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Systematics and ethnobotany: what's in a name?

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Abstract. This paper takes into consideration the two types of systematics used in ethnobotany: scientific systematics and folk taxonomy or ethnotaxonomy. A discussion on how they are related, how each can serve the other, and how researchers can achieve greater rigor in both is provided.

Riassunto. Vengono presi in esame i due tipi di sistematica utilizzati in etnobotanica: la sistematica scientifica e la sistematica popolare o etnotassonomia. Vengono discussi i rapporti tra esse intercorrenti, i reciproci vantaggi e come l'una possa integrare l'altra per ottenere maggior rigore scientifico.

Key words: Classification, Common names, Ethnobiology, Ethnobotany, Ethnotaxonomy, Folk taxonomy, Systematics.

INTRODUCTION

Ethnobotany goes far beyond if and how a plant is used; we wish to know how a culture relates to the plant world around it, including concepts about plant life and how plants are looked at. For example, we want to know if a plant relates to spirits: whether it is a spirit, or contains one, or can be used by one, or can be used to communicate with spirits. We want to know what qualities can be attributed to a plant, how a plant must be treated, in what ways a plant can be used for good or ill, and what properties of the plant are perceived as effecting a cure or an illness. We can gain insights into how plants are perceived by learning what characteristics are used to identify plants; this leads toward understanding what criteria are used for inferring relationships among plants and how these relationships are structured.

The developed world tends to categorize and compartmentalize a useful plant as a source of a product. This is much less

often the case in indigenous and other kinds of "traditional" communities, where plants are regarded more holistically, and many plants are multifarious. In the Dhofar region of Oman, for example, the frankincense tree (*Boswellia sacra* Flueck. - Burseraceae) has religious significance, but in addition parts of it are used to make cosmetics, to start fires, to make medicines, to stimulate milk production in cows, to condition the skin, to repel insects, and put to many other purposes (MILLER, 1988).

All the components of a plant - concepts about it, perceptions about it, its physical parts, its uses, its relationships with other plants - be they related by evolutionary history or by a salient property - can in a given place be united by a unique identifier: its name. So-called common names may reveal a great deal about many of these components; scientific names reveal less but have the advantage of being, in a sense, universal. Names must be treated carefully and with respect, or their information and usefulness will be lost. As the late systematist and ethnobotanist Timothy Plowman used to say, "When we speak the names of plants, we speak the names of the gods." (DAVIS, 1996).

Names are the currency of systematics, and there are two kinds of systematics in ethnobotany, scientific or Western systematics and folk taxonomy or ethnotaxonomy. The two are complementary and often interdependent; when the systematist and ethnobotanist recognize this, they can facilitate and improve the quality of each other's research via better communication, responsiveness, and information.

SYSTEMATICS AND THE SCIENCE OF ETHNOBOTANY

Ethnobotany, a young science that in some ways has only recently emerged from infancy, is still establishing its scientific credibility, principally because it straddles the social and natural sciences, and rarely are the "ethno-" and botanical facets both strong. For work in any branch of the sciences to be publishable, the methods must be detailed, and for the results to be valid, they must be reproducible and it must be possible to use them for comparative purposes. Systematics plays a key role in the validity of ethnobotanical results.

Without a doubt, the majority of ethnobotanical projects suffer from a lack of rigor in one or more of the component disciplines represented. Among the principal sources of errors invalidating the data in many ethnobotanical projects are 1) poorly problematized research questions, inevitably leading to 2) inappropriately structured or badly conducted interviews and other interactions; 3) in medicinal plant studies, either misdiagnosis of Western diseases or misunderstanding of the subjects' disease concepts; and 4) failure to take the measures necessary for accurate data in the systematics and/or folk taxonomy.

Systematics in ethnobotany involves the following:

1) Collection. This includes the specimens, field observations, and additional data that can facilitate identification.

2) Identification. Determinations should be made on the basis of specimens and the data accompanying them and *not* based on checklists or common names and their supposed scientific equivalents; ultimately, there is no substitute for identification of (preferably fertile) material by a taxonomic specialist.

3) Nomenclature and orthography. As arcane as these subjects are to the non-systematist (and to many systematists as well!), they are of critical importance when the results of several ethnobotanical projects are being compared or when computer-assisted searches are being carried out for comparative or background work.

4) Evolutionary relationships. Ethnobotanists are interested in comparing the properties and uses of related taxa, and conversely, knowing the relationships among taxa with related uses.

5) Folk taxonomy, now often considered part of the broader discipline of ethnobiology (e.g., BERLIN, 1992). Continuing on from the discussion of evolutionary relationships, ethnobotanists also want to understand the conceptual framework used by a culture for ordering the regional biological diversity, as well as the resulting classifications, and to compare these with Western systems.

At this point, from any ethnobotanical project it is fair to expect accurate plant identifications (using current nomenclature) based on voucher material that is well-prepared and well-documented,

because the resources for these purposes are becoming more and more accessible. Detailed instructions on the preparation and documentation of herbarium specimens have been published in various languages for readers ranging from manuals for students of botany (e.g., BRIDSON & FORMAN, 1992; FIDALGO & RAMOS, 1989; JAIN & RAO, 1977; LOT & CHIANG, 1986; MORI et al., 1989; STUESSY & SOHMER, 1996; WOMERSLEY, 1981) to locally illustrated pamphlets for traditional communities in Amazonia (e.g., ELISABETSKY et al., 1994; see also ELISABETSKY, 1996). Excellent guidelines for these and other field methods used in ethnobotanical investigations are provided in ALEXIADES (1996) and in MARTIN (1995).

Those for whom computer network resources are available can take advantage of the rapidly growing body of systematic literature that is coming on-line, much of which now includes at least some photographs and/or illustrations. These same people may be able to send digitized photographs or digitized images of specimens to faraway taxonomic specialists for a quick consultation, although this is no substitute for a real specimen. Ethnobotanists with more modest resources have often faxed photocopies of specimens with reasonable success.

Of course, often the most straightforward and accessible resource consists of the systematists themselves. Many systematists are willing to provide basic instruction in field techniques, identify specimens (at least fertile ones) in their taxonomic and/or geographic specialties, provide commentaries on phylogenetic relationships of plants in these specialties, and correct the orthography in lists of species names.

Why be so demanding in regard to identifications and other aspects of systematics? Without rigor in this area, we abandon the scientific principle of reproducible results, but there can be other serious consequences ranging from expensive to deadly. Ethnobotanical investigations are sometimes linked to searches for germplasm, new crops, new medicines, and other activities collectively referred to as biodiversity prospecting. While it is hoped that these activities respect and protect the interests and rights of the communities involved, it is also hoped that they take equal care in the systematic aspects, because failure to do so can lead to expensive and fruitless collections and tests of the wrong species.

Misidentifications of useful plants can be dangerous as well. In 1994, seven cases of serious but thankfully non-fatal poisoning were traced to a shipment of herbal tea imported to the United States by a New York City distributor of South American foods. The customers thought they were drinking *erva* (or *yerba*) *mate* (*Ilex paraguariensis* St.-Hil. - Aquifoliaceae), but they had been sold something in the Solanaceae containing belladonna alkaloids (GREENBERG, 1995).

The importance of accuracy cannot be over-emphasized, because while in many instances congeners (species in the same genus) possess similar useful qualities, in many other cases they can be drastically different. Some species of *sapucaia* (*Lecythis* spp.) in Brazil are valuable timber trees, while the wood of others is practically worthless (S. Mori, pers. comm.). Another example dates from 1985, when one of a series of international botanical expeditions to the Sierra de la Neblina was trapped by fog on the summit without food for several days. Their foraging led them to a population of wild blueberries (*Vaccinium puberulum* Klotzsch ex Meissn. - Ericaceae). Some time after they filled up on the delicious ripe fruits, all of them began to experience serious drops in their heart rate and blood pressure, and some of them fainted (M. Nee, pers. comm., 1997). Overeating in this case could have proven fatal. Similarly, it is well known that some species of *Solanum* give us delicious fruits (e.g., *S. sessiliflorum* Dunal), while others contain poisonous alkaloids in all their parts (e.g., *S. nigrum* L.).

In a final example of this, when Donovan Correll discovered a new species of *Bursera* in the Bahamas, he discovered that it differed significantly from its well-known congener: "Tea made from the fresh leaves of *gumbo-limbo* or *gum-elemi* (*Bursera simaruba* (L.) Sarg.) is a refreshing drink. However, when I insisted on having tea made from the fresh leaves of *B. frenningae*, Jack Wright, who works for Mrs. Frenning, was appalled. Jack whose hobby is carving boats said that the tea would poison me and that when he once carved a boat from the wood it immediately sank to the bottom when placed in water. I did not drink enough of the tea to be poisoned, but what I did imbibe tasted like oily turpentine." (CORRELL, 1979).

THE OTHER SYSTEMATICS

The other, non-Western systematics has been called folk taxonomy and falls within what is now referred to as ethnobiology. Knowledge of common names, their etymology, and the conceptual framework in which they are used can provide invaluable insights into a culture; a great deal can be learned about the plants as well.

Common names often help lead systematic botanists to the plants they wish to study. For example, the Burseraceae are resiniferous trees that are always known by the traditional communities where they occur, and it is usually possible to locate them in *caboclo/ribereño/mestizo* communities by asking for *isigo* in lowland Bolivia, *caraño* or *tacamajaca* in lowland Venezuela, *copal* in Mexico, *anime* in Colombia, *almesca* in Eastern Brazil, *sicantá* in western Amazonian Brazil, and so on.

The etymology of the common name can be instructive about one or more properties of the plant, as in the following simple examples of *caboclo* names in Amazonian Brazil:

Morphology. *Espera-aí* ("wait a minute", usually *Acacia paniculata* Willd.) is a liana with retrorse thorns that can delay or ensnare those coming into contact with it.

Use. *Quebra-pedra* ("breakstone", *Phyllanthus niruri* L. and other species of the genus) is widely used to make a tea that reportedly dissolves kidney stones.

Toxicity. *Mata-calado* ("kill silenced", *Ryania speciosa* Vahl) is a treelet whose leaves mixed with maize in Acre and spread to attract and poison birds that damage crops; leafy branches are sometimes left in a person's trail as a threat.

Relationships to other plants. *Canelão* ("big cinnamon", *Aniba canellila* Mez - Lauraceae) is a large tree in the same family as cinnamon; tea made from the bark is considered a tonic and has a pleasant odor reminiscent of cinnamon plus sassafras.

Common names must be approached with as much rigor as scientific names; they must be also be approached with caution. Accurate transcription of indigenous names may require training in phonetics or at least familiarity with the language, especially in tonal languages such as Chinese. Common and indigenous names often have more etymological significance

than scientific ones, and minor mistakes in transcription can drastically alter that meaning. Even accurately transcribed names may present etymological challenges; for example, a number of species used in various parts of Brazil as aphrodisiacs or sexual tonics are called *catuaba*, a Tupi name that may mean "good leaf" or "valid man," depending on the interpreter (see DALY, 1990).

For any common or indigenous name used in more than a restricted area, there are bound to be differences between regions as well as within regions: the same species can have various names and various species can have the same name. Some of the many common names for Burseraceae in Latin America are noted above; conversely, in Brazil *catuaba* refers to at least twelve species in as many families (DALY, 1990 and further pers. obs.; see also BENNETT & GÓMEZ, 1991). In Acre, a *mateiro* (woodsman) from Acre and one from neighboring Amazonas were asked independently to provide common names for the trees along a 10 x 1000 m transect; the names they gave differed for 110 (28%) of the 397 trees, and many of those that coincided were for a few common palm species (M. Silveira et al., unpubl. data).

Particularly in indigenous communities, concepts and systems of classification are reflected in the names given to plants. Most of these systems include the ranks of kingdom, life form, an intermediate rank, then genus, species, and variety. Some of these ranks are "covert" or implicit, and in many cases there are additional covert categories (e.g., BERLIN, 1992).

Ethnobiological analysis of plant names can help not only in tracing disseminations of useful plant species (and plant uses) but also in determining how peoples and their languages are related and making inferences about past migrations and agricultural history. For example, in a study of related indigenous groups in northeastern Brazil, linguistic analysis of divergence in names for cultivated versus more spontaneous useful plants was used to develop hypotheses about relationships and migrations of these peoples and their plants (BALÉE & MOORE, 1991).

The degree to which folk species correspond exactly to so-called scientific species is often impressive. In many folk taxonomies, however, there are discrete sections of the classification system where the correlation breaks down. This usually occurs when

special attention is given to a particular characteristic - often a useful one - and overrides the gross morphological similarities and differences that form the conceptual core of both scientific and folk taxonomies (e.g., GILMOUR, 1961).

Among the Ka'apor of Maranhao, Brazil, one of these "special purpose" classifications is applied to plants yielding combustible resin or latex, most of them in the Burseraceae (BALÉE & DALY, 1990). This system contains six identifiable ranks, three of which are covert or implicit in the etymology. The third rank is hik and corresponds to resin or latex, and next is the covert suprageneric complex *kanei*, which includes those plants whose sap is combustible and can be used for illumination, including the folk (and scientific) generics *Manilkara* (Sapotaceae), *Hymenaea* (Caesalpiniaceae), *Symphonia* (Clusiaceae), *Trattinnickia*, and *Protium* (both Burseraceae). All those plants in the folk generic *kanei-hik* have a flammable resin and edible fruits, and all are species of *Protium*.

The results of the study were disappointing at the species level. *Protium polybotryum* (Turcz.) Engl. and *P. tenuifolium* (Engl.) Engl. are rather distantly related in scientific classification but were considered the same folk species, while *P. decandrum* (Aublet) Marchand and *P. giganteum* Engl. are closely related in scientific classification but have different folk specific names. It is interesting to note that *P. trifoliolatum* Engl. and *P. aracouchini* (Aublet) Marchand were both placed in separate folk genera; their resin is not easily flammable (DALY, 1987).

Discrepancies between folk and scientific taxonomies at the specific and varietal ranks may be inexplicable, although in some cases they may be instructive to the systematist. In the field, the (ethno)botanist is often puzzled in instances when traditional communities consistently and congruently recognize plant varieties for which (s)he can find no morphological basis. Large numbers of varieties may be recognized for cultivated plants such as manioc or for other types of important plants such as stimulants or psychoactive plants used in rituals (e.g., SCHULTES, 1986).

There are good examples of why (ethno)botanists should take folk taxonomy seriously and seek to learn from it. In one case, it was known for several years that traditional communities in Loreto, Peru and Acre, Brazil recognized two folk specifics that

systematists were calling *Spondias mombin* L. Only after careful examination of fruit and bark morphology did they realize that *uvos* in Loreto and *cajá* in Acre correspond to *S. mombin* and that *uvos colorado* and *taperebá* correspond to an undescribed species (Mitchell & Daly, in preparation).

Similarly, systematists and ethnobotanists can learn from each other, and better collaboration between them will result in progress and greater productivity in both their disciplines. The systematist must place him/herself at the disposition of those ethnobotanical projects that produce vouchers, by providing identifications as rapidly as possible, by a willingness to examine imperfect or in some cases sterile material, and by providing instruction when necessary. Moreover, systematists - principally those involved in writing floras - should consider presenting their work in forms that are more "accessible" to non-systematists. And this cooperation has to be reciprocal: the ethnobotanist must prepare good-quality vouchers of the species involved and make an effort to find fertile material, i.e., material with flowers and/or fruits. The labels should contain the information outlined in a number of helpful publications (e.g., ALEXIADES, 1996), including precise locality data, descriptions of the habitat and the plant itself and, within the constraints of intellectual property rights, as much ethnobotanical information as possible - common name and basic use category at the very least. (S)he should advise taxonomic specialists in advance of his/her wish to send specimens, including an indication of the quantity and when the identifications will be needed. The systematist may have special instructions for preparation of the specimens or special requests such as liquid-preserved material, bark samples, or photographs or observations of particular characteristics. Finally, the ethnobotanist should provide the taxonomic specialists with at least a basic description of the project; not only will most be more willing to examine the vouchers, some may be able to contribute supplementary ethnobotanical information.

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