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FOLK SYSTEMATICS IN RELATION TO BIOLOGICAL CLASSIFICATION AND NOMENCLATURE

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Folk systematics as a field of study is concerned with the elucidation of those general principles which underlie prescientific man's classification, naming, and identification of living things. The subject is part of the more inclusive area of folk science, the aim of which is to describe the nature of primitive knowledge of the natural world. In this paper, I attempt to summarize recent findings in the study of folk classification and point out what I believe to be some close relationships between folk systematics and western science. I hope that these data will be of interest to readers concerned with the historical and philosophical aspects of biological classification as a system for organizing our experience of natural history.

MAJOR AREAS OF STUDY IN FOLK SYSTEMATICS

It appears useful to recognize three major areas of study in folk systematics, each tied closely to the others. These areas may be referred to as classification, nomenclature, and identification. In the study of classification, one is concerned with discovering those principles by which classes of organisms are naturally organized in the preliterate mind. Nomenclatural studies are devoted to the description of linguistic principles of naming the conceptually recognized classes of plants and animals in some particular language. The area of identification deals with the study of those physical characters utilized when assigning a particular organism to a particular recognized class.

Although all three topics should ideally be considered in a complete description of a particular society's folk systematics, no such study has yet been completed and would require many man-years of collaborative effort on the parts of ethnographers, biologists, and psychologists. Research into the nature of folk biological classifica-

tion and nomenclature has been carried sufficiently far in recent years to allow one to describe several general principles which apparently underlie most, if not all, systems of folk biological classification. Field work on the problem of folk biological identification procedures is, with one important exception (22), almost nonexistent.

THE BASIS OF FOLK BIOLOGICAL CLASSIFICATION

One of the best documented findings of folk systematics is that prescientific man's classification of his biological universe is highly systematic and quite developed. The principles which form the basis of folk biological classification seem to be ones which arise out of the recognition of groupings of organisms formed on the basis of gross morphological similarities and differences. Only rarely is classification based primarily on functional considerations of the organisms involved, such as, for example, their cultural utility. Less than half of the named folk generic classes of plants in the folk botany of the Tzeltal, a group of Mayan horticulturalists with whom my collaborators and I have been working for several years, can be shown to have any cultural significance whatsoever (6, 10). My current studies among the Aguaruna Jivaro of the rain forests of north-central Peru suggest the same findings (5). The primitive natural systematist is apparently as much concerned with bringing classificatory order to his biological universe as is his western counterpart.

Perhaps more surprising to the western biologist are recent field data which continue to suggest that the objective biological discontinuities recognized by primitive man are, for the most part and with explainable exceptions, identical at some level with those recognized by western science (3, 9, 12, 13). I believe that these findings, to be partially documented below, can be interpreted as support for the view held by the few remaining conservative taxonomists concerning the "reality of species" and are contrary to the relativistic position I once espoused myself (7).

FOLK TAXONOMY

The fundamental organizing principle of folk biological classification—the result partially, perhaps, of the large numbers of classes of organisms involved—is taxonomic, whereby recognized groupings (hereafter called *taxa*) of greater and lesser inclusiveness are arranged hierarchically (9, 24). It should be noted that the taxa which occur as members of the same folk ethnobiological category are always mutually exclusive. Furthermore, it now appears that in natural folk taxonomies most taxa are members of just five ethnobiological categories that are logically comparable to the ranks of western systematics. These are the *unique beginner*, *life form*, *generic*, *specific*, and *varietal*. A sixth category, tentatively called *intermediate* and containing taxa which fall hierarchically between the life form and generic categories, may be established with further research and as additional data on folk systematics become available.

The *unique beginner* is a distinctive category in that it has but one member, that being the taxon which includes all other taxa. The terms *living things* or *plants and animals* are often used to refer to this taxon in American English folk biology.

Members of the category *life form* represent the broadest, most encompassing

classification of organisms into groups that are apparently easily recognized on the basis of numerous gross morphological characters. Taxa of this category are invariably few in number, usually somewhere between five and ten, and among them include the majority of all taxa of lesser rank. Such terms as *tree*, *vine*, *herb*, *fish*, and *bird* refer to examples of commonly recognized life form taxa in most folk taxonomies.

In contrast to life form taxa, which refer to the largest groupings of organisms distinguished by multiple characters, members of the ethnobiological category *generic* refer to the smallest discontinuities in nature which are easily recognized on the basis of large numbers of gross morphological characteristics (12, 13). Folk generic taxa are the most numerous in any folk taxonomy that has been more or less fully described, yet their numbers appear to be within the range of 500 to 800 in any actual system. Examples of folk generic taxa in American English folk botany would be those classes referred to by the names *hickory*, *maple*, *tulip tree*, and *cottonwood*, all of which are included in the life form *tree*.

Taxonomically, the majority of all generic taxa in any natural folk taxonomy are included in one of the recognized life form taxa. There are, nonetheless, generic classes which are aberrant in some fashion or another, which prohibits their inclusion in one of the major life form classes. In Tzeltal, the cactus *pehtak* (*Opuntia* sp.) is one such example. Possessing characteristics unlike any other grouping of plants in the area inhabited by the Tzeltal, it is considered a conceptual isolate. Aberrancy of a generic may, at times, be due to the fact that it possesses characteristics of two life form taxa simultaneously. In Aguaruna Jívaro, for example, members of the generic taxon *úwi* (*Clusia* sp.) are considered neither to be kinds of *númi* 'tree' nor kinds of *dáek* 'liana,' by virtue of the simultaneous tree-like and liana-like stem habit found in members of this class, a commonly seen strangler.

Finally, the majority of all generic taxa in folk taxonomies are monotypic and include no taxa of lesser rank. Polytypic generic taxa almost invariably refer to those classes of organisms which are important culturally.

Taxa which occur as members of the *specific* and *varietal* ethnobiological categories differ from both life form and generic taxa in several respects, the most important of which appears to be that such taxa are conceptually distinguished on the basis of very few morphological characters. As will be seen in the section on nomenclature, a single, multivalued character, such as color or size, is often sufficient to differentiate two or more folk specifics of the same folk genus.

Generally, specific taxa in folk taxonomies occur in sets of two or three members. It is quite rare for a set of specific taxa to exceed ten; those that do are invariably organisms of supreme cultural significance. Varietal taxa, as might be expected, are rare in all folk taxonomies.

Examples of specific taxa in American English folk botany would be those categories labeled by such names as *white oak* and *sugar maple*. Varietal taxa may be seen in the names *baby lima bean* and *butter lima bean*.

At the opening of this section on folk taxonomy, I mentioned the possibility of recognizing a sixth ethnobiological category, termed *intermediate*, which is comprised of taxa that fall between the life forms and generics. As such, intermediate taxa taxonomically include two or more generic taxa. It now appears that such

intermediate forms are relatively rare in folk taxonomies and, as pointed out in an earlier paper (8), when such taxa are found, they most commonly are not labeled by an habitual expression. The rarity of intermediate taxa in folk systematics, but more importantly, the fact that they are not named, casts doubt as to whether our current knowledge empirically justifies establishing an ethnobiological category of this rank.

THE BASIS OF FOLK BIOLOGICAL NOMENCLATURE

Recent research into the nature of folk biological nomenclature reveals that the naming of plants and animals in folk systematics is essentially identical in all languages and can be described by a small number of nomenclatural principles. While a detailed linguistic discussion of these principles has appeared elsewhere (9, 10), a brief summary is presented here.

There is a fairly close correspondence between the linguistic form of a name for some folk biological taxon and its ethnobiological rank. Linguistically, two basic types of names for plants and animals can be recognized in folk systematics. For lack of more original terminology, these forms can be referred to as primary and secondary names. Primary names occur as labels, almost without exception, for generic and life form taxa and, for the unique beginner, when this latter taxon is named (but see below). Secondary names are generally restricted to taxa of lesser rank, namely, the specific and varietal forms.

Nomenclatural Properties of Generic Names

Generic taxa form the basic core in any folk taxonomy. The labels for taxa of this category are also fundamental and are among the first words in folk ethnobiological lexicon learned by children in preliterate societies (26). The botanist H. H. Bartlett, discussing the development of modern botanical nomenclature, noted that "... the concept of genus must be as old as folk science itself" (2, p. 341), and provided an essentially nomenclatural definition of the concept. For Bartlett, a folk genus is any class of organisms "... which is more or less consciously thought of as the smallest grouping requiring a distinctive name" (2, p. 356).

Etymologically, it is often impossible to provide linguistic analysis of generic names, a fact that should not be surprising since such names are generally quite ancient. When analysis is possible, it is often the case that the name is descriptive of some quality of the class of organisms to which it refers. In Tewa, an American Indian language of the southwestern US, the white fir, *Abies concolor*, is known as *tenyo*, literally, 'large tubes,' presumably due to the hollow stems used in pipes (21).

Onomatopoeia is also important in the formation of many generic names, especially of animals such as birds and frogs whose distinctive calls are often quite characteristically represented (23).

A final linguistic feature of generic names which appears to be widespread in many languages is the use of the generic plus some modifier to refer to some taxon that is conceptually related to the class indicated by the generic name alone. Often the modifier is an animal name as, for example, in Tzeltal where one finds many such

pairs. Typical is the pair *ishim* 'corn' and *ishim ahaw*, literally, 'snake's corn' (*Anthurium* spp.), the latter formed on the basis of the presumed similarity of the mature spadix in many members of *Anthurium* to an ear of corn. In English, one finds such pairs as *oak, poison oak; apple, horse apple* (also known as *Bodark* in some dialects); *cabbage, skunk cabbage; cypress, false cypress; orange, mock orange*; and many others.

It should be pointed out that none of these superficially binomial expressions are seen as conceptually subordinate to their monomial counterparts. Thus, *skunk cabbage* is not a kind of *cabbage* nor is *poison oak* a kind of *oak*. Each simply shares some characters which are seen to be similar to the monomially designated form. This point is discussed by the California botanist Edward Lee Greene in his important *Landmarks of Botanical History* in describing the early nomenclatural writings of Theophrastus. Greene notes that many of Theophrastus' generic names are linguistically complex expressions, several of which appear to be derived from monomial generics, e.g. *Calamos* 'reed grass' (*Arundo* spp.) and *Calamos Euosomos* 'sweet flag' (*Acornus calamus*). There is no doubt in Greene's mind, however, that Theophrastus meant the two taxa as distinct genera:

It is not imaginable that a botanist of Theophrastus' ripe experience and great attainments should think those large grass-plants and the sweet-flag to be of the same genus. Beyond doubt, however, the name *Calamos Euosomos* did originate in the notion that *arundo* and *acornus* are next of kin; for, however unlike they are as to size, foliage, and other particulars, there is a remarkably close similarity in their rootstocks, these being of almost the same size, form and color in the two. The gatherers of roots and herbs, as we know, looked first of all to the 'roots' of things, and these were their first criteria of plant relationships. To these it should be perfectly natural to place the sweet-flag alongside *arundo*, the true [*Calamos*] by its closely imitative "root," and then on account of the aromatic properties of the root to call the plant [*Calamos Euosomos*] (20, p. 123).

Nomenclatural Properties of Life Form Names

As with generic taxa, members of the ethnobiological category, *life form*, are invariably marked by primary linguistic expressions. It is often the case that these names are linguistically unanalyzable, suggesting some antiquity. On the other hand, in many languages spoken by preliterate peoples, it is not uncommon to find that an identical linguistic expression for some generic taxon also occurs as the label for the life form class as well. Such a term, with two distinct but semantically related meanings, is linguistically *polysemous*. An example of life form-generic name polysemy can be seen in Klamath, an Indian language once spoken in Oregon, where the term *k'osh* (*Pinus* sp.) is used to refer to pines as well as to the general life form taxon *tree* (18).

Of the several possible explanations for such a nomenclatural feature, the one most appealing to me suggests that, over time, the name of the most salient or culturally important generic class has become elevated to life form status. This view receives support from the work of Almstedt (1) who has done research among the Digueño, a small group of Indians of Southern California. She reports that the term *isnyaaaw* 'live oak' (*Quercus agrifolia*) is also used for the concept of *tree* in general.

This species is of critical importance to these people; it has the widest distribution of any major tree and is the most generally available source of edible acorns. Early historical linguistic research indicates that the Digueño lacked a term for tree until relatively recently. For Almstedt, "... it seems logical that the name *isnyaaw* should be used for tree when the need arose" (1, p. 13).

In many Indian languages of the American Southwest, the term for cottonwood, the only deciduous tree which is widely distributed outside the major forests, is also used for *tree*, as well (19, 27). A recent linguistic survey by Demory (15) shows that in several languages of the Hokan family one finds life form and generic polysemy as a common occurrence. In each case, the generic name which refers to trees of major cultural importance in that particular geographic area is used for the the more general concept as well. In these cases, the range is wide, including such diverse forms as juniper, sugar pine, live oak, and broad leaf maple.

There is at least some evidence to suggest that an identical nomenclatural development took place in Indo-European, the ancestral language from which most of the major languages of Europe are thought to have evolved. Buck, in an extensive study of synonyms in the major languages of this stock, notes that a commonly widespread group of words for *tree* can be traced etymologically to an Indo-European word "... which probably denoted a particular kind of tree, namely the oak" (11, p. 48). The most conclusive evidence in this regard can be found in Paul Friedrich's detailed and authoritative treatment of the proto Indo-European taxonomy of trees. His conclusions are stated here in detail:

... It seems probable that the primitive, arboreally oriented PIE [Proto Indo-European] distinguished several species of oak by distinct morphs, and that **ayg-*, **perk**, and **dorw-* served in this way. As the oak and mixed-oak forests were reduced and contracted, and as the speakers of the PIE dialects migrated into their new homelands—two simultaneous processes during the second and third millennia—the denotations of the **dorw-* reflexes shifted to "wood, tree, hardness" and yet other referents. ... It is quite possible that even in PIE times the main name for the oak—a sort of *Urbaum*—was occasionally or dialectically applied to 'tree' in general. Within pre-Homeric Greek $\delta\rho\upsilon\sigma$ and $\delta\rho\nu\acute{o}\sigma$ could denote either 'oak' or 'tree' with disambiguation through social or literary context. By Classical Greek times the meaning had narrowed to the original PIE 'tree.' In more recent centuries the identical process has been documented in Germanic, where *eik* shifted from 'oak' to 'tree' in Icelandic—oaks being virtually absent in that country (17, p. 146).

Nomenclatural Properties of Specific and Varietal Names

Linguistically, the structure of specific names in folk systematics is regularly binomial (with one singular, but explainable exception). Formally, the generic name is modified by an adjective which usually designates some obvious morphological character of the plant class such as color, texture, size, location, or the like. Examples such as *sakil ishim* 'white corn' and *tsahal ishim* 'red corn,' in Tzeltal, typify the binomiality of specific names.

It is perhaps an unintentional bit of western systematic ethnocentrism to attribute the "invention" of our current binomial system of nomenclature to Linnaeus (or to

Bauhin) if in so doing one is suggesting a radical break with folk tradition. It is more close to the facts to observe that Linnaeus and his predecessors formally codified a system of nomenclature present in the folk systematics of earliest prescientific man and still recognized in the natural folk biological systems of classification found in the languages of preliterate peoples today (25).

Monomial specific names are also found in folk taxonomies, but when such is the case, the monomial specific is usually polysemous with its superordinate generic. Invariably, such monomially designated specifics are considered to be the best known or most widely distributed members of a particular folk genus. Wyman & Harris, for the Navajo of the American Southwest, have said it is as if "... in our binomial system the generic name were used alone for the best known species of a genus, while binomial terms were used for all other members of the genus" (29, p. 120). Following early botanical tradition, we will refer to folk species exhibiting these nomenclatural characteristics as *type species*.

In Tzeltal, the custard apple *k'ewesh* (*Annona* spp.) includes at least three specific taxa. One, the type specific, is simply labeled *k'ewesh* (*A. cherimola*) due to its wider distribution. In Aguaruna Jivaro, this kind of specific name formation appears to be the rule with polytypic generic taxa which denote wild plants. A single example can be seen in the generic *kamanchá* (*Bactris* spp.), the most important specific member of which is also *kamanchá* due to its frequency. Among the Guaraní of Argentina, the generic taxon *Mboreví* refers to both kinds of tapirs in the area. *Mboreví* is used polysemously to designate the type species, *Tapirus terrestris* while *Mboreví hovih*, a binomial, refers to the lesser known and less prominent *M. terrestris* var. *obscura* (14).

It is particularly interesting to note that Theophrastus, considered by some botanists to be the father of western systematic botany, preserved the basic structure of folk plant names in his early nomenclatural studies. Or, as Greene has stated, Theophrastus "... left plant nomenclature as he found it" (20, p. 125), providing by his ethnobotanical insight historical validation of many of the structural principles suggested here. This is particularly evident in his treatment of type specific terminology. Greene notes:

The Theophrastan nomenclature of plants is as simply natural as can be imagined. Not only are monotypic genera called by a single name; where the species are known to be several, the type-species of the genus—that is, that which is most historic—is without a specific name, at least very commonly, and only the others have each its specific adjective superadded to the generic appellation (20, p. 120).

The following examples bear out this claim.

<u>Theophrastus</u>	<u>Recent Equivalents</u>
Peuce	<i>Pinus picea</i>
Peuce Idaia	<i>P. maritima</i>
Peuce conophoros	<i>P. pinea</i>
Peuce paralios	<i>P. halepensis</i>
Mespilos	<i>Mespilos cotoneaster</i>
Mespilos anthedon	<i>Crataegus tominalis</i>

Varietal Names

The nomenclatural characteristics of varietal names are only trivially different from those of specific names and will be discussed here only briefly. It has been mentioned that varietal taxa are distinctly rare in natural folk taxonomies. Such names refer exclusively to those taxa of major cultural importance such as plants and, rarely, animals that have been under intense domestication and that are represented by morphologically distinct forms.

Linguistically, varietal names are formed by the addition of an attributive to the specific name. For example, in Tzeltal, beans are divided into several specific classes, one or two of which are further partitioned into varietals. Thus, the specific name for the common bean, *shlumil chenek*' (*Phaseolus vulgaris*), is further divided into the two color varieties, *tsahal shlumil chenek*' 'red common bean' and *ihk'al shlumil chenek*' 'black common bean.'

Shortening of the full varietal name is, as might be expected, common in actual speech. One can often hear of *tsahal shlumil* and *ihk'al shlumil* in actual conversation, where the generic appellation has been dropped.

Nomenclatural Properties of the Unique Beginner

Typically, the most inclusive taxon in a folk taxonomy, the unique beginner, is not labeled. This is not to say that the domain of 'plant' or 'animal' is not recognized conceptually, of course, and various descriptive devices can be utilized to refer to these broad classes. In Tzeltal, the domain of plants is referred to as those things "that grow from the earth but do not move," contrasting with the domain of animals, a class of beings which "move by their own power." In many American Indian languages, the contrasting kingdoms are indicated grammatically by affixes which occur with names indicating 'animalness' or 'plantness.'

If the unique beginner is named, it is often the case that the term employed is polysemous, or at least partially so, with some life form class. In Aguaruna Jívaro, the term for 'tree' is *númi* and the domain for plants as a whole is designated by the expression *númi áidau*, literally, 'all (classes) of trees.'

Even in many modern languages, the term 'plant' may be seen to have two meanings. In Spanish, *planta* can be used to refer to the major division as a whole but its central meaning is 'herbaceous plant.' Something of this usage can still be found in English, especially in the speech of botanically naive individuals, where the primary meaning of *plant* is 'small, herbaceous, leafy thing,' excluding trees and shrubs.

Sometimes, the name for the most inclusive taxon may be a compound of two or more life form names. There is some evidence that in ancient Sumerian, the notion of 'plant' was indicated by a compound expression including the terms for 'tree,' 'grass,' and 'vegetable.' And it is well known that in Latin the terms 'tree' and 'herb' were commonly joined (*arbor et herba*) to designate the more general concept. The linguist Ullmann has noted that the term *plant*, in folk botany, at least, is quite recent indeed.

According to a recent inquiry, the modern meaning of 'plant' is first found in Albertus Magnus in the 13th century, whereas the French *plante* did not acquire this wider sense until 300 years later (28, p. 181).

Finally, it should be noted that in modern folk English systematics, no single common expression can be found for both biological kingdoms united. The expression *living things* is, at best, a bit stilted and may be prevalent only in the speech of those with some biological sophistication. The more common, but nonetheless fairly educated label, *plants and animals*, is a linguistic compound.

CORRESPONDENCE OF FOLK AND SCIENTIFIC CLASSIFICATION

I have attempted to point out several formal characteristics of folk systematics which appear to be widespread in actually occurring folk biological systems throughout the world. I believe many of these features of classification and nomenclature can be found in modern western systematics, which is, at least partially, a development of folk systematics.

But aside from these formal structural correspondences, can one also observe substantive correspondences between folk and scientific systems of classification? If such substantive correspondences exist, they might reveal aspects of the natural world which are in some sense 'natural' and which are apparently perceived as the same by persistent observers of nature everywhere.

Some field biologists have noted a rather close correspondence between scientifically recognized species and the linguistic designations given these groups by preliterate peoples (16). Conservative systematists have interpreted these findings, sparse as they are, as support for their views concerning the "reality of species."

Many anthropologists, whose traditional bias is to see the total relativity of man's variant classifications of reality, have generally been hesitant to accept such findings, which suggest some kind of universal ordering of the natural world. Some population biologists, for quite different reasons of course, have also tended to treat lightly or ignore evidence in favor of the objective nature of species—because they regard species as artificial units. My colleagues and I, in an earlier paper (7), have presented arguments in favor of the "relativist" view. Since the publication of that report more data have been made available, and it now appears that this position must be seriously reconsidered. There is at present a growing body of evidence that suggests that the fundamental taxa recognized in folk systematics correspond fairly closely with scientifically known species.

Units of Comparison

One of the difficulties in any comparison concerns the units of analysis to be considered. In the case of western systematics, the selection of the basic unit is straight forward—it must be the species. In folk systematics, it now appears useful to focus on the folk genus as the primary unit. The folk genus, it will be recalled,

is the smallest linguistically recognized class of organisms that is formed, as the folk zoologist Bulmer has succinctly stated, "... by multiple distinctions of appearance, habitat, and behaviour" (13, p. 335). These two units, then, the scientific species and the folk genus, will be those selected as the basic taxa to be examined in any comparison of the folk and scientific systems of classification.¹

Assuming that a detailed folk systematic study of some biological domain has been completed, that all of the folk genera have been discovered, and that their corresponding scientific species have been determined, one can recognize at least three logical types of correspondence between the two systems. These three types of correspondence will be referred to as one-to-one correspondence, over-differentiation, and under-differentiation.

The first type of mapping, one-to-one correspondence, can be observed when a single folk generic taxon refers to one and only one scientific species. The common willow *tok'oy* in Tzeltal folk botany would be in one-to-one correspondence in that it maps perfectly onto the single botanical species *Salix bonplandiana*.

Over-differentiation can be observed when two or more folk generic taxa refer to a single scientific species. As will be seen below, this type of mapping has a quite low occurrence in Tzeltal and I predict it will be rare in other folk taxonomies as well. An example would be the three Tzeltal generics, *bohch*, *tsu*, and *ch'ahko*, all of which denote the various shape varieties of the common bottle gourd *Lagenaria siceraria*.

Under-differentiation can be divided into two easily recognized types. Type 1 under-differentiation occurs when a single folk generic taxon refers to two or more scientific species of the same genus. The Tzeltal generic *ch'ilwet* would exemplify this type of mapping as it refers to at least five species of the genus *Lantana*.

Type 2 under-differentiation is recognized when a single folk generic refers to two or more species of two or more scientific genera. This case can be exemplified by the Tzeltal generic *tah* which refers to several species of *Pinus* as well as to at least one species of *Abies*.

Before proceeding further, it should be pointed out that the inventory of biological species utilized in any comparison are those—and only those—species which occur in the geographic area of the society being studied. For example, one may observe that a particular folk generic such as *oak* refers to one or more of the species of *Quercus* in the area inhabited by the society under study. In the absolute sense, of course, all folk systems are obviously under-differentiated when the totality of all western systematic knowledge is considered. Such an observation is trivial, however, if one is concerned with evaluating the classificatory treatment of those species for which a particular society has first-hand knowledge.

Furthermore, it is obvious that one must restrict one's comparison to those species of organisms which, because of their size, behavior, and significance, are readily

¹A failure to recognize this important fact led to the conclusions published in Berlin, Breedlove & Raven in 1966 (7). Here, the units of comparison selected from the folk system of classification were all *terminal* taxa, regardless of ethnobiological rank, leading to the inclusion of folk generics, specifics, and varieties.

observable to the primitive natural historian. It should not be surprising if many algae and fungi are omitted from the classificatory structures of preliterate peoples, nor, for that matter, species of organisms which can be distinguished only on the basis of characters apparent with the aid of a 10X hand lens.

The materials that my colleagues and I have collected on Tzeltal folk botany, and those of Eugene Hunn on Tzeltal folk zoology (23), are the only data available, to my knowledge, where the conventions of one-to-one mapping, under-, and over-differentiation have been used in measuring the correspondence of scientific and folk taxonomies. Other research now in progress, however, will shortly be available from another society and the early findings appear to support those from Tzeltal (5). Since the Tzeltal results have been reported in greater detail elsewhere (10), I will only summarize them here.

After long-term field work, we are confident in recognizing 471 widely known generic taxa in Tzeltal folk botany. The distribution of these 471 generic forms in terms of the conventions of one-to-one correspondence, under-differentiation, and over-differentiation can be seen in Table 1.

Table 1 Correspondence of Tzeltal generic taxa with botanical species in the area (which are named in Tzeltal)

One-to-one correspondence	291
Under-differentiation, type 1	98
Under-differentiation, type 2	65
Over-differentiation	17
	$N = 471$

Table 1 reveals that a major portion of Tzeltal generics map in a one-to-one fashion onto botanical species. In our inventory of 471 generic taxa, 291, or approximately 61%, show this type of correspondence.

Only 17 generic taxa, or 3% of the inventory, are over-differentiated. In most cases, the plants involved here are important cultivated forms which show rather marked morphological differences that partially explain the occurrence of two or more generic folk names for members of the same botanical species.

While some 36% of Tzeltal generic taxa are under-differentiated, given our earlier stated conventions, it is of interest to observe that more than 2/3 of these taxa are polytypic, i.e. include folk specifics. In all such cases, the folk species refer to single botanical species as well.

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of the relationships of folk and scientific systematics, some of which I am sure they will find questionable if not outlandish. I am also in major debt to Paul Kay, who has provided the most revealing treatment of the formal structure of folk taxonomies yet published, and to William Geoghegan for opportunities to discuss the nature of primitive classification and its implications for broader cognitive studies. In addition to Kay's work on taxonomy, Harold C. Conklin's early research on folk botany and Ralph Bulmer's recent studies in folk zoology have been most influential in the development of my views on folk systematics to the present. Finally, I am grateful to Eugene S. Hunn who, by example, has led me to appreciate more fully what it is to be a "natural historian."

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