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the concept of rank in ethnobiological classification: some evidence from Aguaruna folk botany

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Over the last several years, my colleagues and I have attempted to provide some initial hypotheses concerning the nature of folk biological classification and nomenclature (Berlin, Breedlove, and Raven 1973, 1974; Berlin 1972, 1973; Raven, Berlin, and Breedlove 1971). We have suggested that classes of plants and animals are grouped into a small number of hierarchic ranks such that taxa within each rank are mutually exclusive and exhibit essentially comparable degrees of differentiation from one another. We claim that taxa of the same rank exhibit nomenclatural, biological, taxonomic, and psychological characteristics which permit the assignment of any particular taxon to some particular rank in most instances.

Recently, several folk biologists have made some criticisms and voiced certain doubts about the nature of folk biological rank—suggesting, for example, that the boundaries between ranks are arbitrary (Hunn 1973, 1976) or, more seriously, that the concept itself has no validity (Bulmer 1974; Randall, this issue). Other colleagues have pointed out informally that the criteria for establishing the rank of particular taxon are not explicit and that writing on this subject has been unclear (Kay, personal communication; Conklin, personal communication).

This report attempts to deal with some of these criticisms by reviewing from a somewhat different perspective the basic outlines of our original hypotheses in light of some new data on Aguaruna botanical classification.[1] The report will conclude that certain aspects of our understanding of folk biological classification must be changed from that presented in 1973, but that, in the main, the Aguaruna data conform to the essence of that description. I hope that the revised account presented here will contribute to the development of an empirically based, cross-culturally valid typological description of ethnobiological classification.

semantic contrast, taxonomic level, and rank: some preliminaries

One of the major contributions of Kay's elegant explication of folk taxonomic

Data from Aguaruna Jívaro folk botany provide evidence for the concept of rank in ethnobiological classification. Aguaruna plant taxa can be naturally accommodated into one of six proposed ethnobiological ranks which have been called kingdom (the unique beginner), life form, intermediate, generic, specific, and varietal. The taxonomic, biological, nomenclatural, and psychological characteristics associated with taxa of each rank are described. These data tend to support the hypothesis that the concept of rank is fundamental to all systems of folk biological classification.

structure was an explicit definition of formal semantic contrast (Kay 1971). Of the four types of semantic contrast which can be defined by relations of immediate precedence, one, that of *direct contrast*, is of particular interest in terms of my discussion of rank. For Kay, any two taxa are in direct contrast if they are immediately preceded by the same taxon. Thus, taxa marked by the names *oak* and *maple* are in direct contrast in that they are both immediately preceded by a taxon labeled by the word *tree* (in English folk botany). *Red maple* and *sugar maple* are both immediately included in *maple* and, as a consequence, are also in direct contrast. Finally, for most speakers of English, *tree* and *bush* label taxa which are in direct contrast in that both are included in a taxon labeled by the word *plant.*

Kay's definition of direct contrast had an interesting empirical consequence in that it led him to formalize the concept of *contrast set*, a name for a notion that had been used in cognitive anthropological literature with various and sometimes conflicting meanings for several years. Formally, a contrast set is comprised of just those taxa which are immediately preceded by the same taxon.

In addition to these strictly formal characteristics, it could be claimed on introspective grounds (grounds which can be given empirical validation) that some substantive generalizations can be made about the taxa which comprise, in our examples, the contrast sets {oak, maple, . . .}, {sugar maple, red maple, . . .} and {tree, bush, . . .}. Speaking very loosely, each set contains taxa which exhibit similar or comparable degrees of internal variation. That is, the "degree of separation" (Simpson 1961:191) between the members of each set, as well as the amount of divergence among the organisms included in the taxa of each respective set, is roughly equivalent. Thus, in the above examples, *formal* semantic contrast corresponds well with our informal intuitions about the substantive nature of the taxa which participate in such contrast.

Unfortunately, in folk biological classification, members of the same contrast set often do not exhibit the same degree of internal variation. In Aguaruna folk botany, for example, there are at least fifty-seven formally defined first level taxa (i.e., those taxa immediately included in the covert taxon 'plant'). One taxon, *númi* 'tree,' is polytypic and includes more than 275 named subordinate members which range over more than 400 botanical species. At the other extreme, thirty-three first level taxa are monotypic and often refer to but a single species, e.g., the large bamboo, *kéŋku* (*Bambusa* sp.).

Glick's characterization of the folk botanical classification of the Gimi of New Guinea is quite analogous to the Aguaruna. He notes,

> there are more than twenty [first level] botanical categories, ranging in size from *da* 'tree' with at least 200 members, through *koi* 'ginger' with four, and on down to several problematical sets containing only two or three members apiece (1964:274).

Comparable data are not hard to come by in the domain of folk zoology, as can be seen in the descriptions of Cantonese ethnoichthyology (Anderson 1967), Kalam folk zoology (Bulmer 1968; Bulmer and Tyler 1968), and Tzeltal animal classification (Hunn 1973). An example from the latter's work illustrates the direct contrast relation between the first level taxon, *mut* 'bird,' with more than 100 subordinate taxa, and *soc'* 'bat,' a simple, monotypic class. Hunn cogently describes the situation as follows:

> One would like to say that *soc'* 'bat' (level 1) *contrasts with* categories such as *heš* 'jay' (level 2) rather than with *mut*, which by Kay's definition belongs to the same 'contrast set'. In fine, taxonomic structures defined solely in terms of the relation of set inclusion cannot adequately account for the notion of contrast, relevant to folk as well as scientific classification, which relates taxa to one another by reference to degree of differentiation they exhibit. Taxonomic categories [i.e., ranks] must be defined to account for this relation (Hunn 1973:87-88).

Partly in response to some of these empirical observations on the nature of folk biological taxa of varying degrees of differentiation, Kay has recently revised his 1971 treatment—which explicitly rejected the notion of folk biological rank—and now provides us with a formalism which easily permits the incorporation of rank into folk taxonomy (Kay 1975). Nonetheless, he is quick to advise the folk biological fieldworker that "ranks must be stipulated on the basis of *empirical considerations*. They are not in general deducible from knowledge of the relations of immediate precedence" (1976:161; italics mine).

Just what "empirical considerations" are involved in the assignment of a particular taxon to some particular rank remain controversial. Bulmer, arguing strongly for the priority of taxonomically defined contrast relations, asks for criteria on how to "distinguish clearly between unaffiliated generics [such as Aguaruna *kéŋku*, Tzeltal *soc'*, and Gimi *koi*] and life forms [such as Aguaruna *númi*, Tzeltal *mut*, and Gimi *da*]" (Bulmer 1974:23). Hunn, in spite of his awareness of the need to recognize folk biological rank, has apparently despaired of achieving some workable, non-*ad hoc* characterization, claiming that "boundaries between adjacent categories [i.e., ranks] of taxa are *arbitrary* . . . due to the continuous variation of taxonomic heterogeneity" (1973:106, 112; italics mine).

In spite of Hunn's and Bulmer's reservations, I believe that the data from Aguaruna indicate that taxa of differing ranks can be clearly recognized, that they do not merge arbitrarily into one another as on some undifferentiated continuum, and that their recognition is essential for a full understanding of the Aguaruna conceptual organization of the plant world.

Aguaruna 'plant'

Many ethnographers are apparently willing to accept the domain of 'plant' or 'animal' as the starting point for ethnobiological investigation only if these domains can be shown to constitute a conceptual category by virtue of some habitually applied label (see Brown 1974; Conklin 1954, 1962). I believe that such a stricture is overly restrictive. As I have stressed several times, while a name may be an unambiguous indicator of a category, absence of a label does not necessarily imply the absence of a category. If one observes that 'plant' or 'animal' is named in some language, but not in others, the empirical question immediately arises, "Are there sufficient data to indicate the cognitive recognition of the category in those languages where [these categories] are not named?" (Berlin 1974:328). The answer, of course, will depend on the ethnobiological facts in any particular case.

In Aguaruna, no separate term for the domain of 'plant' has been elicited. The descriptive phrases, *númi áidau* lit., 'all trees,' *dukap áidau* lit., 'all leaves,' and *ahą́kbau áidau* lit., 'all places of cultivated plants' are listed in the only published bilingual dictionary of the language (Larson 1966) with the meaning of 'plant.' *númi áidau* has been verified with one informant but does not appear to be widely shared or understood to have this meaning with those Aguaruna with whom I have worked. A variant of *dukap áidau* has been heard on occasion in natural conversation when my field ethnobotanical assistants were asked by other Aguaruna where they were going (on some particular collecting session) and responded, "We're going to look for leaves" (i.e., 'plants').

Other indirect linguistic evidence for the existence of the domain 'plant' is seen in the extensive vocabulary for morphopological features of plants and plant growth terms—all expressions which apply exclusively to organisms which are independently assigned to the

plant kingdom on botanical grounds. While the presentation of a full inventory would be inappropriate due to space considerations, the following terms are illustrative.

dúka[2]	'leaf'
káŋkap	'buttress root'
susuhį́	'underground root'
saép	'bark'
hįį́	'bud'
titíhį	'main stem above first branching'
kuihį́	'terminal growing tip (of stem)'
néhę	'tuber'
numį́hį	'erect stem'
sakútį	'inner node'
yaŋkuhį́	'flower'
kanáwe	'branch'
hį́ŋkayį	'seed'

On less explicit grounds, there is much informal evidence that the world of plants is recognized as a distinct domain by the Aguaruna. In collecting more than 20,000 specimens (4,000 numbers), informants, some of whom were monolingual, never selected organisms *other* than plants in actual field collecting situations; mushrooms and other fungi were not considered to fall within the domain.

Finally, my experience with the Aguaruna plant name lexicon is identical to that of Hays for the Ndambu who notes,

> in the course of discovering over one thousand lexemes which were subsequently validated as plant names, I never encountered uses of these expressions as labels for anything which I would not consider to be plants, except as they were also used to name products of these plants (e.g., *sa'tari* which may be glossed 'tree or shrub' or 'wood'). By the same token, nothing I considered to be plants, except for 'mushrooms and bracket fungi' was ever labeled with a lexeme which could not be meaningfully inserted in the elicitation frames in the same ways as could plant names (Hays 1974:148-149).

Thus, while the Aguaruna do not label the unique beginner, there is considerable evidence that the domain is conceptually recognized by these people. In this respect, theirs is similar to several other systems which have been recently studied (Berlin, Breedlove, and Raven 1974; Hays 1974; Turner 1973) and conforms to the general statement made earlier (Berlin 1972) that a label for the unique beginner in folk biological nomenclature occurs late in a language's development.

taxa of life form rank in Aguaruna

As in other systems of folk botanical classification, the Aguaruna bring order to the diversity of the domain of plants by classifying groups of similar organisms into a number of taxa of greater and lesser inclusiveness. The most inclusive, wide-ranging categories in folk biological taxonomies (apart from the unique beginner) have been called *life form taxa* and can be assigned to *life form rank*. The recognition of life form taxa depends on the following characteristics:

(1) Life form taxa occur at the first level of the folk taxonomy and are immediately preceded by the unique beginner when the unique beginner is defined as the kingdom 'plant' or 'animal.' Taxa of life form rank are few in absolute number, they are invariably polytypic, and they include among themselves the majority of all taxa of lesser rank.

(2) Nomenclaturally, life form taxa are labeled by primary lexemes and immediately precede taxa most of which are labeled by primary lexemes.[3]

(3) Biologically, life form taxa are diverse in extension as can be objectively measured by an enumeration of the number of distinct biological species included in each such class.

(4) Psychologically, life form taxa can be defined by a small number of biological characters, most of which refer to stem habit (in folk botany) and represent what Hunn would call *deductive categories* (Hunn 1973:94).

The data from Aguaruna uniformly conform to the foregoing characteristics. There are but four first level taxa which exhibit all of these characteristics. Among them they include 75 percent of all taxa of lesser rank. Each is labeled by a primary lexeme. All are extremely diverse in range biologically, and each can be defined by a small number of biological characters. These taxa and their respective glosses are:

númi	'trees and shrubs exhibiting woody (non-pithy) stems with erect habit'
dáek	'plants exhibiting twining stem habit, including woody lianas and herbaceous vines'
dúpa	'net-leaved plants and small shrubs exhibiting herbaceous or pithy stems'
šíŋki	'palms, excluding the small reed-like (e.g., *yaún Chamaedorea* spp.) and trunkless (e.g., *takának Taenianthera* sp.) forms'[4]

Any plant which, in its adult form, consistently exhibits all of the characteristics of one of the major life form taxa will be assigned to that taxon, though there exist a substantial number of taxa of lesser rank which are excluded from these four major groupings because of their distinctive morphological characteristics (see below). Thus, while life form taxa in Aguaruna are broad ranging, they do not exhaust the plant kingdom totally. In this respect, the Aguaruna system of plant classification is identical to that of the Tzeltal (Berlin, Breedlove, and Raven 1974), the Ndambu (Hays 1974), Quechua (Brunel 1974), several languages of the American northwest (Turner n.d.), Hanunóo (Conklin 1954), and K'ekchi (Wilson 1972), and, except for the conceptual recognition of a sub-set of palms, is reminiscent of classical plant classification ('tree,' 'vine,' 'herb'). These three major groupings, it might be speculated, represent such distinct perceptual discontinuities that their recognition may constitute a substantive near-universal in prescientific man's view of the plant world.

taxa of generic rank

In the systems of folk biological classification that have been studied in detail, a large number of highly salient taxa have been discovered which investigators think form the core of any folk biological taxonomy. Bulmer refers to such taxa, in his Kalam zoological research, as "speciemes" in that they constitute the smallest biological discontinuities in nature which are readily perceived on the basis of numerous characters of form and behavior (Bulmer 1968, 1970; Bulmer and Tyler 1968). Conklin's early study of Hanunóo ethnobotany refers to these fundamental taxa as "basic plant categories" (1954:163). My colleagues and I, following what appears to be a long historical precedent, have chosen to refer to these basic classes as *generic taxa*, as did Bartlett (1940)—in his early description of the generic concept in botany—and Wyman and Harris (1948) and Wyman and Bailey (1968) in their characterization of Navajo ethnobotany

and ethnoentomology. The appellation "generic" for this fundamental set is used by Hays (1974), Brunel (1974), Hunn (1973), and Turner (1973) in their recent full-scale ethnobiological descriptions. While the precise label eventually agreed upon by folk biologists to refer to these elementary taxa is, of course, of little consequence to the real issue at hand—understanding the bases of folk biological classification—it may be important to explain why this particular designation has been selected for the present formulation since it has not yet been discussed in print.

historical antecedents

The word "genus" and its possible derivations, with essentially the same meaning as intended here, has had a long history in Western biological classification. This should not be surprising, for as Bartlett has pointed out in reference to the study of the plant world: "Classical botany was folk science" (1940:350).

Cain, in his depiction of the place of the genus in early evolutionary theory, is explicit in noting that the genus was thought to have the same essential characteristics as the folk generic classes discussed here. Thus, "the *idea* of the genus" is formed to deal with the "smallest 'kind' of plant or animal *that can be recognized without close study*" (Cain 1956:97; italics mine. It will be important to recall this passage in the discussion of folk *species* which follows later).

Greene's early, excellent study of the development of botanical thought shows clearly that the genus, as groups of the smallest, easily recognized "kinds" of organisms, formed the basis of Theophrastus' botanical classification (Greene 1909), and Cain (1958, 1959) has the same view of the writings of Linnaeus. Thus, an essential feature for Linnaean classification

> was that its primary category, as being most stable and memorable of all, was the *genus not the species*. All botanists (and by implication all zoologists and mineralogists) must know their genera, which must be separate, distinct entities with distinct names, and natural so that all would agree on their limits .... The genus was the *most useful practical unit* (1958:235, italics mine).

While Darwin's revolutionary ideas on evolution were supposed to have radically changed the foundations of biological taxonomy, in actual practice orthodox views on the fundamental nature of the genus continue to the present day. Thus, Simpson is required to write:

> It frequently appears that the genus is a more usable and reliable unit for classification than the species. In dealing with classifications not erected or revised by modern and evolutionary standards—and many such must still be dealt with [*sic*]—it is often questionable whether its 'species' are such by our definitions and not morphs or typological varieties, mutants, ecotypes, demes, subspecies, or something else. 'Genera' are more likely to be acceptable taxa by modern definition, whether we would not assign them specific, generic, or some other rank. Even in modern usage, genera are often more clearly definable and defined than either infra- or suprageneric taxa. They are likely to lend themselves to more clear-cut characters-in-common diagnosis, lower categories, even species, being less clearly distinct and higher categories have few diagnostic characters in common and sometimes none (1961:199).

Terminologically, it may be considered unwise to utilize a term such as *genus* (and later on, *species* and *varietal*) for folk taxonomic notions when these terms now have rather precise—and distinct—meanings in modern biosystematics. Already some confusion has arisen on this very point (cf. Bulmer's 1974 critique of Berlin, Breedlove, and Raven). The competing terms ("basic plant/animal type," "fundamental category," or "specieme") are, however, somewhat ambiguous or jargonistic. Nonetheless, I have no particular investment in using one set of terms or another since, as I have said above, the

important issues have to do with the nature of the taxa themselves, not what we may choose to call them.

distinguishing characteristics of generic taxa

While there may be general agreement among folk biologists as to the significance of generic taxa, there is little agreement concerning the criteria to be utilized in assigning some class of plants or animals to generic rank. Although there is no definitive set of criteria which will be unanimously accepted at this time, it now appears that a combination of taxonomic, linguistic, psychological, and biological features are always involved in making decisions of generic rank assignment in the actual field situation. I believe that a balanced consideration of the criteria outlined below will make possible the determination of the greater majority of all generic plant and animal taxa in any folk taxonomy. I do not claim that the these criteria necessarily permit the formulation of a foolproof set of discovery procedures which can be automatically employed by someone with no experience (or interest) in the substance of folk biological description. Matters of judgment are always involved, as they are in all but the most sterile areas of scientific inquiry.

(1) Generic taxa are consistently labeled in folk biological taxonomies (cf. Bulmer and Tyler 1968; Bulmer 1974 for a contrary view). The nomenclatural properties of generic taxa constitute one of the first and most important features for their recognition in folk biological research, leading Bartlett to provide an essentially linguistic (though logically circular) definition of these groupings. Thus, "the genus . . . is more or less consciously thought of as the smallest grouping requiring a *distinctive* name" (1940:356). Furthermore, generic taxa are given names of a specifiable linguistic structure. Like life form taxa, generic taxa are usually labeled by *primary lexemes.*[3]

In Aguaruna, some 566 generic taxa have been isolated, all of which are labeled by primary lexemes. There is a strong tendency for simple primaries to predominate, as can be seen in Table 1.

(2) Most generic taxa are taxonomically included in one of the few major life form taxa. In Aguaruna, 468 generic taxa, 86 percent of the total inventory, are members of one of the four life form taxa. Their distribution across these major classes is shown in Table 2.

There is a "residue" of ninety-eight generic taxa which are excluded from major life form categories and are, therefore, unaffiliated, or are ambiguously affiliated with one or more life form classes. An *unaffiliated generic* encompasses organisms which, in all contexts of actual plant identification, are consistently said not to be included in one of the major life forms. Thus far, forty-nine taxa of this kind have been isolated.

An *ambiguously affiliated generic* is one which encompasses a group of organisms, most of which are highly polymorphic usually in stem habit. In some contexts of identification, a specimen which is said to be a member of a particular generic may be classified as a member of one life form; in others, a different specimen of the same generic class may be regarded as a member of another life form, or placed in no life form at all. There are at least forty-nine or fifty such taxa in Aguaruna plant classification.

It is informative to examine some examples of the unaffiliated or ambiguously affiliated generic taxa, for it can be shown that, as is the case with the Tzeltal Mayan ethnobotanical materials, such plant classes are "almost without exception cultivated and/or morphologically peculiar in some fashion" (Berlin, Breedlove, and Raven 1973:219).

Table 1. Examples of Aguaruna generic plant names exhibiting three types of primary lexemes.

Simple (502 names)

ipák 'achiote' (*Bixa orellana*)
bákaiŋ (no common name) (*Hura crepitans*)
áču 'maurita plam' (*Mauritia peruviana*)
čiŋkán 'bamboo' (*Bambusa* sp.)
datém 'ayahuasca' (*Banisteriopsis* spp.)
hímа 'chili pepper' (*Capsicuum* spp.)
čípa [new genus of tree in the Burseraceae]
kái 'avocado' (*Persea* spp.)
dáɬaɬampa [no common name] (*Pothomorphe* spp.)

Unproductive complex (48 names)

iwánči papaihí [no common name] (*Carica microcarpa*) lit. 'devil's papaya' < *íwanč* 'devil,' *papái* 'papaya'
hémpe umpuáŋbau [no common name] (*Clidemia sprucei, Maieta guianensis, Tococa* spp., all small herbaceous spp. in the Melastomataceae) lit. 'hummingbird's manioc garden < *hémpe* 'hummingbird,' *umpuáŋbau* 'manioc garden'

Productive complex (16 names)

činčíp dáek (unidentified vine in the Araceae) < *činčíp* (unanalyzable constituent) + *dáek* 'vine'
númi ménte (unidentified tree in the Bombacaceae) < *numí* 'tree,' *ménte* (unanalyzable constituent)
takašú dupáhi (several unidentified herbs in the Acanthaceae, Rubiaceae, and Gesneriaceae) < *takáš* 'toad' + *dúpa* 'herbaceous plant'

Number of generic names = 566

Of the forty-nine unaffiliated genera, fifteen represent cultivated plants (e.g., *ahéŋ* 'ginger,' *máma* 'manioc,' *dúse* 'peanut,' *idáuk* 'sweet potato,' *kéŋke* 'yam,' *šáa* 'corn'). The remaining thirty-four classes include morphologically distinctive classes of plants, e.g., *čayú dúka*, a twining vine-like palm; *ikamáš*, a cactus (the only such form collected in the area); *kahijís, čiŋkán, taŋkán*, all types of bamboo; *winčú, tumpéa, jaamáš*, all distinctive species of the broad-leafed banana-like genus *Heliconia; kuíš, wasákea*, the former referring to most epiphytic bromeliads, the latter to a remarkable ground variety.

Of the ambiguously affiliated generics, the most interesting refer to groupings of plants which are morphologically diverse. The generic *činčák* is a good example. This taxon covers a major portion of those species of plants in the region which are botanically members of the Melastomataceae, a common family of tropical plants. Members of this family are unambiguously recognized by a unique leaf venation pattern which shows three to nine longitudinal nerves. Species of this family have variant botanical life form characteristics at maturity, and they include trees, shrubs, herbs, and rarely, herbaceous

Table 2. Distribution of Aguaruna generic plant taxa in terms of life form affiliation.

númi	'tree'	275
daék	'vine'	93
dúpa	'herbaceous plant'	70
šíŋki	'palm'	30
		n = 566

vines. Of the sixty-two collections of melastomaceous plants given the name *činčák* in my data, forty-three are assigned to the life form *numí* 'tree,' fourteen to *dúpa* 'herb,' three to *daék* 'vine,' and two are considered to be unaffiliated.

A second illustrative form with similar botanical diversity is *únturtup*, an Aguaruna generic that covers a major portion of the ubiquitious family Piperaceae. While some species in the family are recognized with distinct generic names, it appears that the term *únturtup* is utilized to label a "residual category" (cf. Hunn 1973) of piperaceous plants which are not included in any other name. Like the melastomes, pipers (especially, members of the genus *Piper*) show a wide range of growth forms. Of the fifty-two collections of plants labeled by the term *únturtup*, twenty-eight are placed in the life form *númi*, fifteen in the life form *dúpa*, and nine are considered to be unaffiliated.

The theoretical significance of such ambiguously affiliated generics is of some importance to Kay's "typicality convention" (Kay 1975) discussed in his recent treatment of folk taxonomic structure. Thus, while in English one can say with some confidence that an *oak* is a *tree* (in that all *typical* oaks are trees), I have not been able to determine if *únturtup* or *činčák* have some members which are more "typical" than others. Unfortunately, my data are not sufficiently complete at this time to allow me to address this problem in detail, though I hope to do so in the near future.

(3) Since generic taxa mark the smallest classes of plants and animals that do not require much close study to recognize, most generic taxa are, as one might expect, *monotypic*. That is, most are terminal and include no further named subdivisions. Those generic taxa which are polytypic exhibit some special botanical, nomenclatural, and psychological characteristics which mark them as a special set (see section on specific and varietal taxa, below).

Approximately 82 percent of all Aguaruna generic taxa are monotypic, and the remaining 103 taxa (18 percent) are further subdivided into *folk specific classes* comprised of from two to thirty or more members.

The ratio of monotypic to polytypic taxa found for Aguaruna folk generic taxa is curiously close to that discovered in other systems of folk biological classification which have been recently described. Hays (1974) finds that 14 percent of the generic taxa for the Ndambu of New Guinea are polytypic. The number of polytypic generic forms in Tzeltal folk botany is 16 percent (Berlin, Breedlove, and Raven 1974:91) and that for Tzeltal folk zoology is 17 percent polytypic forms (Hunn 1973). Brunel, working in an area considerably less rich botanically, reports that 11 percent of the generic plant taxa for the Chacan Quechua are polytypic. Conklin's Hanunóo data, however, do not support this trend: 43 percent of his generic plant classes are further subdivided. Nonetheless, it is worthwhile considering the possibility that a specifiable constant of polytypy—somewhere in the range of 15 percent—may be characteristic of many ongoing systems of folk classification and might possibly be explained as a function of a subtle but specifiable interplay of biological and cultural constraints.

The distribution of polytypic genera in Aguaruna seems to follow a regular pattern found in many biological lexicons, a pattern described formally by Geoghegan (this issue). The majority of all polytypic genera are bitypic, including only two specific taxa. A smaller number include sets of three taxa, and so on at a rapidly diminishing rate. The actual distribution for Aguaruna is seen in Table 3.

taxa of specific and varietal rank

Subgeneric taxa in folk biological classification can be said to have *specific* or *varietal*

Table 3. Distribution of polytypic generic plant taxa in Aguaruna.

No. Included Folk Specifics	No. of Generics
1 (i.e., monotypic genus)	463
2	68
3	12
4	9
5	2
6	3
7	2
8	2
9	1
10	2
.	
.	
.	
21 (bananas)	1
.	
.	
.	
30+ (manioc)	1
	Total 566

rank. Taxa which occur as members of these ranks differ from taxa of higher rank in several respects. Taxonomically, most specific taxa occur in sets of two or three members. It is rare for a set of folk species to exceed six, and such sets are invariably organisms of major cultural importance. Varietal taxa are rare in folk taxonomies generally (cf. Hays 1974). Biologically contrasting specific taxa differ on the basis of very few morphological characters; frequently these are readily visible and sometimes verbalizable. Nomenclaturally, specific and varietal classes are labeled, with predictable exceptions, by binomial *secondary lexemes.*[5]

The data for the 104 polytypic Aguaruna generic taxa conform closely to the foregoing general characterization. More than one-half of the specific taxa occur in sets of two members, as do more than two-thirds of the total numbers of sets of either two or three members. All of the larger sets of specific taxa refer to organisms of major cultural importance, e.g., manioc (thirty folk species), banana (twenty-one folk species), ginger (nine), etc. Varietal taxa are infrequent in Aguaruna and have been found only with two important cultigens, yams and bananas.

While generic and life form names are marked by primary lexemes, names for taxa of specific rank in Aguaruna—with important exceptions to be discussed below—are linguistically binomial in form and are analyzed as secondary lexemes. Examples of several specific contrast sets whose members illustrate lexemes of this type are seen in Table 4.

Botanically, the members of each of these specific contrast sets are quite similar except in a few distinctive characters. The four classes of *ípak* are readily distinguished by the shape of the seed capsule as well as the relative abundance and surface distribution of the flexible spine-like protuberances which cover the surface of all but one folk species. The secana types (*Sicana odorifera*) differ in rind color and size and shape of fruit. The two specific types of *ajáŋke* (*mun* and *učí*) apparently differ on one character—the presence or absence of axillary spines on the young growing stem of the vine. Differences between specific taxa of the same contrast are often verbalizable, as well, and I have

Table 4. Binomial specific nomenclature in Aguaruna folk botany.

Generic Name	Specific Names	
ipák 'achiote' (*Bixa orellana*)	*baéŋ ipák*	'kidney-achiote'
	čamíŋ ipák	'yellow achiote'
	hémpe ipák	'hummingbird achiote'
	šíŋ ipák	'genuine achiote'
namúk (*Sicana odorifera*)	*mún namúk*	'large secana'
	ɸéntak namúk	'dart-like secana'
	ikám namúk	'forest secana'
	kapántu namúk	'red secana'
aháŋke (*Uncaria* spp.)	*mun aháŋke*	'large *Uncaria*' (*U. guianeusis*)
	učí aháŋke	'small *Uncaria*' (unidentified)

observed informants avidly discussing the assignment of some specimen to some specific class with enthusiasm.

a nomenclatural qualification

Although binomial nomenclature is the general rule for taxa of specific rank, a number of taxa which are taxonomically included in generic classes are labeled by primary lexemes and, as a consequence, constitute an exception to the binomiality principle. However, the majority of such monomial specifics in Aguaruna can be shown to be what I have called elsewhere "type specifics." Some of these forms refer to the focus of the category. Reasons for focality include such factors as the cultural importance of the members of the class, widespread distribution, or prominence because of one or more morphological features. On the other hand, monomial specifics may also mark the residue of some folk generics which are not members of any of the contrasting specific taxa in the set. Hunn (1973:120-123) who was the first to my knowledge to note this phenomenon in folk biological classification, calls such taxa "residual categories." Nomenclaturally, all type specific taxa (those that indicate focal members or those that indicate residual categories) are marked with expressions which are polysemous with the label of the superordinate generic. Examples of both types of monomial expressions can be found in Table 5.

Type specific monomials, however, do not exhaust the inventory of monomial specific names in Aguaruna. In several important cultivated plants, specific taxa labeled by primary lexemes have been elicited which cannot be analyzed as examples of type species. This nomenclatural feature is especially common for the critical cultigens banana, manioc, yam, and cocoyam (*Xanthosoma*) (see Table 6).

Data from Terrence Hays on the Ndambu of New Guinea and Nancy Turner's materials from the Pacific Northwest also include cases of monomial specific names which are not analyzable as labels for type species. However, such expressions occur in a predictable fashion, and it now appears that where a generic taxon is further

Table 5. Examples of specific taxa in Aguaruna folk botany labeled by expressions polysemous with the superordinate generic name.

monomials marking type specifics	*ɸapátaŋ* (*Siolmatra* spp.)	*ɸapátaŋ*	(*Siolmatra mexiae*)
		mun ɸapátaŋ	(no determinations as yet)
	datém (*Banisteropsis* spp.)	*datém*	(*Banisteriopsis* sp.)
		tehés datém	(unidentified)
monomials marking residual category	*saunák* (several species of the Cyclanthaceae)	*saunák*	(residual category of cyclanthaceous plants)
		mun saunák	(exceptionally large cyclanth)
	suŋkíp (several aroid spp.)	*suŋkíp*	(residual category of this group of aroids)
		yawá suŋkíp	both distinctive unidentified species of aroids
		mehén suŋkíp	

partitioned into specific classes, and one or more of the included species are monomially designated (type specifics excluded), *the monomial(s) will invariably refer to a taxon of major cultural importance*. One will not find, in light of this hypothesis, monomial, non-type-specific names for organisms which lack major cultural significance.

One further characteristic of the nature of subgeneric taxa, which needs to be discussed, concerns their relationship to cultural factors. It will be recalled that one important feature of generic taxa was that they represented discontinuities in the biological world which could be easily recognized "without close study." That is, generic taxa are the smallest discontinuities which stand out as easily perceptual and, hence, potentially nameable chunks. Specific (and varietal) taxa, however, seem to be quite different in this respect. Very briefly, it now seems likely that subgeneric taxa are recognized primarily because of the close attention they receive as a result of their cultural significance. (Cf. Geoghegan, this issue, for a mathematically sophisticated treatment of the data which follow and some intriguing historical implications.)

What is the evidence for this claim? One kind of data relevant to the topic can be drawn from the distribution of specific taxa over a scale which rates the cultural significance of the plants to which they refer. A gross scale which my colleagues and I have used in our work among the Tzeltal recognizes four categories of cultural importance in terms of which plant types might be rated (Berlin, Breedlove, Raven 1974:99-100). From greatest to least importance, these categories rank plants into *cultivated forms* (consciously planted), *protected plants* (not planted but not consciously destroyed), *significant plants* (recognized useful product but not systematically protect-

Table 6. Examples of specific taxa in Aguaruna which are labeled by primary lexemes *not* polysemous with the superordinate generic. [monomials designated by *]

sáŋku 'cocoyam' *Xanthosoma* spp.	
(šiŋ) sáŋku	**mančúp*
yamá saŋku	**nehém*
šuin saŋku	**pituk*
páantam ~ pámpa 'banana' *Musa* spp.	
**setaš*	**sétu*
**perí ya*	**tauč*
**katúču*	*kistían pámpa*
**apášmeš*	**kučik čína*
(šiŋ) páantam	**sáŋkusuk*
wakác pámpa	**upíp*
muntuk pámpa	**káki*
**muhát*	**kuŋkuí meheš*
kukúš 'cocona' *Solanum* spp.	
sáwi kukúš	*mun kukúš*
nantú kukúš	**beɸáŋ*
**šiwankúš*	**yumís*
kistián kukúš	
máma 'yuca' (*Manihot esculenta*) (30 ∓ well known varieties)	
**puyám*	**hihuántaŋ*
**suhíknum*	**apán*
**kanús*	**uhákaŋ*
ipák máma	**maŋkám*
yakía máma	*yusaŋía máma*
**ukayín*	**ušu uwakín*
**suhiktak*	**dapím*
**tunáim*	**patáku*
**čikím*	**ɸenkém*
**šámpiŋ*	**wiŋkániŋ*
**kiŋkís*	**činkás*
**paŋmač*	*nampuíŋ máma*
**páum*	**saké máma*
**šímpu*	**yampíɸaŋ*
šímpi máma	**antúk*
	**muntúm*

ed), and *unimportant plants* (no known cultural utility). A similar scale can be used to trace the distribution of monotypic and polytypic generics in Aguaruna folk botany over these four categories (see Table 7).

Table 7 shows that, while a majority of all Aguaruna *generics* have some cultural significance (sixty-one cultivated, forty-five protected, 268 significant), a full one-third of all known plants (189) are conceptually recognized but lack cultural importance. It would thus be an error to suggest that the Aguaruna classify only those plants in their environment which have some particular cultural utility.

However, Table 7 also shows that 81 percent of all *polytypic* generics (hence specific taxa) fall in one of the three categories of cultural importance; *a mere 11 percent of those generics which have been classified as unimportant are polytypic.*

Furthermore, the tendency for a generic to be further subdivided is apparently a function of its cultural importance. Thus, 40 percent of all cultivated plants include folk

Table 7. Aguaruna polytypic folk generic plant taxa and their relative cultural significance.

	Cultivated	Protected	Significant	Unimportant	Totals
monotypic	37 (15 introduced)	31	215	177	460
polytypic	24 (5 introduced)	14	53	12	103
totals	61	45	268	189	563*

*Actual total 566; 3 generics not classified for lack of data on cultural importance.

species; 31 percent of the protected plants are polytypic; and 19 percent of the significant plants include named subdivisions. Generic plants which are considered to be unimportant culturally, however, are overwhelmingly monotypic—a small handful of twelve generics (of the 189 unimportant plants), or 6 percent, are further subdivided into specific classes (Figure 1).

A possible explanation for this apparent lack of subgeneric taxa in plants with no cultural importance—or, for that matter, for those plants with marginal cultural significance—might be that such folk generic groupings exhibit much less internal polymorphism (internal differentiation) than those with cultural importance. All the evidence available to me now, however, indicates that this is not the case. In fact, the actual numbers of biological species included in generic taxa of little or no cultural importance is many times greater than those included in taxa of major cultural significance. Thus, unimportant generics exhibit more *potential* for further subdivisions than do culturally important forms. I would not discount, however, Bulmer's (1970) and Geoghegan's (this issue) persuasive arguments that the objective genetic and morphological characters in cultivated plants caused by controlled breeding must also be considered an important factor in the recognition of subgeneric taxa.

A more likely explanation of these data from Aguaruna (as well as those from Tzeltal and other languages) is that the conceptual recognition of specific taxa is not so much a function of the "close scrutiny" given polymorphic groupings of plants as they exist in nature as it is a result of special attention due to their presumed functional (cultural) importance. In rather unprecise terms, the native folk biologist recognizes generic taxa "because they are there"; he recognizes specific (and varietal) taxa "because it is culturally important to do so."

taxa of intermediate rank in Aguaruna

With the exception of the unique beginner, which is commonly not named, taxa of the ranks life form, generic, specific, and varietal are all given linguistic recognition. In 1968, and later in 1974, my colleagues and I presented evidence from Tzeltal that indicated the existence of groupings of plants of greater generality than those marked off by taxa of generic rank but of greater specificity than those marked off by taxa of life form rank (much like the taxon marked by the expression *evergreen* in English, a taxon which includes taxa labeled by the terms *pine, spruce, fir,* and which, itself, is taxonomically included in the taxon *tree*). A distinctive characteristic of these mid-level groupings was

that they were rarely labeled, leading us to refer to them as *covert categories*. Subsequent work by Hunn (1973), Hays (1974, n.d.), Bulmer (1974), and others have indicated the occurrence of such covert taxa in other systems of botanical and zoological folk classification.

While the data on such covert groupings from Aguaruna folk botany are not yet all analyzed, it is clear that as many as forty such taxa are commonly recognized. The basis of these groupings seems to be in the recognition of gross, visually recognized morphological similarities of the organisms involved and do not—in the main—represent groupings formed on the basis of functional considerations (for a discussion of this point, see Berlin 1974). Of the thirty-eight covert groupings for which I have sufficient botanical determinations available to make a judgment, twenty-nine, or 76 percent, include generic taxa all of which refer to members of the same botanical family. The remaining nine groupings include generic taxa which are strikingly similar in overall appearance in spite of their distinct familial affiliations. Examples of each of these types of covert groupings appear in Table 8.

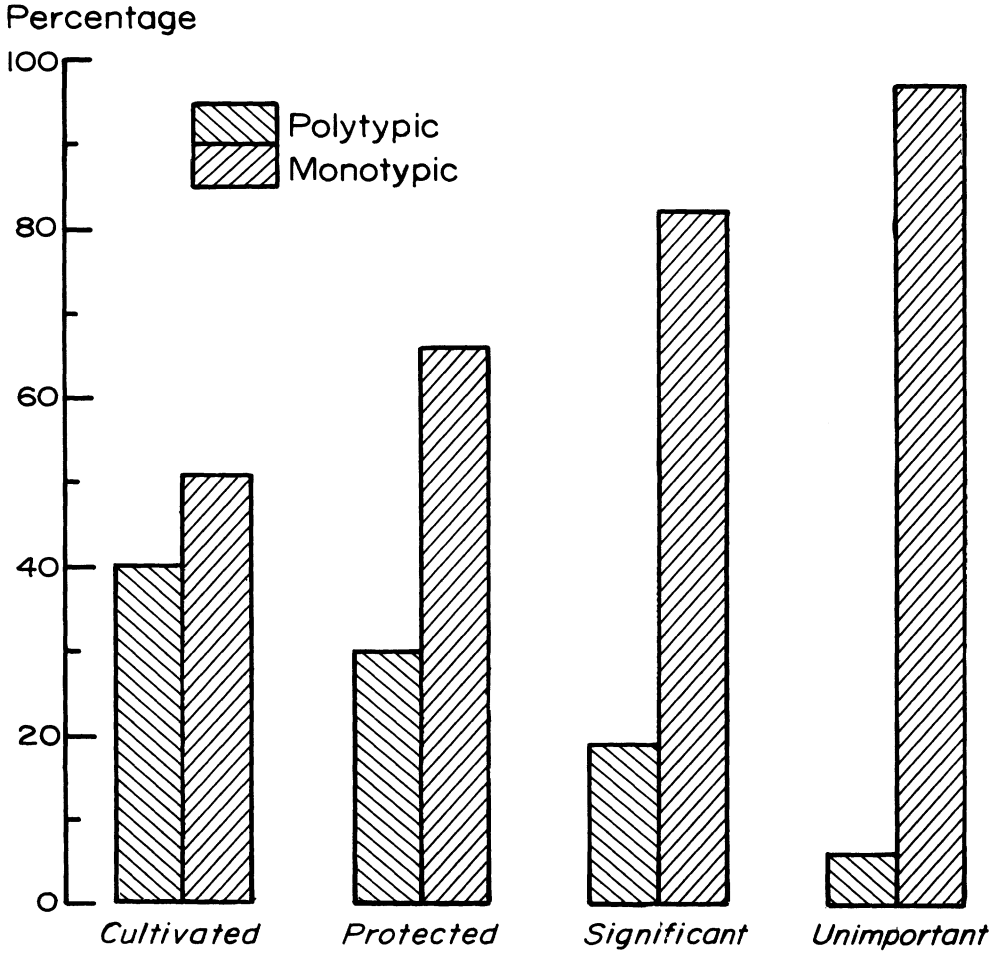

Figure 1. Proportion of monotypic/polytypic generic plant taxa by category of cultural significance.

Table 8. Examples of covert intermediate taxa in Aguaruna folk botany.

Covert Intermediate Taxa	Botanical Species	Family
inák	*Gustavia* sp. nov. 1	Lecthidaceae
inakuám	*Gustavia* sp. nov. 2	Lecthidaceae
tínči *kaíkua* *mantaŋá* *awán*		[all undetermined species in the Lauraceae]
kánḓa	*Alchornea chordata*	Euphorbiaceae
dátaš	*A. glandulosa*	Euphorbiaceae
pantuí	*Protium* sp.	Burseraceae
čípa	[new genus of tree]	Burseraceae
sukúŋ *náha* *kuyúhimas*		[all nettles in the Urticaceae]
ḓéke *satík* *súu*		[all members of the genus *Cecropia* in the Moraceae]
yapít	*Ficus* sp.	Moraceae
kásua	*Ficus* sp.	Moraceae
úwe	*Clusia* sp.	Guttiferaceae
	["Strangler figs"]	

conclusions

In this report, I have presented the first outlines of Aguaruna folk botanical classification. I have shown that classes of plants are arranged hierarchically into a small number of botanical ranks. Taxa occurring as members of a particular rank are mutually exclusive and share several formal and substantive features in common. The most inclusive taxon at the rank of *unique beginner* is not named consistently, but there is ample evidence that the readily visible members of the plant kingdom are conceptually united into a single semantic domain. Four taxa of *life form rank* have been described which roughly correspond to 'tree,' 'vine,' 'herbaceous plant,' and 'palm.' Some 566 taxa of *generic rank* have been attested thus far. These taxa represent the fundamental core of the folk taxonomy and can be recognized by linguistic, taxonomic, botanical, and psychological criteria. Some generic taxa are further subdivided into taxa of *specific rank*, and 296 such classes have been attested at this time. I have suggested that Aguaruna recognize specific taxa primarily because of cultural considerations which bear on the functional utility of the organisms to man. *Varietal taxa* are rare in Aguaruna and have been found for only two important cultivated plants. Finally, several well defined *intermediate* groupings of conceptually related generic taxa have been isolated which conform closely to scientifically recognized families or, when crossing family boundaries, are nonetheless homogeneous in the gross morphology of their members. These taxa are *covert* and are not linguistically recognized.

Problems remain in determining the best treatment of some taxa, especially the ambiguously affiliated generic forms, and I have shown that nomenclatural characteristics of certain taxa of specific rank are less systematic than suggested in 1973. Nonetheless, the vast majority of conceptually recognized plant classes in Aguaruna are easily accommodated into one of the proposed ranks in a natural and straightforward fashion. These data suggest that ranks are neither arbitrary nor a mere typological cataloging device invented for the convenience of the ethnographer. On the contrary, the Aguaruna's view of the plant world provides additional support for the hypothesis that the concept of rank is fundamental to all systems of folk biological classification.[6]

notes

[1]The Aguaruna represent approximately 20,000 manioc cultivating aboriginal Americans who reside in widely dispersed hamlets and villages along the Upper Marañón River and west of the Santiago River in the Department of Amazonas, Peru. Their major area is just to the east of the true Amazon Basin in what is often referred to in Peru as the *montaña*.

The elevations inhabited by these people range from 200 to 1000 meters above sea level; their total extension is more than 30,000 sm. km. (Guallart 1964). The region is covered by tropical rain forest, and travel off the major rivers and tributaries is difficult and, during a goodly portion of the year, impossible. The area exhibits considerable biological diversity, the rough topography of broken hills and creeks contributing to a high degree of biological endemism. In comparison with many areas of the American tropics, this portion of Peru is very poorly known botanically and zoologically.

Linguistically and culturally, the Aguaruna are the largest of four tribes which make up the so-called Jívaroan language family (McQuown 1955:512; Siverts 1972; Varese, et al. 1970). Of the remaining three groups—Huambisa, Achuara, and Jívaro proper—only the latter has been given full ethnographic treatment (Harner 1963, 1970, 1972).

[2]All Aguaruna names are given in a standard phonemic orthography with the exception that /ɨ/ is rendered as *e* for orthographic convenience, following Larson (1966).

[3]Primary lexemes are either linguistically *simple*, such as *oak*, *pine*, *maple*, or *spruce*, or linguistically *complex*. At least two types of linguistically complex lexemes have been recognized. One type includes constituents none of which mark a category superordinate to the form in question, e.g., poison oak, hens-and-chickens, kiss-me-over-the-garden gate, baby's tears, etc. Such expressions can be called *unproductive* (complex) primary lexemes. A second type of complex lexeme includes expressions in which one of the constituents marks a category superordinate to the form in question but which nonetheless contrast directly (occurs in the same contrast set) with simple or unproductive complex lexemes, e.g., tulip tree (which contrasts with oak, maple, etc.), puncture vine (which contrasts with ivy, passion flower, etc.), or creosote bush (which contrasts with rock apple, broom, etc.). Such expressions can be called *productive* (complex) primary lexemes. Some productive primaries may be abbreviated (e.g., pine tree → pine); others may not (e.g., tulip tree → *tulip).

[4]Palm determinations are by José María Guallart (1968:230-251).

[5]Secondary lexemes are linguistically analyzable expressions which (1) include one constituent that labels an immediately superordinate taxon and (2) occur in contrast sets whose members are also labeled by secondary lexemes which include an identical superordinate constituent.

[6]This report is an expansion of an orally presented paper, "General Implications of Aguaruna Jívaro Phytosystematics for General Principles of Folk Biological Classification" given during the symposium, Folk Systems of Biological Classification, at the 72nd Annual Meeting of the American Anthropological Association, New Orleans, 1973. I am grateful to the participants in that symposium for their critical comments, especially those of Paul Kay, Eugene Hunn, William H. Geoghegan, Terrence Hays, and Robert Randall. In addition, it has been rewarding to discuss issues raised in this paper with Elois Ann Berlin, James Shilts Boster, Chad K. McDaniel, and Craig Molgaard. Finally, I would like to express my appreciation to William H. Geoghegan, Allen Sonafrank, and Ruth Deuel for their computer programming assistance. This research has been generously supported by a grant from the National Institute of Mental Health (MH22012), a University of California Faculty Research grant, and the Language Behavior Research Laboratory as authorized under grant MH25703; it is based on sixteen months of field research during 1972-1973 and the summer of 1974. Botanical collections have been deposited at the Missouri Botanical Garden, and determinations have been made available by Drs. Peter H. Raven, Thomas B. Croat, and the staff of the Garden herbarium.

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