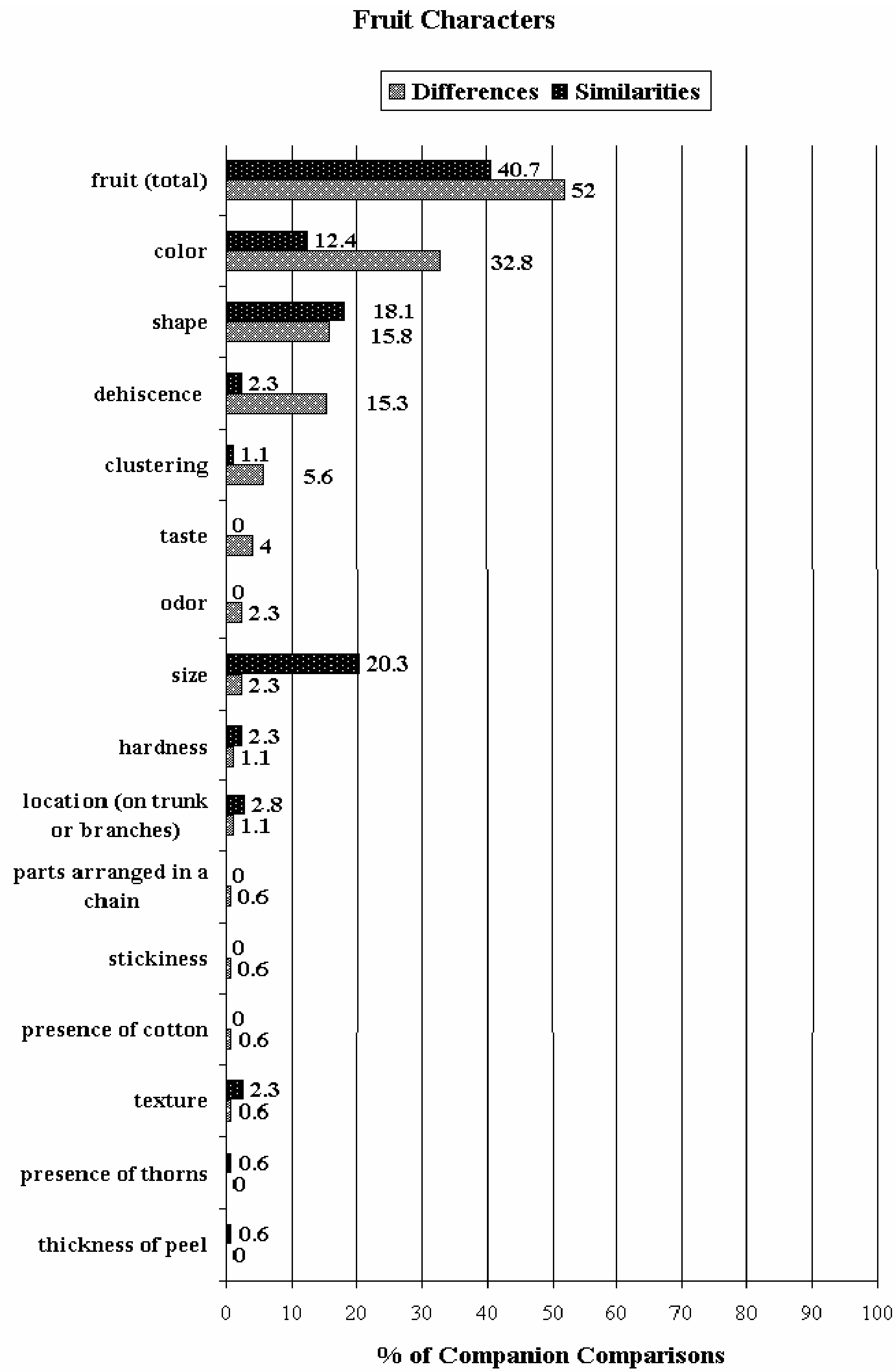

Figure 4.13 – Fruit characters from informants' companion comparisons.

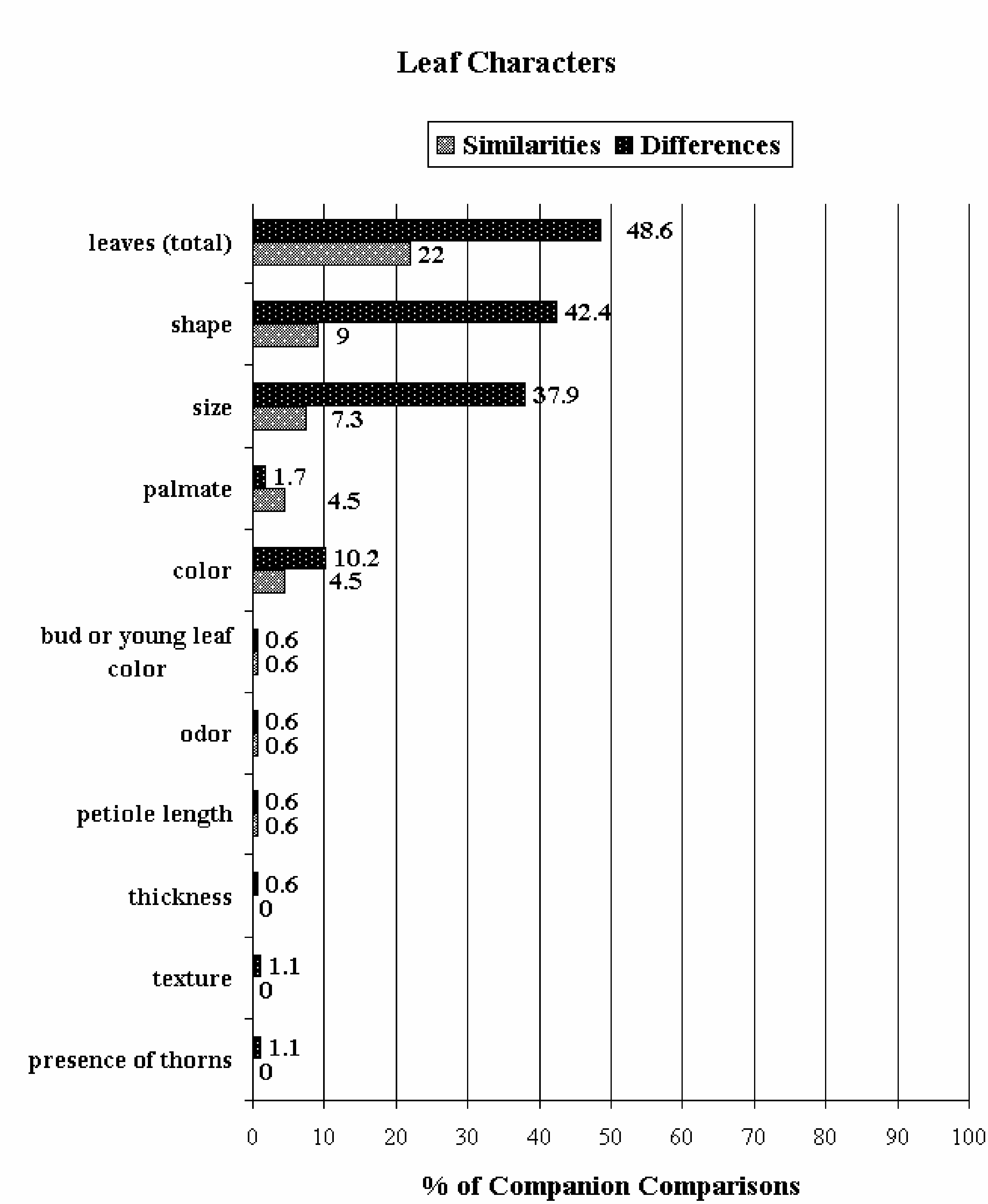

Figure 4.14 – Leaf characters from informants' companion comparisons.

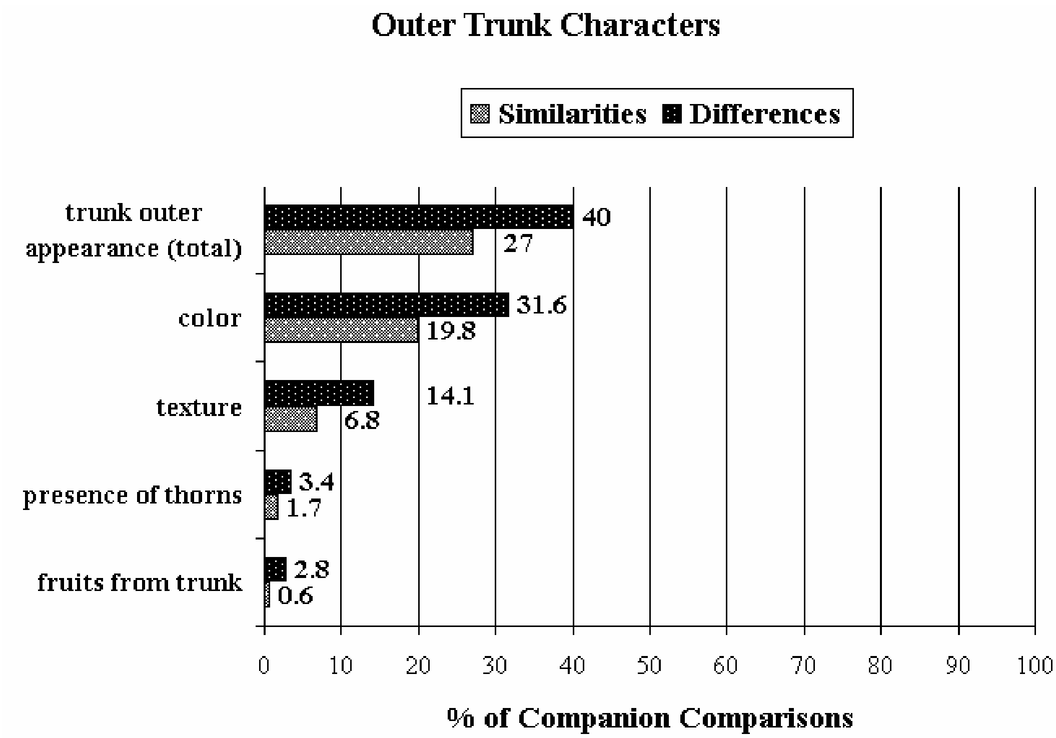

Figure 4.15 – Outer trunk characters from informants' companion comparisons.

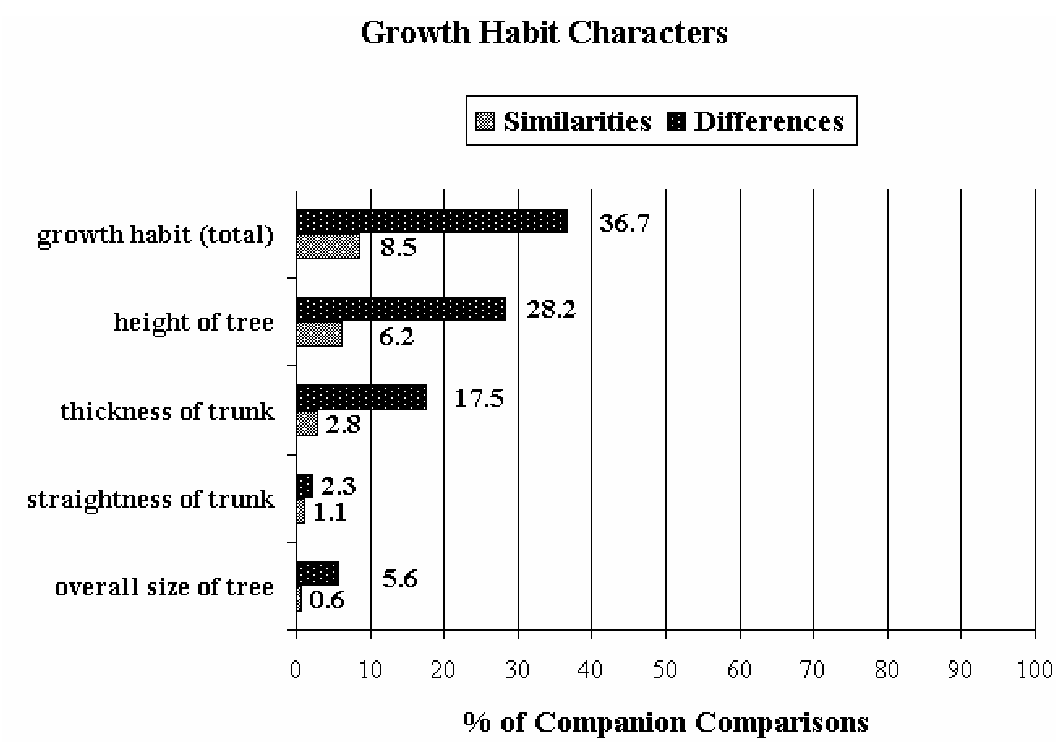

Figure 4.16 – Growth habit characters from informants' companion comparisons.

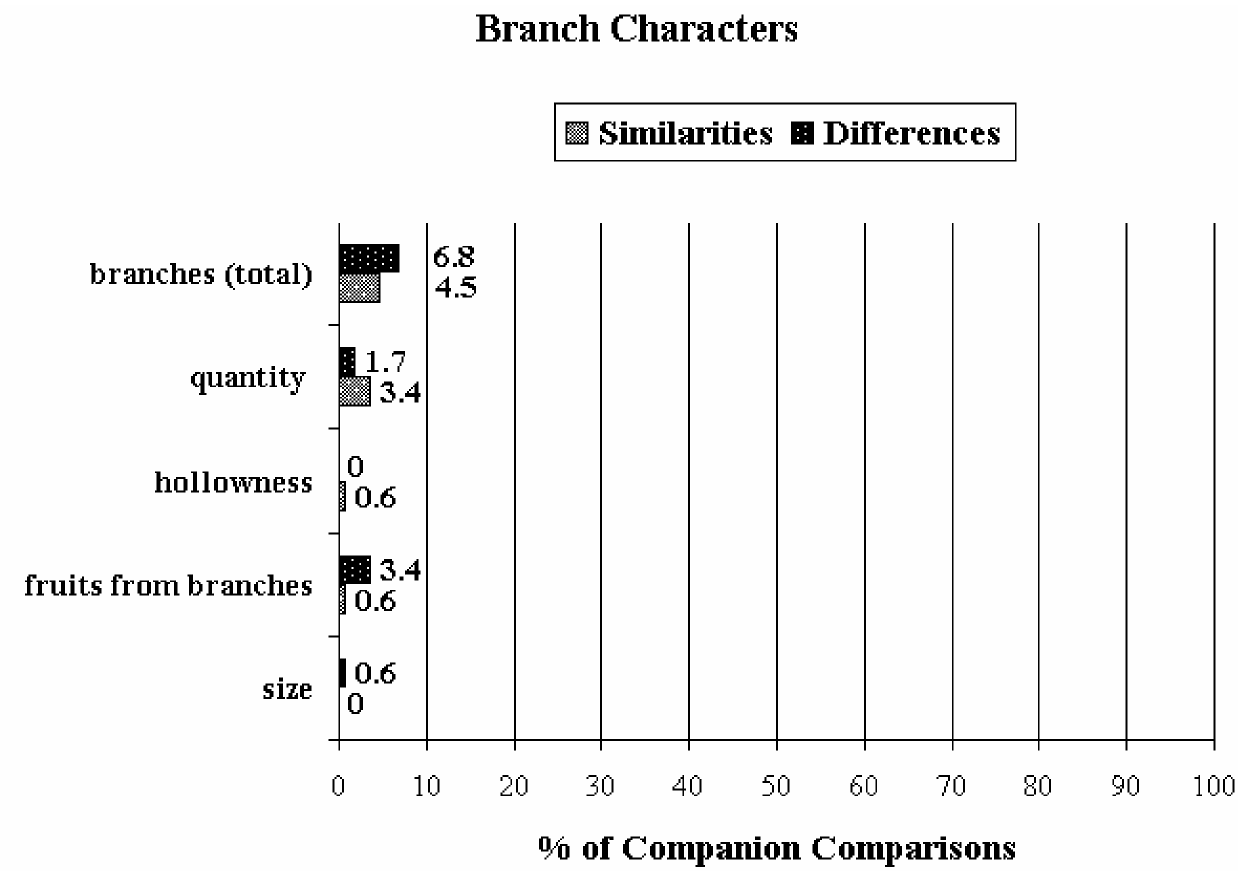

Figure 4.17 – Branch characters from informants' companion comparisons.

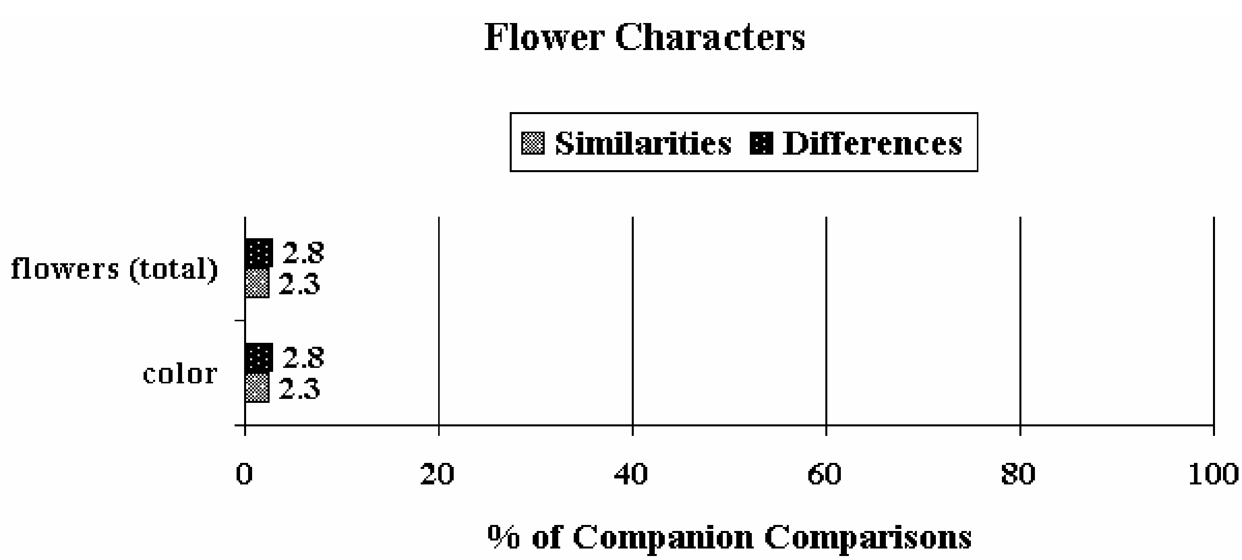

Figure 4.18 – Flower characters from informants' companion comparisons.

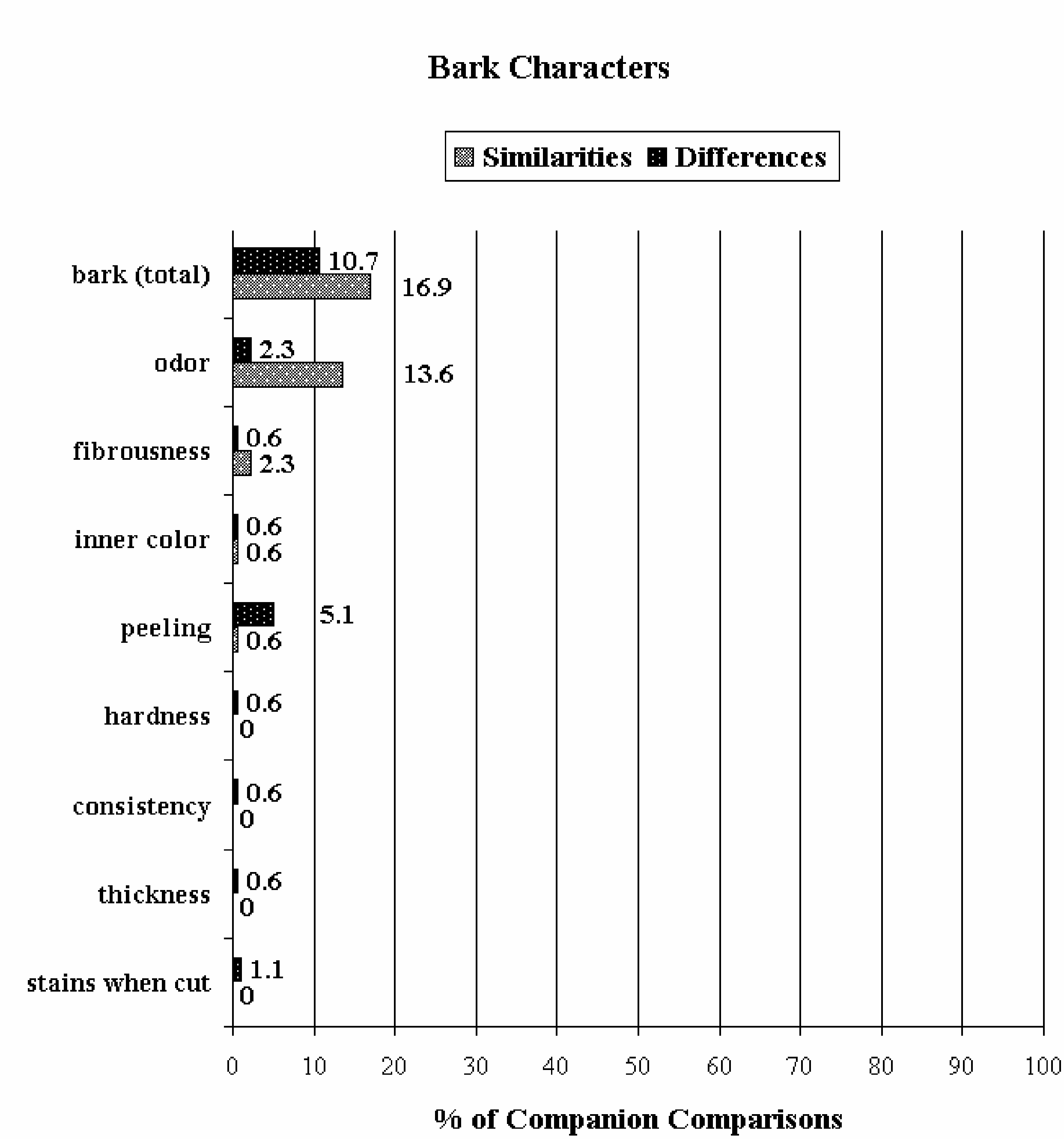

Figure 4.19 – Bark characters from informants' companion comparisons.

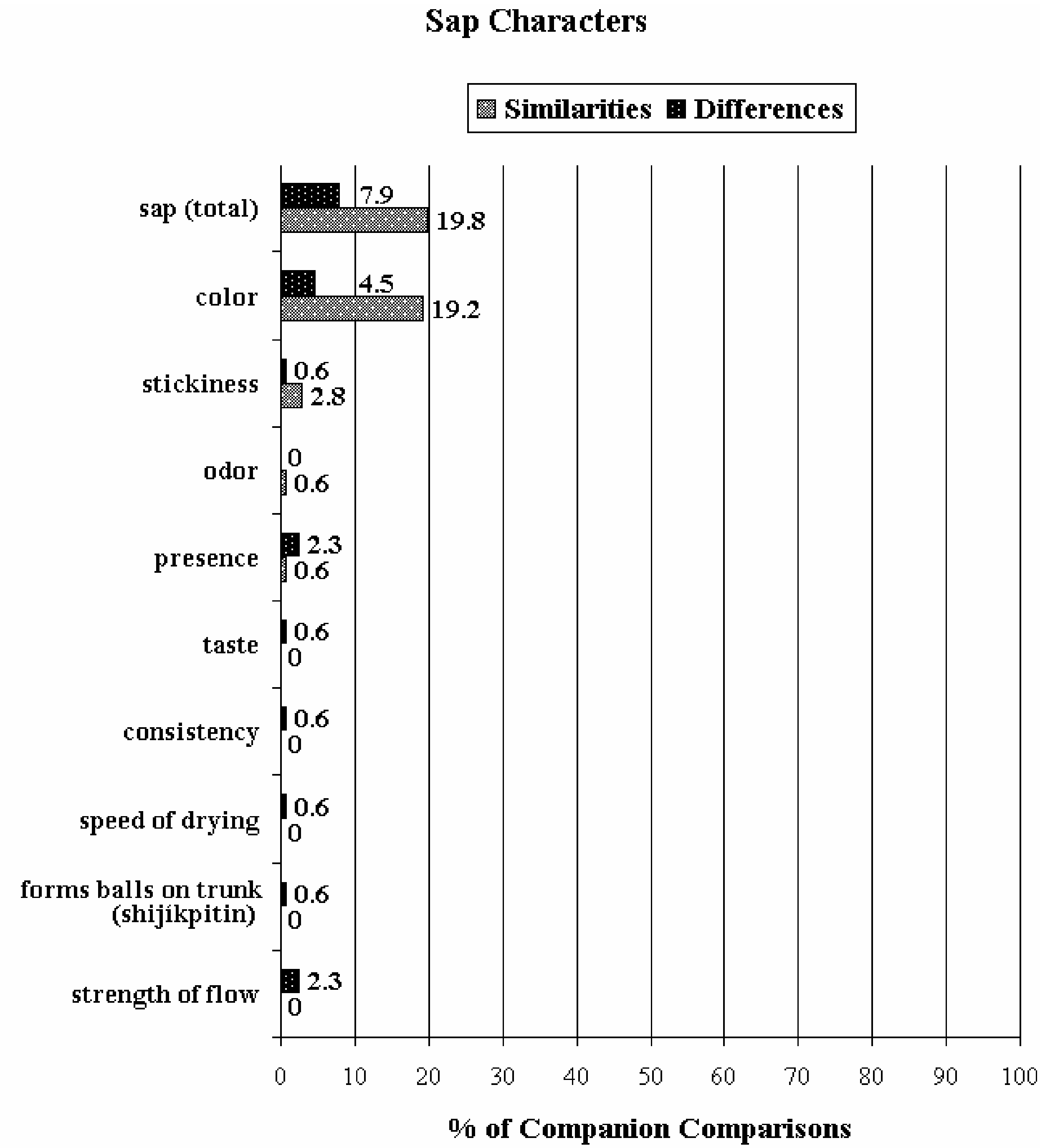

Figure 4.20 – Sap characters from informants' companion comparisons.

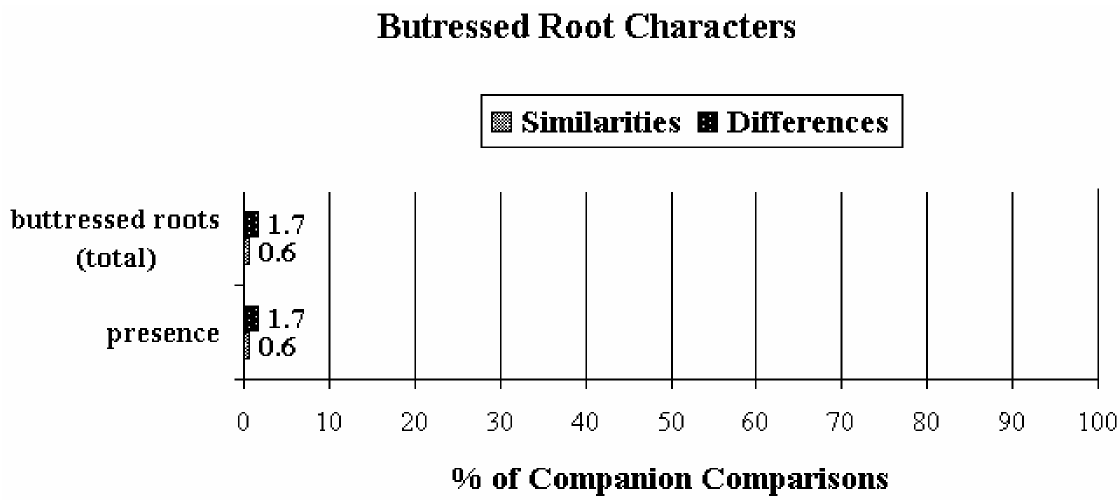

Figure 4.21 – Buttressed root characters from informants' companion comparisons.

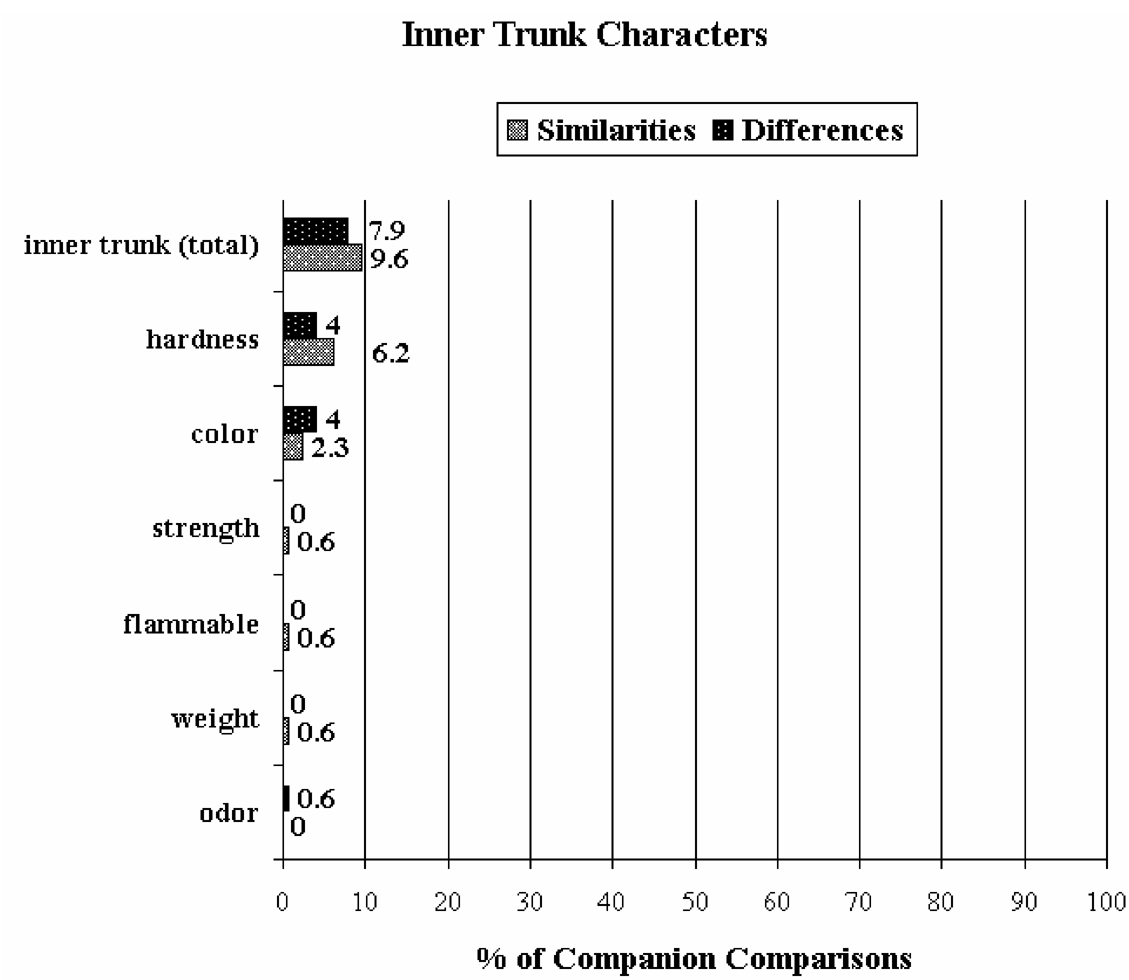

Figure 4.22 – Inner trunk characters from informants' companion comparisons.

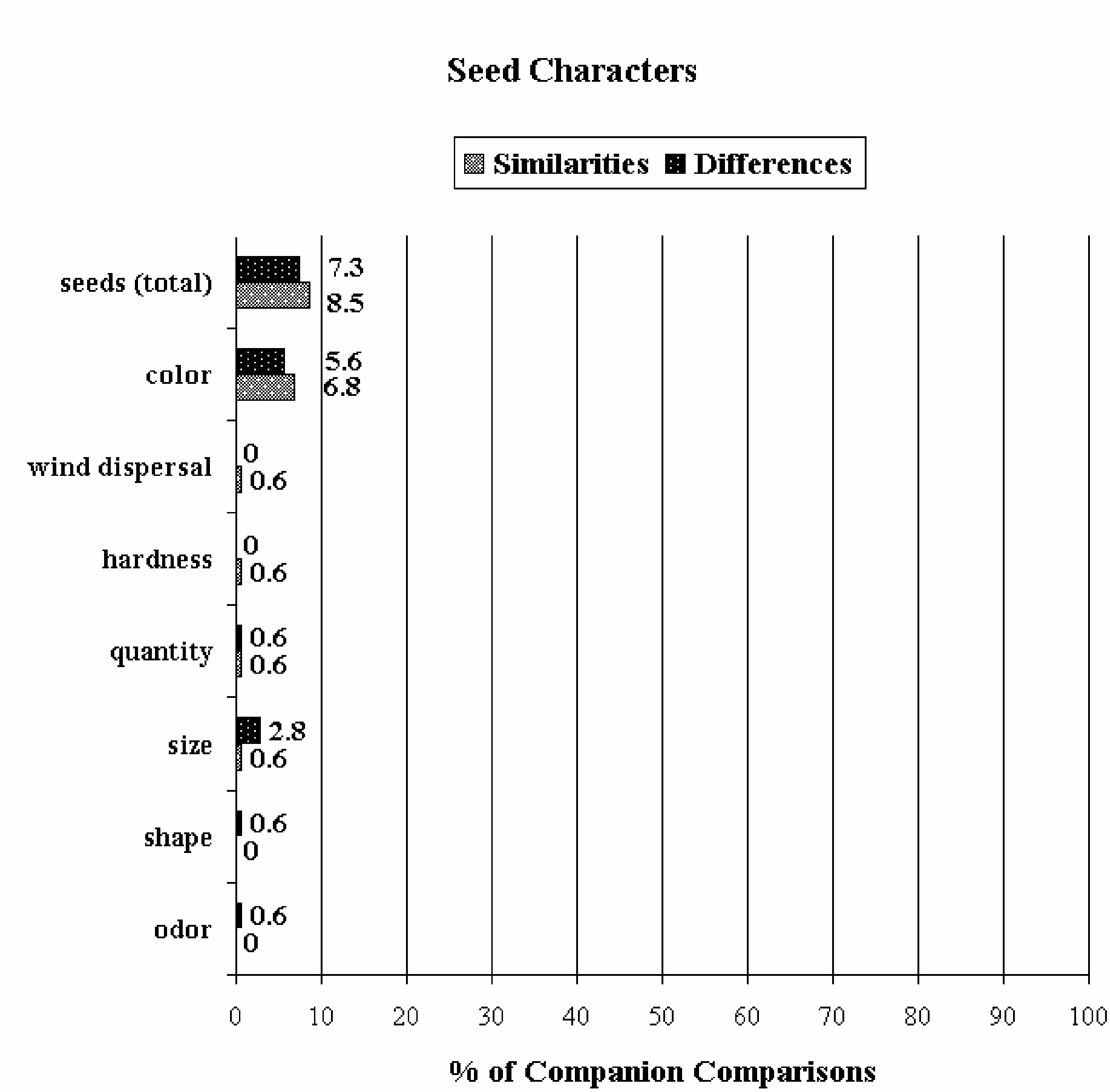

Figure 4.23 – Seed characters from informants' companion comparisons.

Figure 4.24 (below) shows the ecological characters informants mentioned in the companion comparisons. The figure is divided into sections corresponding to association with birds, association with insects, association with mammals, association with other plants and preferred habitat. Association with birds and mammals was mentioned rarely in companion similarities and not at all in companion differences. Informants referred to relationships with insects more often when discussing companion differences. Preferred habitat was mentioned exclusively for making distinctions between group members, while association with other plant species was not mentioned at all. When contrasting members of companion sets, informants provided some additional information about the preferred habitat of a few of the study trees that did not come up in the tree descriptions. The most common habitat distinction informants made was the broad distinction between growing in upland areas (***múja***) and growing in lowland areas (***páka***). For example, one informant noted that the trees ***shíig pegkáenum*** (*Garcinia macrophylla*) and ***úum pegkáenum*** (not collected) grow more in lowland areas, while their companions, ***saáwi pegkáenum*** (not collected), ***wáshi pegkáenum*** (*Garcinia macrophylla*) and ***wayámpainim*** (*Garcinia madruno*) grow more in upland areas. In a few cases, informants gave more detailed habitat information. ***Újuts*** (*Dacryodes* sp.) was said to grow in ***kampáu*** 'hillside cloud forest with spongy ground' and ***éwejush*** 'elfin forest', in contrast to its companion ***kunchái*** (*Dacryodes* spp.). One informant mentioned that ***batút*** (*Ocotea* spp.) grows in ***mújas*** 'upland swampy forest', unlike its companions. ***Súu***, ***tséke*** and ***yanát*** (*Cecropia* spp.) all grow in ***asáuk*** 'secondary forest', while their companion ***satík*** (*Cecropia* spp.) is found along river banks. One informant contrasted ***shíig tagkám*** (*Parkia multijuga*) from ***kapiú tagkám*** (not collected) by noting that the former is found in ***sáat*** 'forest with sparse understory', while the latter is found in ***apiíj*** 'forest with dense understory.'

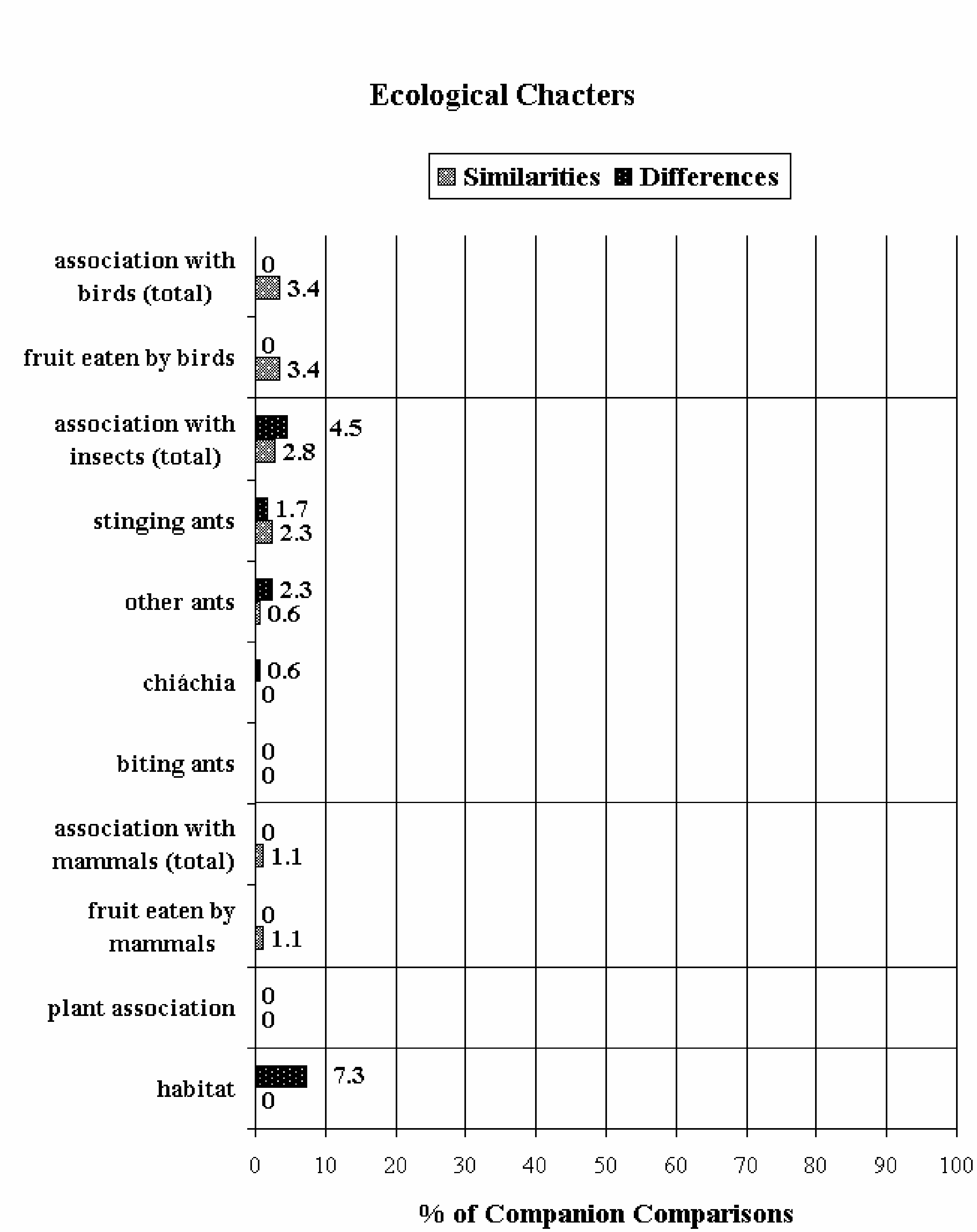

Figure 4.24 – Ecological characters from informants’ companion comparisons.

Hierarchical Cluster Analysis with the Descriptive Data

An important limitation of the structured interview methodology is that it is difficult to imagine how to test whether the characters informants list when describing trees are actually the same features that they use when identifying real examples of those trees. It is, however, possible to do the next best thing; to test whether informants' descriptions of the study trees can at least predict how the trees will be arranged in the folk taxonomy. A matrix was created with rows corresponding to the 63 study trees and columns corresponding to 210 character states from the tree description data. The number in each cell corresponds to the number of key informants who mentioned a given character state (e.g. red fruit, white sap, found in the mountains) for a given tree. The exercise was designed to test the prediction that a hierarchical cluster analysis of the resulting matrix will yield a classification of the 63 study trees that corresponds well with informants' statements about which of the study trees are companions and which are isolated.

Coding the tree descriptions into 210 character states was complicated in some cases by potential overlap in meaning for certain descriptive terms used by informants. When overlapping terms were judged to be very close in meaning, they were simply combined into a single category. I did not make a distinction, for example, between responses indicating that a particular tree's bark is ***púju*** 'white' or ***pushújin*** 'off-white', since trunk color is likely to vary somewhat even among individuals of the same species. In some cases, it was possible to resolve two ambiguous descriptive terms into separate categories. For example I did not combine the color terms ***páuj*** and ***kapántu*** together when dealing with descriptions of fruit, even though the color terms potentially overlap. As previously mentioned, ***páuj*** is roughly equivalent to 'yellow' in English. ***Kapántu*** traditionally encompasses all of the warm colors (Berlin and Berlin 1975) and therefore subsumes the category ***páuj***. However, some informants currently limit the range of ***kapántu*** roughly to 'red', probably due to Spanish influence. I chose to use two character states corresponding to the more modern usage of ***páuj*** and ***kapántu***, rather than combining them, in order to be able to incorporate this finer distinction into the analysis without ambiguity. In cases such as the tree ***úchi táuch*** (*Lacmellea oblongata*), where younger informants tended to describe the fruit as ***páuj***, while some older informants described the fruit as ***kapántu***, I simply coded all responses as ***páuj***. Observations made of study trees during collecting trips and informal forest walks helped me to understand the precise meaning of the descriptive terms my informants used and to form my own mental image of the study trees. A list of the character states that I have used for this cluster analysis can be found in Appendix 5[2].

Hierarchical cluster analysis is a classificatory method that takes data in the form of vectors and produces increasingly inclusive groups based on some measure of the distance between the vectors (Bernard 1995: 505). In this case, each vector corresponds to one of the 63 study trees. Each vector has 210 dimensions corresponding to the 210 character states. Hierarchical cluster analysis was performed on the matrix, using cosine distances with UPGMA (Unweighted Pair Group Method with Arithmetic Mean) for cluster formation. The resulting tree appears in Figure 4.25. Cosine distances worked slightly better than squared Euclidean distances for producing an arrangement of the study trees that closely matches the folk classification. The cosine distance between two vectors takes into account the similarity in overall pattern of the elements that make up the vectors (in this case the character states), but does not take into account the levels of those elements (Diekhoff 1992: 364). The fact that the cosine distance measure worked better than the squared Euclidean measure may stem from the fact that informants had more to say about some

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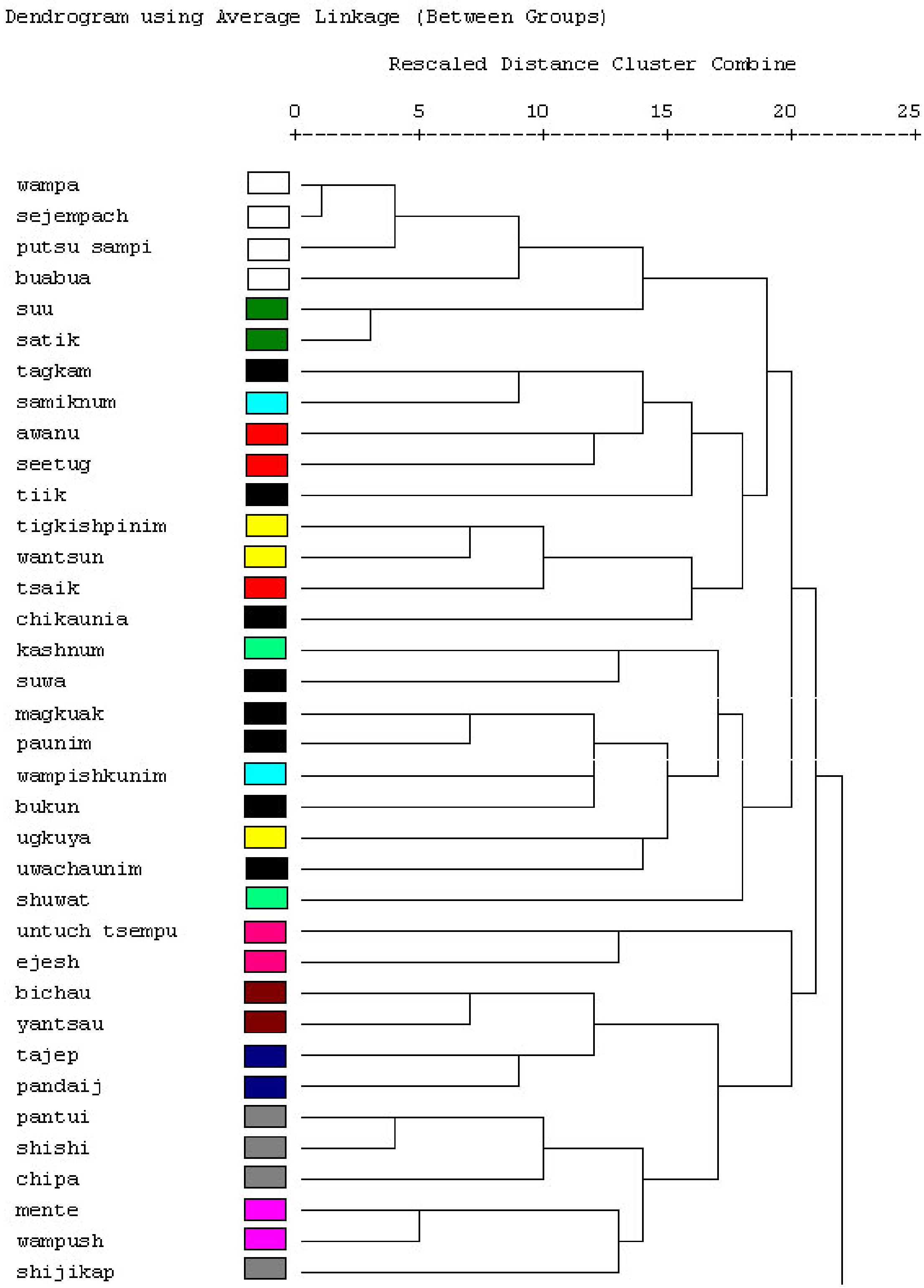
[2] The corresponding characters are largely the same as the chracters I have listed in Tables 4.1-4.12. However, I eliminated a few characters that are likely to be highly correlated with other characters. For example, there is no need to have a character 'sound of bark peeling' when there is already a character 'peeling bark.'


Dendrogram using Average Linkage (Between Groups)
Rescaled Distance Cluster Combine
0
5
10
15
20
25
wampa
sejempach
putsu sampi
buabua
suu
satik
tagkam
samiknum
awanu
seetug
tiik
tigkishpinim
wantsun
tsaik
chikaunia
kashnum
suwa
magkuak
paunim
wampishkunim
bukun
ugkuya
uwachaunim
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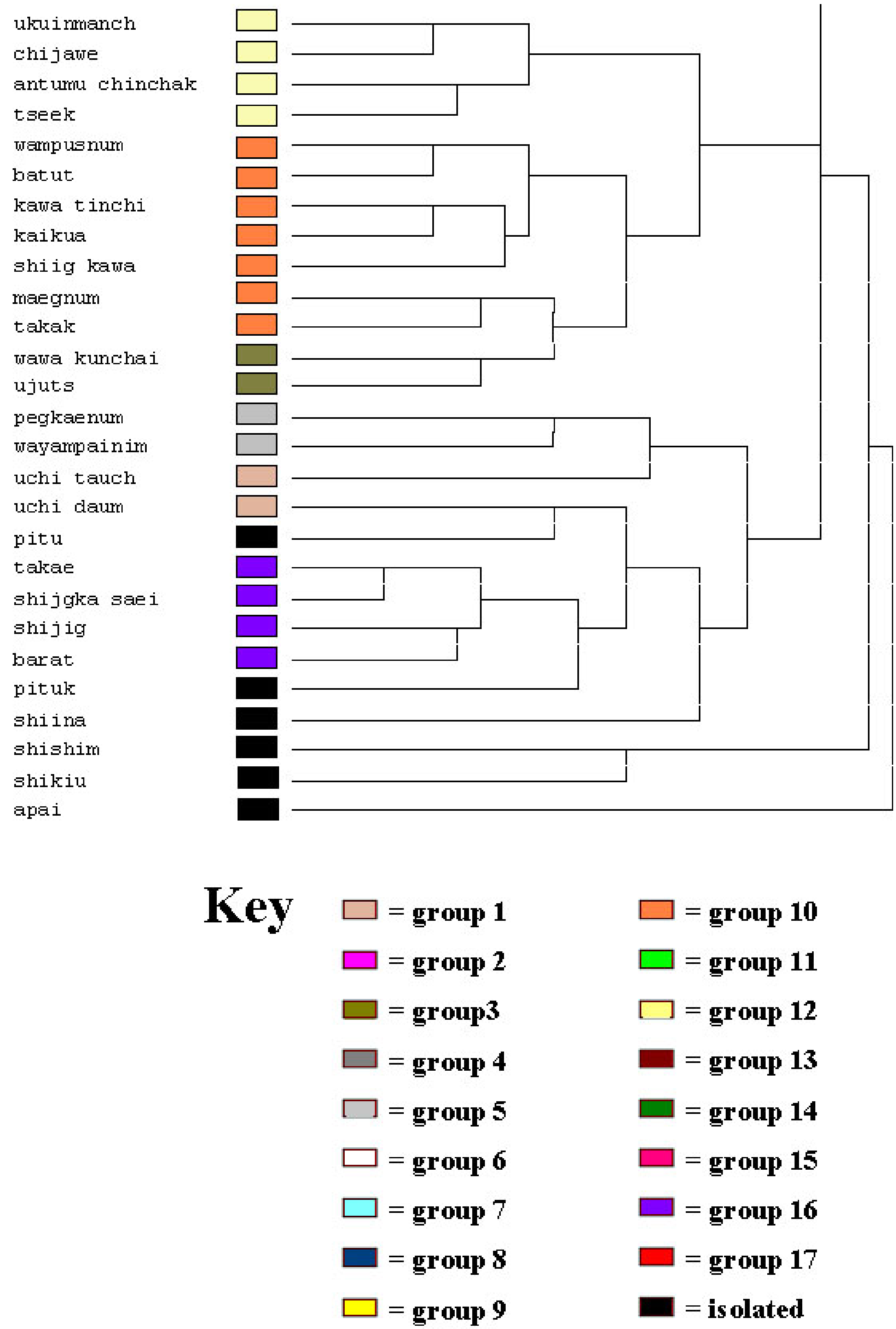

Figure 4.25 – Hierarchical clustering of description data.

trees and less to say about others. Although all of the 63 study trees were known to all eight key informants, clearly some of the trees were less intimately known than others. The cosine distance measure ignores the difference in overall vector magnitude that would result from that kind of differential knowledge.

Ten of the 17 companion sets are fully resolved in the cluster analysis, while four are partially resolved and three are completely unresolved. Groups that were fully resolved include: group 2, consisting of the trees ***ménte*** and ***wampúush*** (both in the Bombacaceae); group 3, consisting of the trees ***újuts*** and ***wáwa kuncháі*** (both in the genus *Dacryodes*, Burseraceae); group 6, made up of the trees ***pustúu sámpi***, ***sejempách***, ***wámpa*** and ***buabúa*** (all in the genus *Inga*, Fabaceae); group 8, consisting of the trees ***tajép*** and ***pandáij*** (both in the genus *Ormosia*, Fabaceae); group 12, consisting of the trees ***antumú chinchák***, ***tseék***, ***ukuínmanch*** and ***chijáwe*** (various genera, Melastomataceae); group 13, made up of the trees ***yantsáu*** and ***bíchau*** (various genera in the Meliaceae); group 14, made up of the trees ***súu*** and ***satík*** (both in the genus *Cecropia*, Moraceae); group 15, consisting of **ejésh** and ***úntuch tsémpu*** (various genera, Myristicaceae) and group 16, consisting of the trees ***shijíg***, ***barát***, ***shijigká sáei*** and ***tákae*** (various families).

The groups that were partially or completely unresolved merit further discussion. The incomplete resolution of two of the groups makes sense in terms of the centrality of taxa included. For group 9, the trees ***wantsún*** and ***tigkíshpinim*** (both in the genus *Tachigali*, Fabaceae) come out clustered together, while ***ugkuyá*** (*Tachigali formicarum*) is separated. Interestingly, all eight key informants agree that ***wantsún*** and ***tigkíshpinim*** are ***kumpají***, while only 5 place ***ugkuyá*** in the same group. ***Ugkuyá*** is distinct from the other members of its group in its smaller growth habit, lack of buttressed roots and in the large quantity of stinging ants living symbiotically in its hollow stems. For group17, the trees ***áwanu*** and ***séetug*** (Meliaceae) cluster together, while ***tsáik*** (*Cedrelinga cateniformis*, Fabaceae) remains separated. Once again, all eight key informants consider ***áwanu*** and ***séetug*** to be companions, while only five agree that ***tsáik*** belongs with them. ***Tsáik*** has rounder leaves, longer, flatter fruit, lacks the garlicky bark odor of the other members of its group and is, in fact, botanically unrelated. The dendrogram from the cluster analysis shows ***tsáik*** to be closer to ***wantsún*** and ***tigkíshpinim***, which are also Fabaceae. However, no informant told me that ***tsáik*** is a companion of ***wantsún*** and ***tigkíshpinim***. The two other examples of groups that are only partially resolved are not as easily explained, either in terms of centrality in the category or in terms of biological heterogeneity. For group 3, the trees ***pantuí***, ***shíshi*** and ***chípa*** (all in the genus *Protium*, Burseraceae) cluster together, while ***shijíkap*** (*Protium* sp.) is separated. Actually, ***shijíkap*** does not come out very far from the rest of group 3, but it clusters more with the biologically unrelated trees ***wampúush*** and ***ménte*** (Bombacaceae). For group 10, the trees ***shíig káwa***, ***káwa tínchi***, ***káikua***, ***batút*** and ***wampúsnum*** (Lauraceae) cluster together, while ***takák*** and ***máegnum*** (also Lauraceae) cluster closer to the trees ***újuts*** and ***wáwa kunchái*** (genus *Dacryodes*, Burseraceae). ***Takák*** and ***máegnum*** did not come out very far from other members of their group but their closer association with ***újuts*** and ***wáwa kunchái*** in the cluster analysis may be due to certain shared trivial features such as light trunk color.

Groups that did not resolve at all in the cluster analysis include: group 1, made up of the trees ***úchi dáum*** and ***úchi táuch*** (both Apocynaceae); group 7, consisting of the trees ***samíknum*** and ***wampíshkunim*** (both Fabaceae) and group 11, made up of the trees ***kaáshnum*** and ***shuwát*** (both in the genus *Eschweilera*, Lecythidaceae). All three unresolved groups involve trees in the same botanical family and one is made up of trees in the same genus, so biological distance cannot explain these cases. One possible explanation of the fact that not all groups were resolved relates to the fact that all 210 character states were given equal weight in the hierarchical analysis. Evidence from the companion comparison data suggests that the Aguaruna actually place greater emphasis on certain characters and less on others when deciding which trees are related as companions. When informants compared the trees grouped together as companions, they mentioned certain characters, including fruit color, sap color, fruit dehiscence and bark odor more often when explaining how group members are similar, and used other characters such as outer trunk color, leaf shape, leaf size, overall height, thickness, fruit size and preferred habitat more often for distinguishing the members of each group.

The idea that not all characters are equally useful at a given level of taxonomic hierarchy is also an important one for plant taxonomists (Stuessy 1990: 33). Some characters tend to be more conservative over evolution than others. Within the mostly temperate genus *Quercus* (oaks), the character leaf shape is quite variable (see for example Brown and Kirkman 1990), but leaf arrangement is not, since all oaks have alternate leaves. Leaf shape, therefore, would be a useful feature for distinguishing between oak species, while leaf arrangement may be useful for distinguishing the genus *Quercus* from other genera. A good direction for future data analysis would be to assign the characters different weights based on the companion comparison data to test whether that would yield a hierarchical clustering result that is even closer to the Aguaruna folk classification.

Despite the limitations of giving all characters equal weight, the large majority of companion groups were resolved, at least partially. Companion groups that share several important characters in common tended to stick together, since individual group members would not likely have enough trivial characters (e.g. leaf size or trunk color) in common with any other tree to ‘pull them out’ of the group. However, groups that are formed on the basis of only one or two common features may not be resolved in a cluster analysis where all character states are given equal weight. Members of such groups may end up being clustered with other trees with which they have several trivial features in common. For example, hardness of heartwood is the main feature informants cite to explain why ***samíknum*** and ***wampíshkunim*** (group 7) are companions. However, these trees differ markedly in other aspects, including leaf size, fruit size and preferred habitat. It is not surprising that ***samíknum*** and ***wampíshkunim*** fail to cluster together when equal weight is give to all characters.

A dendrogram is a good visual tool for understanding which trees are grouped together at various stages of the hierarchical cluster analysis, and for comparing the resulting structure to the arrangement of trees in Aguaruna folk taxonomy. However, a dendrogram is not quite as useful for explaining why certain trees are considered to not have any companions. Figure 4.1 uses black rectangles to indicate all trees that the Aguaruna consider to be isolates. Some isolates, including the trees at the bottom of the figure ***apái*** (*Grias* spp., Lecythidaceae), ***shishíim*** (*Couroupita* spp., Lecythidaceae), ***shikiú*** (*Erythrina*, Fabaceae) and ***shína*** (*Brosimum rubescens*, Moraceae) clearly came out relatively distant from other trees in the cluster analysis. Others, such as ***páunim*** (Vochysiaceae) and ***magkuák*** (*Cespedesia spathulata*) ended up clustered fairly close to other trees. Once again, the assignment of weighted values to character states might improve the match with Aguaruna folk taxonomy.

Using the methods described above, I have classified the 63 study trees based on phenotypic similarity. My approach is somewhat comparable to the phenetic approach to classification in biology. A phenetic classification is based on phenotypic comparison of a particular set of organisms and does not make assumptions about the process of evolution itself (Stuessy 1990:59). It is important to note that the approach I use differs in some important ways from the way biologists typically perform phenetic classifications. In a phenetic classification, each taxon is assigned one and only one character state for each character being considered. In contrast, the approach I have taken considers each character state as a separate variable, so it is possible for a taxon to simultaneously have more than one state for a given character. I allow for some disagreement between informants because it is not always easy to draw the line between the individual character states of certain characters. For the character fruit size, for example, where does ***píipich*** 'small' end and ***múun*** 'large' begin? More importantly, by treating character states rather than characters as the variables, I am able to take into account the number of informants who mentioned a given character state for a given tree. For example, I consider it important not only whether ***shishíim*** (*Couroupita subsessilis*) has large or small fruit, but also how salient ***shishíim***'s fruit size is for the Aguaruna. If all eight key informants say that ***shishíim*** has large fruit, then fruit size is clearly a very salient feature for ***shishíim***. On the other hand, if only one key informant says that ***shishíim*** has large fruit, then, fruit size is not so important for ***shishíim***.

Evidence of the Importance of Ecological Clues from the Binomials

This section examines the distribution of various kinds of descriptive modifiers in Aguaruna folk species names of trees as an additional avenue for evaluating the relative importance of ecological and sensory clues in Aguaruna folk taxonomy and identification. Cross cultural evidence supports the generalization that taxa at the folk generic level tend to be labeled by linguistically complex expressions made up of a folk genus name and a modifier that serves to contrast the folk species in question with other members of the same folk genus (Berlin 1992). An example using trees familiar in the Southeastern United States would be red mulberry (*Morus rubra*) and white mulberry (*Morus alba*) (Brown and Kirkman 1990). The modifiers in folk species names often indicate the dimensions that are important for distinguishing the members of a polytypic folk genus. For example, one can reasonably expect that overall size is likely to be an especially salient difference between the Aguaruna trees ***múun*** 'large' ***táuch*** (*Lacmellea peruviana*) and ***úchi*** 'small' ***táuch*** (*Lacmellea oblongata*).

I identified a total of 256 folk species binomials from key informants' expanded tree freelists. Table 4.3 contains a breakdown of their descriptive modifiers according to a dozen or so categories. The categories are organized into larger groups according to whether they refer to ecological, sensory or other aspects of the trees they describe. The most common sensory reference is to overall size. ***Múun*** 'large' ***sámpi*** (*Inga ruiziana*), for example, grows taller and has a thicker trunk than other kinds of ***sámpi***. Some descriptive terms make a comparison with another plant species. ***Páu shuíya*** (*Pourouma* spp.) (Berlin *et al*. n.d.), for example makes reference to the tree ***páu*** (*Quararibea cordata*) (Guallart 1997); both trees have similar heart-shaped leaves. Other names refer to color, such as ***tuntúu*** 'dark' ***tínchi*** (*Ocotea* spp.) which is so named because it has a darker colored trunk than other kinds of ***tínchi***. Some names refer to texture. The tree ***suír*** 'hairy' ***chími*** (*Pseudolmedia laevis*) (Berlin *et al*. n.d.) is distinguished from other kinds of ***chími*** by its hairy twigs. Some descriptives refer to parts of the human body. For instance, ***úntuch*** 'belly button' ***tsémpu*** (*Iryanthera juruensis*) is cauliflorous and has bumps on its trunk suggestive of belly buttons. Finally, one tree, ***mejéen*** 'foul smelling' ***dúpi*** (not collected) makes reference to odor.

Nearly a third of the folk species names refer to habitat; for example ***mujáya*** 'upland' ***ajátsjats*** (not collected) and ***namakía*** 'riverine' ***ajátsjats*** (*Sorocea* cf. *pilea*). A number of trees make reference to animal species. Some of those indicate actual ecological association with the animal in question. ***Yuwícham sámpi*** (*Inga leiocalycina*), for example, is distinct from other kinds of ***sámpi*** in having a symbiotic relationship with particular ants called ***yuwícham***, that live on its branches. In other cases, folk species names are metaphorical, making a physical comparison between the appearance of the tree and the appearance of the animal in question. ***Yugkíts wakám*** (not collected) is named after the acouchi ***yugkíts*** (*Myoprocta prattii*). The ***yugkíts*** is fairly small compared to some other rodent species found in the area and ***yugkíts wakám*** similarly grows smaller than other types of ***wakám***.

Table 4.3 - The relative salience of tree parts.

NATURE OF MODIFIER	**NUMBER FOUND**	**PERCENT (OUT OF 256)**
sensory	**129**	**50.4**
size	87	40.0
plant reference	17	6.6
color	10	3.9
texture	5	2.0
reference to human body	5	2.0
sensory, other	4	1.6
odor	1	0.4
ecological	**77**	**30.1**
habitat reference	77	30.1
sensory or ecological	**24**	**9.4**
animal reference	24	9.4
other	**18**	**7.0**
centrality in group	8	3.1
use reference	6	2.3
toxicity	3	1.2
group of people	1	0.4
undetermined	**8**	**3.1**

Not all descriptives in Aguaruna folk species make sensory or ecological references. A number of binomials incorporate the descriptive ***shíig***, meaning 'real' or 'genuine', to indicate that a particular folk species is the most prototypical member of its folk genus. Some binomials suggested a use, for example, ***kadáit*** 'oar' ***tsémpu*** (not collected). There are also a few names that indicate toxicity, such as ***tséas*** 'poison' ***kúnakip*** (*Tabernaemontana macrocalyx*) (Berlin *et al*. n.d.). Finally, one name, ***apách*** 'mestizo's' ***shuíya*** (not collected) makes reference to a group of people. The nature of the reference of eight of the terms (3.1%) could not be determined.

Although descriptive terms in binomials often give some idea of the kinds of features that are considered important for distinguishing between members of a polytypic folk genus, some ethnobiologists (Stepp 2002, Berlin personal communication) have suggested that certain modifiers in folk species names, particularly those referring to animals, may actually serve to indicate non-prototypicality. Clearly there is a danger in taking all folk species names literally. For instance, the tree ***wáshi pegkáenum*** (*Garcinia macrophylla*) makes reference to ***wáshi***, a species of spider monkey (Brown 1985). However, it is not clear that ***wáshi pegkáenum*** is so named because it is considered a favorite food of that monkey, or simply as a way of distinguishing it from the more prototypical ***shíig*** 'true' ***pegkáenum*** (*Garcinia macrophylla*). It is also quite possible that some modifiers serve both as an indication of non-prototypicality and as a literal description of a quality of the organism in question. I found this to be true particularly when informants make up folk species names on the fly, for an unfamiliar tree that seems to fit within a particular folk genus but clearly differs from the prototype of that genus in some significant way. For example, on one occasion, when I traveled to the summit of a mountain near the community of Pagki with an informant, Miguel, we encountered a shrub growing in elfin forest (***éwejush***) that I asked him to identify. The shrub was later determined as *Aniba* sp., Lauraceae. Miguel examined the shrub, and picked a twig which he crushed and smelled. He first said that he did not know the name, but, after some thought, he concluded that the shrub was “***mujayá wampúsnumi kumpají***.” ***Wampúsnum*** is a tree that grows on the edge of rivers and large streams, and certainly does not occur in elfin forest. However, from its odor, and, perhaps, from its appearance as well, Miguel decided that the unfamiliar shrub found at a high elevation had some similarity to the named category ***wampúsnum***. He indicated the fact that the tree was not ***shíig*** ‘true’ ***wampúsnum*** by adding the words ***mujayá*** ‘of the uplands’ and ***kumpají*** ‘companion.’

Conclusions

This chapter presents and analyzes data from the structured interviews. The interview questions were specifically designed to elicit informants’ criteria for judging membership in the 63 folk genera chosen for this study. First, I asked informants to describe each of the study trees. Secondly, informants were requested to compare and contrast groups of trees they consider to be ***kumpají*** ‘companions.’ This chapter also contains an analysis of descriptive terms in 256 binomial folk species names provided by my key informants. Taken together, the data presented in this chapter only partially support the basic hypothesis of this research, that both sensory and ecological clues play a role in the process of tree identification. All of the descriptions involved sensory reasoning. Likewise, all of the companion comparisons involved sensory reasoning. However, only 21% of the descriptions involved ecological clues. Ecological clues were involved in only 6% of companion similarities and 11% of companion differences.

The companion comparison data suggest that habitat characters are most important for making relatively fine distinctions between trees considered to be related as ***kumpají***. Analysis of descriptive terms in binomial folk species names also suggests that habitat characters are important for making distinctions between folk species in the same folk genus. Nearly a third

(30.1 %) of the binomial folk species names examined make reference to habitat. On the other hand, the fact that habitat characters do not appear in descriptions of similarities between members of companion sets suggest that they are not very important for making judgments at that broader taxonomic scale.

Data from informants' descriptions and from the companion comparisons indicate which particular sensory and ecological clues are used most for judging membership in the 63 chosen folk genera. For instance, the characters 'fruit color' and 'leaf shape' appear far more often in informants' descriptions than the characters 'inner bark color' or 'fruit taste' (see Figure 4.1). It is not clear that informants use all of the characters that they mentioned in the tree descriptions and companion comparisons when making actual identifications of real trees. However, the results of a hierarchical cluster analysis using character state data from informants' descriptions of the 63 study trees suggest that these descriptions at least provide information that can be used to predict how the trees will be classified. The 63 study trees were selected in the hope that they would provide a representative picture of the kinds of clues that are generally important for the Aguaruna in judging membership in folk genera of ***númi*** 'trees except for palms.' However, the 63 chosen folk genera clearly represent only a fraction of the more than 300 named folk genera of ***númi*** recognized by the Aguaruna. It is possible that a different sample of folk genera would give a different impression of the relative importance of particular sensory and ecological clues. I will address this issue in more detail in chapter 8.

Finally, Table 4.4 shows the relative importance of the five senses in the tree descriptions and companion comparisons. For both the descriptions and the companion, nearly two thirds of the characters are purely visual. Visual characters most commonly involve color, shape and size. Additionally, there are some characters that potentially involve both sight and touch, for

Table 4.4 – The Relative importance of the five senses in characters from the tree descriptions and companion comparisons.

sense	**number of characters**		
	descriptions (% out of 91)	**companion similarities (% out of 49)**	**companion difference (% out of 58)**
sight	65.9	65.3	65.5
sight or touch	13.2	12.2	15.5
touch	8.8	12.2	10.3
smell	6.6	8.2	6.9
taste	3.3	2.0	1.7
hearing	2.2	0.0	0.0

example, texture and presence of thorns. Other characters involve only touch, such as hardness and consistency. Informants mentioned the odor of bark, fruit, seeds, leaves, flowers, sap and inner trunk, in some cases. Taste characters appear to play a minor role. Informants mentioned fruit taste occasionally and bark or sap taste very rarely. In a few cases, informants even described the sounds of dehiscing fruit or peeling bark, although it is not clear if those sounds actually play much of a role in identification.

Chapter 5

The Gentry Plot Experiment

Introduction

The structured interviews provided valuable data for understanding the sensory and ecological criteria that informants use for judging membership in the 63 chosen folk genera. However, estimating the importance of those characters for making actual identifications of real trees is a bit more complicated. An ideal approach for complementing the structured interviews would be to observe informants as they make actual identifications. Performing such an experiment with real examples of the same 63 study trees selected for the structured interviews would be difficult, since some of those trees grow in only one specific habitat, ruling out the possibility of finding all of them growing in any one location. As an alternative, I decided to observe how informants identify trees in study plots in a single location near the community of Bajo Cachiaco. What follows is a description of that experiment and a discussion of the results.

How Identifications are Made

Twenty-five 10m by 10m Gentry (1982) plots were measured out along a path near the community of Bajo Cachiaco in upland swampy primary forest (***mújas***). The plots included a total of 156 trees of 10cm or greater diameter at breast height. Eight key informants went through the plots individually and identified the trees. I recorded the answers, crossing out any changed answers with only one line so that initial guesses would remain visible. I also recorded actions informants took during each identification. Informants generally glanced immediately and very briefly at the trunk and then looked up at the leaves for a slightly longer period of time, which was, in some cases, enough to make an identification. If not, informants would cut the bark in order to examine the bark itself as well as the inner wood, look for latex, and often to smell the piece of cut bark. Tasting the bark was quite rare and mostly limited to a single informant. When informants were still stumped after cutting the bark, they might look up at the leaves again, cut another piece of bark, or, occasionally, look for leaves and fruit on the ground. On several occasions, informants shook the trunk of a tree so that they could be sure which leaves belonged to it.

The steps that my Aguaruna informants took when identifying trees are similar to steps that López-Zent (1999) reports for the Hotï of Venezuela and the steps that Carneiro (1978) describes for the Kuikuru of Brazil. Although I have already described the typical Hotï and the Kuikuru process of tree identification in the introductory chapter, I will mention them again here for the purpose of comparison with the Aguaruna. López-Zent states that, when the Hotï identify woody flora, they first observe the outer trunk and, if that is not enough to make an identification, they will cut the bark in order to smell it, look for sap and observe the inner trunk color. If the identity is still uncertain, after cutting the bark, the Hotï will look for fruits and flowers or try to find fallen leaves on the ground. Carneiro (1978) reports that his Kuikuru informants first observed the trunk. If that was not sufficient to provide a name, they would then look up to the canopy for leaves and any flowers or fruits that might be present. Occasionally, the Kuikuru also cut the bark to examine its appearance, to taste it, smell it or look for sap. In general, the process I observed for my Aguaruna informants appears to be quite similar to what López-Zent and

Carneiro (1978) report for the Hotï and the Kuikuru, respectively. One difference is that the Aguaruna appear to place more emphasis than the Hotï on looking up at the leaves in the canopy.

I attempted to observe and record, as carefully as possible, all actions that my informants took while making identifications. However, certain observations were easier to make than others. I sometimes had difficulty judging, for example, whether an informant had looked up toward the canopy, or whether he focused only on the trunk directly in front of him. I was not able to measure precisely how many times informants looked up at the canopy, since the trees in the plots were often close together, making it easy for an informant to catch a glimpse of the leaves of several trees simply by looking up once. Clearly, without sophisticated eye tracking equipment (Brockmole and Henderson 2005), it would be difficult to say how often informants looked at particular parts of the trees. However, it is clear that the sense of vision played a role in all 1,248 identifications, since it would be nearly impossible for an informant to smell, taste or touch a tree without at least seeing its trunk. Measuring the number of times informants cut, smelled or tasted the bark was easier. The eight informants appear to differ somewhat in the emphasis that they placed on cutting and smelling the bark. Informants cut the bark of an average of 42.9 % of the 156 trees. The range of percent of trees cut was 24.4% to 64.1%, with a standard deviation of 15.3%, over the eight informants. Informants smelled the bark of an average of 35.7 % of the trees. There was a range of 21.8% to 60.3%, over the eight informants, with a standard deviation of 14.1%. Tasting the bark occurred very rarely, in an average of 0.6% of identifications. One informant accounts for all but one of the instances of bark tasting. These observations suggest that different informants who are members of the same culture and live in the same community may, nevertheless have somewhat different “identification styles.”

A majority (69.8 %) of the 1,248 tree identifications produced names only to the folk genus level. That is not surprising, considering that the large majority of Aguaruna tree folk genera are monotypic. However, it is significant that bark cutting was involved in 40.2% of identifications of trees that were named only to the folk genus level. These data conflict with the general assumption in ethnobiological theory (see Berlin 1992 and Hunn 1975) that taxonomic decisions at the folk genus level happen very quickly. Perhaps tall trees are a special case, since many important diagnostic features such as fruit and leaves are high up in the canopy, while other important clues such as sap or bark odor can only be observed after making a bark cut.

Consensus analysis

Consensus analysis is a factor analytic method that allows one to determine what the culturally correct answers are for certain kinds of structured interview questions based on the assumption that the informants who agree the most are the most knowledgeable. In the context of consensus analysis, the Gentry plot experiment can be thought of as an exam with156 fill in the blank type questions that take the form "The name of this tree is ________________ ." Consensus analysis lets one test whether a group of informants share a similar understanding of a particular domain. If informants are found to share a similar understanding, consensus analysis can also be used to quantify the level of expertise of each informant. If informants are fairly knowledgeable, it is then possible to determine what the correct answers are likely to be for most of the questions asked.

Consensus analysis makes three key assumptions (Romney *et al*. 1986; Borgatti 1996). The first is that informants share a single culture. In other words, there should be one right answer to every question. In terms of the present experiment, that means that there should be a single correct name for each tree. The second assumption is that informant responses are independent across informants and across questions. If an informant does not know the right answer he will make a random guess among the available choices. In the case of a fill in the blank type exam, there is a very large number of available choices. Assumption 2 is potentially problematic for tree identification. The structure of folk taxonomies suggest that not all wrong guesses for tree names are equally wrong. Clearly, an informant who makes an incorrect identification that is in the same folk genus as the correct name is closer to being correct than an informant who names a tree that is not considered to be at all related to the correct one. One can reasonably assume that informants will be most likely to confuse a tree with its conspecifics or ***kumpají*** in other folk genera. The third assumption of consensus analysis is that all questions come from a single coherent cultural domain. The relative cultural competence of informants should not vary over the set of questions. In other words, if informant A does better than informant B in one subset of questions, then informant A should do better than informant B in another subset of questions.

Consensus analysis (Romney *et al*. 1986) was performed on the names that the eight informants gave for the156 test plot trees, using the ANTHROPAC software (Borgatti 1996). For the purpose of the consensus analysis, I counted all answers with the same folk genus to be equivalent. Folk species names were excluded from the analysis in order to minimize violation of the assumption that all possible wrong answers are equally likely. The results of the analysis show that the ratio of the first to the second eigenvalue is 28.15 and none of the eight informant variables load strongly on the second factor (Diekhoff 1992:344). Therefore, one can reasonably assume that all eight informants share a common cultural understanding in the domain of ***númi*** 'trees excluding palms.' That is hardly surprising, since all eight informants are Aguaruna and live in the same community. However, it is reassuring that the results are consistent with that basic assumption of consensus analysis.

The average cultural competency of informants is 0.745, with a standard deviation of 0.071. The highest cultural competency score is 0.83 and the lowest is 0.59. It is tempting to say that the informant with a cultural competency score of 0.83 is much more knowledgeable in the domain of ***númi*** than the informant with a cultural competency score of 0.59. However, the cultural competency score generated by a consensus analysis of the data from this kind of experiment is only one way to measure overall knowledge of the domain ***númi***. Length of informants' freelists of ***númi*** is an alternate measure of knowledge in that domain. Table 5.1 compares the ranking in expertise one would infer from each of these two measures of expertise for the eight informants. Interestingly, having a relatively high cultural competency score in the tree identification experiment does not appear to correlate well with having a relatively long freelist for the domain ***númi***. One possible reason for the discrepancy is that the two oldest informants have vision problems that almost certainly compromise their ability to identify trees. The two oldest informants have the strongest loadings on the second factor, indicating that they come closest to having an alternate understanding of the domain at hand. On the other hand, these two men named many trees and discussed them in great detail during the structured interviews. In general, freelist length and cultural competency scores from consensus analysis both have potential utility for identifying expert informants. However, it is important to keep in mind that the two methods of determining expertise are not equivalent and the utility of each is likely to depend on what kind of study one wishes to undertake.

Table 5.1 – A comparison of two measures of tree expertise.

informant	**freelist data**		**cultural consensus**	
	# in list	**rank**	**cult. comp. score**	**rank**
#2	201	1	0.82	2
#4	176	2	0.59	6
#1	154	3	0.73	5
#3	146	4	0.83	1
#7	131	5	0.75	4
#5	121	6	0.73	5
#6	117	7	0.73	5
#8	103	8	0.78	3

Consensus analysis was able to determine the correct name for 144 (92.3%) of the 156 trees, within a 95% confidence interval. Table 5.2 contains a breakdown of folk genera for the trees that were resolved. Time limitations precluded collecting botanical specimens for all of the trees. For the most part, I collected only the most difficult trees, those with the least agreement between informants regarding their identity. A few other trees were easy to collect due to their short stature or easy accessibility from other trees already slated for collection. Botanical names indicated with a star in Table 5.2 correspond to individual trees that were collected, or in a few cases, identified in the field. All other botanical ranges shown are reasonable guesses for the folk taxa based on my other collections and on ethnobotanical data from Berlin *et al*. (n.d.) and Guallart (1997).

I have identified five cases, based on botanical determinations or field observations where the majority of informants appear to have given an incorrect answer. Those five trees are listed at the bottom of Table 5.2. The name appearing in parentheses is the name given by the majority of informants and determined to be the "correct" answer within a 95% confidence interval in the consensus analysis. In four cases, I have favored a name indicated by a minority of informants based on my other collections and on data provided by Guallart (1997) and Berlin (n.d.). In one case, I was able to conclude that the consensus name is not likely to be correct, without being able to decide on a more reasonable one.

Table 5.2 - The distribution of folk genera in the study plot.

folk genus	**# of indiv. present**	**likely biological range**	**family**
pantuí	21	*Protium* spp. *Protium* sp.*	Burseraceae Burseraceae
shijíkap	15	*Protium* sp.	Burseraceae
tsémpu	12	various genera	Myristicaceae
sámpi	9	*Inga* spp. *Inga* sp.*	Fabaceae Fabaceae
kunchái	7	*Dacryodes* spp.	Burseraceae
tínchi	6	various genera	Lauraceae
chijáwe	5	*Miconia* spp.	Melastomataceae
shuíya	5	*Pourouma* spp.	Moraceae
chíajap	4	*Trichilia* spp. *Trichilia poeppigii**	Meliaceae Meliaceae
ejésh	4	various genera	Myristicaceae
dátash	3	*Aparisthmium cordatum*	Euphorbiaceae
kántsa	3	various genera	Euphorbiaceae
chikúm	2	various genera	Myristicaceae
íwakip	2	*Leonia* spp.	Violaceae
kasháinim	2	various genera *Alchornea* sp.*	Euphorbiaceae Euphorbiaceae
papágnum	2	*Tapirira guianensis*	Anacardiaceae
shipítna	2	*Himatanthus sucuuba*	Apocynaceae
sugkách	2	*Perebea* spp.	Moraceae
yakúshnum	2	*Hyeronima alchoneoides*[1]	Euphorbiaceae
akágnum	1	*Theobroma subincanum*	Sterculiaceae
chími	1	*Pseudolmedia* spp.	Moraceae
chinchák	1	various genera	Melastomataceae
chípa	1	*Protium fimbriatum*	Burseraceae
dapújuk	1	*Inga* spp.	Fabaceae
ishpíg	1	*Guarea* spp.	Meliaceae
íwanch sámpi	1	*Zygia* spp.	Fabaceae
kapiú	1	?	-
kátsau	1	*Neea* spp.	Nyctaginaceae
kusútakish	1		Moraceae[1]
kutsápau	1	*Sterculia* spp.	Sterculiaceae
magkuák	1	*Cespedesia spathulata*	Ochnaceae

mejénkach	1	?	-
mujúshinim	1	*Cordia toqueve**	Boraginaceae
pegkáenum	1	various genera	Clusiaceae
sáka	1	*Micropholis brochidodroma*	Sapotaceae
shimút	1	*Apeiba aspera*	Tiliaceae
súu	1	*Cecropia* spp.	Moraceae
tagkána	1	*Triplaris americana*	Polygonaceae
tajép	1	*Ormosia* cf. *coccinea*	Fabaceae
táuch	1	*Lacmellea* spp.	Apocynaceae
tsáagnum	1	*Isertia laevis*	Rubiaceae
tsáchik	1	*Randia armata*	Rubiaceae
tsakátska	1	*Jacaranda* spp.	Bignoniaceae
umpákainim	1	*Carpotroche* sp.	Flacourtiaceae
wewé	1	*Cybianthus* spp.	Myrsinaceae
wichígnum	1	?	Meliaceae
yagkíp	1	various genera	Clusiaceae
yáis	1	various genera	Annonaceae
íwaiwaig (***dúpi***)	1	*Duroia hirsuta**	Rubiaceae
sámpi (***shijíkap***)	1	*Inga* sp.*	Fabaceae
timúna (***yamákainim***)	1	*Pterocarpus* sp.*	Fabaceae
tsémpu (***tsanchínakish***)	1	*Compsoneura capitellata**	Myristicaceae
(***yagkíp***)	1	*Stylogyne micrantha**	Myrsinaceae

[1] (Guallart 1997)

The identity of twelve (7.7%) of the 156 trees could not be determined within a 95% confidence interval in the consensus analysis (see Table 5.3). The failure of the consensus analysis to find a "correct" answer for these trees is a result of serious lack of agreement among informants regarding their name. The botanical identity of all 12 of those trees was determined using voucher specimens or, in a few cases, simply by field observation. Glenn Shepard (personal communication) has predicted that the trees that indigenous peoples of the upper Amazon find difficult to identify should correspond with the trees that the well known neotropical botanist Alwyn Gentry (1993) considers difficult in his key to the plants of that region, which is based mostly on sterile characters. One of the trees that appears in Table 5.3, *Cordia toqueve* (Vásquez Martínez 1997) is a member of a group that Gentry finds troublesome (1993: 58). Another species, *Casearia obovalis* (Sleumer 1980: 372), could only be identified to genus in Gentry's key using leaf punctations (1993:51), a feature that does not appear to be important for the Aguaruna. However, none of the other biological taxa listed in Table 5.3 are in the groups that Gentry considers to be difficult.

Table 5.3 – Trees with no consensus name.

folk genus	**# of indiv. present**	**biological range**	**family**
no consensus	4	(not determined)	Rubiaceae*
no consensus	2	*Cordia toqueve**	Boraginaceae
no consensus	2	*Calyptranthes sp.**	Myrtaceae
no consensus	1	*Trichilia septentrionalis**	Meliaceae
no consensus	1	*Guarea macrophylla* ssp. *macrophylla**	Meliaceae
no consensus	1	(not determined)	Moraceae*
no consensus	1	*Casearia obovalis**	Flacourtiaceae

I have also compared the results of the consensus analysis with observations I made of the actions that informants took while identifying the trees. The aim is to see if there are any correlations between degree of informant consensus and particular actions taken while making identifications. I measured the degree of consensus for each tree as the number of informants who got the "correct" answer, as determined by the consensus analysis. In cases where there was no correct answer with a 95% confidence interval, I counted the degree of consensus as zero. A Spearman nonparametric correlation analysis (Madrigal 1998) shows that there is a statistically significant (with a 99% confidence interval, two tailed) inverse correlation ($\rho = -0.699$) between the number of informants who cut the bark and the number of informants who gave the correct answer for the trees in question. This analysis gives statistical support to my overall impression that bark cutting is a method that informants tend to employ when simply glancing at the trunk and leaves is not enough to make the identification. In other words, informants are most likely to cut the bark of difficult trees. López Zent (1999) and Carneiro (1978) make similar observation regarding the role of bark cutting in tree identification among the Hotï of Venezuela and the Kuikuru of Brazil, respectively. An alternate interpretation of bark cutting is that it serves as a way of verifying one's original suspicion about the identity of a tree. For example, if an Aguaruna man glances at the trunk and leaves of a tree and decides that it is probably ***úchi dáum*** (*Couma macrocarpa*), based on those features, he might cut the bark to confirm that it has white sweet tasting sap, just to make sure he is right. However, the clear inverse correlation between the number of informants who cut the bark of a tree and the number of informants who name it correctly suggests that bark cutting is more likely to be an additional step in the identification of difficult trees than it is to be merely a way of confirming the identity of easy trees.

Conclusion

This chapter details the results of an experiment that involved observing eight informants' actions and recording the names they provided as they independently identified 156 trees in 25 Gentry type study plots. Visual clues involving the trunk or leaves are of primary importance and played a role in all of the identifications. Cutting the bark is the next step for trees that cannot be identified simply by glancing at the trunk and leaves. Informants cut the bark in 42.9 % of the identifications. In some cases, informants cut the bark only for the purpose of observing the inner trunk and looking for sap. Most often, however (35.7 % of all identifications) informants smelled the piece of cut bark. Informants tasted the bark or sap very rarely (less than 1% of all identifications). Consensus analysis of the folk genus names provided by informants for the 156 trees was able to provide a reasonable idea of the correct name of 92.3% of the trees with 95% confidence. However, I judged that a few of the consensus names were incorrect based on botanical determinations and my other collections as well as the ethnobotanical work of Guallart (1997) and Berlin *et al*. (n.d.). A statistically meaningful inverse correlation was found between the number of informants who cut a tree and the number who agreed on the consensus answer. That correlation gives added weight to the observation that bark cutting is a method informants tend to use for more difficult trees.

Chapter 6

Cultural Uses and Ecological Information for the Study Trees

Introduction

Trees play a number of important roles for the Aguaruna. Unfortunately, a description of cultural uses of all the trees mentioned in this monograph would require more space than I can devote here. In this chapter, I describe major uses of the 63 trees that I chose for structured interviews along with their companions (***kumpají***). I have divided uses into the following categories: medicinal, house construction, other construction, firewood, edible fruit. The Aguaruna also value trees with fruits eaten by local mammal and bird species, especially those that are significant food sources for important game animals. My Aguaruna informants often gave such ecological information when I asked the question "***¿Wajúk takátainta?***" 'How is it used?' about a particular tree. This chapter includes sections briefly discussing study trees that are considered important food sources for a few economically significant groups of mammals and birds.

The subject of how trees are useful to the Aguaruna is worthwhile in its own right, but its treatment in this chapter is necessarily brief. Utility is, in some sense, a diversion from the principal discussion of how identification occurs. A classic and ongoing debate within the field of ethnobiology relates to the relative strengths of intellectualist and utilitarian explanations of folk classificatory systems (e.g., Anderson 2000; Berlin 1992; Hunn 1982; Posey 1984). On this matter, however, identification should be less controversial than classification. The motive for identifying a tree might be utilitarian, but the actual process of identification should be influenced little by utilitarian concerns. Clearly one must recognize a plant before one can use it (Jernigan in press). Norbert Ross (personal communication) has suggested that a person who is looking for a tree for a particular purpose might focus his attention most on the part of the tree that is relevant for the intended purpose. In other words, a man looking for a tree to make supporting posts for a house will be looking for a tree with a straight trunk. Therefore, the hypothetical man might focus his gaze more than he normally would on the trunks of trees he encounters. I agree that there is some strength to this argument. As I have discussed in Chapter 5, however, the steps taken during tree identification take a logical order that is strongly influenced by convenience. People generally glance at the trunk first because that is the part that can be seen most easily. The next step is to look up at the canopy to discern leaves and flowers or fruits, if they are present. If those clues are not enough to make an identification, cutting the bark to check for distinctive heartwood, odor or sap is necessary.

Trees with Medicinal Uses

Many of the 63 study trees and their relatives have medicinal uses. The Aguaruna use the sap of a number of trees for treating ***kuwíim*** 'small skin sores.' Several of these correspond to species in the Myristicaceae, including ***takáikit tsémpu*** (*Virola* sp.), ***úntuch tsémpu*** *(Iryanthera juruensis*) and ***ejé̲sh*** (*Iryanthera tricornis*, *Virola pavonis*). Another tree used for this purpose, ***kadáit tsémpu***, was not collected, but, based on informants' descriptions it seems likely that it also corresponds to one or more species in the Myristicaceae. The sap of ***múun sámpi*** (*Inga ruiziana*) also serves for treating skin sores. Interestingly, all of the trees listed above for treating skin sores have reddish sap, although the color is very light red, in the case of ***ejé̲sh***. Informants did not explicitly say so, but the doctrine of signatures may be at work here. Glenn Shepard (2000) has noted that the Matsigenka and Yora of the Southern Peruvian Amazon use certain plants with reddish sap to treat wounds and cuts as well as other illnesses associated with bleeding.

The illness ***jágku*** 'rheumatism' is generally found in the elderly. The most common symptoms include pain and swelling of the joints (Brown 1984). The Aguaruna treat ***jágku*** with the bark of several of the study trees, specifically: ***chikáunia*** (*Myroxylon balsamum*), ***shikiú*** (*Erythrina* spp.), ***séetug*** (*Cedrela odorata*) and ***magkuák*** (*Cespedesia spathulata*). An infusion of the bark of ***magkuák*** also serves to treat ***imúm*** 'edema' and general body pain. Both the bark and seeds of another tree, ***shishíim*** (*Couroupita subsessilis*), are used in aqueous infusion to treat ***jágku***. The bark of ***shína*** (*Brosimum rubescens*, Moraceae), is boiled in water and mixed with *aguardiente* (cane liquor) and drunk to treat rheumatism. ***Shína***'s bark can also be used to prepare an enema for pain in childbirth.

A few of the study trees are useful for treating ***shíip*** 'amoebiasis' (Uwarai Yagkug *et al*. 1998). The major symptom of ***shíip*** is bloody or mucousy diarrhea. An Aguaruna suffering from ***shíip*** might cut the trunk of the tree ***úchi dáum*** (*Couma macrocarpa*) in order to lick some of its sweet tasting sap. The fruit of ***apái*** (*Grias* spp.) is another remedy for ***shíip***. The fruit is grated and used to prepare an enema for treating this illness. Bark from the botanically related trees ***yantsáu*** (*Guarea macrophylla* ssp. *pendulispica*, *Guarea guidonia*) and ***bíchau*** (*Guarea macrophylla* ssp. *pendulispica*, *Trichilia pallida*) can also be used to prepare an enema for treating amoebiasis. The fruit of ***yantsáu*** serves to make a hot water infusion for the same purpose. Crude extracts of the leaves and fruit of the species *Guarea guidonia* have shown antiviral activity in laboratory tests (Simoni *et al*. 1996).

Tajép (*Ormosia* cf. *coccinea*) and ***pandáij*** (*Ormosia* cf. *amazonica*) are both useful for treating ***iyágbau*** 'swelling' caused by fractures and dislocations. Pieces of the bark are cut, heated in boiling water and then placed on the swollen joint (Figure 6.1). The bark of ***tsáik*** (*Cedrelinga cateniformis*) is crushed and applied externally for ***tejemách*** 'dermatitis or fungal infections of the feet' (Uwarai Yagkug *et al*. 1998).

6.1 – The author's swollen foot being treated with hot pieces of bark from ***tajép*** (*Ormosia* cf. *coccinea*), Bajo Cachiaco.

Yunchít is an illness whose primary symptoms are small mouth ulcers, irritation of the tongue and hoarseness of the voice. ***Yunchít*** is sometimes associated with a bout of cold or flu and occurs most frequently in children (Brown 1984). However, according to Uwarai Yagkug (1998), ***yunchít*** is equivalent to scurvy. The Aguaruna treat ***yunchít*** with the sap of the

Myristicaceae ***takáikit tsémpu*** (*Virola* sp.), ***úntuch tsémpu*** *(Iryanthera juruensis*) and ***múun sámpi*** (*Inga ruiziana*, Fabaceae).

The bark of ***wámpa*** (*Inga edulis*) is used to treat stomach and intestinal pain. The sap of ***súu*** (*Cecropia* spp.) is also useful for treating stomachache. The Aguaruna use ***súu***'s bark and leaves to sooth the very painful sting of the freshwater stingray ***kaáshap*** (*Potamotrygon hystrix*) (Guallart 1968).

The bark of the tree ***uwáchaunim*** (*Calycophyllum megistocaulum*) is used to treat ***úgku***, a disease term that refers to a pus filled boil. The condition can be accompanied by a fever (Brown 1984). The Aguaruna treat ***úgku*** by peeling the bark of the tree ***uwáchaunim*** and applying it either directly to the infected part of the skin or using it to prepare a bath with cold water. Some informants also indicated that the bark can be used to prepare an infusion for oral administration, to treat ***úgku***.

Trees Used for House Construction

In the communities where I worked, nearly all family houses still use traditional materials, although community meeting halls and schools often incorporate modern elements such as a cement foundation or a corrugated metal roof. Houses use post and beam construction. Trees are used for the main upright posts, (***ajiámu***) the supporting cross beams (***paují***), lateral beams (***mínag***) and the diagonal ceiling joists (***awágkat***) (Uwarai Yagkug *et al*. 1998). Palm leaves are used for roof thatch (Figure 6.2) and palm wood, or bamboo stalks are used to make walls. Bianchi (1982) gives good descriptions and illustrations of very similar traditional house construction technology among the Shuar and Achuar. A dozen of the study trees play an important role in house construction, either for the main upright posts, the lateral beams, or ceiling joists. Trees that have hard, durable heartwood (***shúgku***) make good upright posts. Among the study trees, these include ***shína*** (*Brosimum rubescens*, Moraceae), ***chikáunia*** (*Myroxylon balsamum*), ***bukún*** (*Chimarrhis* spp., *Macrocnemum roseum*) and ***uwáchaunim*** (*Calycophyllum megistocaulum*). ***Bukún*** and ***uwáchaunim*** can also serve as lateral beams. ***Pantuí*** (*Protium* spp.) is used for ceiling joists. Trees that are good for both lateral beams and ceiling joists include ***tigkíshpinim*** (*Tachigali* sp.), ***wantsún*** (*Tachigali* spp.), ***ugkuyá*** (*Tachigali formicarum*), ***ká̲wa*** (*Ocotea floribunda*), ***chijáwe*** (*Miconia* spp.), ***ukuínmanch*** (*Miconia* spp.),

Figure 6.2 – An Aguaruna man and his family and friends are adding palm leaves to the roof of his house, Bajo Cachiaco.

úntuch tsémpu (*Iryanthera juruensis*) and ***kadáit tsémpu*** (not collected). Doors for houses (***wáiti***) can be made out of the buttressed roots of a very large individual of ***shuwát*** (*Eschweilera* spp.).

Trees Used for Other Types of Construction

A number of the study trees are useful for other kinds of construction. Good trees for making dugout canoes (***kánu***) tend to have wood that is strong and hard and that does not rot quickly (Figure 6.3). The Aguaruna favor the following of the study trees for making dugout canoes: ***tsáik*** (*Cedrelinga cateniformis*), ***káwa tínchi*** (*Nectandra olida*, *Ocotea floribunda*), ***káikua*** (*Ocotea costulata*, *Licaria* sp.), ***máegnum*** (*Ocotea floribunda*), ***káwa*** (*Ocotea floribunda*), ***séetug*** (*Cedrela odorata*), ***awánu*** (*Cedrela odorata*), ***pítuuk*** (one or more species in the Moraceae), ***páunim*** (*Vochysia* spp. and *Ruizterania trichanthera*) and ***tuntuínum*** (not collected). The Aguaruna also use ***tsáik*** and ***káikua*** for making the ***chimpuí***, a wooden seat reserved for the male head of household (Brown 1984) or an important guest. ***Káwa*** is also used for making tables and planks for walls (***tanísh***). Wood from the trees ***shína***, ***súwa*** (*Genipa americana*), ***úntuch tsémpu*** (*Iryanthera juruensis*) and ***kadáit tsémpu*** (not collected) are useful for making axe handles. The trunks of the shrub ***antumú chinchák*** (various Melastomataceae) and the small trees ***tseék*** (various Melastomataceae) and ***kapantú chinchák*** (various Melastomataceae) can be used as supporting posts for making beds and benches. The bark of ***shuwát*** (*Eschweilera* spp.) is very fibrous and makes a strong string and good general purpose fastener for anything from making a leash for an animal, to constructing baskets, to hanging mosquito nets .

A few of the study trees are valued timber species that are selectively logged in the study communities for local use or sale to outside buyers. Locally they are used for making boards for bridges (Figure 6.3), walls and benches. The most important sources of lumber for the Aguaruna are ***tsáik*** (*Cedrelinga cateniformis*), ***ká̲wa*** (*Ocotea floribunda*), ***séetug*** (*Cedrela odorata*), ***awánu*** (*Cedrela odorata*) and ***páunim*** (*Vochysia* spp. and *Ruizterania trichanthera*).

Figure 6.3 – Bridge crossing a stream in Santa María de Nieva. A dugout canoe can be seen on the right.

Trees Used for Firewood:

A number of the study trees and their companions are valued as firewood for cooking. The Aguaruna position three thick logs at opposing angles so that they can support a cooking pot (see Figure 6.4). Trees valued for cooking fuel include: ***úchi dáum*** (*Couma* spp.), ***shíshi*** (*Protium* spp.), ***shijíkap*** (*Protium* sp.), ***chípa*** (*Protium fimbriatum*), ***pantuí*** (*Protium* spp.), ***samíknum***

(*Macrolobium* spp., *Pithecellobium basijugum*), ***wampíshkunim*** (*Macrolobium limbatum*), ***sejempách*** (*Inga* spp.), ***sáu chinchák*** (*Bellucia* cf. *pentamera*), ***satík*** (*Cecropia* spp.), ***súu*** (*Cecropia* spp.), ***úntuch tsémpu*** (*Iryanthera juruensis*), ***bukún*** (*Chimarrhis* spp., *Macrocnemum roseum*) and ***tiík*** (*Zanthoxylum* spp.).

Figure 6.4 **–** Arrangement of logs for cooking. In the foreground, Lala the parrot, a ***tingkú*** (*Amazona amazonica*) attempts to sneak a snack of manioc.

Trees with Fruit Edible for People

The Aguaruna value the fruit of some of the study trees for their edible fruit. Edible trees include two species in the Apocynaceae, ***úchi dáum*** (*Couma macrocarpa*) and ***úchi táuch*** (*Lacmellea oblongata*). ***Úchi dáum*** has a round yellowish sweet tasting fruit that is eaten raw. The fruit of ***úchi táuch*** is similar, but a bit smaller with sticky white sap that gets all over ones hands and mouth in the process of eating it. The Aguaruna also eat the fruit of various trees in the genus *Dacryodes* in the Burseraceae. The fruit are black and ellipsoid, with a thin edible layer covering a large, hard seed. The fruit can be eaten raw or roasted. Folk taxa in this group include ***wáwa kunchái*** (*Dacryodes kukachkana*), ***múun kunchái*** (*Dacryodes kukachkana*), ***númi kunchái*** (*Dacryodes peruviana*), ***tsáju kunchái*** (*Dacryodes nitens*) and ***újuts*** (*Dacryodes* sp.). One day, after a plant collecting trip near the community of Pagki, my field assistant, Gregorio Reátegui, and I were walking back through the community with our hands full of tree branches that we intended to make into voucher specimens. Gregorio was carrying a branch of ***múun kunchái*** full of ripe enticing fruit. As we passed a group of children, Gregorio had to hold the branch high in the air to avoid small grasping hands. The Aguaruna also eat the fruit of members of the genus *Garcinia*, in the Clusiaceae, including ***pegkáenum*** (*Garcinia macrophylla*) and ***wayámpainim*** (*Garcinia madruno*). Another kind of ***pegkáenum***, ***saáwi pegkáenum***, has similar edible fruit. ***Saáwi pegkáenum*** was not collected, but, based on observations of its yellow sap and descriptions of its fruit, it is likely also a member of the genus *Garcinia*. *Garcinia* fruit are yellow when mature and contain a delicious tart pulp inside. The Aguaruna are quite fond of the fruit of trees of the genus *Inga*, in the Fabaceae. Trees in this group have a white sweet tasting pulp. There are many named taxa in this group, including ***wámpa*** (*Inga edulis*), ***múun sámpi*** (*Inga ruiziana*), ***sejempách*** (*Inga* spp.), ***putsúu sámpi*** (*Inga* sp.), ***buabúa*** (*Inga* spp.), ***ímik sámpi*** (*Inga* spp.), ***yakúm sámpi*** (*Inga* spp.) and ***yuwícham sámpi*** (*I. leiocalycina*). All are considered edible, although ***ímik sámpi*** is said to cause vomiting if one consumes too much. Finally, the Aguaruna also consider the fruit of ***apái*** (*Grias* spp., Lecythidaceae) to be edible, although it is hard and does not have much flavor.

Trees with Fruit or Flowers Eaten by Mammals

During the course of my research on the process of tree identification, my Aguaruna informants often volunteered information about which of the study trees have fruit or flowers that are food sources for local mammal species. It would be beyond the scope of the present monograph to try to include a discussion of all data that I gathered on this subject. For this reason, I have chosen to focus only on two frequently mentioned and economically important groups of mammals. One of the groupings consists of large rodents (order Rodentia) in the families Agoutidae, Dasyproctidae, Hydrochaeridae and Dinomyidae. The other group includes monkeys (order Primates) and a few other arboreal mammals (Berlin and Patton 1979; Emmons and Feer 1990). Data from the investigations of José María Guallart (1962) and Brent Berlin and James Patton (1979) on the Cenepa River give a good idea of the biological range of many of the Aguaruna mammal names mentioned by my informants, assuming little variation in the biological referent of names between the Cenepa and Nieva regions.

Berlin and Patton (1979) list five Aguaruna folk genera of large rodents: the paca ***káshai*** (*Cuniculus paca*), the pacarana ***kashaiyáu*** (*Dinomys branickii*), the capybara ***ugkubiú*** (*Hydrochoeris hydrochaeris*), an agouti ***káyuk*** (*Dasyprocta* sp.) and the acouchi ***yugkíts*** (*Myoprocta prattii*). Of these five, my informants only discussed the diet of ***káshai***, ***káyuk*** and ***yugkíts***. My informants told me that ***ugkubiú*** does not occur in the upper Nieva area, and, in any event, capybaras feed on aquatic and grassy vegetation, rather than fallen tree fruit (Emmons and Feer 1990). Berlin and Patton (1979) report that the ***kashaiyáu*** was considered quite rare on the Cenepa River and many informants had never seen one. My Aguaruna informants did not mention the ***kashaiyáu***. The Aguaruna consider all mammals of this group to be edible except the ***kashayáu*** (Berlin and Patton 1979). Michael Brown (1985) notes that the agouti species *Dasyprocta aguti* is a highly favored game species for Aguaruna of the Alto Mayo.

According to the scientific literature, the paca *Cuniculus paca* (***káshai***) eats fallen fruits, seeds, leaves, stems and roots of plants. The Aguaruna folk genus ***káyuk*** corresponds to species in the genus *Dasyprocta* (agoutis). Agoutis eat fruits and other plant matter, even raiding gardens. The acouchi *Myoprocta prattii* (***yugkíts***) feeds on fruits and seeds (Emmons and Feer 1990; Berlin and Patton 1979). My Aguaruna informants said that both ***káshai*** and ***káyuk*** eat the fruits of the following trees: the Burseraceae ***múun kunchái*** (*Dacryodes kukachkana*), ***wáwa kunchái*** (*Dacryodes kukachkana*), ***chípa*** (*Protium fimbriatum*) and ***shíshi*** (*Protium* spp.); the Fabaceae ***ímik sámpi*** (*Inga* spp.), ***múun sámpi*** (*Inga ruiziana*), ***sejempách*** (*Inga* spp.), ***putsúu sámpi*** (*Inga* sp.) and ***tagkáam*** (*Parkia multijuga*); ***káwa*** (*Ocotea floribunda*, Lauraceae), ***ejésh*** (*Iryanthera tricornis*, *Virola pavonis*, Myristicaceae) and ***apái*** (*Grias* spp., Lecythidaceae). Informants also listed some food sources exclusive to the paca ***káshai***, including the fruits of: ***shijíkap*** (*Protium* sp., Burseraceae), ***buabúa*** (*Inga* spp., Fabaceae), ***batút*** (*Ocotea* spp., Lauraceae) and ***tákae*** (*Brosimum* spp., Moraceae), as well as the large flowers of the Lecythidaceae ***kaáshnum*** (*Eschweilera* spp.), ***shuwát*** (*Eschweilera* spp.) and the flowers and fruits of ***shishíim*** (*Couroupita subsessilis,* Lecythidaceae). Informants did not mention any of the study trees as food sources for the acouchi ***yugkíts*** (*Myoprocta prattii*), but one informant did mention the fruits of the tree ***shagkuína*** (*Pseudolmedia macrophylla*, in the Moraceae) for this species.

Berlin and Patton (1979) list nearly two dozen folk genera of monkeys and a few other arboreal mammals that the Aguaruna consider to be related as ***kumpají***. My Aguaruna informants mentioned only eight of those folk genera during our discussions about the study trees. These include: the night monkey ***butúsh*** (*Aotus trivirgatus*), the titi monkey ***sugkamát*** (*Callicebus moloch*), the capuchin monkeys ***bachíg*** (*Cebus albifrons*) and ***wajiám*** (possibly *Cebus macrocephalus*), the howler monkey ***yakúm*** (*Alouatta seniculus*), the marmoset ***pínchi*** (*Cebuella pygmaea*) and the kinkajou ***kúji*** (*Potos flavus*), a member of the family Procyonidae (the raccoon family) (Uwarai Yagkug *et al*. 1998; Emmons and Feer 1990). Informants also mentioned the small monkey ***pichík***, which may correspond to one or more species in the tamarin genus *Saguinus*. Emmons and Feer (1990) list the Peruvian Spanish name *pichico* for several species of *Saguinus*. The Aguaruna consider all mammals in this group to be edible. Berlin and Patton noted, in 1979, that hunting pressure had already made many monkey species scarce around population centers in the Cenepa. My own observations suggest that is also the case in the upper Nieva. I did not actually see any monkeys in the wild while conducting my research and only once heard the distant call of the titi monkey ***sugkamát***. The Aguaruna keep some monkey species as pets (Figure 6.5). Monkeys also play an important role in Aguaruna folktales. In one story, a spider monkey (genus *Ateles*) named Tsewa first taught an Aguaruna hunter how to use the blowgun (***úum***) and to sing special magical songs (***washí ánen*** **–** 'spider monkey songs') for good luck in hunting (Brown 1985).

The preferred diet of the arboreal mammals in this group varies somewhat between species. According to scientific literature, night monkeys, such as *Aotus trivirgatus* (***butúsh***), eat fruits, insects and flower nectar. Titi monkeys, including *Callicebus moloch* (***sugkamát***), feed on leaves and fruits. Capuchin monkeys, including *Cebus albifrons* (***bachíg***) and *Cebus macrocephalus* (possibly ***wajiám***) feed on fruits, seeds and arthropods. *Alouatta seniculus* (***yakúm***), a howler monkey eats fruits and leaves. The Pygmy Marmoset ***pínchi*** (*Cebuella pygmaea*) consumes tree sap, insects and some fruits. The monkey ***pichík*** is possibly a tamarin

Figure 6.5 – The Aguaruna keep some monkeys as pets, including the ***pichík*** (*Saguinus* sp.?) on this lady's shoulder.

of the genus *Saguinus*. Tamarins eat mainly fruits and insects. The kinkajou *Potos flavus* (***kúji***) feeds mostly on fruit, but also eats some insects and flower nectar (Emmons and Feer 1990). My Aguaruna informants said that several of the trees in my study are food sources for mammals of this group. These include the Clusiaceae ***pegkáenum*** (*Garcinia macrophylla*) and ***wayámpainim*** (*Garcinia madruno*) and the Apocynaceae ***úchi dáum*** (*Couma macrocarpa*) and ***úchi táuch*** (*Lacmellea oblongata*). The Fabaceae ***buabúa*** (*Inga* spp.), ***ímik sámpi*** (*Inga* spp.), ***yakúm sámpi*** (*Inga* spp.) were mentioned as food sources for the monkeys in this group, but not for the kinkajou *Potos flavus* (***kúji***).

Trees with Fruit or Flowers Eaten by Birds

The Aguaruna are well known for their extensive knowledge of the bird species found in their local environment (Berlin *et al*. 1981, Boster *et al*. 1986). As José María Guallart (1969) notes, the Aguaruna appreciate birds not only as sources of food or feathers for adornments. Birds also play an important role in Aguaruna folktales and are appreciated for their beautiful songs and ability to fly. The connection between birds and plants is important for the Aguaruna. When hunting, the Aguaruna use their knowledge about bird behavior, ecology and diet to locate preferred game species. Birds considered too small to be hunted by men may be hunted by boys. Furthermore, such ecological knowledge is not limited only to useful species, since indigenous people make many ecological observations while hunting and foraging (Berlin 1992, Nabhan 2000).

My informants were able to tell me not only which of the study trees have fruit or flowers that nourish local birds species, but were also able to say which birds feed on each particular tree. It would require many pages (and therefore be beyond the scope of this monograph) to discuss all of the birds that informants consider to feed on the study trees. However, in the interest of giving some picture of this extensive body of knowledge, I have decided to focus on three highly frugivorous bird families of significant economic importance to the Aguaruna: Cracidae (guans, chacalacas and curassows), Ramphastidae (toucans) and Psittacidae (parrots) (Hilty and Brown 1986). The Ethno-ornithological investigations of Brent Berlin and collaborators (Berlin *et al*. 1981, Boster *et al*. 1986), on the Cenepa River; by Jernigan and Dauphiné (2005), on the upper Marañón and upper Nieva rivers and of José María Guallart (1969), in various sites, allow for a tentative assignment of biological ranges for many Aguaruna bird names. In most cases, data from these three sources are in agreement, but I have indicted some differences that reflect regional or temporal variation.

The family Cracidae in the order Galliformes includes four sub-groupings: the largely arboreal chacalacas, guans and piping guans and the terrestrial curassows (Sick 1993; Parker *et al*. 1996). Many birds of this family are called *pucacungas* or *pavos de monte* 'wild turkeys' in Spanish, the last term referring to their similarity in appearance to turkeys, members of the related family Phasianidae (Sick 1993). The Aguaruna recognize more than half a dozen folk genera of birds in the Cracidae, including the guans ***pítsa*** (*Chamaepetes goudotii*), ***aúnts*** (*Penelope jacquacu*) and ***uwáchau*** (*Aburria aburri*); the piping guan ***kúyu*** (*Pipile cumanensis*); and the curassows ***báshu*** (*Mitu* spp.), ***píwi*** (*Crax globulosa*) and ***ayáchui*** (*Nothocrax urumutum*) (Hilty and Brown 1986). Berlin and O'neil (n.d.) identify ***wakáts*** as the Speckled Chacalaca (*Ortalis guttata*), while Guallart (1969) lists the Andean Guan *Penelope montagnii*, for this name. Some Aguaruna informants said that all of the birds listed above are related as ***kumpají***, but many consider the curassows ***báshu***, ***píwi*** and ***ayáchui*** to be a separate group. The Aguaruna highly value the Cracidae as game birds. Based on his work with the Aguaruna of the Alto Mayo, Michael Brown (1985) names the cracid species *Mitu mitu* (***báshu***), *Pipile cumanensis* (***kúyu***), *Penelope jaguacu* (***aúnts***), and *Penelope montagnii* (***wakáts***) as particularly favored game species in that region.

According to the ornithological literature (Hilty and Brown 1986; Sick 1993), members of this family feed mainly on fruits, seeds and tender shoots. They can also eat arthropods, mollusks and tree frogs. Curassows tend to forage fruits fallen on the ground, while the more arboreal members of the Cracidae feed either in trees or on fruits fallen to the ground. The Aguaruna consider birds of this family to consume mainly fruits and seeds. One informant said that ***ayáchui*** (*Nothocrax urumutum*) and ***aúnts*** (*Penelope jacquacu*) also eat ***námpich***, a general term for worms. Informants considered a number of the study trees as important food sources for cracids. Most significant among these are: the Myristicaceae ***takáikit tsémpu*** (*Virola* sp.), ***ejésh*** (*Iryanthera tricornis*, *Virola pavonis*) and ***chikúm*** (*Virola calophylla*, *Otoba glycicarpa*); the Melastomataceae ***sáu chinchák*** (*Bellucia* cf. *pentamera*), ***kapantú chinchák*** (various genera) and ***antumú chinchák*** (various genera); the Lauraceae ***káwa tínchi*** (*Nectandra olida, Ocotea floribunda*), ***káikua*** (*Ocotea costulata, Licaria* sp.) and ***batút*** (*Ocotea* spp.); ***putsúu sámpi*** (*Inga* sp., Fabaceae); and the Burseraceae ***újuts*** (*Dacryodes* sp.) and ***númi kunchái*** (*Dacryodes peruviana*). A few trees were mentioned as food sources for all of the cracids except the curassows. These include: the Moraceae ***súu*** (*Cecropia* spp.) and ***satík*** (*Cecropia* spp.); ***yantsáu*** (*Guarea* spp., Meliaceae); ***tseék*** (various Melastomataceae); and the Lauraceae ***wampúsnum*** (cf. *Nectandra schomburgkii*) and ***takák*** (*Ocotea gracilis*). Hilty and Brown (1986) note that curassows tend to prefer primary forest and do not do well under hunting pressure. These factors might explain why they would not favor the fruit of *Cecropia*, which are common secondary growth trees. The Aguaruna consider the trees ***yantsáu***, ***tseék***, ***wampúsnum*** and ***takák*** to grow near rivers, or in lowland areas, where contact with humans is more likely.

The family Ramphastidae, in the order Piciformes, includes tucans and aracaris, distinctive, long-beaked birds that feed in the canopy (Parker *et al*. 1996; Sick 1993). Aguaruna folk genera for this family include the toucanets ***ikáuk*** (*Aulacorynchus* spp.) and ***kajúntsam*** (*Selenidera reinwardtii*); the aracari ***pinínch*** (*Pteroglossus* spp.); and the toucans ***kéjua*** (*Ramphastos culminatus*), ***tsukagká*** (*Ramphastos cuvieri*) and ***sháatak***, which Dauphiné and Jernigan (in prep.) identify as the Black-mandibled Toucan (*Ramphastos ambiguous*), and Guallart (1969) identifies as the Gray-breasted Mountain-Toucan (*Andigena hypoglauca*). The Aguaruna consider all birds in this group to be related as ***kumpají***. The Ramphastidae are considered edible and are especially valued for their bright feathers which are used to decorate the ***tawás***, a crown worn by men. The toucan ***tsukagká*** plays a role in Aguaruna folklore. In one story, ***tsukagká*** noticed that the woodpecker ***tátasham*** (*Campephilus* spp.) could make a home for himself in a dead tree. ***Tsukagká*** asked ***tátasham*** for his home and was granted the request. When the home rotted, ***tsukágka*** flew over to ***tátasham***'s new home to ask for that. To this day, ***tátasham*** continues to make new homes and ***tsukagká*** continues to follow him to ask for each new home when his old home has rotted.

Toucans and aracaris are highly frugivorous and play an important role in seed dispersal. Toucans also eat small arthropods and even bird hatchlings (Sick 1993). The Aguaruna also consider that the members of this family feed primarily on fruit, including the fruit of some of the study trees. These include: the Myristicaceae ***úntuch tsémpu*** (*Iryanthera juruensis*), ***takáikit tsémpu*** (*Virola* sp.), ***ejésh*** (*Iryanthera tricornis*, *Virola pavonis*) and ***chikúm*** (*Virola calophylla*, *Otoba glycicarpa*); ***yantsáu*** (*Guarea* spp., Meliaceae); the Melastomataceae ***tseék*** (various genera), ***sáu chinchák*** (*Bellucia* cf. *pentamera*), ***kapantú chinchák*** (various genera), ***chijáwe*** (*Miconia* spp.) and ***antumú chinchák*** (various genera); the Moraceae ***súu*** (*Cecropia* spp.) and ***satík*** (*Cecropia* spp.); the Lauraceae ***wampúsnum*** (cf. *Nectandra schomburgkii*), ***káwa tínchi*** (*Nectandra olida*, *Ocotea floribunda*), ***káwa*** (*Ocotea floribunda*), ***káikua*** (*Ocotea costulata*, *Licaria* sp.), ***takák*** (*Ocotea gracilis*), ***máegnum*** (*Ocotea floribunda*) and ***batút*** (*Ocotea* spp.); and the Burseraceae ***újuts*** (*Dacryodes* sp.), ***wáwa kunchái*** (*Dacryodes kukachkana*), ***tsáju kunchái*** (*Dacryodes nitens*), ***múun kunchái*** (*Dacryodes kukachkana*), ***númi kunchái*** (*Dacryodes peruviana*) and ***chípa*** (*Protium fimbriatum*).

The family Psittacidae, in the order Psittaformes, includes parrots, parakeets and macaws. (Hilty and Brown 1986). The Aguaruna recognize more than a dozen folk genera within this family. These include the macaws ***wácha*** (*Ara severa*), ***takúm*** (*Ara ararauna*), ***yúsa*** (*Ara macao*) and ***shaámak***, which Guallart (1969) lists as the Military Macaw (*Ara severa*) and Dauphiné and Jernigan (in prep.) report as the Red-bellied Macaw (*Orthopsittaca manilata*). The Aguaruna recognize the parrots ***tuwísh*** (*Pionus menstruus*), ***chawáit*** (*Pionus chalcopterus*), ***kawáu*** (*Amazona* spp.), ***uwájmas*** (*Amazona ochrocephala*) and ***tigkú*** (*Amazona amazonica*); the parakeets ***pajái*** (*Aratinga mitrata*), ***chípi*** (*Aratinga leucophthalmus*) and ***mantseét*** (*Pyrrhura picta*) and the parrotlets ***kíjus*** (*Brotogeris jugularis*) and ***shiwíg*** (*Forpus xanthopterygius*) (Hilty and Brown 1986). Dauphiné and Jernigan (in prep.) identify ***nuinúi*** as the Spot-winged Parrotlet *Touit strictoptera*, while Berlin and O'neil (n.d.) report the Cobalt-winged Parakeet *Brotogeris cyanoptera* for that name. Some informants consider all members of the family Psittacidae to be related as ***kumpají***, while some people divide them up into two groups. One informant put the macaws (***wácha***, ***takúm***, ***yúsa*** and ***shaámak***) into a separate group. Another informant divided the parrots into two groups based on tail length, with the macaws and other long tailed parrots such as *Aratinga leucophthalmus* in one group, and short tailed parrots, such as those in the genera *Pionus*, *Brotogeris* and *Forpus*, in the other group. The Aguaruna consider birds in this family to be edible and also keep them as pets (Figure 6.6).

Members of the family Psittacidae eat mostly tree fruit and seeds, often foraging high in the canopy. Some species have very strong beaks capable of cracking hard shells (Sick 1993). My Aguaruna informants could name many tree species with fruit or flowers edible to members of this family. Informants said that the macaws eat the fruit of the Fabaceae ***sejempách*** (*Inga* spp.), ***putsúu sámpi*** (*Inga* sp.), ***múun sámpi*** (*Inga ruiziana*) and ***wámpa̲*** (*Inga edulis*); ***shijíg*** (*Hevea*

Figure 6.6 – A ***Takúm*** (*Ara ararauna*) in the care of the Reátegui family, Santa María de Nieva.

spp., Euphorbiaceae); and ***shuwát*** (*Eschweilera* spp., Lecythidaceae), as well as the fruit and flowers of ***shikiú*** (*Erythrina* spp., Fabaceae). For the parrots, parakeets and parrotlets, informants mentioned the fruit of the Fabaceae ***yuwícham sámpi*** (*I. leiocalycina*), ***wámpa*** (*Inga edulis*), ***sejempách*** (*Inga* spp.), ***putsúu sámpi*** (*Inga* sp.), ***múun sámpi*** (*Inga ruiziana*); ***shijíg*** (*Hevea* spp., Euphorbiaceae); ***súu*** (*Cecropia* spp., Moraceae); ***sáu chinchák*** (*Bellucia* cf. *pentamera*, Melastomataceae); ***káwa tínchi*** (*Nectandra olida*, *Ocotea floribunda*, Lauraceae);

and the Burseraceae ***újuts*** (*Dacryodes* sp.), ***wáwa kunchái*** (*Dacryodes kukachkana*), ***tsáju kunchái*** (*Dacryodes nitens*), ***múun kunchái*** (*Dacryodes kukachkana*), ***númi kunchái*** (*Dacryodes peruviana*) and ***chípa*** (*Protium fimbriatum*). Informants also said the parrots, parakeets and parrotlets consume the fruit and flowers of ***shikiú*** (*Erythrina* spp., Fabaceae).

Trees with Miscellaneous Other Uses

This section includes uses that do not fit well into any of the previous categories. The Aguaruna value the seeds or fruit of several of the study trees for body adornment. These include ***pandáij*** (*Ormosia* cf. *amazonica*) and ***tajép*** (*Ormosia* cf. *coccinea*) which both have hard, brightly colored seeds that can be pierced and strung on thread, either alone, or with other kinds of seeds, to make necklaces. The seed of ***chikáunia*** (*Myroxylon balsamum*) and the fruit of ***batút*** (*Ocotea* spp.) are worn on necklaces because of their pleasant fragrance. ***Chikáunia*** is worn only by women, and in fact, my male informants described the smell of the fruit by saying "***Chikáunia núwa núwa kugkúawai***" '***Chikáunia*** smells like a woman.' The pleasant odor of the fruit of ***batút*** is considered to ward off illness. The fruit of ***súwa*** (*Genipa americana*) is crushed to make a black dye that women use to color their hair. Men and women use ***súwa*** for face paintings which can have both recreational and magical significance (Brown 1984). ***Súwa*** is closely associated with another dye plant, ***ipák*** (*Bixa orellana,* Bixaceae), in Aguaruna folklore. According to legend, ***súwa*** and ***ipák*** were once young women who had a series of misadventures, getting themselves into greater and greater trouble, until they finally decided it would be better just to turn themselves into trees.

A number of trees in the Burseraceae have sap that can be burned as a light source. These are: ***múun kunchái*** (*Dacryodes kukachkana*), ***újuts*** (*Dacryodes* sp.), ***pantuí*** (*Protium* spp.),

shijíkap (*Protium* sp.) and ***shíshi*** (*Protium* spp.). The sap of all of these trees, especially ***shijíkap***, has the tendency to form hard balls on the trunk. The word ***shijíkap*** is used for the ball of sap itself, in addition to the specific tree that is considered to produce the greatest quantity of the sap balls. The Aguaruna fashion a cone shaped holder out of a large leaf and place balls of sap inside. The sap is ignited and burns slowly giving off light for nighttime activities. My field assistants Nestor and Gregorio Reátegui told me that, as school children, they sometimes did their homework by the light of ***shijíkap***.

Shijíg (*Hevea* spp.) has white sticky sap that can be made into rubber and sold. Another tree, ***barát***, also has sticky white sap with similar properties. The specimen I collected for ***barát*** was identified as *Ecclinusa lanceolata*, in the Sapotaceae. The name ***barát*** also likely includes trees in the genus *Chrysophyllum*, also in the Sapotaceae (see Gentry 1993: 776 and Berlin *et al*. n.d.). The process of making rubber from ***barát*** involves collecting the sap and cooking it in a pot until it becomes thick. A few more study trees have sap that can be mixed with the sap of ***shijíg***, when making rubber. These trees are ***tákae*** (*Brosimum* spp.) and ***shijigká sáei*** (*Clarisia racemosa*). One informant also stated that the sap of ***tákae*** can be mixed with the sap of ***úchi dáum*** (*Couma macrocarpa*) to make rubber.

A few other miscellaneous uses of the study trees deserve mention. The sticky yellow sap of the tree ***úum pegkáenum*** is used as an adhesive for the construction of blowguns (***úum***). Although this trees was not collected, field observations strongly suggest that this tree corresponds to one or more species in the Clusiaceae. The sap of the tree ***chípa*** (*Protium fimbriatum*) is used to paint ceramics including bowls (***piníg***), large clay pots (***ichínak***) and special clay pots (***búwits***) for storing manioc beer (***nijamánch***). The sap of ***chípa*** is heated and mixed with the fruit of ***ipák*** (*Bixa orellana*, Bixaceae), which makes a bright red dye. The mixture is then applied to the surface of the pot after firing. The sap of ***úchi dáum*** (*Couma macrocarpa*) can also be mixed with ***ipák*** for painting ceramics, or can be applied by itself to the inside of a pot to give a shiny finish (Brown 1984). The Aguaruna heat sap from ***úchi táuch*** (*Lacmellea oblongata*) and use it to mend small holes in canoes.

The kapok (soft cottony material) inside the fruits of ***wampúush*** (*Ceiba* spp.) and ***ménte*** (one or more species in the Bombacaceae) are used for fletching on the end of darts ***(tséntsak***) for blow guns (***úum***). The kapok from ***wampúush*** is considered superior for that purpose, since it holds together better. The leaves of ***tseék*** (various Melastomataceae) can be crushed and mixed with water and clay to make a pigment for dying clothes black. The Aguaruna fashion the bark of ***pítuuk*** (one or more species in the Moraceae) into a kind of hunting whistle for imitating the call of the ***káyuk*** (*Dasyprocta* sp.) (Berlin and Patton 1979).

Summary

All of the 63 study trees and many of their companions (***kumpají***) are useful to the Aguaruna. Many are directly useful as medicine, in construction, for firewood, for their edible fruit or for a variety of other purposes. Many are also useful in an indirect sense by providing food for favored game animals. The usefulness of trees to the Aguaruna does not likely have a large influence on the process of identification. However, it does not hurt to say something about what the Aguaruna do with trees after they identify them. Within the framework of evolutionary theory, it makes sense that the ability to recognize plants and animals is adaptive since some are potential helpful for survival, while some are potentially dangerous.

Chapter 7

Descripciones de los 63 Árboles del Estudio

En éste capítulo, se encuentran descripciones en el idioma Awajún y en Castellano de los 63 árboles de las entrevistas formales. Esta información viene de los participantes del estudio de las comunidades de Bajo Cachiaco, Kayamás, Tayúnts, Alto Págki y Atásh Shinúkbau, por el alto río Nieva, Condorcanqui, Amazonas, Perú. Las descripciones consisten en los característicos físicos y ecológicos más importantes de los árboles escogidos, incluyendo una mención de los animales que comen sus frutos o flores. Las descripciones también relatan como los árboles se utilizan. El propósito de este capítulo es proveer un documento sobre los resultados del estudio para distribuir en las comunidades participantes.

Ijúmjamu 1

Úchi Dáum

Úchi dáumak esájman, chikáchkaju tsakáwai. Kagkapé atsáwai. Numíji pushújin, pujúsai. Yagkují kapántui. Néje ápu, tenté, yumímitu, tsamák páujai. Puwáji púju, ajatín yumímitui. Úchi daumá numíji jíi tsupítai, néje aentstí yutáiyai. Puwáji ipákjai pachímja búwits ichínkashkam ipákuaku takatáiyai. Puwáji shíipnum tsuwámataiyai. Úchi daumá nején kaútui butúch, pínchi, sugkamát, yakúm, ámich, kújishkam.

Úchi dáum, un tipo de leche caspi, crece alto con muchas ramas. No tiene raíces tablares. El tronco es cenizo y áspero. Las flores son rojas. El fruto es grande, redondo, dulce y amarillo cuando está maduro. Tiene resina blanca, pegajosa y dulce. El tronco de úchi dáum sirve para leña. El fruto es comestible para la gente. Su resina se mezcla con la resina de achiote para pintar la cerámica. Su resina también se utiliza para curar amebiasis. Su fruto es comestible para varios monos, incluyendo el musmuqui, un tipo de mono de bolsillo, el tocón colorado y el cotomono. También comen sus frutos el zorro negro y la chosna.

Úchi Táuch

Úchi táuchak tséjenchi, sútajchi tsakáwai. Dúke wíju, esájmai. Puwáji ajatín, pújui. Néje tujútjutu, áetak samékbau, tsamák páujai. Jigkayí katsújam egkétui. Úchi tauchá néje aentstí yutáiyai. Puwáji daumá puwájijai pachímjamu, áeska kánu sepéptaiyai. Níina puwáji nuintúshkam, ipákjai pachímja, búwits ipákuaku takatáiyai. Úchi tauchá nején kaútui butúch, pínchi, pichík, sugkamát, wajíam, yakúm, kúiíshkam.

Úchi táuch crece delgado y bajo. Sus hojas son delgadas y largas. Tiene una resina blanca y pegajosa. Su fruto es esponjoso, verde cuando está inmaduro y amarillo cuando está maduro. Dentro de los frutos hay semillas duras. El fruto de úchi táuch es comestible para la gente. Su resina mezclado con la resina de leche caspi se utiliza para tapar huequitos en una canoa. Su resina también se mezcla con la resina de achiote para pintar la cerámica. Su fruto es comestible para varios monos, incluyendo el musmuqui, unos monos de bolsillo, el tocón colorado, un mono negro y el cotomono. La chosna también come sus frutas.

I̲júmjamu 2

Ménte

Méntek kampújman esájman tsakáwai. Kagkapé̲ múuntai. Kanáwe̲ kampújam áinawai. Saepé̲ dupájmai. Yágkuji̲ pújui. Néje̲ ápu, tugkuí, takí̲awai, ínitak u̲júch awai púju. Dúke̲ puyái, tsegkétskejui. Numíji̲ piípichin tsaká jagkígtin. Menté néje̲ ujuká dúwi wampuúshji jukí tségas páinka chígki tukutáiyai. Méntek imáchik dakajá takátaiyai. Menté nején kaútui kíjus, wágashkam.

Ménte, un tipo de lupuna, crece grueso y alto. Tiene raíces tablares grandes. Las ramas son gruesas. La corteza también es gruesa. Las flores son blancas. Su fruto es grande y ovalado. El fruto se reventa, y dentro, hay algodón blanco. Sus hojas son pequeñas y palmadas. Cuando el árbol está inmaduro, el tronco tiene espinas. El algodón de ménte se utiliza para hacer dardos para cazar pájaros. Ménte también sirve un poco para hacer tablas. Los frutos de ménte son comestible para un tipo de loro, y un tipo de perdiz.

Wampúush

Wampuúshik múuntan, kampújman tsakáwai. Kanáwe̲ kampújmai. Saepé̲ pujápjaju, tuntúuwai, imáchik jagkígtin. Yagkují̲ pújui. Néje̲ ápui, tenté, imáchik tugkuí, takí̲awai, ínitak u̲júch áwai púju. Jigkayí̲ ínitak, shuínai. Dúke̲ piípich, tsegkétskejui. Wampuúshi néje̲ ujuká dúwi wampúshji jukí tségas páinka chígki tukutáiyai. Wampuúshik imáchik dakajá takátaiyai.

Wampúush, un tipo de huimba, crece grueso y alto. Sus ramas son gruesas. El exterior de su tronco es partido y oscuro. El tronco también tiene algunas espinas. Sus flores son blancas. Su fruto es grande y redondo, un poco ovalado. El fruto se reventa, y dentro, hay algodón blanco. Las semillas son negras. Sus hojas son pequeñas y palmadas. El algodón de ménte se utiliza para hacer dardos para cazar pájaros. Wampúush también sirve un poco para hacer tablas.

Ijúmjamu 3

Wáwa Kunchái

Wáwa kunchaí numíji kampújmai, áwanke pushújnai. Saepé pégkeg kunchái kunchái kugkúawai. Dúke wegkájmai. Kuáshat nejéawai, néje sútu, tugkuích, áetak samékbauwai, bukúsea tsamáwai. Wáwa kunchaí néje aentstí yutáiyai. Nején kaútui káshai, káyuk, jápa, chayú, pambáu, yugkipák, tsukagká, kíjus, táyushkam.

Wáwa kunchái, un tipo de cabalonga, tiene un tronco grueso y cenizo. Su corteza tiene un olor agradable, el olor característico de kunchái. Sus hojas son anchas. Produce muchos frutos en racimos. El fruto es ovalado, verde cuando está inmaduro y negro cuando se madura. El fruto de wáwa kunchái es comestible para la gente. También comen sus frutos el majás, el añuje, el venado, el oso, el sachavaca, el sajino, un tipo de tucán, un tipo de loro y el huacharo.

Újuts

Újutsak tséjenchi, sútajchi, tsegkétskeju tsakáwai. Saepé chipúchpuju, pégkeg, kunchái, kunchái kugkúawai. Néje piípich, áetak samékbau, shuinún tsamáwai. Numíji áwanke pushújnai. Dúke wíjui. Úwejshunum, kampáunum tsapáwai. Ujútsa néje aentstí yutái, númpe ekémataiyai. Nején kaútui chayú, ikáuk, kajúntsam, kéjua, sháatak, tsukagká, pajái, uwáchau, súgka, táwai, táyushkam.

Újuts crece delgado y bajo con muchas ramas. Su corteza se pela y huele rico como kunchái. Su fruto es pequeño, verde cuando está inmaduro y negro cuando está maduro. El exterior del tronco es cenizo. Sus hojas son delgadas. Crece en las alturas, en el bosque de duende y el bosque de neblina. El fruto de újuts es comestible para la gente. Su resina se enciende para iluminación. Su fruto es comestible para el oso, algunos tucanes, un tipo de loro y el huacharo.

Ijúmjamu 4

Shijíkap

Shijíkpik esájman chikáchkaju tsakáwai. Puwáji pújui, numíji íshi wégawai. Saepé, numíjishkam, puwájishkam pégkeg shijíkap shijíkap kugkúawai. Dúke puyáiyai. Néje samékbauwai, esásantui, púju takíawai. Yagkují esájmai. Mujásnum tsapáwai. Shijíkpik jíi tsupítai, númpe ekémataiyai. Nején kaútui káshai.

Shijíkap, un tipo de copal, crece alto con muchas ramas. Su resina es blanca y forma bolitas en el tronco. La corteza, la madera y la resina tienen un olor agradable, el olor característico de shijíkap. Sus hojas son chiquitas. Su fruto es verde, ovalado y, cuando se reventa, está blanco dentro. Su flor es larga. Crece en el bosque cochoso. Shijíkap sirve para leña y su resina se enciende para iluminar. El majás come su fruto.

Chípa

Chípak kampújman, esájman, chuújman tsakáwai. Saepé pégkeg, imáchik shijíkpijai beték kugkúawai. Puwáji imáchik ajáwai, ajátnai. Néje áwanke páujai, púju takíawai. Dúke imáchik ápu, esásantui. Chípak jíi tsupítaiyai. Chipá númpe ukuká ipák ajúntua

piníg jiyá najuámtai chípautai. Chipá nején kaútui káshai, káyuk, waiwásh, tsukagká, kawaúshkam.

Chípa crece alto, grueso y derecho. Su corteza tiene un olor agradable parecido al olor de shijíkap. Tiene poco resina pegajosa. Su fruto es amarilla en el exterior, cuando se reventa, está blanco dentro. Las hojas son medio grandes y largas. La resina de chípa se mezcla con achiote para pintar el cerámico. Su fruto es comestible para el majás, el añuje la ardilla, un tipo de tucán y un tipo de loro.

Pantuí

Pantuík tséjen, tsegkétskeju tsakáwai. Numíji imáchik pushújtaku. Kagkapé áwai. Saepé pégkeg, shijíkpijai beték kugkúawai. Puwáji púju, imáchik áwai. Néje samékbauwai, tugkuí, takíawai, ínitak pújui. Jigkayí tugkuí, shaájmai. Dúke wíjui. Mujásnum tsapáwai. Pantuík awágkat jutái, jíi tsupítaiyai. Níina númpe ekémataiyai.

Pantuí crece delgado, con muchas ramas. Su tronco es medio cenizo. Tienes raíces fúlcreas. La corteza tiene un olor agradable parecido al olor de shijíkap. Tiene poco resina blanca. El fruto es verde en el exterior y ovalado. Cuando se reventa, está blanco dentro. La semilla es ovalada y blanca. Las hojas son delgadas. Crece en el bosque cochoso. Pantuí se utiliza para las vigas de la casa y para leña. Su resina se enciende para iluminación.

Shíishi

Shíshik imáchik kampújman, kanáuknaju tsakáwai. Kagkapé esájmai. Saepé pushújnai. Saepé pégkeg shijíkpijai beték kugkúawai. Yagkují púju. Néje tsamák

tentéch, áwanke kapántui, púju takíawai. Dúke wíjui. Shíshik jíi tsupítai, númpe ekémataiyai. Jigkayí weajá peetáiyai. Nején kaútui káyuk, káshaishkam.

Shíshi crece no tan grueso, con muchas ramas. Sus raíces tablares son largas. El exterior del tronco es cenizo. Su corteza tiene un olor agradable parecido al olor de shijíkap. Sus flor es blanca. Cuando el fruto está maduro, es redondo y rojo en el exterior. Cuando el fruto se reventa, está blanco dentro. Las hojas son delgadas. Shíshi se utiliza para leña y su resina se enciende para iluminar. Su semilla sirve para hacer collares. El fruto es comestible para el añuje y el majás.

Ijúmjamu 5

Pegkáenum

Pegkáenumik kampújman tsakáwai. Puwáji yagkú. Yagkují kapántui. Néje ápu, tenté, áetak samékbau, pauján tsamáwai. Pegkáenumi néje aentstí yutáiyai. Nején kaútui pichík, wajíam, yakúm, kasháishkam. Yagkujín kaútui chúwi, bakákit, dashípkit, jempékit, semanchúk, ukúnchkit, jémpeshkam.

Pegkáenum crece grueso. La resina es amarilla. Su flor es rojo. El fruto es grande y redondo, verde cuando está inmaduro y amarilla cuando se madura. El fruto es comestible para la gente. El fruto también es comestible para un tipo de mono de bolsillo, un mono negro, el cotomono y el majás. La flor es comestible para un tipo de páucar, los picaflores y otros pájaros.

Wayámpainim

Wayámpainmik kampújman, chuújman, tsegkétskeju tsakáwai. Saepé tuntúuwai. Néje tenté, ápui, pauján tsamáwai. Néje jagkígtina núnin, tújash jágkichu, katsújmachu besemáinchau ása. Puwáji yagkú. Wayámpainmi puwáji búwits ipákuaku takatái, néje aentstí yutáiyai. Wayámpainmi nején kaútui butúch, pínchi, sugkamát, wajíam, yakúm, kújishkam.

Wayámpainim crece grueso y derecho con muchas ramas. Su tronco es oscuro en el exterior. El fruto es redondo, grande y amarillo cuando está maduro. El fruto tiene algo como espinas, pero no son espinas verdaderas, porque no son duras y no pueden hacer daño. La resina es amarilla. La resina de wayámpainim se utiliza para pintar la cerámica. Su fruto es comestible para la gente. Su fruto también es comestible para el musmuqui, un tipo de mono de bolsillo, el tocón colorado, un tipo de mono negro, el cotomono y la chosna.

Ijúmjamu 6

Sejempách

Sejempáchik imáchik kampújman, chikáchkaju tsakáwai. Saepé tuntúutakui. Yagkují píjui. Néje tséjen, esájmai. Jigkayí ínitke samékbawai. Dúke wíjui. Namaká wenín tsapáwai. Sejempáchik jíi tsupítai, néje aentstí yutáiyai. Nején kaútui káshai, káyuk, yugkipák, chípi, kíjus, mantseét, tuwísh, wácha, chúwi, waúkshakam.

Sejempách, una guaba silvestre, crece no tan grande y tiene muchas ramas. El tronco es oscuro en el exterior. La flor es blanca. Sus frutos son delgados y largos. La semilla dentro es verde. Las hojas son delgadas. Crece en las orillas del río. Sejempách sirve para leña. Su fruto es comestible para la gente. También comen sus frutos el majás, el añuje, el sajino, algunos loros y algunos páucares.

Putsúu Sámpi

Putsúu sámpik yakíi tsakáwai. Kagkapé esájam, kampújmai. Numíji pushújnai. Yagkují pújui. Néje tséjenkuch, esájmauch, ínitak yumímitu. Dúke puyái. Putsúu sampí néje aentstí yutáiyai. Nején kaútui káshai, káyuk, yugkipák, kawáu, kíjus, nuinúi, tuwísh, wácha, chúwishkam.

Putsúu sámpi, una guaba silvestre, crece alto. Sus raíces tablares son largas y gruesas. Su tronco es cenizo. La flor es blanca. El fruto es delgado y largo y dentro es dulce. Las hojas son pequeñas. El fruto de putsúu sámpi es comestible para la gente. También comen sus frutos el majás, el añuje, el sajino, algunos loros y algunos páucares.

Wámpa

Wámpak kampújman, tsegkétskeju tsakáwai. Saepé pushújnai. Saepé yumímitui. Yagkují pújui. Néje ápui, chuújam, esájam áwanke pujápjaju, ínitke yumímitui. Dúke tenté wijútaku. Wampá néje aentstí yutáiyai. Saepé tikatín, wakéshkam najámamunum umútai, ampímataiyai tíkich dupájai tintíkap, shishíg, mejénkach pachímjamu. Nején kaútui chípi, tuwísh, wáchashkam.

Wámpa, una guaba silvestre, crece grueso con muchas ramas. El tronco es cenizo en el exterior. La corteza tiene un sabor dulce. La flor es blanca. El fruto es grande, recto, largo, su exterior es partido y es dulce dentro. Las hojas son redondas y delgadas. El fruto es comestible para la gente. Su corteza, mezclada con otras hierbas en una infusión, sirve para tratar el dolor del estómago y el dolor de la barriga. Su fruto es comestible para algunos loros.

Buabúa

Buabúak sénchi nejéawai. Imáchik kampújam, sútajuch, tsegkétskeju tsakáwai. Numíji pushújnai. Pujún yagkújawai. Néje téntenkau, esájam, kampújmai, pauján tsamáwai. Jigkayí ínitak ápui. Buabúa néje aentstí yutáiyai. Buabúa nején kaútui pichík, sugkamát, wajíam, yakúm, káshaishkam.

Buabúa, una guaba silvestre, produce muchos frutos. Crece bajo y no tan grueso, con muchas ramas. Su tronco es cenizo. Su flor es blanca. El fruto es encorvado, largo, grueso y es medio amarillo cuando está maduro. Las semillas dentro son grandes. Su fruto es comestible para la gente. Su fruto es comestible para un mono de bolsillo, el tocón colorado, un mono negro, el cotomono y el majás.

Ijúmjamu 7

Wampíshkunim

Wampíshkunmik imáchik kampújman, sútajchi tsakáwai. Saepé tuntúuwai. Dúke múun, esásantui. Numíji katsújmai. Yagkují puyáich, pújui. Imáchik nejéawai, néje ápui, jípit, esájmai. Wampíshkunmik jíi tsupítaiyai.

Wampíshkunim crece bajo y no tan grueso. El tronco es oscuro en el exterior. Las hojas son grandes y largas. El tronco es duro. Las flores son chiquitas y blancas. No produce muchos frutos. Su fruto es grande, aplanado y largo. Wampíshkunim sirve para leña.

Samíknum

Samíknumik mujánum tsapáwai. Sútajchi, tséjenchi tsakáwai. Kanáwe tséjen. Saepé pushújnai. Numíji ínitke katsújam, kijín. Dúke puyáiyai. Yagkují piípich. Néje piípich, esájmauch, kagán takíawai. Samíknumi jéga jegámku jutái, jíi tsupítaiyai.

Samíknum crece en las alturas. Es un árbol bajo y delgado. Las ramas son delgadas. El tronco es cenizo en el exterior. Dentro, el tronco es duro y pesado. Las hojas son finas. Su fruto es pequeño, largo y se reventa cuando está seco. Samíknum sirve para construir la casa y para leña.

Ijúmjamu 8

Tajép

Tajépak kampújman, kanáuknaju tsakáwai. Saepé pushújnai, imáchik páujtakui. Yagkují kapántakui. Néje áetak samékbau, tújash tsamák, imáchik páujtaku. Néje takíawai, ínitak, jigkayí katsújam, tentéch, kapántui. Dúke tentéch, esásantui. Tajépak weajá peetáiyai. Níina saepé ujaká sukúmatai iyájai tsuwámataiyai.

Tajép, un tipo de huairuro, crece grueso, con muchas ramas. Su tronco es cenizo, un poco amarillo. La flor es morada. Su fruto es verde cuando no está maduro, pero tiene el color medio marrón cuando se madura. Su fruto se reventa, y dentro, la semilla es dura, redonda y roja. Sus hojas son redondas y largas. La semilla de tajép sirve para hacer collares. Se puede calentar unos pedazos de su corteza para tratar esguinces.

Pandáij

Pandáijak kampújman, yakíi, chuújman tsakáwai. Kanáwe kampújmai. Saepé tuntúutakui. Kagkapé esájam, kampújmai. Néje jípit, áwanke tuntúuwai. Néje kagák takíawai, ínitke jigkayí tenté, katsújam, kapántu bukúsejai pachímjamu. Dúke tentéch, esásantui. Pandaíja jigkayí weajá peetáiyai. Saepé ujaká sukúmatai, iyágbaunum manchantúkmaunum, kutuímunmashkam tsuwámataiyai.

Pandáij, un tipo de huairuro, crece grueso, alto y derecho. Sus ramas son gruesas. El tronco es oscuro en el exterior. Sus raíces tablares son largas y gruesas. Su fruto es aplanado y oscuro en el exterior. Su fruto se reventa cuando está seco, y dentro, la semilla es redonda, dura, de color rojo mezclado con negro. Las hojas son redondas y largas. La semilla de tajép sirve para hacer collares. Se puede calentar unos pedazos de su corteza para tratar dislocaciones, fracturas y esguinces.

Ijúmjamu 9

Ugkuyá

Ugkuyák esájman, chuújman, Imáchik kampúman tsakáwai. Saepé chíchapich, imáchik pégkegchau mejéawai. Numíji anentái áan sénchi púku, púku mejéawai. Yagkují ápui, sutukajá yagkújawai. Néje kagákmatai, dásee umpuí, utsáwai. Ugkuyák jéga jegámku jutái, minágka jutáiyai.

Ugkuyá crece alto, derecho y no tan grueso. La corteza es fina y un poco apestosa. El corazón del tronco huele más fuerte; es fétido. Las flores son grandes y crecen en racimos.

Cuando su fruto ya está seco, bota las semillas en el viento. Ugkuyá sirve para hacer las vigas de la casa.

Tigkíshpinim

Tigkíshpinmik kampújman, chuújman, chikáchkaju tsakáwai. Numíji wauwáutui, pujupujúsmatui. Yagkují pújui. Néje jípit, esásantu, pújui. Dúke wíjuch, wakentí pushújtakui. Tigkíshpinmik jéga jegámku takatái, minágka jutáiyai. Kánu awatáiyai.

Tigkíshpinim crece grueso y derecho con muchas ramas. El tronco es medio marrón y áspero. Las flores son blancas. Los frutos son aplanados, largos y blancos. Tiene hojas delgadas de color cenizo al reverso. Tigkíshpinim sirve para construir las vigas de la casa. También, sirve para hacer canoas.

Wantsún

Wantsúntak kampújman, tsegkétskeju tsakáwai.   Kanáwe kampújmai. Numíji wauwáutu, pujupujúsmatui. Néje esájmauchi, áetak samékbau, púju kagáwai, jigkayí jípit. Dúke wíjui. Chiáchia wawéam jaáwai. Wantsúntak awágkat jutáiyai.

Wantsún crece grueso, con muchas ramas. Las ramas son gruesas. El tronco es marrón y áspero. El fruto es largo, verde cuando está inmaduro, blanco cuando se seca. La semilla es aplanada. La hoja es delgada. Se muere cuando unos insectos (chiachia) lo embrujan. Wantsún sirve para hacer las vigas de la casa.

I̲júmjamu 10

Ká̲wa Tínchi

Ká̲wa tínchik kampújman, yakíi tsakáwai. Néje̲ tsamák, bukúsea tsamáwai, pégkeg kugkúawai. Dúke̲ puyáich. Saepé̲ kagkígkijau, pégkeg, tínchi tínchi kugkúawai. Numíji̲ pushújin. Ká̲wa tínchik jéga jegámku jutái, minágka jutái. Kánu awatáiyai. Nején kaútui kajúntsam, pinínch, tsukagká, aúnts, kúyu, shímpa, yápagkam, chúwi, páipainchshakam.

Ká̲wa tínchi, un tipo de moena, crece grueso y alto. Cuando está maduro, su fruto es negro y tiene un olor agradable. Las hojas son chiquitas. Su corteza es partida y tiene el olor característico de tínchi. Su tronco es cenizo. Ká̲wa tínchi sirve para construir las vigas de la casa y para construir la canoa. Sus frutos son comestibles para algunos tucanes, algunas pucacungas, algunas palomas, un páucar y el huishhuincho.

Ká̲wa

Ká̲wak kampújman, chuújman, yakíi tsakáwai. Kanáwe̲ kampújmai. Numíji̲ kagkapéjbau. Saepé̲ pégkeg ká̲wa ká̲wa kugkúawai. Numíji̲ anentái páujai. Dúke̲ puyáiyai. Néje̲ puyáichi, bukúsea tsamáwai, pégkeg kugkúawai. Ká̲wak dakajá takatáiyai, jéga jegámku jutái, awágkat, minágka jutáiyai. Kánu, mésashkam, taníshshakam najántaiyai. Nején kaútui káshai, ká̲yu̲k, jápa, yugkipák, kajúntsam, tsukagkáshkam.

Ká̲wa, un tipo de caoba, crece grueso, derecho y alto. Sus ramas son gruesas. Tiene raíces tablares. La corteza tiene el olor agradable, característico de ká̲wa. El corazón del tronco es amarillo. Las hojas son pequeñas. El fruto es chuiquito. Cuando está maduro, el fruto tiene un olor agradable. Ká̲wa sirve para hacer tablas y para construir las vigas de la casa. También sirve para hacer canoas, mesas y paredes. Su fruto es comestible para el majás, el añuje, el venado, el sajino y algunos tucanes.

Káikua

Káikuak kampújman, esájman tsakáwai. Saepé shaájmai. Saepé shíig pégkeg, imáchik tinchíjai beték kugwáwai, chipúchpujui. Dúke, nejéshkam pégkeg kugkúawai. Duké wíju, esájmai. Káikuak jéga jegámku jutái, awágkat jutáiyai. Kánu, chimpuíshkam awatáiyai. Nején kaútui kajúntsam, kéjua, pinínch, sháatak, tsukagká, aúnts, kúyu, uwáchau, súgka, úgkumshkam.

Káikua crece grueso y alto. Su tronco es medio blanco. La corteza tiene un olor muy agradable, parecido al olor de tínchi, y también se pela. Sus hojas y sus frutos también tienen un olor agradable. Las hojas son delgadas y largas. Káikua sirve para construir las vigas de la casa y para construir la canoa y el chimpuí, un asiento especialmente para hombres. Sus frutos son comestibles para algunos tucanes, algunas pucacungas, el gallito de roca y el toropisco.

Wampúsnum

Wampúsnumik namaká wenín tsapáwai. Kampújman, imáchik esájman, tsegkétskeju tsakáwai. Saepé tuntúuwai. Saepé tinchíjai betékmamtin kugkúawai. Néje puyáiyai, áetak, samékbauwai, bukúsea tamáwai, pégkeg kugkúawai. Dúke tenté, esásantuch. Wampúsnumi nején kaútui kajúntsam, kéjua, piígsha, pinínch, aúnts, wakáts, yámpits, yámpaim, yápagkam, kántut, suwíwiwi, timantím, táwai, kúpi, aú, étsa, takáikitshakam. Nején namaká iyáu kaútui kuséa, mamayák, paumítshakam.

Wampúsnum crece en la orillas de los ríos. Crece grueso y no tan alto, con muchas ramas. El tronco es negro en el exterior. La corteza tiene un olor parecido a tínchi. Los frutos son pequeños y tienen un olor agradable. Sus frutos son verdes cuando están inmaduros y negros cuando se maduran. Las hojas son redondas y largas. Sus frutos son comestibles para algunos tucanes, algunas pucacungas, algunas palomas, algunos tipos del pájaro Víctor Díaz, el pájaro huayra pisco, una lechuza y otros pájaros. Cuando el fruto se cae en los ríos lo comen algunos peces.

Batút

Batútuk esájman, kampújman tsakáwai. Mujánum tsapáwai. Numíji tuntúuwai. Saepé, néjeshkam pégkeg imáchik tínchi tínchi kugkúawai. Néje tentéch, áetak samékbauwai, shuinún tsamáwai. Dúke tentétakui. Néje tsamajá kákeu juká, weajá peetái, játa achigkaítusa pégkeg kugkúawai asámtai. Nején kaútui káshai, ikaúk, kéjua, piígsha, pinínch, sháatak, tsukagká, aúnts, kúyu, uwáchau, sékuch, wága, wagkúsh, úgkumshkam.

Batút crece alto y grueso. Crece en las alturas. El tronco es oscuro. La corteza y el fruto tienen un olor agradable parecido al olor de tínchi. Su fruto es redondo. El fruto es verde cuando está inmaduro, y negro cuando se madura. Las hojas son redondas. Como tiene un olor agradable, el fruto seco de batút sirve para hacer collares para traer buena suerte contra la enfermedad. Sus frutos son comestibles para algunos tucanes, algunas pucacungas, algunas perdices y el toropisco.

Takák

Takákak imáchik kampújman, yakíi tsakáwai. Saepé pushújnai. Saepé tínchi tínchi kugkúawai. Yagkují pújui, esásantui. Néje tugkuí, áetak samékbau, bukúsea tsamáwai. Jigkayí ápui. Dúke wíju esásantui. Kanáwe titíjin múnji batsátui. Takákak jéga jegámku jutái, awágkat jutáiyai. Nején kaútui pininch, aúntsshakam.

Takák crece alto, pero no tan grueso. El tronco es cenizo en el exterior. La corteza huele como la corteza de tínchi. Las flores son blancas y largas. El fruto es ovalado, verde cuando está inmaduro y negro cuando está maduro. Su semilla es grande. Las hojas son delgadas y largas. Hormigas viven en los puntos de las ramas. Takák sirve para hacer las vigas de la casa. Los frutos son comestibles para algunos tucanes y algunas pucacungas.

Máegnum

Máegnumik kampújman, tsegkétskeju, yakíi tsakáwai. Kanáwe kampújmai. Numíji tuntúuwai. Saepé máenai. Néje tugkuí, ápui, bukúsea tsamáwai. Ínitak jigkayí ápuchi. Néje imáchik tínchi, tínchi kugkúawai. Dúke ápu, imáchik suisuímatu áinawai. Máegnumik kánu awatáiyai. Nején kaútui káshai, jápa, yugkipák, tsukagkáshkam.

Máegnum crece grueso y alto, con muchas ramas gruesas. El tronco es oscuro. La corteza es flemosa. El fruto es ovalado, grande y negro cuando está maduro. Dentro, la semilla es grande. El fruto tiene un olor casi parecido al olor de tínchi. Las hojas son grandes y un poco peludas. Máegnum sirve para construir la canoa. Comen su fruto, el majás, el venado, el sajíno, y algunos tucanes.

Ijúmjamu 11

Shuwát

Shuwátak múuntan, yakíi tsakáwai. Kagkapé múuntai. Saepé pushújnai. Saepé yáisintin. Yagkují ápu, tenté, kapántu, pújujai. Néje esájmai, tsamák, ukuíniawai, ínitak jígkayí jípit ayáwai. Dásee umpuí, jigkayí utsáwai. Dúke tentéch, imáchik suisuímatu. Shuwáta saepé achí chagkín anátaiyai. Kagkapé waití najámtaiyai. Shuwátak imáchik dakajá takatáiyai. Shuwáta yagkujín káshai kaútui.

Shuwát crece grande y alto. Sus raíces tablares son grandes. El tronco es cenizo en el exterior. La corteza es fibrosa. Las flores son grandes y redondas, de color rojo con blanco. El fruto es largo. Cuando está maduro, el fruto se destapa y dentro, hay semillas aplanadas. Cuando sopla el viento, bota las semillas. Las hojas son redondas y un poco peludas. La corteza de shuwát sirve para hacer la canasta. Sus raíces tablares sirven para construir una puerta para la casa. La madera también sirve un poco para hacer tablas. Sus flores son comestibles para el majás.

Kaáshnum

Kaáshnum ik kampújman, esájman tsakáwai. Mujánum ayáwai. Yagkují kapántaku, pújujai. Néje tenté, ápui. Numíji tuntúuwai. Dúke ápui. Saepé yáisintin. Kaashnúmi yakujín káshai kaútui. Nején kawáu kaútui.

Kaáshnum crece grueso y alto. Se encuentra en las alturas. Las flores son de color rojo con blanco. El fruto es redondo y grande. El tronco es oscuro. Las hojas son grandes. La corteza es fibrosa. Sus flores son comestibles para el majás. El fruto de kaáshnum es comestible para un tipo de loro.

Ijúmjamu 12

Antumú Chinchák

Antumú chinchakí néje áetak kapántu, bukúsea tsamáwai. Kanáwe tunín. Wáamak nejéawai. Piípichin tsákawai. Dúke wíjui.   Antumú chinchakí numíji ekémtai papáku jutáiyai. Nején kaútui kajúntsam, kéjua, pinínch, tsukagká, kúyu, pítsa, wakáts, yápagkam, chúwi, teésh, púuj, takáikit, bakákit, jempékit, tsánu, tsejémna, semanchúk, ukúnchkit, achayáp, wiísham, chágke, kanampúsh, chiyájmanch, chúchup, chunchuíkit, kúpi, pakátkish, píshi, tashíjim, uúshapshakam.

El fruto de antumú chinchák es rojo cuando está inmaduro y negro cuando se madura. Las ramas son torcidas. Produce frutos continualmente. Crece chuiquito. Las hojas son delgadas. La madera de antumú chinchák sirve para construir bancas. El fruto de antumú chinchák es comestible para algunos tucanes, algunas pucacungas, algunas palomas, algunos páucares, el pájaro huayra pisco y otros pájaros.

Ukuínmanch

Ukuínmanchik sútajchi , tséjenchi, chikáchkaju tsakáwai. Saepé pushújnai. Saepé chipúchpuju. Néje tsamák bukúsea. Mujánum tsapáwai. Numíji anentái katsújmai. Dúke wíju, áwanke samékbau, wakentí páujtakui. Ukuínmanchik jéga jegámku, shúgku jutáiyai.

Ukuínmanch crece bajo y delgado, con muchas ramas. El tronco es cenizo en el exterior. La corteza se pela. El fruto es negro cuando está maduro. Crece en las alturas. El corazón del tronco es duro. Las hojas son delgadas, verdes en el obverso y medio rojas en el reverso. Ukuínmanch sirve para construir los postes de la casa.

Tseék

Tseékak sútajuch, tsegkétskeju tsakáwai. Saepé pushújnai. Saepé awatí diám imáchik shuikín wéu. Yagkují píjui. Néje piípich áetak píjui, bukúsea tsamáwai. Dúke wíjuch, esájmauch. Tseékak ekémsatin ajítaiyai, pegák pegákmatu takatáiyai. Tseeká dúke juká ijujá kúcha akái dúwea áanin, yúmi piágmatai dúke ijúgbau chímpia jakígmatai janch púju egkétaiyai shuín ematágtusa. Nején kaútui kajúntsam, pinínch, wakáts, yápagkam, chúwi, takáikit, bakákit, jempékit, pisumánch, tsánu, tsejémna, semanchúk, ukúnchkit, achayáp, wiísham, chágke, kanampúsh, kántut, chiyájmanch, jínincham, píshi, tashíjim, timantímshakam.

Tseék crece bajo con muchas ramas. El tronco es cenizo en el exterior. Dentro, la corteza es un poco negra. Las flores son blancas. El fruto es pequeño, medio blanco cuando está inmaduro y oscuro cuando se madura. Las hojas son delgadas y largas. La madera de tseék sirve para construir bancas y camas. Las hojas de tseék sirven para teñir la ropa, para que salga el color negro. El fruto de tseék es comestible para algunos tucanes, algunas pucacungas, algunas palomas, algunos páucares, algunos tipos del pájaro Víctor Díaz y otros pájaros.

Chijáwe

Chijáwek tséjenchi, sútajchi tsakáwai. Saepé tuntúuwai. Numíji anentái katsújmai. Saepé pujápjajui. Yagkují piípich, pújui. Néje piípich, sutukajá nejéawai, bukúsea tsamáwai. Dúke wíju, wakentí pushújin, áwanke páujtakui. Chijáwek jéga jegámku takatái, shúgku jutái, awágkat, minágka jutáiyai. Nején kaútui ikáuk, kéjua, kajúntsam, pinínch, yápagkam, takáikit, bakákit, tsejémna, semanchúk, ukúnchkit, achayáp, wiísham, chágke, kúpi, píchugkuk, wisuíshkam.

Chijáwe crece delgado y bajo. El tronco es oscuro en el exterior. El corazón del tronco es duro. La corteza se pela. Las flores son pequeñas y blancas. Los frutos crecen en racimos y son chiquitos y negros cuando están maduros. Las hojas son delgadas, el obverso es medio cenizo y el reverso es medio rojo. Chijáwe sirve para construir los postes y las vigas de la casa. Los frutos son comestibles para algunos tucanes, algunas palomas, el pájaro huayra pisco y otros pájaros.

Ijúmjamu 13

Bíchau

Bíchauk tséjenchi, nugkáuchin, tsegkétskeju tsakáwai. Saepé tuntúuwai. Yagkují piípich, pújui. Néje tentéch, áetak, samékbau, tsamák, páujtakui. Néje takíawai, ínitak, jigkayí kapántu ayáwai. Dúke tenté, ápui. Bíchauk aentstí shíipnum umpúmatai, yawáashakam shíipnum tsuwámataiyai, pégkejai. Nején kaútui yámpits, timantímshakam.

Bíchau crece delgado y bajo, con muchas ramas. Su tronco es oscuro en el exterior. Las flores son pequeñas y blancas. El fruto es redondo, verde cuando está inmaduro, medio rojo cuando está maduro. El fruto se reventa cuando está maduro y dentro hay semillas rojas. Las hojas son redondas y grandes. Bíchau sirve para hacer la enema para tratar la amebiasis. También se utiliza para curar la enfermedad en los perros. El fruto es comestible para un tipo de paloma y un tipo del pájaro Víctor Díaz.

Yantsáu

Yantsáuk kampújman, kanáuknaju tsakáwai. Kanáwe múuntai. Kagkapé kuáshat ayáwai. Saepé tuntúuwai. Saepé pégkeg yantsáu yantsáu kugkúawai. Yagkují pújui. Néje tentéyai, áetak samébauwai, tsamák kapántui, takíawai, ínitak, jigkayí puyáich, kapántu ayáwai. Dúke wíju esájmai. Namaká wenín tsapáwai. Yantsaú saepé tsuwámataiyai shíipnum umpúmatai. Bakíchik jigkayí aentstísh kujátai shíipnum pégkejai. Nején kaútui kajúntsam, pinínch, tsukagká, aúnts, kúyu, wakáts, shímpa, yámpaim, yámpits, yápagkam, wiísham, kanampúsh, kántut, kístug, timantímshakam.

Yantsáu crece grueso, con muchas ramas grandes. Tiene muchas raíces tablares. El tronco es oscuro en el exterior. La corteza huele agradable como yantsáu. Las flores son blancas. El fruto es redondo, verde cuando está inmaduro, medio rojo cuando está maduro. El fruto se reventa cuando está maduro y dentro hay semillas chiquitas, rojas. Las hojas son delgadas y largas. Crece en las orillas de los ríos. La corteza de yantsáu sirve para hacer la enema para tratar la amebiasis. También se puede hacer una infusión de una semilla para curar la amebiasis. El fruto es comestible para algunos tucanes, algunas pucacungas, algunas palomas algunos tipos del pájaro Víctor Díaz, y otros pájaros.

I̲júmjamu 14

Súu

Súuk tséjenchi, esájman tsakáwai. Numíji pushújnai. Dúke, apu, tsegkétskeju, suisuímatu. Dúke áwanke samékbau, ínitke pushújnai. Kagkapé sutukajá ayáwai. Numíji anentái kanáweshkam wáa enkétkau. Súuk jíi tsupítaiyai. Puwáji saáwi umútai wáke najámamunum tsuwámataiyai. Saepé dukéjai káshap ijújatmatai tsuwámataiyai. Nején kaútui tsugkagká, shiwíg, aúnts, wakáts, chúwi, chágke, kíjuancham, pishíshkam.

Súu,un tipo de setico, crece delgado y alto. El tronco es cenizo. Las hojas son grandes, palmadas y peludas. Las hojas son verdes en el obverso y cenizas en el reverso. Tiene raíces fúlcreas. El tronco y las ramas son huecos. Súu sirve para leña. Su resina clara se toma para el dolor del estómago y el dolor de la barriga. La corteza y las hojas se utilizan para tratar la picadura de la raya. Sus frutos son comestibles para un tipo de tucan, un tipo de loro, algunas pucacungas, un tipo de páucar el pájaro buey y otros pájaros.

Satík

Satiká dúke tegkétskeju, ápui. Saepé pushújnai. Numíji anentái kanáweshkam wáa enkétkau. Kanáwe ínitke múnji batsátui, esájatin áinawai. Kagkapé sutukajá ayáwai. Satíkak jíi tsupítaiyai. Nején kaútui ámich, kúji, pinínch, aúnts, wakáts, chúwi, teésh, tejasháa, timantímshakam.

Satík, un tipo de setico, tiene hojas palmadas y grandes. Su tronco es cenizo en el exterior. El tronco y las ramas son huecos. Dentro de las ramas huecas viven unas hormigas que muerden. Tiene raíces fúlcreas. Satík sirve para leña. Los frutos son comestibles para el zorro negro, la chosna, un tipo de tucán, algunas pucacungas, algunos páucares, un tipo de carpintero y un tipo del pájaro Víctor Díaz.

Ijúmjamu 15:

Úntuch Tsémpu

Úntuch tsémpuk imáchik kampújamkampújman tsakáwai. Saepé pégkeg tsémpu tsémpu kugkúawai. Puwáji áwai, kapántu. Numíji nejéawai, numíji pujúsai, nejétaiji. Néje takíawai, ínitak kapántui. Dúke wijuch. Úntuch tsémpuk minágka, awágkat jutái, jácha awatáiyai. Puwájijai, kuwím, úchi yunchítjukmataishkam tsuwámataiyai. Úntuch tsempúk jíi tsupítaiyai. Nején kaútui kéjua, pinínch, tsukagkáshkam.

Úntuch tsémpu, un tipo de cumala, crece no tan grueso. La corteza tiene el olor agradable, característico de tsémpu. Tiene resina roja. Produce sus frutos en el tronco , y por eso, el tronco tiene topetones. Cuando el fruto se reventa, está rojo dentro. Las hojas son delgadas. Úntuch tsémpu sirve para hacer las vigas de la casa y para construir el mango de hacha. Su resina sirve para tratar heridas de la piel y para escorbuto de los niños. Úntuch tsémpu también sirve para la leña. El fruto es comestible para algunos tucanes.

Ejésh

Ejéshik kampújman, esájman, chuújman tsakáwai. Saepé dupájmai, tsémpu tsémpu kugkúawai. Puwáji saáwi, imáchik kapántakui. Néje áetak samékbauwai, tújash tsamák, kapántu takíawai. Ejéshi númpe imáchik tsuwámataiyai kuwímnum. Nején kaútui káshai, káyuk, yugkipák, kéjua, pinínch, tsukagká, aúnts, kúyu, wágashkam.

Ejésh crece grueso, alto y derecho. La corteza es gruesa y tiene el olor característico de tsémpu. La resina es transparente, un poco roja. El fruto es verde cuando está inmaduro. Cuando está maduro, el fruto se reventa y dentro, está rojo. La resina de ejésh sirve un poco para curar heridas. El fruto es comestible para el majás, el añuje, el sajino, algunos tucanes, algunas pucacungas y un tipo de perdiz.

Ijúmjamu 16:

Takae

Tákaek yakíi, kampújman tsakáwai. Kagkapé atsáwai. Numíji pushújin. Saepé dupájam, áwanke pujús. Néje ápui, tujútjutu, samékbau, imáchik wauwáutu, tsamák. Puwáji púju, sénchi puwáwai. Dúke ápui, tenté. Takáe puwáji shijigká puwáji pachímja sujútaiyai. Puwáji búwits ipákuaku takátaiyai. Nején kaútui káshai, jápa, yugkipákshakam.

Tákae crece alto y grueso. No tiene raíces tablares. El tronco es cenizo. La corteza es gruesa y áspera en el exterior. El fruto es grande, esponjoso y verde con marrón cuando está maduro. Tiene mucha resina blanca. Las hojas son grandes y redondas. La resina de tákae se puede mezclar con la resina de shiringa para vender como caucho. La resina también sirve para pintar el cerámico. Los frutos son comestibles para el majás, el venado y el sajino.

Shijíg

Shijígkak esájman, kampújman chuújman tsakáwai. Numíji pushújnai pikápkajui. Dúke tsegkétskeju, tentéyai. Dúke kapántu ayáwai. Puwáji pújui, ajatín, japíamu, esájam

wéu. Yagkují sútu, tsegkétskeju, puyáich. Néje ápu, tenté, yantántajui, samékbauwai. Néje kagajá takíawai tashít tashít. Jigkayí ínitak ápui. Shijigká numíji tsentsajá ukátkáwa ikámpui sujútaiyai apáchnum. Nején kaútui káyuk, páki, yugkipák, kawáu, shaámak, takúm, wácha, yúsa, sékuch, wágashkam.

Shijíg, la shiringa, crece alto, grueso y derecho. El tronco es cenizo y áspero. Las hojas son palmadas y redondas. Algunas hojas son rojas. La resina es blanca, pegajosa y elástica cuando se seca. Las flores son pequeñas y crecen en racimos. El fruto es grande redondo, descuadrado y verde. Cuando el fruto ya está seco se reventa haciendo el sonido "tashít." Dentro, las semillas son grandes. El tronco de shijíg se raya para sacar su resina. Se corta un árbol pequeño para poner en forma cuadrada. Entonces, se echa la resina de shijíg. Después de engrosarse, se vende . El fruto es comestible para el añuje, el huangano, algunos loros, algunos guacamayos y algunos perdices.

Shíjigka Sáei

Shijigká sáik kampújman, esájman tsakáwai. Numíji tuntúutakui. Saepé dupájmai. Sénchi puwáwai, puwáji pújui. Dúke piípich áinawai. Shijigká saí puwáji shijigká numpéjai pachímja jíbi najántaiyai. Puwáji búwits ipákuaku takátaiyai.

Shijigká sái crece grueso y alto. El tronco es oscuro. La corteza es gruesa. Tiene mucha resina blanca. Las hojas son pequeñas. La resina de shijigká sái se puede mezclar con la resina de shiringa para hacer caucho. La resina también sirve para pintar la cerámica.

Barát

Barátak mujánum tsapáwai. Chuújman, imáchik kampújman, tsakáwai. Numíji pushújnai. Dúke múun, wegkájmai. Néje ápui, paujín tsamáwai. Puwáji pújui. Baráta numíji tsentsajá númpe jukí yúmi ekegká nimpágmatai wáat ajúntua, nanágmatai jiikí wéet wéet egkejá takatáiyai. Puwáji búwits ipákuaku takatáiyai. Nején, káshai, katípshakam kaútui.

Barát crece en las alturas. Crece derecho, pero no tan grueso. El tronco es cenizo. Las hojas son grandes y anchas. El fruto es grande y amarillo cuando está maduro. La resina es blanca. El tronco de barát se raya para sacar su resina. La resina se caliente con agua en una olla hasta que se endurezca. Después se estira en pedazos largos para transportar para la venta. La resina también sirve para pintar la cerámica. El fruto es comestible para el majás y la rata.

Ijúmjamu 17

Tsáik

Tsáikak kampújman, esájman tsakáwai. Kagkapé esájam wéu. Numíji kapántaku, kagkígkiju áwanke. Saepé imáchik pégkegchau tsáik tsáik mejéawai. Duké piípich, tentéyai. Néje jípit, esásantui. Tsáikak kánu, chimpuíshkam awatáiyai, dakajá takatáiyai. Saepé mátia ujagká jukí dekegkái tejémchinum tsuwámaytaiyai.

Tsáik, el tornillo, crece grueso y alto. Sus raíces tablares son grandes. El tronco es rojo y partido en el exterior. La corteza tiene el olor un poco desagradable, característico de tsáik. Las hojas son pequeñas y redondas. El fruto es aplanado y largo. Tsáik sirve para construir canoas, el chimpuí, un asiento especial, y para hacer tablas. La corteza se chanca y se caliente para tratar comezón de los pies.

Séetug

Séetjuk kampújman, yakíi tsakáwai. Kagkapé esájam wéu. Saepé kapántaku, pujápjajui. Numíji anentái páujai. Saepé pégkeg séetug séetug kugkúawai. Yagkují esájam, pújui, pégkeg kugkúawai. Néje chácha, tugkuí, kagák takíawai. Jigkayí jípituch, dásee umpuí utsáwai. Dúke wíju tsakáskatu. Séetju numíji kánu awatái, tabla takatáiyai. Saepé jagkúnum tsuwámataiyai.

Séetug, el cedro, crece grueso y alto. Sus raíces tablares son largas. El tronco es rojo y partido en su exterior. El corazón del tronco es medio amarillo. La corteza tiene el olor agradable característico de séetug. Las flores son largas y blancas. El fruto es moteado, ovalado y se reventa cuando está maduro y seco. Las semillas son aplanadas y se botan cuando sopla el viento. Las hojas son finas y puntiagudas. El tronco de séetug sirve para construir canoas y para hacer tablas. La corteza también sirve para tratar el reumatismo.

Áwanu

Áwanuk mujánum tsapáwai. Kampújman, chuújman tsakáwai. Numíji kagkígkiju, áwanke pushújnai. Saepé pégkeg, séetjujai beték kugkúawai. Dúke wíjuch. Néje tugkuí, pujupujúsmatu, kagák takíawai. Jigkayí jípituch, dásee umpuí utsáwai. Awánu numíji kánu awatái, dakajá takatáiyai.

Áwanu crece en las alturas. Crece grueso y alto. Su tronco es cenizo y partido en el exterior. La corteza huele agradable como cedro. Las hojas son finas. El fruto es áspero, ovalado y se reventa cuando está maduro y seco. Las semillas son aplanadas y se botan cuando sopla el viento. Áwanu sirve para hacer la canoa y para hacer tablas.

Ijúmjamu Numí Áinau, Kumpají Astámamu

Pítu

Pítuk sútajchi, imáchik kampújman, tsegkétskeju tsakáwai. Saepé pujúsai. Yagkují piípichin yagkújawai. Néje tenté, ápui, ínitak, jigkayí tenté kuáshat ayáwai. Puwáji púju, ajátnai. Dúke wíjui. Pitú néje aentstí yutáiyai. Puwáji búwits pintáku takatáiyai. Númpe jutáiyai, dáumjai pachímjamu jíbi najántaiyai. Nején kaútui káshai, ámich, waiwásh, kújishkam.

Pítu crece bajo, y no tan grueso, con muchas ramas. El tronco es áspero en el exterior. Sus flores son pequeñas. El fruto es redondo y grande. Dentro del fruto, hay muchas semillas redondas. la resina es blanca y pegajosa. Las hojas son delgadas. El fruto de pítu es comestible para la gente. La resina sirve para pintar la cerámica. La resina también se mezcla con la resina de leche caspi para hacer caucho. El fruto es comestible para el majás el zorro negro la ardilla y la chosna.

Uwáchaunim

Uwáchaunmik yakíi, chuújam tsakáwai. Saepé wauwáutu, shíig pinuí. Saepé ujagá yapajínawai. Dúke ápu, esájam, wegkájmai. Néje piípichi, tentéch, sutukajá nejéawai. Néje kagák dásee umpuí útsawai. Uwáchaunmik jéga jegámku takatái, minágka jutáiyai. Saepé pakajá, yúmi undú jukí yakaaká maátai.

Uwáchaunim crece alto y derecho. El tronco es marrón y muy liso en el exterior. La corteza se pela y se cambia. Las hojas son grandes, largas y anchas. Los frutos son pequeños y redondos, crecen en racimos. Los frutos maduros y secos se botan cuando sopla el viento. Uwáchaunim sirve para construir las vigas de la casa. La corteza se pela, se frota con las manos y se baña con agua crudo, para tratar el chupo.

Shína

Shínak mujánum tsapáwai. Yakíi tsakáwai. Saepé tuntúuwai, ínitke kapántui, katsújam. Dúke tentéch, puyáiyai. Néje kapántu tsamáwai. Shínak jácha wéatai, numíji shúgku, jéga jegámku jutáiyai. Saepé ukuká umútai aguardiéntejai jagkúnum tsuwámataiyai. Numíji kesajá ukuká umútai japijátmaunum tsuwámataiyai. Numíji tekaká kesajá jukí núwa umpuntái nántunum sénchi jáakui úchi ejapjukáitusa tsuwámataiyai.

Shína crece en las alturas. Crece alto. El tronco es oscuro en el exterior y medio rojo y duro dentro. Las hojas son redondas y pequeñas. El fruto es rojo cuando está maduro. Shína sirve para construir el mango de hacha y para construir los postes de la casa. La corteza sirve para hacer una infusión que se puede mezclar con aguardiente para tratar el reumatismo. También se puede raspar el tronco para tratar los dolores musculares. La corteza también se saca y se chanca para hacer enema para el control de embarazo.

Bukún

Bukúntak chuújman, tséjen, esájman tsakáwai. Kanáwe tséjen. Dúke wegájmai. Numíji áwanke pushújnai. Numíji ínitak katsújam. Saepé ínitak tsentsájintin. Yagkují

pújui. Néje piípich, sutukajá nejéawai, kagák bukúsea. Bukúntak jéga jegámku takatái, minágka jutáiyai. Jíi tsupítaiyai.

Bukún crece derecho, delgado y alto. Las ramas son delgadas. Las hojas son anchas. El tronco es cenizo en el exterior. El tronco es duro dentro. La corteza tiene una textura granulosa. Las flores son blancas. Los frutos son pequeños, crecen en racimos y son oscuros cuando ya están secos. Bukún se utiliza para hacer los postes y las vigas de la casa y sirve también para leña.

Chikáunia

Chikáunia kampújman, yakíi tsakáwai. Numíji áwanke pujús, pushújnai. Numíji anentái katsújam, shuín, imáchik kapántui. Yagkují pújui. Néje púju kagáwai. Yagkují, saepéshkam, nejéshkam pégkeg kugkúawai. Dúke puyáyai. Chikáunia numíji shúgku, jéga jegámku jutáiyai. Jigkayí weajá peetái, pégkeg kugkúawai asámtai. Saepé jagkúnum tsuwámataiyai.

Chikáunia crece grueso y alto. El tronco es áspero y cenizo en el exterior. El corazón del tronco es duro y tiene un color oscuro, medio rojo. Las flores son blancas. Los frutos son medio blancos cuando se maduran y se secan. Las flores, la corteza y los frutos huelen agradables. Las hojas son finas. Chikáunia sirve para construir los postes de la casa. La semilla sirve para hacer collares porque tiene un olor rico. La corteza sirve para tratar el reumatismo.

Píituk

Pitúkak kampújman, esájman tsakáwai. Saepé pujupujúsmatu, kapántakui. Numíji anentái páujai. Kanáwe kampújmai. Puwáji ajatín, pújui. Yagkují wíjui. Néje tenté,

kapántu tsamáwai. Dúke wíjuch, puyáiyai. Pitúkak kánu awatáiyai. Pitúka saepé jukí káyuk dakúmtai najántaiyai, núnik káyuk dakúmka máutaiyai. Nején kaútui jápa, ámich, kúji, pambaúshkam.

Pítuk crece grueso y alto. El tronco es áspero y rojo en el exterior. El corazón del tronco es amarillo. Las ramas son gruesas. La resina es pegajosa y blanca. Las flores son delgadas. El fruto es redondo y rojo cuando está maduro. Las hojas son finas y pequeñas. Pítuk sirve para hacer la canoa. La corteza sirve para imitar el añuje para la caza. Los frutos son comestibles para el venado, el zorro negro, la chosna y el sachavaca.

Tiík

Tiíkak chuújam imáchik kampújam, sénchi múuntan tsakátsui. Saepé pushújin, jagkígtin. Yagkují semékbau, imáchik yagkúwai. Néje piípich, tentéch. Jigkayí bukúsea, katsújam. Dúke wíju, imáchik kapántakui. Tiíkak jíi tsupítaiyai.

Tiík crece no tan alto y no tan grande, pero derecho. El tronco es cenizo en el exterior y tiene espinas. Las flores son verde amarillentas. El fruto es pequeño y redondo. La semilla es negra y dura. Las hojas son delgadas y un poco rojas. Tiík sirve para leña.

Shishiím

Shishiímak chuújman tsakáwai. Saepé tuntúuwai. Numíji ínitak katsújam, pújui. Saepé, numíjishkam shishiím shishiím mejéawai. Yagkují páuj kapántujai pachímjamu. Néje tenté, ápui, íki íki mejéawai. Numíji sutukajá nejéawai. Namaká wenín tsapáwai. Shishiíma jigkayí dekegká umútai, jagkúnum pégkejai, ampímataiyai. Jigkayí yawáa

tsuwámunashkam umútai, ampímatai, mántin wetítusa. Yagkujín, nejénshakam káshai kaútui.

Shishiím, un tipo de ayahuma, crece derecho. La corteza es oscuro. El tronco es duro y dentro tiene el color blanco. La corteza y la madera tienen un olor malo característico de shishiím. Las flores son de color amarillo mezclado con rojo. El fruto es redondo, grande y huele como la ventosidad. Produce sus frutos en racimos en el tronco. Crece en las orillas de los ríos. La semilla de shishiím se puede chancar para hacer una infusión medicinal para el reumatismo. La semilla también sirve para curar la enfermedad en los perros, para que puedan salir para cazar. La flor y el fruto son comestible para el majás.

Magkuák

Magkuákak kampújman, esájman tsakáwai. Yagkují páujai. Saepé tuntúuwai. Dúke ápu, esájmai. Néje jípituch, esájmauch, wauwáutui tsamák. Néje sutukajá nejéawai. Magkuáka saepé pakái shitámatai, jagkúnum, imúmnumshakam tsuwámataiyai. Saepé kesajá ukuká shitámatai, iyásh najámamunum tsuwámataiyai.

Magkuák crece grueso y alto. Las flores son amarillas. El tronco es oscuro en el exterior. Las hojas son grandes y largas. Los frutos son aplanados, largos y marrones cuando están maduros. Los frutos crecen en racimos. La corteza de magkuák se pela para hacer una masaje para tratar el reumatismo, la edema y el dolor del cuerpo.

Súwa

Súwak chuújman, imáchik kampújman tsakáwai. Numíji pinuí, pushújnai. Dúke ápui. Yagkují tsegkétskeju. Néje tenté, ápui, shuinún jakíawai. Súwak jácha wéataiyai. Néje

kesajá intáshnum nijámtai bukúsea wéawai. Núwa muntsujút nijámkaum wejukmá áishmag iyashín jakígmatai múun ejéyi katsúgma wajáku. Nején káyuk, pambaúshkam kaútui.

Súwa, el huito, crece derecho y no tan grueso. El tronco es cenizo. Las hojas son grandes. Las flores crecen en racimos. El fruto es grande, redondo y se tiñe negro. Súwa sirve para hacer el mango de hacha. El fruto se chanca para teñir el cabello el color negro. Si un hombre se ancoraba con una mujer que utilizaba el huito era fácil detectar y darle el castigo. El fruto es comestible para el añuje y el sachavaca.

Shikiú

Shikiúk esájman, imáchik kampújman tsakáwai. Numíji jagkígtin. Numíji yumíji kuáshat áwai, saáwi. Numíji ínitak púkutsai. Dúke tentéyai, tsegéakui kampátum. Yagkují kapántui. Yagkújawai dúke akaejamtai. Néje esájmauchin, chíchapchin nejéawai. Shikiú saepé jagkúnum ampímataiyai. Shikiú nején kíjus, tuwísh, wácha kaútui. Shikiú yagkujín kaútui kíjus, mantseét, wácha, chúwi, chuwitám, teésh, píshishkam.

Shikiú crece alto pero no tan grueso. El tronco tiene espinas. El tronco tiene mucha resina blanca y es suave dentro. las hojas son redondas y se encuentran en racimos de tres. Las flores son rojas. Produce sus flores cuando se caen las hojas. Los frutos son largos y finos. La corteza de shikiú sirve para tratar el reumatismo. Los frutos de shikiú son comestibles para algunos loros. Las flores de shikiú son comestibles para algunos loros, algunos páucares y otros pájaros.

Tagkáam

Tagkáamak kampújman, esájman tsakáwai. Numíji pushújnai. Saepé sej sej mejéawai. Yagkují kapántui. Néje esájam, jípit, katsújmai, áetak samékbau, tsamák shuínai. Néje takíawai, ínitak jigkayí shuín, katsújmai. Dúke puyáiyai. Tagkaáma nején, káshai, káyuk, yugkipákshakam kaútui.

Tagkáam crece grueso y alto. El tronco es cenizo. La corteza tiene un olor desagradable como el olor a la sangre. Las flores son rojas. El fruto es largo, aplanado, duro y verde cuando está inmaduro. Cuando está maduro el fruto es negro y se reventa. Dentro, hay semillas duras. Las hojas son pequeñas. Los frutos de tagkáam son comestibles para el majás, el añuje y el sajino.

Apái

Apáik sútajuch, tséjenkuch tsakáwai. Kanawé astáwai. Saepé tuntúuwai. Numíji nejéawai. Néje shújam wéawai, ápu, tugkuí wauwáutui. Yagkují páujai pégkeg kugkúawai. Dúke ápui. Apaí néje aentstí yutái, néje kesajá umpúmataiyai shíipnum. Nején waiwásh, kayúk, káshaishkam kaútui.

Apái, el sacha mango, crece bajo y delgado. No tiene ramas. El tronco es oscuro en el exterior. Los frutos salen del tronco en todas las direcciones. Los frutos son grandes, ovalados y marrones. Las flores son amarillas y huelen agradables. Las hojas son grandes. Los frutos de apái son comestibles para la gente. El fruto se puede pelar para hacer una enema para tratar amebiasis. El fruto es comestible para la ardilla, el añuje y el majás.

Paúnim

Paúnmik yakíi, kampújman, kanáuknaju tsakáwai. Numíji tuntúuwai. Dúke shijín, páuj, tentétakui, wegkájmai. Yagkují páujai. Néje piípich, tenté, wauwáutu tsamák. Paúnmik awágkat, minágka jutáiyai. Numíji kánu awatái, dakajá takátaiyai.

Paúnim crece alto y grueso con muchas ramas. El tronco es oscuro. Las hojas son crespas, medio rojas, redondas y anchas. Las flores son amarillas. Los frutos son pequeños, redondos y marrones, cuando están maduros. Paúnim sirve para construir las vigas de la casa, para construir canoas y para hacer tablas.

Chapter 8

Conclusions

Summary of the Research Question, Hypothesis and Methods

The major goal of this research was to investigate how the Aguaruna Jívaro of the Peruvian Amazon identify members of the life-form category ***númi*** 'trees excluding palms.' More generally, I also hope to contribute in some small way to addressing the little-studied theoretical question of how people identify living organisms. The principal hypothesis of the investigation builds upon the theoretical contributions of Atran (1999) Berlin (1974, 1992), Ellen (1993) and Hunn (1975). It is: **The process of tree identification among indigenous peoples involves both sensory and ecological reasoning, at least part of which can be verbalized by informants in terms of discrete clues**.

The Aguaruna concept of ***kumpají*** 'its companion' played an important role in this research. The term ***kumpají*** denotes organisms thought to be morphologically similar but not necessarily subsumed under a common linguistic label. Plants in the same folk genus are always considered ***kumpají***, but the term can also be used to unite two or more folk genera in a covert category. This research uses the ***kumpají*** concept as one means of exploring the morphological and ecological clues that allow the Aguaruna to identify trees. I have assumed that asking informants to compare and contrast trees that they consider to be companions can help distinguish the characters that allow them to recognize broad membership in groups of related trees, and the characters that allow them to make finer distinctions between the members of groups.

Structured interviews were the primary methodology in this study. It would not have been feasible to study all tree taxa that the Aguaruna recognize (over 300 folk genera). For that reason, I selected a sample of 63 widely recognized folk genera spanning 48 biological genera in 17 plant families. That is clearly only a small portion of the biological diversity in the study region, but, hopefully, it is a large enough sample to at least illustrate the variety of clues and methods that the Aguaruna use in distinguishing between trees. The 63 folk genera were selected in a purposive fashion appropriate for evaluating the hypothesis that the Aguaruna use both sensory and ecological characters to identify trees. The approach I have used in the structured interviews is summarized as follows: 1) Informants were requested to list features that allow them to recognize each tree and 2) Informants were requested to group ***kumpají*** (i.e., related) trees, and compare and contrast the groups. Implicit in the second question is that the sample includes groups of related trees. Forty-nine of the 63 study trees comprised 17 widely recognized groupings. The remaining 14 represent folk genera widely considered to be unrelated to any other folk genus (Jernigan in press).

The structured interviews provided valuable data for understanding the sensory and ecological criteria that informants use for judging membership in the 63 chosen folk genera. However, it is not completely clear how important those characters are for making actual identifications of real trees. An ideal approach for complementing the structured interviews would be to observe informants as they make identifications of real individuals of the 63 study trees selected for the structured interviews. However, such an experiment would not be feasible, since some of those trees grow in only one specific habitat, precluding the possibility of finding them all together in any one location. As an alternative, I decided to observe how informants identify trees in twenty-five $10m^2$ Gentry (1982) plots in a single patch of primary forest near the community of

Bajo Cachiaco. The plots contained a total of 156 trees of 10cm or greater diameter at breast height. Eight key informants went through the plots individually and identified the trees. I recorded the answers, and also noted the actions informants took as they made each identification.

Summary of the Results

The structured interview questions elicited information relevant to informants' criteria for judging membership in the folk taxa chosen for the study. Analysis of eight key informants' descriptions of the 63 study trees (504 total descriptions) suggests that certain characters are more significant than others for making taxonomic distinctions between trees. Fruit characters, including color, shape size and dehiscence, are well represented in the descriptions. Outside trunk appearance is also quite salient, particularly color and texture. Salient leaf characters include shape, size and color. Informants also mentioned growth habit quite often, particularly tree height and thickness and straightness of the trunk. Flower color, quantity of branches, bark odor and sap color are also salient characters.

The companion comparison data provide additional clues to understanding which characters are most important for differentiating between the folk taxa chosen for this study. Some characters were found to be particularly important for making broad taxonomic judgments (i.e. explaining what features the members of companion sets have in common), while other characters appear to be more important for making finer scale taxonomic judgments (i.e. describing what features can be used to distinguish between the members of each companion set).

Characters that were particularly important for the broad recognition of companion groups include fruit color, shape and dehiscence. Sap color and bark odor are also relatively important for explaining the cohesion of the companion groups. Some of the clues used to justify companion groupings also make sense from the standpoint of Western botanical taxonomy. Sap color is an important basis for four of the companion sets. One of those groups is made up of biologically unrelated trees with sticky white sap, from the families Moraceae, Euphorbiaceae and Sapotaceae. The other three groupings are: 1) the trees ***dáum*** (*Couma* spp.) and ***táuch*** (*Lacmellea* spp.) in the Apocynaceae (white sap), 2) the trees ***tsémpu***, ***ejésh*** and ***chikúm***, all in the family Myristicaceae (reddish sap) and 3) the trees ***pegkáenum*** and ***wayámpainim***, both in the genus *Garcinia* in the Clusiaceae (opaque yellow sap). Gentry confirms that white sap is a good diagnostic feature for Apocynaceae (1993: 238), that thin red sap is often associated with Myristicaceae (1993: 638) and that opaque yellow sap almost always indicates Clusiaceae (1993: 445). My informants considered bark odor to be an important basis for four of the companion sets. Those groups are: 1) the trees ***kunchái*** and ***újuts***, both in the genus *Dacryodes*, Burseraceae, 2) the trees ***pantuí***, ***shijíkap***, ***chípa*** and ***shíshi***, all in the genus *Protium*, in the Burseraceae, 3) the trees ***tínchi***, ***káwa***, ***káikua***, ***takák***, ***wampúsnum***, ***batút*** and ***máegnum***, all in the Lauraceae and 4) the trees ***tsémpu***, ***ejésh*** and ***chikúm***, all in the family Myristicaceae. Gentry observes that trees in the Burseraceae often have an "incenselike or turpentine-like vegetative odor" (1993:299) and that trees in the Lauraceae and Myristicaceae typically have a distinctive "Ranalean odor" due to the presence of aromatic essential oils (1993:484,638). It is important to note that the Aguaruna typically group companions together based on several characters rather than just one. For example, ***pantuí***, ***shijíkap***, ***chípa*** and ***shíshi*** (genus *Protium*) are placed in a separate group from the trees ***kunchái*** and ***újuts*** (genus *Dacryodes*), even though they both have the insence-like odor characteristic of the family Burseraceae. The Aguaruna separate the two groups because of their distinctive fruits. The taxa in *Dacryodes* have indehiscent fruits that are typically black when mature and edible, while the taxa in *Protium* have dehiscent fruits that mature to a green, red or yellow color and are inedible.

Characters that are more important for making the finer distinctions between members of ***kumpají*** groups include leaf size and shape, overall tree height, trunk thickness, outside trunk color and texture and fruit size and shape. Preferred habitat also appears to be most important for making fine level taxonomic distinctions. Habitat clues were never cited as a feature that holds companion groups together, but they were cited in a small number (7.3%) of distinctions within companion sets. Analysis of 256 descriptive terms in folk species binomials of trees suggests that preferred habitat is fairly important for making distinctions between folk species in the same folk genus. Nearly a third (30.1 %) of the binomial folk species names examined make reference to habitat.

Taken together, the structured interview data only partially support the basic hypothesis of this research, that both sensory and ecological clues play a role in the process of tree identification. All of the 504 descriptions involved sensory reasoning. Likewise, all of the 177 companion comparisons involved sensory reasoning. However, only 21% of the descriptions involved ecological clues. Ecological clues were involved in only 6% of companion similarities and 11% of companion differences (Jernigan in press).

A hierarchical cluster analysis was performed using the character states mentioned in informants' descriptions of the 63 study trees. The resulting classification grouped the 63 trees in an arrangement that corresponds fairly well to their grouping in Aguaruna folk taxonomy. Ten of the 17 (58.8%) companion sets included in the study were fully resolved in the cluster analysis, four (23.5%) were partially resolved and three (17.6%) were completely unresolved. I placed equal weight on all character states in this hierarchical cluster analysis. The resulting classification might come even closer to the folk taxonomy if more weight were placed on the characters that the Aguaruna consider to be most important for making higher level taxonomic judgments (e.g. sap, color, bark odor etc.).

How Representative Is the Sample of Trees?

The 63 folk genera that I chose for the structured interviews represent only a fraction of the more than 300 named folk genera of trees that the Aguaruna recognize. It would be reasonable to ask whether this sample is really representative of Aguaruna tree folk genera and to wonder if I would have come to a different conclusion about the relative importance of particular sensory and ecological clues if I had chosen a different sample of folk genera. One approach for dealing with this problem is to compare informants' descriptions of the 63 from the main study, with descriptions of the sample of 38 trees chosen for the 2nd pilot study (see Appendix 6). The 2nd pilot study was carried out in Santa María de Nieva in 2003, with five key informants. Nineteen of the 38 (50%) trees from the 2nd pilot study were also included in the main study. The fact that there is some overlap in the two samples should not be surprising. In each case, I attempted to choose a sample of very well known trees. The two samples are different enough, however, to make for an interesting comparison. Specifically, I am comparing the sensory and ecological characters that informants mentioned most commonly for each sample. For the sake of brevity, I have chosen to compare sensory characters mentioned in at least 10% of tree descriptions for each study. I have also listed ecological clues mentioned in each study, in three broad categories: animal association, plant association and habitat (see Table 8.1).

Table 8.1 – Comparison of important characters for two samples of trees.

	main study		**pilot study #2**	
	% of IDs (out of 504)	**rank**	**% of IDs (out of 190)**	**rank**
sensory characters	**100.0**		**100.0**	
outer trunk color	48.8	1	61.1	1
fruit color	42.9	2	23.7	5
leaf shape	38.1	3	41.6	2
fruit shape	38.1	3	16.3	10
overall height of tree	32.3	4	15.8	11
thickness of trunk	28.2	5	21.6	7
flower color	27.6	6	-	
leaf size	23.4	7	36.8	3
quantity of branches	23.4	7	-	
bark odor	16.5	8	10.5	13
fruit size	16.5	8	13.7	12
fruit dehiscence	16.3	9	-	
outer trunk texture	15.3	10	24.7	4
sap color	15.1	11	18.9	8
leaf color	10.7	12	22.1	6
straightness of trunk	10.5	13	-	
hardness of trunk	-		17.9	9
ecological characters	**21.0**		**9.5**	
animal association	19.8	1	7.9	1
habitat	2.4	2	1.6	2
plant association	0.2	3	0.0	3

The data presented in table 8.1 (above) suggest that choosing a different sample of trees does indeed lead to a somewhat different impression of the importance of certain sensory and ecological clues. For example, fruit color was mentioned in 43.1 % of descriptions in the main study, but only 27.1 % of descriptions in the second pilot study. The characters flower color, fruit dehiscence, quantity of branches and straightness of trunk were mentioned in more than 10% of descriptions in the main study, but less than 10% of descriptions in the second pilot study. Similarly, trunk hardness was mentioned in 17.9% of description in the 2nd pilot study, but in less than 10% of descriptions for the main study. The differences between the results of the two studies could stem from the fact that the samples of trees were different in each study. However, the divergence in results may also be related to the fact that the informants in each study were different as well. In the main study, the frequency of mention for certain clues varied significantly between individual informants (see Table 4.2).

Despite some variation in emphasis of particular characters between the two studies, it is still quite noteworthy that the characters that were mentioned most often in the 2nd pilot study are largely the same ones that were mentioned most often in the main study. Twelve out of the 17 (70.6%) of the sensory characters that appear in Table 8.1 are mentioned in 10% or more descriptions for both samples. Both studies suggest a much greater role for sensory clues than for ecological ones. However, ecological clues were mentioned significantly more in the main study (21.0% of descriptions) than in the pilot study (9.5% of descriptions).

In the Gentry plot experiment, I collected data relating to eight informants' identifications of 156 trees (1,248 total identification) in 25 study plots. I recorded the names and, as far as possible, the actions that my informants took while making identifications. Visual clues involving the trunk or leaves played a role in all of the identifications. Bark cutting was involved in 42.9% of the identifications. In some cases, informants cut the bark apparently only to observe the inner trunk or look for sap. Most often, however (35.7% of all identifications) informants smelled the piece of cut bark. Informants tasted the bark or sap in less than 1% of identifications. Based on consensus analysis (Romney *et al*. 1986) of the folk genus names provided by informants, I was able to determine the correct name of 92.3% of the 156 trees, within a 95% confidence interval. Using Spearman nonparametric correlation analysis (Madrigal

1998), I found a statistically meaningful inverse correlation ($\rho = -0.699$) between the number of informants who cut a tree and the number who agreed on the consensus answer. The correlation suggests that bark cutting is more commonly used as a next step for identifying difficult trees, rather than simply for confirming identifications of easy trees. For most of the taxa encountered in the test plots, the percentage of correct answers (according to the consensus analysis) was actually higher for those instances when bark was not cut. It seems reasonable to assume that, for any given taxon, some individuals are harder to identify than others. There is certainly morphological variation with a single species, and many Aguaruna folk taxa correspond to multiple species. Some examples of a particular taxon could be atypical in some way, making them harder to identify. For a few taxa, particularly ***tínchi*** (various Lauraceae), informants did have a much better percentage of correct identifications when they cut and smelled the bark.

Significance for Ethnobiology

One factor that likely complicates elicitation of identification methods is the tendency of informants to make identifications very quickly based on an overall impression, or gestalt (Berlin *et al*. 1974: 154). Informants may have difficulty verbalizing discrete features that help them distinguish a particular tree from other similar ones. When I was first designing this project, I honestly wondered whether informants would respond to questions about how they identify trees by saying something like ‘I can just tell’, or ‘you just have to see for yourself, let me show you.’ Glenn Shepard has suggested that the gestalt issue would likely especially be a problem for common, highly utilized or cultivated species (written communication 2003). A study such as the one I have made can never reveal all of the clues that are important to the Aguaruna for identifying of trees. It seems quite likely that my Aguaruna informants did not verbalize all the clues that they utilize when distinguishing tree taxa. For example, the Aguaruna consider most melastomes to be related, but none of my informants ever mentioned the characteristic leaf venation (Gentry 1993: 595) that Western botanists find so important for recognizing this family. I do share the optimism of several authors (see Berlin *et al*. 1974, Ellen 1993) that informants should be able to verbalize at least some information about how they make identifications in terms of discrete clues. Some investigators including Berlin *et al*. (1974) and Hunn (1975) argue that people can, in many cases, verbalize the relatively minor differences between conspecifics of a particular folk genus.

Ethnobiological theory (see Berlin 1992 and Hunn 1975) has generally assumed that taxonomic decisions at the folk genus level happen very rapidly and can typically be made with a single glance. However, my data suggest that a quick glance is often not sufficient for identifying tall trees to folk genus. Many important diagnostic features such as fruit and leaves must be discerned far up in the canopy, while other significant clues such as sap or bark odor can only be observed after making a bark cut. Evidence to support my claim comes from my informal observations of tree identifications, and from the Gentry plot experiment (Chapter 5). A majority (69.8%) of tree identifications in the Gentry plot experiment produced names consisting of only a folk genus. In 59.8% of those cases, informants were apparently able to name the folk genus after only a quick glance at the trunk and leaves. However, in 40.2% those cases, informants named the folk genus only after cutting the bark. Identification of a tall tree proceeds in a series of discrete steps, each of which involves observing only a portion of the entire organism. In the vast majority of cases, informants made at least two glances, one at the trunk and another up toward the canopy. The fact that the identification of large trees tends to occur in pieces makes it seem plausible that people will be able to accurately describe some of the major diagnostic features that allow them to make the identifications. Since identification takes place in more than one step, informants will not be dealing with a single gestalt but two or more.

The structured interview data provide some indication of what characters informants consider to be the most salient for the 63 study trees. However, those data are limited in their ability to predict what features informants actually use most commonly when making identifications of real trees. Some features, such as fruit and flowers are seasonal for many species and may not be present when an actual identification is made. A few informants also mentioned the fact that birds or other animals eat the fruit of particular trees as a possible clue to identification. This clue would clearly also be contingent on circumstances, since the animals in question would not always be present (Jernigan in press).

It is worth noting that the findings the structured interviews appear to partly contradict the anecdotal reports (see Berlin 1992:7; Davis 1996:453, Gentry 1993:4) mentioned in the introduction of this monograph. These anecdotal reports have emphasized the ability of indigenous peoples of the Amazon basin to identify trees in their local environment simply by observing characteristics of the trunk and bark. As Gentry put it, “[a]nyone who has ever observed a good ‘matero’ effortlessly identify trees with nothing more than a machete slash of the bark and a sniff of his nose can begin to appreciate some of these additional characters” (1993: 4). Trunk and bark characteristics do appear to be very salient to the Aguaruna. My informants mentioned outer trunk appearance in nearly two thirds (62.1%) of their descriptions (Figure 4.3). Additionally, they mentioned bark, inner trunk, and sap in 24.0%, 14.9% and 17.5% of their descriptions, respectively. These last features are the ones that Gentry refers to as “bark and slash characters” (1993: 4), and the structured interview data support their importance to the Aguaruna for identifying trees. However, my informants' descriptions and companion comparisons also place a heavy emphasis on fruit and leaf characters as well as overall growth habit. Results of the Gentry plot experiment suggest that cutting and smelling bark is a step that informants tend to take for more difficult trees. Informants were able to provide a name in 57.1 % of 1,248 total identifications, without bark cutting, relying instead on the more readily obvious features of growth habit, outside trunk appearance leaf size and shape and also likely, buttressed or stilt roots, when present. The structured interview data suggest that fruit characters can be very diagnostic, but fruits were not apparent for most trees in the Gentry plots. During informal walks through the forest, I did occasionally observe informants examining fruits or flowers that had fallen on the ground for the purpose of making an identification.

The sorts of formal interview questions that I asked encouraged informants to describe their ideal image of a tree which would include all the most salient features. However, an informant may not actually need to see all of the most salient features of any given tree in order to identify it. As Ellen has noted, "real world attributes do not occur independently of each other, but have a highly correlational structure and are perceived as such" (1993:72). In other words, through years of observation, my Aguaruna informants have acquired a clear image of which features go together, so that, for some trees at least, simply observing one or two of these features (e.g. the trunk or leaves) is enough to bring to mind any important features that are not actually present (e.g. fruit) (Glenn Shepard written communication 2005).

Results of the Gentry plot experiment support the idea that people can often assign a tree to a folk taxon without needing to observe all of the most salient characteristics of the taxon in question. In the structured interviews, informants commonly mentioned that the bark of ***pantuí*** (*Protium* spp.) has a recognizable odor. In the Gentry plot experiment, however, informants were able to identify the tree ***pantuí*** in most (85.1%) of cases, simply by observing the outer trunk, stilt roots and looking up at the leaves in the canopy. Cutting and smelling the bark was necessary in a minority (14.9%) of cases. Fruit characters did not appear to play much of a role in the Gentry plot experiment, although such characters were mentioned very frequently in the structured interviews. I did not observe fruits on many of the study trees, although it is quite possible that in some cases my informants eyes could pick out features that mine did not. Only once did an informant pick up a fallen fruit to examine it. Animal associations played an obvious role for only one tree, ***tagkána*** (*Triplaris* spp.). The red stinging ants that live on the trunk of ***tagkána*** were clearly visible.

Interestingly, the Aguaruna appear not to place much emphasis on certain characters that Western botanists find very useful. For example, botanists find leaf arrangement to be an important diagnostic character for many families and genera of woody neotropical flora (Gentry 1993). I showed one Aguaruna informant drawings I had made of alternate, opposite and 3-whirled leaves to see if he could provide terms for those arrangements. He described the alternate leaves as "***dúke̲ iká***" 'it's leaves are far apart', the opposite leaves as "***dúke̲ beték***" 'it's leaves are the same' and the 3-whorled leaves as "***dúke beték kampátum dúka***" 'it's leaves are the same with three leaves.' During structured interviews, however, none of my informants ever volunteered those terms, nor did they ever point out leaf arrangement to me when teaching me how to identify the various trees we encountered during informal walks through the forest. Craig Perdue (n.d.) has made similar observations from his analysis of ethnobotanical data that Bourdy *et al*. (1999) collected with the Tacana of the Bolivian Amazon. The data include descriptions of morphological and ecological features that the Tacana cited for distinguishing between conspecifics in 35 folk genera. Perdue is surprised to find that characters such as leaf arrangement and number of leaflets in compound leaves are not mentioned in the descriptions of how the folk species in each folk genus are differentiated. Perdue proposes two possible explanations for the absence of such characters. On one hand, leaf arrangement and number of leaflets could be characters that the Tacana use more for making distinctions *between* folk genera (information that Bourdy *et al*. (1999) did not elicit). On the other hand, Perdue argues (n.d.), the Tacana may not need to rely on arrangement and quantity characters, because they are more attuned to certain other features that Western botanists do not typically use. Based on my research with the Aguaruna, I tend to favor the later explanation. As I have stated, leaf arrangement never came up in my formal or informal observations of the identification process. Leaflet number came up very rarely. On one occasion, an Aguaruna collaborator pointed out to me that saplings of ***shijíg*** (*Hevea* spp.) can be identified by their clusters of three leaves (really leaflets). One informant also mentioned the 3-foliate leaves of ***shikiú*** (*Erythrina* spp.). It seems quite possible that the Aguaruna may not need to rely on leaf arrangement or number of leaflets, because they are more attuned than most Western botanists to subtle differences in such features as trunk appearance, leaf shape and bark odor. Additionally, the Aguaruna know exactly which trees to expect in the various habitats found in their local environment, thus greatly limiting the possibilities. Diamond and Bishop (1999) have made similar comments regarding the importance of ecological context for bird identification among the Ketengban of New Guinea.

Significance for Tropical Forestry and Ecology

A broader goal of this investigation is to contribute, in a small way, to understanding how scientific and ethnoscientific knowledge can be complimentary. In this case, Aguaruna ethnoscientific knowledge of tree identification may contribute something to tropical forestry and conservation projects in the upper Marañón region of Peru and adjacent regions of the upper Amazon, by adding to the recent efforts of Gentry (1993) and others to find easier methods for identifying neotropical trees based on sterile characteristics. Floral characteristics can be problematic for a couple of reasons. In addition to the high degree of convergence in these features (Gentry 1993), flowers and fruit are also difficult to collect since they often appear seasonally, and, with large trees, could be very high up in the canopy. Additionally, Aguaruna communities could collaborate with tropical ecologists and conservation biologists in monitoring plant species composition in various locations around their land holdings. In such a collaboration, biologists would gain knowledgeable collaborators and indigenous communities wishing to participate would gain income and perhaps non-monetary benefits as well. Aguaruna communities with access to montane forest habitats, including many in the upper Nieva area could be particularly valuable collaborators since tropical montane forest of the region is an especially high priority for plant conservation (Rodriguez and Young 2000).

Future Directions

Determining the most salient characters of tree taxa for Aguaruna informants is a good first step for approaching the question of how those trees are recognized and identified. The Gentry plot experiment provides additional data relevant to this question from observations of actual identifications. While analyzing the data from those two experiments, an idea occurred to me for an additional set of experiments that could shed more light on the question of how the Aguaruna identify trees. Part of my inspiration comes from Carneiro's (1978) classic experiment with the Kuikuru of Brazil, in which he showed a group of men an assortment of leaves he collected from the forest floor in order to elicit identifications of the trees they came from. What follows is a brief outline of the proposed experiments. These can be carried out in one of the communities on the upper Nieva, where I previously worked. First, I will walk in the vicinity of the chosen community with a particularly knowledgeable key informant and select a sample of 50 trees. The goal will be to find a sample of trees representing a large variety of families and genera. I will also be sure to include some trees that my informants have previously indicated have distinctive odors, such as members of the families Annonaceae, Burseraceae, Lauraceae, Meliaceae and Myristicaceae. For each potential member of the sample, I will ask my knowledgeable informant to provide an Aguaruna name. The next step will be to collect voucher specimens from the fifty trees. If any trees prove impossible to collect, I will substitute others that can be collected. Some trees will certainly be sterile when the first round of collections are made. I will return at a later date to see if any more trees are in flower or fruit.

For the next phase of the experiment, I will find 10 to 15 informants willing to participate in the study. First, I will cut fresh leaves and show them individually to all informants, asking each person if he can tell what tree the leaf comes from. Ideally, I will be able to interview all informants in a single day, so that the leaves do not dry out very much. Alternately, I could press the leaves and then show them to informants at a more leisurely pace. However, the drying process might alter certain important characters such as color and odor. Secondly, I will cut pieces of bark from the same 50 study trees. I will then request that each informant wear a blindfold as I hold the piece of bark up to his nose for him to smell. I will record his best guess as to the identity of the tree in question. Thirdly, on a different day, I will cut another piece of bark from each tree and request informants to identify the tree each piece comes from without smelling it. Finally, I will lead each informant individually to each of the 50 trees and request him to make an identification using any method he wants. I will record the actions informants take and the answers they give.

Clearly more studies are needed, both cross-culturally and with different folk taxonomic life-forms (e.g. palms, vines and herbs) to better understand how people identify plants. It seems probable that leaves and fruit would play an even greater role in the actual process of identification for herbs and shrubs, since those features would be much easier to observe than they are for large trees. This is a prediction that future research could address.

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Appendix 1: All Plants Collected in the Course of this Research

Family	**Species**	**coll. #[ii]**	**Aguaruna name**	**LF[i]**
not determined	not determined	J34	***ipáknum***	n
not determined	not determined	J27	***jíjuantam***	n
not determined	not determined	J195	***núgkam***	n
not determined	not determined	J11	***sháuknum***	n
not determined	not determined	J32	***súku***	n
not determined	not determined	J39	no name given	n
not determined	not determined	J40	no name given	n
Acanthaceae	not determined	J141	***jempénim***	d
Acanthaceae	not determined	J156	***jempénim***	d
Acanthaceae	*Sanchezia* sp.	J137	***jempénim***	d
Acanthaceae	*Sanchezia* sp.	J142	***jempénim***	d
Annonaceae	*Crematosperma* sp.	J263	***yáis, tsáju***	n
Annonaceae	*Pseudoxandra* sp.	J180	***yaisá kumpají***	n
Annonaceae	*Xylopia parviflora* Spruce	J269	***kayayáis***	n
Apocynaceae	*Couma macrocarpa* Barb. Rodr.	J188	***dáum, uchí***	n
Apocynaceae	*Himatanthus sucuuba* (Spruce ex Müll. Arg.) Woodson	J201	***shipítna***	n

[i] LF = 'life-form': n = ***númi*** (trees), sh = ***shígki*** (palms), v = ***dáek*** (lianas and vines), d = ***dúpa*** (herbs)

[ii] Collection numbers preceded by J indicate my own collections, which are deposited in the herbarium of the Universidad Nacional Mayor de San Marcos, in Lima, Peru.

Family	**Species**	**coll. #[ii]**	**Aguaruna name**	**LF[i]**
Apocynaceae	*Lacmellea* sp.	J7	***táuch***	n
Apocynaceae	*Lacmellea oblongata* Markgr.	J199	***táuch, úchi***	n
Apocynaceae	*Lacmellea peruviana* (Van Heurck & Müll. Arg.) Markgr.	J200	***táuch, múun***	n
Apocynaceae	*Tabernaemontana* sp.	J41	***kúnakip***	n
Apocynaceae	*Tabernaemontana sananho* Ruiz & Pav.	J181	***kúnakip***	n
Apocynaceae	*Tabernaemontana undulata* Perrier ex A. DC.	J179	***íwakip***	n
Araceae	*Anthurium* sp.	J165	***tsegkejúsh***	d
Arecaceae	*Geonoma stricta* var. *trailii* (Burret) A.J. Hend.	J182	***yugkúp***	sh
Asteraceae	not determined	J26	***daiták***	n
Asteraceae	*Ageratum conyzoides* L.	J255	***tujutjutú dupá***	d
Asteraceae	*Clibadium* sp.	J277	***basú***	d
Asteraceae	*Clibadium* sp.	J21	***basúnsu***	d
Asteraceae	*Eirmoraphala* sp.	J213	***újik kuntútkam***	d
Asteraceae	*Erechtites hieraciifolius* (L.) Raf. ex DC.	J220	***pakúpkus***	d
Asteraceae	*Liabum acuminatum* Rusby	J256	***tukútkus, namakía***	d
Asteraceae	*Tilesia baccata* (L.) Pruski	J244	***uyúnmis***	v
Asteraceae	*Vernonia* sp.	J276	***uyúyunim***	v
Asteraceae	*Wedelia triloba* (L.) Hitchc.	J221	***dígki dupáji***	d
Begoniaceae	*Begonia* sp.	J166	***kunugkút***	v
Bignoniaceae	*Tabebuia obscura* (Bureau & K. Schum.) Sandwith	J192	***numiwáinim***	n
Bombacaceae	not determined	J122	***ménte***	n
Bombacaceae	not determined	J123	***ménte***	n
Bombacaceae	not determined	J210	***ménte, wampúush***	n
Bombacaceae	*Ceiba pentandra* L. (Gaertn.)	J266	***wampúush***	n
Bombacaceae	*Ochroma* sp.	J35	***wáwa***	n
Bombacaceae	*Pachira insignis* (Sw.) Sw. ex Savigny	J224	no name given	n
Bombacaceae	*Pseudobombax* sp.	J209	***ménte, wampúush***	n

Family	**Species**	**coll. #[ii]**	**Aguaruna name**	**LF[i]**
Boraginaceae	*Cordia nodosa* Lam.	J194	***supínim***	n
Boraginaceae	*Cordia toqueve* Aubl.	J231	no name given	n
Boraginaceae	*Cordia toqueve* Aubl.	J234	no name given	n
Boraginaceae	*Cordia toqueve* Aubl.	J239	no name given	n
Burseraceae	*Dacryodes* sp.	J48	***újuts***	n
Burseraceae	*Dacryodes kukachkana* L.O. Williams	J79	***kunchái, múun***	n
Burseraceae	*Dacryodes kukachkana* L.O. Williams	J58	***kunchái, wáwa***	n
Burseraceae	*Dacryodes nitens* Cuatrec.	J121	***kunchái, tsáju***	n
Burseraceae	*Dacryodes peruviana* (Loes.) H.J. Lam	J50	***kunchái, númi***	n
Burseraceae	*Protium* sp.	J233	***pantuí***	n
Burseraceae	*Protium* sp.	J54	***shijíkap***	n
Burseraceae	*Protium* sp.	J38	***shíshi***	n
Burseraceae	*Protium fimbriatum* Swart	J70	***chípa***	n
Burseraceae	*Protium grandifolium* Engl.	J49	***pantuí***	n
Burseraceae	*Protium grandifolium* Engl.	J64	***shíshi***	n
Burseraceae	*Tetragastris* sp.	J69	***chunchuína***	n
Campanulaceae	*Centropogon* sp.	J140	***ántashbuuk***	d
Campanulaceae	*Centropogon* sp.	J134	***jempénim, mujáya***	d
Campanulaceae	*Centropogon* sp.	J150	***tsemantsém, mujáya***	d
Campanulaceae	*Centropogon* sp.	J153	***tsemantsém, mujáya***	d
Caricaceae	*Carica* sp.	J155	***shiwanúk***	d
Caryocaraceae	*Caryocar* sp.	J6	***dusenés***	n
Chrysobalanaceae	*Hirtella bullata*	J203	***shampiúnum***	n
Chrysobalanaceae	*Licania cecidiophora* Prance	J185	***dúship***	n
Chrysobalanaceae	*Licania cecidiophora* Prance	J211	***dúship***	n
Chrysobalanaceae	*Licania cecidiophora* Prance	J214	***dúship***	n
Clusiaceae	*Chrysochlamys* sp.	J29	***yagkíp***	n

Family	**Species**	**coll. #[ii]**	**Aguaruna name**	**LF[i]**
Clusiaceae	*Chrysochlamys* sp.	J158	***yagkíp***	n
Clusiaceae	*Chrysochlamys weberbaueri* Engl.	J89	***yagkíp***	n
Clusiaceae	*Clusia weberbauerii*	J175	***úwe***	n
Clusiaceae	*Garcinia macrophylla* Mart.	J119	***pegkáenum, shíig***	n
Clusiaceae	*Garcinia macrophylla* Mart.	J61	***pegkáenum, wáshi***	n
Clusiaceae	*Garcinia macrophylla* Mart.	J62	***wayámpainim***	n
Clusiaceae	*Garcinia madruno* (Kunth) Hammel	J275	***wayámpainim***	n
Clusiaceae	*Vismia* sp.	J4	***yampiánim***	n
Clusiaceae	*Vismia glabra* Ruiz & Pav.	J106	***tsuemú dupá***	n
Convolvulaceae	*Ipomoea* sp.	J130	***inchínchi***	v
Cucurbitaceae	not determined	J131	***yuwícha***	v
Cucurbitaceae	*Gurania pyrrhocephala* Harms	J246	***yuwícha***	v
Ericaceae	*Befaria glauca* Bonpl.	J253	***kunugkut, kampáunmaya***	n
Ericaceae	*Macleania* sp.	J46	***kunugkút, mujáya***	n
Erythroxylaceae	*Erythroxylum macrophyllum* Cav.	J107	***sacha coca***	n
Euphobiaceae	*Senefeldera inclinata* Müll. Arg.	J205	***tsáchij***	n
Euphorbiaceae	*Acalypha* sp.	J15	***jíini***	n
Euphorbiaceae	*Acalypha macrostachya* Jacq.	J215	***jíini, bákaij***	n
Euphorbiaceae	*Alchornea* sp.	J238	***kasháinim***	n
Euphorbiaceae	*Aparisthmium cordatum*(Juss.) Baill.	J170	***dátash***	n
Euphorbiaceae	*Hevea guianensis* Aubl.	J84	***shijíg***	n
Euphorbiaceae	*Mabea* sp.	J230	no name given	n
Euphorbiaceae	*Mabea maynensis* Spruce	J120	***tákit***	n
Euphorbiaceae	*Senefeldera inclinata* Müll. Arg.	J85	***tsáchij***	n
Fabaceae	not determined	J8	***tampúsh, mujáya***	n
Fabaceae	not determined	J19	***tampúsh, mujáya***	n
Fabaceae	*Bauhinia* sp.	J14	***shigkát***	n

Family	**Species**	**coll. #**[ii]	**Aguaruna name**	**LF**[i]
Fabaceae	*Cedrelinga cateniformis* (Ducke) Ducke	J271	***tsáik***	n
Fabaceae	*Erythrina* sp.	J249	***shikiú, múun***	n
Fabaceae	*Erythrina* cf. *poeppigiana* (Walp.) O.F. Cook	J248	***shikiú, apách***	n
Fabaceae	*Erythrina* cf. *poeppigiana* (Walp.) O.F. Cook	J247	***shikiú, awajún***	n
Fabaceae	*Inga* sp.	J240	***sámpi, dupajám***	n
Fabaceae	*Inga* sp.	J242	***sámpi, dupajám***	n
Fabaceae	*Inga* sp.	J190	***sámpi, múun***	n
Fabaceae	*Inga* sp.	J60	***sámpi, putsúu***	n
Fabaceae	*Inga* sp.	J189	***sámpi, sháajam***	n
Fabaceae	*Inga* sp.	J187	***sámpi, yuwícham***	n
Fabaceae	*Inga* sp.	J9	***wámpa***	n
Fabaceae	*Inga* sp.	J5	***wámpushik***	n
Fabaceae	*Inga* cf. *densiflora* Benth.	J51	***sámpi, ímik***	n
Fabaceae	*Inga* cf. *multinervis* T.D. Penn.	J72	***buabúa***	n
Fabaceae	*Inga* cf. *umbellifera* (Vahl) Steud.	J78	***katámankamat***	n
Fabaceae	*Inga edulis* Mart.	J63	***wámpa***	n
Fabaceae	*Inga marginata* Willd.	J212	***sejempách***	n
Fabaceae	*Macrolobium acaciifolium* (Benth.) Benth.	J82	***samíknum***	n
Fabaceae	*Macrolobium* aff. *microcalyx*	J254	***tagkáam, mujáya***	n
Fabaceae	*Macrolobium limbatum* Spruce ex Benth.	J56	***wampishkunim***	n
Fabaceae	*Myroxylon balsamum* (L.) Harms	J207	***chikáunia***	n
Fabaceae	*Myroxylon balsamum* (L.) Harms	J208	***chikáunia***	n
Fabaceae	*Ormosia* sp.	J115	***pandáij***	n
Fabaceae	*Ormosia* cf. *amazonica* Ducke	J114	***pandáij***	n
Fabaceae	*Ormosia* cf. *coccinea* (Aubl.) Jacks.	J71	***tajép***	n
Fabaceae	*Pithecellobium basijugum* Ducke	J164	***samiknum, mujáya***	n
Fabaceae	*Pterocarpus* sp.	J236	no name given	n

Family	Species	coll. #[ii]	Aguaruna name	LF[i]
Fabaceae	*Senna* cf. *ruiziana* (G. Don) H.S. Irwin & Barneby	J160	***tampúsh, mujáya***	n
Fabaceae	*Swartzia* sp.	J202	***ikánchmanim***	n
Fabaceae	*Swartzia* sp.	J13	***jiyúnum***	n
Fabaceae	*Tachigali* sp.	J261	***tigkíshpinim***	n
Fabaceae	*Tachigali* cf. *bracteosa* (Harms) Zarucchi & Pipoly	J270	***wantsún***	n
Fabaceae	*Tachigali formicarum* Harms	J264	***ugkuyá***	n
Fabaceae	*Zygia latifolia* (L.) Fawc. & Rendle	J59	***íwanch sámpi***	n
Flacourtiaceae	*Casearia obovalis* Poepp. ex Griseb.	J225	no name given	n
Gentianaceae	*Symbolanthus*	J173	no name given	n
Gesneriaceae	*Besleria pliata* (spel ?)	J133	***tujutjutú dupá***	d
Gesneriaceae	*Columnea* sp.	J144	***awajímas***	v
Gesneriaceae	*Columnea* aff. *anisophylla*	J222	***awajímas***	v
Gesneriaceae	*Columnea ericae* Mansf.	J162	***yusánim***	v
Gesneriaceae	*Columnea guttata* Poepp.	J245	***tsukagkámas***	v
Gesneriaceae	*Corytoplectus speciosus* (Poepp.) Wiehler	J219	***takashú dupáji***	d
Gesneriaceae	*Diastema* sp.	J265	no name given	d
Gesneriaceae	*Drymonia affinis* (Mansf.) Wiehler	J260	***tawásnum, mujáya***	v
Gesneriaceae	*Drymonia serrulata* (Jacq.) Mart.	J274	***jempénim***	v
Gesneriaceae	*Monopyle flava* L.E. Skog	J250	***jempénim***	v
Gesneriaceae	*Nautilocalyx* cf. *bullatus* (Lem.) Sprague	J257	***awajímas, kampáunmaya***	d
Gesneriaceae	*Paradrymonia ciliosa* (Mart.) Wiehler	J218	***tsunúp***	d
Heliconiaceae	*Heliconia velutina* L. Andersson	J138	***wínchu***	d
Lauraceae	not determined	J28	***tínchi, káwa***	n
Lauraceae	*Aniba* sp.	J44	***wampúsnum, mujáya (kumpají)***	n
Lauraceae	*Licaria* sp.	J196	***káikua***	n
Lauraceae	cf. *Nectandra schomburgkii* Meisn.	J53	***wampúsnum***	n
Lauraceae	*Nectandra cuneatocordata* Mez	J171	***mantagá***	n

Family	**Species**	**coll. #[ii]**	**Aguaruna name**	**LF[i]**
Lauraceae	*Nectandra olida* Rohwer	J268	***tínchi, káwa***	n
Lauraceae	*Nectandra reticulata* (Ruiz & Pav.) Mez	J73	***takák***	n
Lauraceae	*Ocotea argyrophylla* Ducke	J169	***tínchi, tuntúu***	n
Lauraceae	*Ocotea gracilis* (Meisn.) Mez	J272	***takák***	n
Lauraceae	*Ocotea longifolia* Kunth	J113	***tínchi, tuntúu***	n
Lecythidaceae	*Couroupita subsessilis* Pilg.	J68	***shishíim***	n
Lecythidaceae	*Eschweilera gigantea* (R. Knuth) J.F. MacBr.	J102	***kaáshnum***	n
Lecythidaceae	*Eschweilera gigantea* (R. Knuth) J.F. MacBr.	J217	***shuwát***	n
Lecythidaceae	*Grias peruviana* Miers	J57	***apái***	n
Loranthaceae	*Gaiadendron* sp.	J176	***íwawanch***	n
Lythraceae	not determined	J109	***wayáp***	n
Melastomataceae	not determined	J16	***chinchák, uchúch***	n
Melastomataceae	not determined	J25	***yujách***	n
Melastomataceae	not determined	J128	***chinchák, nugkáya***	d
Melastomataceae	*Aciotis* sp.(?)	J129	***chinchák, nugkáya***	d
Melastomataceae	*Bellucia* cf. *pentamera* Naudin	J66	***chinchák, sáu***	n
Melastomataceae	*Clidemia* sp.	J47	***chinchák, mujáya tujutjutú***	d
Melastomataceae	*Clidemia* sp.?	J126	***chinchák, nugkáya***	d
Melastomataceae	*Miconia* sp.	J149	***chinchák, antumú***	n
Melastomataceae	*Miconia* sp.	J216	***chinchák, antumú***	n
Melastomataceae	*Miconia* sp.	J76	***chinchák, kapantú***	n
Melastomataceae	*Miconia* sp.	J99	***ukuinmanch***	n
Melastomataceae	*Miconia* sp.?	J148	***chinchák, antumú***	n
Melastomataceae	*Miconia affinis*	J178	***chinchák, kapantú***	n
Melastomataceae	*Miconia bulbalina* (Don) Naudin	J112	***chijáwe***	n
Melastomataceae	*Miconia lourteigiana* Wurdack	J267	***ukuinmanch***	n
Melastomataceae	*Miconia ternatifolia* Triana	J75	***tseék***	n

Family	**Species**	**coll. #[ii]**	**Aguaruna name**	**LF[i]**
Melastomataceae	*Ossaea* sp.	J65	***chinchák, kugkúim***	d
Melastomataceae	*Tibouchina ochypetala* (Ruiz & Pav.) Baill.	J177	***újik kuntút***	n
Meliaceae	*Cedrela odorata* L.	J83	***áwanu***	n
Meliaceae	*Cedrela odorata* L.	J67	***séetug***	n
Meliaceae	*Guarea* sp.	J146	***cedrón***	n
Meliaceae	*Guarea grandiflora* Decne. ex Steud.	J183	***tsanchínakish, múun***	n
Meliaceae	*Guarea macrophylla* spp. *macrophylla*	J226	***ishpíg***	n
Meliaceae	*Guarea macrophylla* ssp. *pendulispica* (C. DC.) T.D. Pennington	J52	***yantsáu***	n
Meliaceae	*Guarea macrophylla* ssp. *pendulispica* (C. DC.) T.D. Pennington	J74	***bíchau***	n
Meliaceae	*Trichilea* sp.	J157	***bíchau kumpají***	n
Meliaceae	*Trichilia pallida* Sw.	J90	***takitík***	n
Meliaceae	*Trichilia poeppigii* C. DC.	J232	***chíajap, uchúch***	n
Meliaceae	*Trichilia septentrionalis* C. DC.	J237	***chíajap, múun***	n
Monimiaceae	*Siparuna* sp.	J18	***kuásip***	n
Monimiaceae	*Siparuna* sp.	J22	***mejénkach***	n
Monimiaceae	*Siparuna* sp.	J127	***mejénkach***	n
Moraceae	not determined	J105	***shína***	n
Moracceae	*Cecropia engleriana* Snethl.	J273	***súu***	n
Moracceae	*Clarisia racemosa* Ruiz & Pav.	J258	***shijigká sáei***	n
Moracceae	*Perebea xanthochyma*	J252	***pítuuk***	n
Moraceae	*Batocarpus orinocensis* H. Karst.	J42	***pítu***	n
Moraceae	*Brosimum parinarioides* Ducke	J86	***tákae***	n
Moraceae	*Cecropia* sp.	J12	***súu***	n
Moraceae	*Cecropia engleriana* Snethl.	J206	***satík***	n
Moraceae	*Ficus* sp.	J145	***yapít***	v
Moraceae	*Ficus cf. maxima*	J96	***tsuntsúj***	n
Moraceae	*Sorocea* cf. *pileata* W.C. Burger	J94	***ajátsjats, namakía***	n

Family	**Species**	**coll. #**[ii]	**Aguaruna name**	**LF**[i]
Myristicaceae	*Compsoneura capitellata* (A. DC.) Warb.	J241	***tsémpu, mujáya***	n
Myristicaceae	*Iryanthera juruensis* Warb.	J55	***tsémpu, úntuch***	n
Myristicaceae	*Iryanthera tricornis* Ducke	J80	***ejé̲sh***	n
Myristicaceae	*Virola* sp.	J135	***tsémpu, takáikit***	n
Myristicaceae	*Virola calophylla* (Spruce) Warb.	J95	***chikúm, namakía***	n
Myristicaceae	*Virola calophylla* (Spruce) Warb.	J198	***chikúm, namakía***	n
Myrtaceae	*Calyptranthes* sp.	J235	***sháakish***	n
Myrtaceae	*Calyptranthes* sp.	J243	***shajímat***	n
Myrtaceae	*Myrciaria* sp.	J228	***sháakish, mujáya***	n
Mysinaceae	*Stylogyne micrantha* (Kunth) Mez	J227	***yagkíp, mujáya***	n
Nyctaginaceae	*Neea divaricata* Poepp. & Endl.	J124	***kátsau***	n
Ochnaceae	*Cespedesia spathulata* (Ruiz & Pav.) Planch.	J87	***magkuák***	n
Ochnaceae	*Godoya* sp.	J174	***páushnum, úwejshunmaya***	n
Olacaceae	*Minquartia* sp.	J36	***wakapú***	n
Orchidaceae	not determined	J172	***ekéntumash***	d
Phytolaccaceae	*Phytolacca* sp.	J132	***wampagkán***	d
Piperaceae	*Piper* sp.	J23	***untuntú***	d
Piperaceae	*Piper* sp.	J37	***untuntú, mujáya***	d
Poaceae	not determined	J159	***nagkúchip***	d
Polygonaceae	*Triplaris americana* L.	J186	***tagkána***	n
Rosaceae	*Prunus* sp.	J93	***bákashap***	n
Rubiaceae	not determined	J17	***nágkuduk***	n
Rubiaceae	not determined	J30	***shamíkua***	n
Rubiaceae	not determined	J31	***shuípiu***	n
Rubiaceae	not determined	J103	***shuípiu, uchúch***	n
Rubiaceae	*Calycophyllum megistocaulum* (K. Krause) C.M. Taylor	J81	***uwáchaunim***	n
Rubiaceae	*Chimarrhis glabriflora* Ducke	J92	***bukún***	n

Family	**Species**	**coll. #[ii]**	**Aguaruna name**	**LF[i]**
Rubiaceae	*Coussarea* aff. *tortilis* Standl.	J229	***tsampáunum***	n
Rubiaceae	*Coussarea brevicaulis* K. Krause	J168	***supínim***	n
Rubiaceae	*Duroia hirsuta* (Poepp.) K. Schum.	J193	***íwaiwaig***	n
Rubiaceae	*Faramea rectinervia* Standl.	J101	***shuípiu, uchúch***	n
Rubiaceae	*Ferdinandusa* sp.	J191	***yapúkuit***	n
Rubiaceae	*Genipa americana* L.	J43	***súwa***	n
Rubiaceae	*Geophila macropoda* (Ruiz & Pav.) DC.	J118	***takashú dupáji***	d
Rubiaceae	*Geophila repens* (L.) I.M. Johnst.	J111	***takashú dupáji***	d
Rubiaceae	*Hamelia axillaris* Sw.	J259	***tsukagká***	n
Rubiaceae	*Hippotis brevipes* Spruce ex K. Schum.	J167	***dupí kumpají***	n
Rubiaceae	*Hippotis brevipes* Spruce ex K. Schum.	J139	***ikámia yagkúj***	d
Rubiaceae	*Isertia* sp.	J20	***tsáagnum***	n
Rubiaceae	*Isertia laevis* (Triana) B.M. Boom	J104	***tsáagnum, shíig***	n
Rubiaceae	*Manettia* sp.	J161	***untuntúp, úchi***	d
Rubiaceae	*Notopleura iridescens* C.M. Taylor	J125	***shamíkua***	n
Rubiaceae	*Palicourea mansoana* (Müll. Arg.) Standl.	J136	***shuípiu***	n
Rubiaceae	*Palicourea subspicata* Huber	J143	***shuípiu, úchi***	d
Rubiaceae	*Pentagonia macrophylla* Benth.	J117	***apáich***	n
Rubiaceae	*Psychotria* sp.	J163	***shamíkua kumpají***	n
Rubiaceae	*Psychotria* sp.	J154	***shuípiu, mujáya***	d
Rubiaceae	*Psychotria poeppigiana* Müll. Arg.	J152	***jempénim, mujáya***	n
Rubiaceae	*Psychotria tinctoria* Ruiz & Pav.	J100	***shuípiu, múun***	n
Rubiaceae	*Randia armata* (Sw.) DC.	J108	***tsáchik, putsúu***	n
Rubiaceae	*Retiniphyllum fuchsioides* Krause	J45	no name given	n
Rubiaceae	*Sabicea villosa* Willd. ex Roem. & Schult.	J98	***yutuímas***	d
Rubiaceae	*Uncaria tomentosa* (Willd. ex Roem. & Schult.) DC.	J97	***ajágke***	v
Rubiaceae	*Uncaria tomentosa* (Willd. ex Roem. & Schult.) DC.	J110	***tintígmas***	v

Family	**Species**	**coll. #[ii]**	**Aguaruna name**	**LF[i]**
Rubiaceae	*Warszewiczia* sp.	J33	***yúsa patámkamu***	n
Rutaceae	*Zanthoxylum fagara* (L.) Sarg.	J77	***umpákainim, namakía***	n
Rutaceae	*Zanthoxylum* sp.	J204	***tiík***	n
Rutaceae	*Zanthoxylum valens* (J.F. Macbr.) J.F. Macbr.	J251	***tiík***	n
Sabiaceae	*Ophiocaryon manausense* (W.A. Rodrigues) Barneby	J88	***dátej***	n
Sapotaceae	*Ecclinusa lanceolata* (Mart. & Eichler) Pierre	J197	***barát***	n
Sapotaceae	*Micropholis brochidodroma* T.D. Penn.	J223	***sáka***	n
Solanaceae	*Solanum* sp.	J10	***ugtukáj***	n
Solanaceae	*Solanum* sp.	J3	***ugtúkja kumpají***	n
Solanaceae	*Witheringia* sp.	J24	***ampígpig***	d
Solanaceae	*Witheringia* sp.	J151	***ampígpis***	d
Solanaceae	*Witheringia macrophylla* Kunth ex Dunal	J116	***ampígpig***	d
Sterculiaceae	*Theobroma subincanum* Martius in Buchner	J184	***akágnum***	n
Tiliaceae	*Heliocarpus* sp.	J1	***kútsa***	n
Ulmaceae	*Trema* sp.	J2	***kaka***	n
Violaceae	*Leonia crassa* L.B. Sm. & A. Fernández	J91	***íwakip, namakía***	n
Vochysiaceae	*Vochysia elongata* Pohl	J262	***páunim***	n
Zingiberaceae	*Renealmia thyrsoidea* (Ruiz & Pav.) Poepp. & Endl.	J147	***kúmpia***	d

Appendix 2: Aguaruna Plant Taxa Mentioned in this Monograph (Arranged by Common Name)

Aguaruna name	LF[i]	Species	Family	coll #[ii]
ajátsjats, namakía	n	*Sorocea* cf. *pileata* W.C. Burger	Moraceae	J94
akágnum	n	*Theobroma subincanum* Martius in Buchner	Sterculiaceae	J184, A293
ampágpag	n n	*Piper obtusilimbum* C. DC. *Piper strigosum* Trel.	Piperaceae Piperaceae	A336 A 513
anúna	n n	*Rollinia microcarpa* R.E. Fr. *Rollinia mucosa* (Jacq.) Baill.	Annonaceae Annonaceae	A449 B328
apái	n n	*Grias peruviana* Miers *Grias neuberthii* J.F. Macbr.	Lecythidaceae Lecythidaceae	J57, B884, T5 H488, H41
áwanu	n	*Cedrela odorata* L.	Meliaceae	J83
bákaij	n	*Hura crepitans* L.	Euphorbiaceae	B1719
barát	n	*Ecclinusa lanceolata* (Mart. & Eichler) Pierre	Sapotaceae	J197
batút	n n	*Ocotea floribunda* (Sw.) Mez *Ocotea* cf. *wachenheimii* Benoist	Lauraceae	A472, A138, B875 H483, K335
bíchau	n n	*Guarea macrophylla* ssp. *pendulispica* (C. DC.) T.D. Pennington *Trichilia pallida* Sw.	Meliaceae Meliaceae	J74 KU53
bíchau kumpají	n	*Trichilea* sp.	Meliaceae	J157

[i] LF = 'life-form': n = ***númi*** (trees), sh = ***shígki*** (palms), v = ***dáek*** (lianas and vines), d = ***dúpa*** (herbs)

[ii] Collection numbers preceded by J indicate my own collections, which are deposited in the herbarium of the Universidad Nacional Mayor de San Marcos, in Lima, Peru. Other letters indicate collections from Brent Berlin and his collaborators, as follows: A = Ernesto Ancuash, B = Brent Berlin, BO = J.S. Boster, D = Feliz Domínguez Pena, H = Victor Huashikat, K = Rubio Kayap, KU = Kujikat, L = Jose Asunción Leveau, T = Santiago Tunqui. All material collected by the above collaborators is deposited at the Missouri Botanical Garden, in St. Luis Missouri.

Aguaruna name	**LF**[i]	**Species**	**Family**	**coll #**[ii]
buabúa	n	*Inga multinervis* T.D. Penn.	Fabaceae	A10
	n	*Inga* cf. *multinervis* T.D. Penn.	Fabaceae	J72
	n	*Inga urabensis* L.Uribe	Fabaceae	K193
bukún	n	*Chimarrhis glabriflora* Ducke	Rubiaceae	J92
	n	*Chimarrhis hookeri* K. Schum.	Rubiaceae	A504
	n	*Macrocnemum roseum* (Ruiz & Pav.) Wedd.	Rubiaceae	K59
chápi	sh	*Phytelephas macrocarpa* ssp. *macrocarpa* Ruiz & Pav.	Arecaceae	B646
chíajap, múun	n	*Trichilia septentrionalis* C. DC.	Meliaceae	J237
chíajap, uchúch	n	*Trichilia poeppigii* C. DC.	Meliaceae	J232
chijáwe	n	*Miconia bulbalina* (Don) Naudin	Melastomataceae	J112
	n	*Miconia serrulata* (DC.) Naudin	Melastomataceae	K941
chikáunia	n	*Myroxylon balsamum* (L.) Harms	Fabaceae	J207, J208
chikúm	n	*Otoba glycicarpa* (Ducke) W.A. Rodrigues & T.S. Jaramillo	Myristicaceae	H1644
chikúm, namakía	n	*Virola calophylla* (Spruce) Warb.	Myristicaceae	J95
	n	*Virola calophylla* (Spruce) Warb.	Myristicaceae	J198
chími	n	*Pseudolmedia laevis* (Ruiz & Pav.) J.F. Macbr.	Moraceae	KU239
chími, suír	n	*Pseudolmedia laevis* (Ruiz & Pav.) J.F. Macbr.	Moraceae	H1543
chinchák, antumú	n	*Miconia* sp.	Melastomataceae	J149
	n	*Miconia* sp.	Melastomataceae	J216
	n	*Miconia* sp.?	Melastomataceae	J148
	n	*Leandra secunda* (D. Don) Cogn.	Melastomataceae	A553
	n	*Leandra longicoma* Cogn.	Melastomataceae	B1505
	n	*Miconia paleacea* Cogn.	Melastomataceae	A1202, B1753
	n	*Miconia subspicata* Wurdack	Melastomataceae	H571
	n	*Triolena pluvialis* (Wurdack) Wurdack	Melastomataceae	A1514

Aguaruna name	**LF**[i]	**Species**	**Family**	**coll #**[ii]
chinchák, dáek	d	*Adelobotrys* sp.	Melastomataceae	H1797
	d	*Blakea hirsuta* Berg ex Triana	Melastomataceae	H293, H579
	d	*Clidemia epiphytica* (Triana) Cogn.	Melastomataceae	H312
chinchák, kapantú	n	*Miconia* sp.	Melastomataceae	J76
	n	*Miconia affinis* DC.	Melastomataceae	J178
chinchák, kugkúim	d	*Ossaea* sp.	Melastomataceae	J65
chinchák, mujáya tujutjutú	d	*Clidemia* sp.	Melastomataceae	J47
chinchák, nugkáya	d	not determined	Melastomataceae	J128
	d	*Aciotis* sp.(?)	Melastomataceae	J129
	d	*Clidemia* sp.(?)	Melastomataceae	J126
chinchák, sáu	n	*Bellucia* cf. *pentamera* Naudin	Melastomataceae	J66
chinchák, uchúch	n	not determined	Melastomataceae	J16
chípa	n	*Protium fimbriatum* Swart	Burseraceae	J70, K264, B930, B1502
chunchuína	n	*Tetragastris* sp.	Burseraceae	J69
daikát	n	*Vernonia patens* Kunth	Asteraceae	B1634, B1970
dapúju̲k	n	*Inga cayennensis* Sagot ex Benth.	Fabaceae	K737
	n	*Inga thibaudiana* DC.	Fabaceae	B971, K710
dátash	n	*Aparisthmium cordatum*(Juss.) Baill.	Euphorbiaceae	J170, B937, K108, K236, K554
dáum, uchí	n	*Couma macrocarpa* Barb. Rodr.	Apocynaceae	J188
dúpi	n	*Pouteria reticulata* (Engl.) Eyma	Sapotaceae	K195
	n	*Pouteria torta* (Mart.) Radlk.	Sapotaceae	K190
	n	*Pouteria torta* ssp. *tuberculata* (Sleumer) T.D. Penn.	Sapotaceae	B720
dupí kumpají	n	*Hippotis brevipes* Spruce ex K. Schum.	Rubiaceae	J167
dusenés	n	*Caryocar* sp.	Caryocaraceae	J6

Aguaruna name	LF[i]	Species	Family	coll #[ii]
ejésh	n	*Iryanthera tricornis* Ducke	Myristicaceae	J80
	n	*Virola pavonis* (A. DC.) A.C. Sm.	Myristicaceae	K197
éwe	n	*Clusia weberbaueri* Engl.	Clusiaceae	J175
inák	n	*Gustavia macarenensis ssp. macarenensis* Philipson	Lecythidaceae	A1056
inakúam	n	*Gustavia inakuama* S.A. Mori	Lecythidaceae	B495, B656, B2036, KU8
ipák	n	*Bixa orellana* L.	Bixaceae	H219, H744
ishpíg	n	*Guarea macrophylla* spp. *macrophylla* Vahl	Meliaceae	J226
íwaiwaig	n	*Duroia hirsuta* (Poepp.) K. Schum.	Rubiaceae	J193
íwakip	n	*Leonia crassa* L.B. Sm. & A. Fernández	Violaceae	B501, K251
	n	*Leonia glycycarpa* Ruiz & Pav.	Violaceae	A1390, K913
	n	*Tabernaemontana undulata* Perrier ex A. DC.	Apocynaceae	J179
íwakip, namakía	n	*Leonia crassa* L.B. Sm. & A. Fernández	Violaceae	J91
íwanch sámpi	n	*Zygia latifolia* (L.) Fawc. & Rendle	Fabaceae	J59
kaáshnum	n	*Eschweilera gigantea* (R. Knuth) J.F. MacBr.	Lecythidaceae	J102
	n	*Eschweilera tessmannii* R.Knuth	Lecythidaceae	K568
káikua	n	*Licaria* sp.	Lauraceae	J196
	n	*Ocotea costulata* (Nees) Mez	Lauraceae	K663
kaka	n	*Trema* sp.	Ulmaceae	J2
	n	*Trema micrantha* (L.) Blume	Ulmaceae	T756
kántsa	n	*Alchornea glandulosa* Poepp.	Euphorbiaceae	B537, K1160
	n	*Conceveiba rhytidocarpa* Müll. Arg.	Euphorbiaceae	K322
	n	*Neosprucea grandiflora* (Spruce ex Benth.) Sleumer	Flacoutiaceae	T1101
	n	*Allophylus loretensis* Standl. ex J.F. Macbr.	Sapindaceae	H303

Aguaruna name	LF[i]	Species	Family	coll #[ii]
kapiú	n n	*Calycophyllum spruceanum* (Benth.) Hook. f. ex K. Schum. *Brosimum guianense* (Aubl.) Huber	Rubiaceae Moraceae	B3712 H240, H1103
kasháinim	n	*Alchornea* sp.	Euphorbiaceae	J238
kátsau	n n n	*Neea divaricata* Poepp. & Endl. *Neea macrophylla* Poepp. & Endl. *Neea speciosa* Heimerl	Nyctaginaceae Nyctaginaceae Nyctaginaceae	J124, A70, D137 K309, D98, BO55 A1128, K344, H352
katámankamat	n	*Inga* cf. *umbellifera* (Vahl) Steud.	Fabaceae	J78
káwa	n	*Ocotea floribunda* (Sw.) Mez	Lauraceae	A170
kawít	n n	*Perebea guianensis* ssp. acanthogyne (Ducke) C.C. Berg *Perebea guianensis* ssp. *pseudopeltata* (Mildbr.) C.C. Berg	Moraceae Moraceae	A464, K383 B448
kayayáis	n n	*Xylopia parviflora* Spruce *Oxandra xylopioides* Diels	Annonaceae Annonaceae	J269 A468
kúnakip	n n	*Tabernaemontana sananho* Ruiz & Pav. *Tabernaemontana* sp.	Apocynaceae Apocynaceae	J181, A72, B496 J41
kúnakip tséas	n	*Tabernaemontana macrocalyx* Müll. Arg.	Apocynaceae	A435, A1226, A1298
kunchái, múun	n	*Dacryodes kukachkana* L.O. Williams	Burseraceae	J79
kunchái, númi	n	*Dacryodes peruviana* (Loes.) H.J. Lam	Burseraceae	J50
kunchái, tsáju	n	*Dacryodes nitens* Cuatrec.	Burseraceae	J121
kunchái, wáwa	n	*Dacryodes kukachkana* L.O. Williams	Burseraceae	J58
kunugkút, kampáunmaya	n	*Befaria glauca* Bonpl.	Ericaceae	J253
kunugkút, mujáya	n	*Macleania* sp.	Ericaceae	J46

Aguaruna name	LF[i]	Species	Family	coll #[ii]
kutsápau	n	*Sterculia apetala* var. *elata* (Ducke) E.L. Taylor	Sterculiaceae	K148, K678
	n	*Sterculia frondosa* Rich.	Sterculiaceae	K173
	n	*Sterculia pruriens* (Aubl.) K. Schum.	Sterculiaceae	A 675
kútsa	n	*Heliocarpus* sp.	Tiliaceae	J1
	n	*Heliocarpus americanus* L.	Tiliaceae	A496, H14, K735, L43
kúwai	n	*Guarea pubescens* ssp. *pubescens* (Rich.) A. Juss.	Meliaceae	H1516
máegnum	n	*Ocotea floribunda* (Sw.) Mez	Lauraceae	A343
magkuák	n	*Cespedesia spathulata* (Ruiz & Pav.) Planch.	Ochnaceae	J87
mamántunim	n	*Spondias mombin* L.	Anacardiaceae	H392, H1563
	n	*Cabralea canjerana* (Vell.) Mart.	Meliaceae	K614
mantagá	n	*Nectandra cuneatocordata* Mez	Lauraceae	J171
mejénkach	n	*Capparis detonsa* Triana & Planch.	Capparaceae	A191
	n	*Siparuna* sp.	Monimiaceae	J22
	n	*Siparuna* sp.	Monimiaceae	J127
	n	*Siparuna thecaphora* (Poepp. & Endl.) A. DC.	Monimiaceae	B1706, K313
	n	*Cyphomandra endopogon* ssp. *endopogon* (Bitter) Bohs	Solanaceae	A1512, B1974, K2029, B2009
ménte	n	not determined	Bombacaceae	J122
	n	not determined	Bombacaceae	J123
ménte, númi	n	*Eriotheca macrophylla* ssp. *sclerophylla* (Ducke) A. Robyns	Bombacaceae	K980
ménte, wampúush	n	not determined	Bombacaceae	J210
	n	*Pseudobombax* sp.	Bombacaceae	J209
muráina	n	*Guazuma crinita* Mart.	Sterculiaceae	K645
náam	n	*Caryodendron orinocense* H. Karst.	Euphorbiaceae	K308
nája	n	*Urera baccifera* (L.) Gaudich. ex Wedd.	Urticaceae	K1181

Aguaruna name	**LF**[i]	**Species**	**Family**	**coll #**[ii]
náji	n	*Inga capitata* Desv.	Fabaceae	H1618
	n	*Inga ruiziana* G. Don	Fabaceae	K601
námukam	n	*Alibertia curviflora* K. Schum.	Rubiaceae	B1522
	n	*Borojoa claviflora* (K. Schum.) Cuatrec.	Rubiaceae	A132, K1110
	n	*Kotchubaea* sp.	Rubiaceae	A1064
	n	*Tocoyena* sp.	Rubiaceae	B796
númpi	n	*Jacaratia digitata (*Poepp. & Endl.) Solms	Caricaceae	B 548, K585
pandáij	n	*Ormosia* cf. *amazonica* Ducke	Fabaceae	J114
	n	*Ormosia* sp.	Fabaceae	J115
pantuí	n	*Protium* sp.	Burseraceae	J233
	n	*Protium grandifolium* Engl	Burseraceae	J49
	n	*Protium nodulosum* Swart	Burseraceae	A26
	n	*Protium robustum* (Swart) D.M. Porter	Burseraceae	K384
	n	*Protium sagotianum* Marchand	Burseraceae	A163
papágnum	n	*Tapirira guianensis* Aubl.	Anacardiaceae	A500, K204
	n	*Tapirira obtusa* (Benth.) D.J. Mitch.	Anacardiaceae	A345
páunim	n	*Vochysia braceliniae* Standl.	Vochysiaceae	BO47, A202, B812
	n	*Vochysia elongata* Pohl	Vochysiaceae	J262
páushnum, úwejshunmaya	n	*Godoya* sp.	Ochnaceae	J174
pegkáenum	n	*Garcinia macrophylla* Mart.	Clusiaceae	K321
pegkáenum, shíig	n	*Garcinia macrophylla* Mart.	Clusiaceae	J119
pegkáenum, wáshi	n	*Garcinia macrophylla* Mart.	Clusiaceae	J61
pítu	n	*Batocarpus orinocensis* H. Karst.	Moraceae	J42, A100
pítuuk	n	*Perebea xanthochyma* H. Karst.	Moracceae	J252
	n	*Trophis racemosa* (L.) Urb.	Moraceae	K107
	n	*Agonandra silvatica* Ducke	Opiliaceae	H1500

Aguaruna name	**LF**[i]	**Species**	**Family**	**coll #**[ii]
sáka	n	*Mouriri myrtifolia* Spruce ex Triana	Melastomataceae	B1734
	n	*Mollinedia caudata* J.F. Macbr.	Monimiaceae	L74
	n	*Calyptranthes tessmannii* Burret ex McVaugh	Myrtaceae	D26, H86, H380
	n	*Myrcia multiflora* (Lam.) DC.	Myrtaceae	T106
	n	*Myrciaria amazonica* O. Berg	Myrtaceae	B3556
	n	*Ixora ulei* K. Krause	Rubiaceae	H407
	n	*Micropholis brochidodroma* T.D. Penn.	Sapotaceae	J223
samík	n	*Pithecellobium longifolium* (Humb. & Bonpl. ex Willd.) Standl.	Fabaceae	B851
samíknum	n	*Macrolobium* sp.	Fabaceae	A510
	n	*Macrolobium acaciifolium* (Benth.) Benth.	Fabaceae	J82
	n	*Pithecellobium basijugum* Ducke	Fabaceae	B749, H232
samiknum, mujáya	n	*Pithecellobium basijugum* Ducke	Fabaceae	J164
sámpi, dupaján	n	*Inga* sp.	Fabaceae	J240, J242
sámpi, ímik	n	*Inga* cf. *densiflora* Benth.	Fabaceae	J51
	n	*Inga tessmannii* Harms	Fabaceae	K153
	n	*Inga tocacheana* D.R. Simpson	Fabaceae	B920
sámpi, múun	n	*Inga* sp.	Fabaceae	J190
	n	*Inga ruiziana G. Don*	Fabaceae	B472
sámpi, putsúu	n	*Inga* sp.	Fabaceae	J60
sámpi, sháajam	n	*Inga* sp.	Fabaceae	J189
sámpi yakúm	n	*Inga japurensis* T.D. Penn.	Fabaceae	H1504
	n	*Inga pruriens* Poepp.	Fabaceae	H238
sámpi, yuwícham	n	*Inga* sp.	Fabaceae	J187
	n	*Inga leiocalycina* Benth.	Fabaceae	K277
satík	n	*Cecropia engleriana* Snethl.	Moraceae	J206
satík	n	*Cecropia membranacea* Trécul	Moraceae	K805
séetug	n	*Cedrela odorata* L.	Meliaceae	J67

Aguaruna name	LF[i]	Species	Family	coll #[ii]
sejempách	n	*Inga marginata* Willd.	Fabaceae	J212
	n	*Inga punctata* Willd.	Fabaceae	K817
	n	*Inga semialata* (Vell.) Mart.	Fabaceae	A1500
séntuch	n	*Schefflera dielsii* Harms	Araliaceae	H263
	n	*Schefflera morototoni* (Aubl.) Maguire, Steyerm. & Frodin	Araliaceae	K1070, A402
sugkách	n	*Perebea guianensis* ssp. *guianensis* Aubl.	Moraceae	H1592
	n	*Perebea guianensis* ssp. *hirsuta* C.C. Berg	Moraceae	K234
	n	*Perebea xanthochyma* H. Karst.	Moraceae	T117, A745, A1289
súku	n	*Urera caracasana* (Jacq.) Gaudich. ex Griseb.	Urticaceae	H1109, L25, L296
súu	n	*Cecropia* sp.	Moraceae	J12
	n	*Cecropia engleriana* Snethl.	Moraceae	J273, KU132
	n	*Cecropia ficifolia* Warb. ex Snethl.	Moraceae	K442
	n	*Cecropia marginalis* Cuatrec.	Moraceae	T16
	n	*Cecropia membranacea* Trécul	Moraceae	K680
	n	*Cecropia sciadophylla* Mart.	Moraceae	K213
súwa	n	*Genipa americana* L.	Rubiaceae	J43, H261
shagkuína	n	*Pseudolmedia macrophylla* Trécul	Moraceae	K397, H516
shamíkua	n	not determined	Rubiaceae	J30
	n	*Faramea glandulosa* Poepp. & Endl.	Rubiaceae	A5
	n	*Notopleura iridescens* C.M. Taylor	Rubiaceae	J125
	n	*Psychotria cenepensis* C.M. Taylor	Rubiaceae	A1058
	n	*Psychotria flaviflora* C.M. Taylor	Rubiaceae	B2013, B2073
shamíkua kumpají	n	*Psychotria* sp.	Rubiaceae	J163
shijíg	n	*Hevea guianensis* Aubl.	Euphorbiaceae	J84
	n	*Hevea pauciflora* (Spruce ex Benth.) Müll. Arg.	Euphorbiaceae	A99
shijigká sáei	n	*Clarisia racemosa* Ruiz & Pav.	Moracceae	J258
shijíkap	n	*Protium* sp.	Burseraceae	J54

Aguaruna name	**LF**[i]	**Species**	**Family**	**coll #**[ii]
shikiú	n	*Erythrina ulei* Harms	Fabaceae	K887
shikiú, apách	n	*Erythrina* cf. *poeppigiana* (Walp.) O.F. Cook	Fabaceae	J248
shikiú, awajún	n	*Erythrina* cf. *poeppigiana* (Walp.) O.F. Cook	Fabaceae	J247
shikiú, múun	n	*Erythrina* sp.	Fabaceae	J249
shimút	n	*Apeiba aspera* Aubl.	Tiliaceae	K650
shína	n n	not determined *Brosimum rubescens* Taub.	Moraceae Moraceae	J105 [ii]
shipítna	n	*Himatanthus sucuuba* (Spruce ex Müll. Arg.) Woodson	Apocynaceae	J201, BO48
shíshi	n n n	*Protium* sp. *Protium grandifolium* Engl. *Protium spruceanum* (Benth.) Engl.	Burseraceae Burseraceae Burseraceae	J38 J64 A427
shishíim	n	*Couroupita subsessilis* Pilg.	Lecythidaceae	J68
shuípiu	n	not determined	Rubiaceae	J31
	n	*Palicourea mansoana* (Müll. Arg.) Standl.	Rubiaceae	J136
shuípiu, mujáya	d	*Psychotria* sp.	Rubiaceae	J154
shuípiu, múun	n	*Psychotria tinctoria* Ruiz & Pav.	Rubiaceae	J100
shuípiu, úchi	d	*Palicourea subspicata* Huber	Rubiaceae	J143
shuípiu, uchúch	n n	not determined *Faramea rectinervia* Standl.	Rubiaceae Rubiaceae	J103 J101
shuíya	n n	*Pourouma bicolor* ssp. *bicolor* Mart. *Pourouma cecropiifolia* Mart.	Moraceae Moraceae	T7 K268
shuíya**, **páu	n	*Pourouma tomentosa* ssp. *tomentosa* Mart. ex Miq.	Moraceae	K201
shuwát	n n	*Eschweilera andina* (Rusby) J.F.Macbr. *Eschweilera gigantea* (R. Knuth) J.F. MacBr.	Lecythidaceae Lecythidaceae	A1295 J217

[ii] Collected by Walter Lewis, Memory Elvin-Lewis, Rogerio Castro and Genaro Yarupait, collection #17322, Missouri Botanical Garden

Aguaruna name	LF[i]	Species	Family	coll #[ii]
tagkáam	n	*Parkia multijuga* Benth.	Fabaceae	B742
tagkáam, mujáya	n	*Macrolobium* aff. *microcalyx* Ducke	Fabaceae	J254
tagkán	d	*Gynerium sagittatum* (Aubl.) P. Beauv.	Poaceae	BO3
tagkána	n	*Triplaris americana* L.	Polygonaceae	J186, K1243
tajép	n	*Ormosia* cf. *coccinea* (Aubl.) Jacks.	Fabaceae	J71
tákae	n	*Brosimum multinervium* C.C. Berg	Moraceae	K996
	n	*Brosimum parinarioides* Ducke	Moraceae	J86
takák	n	*Nectandra reticulata* (Ruiz & Pav.) Mez	Lauraceae	J73
	n	*Ocotea gracilis* (Meisn.) Mez	Lauraceae	J272
tákit	n	*Mabea klugii* Steyerm.	Euphorbiaceae	B792
	n	*Mabea macbridei* I.M. Johnst.	Euphorbiaceae	A1427
	n	*Mabea maynensis* Spruce	Euphorbiaceae	J120
	n	*Mabea occidentalis* Benth.	Euphorbiaceae	K3
táuch	n	*Lacmellea* sp.	Apocynaceae	J7
táuch, múun	n	*Lacmellea peruviana* (Van Heurck & Müll. Arg.) Markgr.	Apocynaceae	J200
táuch, úchi	n	*Lacmellea oblongata* Markgr.	Apocynaceae	J199, K432, K490
táuna	n	*Faramea* sp.	Rubiaceae	K2000
tigkíshpinim	n	*Tachigali* sp.	Fabaceae	J261
tiík	n	*Zanthoxylum* sp.	Rutaceae	J204
	n	*Zanthoxylum valens* (J.F. Macbr.) J.F. Macbr.	Rutaceae	J251
tímu	d	*Lonchocarpus utilis* A.C. Sm.	Fabaceae	K702
timúna	n	*Pterocarpus amazonum* (Mart. ex Benth.) Amshoff	Fabaceae	H350
tínchi, káwa	n	not determined	Lauraceae	J28
	n	*Nectandra olida* Rohwer	Lauraceae	J268
	n	*Ocotea floribunda* (Sw.) Mez	Lauraceae	A212

Aguaruna name	LF[i]	Species	Family	coll #[ii]
tínchi, tuntúu	n	*Ocotea argyrophylla* Ducke	Lauraceae	J169
	n	*Ocotea longifolia* Kunth	Lauraceae	J113
tugkápna	n	*Pourouma minor* Benoist	Moraceae	H693
tsáagnum	n	*Isertia* sp.	Rubiaceae	J20
	n	*Isertia laevis* (Triana) B.M. Boom	Rubiaceae	K732
tsáagnum, shíig	n	*Isertia laevis* (Triana) B.M. Boom	Rubiaceae	J104
tsáchij	n	*Senefeldera inclinata* Müll. Arg.	Euphobiaceae	J205
	n	*Senefeldera inclinata* Müll. Arg.	Euphorbiaceae	J85
	n	*Senefeldera macrophylla* Ducke	Euphorbiaceae	A96
tsáchik, putsúu	n	*Randia armata* (Sw.) DC.	Rubiaceae	J108
tsáik	n	*Cedrelinga cateniformis* (Ducke) Ducke	Fabaceae	J271, K410, A18
tsakátska	n	*Jacaranda copaia* (Aubl.) D. Don	Bignoniaceae	B745
	n	*Jacaranda glabra* (A. DC.) Bureau & K. Schum.	Bignoniaceae	B327
tsanchínakish, múun	n	*Guarea grandiflora* Decne. ex Steud.	Meliaceae	J183
tseék	n	*Miconia decurrens* Cogn.	Melastomataceae	K391
	n	*Miconia ternatifolia* Triana	Melastomataceae	J75
	n	*Miconia vittata* (Linden & Andre) Cogn.	Melastomataceae	K839
	n	*Ossaea bullifera* (Pilg.) Gleason	Melastomataceae	T577
tséke	n	*Cecropia engleriana* Snethl.	Moraceae	B2057, K1099
	n	*Cecropia putumayonis* Cuatrec.	Moraceae	A1020
tsémpu, mujáya	n	*Compsoneura capitellata* (A. DC.) Warb.	Myristicaceae	J241
tsémpu, takáikit	n	*Virola* sp.	Myristicaceae	J135
tsémpu, úntuch	n	*Iryanthera juruensis* Warb.	Myristicaceae	J55, B1606
	n	*Virola elongata* (Benth.) Warb.	Myristicaceae	K665

Aguaruna name	LF[i]	Species	Family	coll #[ii]
tsúna japimágbau	n n n n	*Siparuna cervicornis* Perkins *Siparuna mollicoma* (Mart. ex Tul.) A. DC. *Siparuna pauciflora* (Beurl.) A. DC. *Siparuna schimpffii* Diels	Monimiaceae Monimiaceae Monimiaceae Monimiaceae	K1424 A348 K915 A732, A421, KU183, K950
tsuntsúj	n	*Ficus* cf. *maxima* Mill.	Moraceae	J96
ujúshnum, ***yawáa***	n	*Croton lechleri* Müll. Arg.	Euphorbiaceae	B545
ugkuyá	n	*Tachigali formicarum* Harms	Fabaceae	J264
újuts	n	*Dacryodes* sp.	Burseraceae	J48
ukuínmanch	n n n	*Miconia* sp. *Miconia lourteigiana* Wurdack *Miconia serrulata* (DC.) Naudin	Melastomataceae Melastomataceae Melastomataceae	J99 J267 A729, K909
umpákainim	n	*Carpotroche arborea*	Flacourtiaceae	A1194
untuntúp	n n n	*Piper augustum* Rudge *Piper grande* Vahl *Piper obliquum* Ruiz & Pav.	Piperaceae Piperaceae Piperaceae	KU426, B323,K1011 B296, K1352 B1594, K29, KU283
ugtukáj	n n n	*Solanum* sp. *Solanum acanthodes* Hook. f. *Solanum vanheurckii* Müll. Arg.	Solanaceae Solanaceae Solanaceae	J10 K820 A75
uwáchaunim	n	*Calycophyllum megistocaulum* (K. Krause) C.M. Taylor	Rubiaceae	J81, K263
wakám	n	*Theobroma bicolor* Bonpl.	Sterculiaceae	BO5
wakapú	n n	*Minquartia* sp. *Minquartia guianensis* Aubl.	Olacaceae Olacaceae	J36 B717, K92

Aguaruna name	LF[i]	Species	Family	coll #[ii]
wámpa	n	*Inga* sp.	Fabaceae	J9
	n	*Inga edulis* Mart.	Fabaceae	J63, K1179
	n	*Inga striata* Benth.	Fabaceae	BO99
wámpu	n	*Ficus maxima* Mill.	Moraceae	K253, K2024
wámpu, múun	n	*Ficus insipida*Willd.	Moraceae	K367
wampíshkunim	n	*Macrolobium limbatum* Spruce ex Benth.	Fabaceae	J56
wámpushik	n	*Inga* sp.	Fabaceae	J5
	n	*Inga nobilis* Willd.	Fabaceae	K1087
	n	*Inga ruiziana* G. Don	Fabaceae	A1114
wampúush	n	*Ceiba pentandra* L. (Gaertn.)	Bombacaceae	J266
	n	*Ceiba samauma* (Mart.) K. Schum.	Bombacaceae	B1624, K1236
wampúsnum	n	cf. *Nectandra schomburgkii* Meisn.	Lauraceae	J53
wampúsnumi, mujáya (kumpají)	n	*Aniba* sp.	Lauraceae	J44
wantsún	n	*Tachigali* cf. *bracteosa* (Harms) Zarucchi & Pipoly	Fabaceae	J270
	n	*Tachigali chrysophylla* (Poepp.) Zarucchi & Herend.	Fabaceae	A1242
	n	*Tachigali rugosa* (Mart. ex Benth.) Zarucchi & Pipoly	Fabaceae	A275, H654
wápae	n	*Tabernaemontana macrocalyx* Müll. Arg .	Apocynaceae	KU43
wáwa	n	*Ochroma* sp.	Bombacaceae	J35
	n	*Ochroma pyramidale* (Cav. ex Lam.) Urb.	Bombacaceae	A532, H543
wayámpainim	n	*Garcinia macrophylla* Mart.	Clusiaceae	J62
	n	*Garcinia madruno* (Kunth) Hammel	Clusiaceae	J275
wewé	n	*Cybianthus comperuvianus* Pipoly	Myrsinaceae	K558
	n	*Cybianthus gigantophyllus* Pipoly	Myrsinaceae	A580
	n	*Cybianthus peruvianus* (A. DC.) Miq.	Myrsinaceae	A593

Aguaruna name	LF[i]	Species	Family	coll #[ii]
yáas	n	*Chrysophyllum colombianum* (Aubrév.) T.D. Penn.	Sapotaceae	H2259
	n	*Sarcaulus brasiliensis* ssp. *gracilis* T.D. Penn.	Sapotaceae	H658, H1224
yagkíp	n	*Chrysochlamys* sp.	Clusiaceae	J29, J158
	n	*Chrysochlamys macrophylla* Pax	Clusiaceae	B1687
	n	*Chrysochlamys weberbaueri* Engl.	Clusiaceae	J89
yagkíp, mujáya	n	*Stylogyne micrantha* (Kunth) Mez	Mysinaceae	J227
yáis	n	*Cymbopetalum aequale* N.A. Murray	Annonaceae	A410, K612
	n	*Rollinia fosteri* Maas & Westra	Annonaceae	K641
	n	*Unonopsis floribunda* Diels	Annonaceae	BO49
	n	*Unonopsis gracilis* R.E. Fr.	Annonaceae	A376, K349, K1024
	n	*Xylopia cuspidata* Diels	Annonaceae	A1495
yáis, tsáju	n	*Crematosperma* sp.	Annonaceae	J263
yaisá kumpají	n	*Pseudoxandra* sp.	Annonaceae	J180
yampák	n	*Clavija hookeri* A. DC.	Theophrastaceae	B1692, K1042
	n	*Clavija longifolia* Ruiz & Pav.	Theophrastaceae	K869
	n	*Clavija tarapotana* Mez	Theophrastaceae	B686
	n	*Clavija venosa* B. Ståhl	Theophrastaceae	D83
yampiánim	n	*Vismia* sp.	Clusiaceae	J4
yantsáu		*Guarea guidonia* (L.) Sleumer	Meliaceae	K60, A1476, H546, K1456, KU78, KU436
	n	*Guarea macrophylla* ssp. *pendulispica* (C. DC.) T.D. Pennington	Meliaceae	J52
yugkuánim	n	*Rollinia glomerulifera* Maas & Westra	Annonaceae	H366, T23
	n	*Rollinia pittieri* Saff.	Annonaceae	H478

Aguaruna name	LF[i]	Species	Family	coll #[ii]
yujách	n	not determined	Melastomataceae	J25
	n	*Bellucia pentamera* Naudin	Melastomataceae	B314, K730
	n	*Loreya spruceana* Benth. ex Triana	Melastomataceae	A1123
yujúnts	n	*Albizia subdimidiata* (Splitg.) Barneby & J.W. Grimes	Fabaceae	K73
	n	*Acacia glomerosa* Benth.	Fabaceae	K378
yujáya	n	*Miconia poeppigii* Triana	Melastomataceae	A1426
yukát	n	*Pollalesta discolor* (Kunth) Aristeg.	Asteraceae	B1627
yukúku	n	*Hirtella eriandra* Benth.	Chrysobalanaceae	H783
	n	*Licania longipedicellata* Ducke	Chrysobalanaceae	H70
	n	*Licania pallida* Spruce ex Sagot	Chrysobalanaceae	H1425
	n	*Parinari klugii* Prance	Chrysobalanaceae	T105
	n	*Ryania speciosa* var. *tomentella* Sleumer	Flacourtiaceae	D81, L81
	n	*Vantanea parviflora* Lam.	Humiriaceae	H712, H1217
yumpíg	n	*Terminalia bucidoides* Standl. & L.O. Williams	Combretaceae	A432
	n	*Tapura peruviana* K. Krause	Dichapetalaceae	H184
	n	*Talisia peruviana* Standl.	Sapindaceae	T373
	n	*Picramnia* sp.	Simaroubaceae	B3557
yúsa patámkamu	n	*Warszewiczia* sp.	Rubiaceae	J33
no name given	n	*Cordia toqueve* Aubl.	Boraginaceae	J231
	n	*Cordia toqueve* Aubl.	Boraginaceae	J234
	n	*Cordia toqueve* Aubl.	Boraginaceae	J239
	n	*Mabea* sp.	Euphorbiaceae	J230
	n	*Pterocarpus* sp.	Fabaceae	J236
	n	*Casearia obovalis* Poepp. ex Griseb.	Flacourtiaceae	J225
	n	*Symbolanthus* sp.	Gentianaceae	J173
	n	*Retiniphyllum fuchsioides* Krause	Rubiaceae	J45

Appendix 3: Aguaruna Plant Taxa Mentioned in this Monograph (Arranged by Family)

Family	**Species**	**coll #**[ii]	**Aguaruna name**	**LF**[i]
Anacardiaceae	*Spondias mombin* L.	H392, H1563	***mamántunim***	n
Anacardiaceae	*Tapirira guianensis* Aubl.	A500, K204	***papágnum***	n
Anacardiaceae	*Tapirira obtusa* (Benth.) D.J. Mitch.	A345	***papágnum***	n
Annonaceae	*Crematosperma* sp.	J263	***yáis, tsáju***	n
Annonaceae	*Cymbopetalum aequale* N.A. Murray	A410, K612	***yáis***	n
Annonaceae	*Oxandra xylopioides* Diels	A468	***kayayáis***	n
Annonaceae	*Pseudoxandra* sp.	J180	***yaisá kumpají***	n
Annonaceae	*Rollinia fosteri* Maas & Westra	K641	***yáis***	n
Annonaceae	*Rollinia glomerulifera* Maas & Westra	H366, T23	***yugkuánim***	n
Annonaceae	*Rollinia microcarpa* R.E. Fr.	A449	***anúna***	n
Annonaceae	*Rollinia mucosa* (Jacq.) Baill.	B328	***anúna***	n
Annonaceae	*Rollinia pittieri* Saff.	H478	***yugkuánim***	n
Annonaceae	*Unonopsis floribunda* Diels	BO49	***yáis***	n
Annonaceae	*Unonopsis gracilis* R.E. Fr.	A376, K349, K1024	***yáis***	n

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[i] LF = 'life-form': n = ***númi*** (trees), sh = ***shígki*** (palms), v = ***dáek*** (lianas and vines), d = ***dúpa*** (herbs)

[ii] Collection numbers preceded by J indicate my own collections, which are deposited in the herbarium of the Universidad Nacional Mayor de San Marcos, in Lima, Peru. Other letters indicate collections from Brent Berlin and his collaborators, as follows: A = Ernesto Ancuash, B = Brent Berlin, BO = J.S. Boster, D = Feliz Domínguez Pena, H = Victor Huashikat, K = Rubio Kayap, KU = Kujikat, L = Jose Asunción Leveau, T = Santiago Tunqui. All material collected by the above collaborators is deposited at the Missouri Botanical Garden, in St. Luis Missouri.

Family	**Species**	**coll #**[ii]	**Aguaruna name**	**LF**[i]
Annonaceae	*Xylopia cuspidata* Diels	A1495	***yáis***	n
Annonaceae	*Xylopia parviflora* Spruce	J269	***kayayáis***	n
Apocynaceae	*Couma macrocarpa* Barb. Rodr.	J188	***dáum, uchí***	n
Apocynaceae	*Himatanthus sucuuba* (Spruce ex Müll. Arg.) Woodson	J201, BO48	***shipítna***	n
Apocynaceae	*Lacmellea* sp.	J7	***táuch***	n
Apocynaceae	*Lacmellea oblongata* Markgr.	J199, K432, K490	***táuch, úchi***	n
Apocynaceae	*Lacmellea peruviana* (Van Heurck & Müll. Arg.) Markgr.	J200	***táuch, múun***	n
Apocynaceae	*Tabernaemontana* sp.	J41	***kúnakip***	n
Apocynaceae	*Tabernaemontana macrocalyx* Müll. Arg .	KU43	***wápae***	n
Apocynaceae	*Tabernaemontana macrocalyx* Müll. Arg.	A435, A1226, A1298	***kúnakip tséas***	n
Apocynaceae	*Tabernaemontana sananho* Ruiz & Pav.	J181, A72, B496	***kúnakip***	n
Apocynaceae	*Tabernaemontana undulata* Perrier ex A. DC.	J179	***íwakip***	n
Araliaceae	*Schefflera dielsii* Harms	H263	***séntuch***	n
Araliaceae	*Schefflera morototoni* (Aubl.) Maguire, Steyerm. & Frodin	K1070, A402	***séntuch***	n
Arecaceae	*Phytelephas macrocarpa* ssp. *macrocarpa* Ruiz & Pav.	B646	***chápi***	sh
Asteraceae	*Vernonia patens* Kunth	B1634, B1970	***daikát***	n
Asteraceae	*Pollalesta discolor* (Kunth) Aristeg.	B1627	***yukát***	n
Bignoniaceae	*Jacaranda copaia* (Aubl.) D. Don	B745	***tsakátska***	n
Bignoniaceae	*Jacaranda glabra* (A. DC.) Bureau & K. Schum.	B327	***tsakátska***	n
Bixaceae	*Bixa orellana* L.	H219, H744	***ipák***	n
Bombacaceae	not determined	J122	***ménte***	n
Bombacaceae	not determined	J123	***ménte***	n
Bombacaceae	not determined	J210	***ménte, wampúush***	n
Bombacaceae	*Ceiba pentandra* L. (Gaertn.)	J266	***wampúush***	n

Family	**Species**	**coll #[ii]**	**Aguaruna name**	**LF[i]**
Bombacaceae	*Ceiba samauma* (Mart.) K. Schum.	B1624, K1236	***wampúush***	n
Bombacaceae	*Eriotheca macrophylla* ssp. *sclerophylla* (Ducke) A. Robyns	K980	***ménte, númi***	n
Bombacaceae	*Ochroma* sp.	J35	***wáwa***	n
Bombacaceae	*Ochroma pyramidale* (Cav. ex Lam.) Urb.	A532, H543	***wáwa***	n
Bombacaceae	*Pseudobombax* sp.	J209	***ménte, wampúush***	n
Boraginaceae	*Cordia toqueve* Aubl.	J231	no name given	n
Boraginaceae	*Cordia toqueve* Aubl.	J234	no name given	n
Boraginaceae	*Cordia toqueve* Aubl.	J239	no name given	n
Burseraceae	*Dacryodes* sp.	J48	***újuts***	n
Burseraceae	*Dacryodes kukachkana* L.O. Williams	J79	***kunchái, múun***	n
Burseraceae	*Dacryodes kukachkana* L.O. Williams	J58	***kunchái, wáwa***	n
Burseraceae	*Dacryodes nitens* Cuatrec.	J121	***kunchái, tsáju***	n
Burseraceae	*Dacryodes peruviana* (Loes.) H.J. Lam	J50	***kunchái, númi***	n
Burseraceae	*Protium sagotianum* Marchand	A163	***pantuí***	n
Burseraceae	*Protium* sp.	J233	***pantuí***	n
Burseraceae	*Protium* sp.	J54	***shijíkap***	n
Burseraceae	*Protium* sp.	J38	***shíshi***	n
Burseraceae	*Protium fimbriatum* Swart	J70, K264, B930, B1502	***chípa***	n
Burseraceae	*Protium grandifolium* Engl	J49	***pantuí***	n
Burseraceae	*Protium grandifolium* Engl.	J64	***shíshi***	n
Burseraceae	*Protium nodulosum* Swart	A26	***pantuí***	n
Burseraceae	*Protium robustum* (Swart) D.M. Porter	K384	***pantuí***	n
Burseraceae	*Protium spruceanum* (Benth.) Engl.	A427	***shíshi***	n
Burseraceae	*Tetragastris* sp.	J69	***chunchuína***	n
Capparaceae	*Capparis detonsa* Triana & Planch.	A191	***mejénkach***	n
Caricaceae	*Jacaratia digitata (*Poepp. & Endl.) Solms	B 548, K585	***númpi***	n

Family	**Species**	**coll #**[ii]	**Aguaruna name**	**LF**[i]
Caricaceae	*Jacaratia digitata (*Poepp. & Endl.) Solms	B 548, K585	***númpi***	n
Chrysobalanaceae	*Hirtella eriandra* Benth.	H783	***yukúku***	n
Chrysobalanaceae	*Licania longipedicellata* Ducke	H70	***yukúku***	n
Chrysobalanaceae	*Licania pallida* Spruce ex Sagot	H1425	***yukúku***	n
Chrysobalanaceae	*Parinari klugii* Prance	T105	***yukúku***	n
Clusiaceae	*Chrysochlamys* sp.	J29	***yagkíp***	n
Clusiaceae	*Chrysochlamys* sp.	J158	***yagkíp***	n
Clusiaceae	*Chrysochlamys macrophylla* Pax	B1687	***yagkíp***	
Clusiaceae	*Chrysochlamys weberbaueri* Engl.	J89	***yagkíp***	n
Clusiaceae	*Clusia weberbaueri* Engl.	J175	***éwe***	n
Clusiaceae	*Garcinia macrophylla* Mart.	K321	***pegkáenum***	n
Clusiaceae	*Garcinia macrophylla* Mart.	J119	***pegkáenum, shíig***	n
Clusiaceae	*Garcinia macrophylla* Mart.	J61	***pegkáenum, wáshi***	n
Clusiaceae	*Garcinia macrophylla* Mart.	J62	***wayámpainim***	n
Clusiaceae	*Garcinia madruno* (Kunth) Hammel	J275	***wayámpainim***	n
Clusiaceae	*Vismia* sp.	J4	***yampiánim***	n
Combretaceae	*Terminalia bucidoides* Standl. & L.O. Williams	A432	***yumpíg***	n
Dichapetalaceae	*Tapura peruviana* K. Krause	H184	***yumpíg***	n
Ericaceae	*Befaria glauca* Bonpl.	J253	***kunugkút, kampáunmaya***	n
Ericaceae	*Macleania* sp.	J46	***kunugkút, mujáya***	n
Euphobiaceae	*Senefeldera inclinata* Müll. Arg.	J205	***tsáchij***	n
Euphorbiaceae	*Alchornea* sp.	J238	***kasháinim***	n
Euphorbiaceae	*Alchornea glandulosa* Poepp.	B537, K1160	***kántsa***	n
Euphorbiaceae	*Aparisthmium cordatum*(Juss.) Baill.	J170, B937, K108, K236, K554	***dátash***	n
Euphorbiaceae	*Caryodendron orinocense* H. Karst.	K308	***náam***	n

Family	Species	coll #[ii]	Aguaruna name	LF[i]
Euphorbiaceae	*Conceveiba rhytidocarpa* Müll. Arg.	K322	***kántsa***	n
Euphorbiaceae	*Croton lechleri* Müll. Arg.	B545	***ujúshnum***, ***yawáa***	n
Euphorbiaceae	*Hevea guianensis* Aubl.	J84	***shijíg***	n
Euphorbiaceae	*Hevea pauciflora* (Spruce ex Benth.) Müll. Arg.	A99	***shijíg***	n
Euphorbiaceae	*Hura crepitans* L.	B1719	***bákaij***	n
Euphorbiaceae	*Mabea* sp.	J230	no name given	n
Euphorbiaceae	*Mabea klugii* Steyerm.	B792	***tákit***	n
Euphorbiaceae	*Mabea macbridei* I.M. Johnst.	A1427	***tákit***	n
Euphorbiaceae	*Mabea maynensis* Spruce	J120	***tákit***	n
Euphorbiaceae	*Mabea occidentalis* Benth.	K3	***tákit***	n
Euphorbiaceae	*Senefeldera inclinata* Müll. Arg.	J85	***tsáchij***	n
Euphorbiaceae	*Senefeldera macrophylla* Ducke	A96	***tsáchij***	n
Fabaceae	*Acacia glomerosa* Benth.	K378	***yujúnts***	n
Fabaceae	*Albizia subdimidiata* (Splitg.) Barneby & J.W. Grimes	K73	***yujúnts***	n
Fabaceae	*Cedrelinga cateniformis* (Ducke) Ducke	J271, K410, A18	***tsáik***	n
Fabaceae	*Erythrina* sp.	J249	***shikiú, múun***	n
Fabaceae	*Erythrina* cf. *poeppigiana* (Walp.) O.F. Cook	J248	***shikiú, apách***	n
Fabaceae	*Erythrina* cf. *poeppigiana* (Walp.) O.F. Cook	J247	***shikiú, awajún***	n
Fabaceae	*Erythrina ulei* Harms	K887	***shikiú***	n
Fabaceae	*Inga* sp.	J240	***sámpi, dupajám***	n
Fabaceae	*Inga* sp.	J242	***sámpi, dupajám***	n
Fabaceae	*Inga* sp.	J190	***sámpi, múun***	n
Fabaceae	*Inga* sp.	J60	***sámpi, putsúu***	n
Fabaceae	*Inga* sp.	J189	***sámpi, sháajam***	n
Fabaceae	*Inga* sp.	J187	***sámpi, yuwícham***	n
Fabaceae	*Inga* sp.	J9	***wámpa***	n

Family	**Species**	**coll #**[ii]	**Aguaruna name**	**LF**[i]
Fabaceae	*Inga* sp.	J5	***wámpushik***	n
Fabaceae	*Inga capitata* Desv.	H1618	***náji***	n
Fabaceae	*Inga cayennensis* Sagot ex Benth.	K737	***dapújuk***	n
Fabaceae	*Inga* cf. *densiflora* Benth.	J51	***sámpi, ímik***	n
Fabaceae	*Inga* cf. *multinervis* T.D. Penn.	J72	***buabúa***	n
Fabaceae	*Inga* cf. *umbellifera* (Vahl) Steud.	J78	***katámankamat***	n
Fabaceae	*Inga edulis* Mart.	J63, K1179	***wámpa***	n
Fabaceae	*Inga japurensis* T.D. Penn.	H1504	***sámpi yakúm***	n
Fabaceae	*Inga leiocalycina* Benth.	K277	***sámpi, yuwícham***	n
Fabaceae	*Inga marginata* Willd.	J212	***sejempách***	n
Fabaceae	*Inga multinervis* T.D. Penn.	A10	***buabúa***	n
Fabaceae	*Inga nobilis* Willd.	K1087	***wámpushik***	n
Fabaceae	*Inga pruriens* Poepp.	H238	***sámpi yakúm***	n
Fabaceae	*Inga punctata* Willd.	K817	***sejempách***	n
Fabaceae	*Inga ruiziana* G. Don	K601	***náji***	n
Fabaceae	*Inga ruiziana G. Don*	B472	***sámpi, múun***	n
Fabaceae	*Inga ruiziana* G. Don	A1114	***wámpushik***	n
Fabaceae	*Inga semialata* (Vell.) Mart.	A1500	***sejempách***	n
Fabaceae	*Inga striata* Benth.	BO99	***wámpa***	n
Fabaceae	*Inga tessmannii* Harms	K153	***sámpi, ímik***	n
Fabaceae	*Inga thibaudiana* DC.	B971, K710	***dapújuk***	n
Fabaceae	*Inga tocacheana* D.R. Simpson	B920	***sámpi, ímik***	n
Fabaceae	*Inga urabensis* L.Uribe	K193	***buabúa***	n
Fabaceae	*Lonchocarpus utilis* A.C. Sm.	K702	***tímu***	d
Fabaceae	*Macrolobium* sp.	A510	***samíknum***	n
Fabaceae	*Macrolobium acaciifolium* (Benth.) Benth.	J82	***samíknum***	n
Fabaceae	*Macrolobium* aff. *microcalyx* Ducke	J254	***tagkáam, mujáya***	n

Family	Species	coll #[ii]	Aguaruna name	LF[i]
Fabaceae	*Macrolobium limbatum* Spruce ex Benth.	J56	***wampíshkunim***	n
Fabaceae	*Myroxylon balsamum* (L.) Harms	J207, J208	***chikáunia***	n
Fabaceae	*Ormosia* sp.	J115	***pandáij***	n
Fabaceae	*Ormosia* cf. *amazonica* Ducke	J114	***pandáij***	n
Fabaceae	*Ormosia* cf. *coccinea* (Aubl.) Jacks.	J71	***tajép***	n
Fabaceae	*Parkia multijuga* Benth.	B742	***tagkáam***	n
Fabaceae	*Pithecellobium basijugum* Ducke	B749, H232	***samíknum***	n
Fabaceae	*Pithecellobium basijugum* Ducke	J164	***samiknum, mujáya***	n
Fabaceae	*Pithecellobium longifolium* (Humb. & Bonpl. ex Willd.) Standl.	B851	***samík***	n
Fabaceae	*Pterocarpus* sp.	J236	no name given	n
Fabaceae	*Pterocarpus amazonum* (Mart. ex Benth.) Amshoff	H350	***timúna***	n
Fabaceae	*Tachigali* sp.	J261	***tigkíshpinim***	n
Fabaceae	*Tachigali* cf. *bracteosa* (Harms) Zarucchi & Pipoly	J270	***wantsún***	n
Fabaceae	*Tachigali chrysophylla* (Poepp.) Zarucchi & Herend.	A1242	***wantsún***	n
Fabaceae	*Tachigali formicarum* Harms	J264	***ugkuyá***	n
Fabaceae	*Tachigali rugosa* (Mart. ex Benth.) Zarucchi & Pipoly	A275, H654	***wantsún***	n
Fabaceae	*Zygia latifolia* (L.) Fawc. & Rendle	J59	***íwanch sámpi***	n
Flacourtiaceae	*Carpotroche arborea*	A1194	***umpákainim***	n
Flacourtiaceae	*Casearia obovalis* Poepp. ex Griseb.	J225	no name given	n
Flacoutiaceae	*Neosprucea grandiflora* (Spruce ex Benth.) Sleumer	T1101	***kántsa***	n
Flacourtiaceae	*Ryania speciosa* var. *tomentella* Sleumer	D81, L81	***yukúku***	n
Gentianaceae	*Symbolanthus* sp.	J173	no name given	n

Family	**Species**	**coll #[ii]**	**Aguaruna name**	**LF[i]**
Humiriaceae	*Vantanea parviflora* Lam.	H712, H1217	***yukúku***	n
Lauraceae	not determined	J28	***tínchi, káwa***	n
Lauraceae	*Aniba* sp.	J44	***wampúsnum, mujáya (kumpají)***	n
Lauraceae	cf. *Nectandra schomburgkii* Meisn.	J53	***wampúsnum***	n
Lauraceae	*Licaria* sp.	J196	***káikua***	n
Lauraceae	*Nectandra cuneatocordata* Mez	J171	***mantagá***	n
Lauraceae	*Nectandra olida* Rohwer	J268	***tínchi, káwa***	n
Lauraceae	*Nectandra reticulata* (Ruiz & Pav.) Mez	J73	***takák***	n
Lauraceae	*Ocotea argyrophylla* Ducke	J169	***tínchi, tuntúu***	n
Lauraceae	*Ocotea* cf. *wachenheimii* Benoist	H483, K335	***batút***	n
Lauraceae	*Ocotea costulata* (Nees) Mez	K663	***káikua***	n
Lauraceae	*Ocotea floribunda* (Sw.) Mez	A170	***káwa***	n
Lauraceae	*Ocotea floribunda* (Sw.) Mez	A212	***tínchi, káwa***	n
Lauraceae	*Ocotea floribunda* (Sw.) Mez	A472, A138, B875	***batút***	n
Lauraceae	*Ocotea floribunda* (Sw.) Mez	A343	***máegnum***	n
Lauraceae	*Ocotea gracilis* (Meisn.) Mez	J272	***takák***	n
Lauraceae	*Ocotea longifolia* Kunth	J113	***tínchi, tuntúu***	n
Lecythidaceae	*Couroupita subsessilis* Pilg.	J68	***shishíim***	n
Lecythidaceae	*Eschweilera andina* (Rusby) J.F.Macbr.	A1295	***shuwát***	n
Lecythidaceae	*Eschweilera gigantea* (R. Knuth) J.F. MacBr.	J102	***kaáshnum***	n
Lecythidaceae	*Eschweilera gigantea* (R. Knuth) J.F. MacBr.	J217	***shuwát***	n
Lecythidaceae	*Eschweilera tessmannii* R.Knuth	K568	***kaáshnum***	n
Lecythidaceae	*Grias neuberthii* J.F. Macbr.	H488, H41	***apái***	n
Lecythidaceae	*Grias peruviana* Miers	J57, B884, T5	***apái***	n
Lecythidaceae	*Gustavia macarenensis ssp. macarenensis* Philipson	A1056	***inák***	n

Family	**Species**	**coll #[ii]**	**Aguaruna name**	**LF[i]**
Lecythidaceae	*Gustavia inakuama* S.A. Mori	B495, B656, B2036, KU8	***inakúam***	n
Melastomataceae	not determined	J128	***chinchák, nugkáya***	d
Melastomataceae	not determined	J16	***chinchák, uchúch***	n
Melastomataceae	not determined	J25	***yujách***	n
Melastomataceae	*Aciotis* sp.(?)	J129	***chinchák, nugkáya***	d
Melastomataceae	*Adelobotrys* sp.	H1797	***chinchák, dáek***	d
Melastomataceae	*Bellucia* cf. *pentamera* Naudin	J66	***chinchák, sáu***	n
Melastomataceae	*Bellucia pentamera* Naudin	B314, K730	***yujách***	n
Melastomataceae	*Blakea hirsuta* Berg ex Triana	H293, H579	***chinchák, dáek***	d
Melastomataceae	*Clidemia* sp.	J47	***chinchák, mujáya tujutjutú***	d
Melastomataceae	*Clidemia* sp.(?)	J126	***chinchák, nugkáya***	d
Melastomataceae	*Clidemia epiphytica* (Triana) Cogn.	H312	***chinchák, dáek***	d
Melastomataceae	*Leandra longicoma* Cogn.	B1505	***chinchák, antumú***	n
Melastomataceae	*Leandra secunda* (D. Don) Cogn.	A553	***chinchák, antumú***	n
Melastomataceae	*Loreya spruceana* Benth. ex Triana	A1123	***yujách***	n
Melastomataceae	*Miconia* sp.	J149	***chinchák, antumú***	n
Melastomataceae	*Miconia* sp.	J216	***chinchák, antumú***	n
Melastomataceae	*Miconia* sp.	J76	***chinchák, kapantú***	n
Melastomataceae	*Miconia* sp.	J99	***ukuínmanch***	n
Melastomataceae	*Miconia* sp.?	J148	***chinchák, antumú***	n
Melastomataceae	*Miconia affinis* DC.	J178	***chinchák, kapantú***	n
Melastomataceae	*Miconia bulbalina* (Don) Naudin	J112	***chijáwe***	n
Melastomataceae	*Miconia decurrens* Cogn.	K391	***tseék***	n
Melastomataceae	*Miconia lourteigiana* Wurdack	J267	***ukuínmanch***	n

Family	**Species**	**coll #**[ii]	**Aguaruna name**	**LF**[i]
Melastomataceae	*Miconia paleacea* Cogn.	A1202, B1753	***chinchák, antumú***	n
Melastomataceae	*Miconia poeppigii* Triana	A1426	***yujáya***	n
Melastomataceae	*Miconia serrulata* (DC.) Naudin	K941	***chijáwe***	n
Melastomataceae	*Miconia serrulata* (DC.) Naudin	A729, K909	***ukuínmanch***	n
Melastomataceae	*Miconia subspicata* Wurdack	H571	***chinchák, antumú***	n
Melastomataceae	*Miconia ternatifolia* Triana	J75	***tseék***	n
Melastomataceae	*Miconia vittata* (Linden & Andre) Cogn.	K839	***tseék***	n
Melastomataceae	*Mouriri myrtifolia* Spruce ex Triana	B1734	***sáka***	n
Melastomataceae	*Ossaea* sp.	J65	***chinchák, kugkúim***	d
Melastomataceae	*Ossaea bullifera* (Pilg.) Gleason	T577	***tseék***	n
Melastomataceae	*Triolena pluvialis* (Wurdack) Wurdack	A1514	***chinchák, antumú***	n
Meliaceae	*Cabralea canjerana* (Vell.) Mart.	K614	***mamántunim***	n
Meliaceae	*Cedrela odorata* L.	J67	***séetug***	n
Meliaceae	*Guarea grandiflora* Decne. ex Steud.	J183	***tsanchínakish, múun***	n
Meliaceae	*Guarea macrophylla* spp. *macrophylla* Vahl	J226	***ishpíg***	n
Meliaceae	*Guarea macrophylla* ssp. *pendulispica* (C. DC.) T.D. Pennington	J74	***bíchau***	n
Meliaceae	*Guarea macrophylla* ssp. *pendulispica* (C. DC.) T.D. Pennington	J52	***yantsáu***	n
Meliaceae	*Guarea pubescens* ssp. *pubescens* (Rich.) A. Juss.	H1516	***kúwai***	n
Meliaceae	*Trichilea* sp.	J157	***bíchau kumpají***	n
Meliaceae	*Trichilia pallida* Sw.	KU53	***bíchau***	n
Meliaceae	*Trichilia poeppigii* C. DC.	J232	***chíajap, uchúch***	n
Meliaceae	*Trichilia septentrionalis* C. DC.	J237	***chíajap, múun***	n
Monimiaceae	*Mollinedia caudata* J.F. Macbr.	L74	***sáka***	n
Monimiaceae	*Siparuna* sp.	J22	***mejénkach***	n
Monimiaceae	*Siparuna* sp.	J127	***mejénkach***	n

Family	**Species**	**coll #**[ii]	**Aguaruna name**	**LF**[i]
Monimiaceae	*Siparuna cervicornis* Perkins	K1424	***tsúna japimágbau***	n
Monimiaceae	*Siparuna mollicoma* (Mart. ex Tul.) A. DC.	A348	***tsúna japimágbau***	n
Monimiaceae	*Siparuna pauciflora* (Beurl.) A. DC.	K915	***tsúna japimágbau***	n
Monimiaceae	*Siparuna schimpffii* Diels	A732, A421, KU183, K950	***tsúna japimágbau***	n
Monimiaceae	*Siparuna thecaphora* (Poepp. & Endl.) A. DC.	B1706, K313	***mejénkach***	n
Moraceae	not determined	J105	***shína***	n
Moracceae	*Clarisia racemosa* Ruiz & Pav.	J258	***shijigká sáei***	n
Moracceae	*Perebea xanthochyma* H. Karst.	J252	***pítuuk***	n
Moraceae	*Batocarpus orinocensis* H. Karst.	J42, A100	***pítu***	n
Moraceae	*Brosimum guianense* (Aubl.) Huber	H240, H1103	***kapiú***	n
Moraceae	*Brosimum multinervium* C.C. Berg	K996	***tákae***	n
Moraceae	*Brosimum parinarioides* Ducke	J86	***tákae***	n
Moraceae	*Brosimum rubescens* Taub.	[ii]	***shína***	n
Moraceae	*Cecropia* sp.	J12	***súu***	n
Moraceae	*Cecropia engleriana* Snethl.	J206	***satík***	n
Moraceae	*Cecropia engleriana* Snethl.	J273, KU132	***súu***	n
Moraceae	*Cecropia engleriana* Snethl.	B2057, K1099	***tséke***	n
Moraceae	*Cecropia ficifolia* Warb. ex Snethl.	K442	***súu***	n
Moraceae	*Cecropia marginalis* Cuatrec.	T16	***súu***	n
Moraceae	*Cecropia membranacea* Trécul	K805	***satík***	n
Moraceae	*Cecropia membranacea* Trécul	K680	***súu***	n
Moraceae	*Cecropia putumayonis* Cuatrec.	A1020	***tséke***	n
Moraceae	*Cecropia sciadophylla* Mart.	K213	***súu***	n
Moraceae	*Ficus insipida*Willd.	K367	***wámpu, múun***	n

[ii] Collected by Walter Lewis, Memory Elvin-Lewis, Rogerio Castro and Genaro Yarupait, collection #17322, Missouri Botanical Garden

Family	**Species**	**coll #**[ii]	**Aguaruna name**	**LF**[i]
Moraceae	*Ficus maxima* Mill.	K253, K2024	***wámpu***	n
Moraceae	*Ficus* cf. *maxima* Mill.	J96	***tsuntsúj***	n
Moraceae	*Perebea guianensis* ssp. acanthogyne (Ducke) C.C. Berg	A464, K383	***kawít***	n
Moraceae	*Perebea guianensis* ssp. *guianensis* Aubl.	H1592	***sugkách***	n
Moraceae	*Perebea guianensis* ssp. *pseudopeltata* (Mildbr.) C.C. Berg	B448	***kawít***	n
Moraceae	*Perebea guianensis* ssp. *hirsuta* C.C. Berg	K234	***sugkách***	n
Moraceae	*Perebea xanthochyma* H. Karst.	T117, A745, A1289	***sugkách***	n
Moraceae	*Pourouma bicolor* ssp. *bicolor* Mart.	T7	***shuíya***	n
Moraceae	*Pourouma cecropiifolia* Mart.	K268	***shuíya***	n
Moraceae	*Pourouma minor* Benoist	H693	***tugkápna***	n
Moraceae	*Pourouma tomentosa* ssp. *tomentosa* Mart. ex Miq.	K201	***shuíya**, **páu***	n
Moraceae	*Pseudolmedia laevis* (Ruiz & Pav.) J.F. Macbr.	KU239	***chími***	n
Moraceae	*Pseudolmedia laevis* (Ruiz & Pav.) J.F. Macbr.	H1543	***chími, suír***	n
Moraceae	*Pseudolmedia macrophylla* Trécul	K397, H516	***shagkuína***	n
Moraceae	*Sorocea* cf. *pileata* W.C. Burger	J94	***ajátsjats, namakía***	n
Moraceae	*Trophis racemosa* (L.) Urb.	K107	***pítuuk***	n
Myristicaceae	*Compsoneura capitellata* (A. DC.) Warb.	J241	***tsémpu, mujáya***	n
Myristicaceae	*Iryanthera juruensis* Warb.	J55, B1606	***tsémpu, úntuch***	n
Myristicaceae	*Iryanthera tricornis* Ducke	J80	***ejé̱sh***	n
Myristicaceae	*Otoba glycicarpa* (Ducke) W.A. Rodrigues & T.S. Jaramillo	H1644	***chikúm***	n
Myristicaceae	*Virola* sp.	J135	***tsémpu, takáikit***	n
Myristicaceae	*Virola calophylla* (Spruce) Warb.	J95	***chikúm, namakía***	n
Myristicaceae	*Virola calophylla* (Spruce) Warb.	J198	***chikúm, namakía***	n

Family	**Species**	**coll #[ii]**	**Aguaruna name**	**LF[i]**
Myristicaceae	*Virola elongata* (Benth.) Warb.	K665	***tsémpu, úntuch***	n
Myristicaceae	*Virola pavonis* (A. DC.) A.C. Sm.	K197	***ejé̲sh***	n
Myrsinaceae	*Cybianthus comperuvianus* Pipoly	K558	***wewé***	n
Myrsinaceae	*Cybianthus gigantophyllus* Pipoly	A580	***wewé***	n
Myrsinaceae	*Cybianthus peruvianus* (A. DC.) Miq.	A593	***wewé***	n
Myrtaceae	*Calyptranthes tessmannii* Burret ex McVaugh	D26, H86, H380	***sáka***	n
Myrtaceae	*Myrcia multiflora* (Lam.) DC.	T106	***sáka***	n
Myrtaceae	*Myrciaria amazonica* O. Berg	B3556	***sáka***	n
Mysinaceae	*Stylogyne micrantha* (Kunth) Mez	J227	***yagkíp, mujáya***	n
Nyctaginaceae	*Neea divaricata* Poepp. & Endl.	J124, A70, D137	***kátsau***	n
Nyctaginaceae	*Neea macrophylla* Poepp. & Endl.	K309, D98, BO55	***kátsau***	n
Nyctaginaceae	*Neea speciosa* Heimerl	A1128, K344, H352	***kátsau***	n
Ochnaceae	*Cespedesia spathulata* (Ruiz & Pav.) Planch.	J87	***magkuák***	n
Ochnaceae	*Godoya* sp.	J174	***páushnum, úwejshunmaya***	n
Olacaceae	*Minquartia* sp.	J36	***wakapú***	n
Olacaceae	*Minquartia guianensis* Aubl.	B717, K92	***wakapú***	n
Opiliaceae	*Agonandra silvatica* Ducke	H1500	***pítuuk***	n
Piperaceae	*Piper augustum* Rudge	KU426, B323,K1011	***untuntúp***	n
Piperaceae	*Piper grande* Vahl	B296, K1352	***untuntúp***	n
Piperaceae	*Piper obliquum* Ruiz & Pav.	B1594, K29, KU283	***untuntúp***	n
Piperaceae	*Piper obtusilimbum* C. DC.	A336	***ampágpag***	n
Piperaceae	*Piper strigosum* Trel.	A 513	***ampágpag***	n
Poaceae	*Gynerium sagittatum* (Aubl.) P. Beauv.	BO3	***tagkán***	d
Polygonaceae	*Triplaris americana* L.	J186, K1243	***tagkána***	n
Rubiaceae	not determined	J30	***shamíkua***	n
Rubiaceae	not determined	J31	***shuípiu***	n

Family	**Species**	**coll #[ii]**	**Aguaruna name**	**LF[i]**
Rubiaceae	not determined	J103	***shuípiu, uchúch***	n
Rubiaceae	*Alibertia curviflora* K. Schum.	B1522	***námukam***	n
Rubiaceae	*Borojoa claviflora* (K. Schum.) Cuatrec.	A132, K1110	***námukam***	n
Rubiaceae	*Calycophyllum megistocaulum* (K. Krause) C.M. Taylor	J81, K263	***uwáchaunim***	n
Rubiaceae	*Calycophyllum spruceanum* (Benth.) Hook. f. ex K. Schum.	B3712	***kapiú***	n
Rubiaceae	*Chimarrhis glabriflora* Ducke	J92	***bukún***	n
Rubiaceae	*Chimarrhis hookeri* K. Schum.	A504	***bukún***	n
Rubiaceae	*Duroia hirsuta* (Poepp.) K. Schum.	J193	***íwaiwaig***	n
Rubiaceae	*Faramea* sp.	K2000	***táuna***	n
Rubiaceae	*Faramea glandulosa* Poepp. & Endl.	A5	***shamíkua***	n
Rubiaceae	*Faramea rectinervia* Standl.	J101	***shuípiu, uchúch***	n
Rubiaceae	*Genipa americana* L.	J43, H261	***súwa***	n
Rubiaceae	*Hippotis brevipes* Spruce ex K. Schum.	J167	***dupí kumpají***	n
Rubiaceae	*Isertia* sp.	J20	***tsáagnum***	n
Rubiaceae	*Isertia laevis* (Triana) B.M. Boom	K732	***tsáagnum***	n
Rubiaceae	*Isertia laevis* (Triana) B.M. Boom	J104	***tsáagnum, shíig***	n
Rubiaceae	*Ixora ulei* K. Krause	H407	***sáka***	n
Rubiaceae	*Kotchubaea* sp.	A1064	***námukam***	n
Rubiaceae	*Macrocnemum roseum* (Ruiz & Pav.) Wedd.	K59	***bukún***	n
Rubiaceae	*Notopleura iridescens* C.M. Taylor	J125	***shamíkua***	n
Rubiaceae	*Palicourea mansoana* (Müll. Arg.) Standl.	J136	***shuípiu***	n
Rubiaceae	*Palicourea subspicata* Huber	J143	***shuípiu, úchi***	d
Rubiaceae	*Psychotria* sp.	J163	***shamíkua kumpají***	n
Rubiaceae	*Psychotria* sp.	J154	***shuípiu, mujáya***	d
Rubiaceae	*Psychotria cenepensis* C.M. Taylor	A1058	***shamíkua***	n

Family	**Species**	**coll #**[ii]	**Aguaruna name**	**LF**[i]
Rubiaceae	*Psychotria flaviflora* C.M. Taylor	B2013, B2073	***shamíkua***	n
Rubiaceae	*Psychotria tinctoria* Ruiz & Pav.	J100	***shuípiu, múun***	n
Rubiaceae	*Randia armata* (Sw.) DC.	J108	***tsáchik, putsúu***	n
Rubiaceae	*Retiniphyllum fuchsioides* Krause	J45	no name given	n
Rubiaceae	*Tocoyena* sp.	B796	***námukam***	n
Rubiaceae	*Warszewiczia* sp.	J33	***yúsa patámkamu***	n
Rutaceae	*Zanthoxylum* sp.	J204	***tiík***	n
Rutaceae	*Zanthoxylum valens* (J.F. Macbr.) J.F. Macbr.	J251	***tiík***	n
Sapindaceae	*Allophylus loretensis* Standl. ex J.F. Macbr.	H303	***kántsa***	n
Sapindaceae	*Allophylus stenodictyus* Radlk.	K1426	***jimájma***	n
Sapindaceae	*Talisia peruviana* Standl.	T373	***yumpíg***	n
Sapotaceae	*Chrysophyllum colombianum* (Aubrév.) T.D. Penn.	H2259	***yáas***	n
Sapotaceae	*Ecclinusa lanceolata* (Mart. & Eichler) Pierre	J197	***barát***	n
Sapotaceae	*Micropholis brochidodroma* T.D. Penn.	J223	***sáka***	n
Sapotaceae	*Pouteria reticulata* (Engl.) Eyma	K195	***dupí***	n
Sapotaceae	*Pouteria torta* (Mart.) Radlk.	K190	***dupí***	n
Sapotaceae	*Pouteria torta* ssp. *tuberculata* (Sleumer) T.D. Penn.	B720	***dupí***	n
Sapotaceae	*Sarcaulus brasiliensis* ssp. *gracilis* T.D. Penn.	H658, H1224	***yáas***	n
Simaroubaceae	*Picramnia* sp.	B3557	***yumpíg***	n
Solanaceae	*Cyphomandra endopogon* ssp. *endopogon* (Bitter) Bohs	A1512, B1974, K2029, B2009	***mejénkach***	n
Solanaceae	*Solanum* sp.	J10	***ugtukáj***	n
Solanaceae	*Solanum acanthodes* Hook. f.	K820	***ugtukáj***	n
Solanaceae	*Solanum vanheurckii* Müll. Arg.	A75	***ugtukáj***	n
Sterculiaceae	*Guazuma crinita* Mart.	K645	***muráina***	n

Family	**Species**	**coll #[ii]**	**Aguaruna name**	**LF[i]**
Sterculiaceae	*Sterculia apetala* var. *elata* (Ducke) E.L. Taylor	K148, K678	***kutsápau***	n
Sterculiaceae	*Sterculia frondosa* Rich.	K173	***kutsápau***	n
Sterculiaceae	*Sterculia pruriens* (Aubl.) K. Schum.	A675	***kutsápau***	n
Sterculiaceae	*Theobroma bicolor* Bonpl.	BO5	***wakám***	n
Sterculiaceae	*Theobroma subincanum* Martius in Buchner	J184, A293	***akágnum***	n
Theophrastaceae	*Clavija hookeri* A. DC.	B1692, K1042	***yampák***	n
Theophrastaceae	*Clavija longifolia* Ruiz & Pav.	K869	***yampák***	n
Theophrastaceae	*Clavija tarapotana* Mez	B686	***yampák***	n
Theophrastaceae	*Clavija venosa* B. Ståhl	D83	***yampák***	n
Tiliaceae	*Apeiba aspera* Aubl.	K650	***shimút***	n
Tiliaceae	*Heliocarpus* sp.	J1	***kútsa***	n
Tiliaceae	*Heliocarpus americanus* L.	A496, H14, K735, L43	***kútsa***	n
Ulmaceae	*Trema* sp.	J2	***káka***	n
Ulmaceae	*Trema micrantha* (L.) Blume	T756	***káka***	n
Urticaceae	*Urera baccifera* (L.) Gaudich. ex Wedd.	K1181	***nája***	n
Urticaceae	*Urera caracasana* (Jacq.) Gaudich. ex Griseb.	H1109, L25, L296	***súku***	n
Violaceae	*Leonia crassa* L.B. Sm. & A. Fernández	B501, K251	***íwakip***	n
Violaceae	*Leonia crassa* L.B. Sm. & A. Fernández	J91	***íwakip, namakía***	n
Violaceae	*Leonia glycycarpa* Ruiz & Pav.	A1390, K913	***íwakip***	n
Vochysiaceae	*Vochysia braceliniae* Standl.	BO47, A202, B812	***páunim***	n
Vochysiaceae	*Vochysia elongata* Pohl	J262	***páunim***	n

Appendix 4: Aguaruna Plant Taxa Mentioned in this Monograph (Arranged by Species)

Species	**Family**	**coll #[ii]**	**Aguaruna name**	**LF[i]**
not determined	Bombacaceae	J122	***ménte***	n
not determined	Bombacaceae	J123	***ménte***	n
not determined	Bombacaceae	J210	***ménte, wampúush***	n
not determined	Lauraceae	J28	***tínchi, ká̲wa***	n
not determined	Melastomataceae	J128	***chinchák, nugkáya***	d
not determined	Melastomataceae	J16	***chinchák, uchúch***	n
not determined	Melastomataceae	J25	***yujách***	n
not determined	Moraceae	J105	***shína***	n
not determined	Rubiaceae	J30	***shamíkua***	n
not determined	Rubiaceae	J31	***shuípiu***	n
not determined	Rubiaceae	J103	***shuípiu, uchúch***	n
Acacia glomerosa Benth.	Fabaceae	K378	***yujúnts***	n
Aciotis sp.(?)	Melastomataceae	J129	***chinchák, nugkáya***	d
Adelobotrys sp.	Melastomataceae	H1797	***chinchák, dáek***	d

[i] LF = 'life-form': n = ***númi*** (trees), sh = ***shígki*** (palms), v = ***dáek*** (lianas and vines), d = ***dúpa*** (herbs)

[ii] Collection numbers preceded by J indicate my own collections, which are deposited in the herbarium of the Universidad Nacional Mayor de San Marcos, in Lima, Peru. Other letters indicate collections from Brent Berlin and his collaborators, as follows: A = Ernesto Ancuash, B = Brent Berlin, BO = J.S. Boster, D = Feliz Domínguez Pena, H = Victor Huashikat, K = Rubio Kayap, KU = Kujikat, L = Jose Asunción Leveau, T = Santiago Tunqui. All material collected by the above collaborators is deposited at the Missouri Botanical Garden, in St. Luis Missouri.

Species	Family	coll #[ii]	Aguaruna name	LF[i]
Agonandra silvatica Ducke	Opiliaceae	H1500	***pítuuk***	n
Albizia subdimidiata (Splitg.) Barneby & J.W. Grimes	Fabaceae	K73	***yujúnts***	n
Alchornea sp.	Euphorbiaceae	J238	***kasháinim***	n
Alchornea glandulosa Poepp.	Euphorbiaceae	B537, K1160	***kántsa***	n
Alibertia curviflora K. Schum.	Rubiaceae	B1522	***námukam***	n
Allophylus divaricatus Radlk.	Sapindaceae	K115	***jimájma***	
Allophylus loretensis Standl. ex J.F. Macbr.	Sapindaceae	H303	***kántsa***	n
Aniba sp.	Lauraceae	J44	***wampúsnum, mujáya (kumpají)***	n
Aparisthmium cordatum(Juss.) Baill.	Euphorbiaceae	J170, B937, K108, K236, K554	***dátash***	n
Apeiba aspera Aubl.	Tiliaceae	K650	***shimút***	n
Batocarpus orinocensis H. Karst.	Moraceae	J42, A100	***pítu***	n
Befaria glauca Bonpl.	Ericaceae	J253	***kunugkút, kampáunmaya***	n
Bellucia cf. *pentamera* Naudin	Melastomataceae	J66	***chinchák, sáu***	n
Bellucia pentamera Naudin	Melastomataceae	B314, K730	***yujách***	n
Bixa orellana L.	Bixaceae	H219, H744	***ipák***	n
Blakea hirsuta Berg ex Triana	Melastomataceae	H293, H579	***chinchák, dáek***	d
Borojoa claviflora (K. Schum.) Cuatrec.	Rubiaceae	A132, K1110	***námukam***	n
Brosimum guianense (Aubl.) Huber	Moraceae	H240, H1103	***kapiú***	n
Brosimum multinervium C.C. Berg	Moraceae	K996	***tákae***	n
Brosimum parinarioides Ducke	Moraceae	J86	***tákae***	n
Brosimum rubescens Taub.	Moraceae	[ii]	***shína***	n

[ii] Collected by Walter Lewis, Memory Elvin-Lewis, Rogerio Castro and Genaro Yarupait, collection #17322, Missouri Botanical Garden

Species	Family	coll #[ii]	Aguaruna name	LF[i]
Cabralea canjerana (Vell.) Mart.	Meliaceae	K614	***mamántunim***	n
Calycophyllum megistocaulum (K. Krause) C.M. Taylor	Rubiaceae	J81, K263	***uwáchaunim***	n
Calycophyllum spruceanum (Benth.) Hook. f. ex K. Schum.	Rubiaceae	B3712	***kapiú***	n
Calyptranthes tessmannii Burret ex McVaugh	Myrtaceae	D26, H86, H380	***sáka***	n
Capparis detonsa Triana & Planch.	Capparaceae	A191	***mejénkach***	n
Carpotroche arborea	Flacourtiaceae	A1194	***umpákainim***	n
Caryocar sp.	Caryocaraceae	J6	***dusenés***	n
Caryodendron orinocense H. Karst.	Euphorbiaceae	K308	***náam***	n
Casearia obovalis Poepp. ex Griseb.	Flacourtiaceae	J225	no name given	n
Cecropia sp.	Moraceae	J12	***súu***	n
Cecropia engleriana Snethl.	Moraceae	J206	***satík***	n
Cecropia engleriana Snethl.	Moraceae	J273, KU132	***súu***	n
Cecropia engleriana Snethl.	Moraceae	B2057, K1099	***tséke***	n
Cecropia ficifolia Warb. ex Snethl.	Moraceae	K442	***súu***	n
Cecropia marginalis Cuatrec.	Moraceae	T16	***súu***	n
Cecropia membranacea Trécul	Moraceae	K805	***satík***	n
Cecropia membranacea Trécul	Moraceae	K680	***súu***	n
Cecropia putumayonis Cuatrec.	Moraceae	A1020	***tséke***	n
Cecropia sciadophylla Mart.	Moraceae	K213	***súu***	n
Cedrela odorata L.	Meliaceae	J83	***áwanu***	n
Cedrela odorata L.	Meliaceae	J67	***séetug***	n
Cedrelinga cateniformis (Ducke) Ducke	Fabaceae	J271, K410, A18	***tsáik***	n
Ceiba pentandra L. (Gaertn.)	Bombacaceae	J266	***wampúush***	n
Ceiba samauma (Mart.) K. Schum.	Bombacaceae	B1624, K1236	***wampúush***	n

Species	**Family**	**coll #[ii]**	**Aguaruna name**	**LF[i]**
Cespedesia spathulata (Ruiz & Pav.) Planch.	Ochnaceae	J87	***magkuák***	n
cf. *Nectandra schomburgkii* Meisn.	Lauraceae	J53	***wampúsnum***	n
Chimarrhis glabriflora Ducke	Rubiaceae	J92	***bukún***	n
Chimarrhis hookeri K. Schum.	Rubiaceae	A504	***bukún***	n
Chrysochlamys sp.	Clusiaceae	J29	***yagkíp***	n
Chrysochlamys sp.	Clusiaceae	J158	***yagkíp***	n
Chrysochlamys macrophylla Pax	Clusiaceae	B1687	***yagkíp***	n
Chrysochlamys weberbaueri Engl.	Clusiaceae	J89	***yagkíp***	n
Chrysophyllum colombianum (Aubrév.) T.D. Penn.	Sapotaceae	H2259	***yáas***	n
Clarisia racemosa Ruiz & Pav.	Moracceae	J258	***shijigká sáei***	n
Clavija hookeri A. DC.	Theophrastaceae	B1692, K1042	***yampák***	n
Clavija longifolia Ruiz & Pav.	Theophrastaceae	K869	***yampák***	n
Clavija tarapotana Mez	Theophrastaceae	B686	***yampák***	n
Clavija venosa B. Ståhl	Theophrastaceae	D83	***yampák***	n
Clidemia sp.	Melastomataceae	J47	***chinchák, mujáya tujutjutú***	d
Clidemia sp.(?)	Melastomataceae	J126	***chinchák, nugkáya***	d
Clidemia epiphytica (Triana) Cogn.	Melastomataceae	H312	***chinchák, dáek***	d
Clusia weberbaueri Engl.	Clusiaceae	J175	***éwe***	n
Compsoneura capitellata (A. DC.) Warb.	Myristicaceae	J241	***tsémpu, mujáya***	n
Conceveiba rhytidocarpa Müll. Arg.	Euphorbiaceae	K322	***kántsa***	n
Cordia toqueve Aubl.	Boraginaceae	J231	no name given	n
Cordia toqueve Aubl.	Boraginaceae	J234	no name given	n
Cordia toqueve Aubl.	Boraginaceae	J239	no name given	n
Couma macrocarpa Barb. Rodr.	Apocynaceae	J188	***dáum, uchí***	n
Couroupita subsessilis Pilg.	Lecythidaceae	J68	***shishíim***	n

Species	**Family**	**coll #**[ii]	**Aguaruna name**	**LF**[i]
Crematosperma sp.	Annonaceae	J263	***yáis, tsáju***	n
Croton lechleri Müll. Arg.	Euphorbiaceae	B545	***ujúshnum**, **yawáa***	n
Cybianthus comperuvianus Pipoly	Myrsinaceae	K558	***wewé***	n
Cybianthus gigantophyllus Pipoly	Myrsinaceae	A580	***wewé***	n
Cybianthus peruvianus (A. DC.) Miq.	Myrsinaceae	A593	***wewé***	n
Cymbopetalum aequale N.A. Murray	Annonaceae	A410, K612	***yáis***	n
Cyphomandra endopogon ssp. *endopogon* (Bitter) Bohs	Solanaceae	A1512, B1974, K2029, B2009	***mejénkach***	n
Dacryodes sp.	Burseraceae	J48	***újuts***	n
Dacryodes kukachkana L.O. Williams	Burseraceae	J79	***kunchái, múun***	n
Dacryodes kukachkana L.O. Williams	Burseraceae	J58	***kunchái, wáwa***	n
Dacryodes nitens Cuatrec.	Burseraceae	J121	***kunchái, tsáju***	n
Dacryodes peruviana (Loes.) H.J. Lam	Burseraceae	J50	***kunchái, númi***	n
Duroia hirsuta (Poepp.) K. Schum.	Rubiaceae	J193	***íwaiwaig***	n
Ecclinusa lanceolata (Mart. & Eichler) Pierre	Sapotaceae	J197	***barát***	n
Eriotheca macrophylla ssp. *sclerophylla* (Ducke) A. Robyns	Bombacaceae	K980	***ménte, númi***	n
Erythrina sp.	Fabaceae	J249	***shikiú, múun***	n
Erythrina cf. *poeppigiana* (Walp.) O.F. Cook	Fabaceae	J248	***shikiú, apách***	n
Erythrina cf. *poeppigiana* (Walp.) O.F. Cook	Fabaceae	J247	***shikiú, awajún***	n
Erythrina ulei Harms	Fabaceae	K887	***shikiú***	n
Eschweilera andina (Rusby) J.F.Macbr.	Lecythidaceae	A1295	***shuwát***	n
Eschweilera gigantea (R. Knuth) J.F. MacBr.	Lecythidaceae	J102	***kaáshnum***	n
Eschweilera gigantea (R. Knuth) J.F. MacBr.	Lecythidaceae	J217	***shuwát***	n
Eschweilera tessmannii R.Knuth	Lecythidaceae	K568	***kaáshnum***	n
Faramea sp.	Rubiaceae	K2000	***táuna***	n
Faramea glandulosa Poepp. & Endl.	Rubiaceae	A5	***shamíkua***	n

Species	**Family**	**coll #**[ii]	**Aguaruna name**	**LF**[i]
Faramea rectinervia Standl.	Rubiaceae	J101	***shuípiu, uchúch***	n
*Ficus insipida*Willd.	Moraceae	K367	***wámpu, múun***	n
Ficus maxima Mill.	Moraceae	K253, K2024	***wámpu***	n
Ficus cf. *maxima* Mill.	Moraceae	J96	***tsuntsúj***	n
Garcinia macrophylla Mart.	Clusiaceae	K321	***pegkáenum***	n
Garcinia macrophylla Mart.	Clusiaceae	J119	***pegkáenum, shíig***	n
Garcinia macrophylla Mart.	Clusiaceae	J61	***pegkáenum, wáshi***	n
Garcinia macrophylla Mart.	Clusiaceae	J62	***wayámpainim***	n
Garcinia madruno (Kunth) Hammel	Clusiaceae	J275	***wayámpainim***	n
Genipa americana L.	Rubiaceae	J43, H261	***súwa***	n
Godoya sp.	Ochnaceae	J174	***páushnum, úwejshunmaya***	n
Grias neuberthii J.F. Macbr.	Lecythidaceae	H488, H41	***apái***	n
Grias peruviana Miers	Lecythidaceae	J57, B884, T5	***apái***	n
Guarea grandiflora Decne. ex Steud.	Meliaceae	J183	***tsanchínakish, múun***	n
Guarea macrophylla spp. *macrophylla* Vahl	Meliaceae	J226	***ishpíg***	n
Guarea macrophylla ssp. *pendulispica* (C. DC.) T.D. Pennington	Meliaceae	J74	***bíchau***	n
Guarea macrophylla ssp. *pendulispica* (C. DC.) T.D. Pennington	Meliaceae	J52	***yantsáu***	n
Guarea pubescens ssp. *pubescens* (Rich.) A. Juss.	Meliaceae	H1516	***kúwai***	n
Guazuma crinita Mart.	Sterculiaceae	K645	***muráina***	n
Gustavia inakuama S.A. Mori	Lecythidaceae	B495, B656, B2036, KU8	***inakúam***	n
Gustavia macarenensis ssp. macarenensis Philipson	Lecythidaceae	A1056	***inák***	n

Species	**Family**	**coll #**[ii]	**Aguaruna name**	**LF**[i]
Gynerium sagittatum (Aubl.) P. Beauv.	Poaceae	BO3	***tagkán***	d
Heliocarpus sp.	Tiliaceae	J1	***kútsa***	n
Heliocarpus americanus L.	Tiliaceae	A496, H14, K735, L43	***kútsa***	n
Hevea guianensis Aubl.	Euphorbiaceae	J84	***shijíg***	n
Hevea pauciflora (Spruce ex Benth.) Müll. Arg.	Euphorbiaceae	A99	***shijíg***	n
Himatanthus sucuuba (Spruce ex Müll. Arg.) Woodson	Apocynaceae	J201, BO48	***shipítna***	n
Hippotis brevipes Spruce ex K. Schum.	Rubiaceae	J167	***dupí kumpají***	n
Hirtella eriandra Benth.	Chrysobalanaceae	H783	***yukúku***	n
Hura crepitans L.	Euphorbiaceae	B1719	***bákaij***	n
Inga sp.	Fabaceae	J240	***sámpi, dupaják***	n
Inga sp.	Fabaceae	J242	***sámpi, dupajám***	n
Inga sp.	Fabaceae	J190	***sámpi, múun***	n
Inga sp.	Fabaceae	J60	***sámpi, putsúu***	n
Inga sp.	Fabaceae	J189	***sámpi, sháajam***	n
Inga sp.	Fabaceae	J187	***sámpi, yuwícham***	n
Inga sp.	Fabaceae	J9	***wámpa***	n
Inga sp.	Fabaceae	J5	***wámpushik***	n
Inga capitata Desv.	Fabaceae	H1618	***náji***	n
Inga cayennensis Sagot ex Benth.	Fabaceae	K737	***dapújuk***	n
Inga cf. *densiflora* Benth.	Fabaceae	J51	***sámpi, ímik***	n
Inga cf. *multinervis* T.D. Penn.	Fabaceae	J72	***buabúa***	n
Inga cf. *umbellifera* (Vahl) Steud.	Fabaceae	J78	***katámankamat***	n
Inga edulis Mart.	Fabaceae	J63, K1179	***wámpa***	n
Inga japurensis T.D. Penn.	Fabaceae	H1504	***sámpi yakúm***	n
Inga leiocalycina Benth.	Fabaceae	K277	***sámpi, yuwícham***	n

Species	**Family**	**coll #[ii]**	**Aguaruna name**	**LF[i]**
Inga marginata Willd.	Fabaceae	J212	***sejempách***	n
Inga multinervis T.D. Penn.	Fabaceae	A10	***buabúa***	n
Inga nobilis Willd.	Fabaceae	K1087	***wámpushik***	n
Inga pruriens Poepp.	Fabaceae	H238	***sámpi yakúm***	n
Inga punctata Willd.	Fabaceae	K817	***sejempách***	n
Inga ruiziana G. Don	Fabaceae	K601	***náji***	n
Inga ruiziana G. Don	Fabaceae	B472	***sámpi, múun***	n
Inga ruiziana G. Don	Fabaceae	A1114	***wámpushik***	n
Inga semialata (Vell.) Mart.	Fabaceae	A1500	***sejempách***	n
Inga striata Benth.	Fabaceae	BO99	***wámpa̲***	n
Inga tessmannii Harms	Fabaceae	K153	***sámpi, ímik***	n
Inga thibaudiana DC.	Fabaceae	B971, K710	***dapúju̲k***	n
Inga tocacheana D.R. Simpson	Fabaceae	B920	***sámpi, ímik***	n
Inga urabensis L.Uribe	Fabaceae	K193	***buabúa***	n
Iryanthera juruensis Warb.	Myristicaceae	J55, B1606	***tsémpu, úntuch***	n
Iryanthera tricornis Ducke	Myristicaceae	J80	***ejé̲sh***	n
Isertia sp.	Rubiaceae	J20	***tsáagnum***	n
Isertia laevis (Triana) B.M. Boom	Rubiaceae	K732	***tsáagnum***	n
Isertia laevis (Triana) B.M. Boom	Rubiaceae	J104	***tsáagnum, shíig***	n
Ixora ulei K. Krause	Rubiaceae	H407	***sáka***	n
Jacaranda copaia (Aubl.) D. Don	Bignoniaceae	B745	***tsakátska***	n
Jacaranda glabra (A. DC.) Bureau & K. Schum.	Bignoniaceae	B327	***tsakátska***	n
*Jacaratia digitata (*Poepp. & Endl.) Solms	Caricaceae	B 548, K585	***númpi***	n
Kotchubaea sp.	Rubiaceae	A1064	***námukam***	n
Lacmellea sp.	Apocynaceae	J7	***táuch***	n
Lacmellea oblongata Markgr.	Apocynaceae	J199, K432, K490	***táuch, úchi***	n

Species	**Family**	**coll #[ii]**	**Aguaruna name**	**LF[i]**
Lacmellea peruviana (Van Heurck & Müll. Arg.) Markgr.	Apocynaceae	J200	***táuch, múun***	n
Leandra longicoma Cogn.	Melastomataceae	B1505	***chinchák, antumú***	n
Leandra secunda (D. Don) Cogn.	Melastomataceae	A553	***chinchák, antumú***	n
Leonia crassa L.B. Sm. & A. Fernández	Violaceae	B501, K251	***íwakip***	n
Leonia crassa L.B. Sm. & A. Fernández	Violaceae	J91	***íwakip, namakía***	n
Leonia glycycarpa Ruiz & Pav.	Violaceae	A1390, K913	***íwakip***	n
Licania longipedicellata Ducke	Chrysobalanaceae	H70	***yukúku***	n
Licania pallida Spruce ex Sagot	Chrysobalanaceae	H1425	***yukúku***	n
Licaria sp.	Lauraceae	J196	***káikua***	n
Lonchocarpus utilis A.C. Sm.	Fabaceae	K702	***tímu***	d
Loreya spruceana Benth. ex Triana	Melastomataceae	A1123	***yujách***	n
Mabea sp.	Euphorbiaceae	J230	no name given	n
Mabea klugii Steyerm.	Euphorbiaceae	B792	***tákit***	n
Mabea macbridei I.M. Johnst.	Euphorbiaceae	A1427	***tákit***	n
Mabea maynensis Spruce	Euphorbiaceae	J120	***tákit***	n
Mabea occidentalis Benth.	Euphorbiaceae	K3	***tákit***	n
Macleania sp.	Ericaceae	J46	***kunugkút, mujáya***	n
Macrocnemum roseum (Ruiz & Pav.) Wedd.	Rubiaceae	K59	***bukún***	n
Macrolobium sp.	Fabaceae	A510	***samíknum***	n
Macrolobium acaciifolium (Benth.) Benth.	Fabaceae	J82	***samíknum***	n
Macrolobium aff. *microcalyx* Ducke	Fabaceae	J254	***tagkáam, mujáya***	n
Macrolobium limbatum Spruce ex Benth.	Fabaceae	J56	***wampíshkunim***	n
Miconia sp.	Melastomataceae	J149	***chinchák, antumú***	n
Miconia sp.	Melastomataceae	J216	***chinchák, antumú***	n
Miconia sp.	Melastomataceae	J76	***chinchák, kapantú***	n

Species	**Family**	**coll #[ii]**	**Aguaruna name**	**LF[i]**
Miconia sp.	Melastomataceae	J99	***ukuínmanch***	n
Miconia sp.?	Melastomataceae	J148	***chinchák, antumú***	n
Miconia affinis DC.	Melastomataceae	J178	***chinchák, kapantú***	n
Miconia bulbalina (Don) Naudin	Melastomataceae	J112	***chijáwe***	n
Miconia decurrens Cogn.	Melastomataceae	K391	***tseék***	n
Miconia lourteigiana Wurdack	Melastomataceae	J267	***ukuínmanch***	n
Miconia paleacea Cogn.	Melastomataceae	A1202, B1753	***chinchák, antumú***	n
Miconia poeppigii Triana	Melastomataceae	A1426	***yujáya***	n
Miconia serrulata (DC.) Naudin	Melastomataceae	K941	***chijáwe***	n
Miconia serrulata (DC.) Naudin	Melastomataceae	A729, K909	***ukuínmanch***	n
Miconia subspicata Wurdack	Melastomataceae	H571	***chinchák, antumú***	n
Miconia ternatifolia Triana	Melastomataceae	J75	***tseék***	n
Miconia vittata (Linden & Andre) Cogn.	Melastomataceae	K839	***tseék***	n
Micropholis brochidodroma T.D. Penn.	Sapotaceae	J223	***sáka***	n
Minquartia sp.	Olacaceae	J36	***wakapú***	n
Minquartia guianensis Aubl.	Olacaceae	B717, K92	***wakapú***	n
Mollinedia caudata J.F. Macbr.	Monimiaceae	L74	***sáka***	n
Mouriri myrtifolia Spruce ex Triana	Melastomataceae	B1734	***sáka***	n
Myrcia multiflora (Lam.) DC.	Myrtaceae	T106	***sáka***	n
Myrciaria amazonica O. Berg	Myrtaceae	B3556	***sáka***	n
Myroxylon balsamum (L.) Harms	Fabaceae	J207, J208	***chikáunia***	n
Neea divaricata Poepp. & Endl.	Nyctaginaceae	J124, A70, D137	***kátsau***	n
Neea macrophylla Poepp. & Endl.	Nyctaginaceae	K309, D98, BO55	***kátsau***	n
Neea speciosa Heimerl	Nyctaginaceae	A1128, K344, H352	***kátsau***	n

Species	**Family**	**coll #**[ii]	**Aguaruna name**	**LF**[i]
Nectandra cuneatocordata Mez	Lauraceae	J171	***mantagá***	n
Nectandra olida Rohwer	Lauraceae	J268	***tínchi, káwa***	n
Nectandra reticulata (Ruiz & Pav.) Mez	Lauraceae	J73	***takák***	n
Neosprucea grandiflora (Spruce ex Benth.) Sleumer	Flacoutiaceae	T1101	***kántsa***	n
Notopleura iridescens C.M. Taylor	Rubiaceae	J125	***shamíkua***	n
Ochroma sp.	Bombacaceae	J35	***wáwa***	n
Ochroma pyramidale (Cav. ex Lam.) Urb.	Bombacaceae	A532, H543	***wáwa***	n
Ocotea argyrophylla Ducke	Lauraceae	J169	***tínchi, tuntúu***	n
Ocotea cf. *wachenheimii* Benoist	Lauraceae	H483, K335	***batút***	n
Ocotea costulata (Nees) Mez	Lauraceae	K663	***káikua***	n
Ocotea floribunda (Sw.) Mez	Lauraceae	A170	***káwa***	n
Ocotea floribunda (Sw.) Mez	Lauraceae	A212	***tínchi, káwa***	n
Ocotea floribunda (Sw.) Mez	Lauraceae	A472, A138, B875	***batút***	n
Ocotea floribunda (Sw.) Mez	Lauraceae	A343	***máegnum***	n
Ocotea gracilis (Meisn.) Mez	Lauraceae	J272	***takák***	n
Ocotea longifolia Kunth	Lauraceae	J113	***tínchi, tuntúu***	n
Ormosia sp.	Fabaceae	J115	***pandáij***	n
Ormosia cf. *amazonica* Ducke	Fabaceae	J114	***pandáij***	n
Ormosia cf. *coccinea* (Aubl.) Jacks.	Fabaceae	J71	***tajép***	n
Ossaea sp.	Melastomataceae	J65	***chinchák, kugkúim***	d
Ossaea bullifera (Pilg.) Gleason	Melastomataceae	T577	***tseék***	n
Otoba glycicarpa (Ducke) W.A. Rodrigues & T.S. Jaramillo	Myristicaceae	H1644	***chikúm***	n
Oxandra xylopioides Diels	Annonaceae	A468	***kayayáis***	n
Palicourea mansoana (Müll. Arg.) Standl.	Rubiaceae	J136	***shuípiu***	n

Species	**Family**	**coll #**[ii]	**Aguaruna name**	**LF**[i]
Palicourea subspicata Huber	Rubiaceae	J143	***shuípiu, úchi***	d
Parinari klugii Prance	Chrysobalanaceae	T105	***yukúku***	n
Parkia multijuga Benth.	Fabaceae	B742	***tagkáam***	n
Perebea guianensis ssp. acanthogyne (Ducke) C.C. Berg	Moraceae	A464, K383	***kawít***	n
Perebea guianensis ssp. *guianensis* Aubl.	Moraceae	H1592	***sugkách***	n
Perebea guianensis ssp. *pseudopeltata* (Mildbr.) C.C. Berg	Moraceae	B448	***kawít***	n
Perebea guianensis ssp. *hirsuta* C.C. Berg	Moraceae	K234	***sugkách***	n
Perebea xanthochyma H. Karst.	Moracceae	J252	***pítuuk***	n
Perebea xanthochyma H. Karst.	Moraceae	T117, A745, A1289	***sugkách***	n
Phytelephas macrocarpa ssp. *macrocarpa* Ruiz & Pav.	Arecaceae	B646	***chápi***	sh
Picramnia sp.	Simaroubaceae	B3557	***yumpíg***	n
Piper augustum Rudge	Piperaceae	KU426, B323,K1011	***untuntúp***	n
Piper grande Vahl	Piperaceae	B296, K1352	***untuntúp***	n
Piper obliquum Ruiz & Pav.	Piperaceae	B1594, K29, KU283	***untuntúp***	n
Piper obtusilimbum C. DC.	Piperaceae	A336	***ampágpag***	n
Piper strigosum Trel.	Piperaceae	A 513	***ampágpag***	n
Pithecellobium basijugum Ducke	Fabaceae	B749, H232	***samíknum***	n
Pithecellobium basijugum Ducke	Fabaceae	J164	***samiknum, mujáya***	n
Pithecellobium longifolium (Humb. & Bonpl. ex Willd.) Standl.	Fabaceae	B851	***samík***	n
Pollalesta discolor (Kunth) Aristeg.	Asteraceae	B1627	***yukát***	n
Pourouma bicolor ssp. *bicolor* Mart.	Moraceae	T7	***shuíya***	n

Species	**Family**	**coll #**[ii]	**Aguaruna name**	**LF**[i]
Pourouma cecropiifolia Mart.	Moraceae	K268	***shuíya***	n
Pourouma minor Benoist	Moraceae	H693	***tugkápna***	n
Pourouma tomentosa ssp. *tomentosa* Mart. ex Miq.	Moraceae	K201	***shuíya***, ***páu***	n
Pouteria reticulata (Engl.) Eyma	Sapotaceae	K195	***dupí***	n
Pouteria torta (Mart.) Radlk.	Sapotaceae	K190	***dupí***	n
Pouteria torta ssp. *tuberculata* (Sleumer) T.D. Penn.	Sapotaceae	B720	***dupí***	n
Protium sp.	Burseraceae	J233	***pantuí***	n
Protium sp.	Burseraceae	J54	***shijíkap***	n
Protium sp.	Burseraceae	J38	***shíshi***	n
Protium fimbriatum Swart	Burseraceae	J70, K264, B930, B1502	***chípa***	n
Protium grandifolium Engl	Burseraceae	J49	***pantuí***	n
Protium grandifolium Engl.	Burseraceae	J64	***shíshi***	n
Protium nodulosum Swart	Burseraceae	A26	***pantuí***	n
Protium robustum (Swart) D.M. Porter	Burseraceae	K384	***pantuí***	n
Protium sagotianum Marchand	Burseraceae	A163	***pantuí***	n
Protium spruceanum (Benth.) Engl.	Burseraceae	A427	***shíshi***	n
Pseudobombax sp.	Bombacaceae	J209	***ménte, wampúush***	n
Pseudolmedia laevis (Ruiz & Pav.) J.F. Macbr.	Moraceae	KU239	***chími***	n
Pseudolmedia laevis (Ruiz & Pav.) J.F. Macbr.	Moraceae	H1543	***chími, suír***	n
Pseudolmedia macrophylla Trécul	Moraceae	K397, H516	***shagkuína***	n
Pseudoxandra sp.	Annonaceae	J180	***yaisá kumpají***	n
Psychotria sp.	Rubiaceae	J163	***shamíkua kumpají***	n
Psychotria sp.	Rubiaceae	J154	***shuípiu, mujáya***	d
Psychotria cenepensis C.M. Taylor	Rubiaceae	A1058	***shamíkua***	n

Species	**Family**	**coll #**[ii]	**Aguaruna name**	**LF**[i]
Psychotria flaviflora C.M. Taylor	Rubiaceae	B2013, B2073	***shamíkua***	n
Psychotria tinctoria Ruiz & Pav.	Rubiaceae	J100	***shuípiu, múun***	n
Pterocarpus sp.	Fabaceae	J236	no name given	n
Pterocarpus amazonum (Mart. ex Benth.) Amshoff	Fabaceae	H350	***timúna***	n
Randia armata (Sw.) DC.	Rubiaceae	J108	***tsáchik, putsúu***	n
Retiniphyllum fuchsioides Krause	Rubiaceae	J45	no name given	n
Rollinia fosteri Maas & Westra	Annonaceae	K641	***yáis***	n
Rollinia glomerulifera Maas & Westra	Annonaceae	H366, T23	***yugkuánim***	n
Rollinia microcarpa R.E. Fr.	Annonaceae	A449	***anúna***	n
Rollinia mucosa (Jacq.) Baill.	Annonaceae	B328	***anúna***	n
Rollinia pittieri Saff.	Annonaceae	H478	***yugkuánim***	n
Ryania speciosa var. *tomentella* Sleumer	Flacourtiaceae	D81, L81	***yukúku***	n
Sarcaulus brasiliensis ssp. *gracilis* T.D. Penn.	Sapotaceae	H658, H1224	***yáas***	n
Schefflera dielsii Harms	Araliaceae	H263	***séntuch***	n
Schefflera morototoni (Aubl.) Maguire, Steyerm. & Frodin	Araliaceae	K1070, A402	***séntuch***	n
Senefeldera inclinata Müll. Arg.	Euphobiaceae	J205	***tsáchij***	n
Senefeldera inclinata Müll. Arg.	Euphorbiaceae	J85	***tsáchij***	n
Senefeldera macrophylla Ducke	Euphorbiaceae	A96	***tsáchij***	n
Siparuna sp.	Monimiaceae	J22	***mejénkach***	n
Siparuna sp.	Monimiaceae	J127	***mejénkach***	n
Siparuna cervicornis Perkins	Monimiaceae	K1424	***tsúna japimágbau***	n
Siparuna mollicoma (Mart. ex Tul.) A. DC.	Monimiaceae	A348	***tsúna japimágbau***	n
Siparuna pauciflora (Beurl.) A. DC.	Monimiaceae	K915	***tsúna japimágbau***	n
Siparuna schimpffii Diels	Monimiaceae	A732, A421, KU183, K950	***tsúna japimágbau***	n

Species	**Family**	**coll #[ii]**	**Aguaruna name**	**LF[i]**
Siparuna thecaphora (Poepp. & Endl.) A. DC.	Monimiaceae	B1706, K313	***mejénkach***	n
Solanum sp.	Solanaceae	J10	***ugtukáj***	n
Solanum acanthodes Hook. f.	Solanaceae	K820	***ugtukáj***	n
Solanum vanheurckii Müll. Arg.	Solanaceae	A75	***ugtukáj***	n
Sorocea cf. *pileata* W.C. Burger	Moraceae	J94	***ajátsjats, namakía***	n
Spondias mombin L.	Anacardiaceae	H392, H1563	***mamántunim***	n
Sterculia apetala var. *elata* (Ducke) E.L. Taylor	Sterculiaceae	K148, K678	***kutsápau***	n
Sterculia frondosa Rich.	Sterculiaceae	K173	***kutsápau***	n
Sterculia pruriens (Aubl.) K. Schum.	Sterculiaceae	A 675	***kutsápau***	n
Stylogyne micrantha (Kunth) Mez	Mysinaceae	J227	***yagkíp, mujáya***	n
Symbolanthus sp.	Gentianaceae	J173	no name given	n
Tabernaemontana sp.	Apocynaceae	J41	***kúnakip***	n
Tabernaemontana macrocalyx Müll. Arg .	Apocynaceae	KU43	***wápae***	n
Tabernaemontana macrocalyx Müll. Arg.	Apocynaceae	A435, A1226, A1298	***kúnakip tséas***	n
Tabernaemontana sananho Ruiz & Pav.	Apocynaceae	J181, A72, B496	***kúnakip***	n
Tabernaemontana undulata Perrier ex A. DC.	Apocynaceae	J179	***íwakip***	n
Tachigali sp.	Fabaceae	J261	***tigkíshpinim***	
Tachigali cf. *bracteosa* (Harms) Zarucchi & Pipoly	Fabaceae	J270	***wantsún***	n
Tachigali chrysophylla (Poepp.) Zarucchi & Herend.	Fabaceae	A1242	***wantsún***	n
Tachigali formicarum Harms	Fabaceae	J264	***ugkuyá***	n
Tachigali rugosa (Mart. ex Benth.) Zarucchi & Pipoly	Fabaceae	A275, H654	***wantsún***	n
Talisia peruviana Standl.	Sapindaceae	T373	***yumpíg***	n
Tapirira guianensis Aubl.	Anacardiaceae	A500, K204	***papágnum***	n

Species	**Family**	**coll #[ii]**	**Aguaruna name**	**LF[i]**
Tapirira obtusa (Benth.) D.J. Mitch.	Anacardiaceae	A345	***papágnum***	n
Tapura peruviana K. Krause	Dichapetalaceae	H184	***yumpíg***	n
Terminalia bucidoides Standl. & L.O. Williams	Combretaceae	A432	***yumpíg***	n
Tetragastris sp.	Burseraceae	J69	***chunchuína***	n
Theobroma bicolor Bonpl.	Sterculiaceae	BO5	***wakám***	n
Theobroma subincanum Martius in Buchner	Sterculiaceae	J184, A293	***akágnum***	n
Tocoyena sp.	Rubiaceae	B796	***námukam***	n
Trema sp.	Ulmaceae	J2	***káka***	n
Trema micrantha (L.) Blume	Ulmaceae	T756	***káka***	n
Trichilea sp.	Meliaceae	J157	***bíchau kumpají***	n
Trichilia pallida Sw.	Meliaceae	KU53	***bíchau***	n
Trichilia poeppigii C. DC.	Meliaceae	J232	***chíajap, uchúch***	n
Trichilia septentrionalis C. DC.	Meliaceae	J237	***chíajap, múun***	n
Triolena pluvialis (Wurdack) Wurdack	Melastomataceae	A1514	***chinchák, antumú***	n
Triplaris americana L.	Polygonaceae	J186, K1243	***tagkána***	n
Trophis racemosa (L.) Urb.	Moraceae	K107	***pítuuk***	n
Unonopsis floribunda Diels	Annonaceae	BO49	***yáis***	n
Unonopsis gracilis R.E. Fr.	Annonaceae	A376, K349, K1024	***yáis***	n
Urera baccifera (L.) Gaudich. ex Wedd.	Urticaceae	K1181	***nája***	n
Urera caracasana (Jacq.) Gaudich. ex Griseb.	Urticaceae	H1109, L25, L296	***súku***	n
Vantanea parviflora Lam.	Humiriaceae	H712, H1217	***yukúku***	n
Vernonia patens Kunth	Asteraceae	B1634, B1970	***daikát***	n
Virola sp.	Myristicaceae	J135	***tsémpu, takáikit***	n
Virola calophylla (Spruce) Warb.	Myristicaceae	J95	***chikúm, namakía***	n
Virola calophylla (Spruce) Warb.	Myristicaceae	J198	***chikúm, namakía***	n

Species	**Family**	**coll #[ii]**	**Aguaruna name**	**LF[i]**
Virola elongata (Benth.) Warb.	Myristicaceae	K665	***tsémpu, úntuch***	n
Virola pavonis (A. DC.) A.C. Sm.	Myristicaceae	K197	***ejésh***	n
Vismia sp.	Clusiaceae	J4	***yampiánim***	n
Vochysia braceliniae Standl.	Vochysiaceae	BO47, A202, B812	***páunim***	n
Vochysia elongata Pohl	Vochysiaceae	J262	***páunim***	n
Warszewiczia sp.	Rubiaceae	J33	***yúsa patámkamu***	n
Xylopia cuspidata Diels	Annonaceae	A1495	***yáis***	n
Xylopia parviflora Spruce	Annonaceae	J269	***kayayáis***	n
Zanthoxylum sp.	Rutaceae	J204	***tiík***	n
Zanthoxylum valens (J.F. Macbr.) J.F. Macbr.	Rutaceae	J251	***tiík***	n
Zygia latifolia (L.) Fawc. & Rendle	Fabaceae	J59	***íwanch sámpi***	n

Appendix 5: Characters and Character States Mentioned in the Tree Descriptions

fruit

- color
  - ***páuj*** **–** ‘yellow’
  - ***púju*** **–** ‘white’
  - ***púju áetak*** **–** ‘white when unripe’
  - ***púju ínitak*** **–** ‘white inside’
  - ***kapántu*** **–** ‘red’
  - ***kapántu áetak*** **–** ‘red when unripe’
  - ***kapántu ínitak*** **–** ‘red inside’
  - ***bukúsea*** **–** ‘black’
  - ***bukúsea jakíau*** – ‘stains black’
  - ***samékbau*** **–** ‘green’
  - ***samékbau áetak*** **–** ‘green when unripe’
  - ***samékbau ínitak*** **–** ‘green inside’
  - ***tuntúu*** **–** ‘dark’
- shape
  - ***chújam*** **–** ‘straight’
  - ***esájam*** **–** ‘long’
  - ***jípit*** **–** ‘flat’
  - ***kampújam*** **–** ‘thick’
  - ***wegkájam*** **–** ‘wide’
  - ***tugkuí*** **–** ‘ellipsoid’
  - ***tenté*** (= ***neněntu***) **–** ‘spherical’
  - ***téntenkau*** **–** ‘curved’
  - ***tsakátskatu*** **–** ‘pointy’
  - ***tséjen*** **–** ‘thin’
  - ***yantántaju*** **–** ‘not perfectly round’
- size
  - ***ápu*** **–** ‘large’
  - ***puyái*** **–** ‘small’
- dehiscence
  - ***takíawai*** **–** ‘dehisces’
- location (e.g. on trunk)
  - ***kanáwe nejéawai*** **–** ‘fruits on its branches’
  - ***numíji nejéawai*** **–** fruits on its trunk’
- odor
  - ***chípa chípa kugkúawai*** **–** ‘smells like ***chípa*** (*Protium fimbriatum*)’
  - ***séetug séetug kugkúawai*** **–** ‘smells like ***séetug*** (*Cedrela odorata*)’

chikáunia chikáunia kugkúawai* –** 'smells like ***chikáunia (*Myroxylon balsamum*)'
***jijuán jijuán kugkúawai* –** 'smells like roasted manioc'
shijíkap shijíkap kugkúawai* –** 'smells like ***shijíkap (*Protium* sp.)'
tínchi tínchi kugkúawai* –** 'smells like ***tínchi (various Lauraceae)'
shishíim shishíim mejéawai* –** 'smells like ***shishíim (*Couroupita subsessilis*)'

clustering
***sutúkajá nejéawai* –** 'fruits in clusters'
taste
***chujuín* –** 'sour'
***yumímitu* –** 'sweet'
***yapáu* –** 'bitter'
quantity
***kuáshat nejéawai* –** 'produces a lot of fruit'
***imáchik nejéawai* –** 'produces few fruit'
comes undone
***ukuíniawai* –** 'comes undone'
texture
***chácha* –** 'speckled'
***jágki núnin* –** 'has something like spines'
***tsantsúntsuju* –** 'ribbed'
presence of cotton
***ujúshji̲ áwai* –** 'cotton present'
hardness
***katsújam* –** 'hard'
***púkuts* –** 'soft'
sponginess
***tujútjutu* –** 'spongy'
fruiting season
***wáamak nejéawai* –** 'fruits continuously'
wind dispersed
***dásee umpuí utsáwai* –** 'dispersed by wind'
chambered
***kampátum akatínu* –** 'three chambered'
in the form of a chain
***ikátjinu* –** 'chain-like'

leaves

shape
***esájam* –** 'long'
***wíju* –** 'narrow'
***wegkájam* –** 'wide'

tenté **–** ‘rounded’
tsakátskatu **–** ‘pointy’
size
ápu **–** ‘large’
puyái **–** ‘small’
color
pushújin **–** ‘off-white’
kapántu **–** ‘red’
kijítu **–** ‘dark’
samékbau **–** ‘green’
texture
pinuí **–** ‘smooth
pujús **–** ‘rough’
suisuímatu **–** ‘with fine hairs’
odor
séetug séetug kugkúawai **–** ‘smells like ***séetug*** (*Cedrela odorata*)’
chikáunia chikáunia kugkúawai **–** ‘smells like ***chikáunia*** (*Myroxylon balsamum*)’
shijíkap shijíkap kugkúawai **–** ‘smells like ***shijíkap*** (*Protium* sp.)’
tínchi tínchi kugkúawai **–** ‘smells like ***tínchi*** (various Lauraceae)’
petiole characteristics
kagkají esájam **–** ‘petiole is long’
thickness
dupájam **–** ‘thick’
undulating
shijín **–** ‘undulating’
compound or divided
tsegkétskeju **–** ‘compound or divided’

trunk outer appearance

color
kapántu **–** ‘red
páuj **–** ‘yellow’
pushújin **–** ‘off white’
samékbau **–** ‘green’
tuntúu **–** ‘dark’
texture
pinuí **–** ‘smooth’
pujús **–** ‘rough’
kagkígkiju **–** ‘divided’
presence of thorns
jagkígtin **–** ‘thorny’
presence of bumps
íshi ayáwai **–** ‘bumps present’

growth habit

height of tree
***esájam* –** 'tall'
***sútaj* –** 'short'
thickness of trunk
***kampújam* –** 'thick
***tséjen* –** 'thin'
straightness of trunk
***chújam* –** 'straight'
overall size of tree
***múun* –** 'large'
***píipich* –** 'small'
roundness of trunk
***yantántaju* –** 'not perfectly round'

branches

quantity
tsegkétskeju – 'branchy'
thickness
kampújam – 'thick'
***tséjen* –** 'thin'
***múun* –** 'large'
color
***sháajam* –** 'off white'
presence of thorns
***jagkígtin* –** 'thorny'
texture
pinuí – 'smooth'
suisuímatu 'with fine hairs'
length
***esájam* –** 'long'
winding
***tunín* –** 'winding'

flowers

color
***bukúsea kagáwai* –** 'black when dry'
***púju* –** 'white'
samékbau – 'green'
kapántu – 'red'
páuj – 'yellow'

kijítu – ‘black’

shape

esájam – ‘long’

tenté – ‘rounded’

wíju – ‘narrow’

location (e.g. on trunk)

kanáwe yagkújawai – ‘flowers on the trunk’

size

ápu – ‘large’

puyái – ‘small’

odor

apái apái kugkúawai – ‘smells like ***apái*** (*Grias* spp.)’

séetug séetug kugkúawai – ‘smells like ***séetug*** (*Cedrela odorata*)’

chikáunia chikáunia kugkúawai – ‘smells like ***chikáunia*** (*Myroxylon balsamum*)’

shishíim shishíim mejéawai – ‘smells like ***shishíim*** (*Couroupita subsessilis*)’

clustering

sutukajá yagkújawai – ‘flowers in clusters’

flowering season

yagkují dúke akagá wekámtai – ‘flowers after leaves fall’

bark

odor

bíchau bíchau kugkúawai – ‘smells like ***bíchau*** (various Meliaceae)’

tsémpu tsémpu kugkúawai – ‘smells like ***tsémpu*** (various Myristicaceae)’

wámpa wámpa kugkúawai – ‘smells like ***wámpa*** (Inga edulis)’

chípa chípa kugkúawai – ‘smells like ***chípa*** (*Protium fimbriatum*)’

séetug séetug kugkúawai – ‘smells like ***séetug*** (*Cedrela odorata*)’

chikáunia chikáunia kugkúawai – ‘smells like ***chikáunia*** (*Myroxylon balsamum*)’

shijíkap shijíkap kugkúawai – ‘smells like ***shijíkap*** (*Protium* sp.)’

tínchi tínchi kugkúawai – ‘smells like ***tínchi*** (various Lauraceae)’

shishíim shishíim mejéawai – ‘smells like ***shishíim*** (*Couroupita subsessilis*)’

séj séj mejéawai – ‘smells like blood’

púku púku mejéawai – ‘smells like pus’

peeling

chipúchpuju – ‘flakes off’

ujagák wéu – ‘peels off’

thickness

chíchapich – ‘thin’

dupájam – ‘thick’

fibrous

- ***yáisintin*** **–** ‘fibrous’

inner color

- ***bukúsea ínitak*** **–** ‘black inside’
- ***púju ínitak*** **–** ‘white inside’
- ***kapántu ínitak*** **–** ‘red inside’
- ***katsújam*** **–** ‘hard’

taste

- ***yapáu*** **–** ‘bitter’
- ***yumímitu*** **–** ‘sweet’

consistency

- ***máeg*** **–** ‘mucousy’
- ***ajatín*** **–** ‘sticky’
- ***ínitak tsentsájintin*** **–** ‘grainy inside’

color stained

- ***bukúsea jakíawai*** **–** ‘stains black’

buttressed roots

presence

- ***kagkapé áwai*** **–** ‘buttressed roots present’
- ***kagkapé astáwai*** **–** ‘buttressed roots absent’

size

- ***múun*** **–** ‘large’

length

- ***esájam*** **–** ‘long’

sap

color

- ***kapántu*** **–** ‘red’
- ***páuj*** – ‘yellow
- ***púju*** – ‘white’
- ***saáwi*** **–** ‘clear’

strength of flow

- ***sénchi puwáwai*** **–** ‘strong flow’

forms balls on trunk

- ***shijíkpitin*** **–** ‘forms balls on trunk’

rubbery when dry

- ***najámtai*** **–** ‘rubbery when dry’

odor

chikáunia chikáunia kugkúawai **–** ‘smells like ***chikáunia*** (*Myroxylon balsamum*)’
shijíkap shijíkap kugkúawai **–** ‘smells like ***shijíkap*** (*Protium* sp.)’

presence

puwáji̲ atsáwai **–** ‘sap absent’

taste

yapáu **–** ‘bitter’

consistency

máeg (= ***shíip***) **–** ‘mucousy’
tamén **–** ‘greasy’
ajatín **–** ‘sticky’

inner trunk

color

bukúsea **–** ‘black
bukúsea jakí̲awai **–** ‘stains black’
páuj **–** ‘yellow’
kapántu **–** ‘red’
púju **–** ‘white’

hardness

katsújam **–** ‘hard’
púkuts **–** ‘soft’

weight

kijín **–** ‘heavy’
wampúush **–** ‘light’

odor

séetug séetug kugkúawai **–** ‘smells like ***séetug*** (*Cedrela odorata*)’
shijíkap shijíkap kugkúawai **–** ‘smells like ***shijíkap*** (*Protium* sp.)’
tínchi tínchi kugkúawai **–** ‘smells like ***tínchi*** (various Lauraceae)’
shishíim shishíim mejéawai **–** ‘smells like ***shishíim*** (*Couroupita subsessilis*)’
púku púku mejéawai **–** ‘smells like pus’

hollow

wáa ayáwai **–** ‘hollow’

seeds

color

bukúsea **–** ‘black’
páuj **–** ‘yellow’
kapántu **–** ‘red’

samékbau – 'green'
púju – 'white'

shape

jípit – ' flat'
tugkuí – 'ellipsoid'
tenté – 'spherical'

size

ápu – 'large'
puyái – 'small'

odor

pítu pítu kugkúawai – 'smells like ***pítu*** (*Batocarpus orinocensis*)'
chikáunia chikáunia kugkúawai – 'smells like ***chikáunia*** (*Myroxylon balsamum*)'
shishíim shishíim mejéawai – 'smells like ***shishíim*** (*Couroupita subsessilis*)'

hardness

katsújam – 'hard'

wind dispersed

dásee umpuí utsáwai – 'wind dispersed'

quantity

kuáshat ayáwai – 'large quantity present'

texture

tamén – 'greasy'

life cycle

life cycle

nígki jáwai – 'dies of its own accord'

animal association

birds

néje pisháka yutái – 'fruit edible for bids'
yagkují pisháka yutái – 'flower edible for bids'
jigkaí pisháka yutái – 'seeds edible for bids'

mammals

néje kuntína yutái – 'fruit edible for mammals'
yagkují kuntína yutái – 'flower edible for mammals'

insects

múnji ayáwai ijújatin – 'stinging ants present'
múnji ayáwai esájatin – 'biting ants present'
chiáchia wawém máawai – 'dies when bewitched by chiáchia insects'

fish

néje namaká kakíawai, **namák níina yúwau** – 'fallen fruit eaten by fish'

plant association

moss

***júu atsáwai* –** ‘moss absent’

habitat

habitat

***mujánum tsapáwai* –** ‘grows in uplands’

***asáuknum tsapáwai* –** ‘grows in secondary forest’

Appendix 6: The Sample of Trees Used in the Second Pilot Study

Aguaruna Name	Probable Botanical Range[i]	botanical family
tsáik	*Cedrelinga cateniformis*	Fabaceae
wámpu	*Ficus* spp.	Moraceae
wampúush	*Ceiba pentandra*	Bombacaceae
ménte	not determined	Bombacaeae
bákaij	*Hura crepitans*	Euphorbiaceae
shuwát	*Eschweilera* spp.	Lecythidaceae
chípa	*Protium fimbriatum*	Burseraceae
kapiú	various genera	Rubiaceae, Moraceae
kapijúna	*Calycophyllum spruceanum*?	Rubiaceae
uwáchaunim	*Calycophyllum megistocaulum*	Rubiaceae
sáka	various genera	various families
kunchái	*Dacryodes* spp.	Burseraceae
tagkáam	*Parkia multijuga*	Fabaceae
shagkuína	*Pseudolmedia macrophylla*	Moraceae
séetug	*Cedrela odorata*	Meliaceae
apái	*Grias* spp.	Lecythidaceae
páunim	various genera	Vochysiaceae
yumpíg	various genera	various families
wakapú	*Minquartia guianensis*	Olacaceae
ká̲wa	*Ocotea floribunda*	Lauraceae
wáwa	*Ochroma pyramidale*	Bombacaceae
kayayáis	various genera	Annonaceae
shijíg	*Hevea* spp.	Euphorbiaceae
akágnum	*Theobroma subincanum*	Sterculiaceae
samíknum	various genera	Fabaceae
pegkáinum	*Garcinia macrophylla*	Clusiaceae
wantsún	*Tachigali* spp.	Fabaceae
táuch	*Lacmellea* spp.	Apocynaceae
yagkíp	*Chrysochlamys* spp.	Clusiaceae
séntuch	*Schefflera* spp.	Araliaceae
bukún	various genera	Rubiaceae
ugtukáj	*Solanum* spp.	Solanaceae
papágnum	*Tapirira* spp.	Anacardiaceae
dusenés	*Caryocar* sp.	Caryocaraceae

[i] From my own collections and *Berlin et al*. (n.d.)

sugkách	*Perebea* spp.	Moraceae
s<u>úu</u>	*Cecropia* spp.	Moraceae
kántsa	various genera	various families
yukúku	various genera	various families