
Mixtepec Zapotec Ethnobiological Classification: A Preliminary Sketch and Theoretical Commentary

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Dedicated to Donato Acuca Vázquez, 1969-98, promising Mexican ethnobiologist and esteemed colleague.

Abstract: Despite 470 years of contact with Spanish-speaking colonial powers, members of the Zapotec-speaking community of San Juan Mixtepec in the Sierra de Miahuatlán, Oaxaca, Mexico, have conserved largely intact an extensive body of knowledge about their natural environment. We have recorded to date 868 named plant taxa (of which 520 are “folk generics”) and 443 of animals (of which 256 are “folk generics”). Eighteen percent of generic plant name elements are Spanish loans, which compares favourably with other conservative systems of traditional biological knowledge in southern Mexico. Mixtepec Zapotec animal classification appears to be relatively less developed than the botanical. We describe the Mixtepec Zapotec classification of oaks (*Quercus* spp., Fagaceae) to illustrate how precise this classification may be. Mixtepec Zapotec botanical life-form names are routinely prefixed to the names for the generic and specific taxa they include.

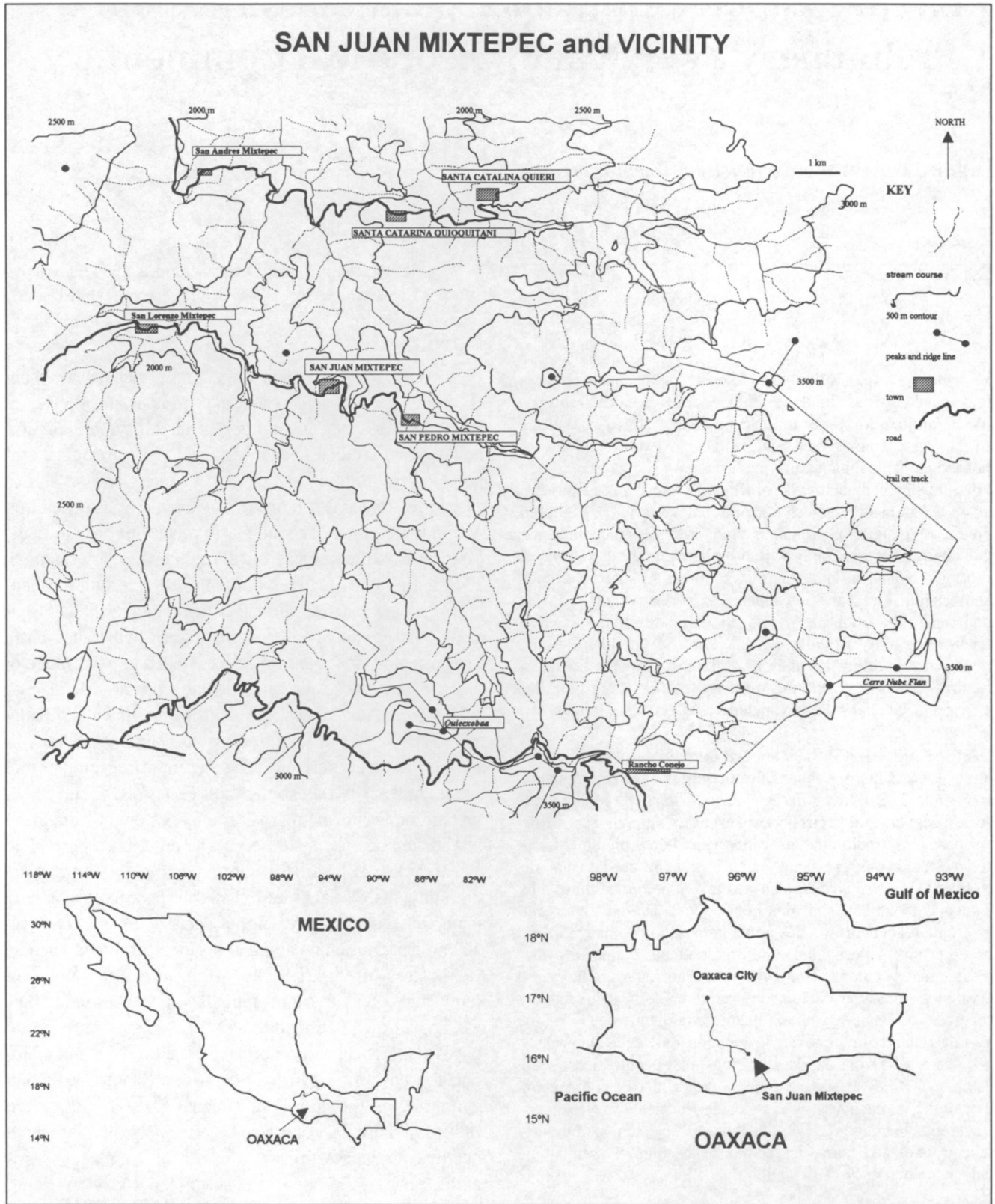
Résumé: En dépit de 470 années de rapports avec les pouvoirs coloniaux hispanophones, les membres de la communauté zapotèque de San Juan Mixtepec dans la Sierra de Miahuatlán, Oaxaca, Mexique, ont réussi à conserver une grande somme de connaissances traditionnelles concernant l'environnement naturel. Nous avons consigné jusqu'à présent 868 taxons de plantes nommés (dont 520 sont des taxons génériques) et 443 d'animaux (dont 256 sont des génériques). Dix-huit pourcent des éléments constitutifs des noms génériques de plantes sont des emprunts à l'espagnol, une situation qui supporte avantageusement la comparaison avec celle d'autres systèmes conservateurs de savoir biologique traditionnel dans le sud du Mexique. La classification mixtepèque zapotèque des animaux apparaît relativement moins développée que celle des végétaux. Nous décrivons la classification mixtepèque zapotèque des chênes (*Quercus* spp., Fagacées) pour illustrer la précision du système vernaculaire. Les noms des formes du vivant dans le système botanique zapotèque mixtepèque sont communément préfixés aux noms des taxons génériques et spécifiques qu'ils incluent.

Introduction

Berlin's bold statement of general principles of ethnobiological classification and nomenclature (Berlin, 1992) defines a baseline of information all systematic ethnobiological studies should establish. An adequate ethnobiological account should list all plant and/or animal categories that merit more than idiosyncratic recognition within the community studied. In most, but not all cases, categories so recognized will be consistently named. This initial step involves defining the referential meanings of all plant and/or animal names used in the community. A large majority of such names will label basic categories or “folk generic taxa.” A certain percentage of these basic categories will include consistently named subdivisions, or “folk specific taxa.” Finally, a few broadly inclusive “life-form taxa” may also be named. Thus, in addition to characterizing the referential meanings of all these names, the taxonomic rank (e.g., folk generic, folk specific or life-form) of each named category should be established as far as inherent ambiguities allow. The researcher may then (or more commonly in practice, simultaneously) elaborate for all folk taxa biological data about the scientific referents of each, such as phenological and distributional data, and sociocultural data such as the pattern of distribution within the community of knowledge of plants and animals, their uses and their ecological interrelationships.

We sketch here preliminary results of an ethnobiological study in San Juan Mixtepec, a Zapotec-speaking community in the district of Miahuatlán, state of Oaxaca, Mexico (Figure 1). Zapotecan is a language family which includes an indeterminate number of languages (estimates range from four to 54) spoken today by some 400 000 people in over 250 distinct communities, the vast majority in the state of Oaxaca (INEGI, 1995). Approximately 500 BC, ancestral Zapotecan speakers

Figure 1
Map of the Study Site, Oaxaca, Mexico



founded Monte Albán, the most impressive archaeological site between the Valley of Mexico and the Mayan region. Zapotecan is a major branch of the Otomanguean phylum of Mesoamerican languages, which also includes Mixtecan, Chinantecan, Popolucan and Otopamean divisions. Each of these branches is judged to have diverged from a common ancestral language approximately 6 400 years ago (Hopkins, 1984). The Zapotec languages are thought to have begun to diverge about 1 700 years ago (Rendón, 1995: 123). We will refer to the form of Zapotec spoken in San Juan Mixtepec as Mixtepec Zapotec (Reeck, 1991). It is readily understood in at least four adjacent communities but is considered barely intelligible at best elsewhere in the Sierra de Miahuatlán.

A number of ethnobiological studies have been published for Oaxaca but virtually nothing for Zapotec, despite the importance of Zapotecan peoples in the development of Mesoamerican civilization. Other than lists of names printed as dictionary supplements (Nellis and Nellis, 1983; Stubblefield and Stubblefield, 1991), the only study of contemporary Zapotec ethnobiology to date is Messer's Mitla ethnobotany (1978). Katz' ethnobiological research in a Mixteca Alta community in western Oaxaca is well documented (Casas et al., 1987; Katz, 1990, 1992, 1993a, 1993b) and we await the results of de Ávila's Mixtec ethnobiological studies (Ávila B. and Martin, 1990). Martin's 1996 dissertation sets a high standard in documenting two non-Zapotec systems of the Sierra Norte of Oaxaca, that of the Chinantecs of Comaltepec and the Mixe of Totontepec (Martin 1993, 1996). An Amuzgo ethnobotany was begun in the 1970s, but few results were published (Hopkins, 1987). Cuevas Suárez's Amuzgo research (1985, 1987) is the only comprehensive ethnozoological study of an indigenous Oaxacan community extant. Marcus (Flannery and Marcus, 1983) attempts a reconstruction of classic period Zapotec ethnobiology.

San Juan Mixtepec is located on the north slope of the Sierra de Miahuatlán, in the rainshadow of the range, near the headwaters of the Tehuántepec River. The town is at 2 050 m (6 850 feet), with a municipal territory of 57 km² and a 1990 population of 897 (INEGI, 1995). The communal lands extend below the town to approximately 1 650 m through a mosaic of milpa plots in use or fallow, patches of oak woodland,¹ chaparral dominated by manzanita (*Arctostaphylos pungens* H.B.K., Ericaceae) and disturbed remnants of tropical deciduous forest. Above the town oak woodland gives way to a mixed pine-oak forest.² Pine-oak forest extends from 2 300 m to 3 000 m, pine-fir stands occur on humid sites at 2 700-3 400 m, while a forest of pure *Pinus rudis* Endl. dominates above 3 000 m, covering even the highest

Plate 1



Women of the Cruz Hernández family en route to their *milpa*. The plaza of San Juan Mixtepec is visible below them.

Plate 2



Lilia and Griselda Sánchez Cruz play house in the garden beside their home in San Juan Mixtepec. Children learn about plants from a very early age as they accompany their parents and elder siblings at daily chores.

ridges above 3 700 m. These forests are broken here and there by limestone cliffs, natural meadows on saturated soils and scattered high-elevation "ranchos" devoted to fruit tree cultivation (e.g., *Crataegus pubescens* [H.B.K.] Steud.), cold adapted corn (*Zea mays* L., Poaceae), faba beans (*Vicia faba* L., Fabaceae), potatoes (*Solanum tuberosum* L., Solanaceae), *chilacayote* (*Cucurbita ficifolia* Bouché) and oregano (*Origanum vulgare* L., Lamiaceae). To date San Juan's forests have seen little commercial logging due to widespread community opposition. Magnificent pristine forests are found within an hour's walk above the town.

Procedures

This report is based on work in San Juan between July 1996 and August 1997. We first presented the communal authorities a statement of our goals and requested permission to pursue the study. A community meeting was held in August 1996, and our work authorized by consensus. As a condition, we are to assist the community in locating experts in arboriculture, agriculture and forest management to give workshops and provide expert advice to community members. The municipal president, C. Hermilo Silva, put it this way: "We will share our traditional knowledge with you if you will share your modern technical knowledge with us." We are collecting a comprehensive set of plant vouchers to document the local vascular plant flora. To date we have collected over 1 600 plant specimens in five sets, which have been deposited at Mexican herbaria (SERBO and CIIDIR in Oaxaca, MEXU at UNAM in Mexico City). We have been assisted in these collections to date by paid local assistants. We have started a less comprehensive but representative set of collections of mosses, lichens, fungi and invertebrate animals. We are documenting the local avifauna—171 species to date—by a program of mist-netting and of recording birds seen and/or heard during exploratory hikes throughout the community. We record Zapotec names from our local guides and assistants and as much cultural and ecological data as we can in conjunction with each observation. Amphibians, snakes and wild mammals are scarce or at least rarely seen. These we are attempting to document using drawings, photographs and descriptions. Fish are virtually nonexistent within the boundaries of the *municipio* but are known to local residents from travels to the Isthmus of Tehuántepec and the coast.

The accurate transcription of the Mixtepec Zapotec names has proved a severe challenge. We rely heavily on a trilingual dictionary of Mixtepec Zapotec by Roger Reeck (1991) based on his residence of nearly a decade in San Juan during the late 1970s. Reeck recognizes four contrastive tones (high, low, rising and falling), simple and glottalized vowels and series of lenis and fortis consonants. As most plant and many animal names are productive compounds, we have been able to compare our provisional transcriptions with forms in Reeck's dictionary. Whenever our transcriptions are at odds with Reeck's, we defer to his expert judgment. For verification, we have submitted our corpus of terms to two local native speakers who were trained by Reeck to write their language using his phonemic orthography.³ In this way we may be confident in the accuracy of our inventory of local names.⁴

Preliminary Results

Though many plants and invertebrates remain to be positively identified and we have yet to complete our first annual cycle in the village, we may draw a few preliminary conclusions. (1) Mixtepec Zapotec knowledge of the local environment is largely intact 470 years after the Conquest. This is attested by the fact that most Mixtepecanos over 10 years of age recognize and can name in Zapotec nearly all plants in their local environment. Their knowledge of animals is somewhat less well developed. (2) The Mixtepec Zapotec system of biological classification and nomenclature supports Berlin's general principles (1992) in most respects, but exhibits peculiarities that may require theoretical refinements at life-form, generic and specific ranks. This summary focuses on two comparisons: (1) the precision of Mixtepec Zapotec biological classification as compared with that of Western biosystematics, and (2) the properties of Mixtepec Zapotec biological classification as a taxonomic system compared with Berlin's general principles (1992).

Mixtepec Zapotec Ethnobiology Is Intact

At least 1 200 plant and animal names are currently in use in the community. Young children are actively learning this vocabulary as they accompany their parents to work their fields and tend their animals. While these names employ a number of Spanish-derived terms (for example, 18 percent of all morphological elements in generic plant names), in most cases loans are limited to introduced plants and animals and are modified phonologically to approximate Zapotec norms. Here are a few examples that illustrate the variety of such names:

Yàg-làdz "tree + rash?" (*Pseudosmodium multifolium* Rose, Anacardiaceae), a tree related to poison sumac that I had the misfortune to examine too closely before my guide could warn me off. This is a typical Mixtepec Zapotec generic plant name. It is composed of the life-form name followed by a qualifier. The fact that most trees and shrubs bear names of the form *yàg-X* might lead one to conclude that this is what Berlin designates a "secondary lexeme" (1992: 34) and that *yàg-làdz* must therefore be a "folk specific" taxon. However, that conclusion is not warranted, since *yàg* "tree/shrub" is a life-form; thus *yàg-làdz* must be a "folk generic."

Guiè-còb-làs "little marigold" (*Tagetes lunulata* Ort., Asteraceae), one of six named folk specifics included in the folk generic *guiè-còb*, the prototype of which is the famed Mexican marigold (*Tagetes erecta* L., Asteraceae), known in Mexican Spanish as *zempasuchil* or *flor de muerto*, a strong-scented ornamental. This is a wild spe-

cies that flowers in abundance about the time of the celebration of Todos Santos (November 2). As in the previous example, Mixtepec Zapotec generic taxa bear “binomial names” of the form “LIFE-FORM + X,” with *guiè* “flower” the life-form in this case. Thus, folk specific names are typically trinomials of the form LIFE-FORM + X + Y.

Blåg-wé “leaf + ?” (*Wigandia urens* Ruiz & Pav., Hydrophyllaceae), a ubiquitous, tall, weedy shrub or small tree with huge leaves covered with irritating hairs. The leaves are used to trap fleas, and a choice variety of edible maguëy worm is dug out from among its roots at certain seasons. The large size and utility of the leaves is perhaps responsible for the fact that this shrub is assigned to the life-form *blåg* “leaf” rather than to *yàg* “tree/shrub.”

Ncuàan-dzèb-guèl “medicine [for] night fright” (*Anagallis arvensis* f. *arvensis* L. and *A. arvensis* f. *azurea* Hyl., Primulaceae), delicate weeds of European origin used to treat nightmares and other like symptoms of “night fright.” The blue-flowered form *azurea* is considered the male (*zhëy*); the salmon-flowered *arvensis*, the female (*zhüs*). The life-form in this case is *ncuàan* “medicine,” a utility-based category. This deviates from the expectations of Berlin’s taxonomic theory (1992: 24, 33).

Zhòb, corn, a staple crop that comes in several local varieties, including *zhòb-ngäs* “black corn,” which is adapted to higher elevations and considered a local specialty. There is an elaborate vocabulary for parts and stages of corn, and *guièl* “milpa” or “corn field” is the etymological base for a range of local philosophical concepts (Reeck, 1991). *Zhòb* is an “unaffiliated generic” taxon (Berlin, 1992: 23-24), which accords with its status as the primary staple crop.

Mdzin is deer (*Odocoileus virginianus*) while *mzìn* is mouse, a subtle phonological contrast typical of Mixtepec Zapotec. As is true of the majority of folk generic animal names, these begin with the prefix *m-*, which likely is a contraction of *mâ* “animal in general.”

Màecw-guiùu “river dog” is the blue mockingbird (*Melanotis caerulescens*). This striking bird skulks and is thus difficult to see, but is highly vocal and a wonderful mimic. Mixtepecanos tell stories of how it deceives people. *Màecw* means “dog” and *guiùu* means “river.” To account for the name, consultants suggest that it is like a dog by virtue of its intelligence and is common near water courses (but not limited to such situations).

Màecw-xiil “cotton dog,” sheep, an introduced animal with an authentic Zapotec name, a usage which dates to the 16th century (Córdova, 1942 [1578]). *Ngòn* “cow, bull” and *ngüts* “pig” (cf. *ngüts-guix* “bush pig” or pec-

cary) are additional examples of introduced animals with native names.

Chùurr, the white-throated towhee (*Pipilo albicollis*), constantly repeats its name about town. Onomatopoeic names usually do not begin with *m-*.

Cuìl, the scrub-jay (*Aphelocoma coerulescens*), is another familiar bird about town; *cuìl-guì* “mountain scrub-jay” is the Steller’s jay (*Cyanocitta stelleri*), common in the pine forests above town.

Dzìng is any of a dozen species of hummingbirds (Trochilidae). The name is clearly onomatopoeic. They may be swallowed whole to treat a variety of “fright.” *Guiè-dzìng* “flower [of] hummingbird” refers to a variety of red, tubular flowers (e.g., *Penstemon* spp., Scrophulariaceae; *Salvia* spp., Lamiaceae) on which hummingbirds feed.

Mguìn-ngäs “bird + black” is the great-tailed grackle (*Quiscalus mexicanus*), ubiquitous town bird. This example shows that not all bird names are onomatopoeic. In this case colour is the pre-eminent feature noted.

Mguìn-nìs “bird + water” is the dipper or water ouzel (*Cinclus mexicanus*), an uncommon bird in Mexico, found only in the clearest mountain streams. In this case a characteristic habitat is singled out in the name.

Mèel “snake” and *mèl* “fish,” constitute a minimal-pair illustrating the simple versus glottalized vowel contrast. One small fish has penetrated the lower stream courses of the community. Our data on snakes is still inadequately analyzed, but there appear to be no more than 10 kinds recognized. Because of the small number of types of snakes recognized, I consider *mèel* to be a folk generic category rather than a life-form (cf. Berlin, 1992: 161ff.). *Mèel-yù* “snake + earth” is the earthworm, but this usage seems clearly metaphorical.

Mrè is “ant in general,” not including *miòb*, the “leaf-cutter ant” (*Atta* spp.).

Mtsàn includes various edible cutworms, including *mtsàn-blåg-wé* “cutworm [of] *Wigandia urens*,” which refers to the host plant, which is noted above.

Mlòol is “tadpole,” but also may refer to an odd variety of aquatic beetles (Coleoptera) and bugs (Hemiptera).

Má-nàaeg “animal + heat” is the cicada. In this case, the kingdom name *mâ* “animal” is prefixed to the name without abbreviation.

Ngurägw, “lizard,” comes in as many varieties as “snake.” One such is *ngurägw-bäy* “lizard + *rebozo*,” the collared spiny lizard (*Sceloporus grammicus?*), which looks as if it is wearing a *rebozo*. *Mdzid*, the horned lizard (*Phrynosoma modestum?*) is not included in *ngurägw*. Some say you should put *mdzid* on your head to suck out the heat of a fever. *Ngu-* is a common animal name prefix

of uncertain derivation. It functions much as does the prefix *m-*.

Ngudzii is "spider in general," of which there are some 20 kinds named, including *ngudzii-zhàb* "spider + husk," the tarantula.

Additional examples of animal names that begin with *ngu-* include various types of grasshoppers, several of which are avidly harvested for food. These include *ngusòc* (*Sphenarium* sp.?), *ngulòdz* (*Schistocerca* sp.?) and *nguzhànch* (Acrididae spp.).

Bùrr, donkey, is an obvious loan from Spanish "burro." Their morning chorus defines village life. *Chív*, goat, likewise is from Spanish "chivo." Note that these Spanish loans, like the onomatopoeic names, do not begin with *m-*.

Càrpintêr, woodpecker, is another Spanish loan (< *carpintero*). Native terms for the several local species of woodpecker have been lost. Only the flicker (*Colaptes auratus*) among the woodpeckers retains its onomatopoeic Zapotec name, *pliêgw*.

Pàlòmít, "butterfly/moth," now bears the Spanish name for "moth," *palomita*, though an indigenous term (*mèe-guìd*) is still in use in neighbouring San Pedro Mixtepec. Dozens of ad-hoc varietal names for kinds of butterflies and moths may be had for the asking, but most are purely descriptive.

Measuring What People Know about Their Biological Environment

It is sometimes assumed that "primitive" people lack scientific knowledge of their local environment, or, at the opposite extreme, that their intimacy with nature is such that they name every living thing. The truth is somewhere between these two extremes. San Juan Mixtepec consultants are puzzled and appear disturbed when they encounter a plant or animal in their home territory that they do not recognize and cannot name. Our usual procedure in the village is to take hikes with local guides, sampling habitats in season, collecting plants and insects en route and noting whatever bird or lizard might cross our path. During these rounds we ask monotonously "*zhàw làe mìn ríi?*" "What is the name of this?" Our guides are rarely at a loss for a name. However, on occasion they were stumped. Once we inquired about a small tree not far above the village. After studying it for a while, our guide remarked that he did not recognize it and that therefore someone must have planted it. He implied that if he did not recognize it, it must not be native to the area. The other instance involved a bizarre insect we spotted on the trunk of an oak (which proved to be a homopteran of the family Fulgoridae), which our

guide had never seen before. We consulted an older man who, after some reflection, recalled having seen it once or twice before and that it was called *rsiòog-lò*, which refers to a belief that it can cause blindness. In short, Mixtepecano adults expect to recognize every living thing they encounter in their local environment and are disturbed if they do not. However, very small plants and tiny invertebrates are often dismissed in very general terms, e.g., as "small flower" or "small black animal."

The great majority of plant and animal names are presumed to name "species" (though there is no native term for this concept per se), that is, categories of organisms that faithfully reproduce themselves. Our consultants are quite sensitive to variation within their named categories and are quick to note cases where the same name applies to "*chòp clàs*" "two classes," that is, to distinct covert categories or to polysemously named categories. They nevertheless name several "residual categories" which include a wide variety of small and/or otherwise insignificant organisms, for example, *guìe-nquìts* "white flower" or *má-lò-guìzh* "plant bug." There is nothing unique about such names other than the range of organisms to which they apply, as exemplary generics may have names with similar descriptive force.

In sum, they do not recognize or name "every living thing in their local environment" with distinct folk generic names. To say more precisely how closely they approximate the ideal of "naming every living thing," we need to measure the degree to which an ethnobiological system approximates the detail of the Western scientific system when applied to the same range of organisms. One such measure is the "Scientific Species Recognition Ratio" (SSRR) (Hunn, 1998). Quite simply, one divides the number of folk taxa used to name a certain range of flora or fauna by the number of scientific species of that range known or believed to occur in the local area. Such calculations may involve folk taxa at various ranks.

Table 1 compares total taxa by rank and domain for Tenejapa Tzeltal (Berlin, Breedlove and Raven, 1974: 31, 99; Hunn, 1977: 79), Comaltepec Chinantec (Martin, 1996) and Mixtepec Zapotec. SSRRs for Mixtepec Zapotec, Tenejapa Tzeltal and Comaltepec Chinantec plants, birds and mammals are reported in Table 2. Except in the case of Tzeltal plants these SSRRs are estimated from biogeographic references (Binford, 1989; Hall and Kelson, 1959; Howell and Webb, 1995). Only Berlin's Tzeltal plant figure is definitive, as it is based on Breedlove's comprehensive plant collections. Surprisingly, our estimated SSRR for Mixtepec Zapotec plants exceeds those for Tzeltal and Chinantec. This reflects our relatively low estimate of the number of plant spe-

cies in the Mixtepec zone. However, we believe our estimate is reasonable given the relative sizes of the three communities and the ranges of elevations and habitats they encompass.

Table 1
Comparison of Numbers of Taxa at Various Ranks

	Generic	Specific	Varietal	Total
<i>Plants</i>				
Mixtepec Zapotec	520	344	4	868
Tenejapa Tzeltal ^a	471	237	7	715
Comaltepec Chinantec ^b	388	307	6	701
<i>Animals</i>				
Mixtepec Zapotec	256	183	4	443
Tenejapa Tzeltal ^a	335	168	0	503
Comaltepec Chinantec ^b	—	—	—	—

a Berlin, Breedlove and Raven, 1974; Hunn, 1977.

b Martin, 1996.

Table 2
Comparison of Scientific Species Recognition Ratios

	Total scientific species	Total terminal taxa	SSRR (%)
<i>Plants</i>			
Mixtepec Zapotec	1 200	763	63
Tenejapa Tzeltal ^a	1 690	638	38
Comaltepec Chinantec ^b	1 200-1 800	701	39-54
<i>Wild birds</i>			
Mixtepec Zapotec	233	108	46
Tenejapa Tzeltal ^a	413	151	37
Comaltepec Chinantec ^b	—	—	—
<i>Wild mammals</i>			
Mixtepec Zapotec	103	29	28
Tenejapa Tzeltal ^a	126	66	52
Comaltepec Chinantec ^b	—	—	—

a Berlin, Breedlove and Raven, 1974; Hunn, 1977.

b Martin, 1996.

Both Zapotec and Tzeltal SSRRs for birds seem low. Though Tenejapanecos recognize substantially more kinds of birds than Mixtepecanos, they also have a considerably greater diversity to choose from. The relatively low SSRR for birds might be explained in part by virtue of the fact that most of the 171 bird species we have observed so far⁵ at San Juan are small and in constant motion, viz., the 13 hummingbird species, 16 flycatchers and 19 wood-warblers on our list. Many are winter visitors (36 species) and thus rarely sing, offering the observer only a confusing variety of “chip” notes. Most small flycatchers and warblers are named rather indis-

criminally, e.g., as *wit*, an onomatopoeic Zapotec name subject to a range of interpretations. The low SSRR for mammals in Mixtepec Zapotec is due primarily to the fact that small terrestrial mammals, such as shrews and mice (28 species likely) are “lumped” into just two generic taxa by the Mixtepecanos. Tenejapanecos have a considerably more elaborate classification of small mammals (Hunn, 1977: 207-215). Both groups lump all bats together as a single folk generic taxon.

The present total of 763 Mixtepec Zapotec terminal plant categories still falls short of the ideal of “naming every local species,” which we estimate number 1 200. The gap is attributable to the fact that Mixtepecanos more often underdifferentiate than overdifferentiate scientific species. Overdifferentiated categories are limited to a few staple cultivars such as corn, beans (*Phaseolus vulgaris* L.) and chilis (*Capsicum* spp.), for each of which we have so far recorded five to ten named varieties.

Underdifferentiation is far more extensive. Underdifferentiation takes several forms, among the most important of which are: (1) “pseudo-life-forms,” such as *guizh-crùz* “fern” and *guizh-dip* “grass-like plant,” each of which may account for 100 or more otherwise unnamed species; (2) *residual categories*, such as *guizh-làs* “slender herb” or *guiè-mòràd* “purple flower,” which may each include an assortment of species representing several plant families; and (3) *extended ranges*, which may encompass a number of species not otherwise specifically named. A species may be referred to as *zhin-X*, which is to say, “relative of X,” where X is the name of a particularly well-known plant category. For example, *zhin-x-còl-màecw-xiil* “relative of sheep’s-tail,” refers to several species of Indian paint-brush (*Castilleja* spp., Scrophulariaceae). The true *x-còl-màecw-xiil* “sheep’s-tail” is *Castilleja arvensis* Schlech. & Cham, which particularly resembles its namesake and thus serves as the prototype for the extended generic concept. I classify pseudo-life-forms and residual categories as folk generics, though they are clearly anomalous (cf. Berlin, 1992: 60ff.).

Mixtepec Zapotec Oaks

By these various means, Mixtepecanos reduce the botanical diversity they encounter to a manageable level, roughly on the order of 500 basic or folk generic categories (cf. Berlin, 1992: 96-101). Though Mixtepecanos eventually lose patience with naming local plants, they persevere to a far greater degree than the average urbanite. Just where their patience runs out is a fruitful question we are investigating. However, let us examine a region of “botanical space” that Mixtepecanos have mapped in exacting detail. San Juan is located in a belt of

oak woodland. It is not, therefore, surprising that they recognize a variety of oaks (*Quercus* spp., Fagaceae). Oak classification is not a simple matter, as there is extensive variation within oak species due to ecological factors and hybridization is common. Furthermore, central and southern Mexico is the epicentre of oak diversity in the Western Hemisphere (Nixon, 1993: 454).

Table 3
Mixtepec Zapotec Oaks and Allies

<i>yàg-lbis</i>	<i>Quercus laurina</i> Humb. & Bonpl., <i>Quercus acutifolia</i> Née
<i>yàg-pxù = yàg-pxù-nrùdz</i>	<i>Quercus glaucoides</i> Mart. & Gal.
<i>yàg-pxù-diè</i>	<i>Quercus obtusata</i> Humb. & Bonpl.?
<i>yàg-pxù-làs</i>	<i>Quercus</i> sp.
<i>yàg-rèdz</i>	<i>Quercus magnoliifolia</i> Née
<i>yàg-rèdz-bëy</i>	<i>Fraxinus uhdei</i> (Wenzig) Linglesheim, Oleaceae
<i>yàg-xtid = yàg-xtid-làs</i>	<i>Quercus castanea</i> Née
<i>yàg-xtid-diè =</i> <i>yàg-xtid-mbëe</i>	<i>Quercus obtusata</i>
<i>yàg-xtid-zèd</i>	<i>Myrica cerifera</i> L., Myricaceae
<i>yàg-zhòg</i>	<i>Quercus conzattii</i>
<i>yàg-zhòg-diè =</i> <i>yàg-zhòg-yèts</i>	<i>Quercus crassifolia</i> H. & B.

In San Juan five basic categories encompass the various oaks (as well as two additional species of other genera), though no single term is applied to oaks as a group (see Table 3). Nevertheless, preliminary sorting tasks demonstrate that a “family resemblance” among all oaks is recognized. The fact that a unique term *mgàg* “acorn” describes the fruits of just these species and no others is further evidence that the genus *Quercus* corresponds to a valid, if covert, category.⁶ The five folk generic oak taxa each includes two to three scientific species, with the scientific species generally distinguished at the folk specific level. We know of one exception to this 1:1 correspondence between terminal folk taxa and scientific oak species, the two species included in *yàg-lbis*. One is common in pine forests 500 m above the village (*Quercus laurina* Humb. & Bonpland), the other (*Q. acutifolia* Née) is of sporadic occurrence at or below the village. However, local people are aware that the two species are different, though they do not distinguish them by name.

The detail of the Mixtepec Zapotec oak classification serves some utilitarian functions, as certain of the oaks have specific uses. For example, the wood of *yàg-lbis* is preferred for making ploughshares and axe handles due to its durability and straight grain. However, we have not recorded specific patterns of use for each category of oak. It seems likely that they are so finely classified be-

cause of their ecological prominence and general utility. The Zapotec peoples of the highlands have long held this fascination for oaks, as is shown by consulting Fray Juan de Córdova’s 1578 Zapotec dictionary (1942 [1578]), where we also find five categories of oaks, as follows:

<i>enzina arbol</i> “oak tree”	<i>yàgapito</i>
<i>enzina arbol</i> “oak tree”	<i>yàgayóo</i>
<i>enzina arbol</i> “oak tree”	<i>yàgantça, yàgantta</i>
<i>roble arbol</i> “oak tree”	<i>yàgapixóhui</i>
<i>roble con agallas y hojas anchas</i> “oak with galls and wide leaves”	<i>yàgazàchi</i>

(In medieval Spanish *roble* and *encino* designated two types of European oaks, a distinction that did not correspond to patterns of oak diversity encountered in the New World.) It is not clear exactly how these five categories correspond to the contemporary Mixtepec taxa, but it is likely that a common ancient conceptual framework is involved.⁷

Mixtepecanos are transmitting this heritage of local environmental knowledge to the next generation, as we have observed that, in certain families at least, children as young as 10 years of age have an impressive command of plant names and can detail where they are found and how they are used. (We plan a systematic inventory during 1998 of the distribution of biological knowledge within the community.) We believe that this traditional heritage may survive so long as the local community retains effective control of its land and resource base and so long as the families of the community continue to use their lands to provide for their basic subsistence needs. Communities such as San Juan Mixtepec are in a delicate balance between population growth—which would exhaust their land if too many young people stay home—and population decline through emigration—which would demoralize the community if too many young people leave. The present balance is maintained in large part by a division of labour within families between those who stay to tend fields and animals (and to attend school) and those who live away for varying periods of time earning cash—mostly in urban centres within Oaxaca. Ironically, the global market that threatens to destroy so many rural subsistence-oriented communities like San Juan provides outside economic opportunities that may help to preserve the local community and its stewardship of communal lands by providing both an outlet for a growing rural population and cash income to enhance the quality of rural life.

As noted above, the Mixtepec Zapotec biological classification system supports Berlin's general principles in most respects, but exhibits peculiarities that may require theoretical refinements at life-form, generic and specific ranks. Berlin's (1992) general principles of folk biological classification and nomenclature state: (1) that all folk biological classification systems will consist of a set of several hundred consistently named categories (taxa) of plants and animals established with respect to perceptible attributes of morphology and behaviour, (2) that in addition a small number of covert categories similarly constituted may be demonstrated to exist, (3) that these taxa may be assigned to one of the following universal folk biological ranks: (a) *folk generics*, which constitute the core of a folk biological classification and which typically are named without direct reference to any more inclusive taxa to which they may belong; these categories characteristically number in the neighbourhood of the "magic number 500"; (b) *folk specifics and varieties*, which are subcategories of folk generics typically named by the generic name plus one or more modifiers, a naming pattern Berlin distinguishes as "secondary lexemes"; (c) *life-forms*, a small number of general categories that each include 10 to 200 or more generic taxa; (d) the *folk kingdom* or unique beginner, which encompasses all the categories of the plant or animal domains, a category that is rarely named; and (e) *intermediate* categories which bridge the gap between generics and life-forms.

The Mixtepec Zapotec botanical and zoological classification systems clearly include large sets of consistently named categories, the great majority established with respect to perceptible attributes of morphology and behaviour. There is evidence as well of a small number of covert categories of the same sort, as we have noted. The number of generic taxa, for plants at least, approaches the "magic number 500." Furthermore, these folk biological taxa may be set in hierarchical order as in a Western scientific taxonomy, as, for example, in the series in Table 4.

The middle term in each of the lists in Table 4 is a generic taxon, those on the left are life-forms or, in the case of *mâ*, the animal unique beginner. Those on the right are folk specifics. The animal generic and specific names seem to fit the normal expectations of Berlin's scheme. The generic names are relatively simple constructions that only occasionally include as part of the name the name of a superordinate taxon, and the specific names are composed of the inclusive generic name as "head" plus an obligatory specific modifier. However, many invertebrate names incorporate the kingdom name as a prefixed element, *mâ*. When we note that this may be abbreviated as *m-*, we see that a substantial majority of all animal generic names are compounds that incorporate the kingdom category name. This is most unusual.

The plant generic names are extraordinary. They look like they should be specific names, that is, they are mostly obligatory binomials, and thus indistinguishable by formal criteria from the "secondary lexemes" of Berlin's terminology (Berlin, Breedlove and Raven, 1974:

Table 4
Mixtepec Zapotec Taxonomic Hierarchy

Unique beginner/life-form	Folk generic	Folk specific
yàg "tree/shrub"	tree' yàg-pxù "glaucous-leaved oak"	yàg-pxù-làs "slender glaucous-leaved oak"
guièe "flower"	guièe-còb "zempasuchil"	guièe-còb-ngòn "planting zempasuchil"
guizh "herbaceous plant"	guizh-ncuàan-dzèb "fright medicinal herb"	guizh-ncuàan-dzèb-guièel "night fright medicinal herb"
dòb "maguey" or mëy "fungus"	dòb-guièdz "fibre maguey" dòb "maguey" mëy-yàg "tree fungus" mëy-yàg-guièr "pine tree fungus" ^a	dòb-guièdz "fibre maguey"
mguín "bird"	cuil "jay"	cuil-gui "Steller's jay"
mâ "animal" [kingdom]	ngurägw "lizard"	ngurägw-zhòy "spiny-lizard sp."
mâ "animal" [kingdom]	ngudzii "spider"	ngudzii-zhàb "tarantula"
mâ "animal" [kingdom]	mâ-dòozhèr "scissor animal," i.e., earwig	mâ-dòozhèr-nròob "large earwig"

a *mëy-yàg-guièr* "pine tree fungus" is *not* a kind of *mëy-yàg* "tree fungus," so it is not a folk specific but rather a folk generic in its own right.

32ff.). However, the “head” in the case of these Mixtepec Zapotec plant names is the superordinate life-form name rather than the name of the superordinate generic taxon. And since most generic names are binomial, specific names (as those on the far right in Table 4) are mostly trinomials.

The fact that there are nearly 100 kinds each of “trees,” “flowers” and “herbaceous plants” all named with binomials of the form LIFE-FORM-X supports the inference that such taxa should be considered folk generics despite the fact that, strictly speaking, they are labeled with “secondary lexemes.” Furthermore, most such names denote perceptibly well-defined and phylogenetically meaningful biological categories, further evidence that they label folk generic concepts.

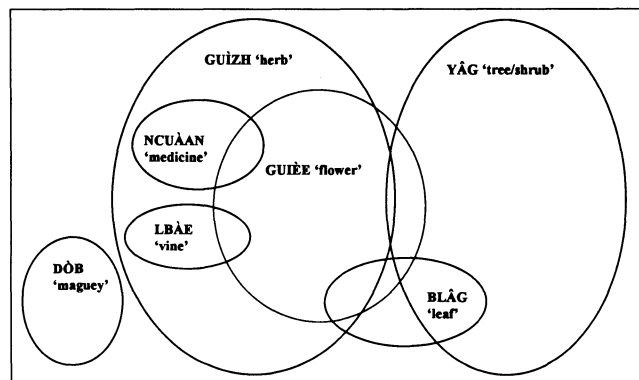
We are left, however, with an ambiguity. Not all plants are included in the life-forms *yâg* “tree/shrub,” *guizh* “herbaceous plant,” *guiè* “flower,” *blâg* “leaf,” *ncuàan* “medicinal plant” or *lbâe* “vine.” These “unaffiliated taxa” exhibit varying degrees of internal complexity and biological range. Two key examples are *dòb* “maguey” and *bziàa* “cultivated bean.” Berlin is not explicit about how to decide in such cases whether to treat them as unaffiliated generic taxa or as small life-forms. We show both alternatives for *dòb* “maguey” in Table 4. Three criteria are implicit, however: (1) generics include fewer subcategories than life-forms; (2) generics encompass a narrower biological range than life-forms; and (3) polytypic generics immediately include a set of binomially named specific taxa. However, Mixtepec Zapotec leaves us without this last nomenclatural clue, and the first two criteria are quantities that vary continuously and not necessarily in concert. So, are *dòb* “maguey” and *bziàa* “cultivated bean” life-forms or generics? Provisionally, we treat *dòb* as a life-form and *bziàa* as a generic. *Bziàa* is as diverse internally as *dòb*, but *dòb* encompasses a somewhat greater diversity of biological taxa. But, if we define folk biological ranks in terms of Western biological scope, we abandon the pretense that our comparisons of folk and Western scientific classification are independent.

Overlapping Life-Forms

Taxonomic theory implies that taxa will belong to one and only one rank and that all taxa of a given rank will contrast.⁸ Thus, life-forms should not “stack” or overlap. However, Mixtepec Zapotec life-forms broadly overlap (see Figure 2).⁹ Many Mixtepec Zapotec generic plant categories may bear alternative life-form prefixes or, quite commonly, multiple life-form prefixes, i.e., two or three such prefixes one before the other.¹⁰ Consultants

spontaneously volunteered on several occasions that, for example, *guiè-dzing* “hummingbird flower” is *guiè-dzing* when it bears flowers, but is more properly *guizh-dzing* “hummingbird herb” otherwise. We call this an alternative life-form assignment. However, it is necessary to eliminate the possibility that what may appear to be an alternative life-form assignment in fact involves contrasting terms. For example, *guiè-sàntmàrt* “*Santa Marta* flower” is a cultivated medicinal plant of European origin (*Chrysanthemum parthenium* [L.] Bernh.), while *guizh-sàntmàrt* “*Santa Marta* herb” is an as-yet-unidentified wild composite with similar medicinal value. Overlapping life-forms may be expressed also in the use of multiple prefixes, e.g., *guizh-guè-dzing*, *guizh-guè-tí* “*Bidens* spp.,” and *guizh-guè-nziù* “*Stevia* spp.” We call these cases multiple life-form assignments. Multiple assignments show an order of precedence with the more inclusive category placed first.

Figure 2
Venn Diagram of Mixtepec Zapotec Plant Life-Forms



Tables 5 and 6 show the numbers and percentages of alternative and multiple life-form prefixes in our corpus of plant names. We believe these totals will increase, perhaps substantially, with systematic elicitation of all allowable alternative life-form prefixes. Percentage of overlap for Mixtepec Zapotec life-forms ranges from 14 percent for “tree-shrub” to 44 percent for “leaf.” (“Maguey” does not overlap.) These totals are too high to be dismissed as cases of ambiguous affiliation (Berlin, Breedlove and Raven, 1974: 157).

Our evidence suggests that Mixtepec Zapotec plant life-forms are best understood as a series of partially overlapping categories in which an initial two-way distinction between woody (*yâg*) and non-woody (*guizh*) plants is dominant, but that this distinction may be overridden by the outstanding prominence of either (1) a particular plant part, e.g., *guiè* “flower” and *blâg* “leaf,”

(2) a particular form of growth, e.g., *lbàe* “vine” or (3) a particular use, e.g., *ncuàan* “medicinal/venomous plant.” The small life-form, *dòb* “maguey,” stands apart.

Table 5
Numbers (Percentages) of Alternative Life-Form Assignment

	Total cases	<i>guizh</i>	<i>guièe</i>	<i>yâg</i>	<i>blâg</i>	<i>lbàe</i>	Total overlaps
<i>guizh</i>	144	—	26 (18)	10 (7)	4 (3)	0 (0)	40 (28)
<i>guièe</i>	93	26 (28)	—	3 (3)	4 (4)	1 (1)	34 (37)
<i>yâg</i>	115	10 (9)	3 (3)	—	3 (3)	0 (0)	16 (14)
<i>blâg</i>	27	4 (15)	4 (15)	3 (11)	—	1 (4)	12 (44)
<i>lbàe</i>	8	0 (0)	1 (13)	0 (0)	1 (13)	—	2 (25)

Table 6
Numbers (Percentages) of Multiple Life-Form Assignment

	Total cases	<i>guizh</i>	<i>guièe</i>	<i>yâg</i>	<i>blâg</i>	<i>lbàe</i>	Total overlaps
<i>guizh</i>	144	—	11 (8)	1 (1)	2 (1)	0 (0)	14 (10)
<i>guièe</i>	93	0 (0)	—	3 (3)	1 (1)	1 (1)	5 (5)
<i>yâg</i>	115	1 (1)	9 (8)	—	2 (2)	0 (0)	12 (10)
<i>blâg</i>	27	2 (7)	0 (0)	0 (0)	—	0 (0)	2 (7)
<i>lbàe</i>	8	0 (0)	1 (13)	0 (0)	0 (0)	—	1 (13)
Overlaps	3 (2)	21 (23)	4 (3)	5 (19)	1 (13)	34	

Mixtepec Zapotec plant life-forms do not require definition in terms of utilitarian factors. However, it is necessary to expand the criteria that play a role in defining life-forms from the classic criterion, basic growth habit, as is fundamental to such life-forms as “tree,” “vine,” “grass,” “herbaceous plant,” “bird,” “snake” and “fish,” to include the prominence of particular plant parts, which seems to play the key role in raising such categories as “flower,” “berry” and “leaf” to life-form status. Clément (1995) has described a very similar situation among the Montagnais and Cree of eastern Canada. He argues that life-form classifications in terms of salient plant parts integrate cognitive and utilitarian principles in classification, but may also generate “taxonomic anomalies” and multiple life-form assignment. His interpretation corresponds well with the Mixtepec Zapotec data.

It also seems reasonable to allow that habitat associations and utilitarian factors will likewise “intrude” in life-form definitions. It is often difficult to separate habitat considerations and utilitarian concerns from growth form or the prominence of parts as the fundamental criterion defining a given life-form. For example, the prominence of “flower” as a Mixtepec Zapotec life-form is clearly linked to the extraordinary cultural importance

placed on ornamental flowers in this culture. In conclusion, we believe the Mixtepec Zapotec data provide further evidence for the eclectic nature of life-forms (cf. Randall and Hunn, 1984) and the necessity for a more flexible approach to their definition.

We also find that the generic rank is best considered a psychologically diverse collection of categories. Though the Mixtepec Zapotec folk generic rank includes a great many monotypic and polytypic generics of the “classic” sort, that is, categories that reflect complex patterns of covariation of perceptible features among the organisms classified, it also includes residual categories (as noted above) and categories more like folk specifics and varieties in the relative simplicity of their perceptual bases. This is particularly evident in the Mixtepec Zapotec animal domain amongst invertebrates. Here the diversity of nature tends to produce a chronic cognitive overload with the result that large regions of invertebrate zoological space are sketched, not systematically mapped.

Mixtepec Zapotec Animal Classification

Many Mixtepec Zapotec animal names start with “*m*.” In fact, 65 percent of all non-Spanish derived animal names do, and 36 percent of all non-Spanish derived entries in Reeck’s dictionary that start with “*m*” are animal names.¹¹ Such names are by no means restricted to invertebrates (75%) but are frequent among mammals (52%), birds (48%) and other vertebrates (64%) as well. This initial “*m*” most likely originated as *má-* “animal” (cf. *máni* in Córdova’s 1578 dictionary). However, if the *m-* is deleted, the remaining expression is nearly always meaningless. Most animal names that are not prefixed in this way are onomatopoeic or Spanish loans (see examples above). In Amuzgo—an Otomanguan language affiliated with Mixtec—animal names exhibit a similar pattern. Most animal names incorporate the prefix *ki-*, from *kio?* “animal.” However, in Amuzgo the stem to which this kingdom marker is prefixed is frequently independently meaningful (Cuevas Suárez, 1987: 92). As it is unusual for the unique beginner of either the plant or animal domains to be named, Mixtepec Zapotec is exceptional in this respect also (Berlin, 1992: 34).

Mixtepec Zapotec animal classification is strikingly different from that of plants. There is no parallel among animal names to the obligatory life-form marking so characteristic of botanical names. Animal life-forms are rare (see Figure 3). Only *mguin* “bird” clearly qualifies as a life-form. *Mguin* includes some 60 generic subcategories. Three other categories might qualify, *mèel* “snake” and *ngurägw* “lizard,” each with seven subcategories, and *ngudzii* “spider” with nearly 20. All encom-

pass a range of biological forms. However, given the small number of included subcategories and the predominance of “secondary lexemes” among the names for these subdivisions, I am more comfortable calling them generics or, at most, named intermediates. I may eventually decide that *mëy* “fungus” is an *animal* (author’s emphasis) life-form. *Mëy* includes 36 named subdivisions. The prefix *m-* and the use of animate pronouns to refer to fungi (Roger Reeck, personal communication, July 1997) support that conclusion. It is worth noting that the Aztecs referred to certain mushrooms as the “flesh of the gods” and that Tzeltal Mayans use the verb stem *-ti*’ to refer to eating both meat and mushrooms (Hunn, 1977: 135). Curiously, current Western scientific opinion places the fungi in their own kingdom, and some taxonomists suggest that they may be more closely allied to animal than plants.

Figure 3
Venn Diagram of Mixtepec Zapotec
Animal Life-Forms



Less than a dozen bird generics have binomial names on the plant model. Most are named as is the raven (*Corvus corax*): *ngä*, in imitation of its call. A large number of insects—45 of 129 (35%) non-Spanish derived generics—are called *má-X*, but those so named do not form a well-defined set. We have decided to treat most categories named *má-X* as generics, although most resemble folk specifics or varietals psychologically more than they do generics. That is, *má-X* typically singles out a particular colour, pattern, host plant or habitat that distinguishes the organism from others like it. Moreover, many such taxa are heterogeneous, e.g., *má-pínt* “pinto bug” includes a variety of small spotted beetles; *má-dán* “forest bug,” a variety of beetles found in forest habitats; and *má-lò-guizh* “bug of herbaceous plant,” a range of herbivorous insects.

Thus, for invertebrates, our consultants tend to employ folk specific or varietal classification strategies when they encounter “holes” in the generic partition. To

systematically describe what is going on here, we may need to recognize the existence of “unaffiliated specifics/varietyals,” that is, taxa with the psychological characteristics of the lowest level taxa but which are included with no intervening generic in a life-form or the kingdom. These peculiarities of Zapotec (or of Otomanguan) folk biological classification and nomenclature would seem to require that we further loosen the analysis of folk biological classification from its formalist anchors in taxonomic structure.

Conclusions

In sum, the people of San Juan Mixtepec today actively preserve an extensive vocabulary for their local flora and fauna. Their nomenclature for various domains exhibits a level of detail 30 percent to 70 percent of that recognized by Western professional taxonomists. Naming patterns of great antiquity persist, despite exposure to Spanish terms and the introduction of many exotic plants and animals. Prospects for the transmission of this impressive, empirically robust body of traditional environmental knowledge to future generations are mixed, however.

The Mixtepec Zapotec ethnobiological classification and nomenclature exhibit several unusual features that, in our judgment, warrant revisions of the current standard “taxonomic” theory. In particular, we argue (1) that life-forms should be considered an eclectic set of abstract categories motivated not only by overall growth form but also by outstanding anatomical features, habitat preferences and use values; (2) that life-forms need not contrast, but may overlap; (3) that in regard to rank assignment the nomenclatural distinction between productive primary and secondary lexemes cannot be maintained; and (4) that “holes” in the generic ranks, most conspicuous among invertebrates, imply the existence of “unaffiliated specific/varietyal” taxa or suggest that generic taxa are psychologically diverse.

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Notes

- 1 Predominantly *Quercus castanea* Née, *Q. magnoliifolia* Née, *Q. cf. crassifolia* Humb. & Bonpl., *Q. glaucoides* Mart. & Gal.
- 2 Predominantly *Quercus cf. rugosa* Née, *Quercus laurina* Humb. & Bonpl., *Pinus cf. teocote* Schl. & Cham., *Pinus oaxacana* Mirov, *P. leiophylla* Schl. & Cham., *P. douglasiana* Mart., with some *P. ayacahuite* Ehrenb. above 2400 m.
- 3 There are six vowel positions (*i, e, ae, u, o, a*), each of which may be simple or glottalized (*ii, ee, aae, uu, oo, aa*), and each of which may take one of four tones, low, high, falling or rising (e.g., *à, á, â, ä*). Consonants may be lenis or fortis (e.g., *ts* vs. *dz*, *n* vs. *ñ*, *r* vs. *rr*).
- 4 We maintain and continuously update the following databases: *Plant collections*: which include date, location, major habitat category and/or soil type; scientific names for division, family, genus, species and variety, as far as can be determined; vernacular names in use locally, both Zapotec and Spanish; names of local consultants; a description of the plant; and an account of its cultural significance. *Plants identified*: whether collected or not, by family, genus, species and author, cross-indexed to files of collections and Zapotec names. *Bird observations*: which include date, location, number, age and sex, if that can be determined, using the nomenclature in Latin, English and Spanish of Howell and Webb (1995); plus notes on behaviour, naming responses of local consultants and other ethnographic notes. *Invertebrate collections*: which include date, location, scientific names keyed to family whenever possible, if not to genus; Zapotec and/or local Spanish names; ethnographic data; local observations on seasonality, food preferences, etc. *People of San Juan Mixtepec*: which include personal names and paternal and maternal family names, age and kinship relationships; dates and details of identifications provided and other topics of conversation; community offices, etc. *Zapotec plant and animal name files*: which include taxonomic rank assignment; semantic analysis; provenience of loan words; Spanish, English and scientific Latin equivalents; and use categories. *Zapotec medicinal plant file*: which includes Zapotec and local Spanish names, scientific equivalents, disease or condition targeted (as named in Zapotec and Span-
- ish), part of plant used, mode of preparation, mode of ingestion, dosage and admixtures, as far as possible.
- 5 Of an estimated 233 possible, according to Binford (1989) and Howell and Webb (1995).
- 6 Curiously, in neighbouring San Pedro Mixtepec one of these five oak categories, *yàg-xtíd*, has been elevated to include the others, thus giving explicit recognition to the genus as a basic category in its own right. Reeck (personal communication, July 1997) has suggested that acorns are considered “animals” as *mgàg* begins with *m-* and an animate personal pronoun is used when referring to them. Compare *mëy* “fungus,” discussed below.
- 7 Though the Mixtepec Zapotec classification of oaks is empirically robust, their interpretations of certain related phenomena is at variance with the contemporary scientific canon. For example, oaks are said to lack flowers. What we call the inflorescence they call *lò-yàg-yèen* “baby mistletoe.” The insect galls that commonly infest certain oak species (as noted also by Córdova’s informants)—referred to in Zapotec as *ngòl-bèdz*, literally “doll-mumps”—are considered to be the “fruit” of the oak (*nèx* “fruit” also means “sweet”)? The fact that these “fruits” contain tiny larvae does not disconfirm their interpretation, as many “real” fruits are likewise parasitized. These “non-scientific” understandings impress us with the fact that the system of nature is not in all respects obvious but must be divined by a process of theoretical interpretation.
- 8 The stronger demand that the taxa of a given rank must partition the domain is no longer tenable (Berlin, 1992: 114, 168).
- 9 The regular marking of plant generics by prefixing the “life-form” name both simplifies and complicates the task of analyzing life-form relationships. It is more difficult in that it precludes simply requesting that consultants state the life-form membership of each category, which would be equivalent to asking them the normally meaningless question whether a plant called *yàg-X* is *yàg* or not. This produces a sort of interference between nomenclatural and conceptual relationships that is not easy to overcome. We are left then with assuming that if the plant is called *yàg-X* it almost certainly therefore is a kind of *yàg*, unless we have compelling reasons to doubt this. On the other hand, we may inquire if a plant called *X* might also be called *yàg-X*.
- 10 Martin reports a similar situation for the Comaltepec Chinantec life-forms “ornamental flower” and “medicinal leaf” (1996).
- 11 A somewhat smaller but still substantial fraction of animal names begin with *ngu-*, which is apparently best interpreted phonologically as a nasalized “w” (Reeck, 1991). We have no idea what this might once have meant.

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