

## IS THE *FRAILEJÓN* A LIFE FORM OR AN UNAFFILIATED GENERIC?: EXAMINING THE RANK OF AN ENDEMIC PARAMO PLANT

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**ABSTRACT.**— The debate over the distinction between life form and generic ranks provides the theoretical backdrop of this article. The case of the *frailejón* folk botanical taxon is described and an attempt is made to define its rank. The *frailejón* refers to a group of endemic plants of the high altitude paramo ecosystem (between the timberline and the permanent frost zone, 2,800 to 4,700 m a.s.l.), distributed throughout the northern Andes mountains of South America. The center of origin and dispersion of this botanical group is the Venezuelan paramo, the precise location of the fieldwork upon which this article is based. Ecological and floristic characteristics of the paramo environment are described and the Paramero people's identification, classification, nomenclature, use, and ecological association of the *frailejón* are reviewed. The evidence shows that the *frailejón* category is botanically polytypic and displays perceptual and taxonomic aspects of both life form and generic ranks. The high salience of this plant from morphological, utilitarian, and ecological points of view may help to explain this structural complexity. This case calls into question the validity and universality of a sharp distinction between the two ranks.

**Key words:** paramo, *frailejón*, ethnobiology, folk biological range, Andean flora.

**RESUMEN.**— El contexto teórico de este artículo gira alrededor del debate sobre la distinción entre los rangos genérico y forma de vida etnobiológicos. Un intento por definir el rango del taxón etnobotánico *frailejón* permite la incursión de los autores en el debate mencionado. Se conoce como *frailejón* a un grupo de plantas endémicas del ecosistema de alta montaña tropical páramo (entre la línea continua de bosques y la nieve permanente, 2,800-4700 m.s.n.m.), el cual se extiende a lo largo de los Andes del Norte de Suramérica. El centro de origen y dispersión de este grupo botánico se localiza en los páramos venezolanos, justamente donde se llevó a cabo el trabajo de campo del que provienen los datos de este artículo. Se describen aquí las características florísticas y ecológicas del ambiente páramo, además de detallarse los rasgos de identificación, clasificación, nomenclatura, uso y asociaciones ecológicas destacadas por los habitantes del páramo con respecto al *frailejón*. Nuestros datos muestran que la categoría *frailejón* es botánicamente politípica, además de presentar aspectos perceptuales y taxonómicos de tanto el rango genérico como del de forma de vida. Tal complejidad estructural podría verse explicada mediante el alto grado de conspicuidad de este taxón desde diversos puntos de vista, morfológico, utilitario y ecológico. De esta manera se cuestiona la validez de una distinción discreta universal entre los dos rangos.

**Palabras clave:** páramo, *frailejón*, etnobiología, rango etnobiológico, flora andina.

RÉSUMÉ.-- Le débat sur la distinction entre les formes de vie biologique et les rangs génériques sert de toile de fond théorique à cet article. Nous y décrivons le cas du taxon ethnobotanique **frailejón** et essayons de définir son rang. Le frailejon se réfère à un groupe de plantes endémiques de l'écosystème de haute altitude paramo (entre la ligne supérieure de la forêt et la zone de neige permanente, 2800-4700 m), dispersé à travers les Andes du Nord de l'Amérique du Sud. Le centre d'origine et la dispersion de ce groupe botanique sont situés dans le paramo vénézuélien, précisément là où a été menée la recherche sur laquelle est basé cet article. Les caractéristiques écologiques et floristiques de l'environnement du paramo y sont décrites et l'identification, la classification, la nomenclature, l'utilisation et l'association écologique y sont passées en revue. Nos données indiquent que la catégorie **frailejón** est botaniquement polytypique et présente également les aspects perceptuels et taxonomiques aussi bien des formes de vie biologique que des rangs génériques. L'importance de cette plante du point de vue morphologique, utilitaire et écologique peut peut-être expliquer cette complexité structurelle. Ce cas met donc en doute la validité et l'universalité de la forte distinction entre les deux rangs.

Mots clés: paramo, **frailejón**, ethnobiologie, registre ethnobiologique, flore andine.

#### THEORETICAL BASIS OF LIFE FORM AND GENERIC RANKS

The concept of rank is a central element in most theoretical formulations of folk biological classification (Glick 1964; Berlin et al. 1973, 1974; Berlin 1972, 1976, 1978, 1992; Bulmer 1970, 1974; Kay 1975; Hunn 1976, 1977, 1982, 1987; Brown 1977, 1979, 1984, 1987; Randall and Hunn 1984; Randall 1987; Wierzbicka 1985; Atran 1985, 1987, 1993; Atran *et al.* 1997). The theory of Brent Berlin (1992) describes a hierarchical organization of biological taxa into a minimum of three and a maximum of six major ethnobiological ranks, and this basic taxonomic structure has been confirmed for a considerable number of cultures (cf. Brown 1984). Ethnobiological ranks are conceived as being analogous to the ranks found in systematic biology, in which taxa occupying the same rank are mutually exclusive. The following ranks, ranging from most to least inclusive, have been recognized: kingdom, life form, intermediate, generic, specific and varietal. Taxa of the same ethnobiological rank usually (but not always) occupy the same level in a particular taxonomic structure (Berlin *et al.* 1973:215; cf. Atran 1993:53).

While the notion of rank is an intuitively appealing organizing concept for explaining the obvious hierarchical structures observed in most (if not all) ethnobiological classification systems, the ontological, epistemological, logical, perceptual, and biological status of ethnobiological ranking behavior in general and of some of the individual ranks in particular have been a matter of considerable debate and disagreement among the principal proponents of ethnobiological theory. The discussion about the naturalness, intellectual motivation, functionality, and definitional borders (i.e. intentional and extensional limits) of life form and generic categories has been especially lively and tendentious, marked by several competing points of view.

According to Berlin (1976, 1992), ranks are nonarbitrary and psychologically

real (i.e. not a mere cataloguing device imposed on the data by the analyst), and correspond to distinctly bounded groupings of ethnobiological taxa at different levels of psychological and biological reality according to similar or comparable internal degrees of variation within a category and external degrees of separation between categories. His view of rank makes clear that the ethnobiological domain is discretely partitioned by the folk taxonomist and not perceived in terms of continuous variation. The high degree of correspondence between native genera and scientific species is offered as partial proof of the objective reality of natural discontinuities encoded in folk classifications, whereas instances of noncorrespondence are attributed to external influence by the cultural domain (Berlin 1973). Life form (e.g. tree, vine) is defined as the second most inclusive rank, broadly polytypic, encompassing a few morphotypes, recognized on the basis of a small number of biocharacters, and perceptually natural although it frequently crosscuts phylogenetically valid natural categories, such as Family. The generic category (e.g. oak, maple) is considered the nucleus of the classificatory system, typically the most numerous category, the first recognized by children, implying the naturalness and effortlessness with which it is discriminated, named by primary lexemes, and mostly monotypic. Whereas most folk generics are observed to be taxonomically included within taxa of life form rank, a minority of folk generics appears to be conceptually unaffiliated to life forms. Berlin accounts for the taxonomic irregularity of the unaffiliated generics as resulting from morphological aberrance (e.g. bromeliads) or special economic importance (e.g. cultigens) (Berlin 1974, 1992).

An early alternative viewpoint to the universalist, intellectualist and objectivist perspective of Berlin was offered by Ralph Bulmer, who endorses an integral ecological model of folk biological classification in which the importance of the specific cultural and natural environment in determining the taxonomic space is emphasized (Bulmer 1974:11-2). He considers the higher inclusive taxa (Berlin's life forms) as largely variable in configuration because local cultural as well as perceptual criteria are used to construct the categorizations. In other words, the generative criteria of categories – cultural significance, use patterns, and ecological relationships in addition to morphology and behavior – do not produce pancultural patterns because they are dependent on culturally and ecologically specific circumstances which are numerous and variable (Bulmer 1974:20, 1967:6). The highly inclusive taxa are regarded as logically natural, but they may not always be biologically natural (Bulmer 1970:1087; cf. Hunn 1987). Instead, Bulmer argues that biologically natural reality is more closely reflected by the lesser inclusive taxa which he labels the "specieme," defined as the smallest perceptible natural discontinuities differentiated lexically. This minimal natural unit is described as being segregated not by single characters but on the basis of multiple overlapping definitional criteria: morphological salience, habitat, and behavioral habits such as nourishment, reproduction, etc. (Bulmer 1967, 1970, 1974). This definition is nearly identical to Berlin's concept of the folk generic.

Eugene Hunn (1976) rejects the strict taxonomic framework and instead elaborates a more flexible and process-oriented perceptual model of folk biological classification, which considers the structural complexity (e.g. taxonomic anoma-

lies, like taxonomic structures) and variability of folk biological classification systems to be the product of the empirical perception of the classification space in different environments. Life form and generic categories are distinguished by essentially different perceptual processes: deduction and induction respectively. The life form category results from deductive processes in the sense of being monothetic, defined by a few abstract features, arbitrary, special-purpose, and artificial in a biological sense. By contrast, the generic category involves induction in being polythetic, a gestalt (i.e. whole image) pattern abstracted from the sharing of many concrete attributes, general-purpose, and natural in a logical sense. The natural perceptual salience of the generic is defined in algebraic terms as the higher critical ratio (CR) of a taxon or its higher inherent stimulus capacity [ $CR(t) > CR(t \pm n)$ , where  $\pm n$  indicates a taxon including  $t$  or included within it] (Hunn 1976:518-527). Offering an explanation to the ponderable recurrent non-transitivity of certain reported taxa, Hunn argues that this definition of the generic in terms of CR permits a generic taxon to occupy different ranks depending more on empirical phenomena than on theoretical axioms: the non-finite boundaries of taxa are generated by the variable prominence (CR value) of the perceptions. The theoretical problem of the unaffiliated generic is thus resolved as "a situation in which the same taxon is both a generic and a life form ... i.e. if  $CR(x) < CR(y) < CR(z)$ ,  $x, z \not\subseteq y$ " (Hunn 1976:520).

Hunn (1987) later qualifies his position somewhat regarding the perceptual, biological and logical bases of the life form rank. He admits that some life form taxa, notably "grass", "bird", and "fish", display clearly inductive "configurational integrity" similar to folk generics whereas other life forms, such as "herb", "vine", "mammal", and "wug" are indisputably deductive and artificial in nature. Meanwhile, "tree" is considered to occupy an intermediate position in a logical and biological sense – that is, lacking the natural configurational integrity characteristic of folk generics but nevertheless perceptually compelling. This qualification implies that the perceptual and logical distinctions between life form and generic ranks are not as clear-cut as Hunn himself stated earlier, and instead the differences are more accurately conceived as a continuum ranging from artificial deduction at one pole to natural induction at the other. Thus the question of what rank a taxa should be assigned to may not be a simple either-or choice but rather a matter of degree of conformity to whichever pole.

Robert Randall and Hunn (1984), building upon Hunn's earlier perceptual model, argue that highly inclusive folk biological categories comparable in scope and function to life forms are motivated by recognition of functional (i.e. utility) and ecological (i.e. local biodiversity) criteria in addition to perceptual attributes (i.e. behavior, morphology), and therefore are culturally idiosyncratic constructs. Randall (1976:543-545, 1987) further elaborates his opposition to universalist and essentialist taxonomic thinking in stating that the structure of folk biological classification resembles a perceptual network based on the fuzzy logic of focal or prototypic categories with extended ranges rather than a rigid hierarchical scheme conceived vertically in terms of transitive set inclusion and horizontally as mutually exclusive classes. Prototypicality facilitates the grouping of different organisms sharing a range of features through inclusion at peripheral positions of the class

(i.e. categoric membership grading, central nucleus, and extended percepts; see also Gal 1973:206; Ellen 1975:221; Kempton 1978:44). Both higher inclusive and generic categories are said to be characterized by this focal-peripheral logical structure. Randall considers that generics frequently lack the attributes necessary for focal membership in a higher inclusive category and the so-called unaffiliated generics are those displaying unique uses and/or atypical perceptual attributes to the degree that they are completely outside the ranges of the higher inclusions.

Scott Atran, influenced by classic Aristotelian philosophy (cf. Mayr 1982; Ruse 1992), reaffirms the universalist, essentialist, and transitive taxonomic approach to ethnobiological ranking. He refutes Hunn in stating that life form and generic categories are equal in terms of deductive/inductive or monothetic/polythetic logical distinctions, largely because biotaxa of all levels pertain only to essences of kind (i.e. underlying nature) and not actual appearance. Logically necessary features are imposed on both sorts of taxa and hence there is no vagueness of boundaries at either level. Atran considers the difference between life-form and generic taxa as two-fold: the latter comprise subsets of the former and the life forms divide the conceptual categories of biological domains into a contrastive lexical field. As a result, the lexical system marking the life forms make up *fundamentum divisionis*, indicating a logical fractioning of the category into features that are "positive and opposed" along one or more perceptible dimensions. The generics, by contrast, are characterized by a conjunction of features, and thus in order to define a generic it is sufficient that the other generics lack one or more of its attributes. The partitioning of a living kind as a generic represents a logical *fundamentum relationis*, meaning a relational segregation of bioforms into specific configurations. Morphologically unaffiliated generics, also referred to as monogeneric life forms, display both divisional and relational segregational aspects and therefore are simply double indexed in taxonomic trees at life form as well as generic ranks (Atran 1985, 1993).

The preceding review of the ethnobiological literature makes clear that the concept of rank and in particular the distinction between life form and generic ranks is a topic of widely contrasting opinion. Major disagreements persist regarding the issues of the psychological reality, universality, functionality, transitivity, prototypicality, naturalness, and boundedness of folk biological ranks. Scientific acceptance of one or the other competing viewpoints will depend upon how well the theories conform to the empirical facts uncovered by further field investigations. Studies of endemic bioforms in geographically restricted and ecologically stressed biomes may be especially revealing here in the sense of testing the outer empirical limits of theoretical explanation by giving due consideration to the so-called special or exceptional cases. Accordingly, the present article considers the case of the *frailejón* folk taxon among Venezuelan Paramero peasants in the context of the debate on ethnobiological rank. We consider the *frailejón* to be especially pertinent to this debate because it appears to display diverse perceptual, logical, and biological features which have been associated with both life form and generic ranks. Thus our specific aim is to describe what these features are and analyze whether the *frailejón* should be defined as a life form or an unaffiliated generic.

DESCRIPTION OF THE PARAMO VEGETAL BIOTYPES:  
THE CAULIRROSULA

The high altitude ecosystem known as *paramo* in the northern Andes exhibits a unique vegetation of about 3,000-4,000 species of vascular plants, of which 60% are considered to be endemic (Luteyn 1992:6). Although there are different definitions of paramo, based on floristic, geomorphological, climatic, physionomic and human features (see López 1993, 1995 for different notions of paramo), plants are one of the most conspicuous features and not surprisingly constitute one of the diagnostic criteria for distinguishing this tropical high mountain zone. The recurrent presence of certain botanical types throughout the paramo habitat points to the high biological potentiality in terms of species richness (Cuatrecasas 1968:165) as well as the ecological restrictiveness in terms of morphophysiological development. The most common life forms are: Caulirrosula (caulescent rosette), Cryptofrutex (partially hidden, dwarf or prostrate woody shrub), Herba (herbaceous plant), Fascigramina (bunch grass), Proteretum (mat or cushion plants such as moss, lichen and hepatica), Arbor (tree, usually small or even dwarfed but with distinct trunk and crown), Frutex (woody shrub) and Suffrutex (subshrub: woody at the base, herbaceous above) (Cuatrecasas 1968:166-69; Heldberg 1992:15; Monasterio 1980:22; Troll 1968:29; Lauer 1979:33).

The botanical element is clearly emphasized in biogeographical descriptions of the paramo as a high open humid region characterized by the dominating presence of tussock, cushion and rosette plant communities (Lauer 1979:29-30). These vegetationally distinct landscapes are discontinuously distributed in high elevation islands, between 2,800 and 4,700 meters above sea level (Vuilleumier 1979:186; Monasterio & Vuilleumier 1986:3), mainly throughout the Northern Andes of South America (Lauer 1979:29; Azocar 1980:16) but with sparser formations extending to Costa Rica in the north (Cordillera de Talamanca, 11° N) and to Huánuco province, Peru in the south (8° S). Isolated paramo biomes are also found in Panama, on the humid eastern Andean slopes of Peru and Bolivia (Cleef 1978:367) and atop *tepuy* (tabletop sandstone mountain) formations in the Guiana Shield (Cleef 1983). Moreover, high mountain regions similar in ecological structure and function to the paramos can be found between the Tropics of Cancer and Capricorn on all continents: the Central Andes (punas), East Africa (afroalpine level), Malaysia, Hawaii, and New Guinea (tropical-alpine level; Troll 1968:29; Lauer 1979:29; Monasterio 1979:117; Monasterio & Vuilleumier 1986:3). It should be mentioned, however, that studies carried out in the Colombian and Ecuadorian paramo have raised questions about the origin of this biome, whether natural or human-made (cf. Balslev & Luteyn 1992; Læggaard 1992; Verweij & Beukema 1992). Specifically, observations of vegetational dynamics in response to fires and grazing give some weight to the hypothesis that human activities are partly responsible for shaping this particular environment (Ramsay & Oxley 1996).

Paramo plant types are commonly characterized by a number of special morphophysiological features that crosscut phylogenetic lines and are thus explained as resulting from adaptive convergence to the stressful climatic conditions prevailing in this environment (Jahn 1931:105; Billings 1974:403; Mani 1980: 127).

Significant climatic parameters include: considerable diurnal fluctuation of temperature (up to 25°C difference between minima and maxima), occurrence of frost, dry atmosphere, high intensity and rapid change of ultraviolet solar radiation, and strong winds. Such conditions, along with highly drained soils, exacerbate the potential dehydration of plants and therefore select for species with persistent foliage and xeromorphic structure, despite the constantly humid weather (Pittier 1929:29; Tamayo 1958:13-15; Cuatrecasas 1968:165; Heldberg 1992:21). High humidity is in fact largely offset by high solar radiation and low atmospheric pressure, and consequently the vegetation cover is specifically designed for efficient absorption and storage of water (Guhl 1982:43-44). The high rate of evapotranspiration induces the slow and stunted growth of many plants – for example, internodal spaces are often shorter (Pittier 1929:29; Jahn 1931:105; Troll 1968:30), and also exerts selective pressure on leaf size, shape, and structure. In regards to the latter, common morphological traits include: spiral arrangements; spatulate, obovate or oblanceolate overall shapes; lobed or dentate margins; broad apices; pinnate venation; pubescent or tomentose surfaces; coriaceous (i.e. leathery) texture; and thickened epidermic cells (Pifano 1961:124; Guhl 1968:208; Mani 1980:130; Azocar 1980:19). Especially common are the so-called “dwarf” and other low volume species as well as plant types growing very close to the soil (especially in rocky sites) in order to maximize the capture of heat energy (Budowski 1968:157), as is typical of cushion, cespitose (i.e. tufted), and acaulescent (i.e. stemless) plants.

The morphophysiological traits mentioned above overlap not just diverse phylogenetic classes but also different geographical regions, being most prevalent in the provenance zones of the contemporary paramo species. Evidence of open habitats populated by paramo-like vegetation is found in pollen data of the Middle Eocene (Van der Hammen & Cleef 1986:172). However, it is believed that the most likely direct precursors of paramo vegetation evolved as early as five million years ago in the Early Pliocene (Van der Hammen & Cleef 1986:173). The first indications of a definitely paramo vegetation date to the Late Pliocene or Early Pleistocene geological periods, around 1.9 million years ago (Van der Hammen 1979:55; Van der Hammen & Cleef 1986:175, 182), and point to a neotropical origin. Later, botanical traits originating from the holarctic or austral-antarctic regions appear on the scene (Van der Hammen & Cleef 1986:175; Monasterio 1980:22). Both groups of plants successfully adapted to the paramo environment, the neotropicals to the low temperatures and the holarctics/austral-antarctics to the tropical thermal regime, in which the diurnal range of temperature far exceeds the annual range.

It is the neotropical *Caulirrosula* life form (perennial caulescent rosette) that is of most interest to us here. The presence of this plant type distinguishes the high elevation ecosystems of the tropics from those of the temperate latitudes (Smith 1981:1). Smith (1981) affirms that it evolved independently in the high mountain belts of Eastern Africa (*Senecio*, *Carduus*, and *Lobelia*), South America (*Espeletia* and *Puya*), Hawaii (*Argyroxiphium*), and New Guinea (*Cyathea*), but is not found in the extra-tropical highlands. In the Northern Andes, it is represented primarily by members of the genus *Espeletia* (Asteraceae), and is deemed the most distinctive biotype of the paramo biome (Cuatrecasas 1968:167, 1979, 1976:43-4). This plant appears in the form of large rosettes (10 to 100 cm diameter), with whitish-grayish

to yellow-gold, pubescent to tomentose (although a few species are glabrous), densely basal or radical oblanceolate leaves (10 to 70 cm long, 3 to 50 cm broad), and with usually yellow (although orange-reddish in some species) scapose and bracteolate flowers. They are either acaulescent or erect (unbranched woolly trunks), reaching heights up to 10 meters in undisturbed paramo. The *Caulirrosula* is also represented by some plants of the genus *Puya* (Bromeliaceae) but its presence in the paramo is less common than *Espeletia*.

The genus *Espeletia* displays an extraordinarily high degree of diversification and endemism, comprising about 150 species (Luteyn *et al.* 1992:74). As more specimens of this group of plants were collected, analyzed and described by José Cuatrecasas (1934, 1954), the leading taxonomic expert of the group, significant differences in habit and inflorescence were discovered and consequently the group was reclassified into seven distinct genera based on the differential sharing of certain floral, fruit and other characters. The entire grouping was then reconsidered as a new sub-tribe, the Espeletiinae (Helianthae tribe, Asteraceae family; Cuatrecasas 1976:47). The seven genera (*Carramboia*, *Tamania*, *Libanothamnus*, *Ruilopezia*, *Coespeletia*, *Espeletiopsis*, and *Espeletia*) correspond to various taxonomically significant growth forms: three types of trees, four categories of acaulirrosula (acaulescent rosette), and two kinds of caulirrosula (one of which is subdivided into two types). The latter group includes the most characteristic "form of *frailejón*" (Cuatrecasas 1976:45; Robinson 1981:35):

The biotype of 'caulirrosula' with short or long stem, is the most characteristic feature of the plant life of the high tropical mountains. It accounts for the physiognomy of the most part of the paramo vegetation (Cuatrecasas 1976:46).

The Espeletiinae inhabit an area stretching about 1,700 km from Llanganatis, Ecuador to El Avila, Venezuela, with the largest concentration of taxa being found in the Sierra Nevada de Mérida in Venezuela (Cuatrecasas 1986:274). All seven genera, four of which are endemic, as well as 65 endemic species are found in the Venezuelan Andes alone (see Figure 1). Thus biogeographical evidence supports the hypothesis that this latter area corresponds to the center of origin and dispersion of this botanical sub-tribe (Cuatrecasas 1986:275; Robinson 1981:35). The genus *Polymnia*, which typically inhabits tropical mountain forest zones, is believed to be ancestral to the sub-tribe. *E. neriifolia* Sch. Bip., one of the 15 arborescent forms with a currently wide distribution, has been identified as the most primitive member (Smith 1981:2).

Sometime during the Pliocene or Pleistocene, the Andes reached their present height (Schubert & Vivas 1993:29, 307; James 1975:62-63; Vuilleumier & Ewert 1978) and probably about the same time an ancestor of the Espeletiinae evolved "along the Venezuelan Andes" (Cuatrecasas 1986:275). Early to Middle Pleistocene sediments from the Venezuelan High Andes have been analyzed for paleoecological reconstruction (Rinaldi 1993:200; Salgado-Labouriau 1986:203). The principal sources of pollen and spores from this period are the Asteraceae and Gramineae, including members of the Espeletiinae. It is believed that the proto-Espeletiinae were perennial, evergreen, woody, shrubby, branched, and had xeromorphic foliage (Rinaldi

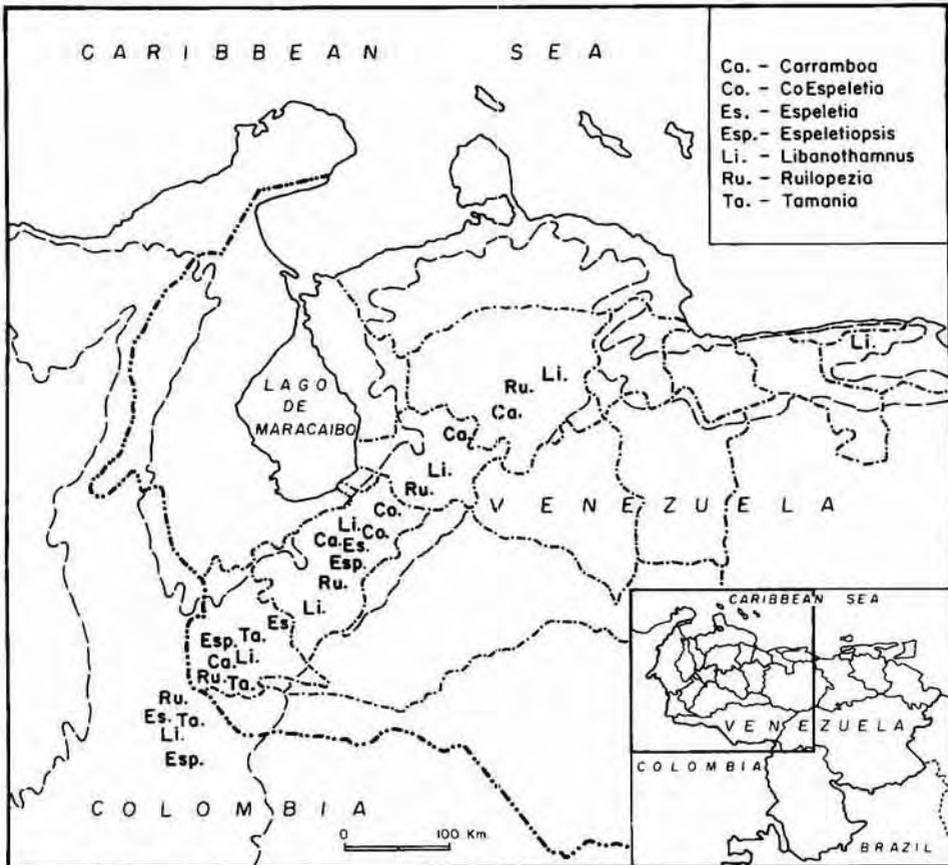


FIGURE 1.- Geographic Distribution of the Espeletiinae Sub-Tribe.

1993:201-202). Isolated islands of paramo environment were probably invaded by a proto-Espeletiinae, "presumably by genotypes of arborescent forest species similar to *E. Neriifolia*- producing numerous isolated populations. This comparative isolation combined with new selective forces imposed by the paramo environment, apparently contributing to extensive speciation" (Smith 1981:3).

The seven genera of the Espeletiinae exhibit various bioforms and occupy confined areas. The genus *Tamania* for example is monotypic and restricted to very particular areas; it consists of medium-sized trees and is found only in the paramo of the Tamá-El Cobre massif (Cuatrecasas 1986:275) on the Venezuelan-Colombian border. Seven arboreal species belonging to the genus *Carramboia* are restricted to the cloud or humid mountain forest of the Mérida Andes (Cuatrecasas 1986: 286) in the States of Trujillo, Mérida, Lara, and Táchira in Venezuela. The genus *Libanothamnus* is characterized by trees of xeromorphic structure and shows a very wide distribution, from the Colombian Tamá paramo, throughout the whole Venezuelan Andean Cordillera, and even appearing in the Venezuelan Coastal Cordillera. The characteristic form of *Ruilopezia* is a branched or monocarpic

caulirrosula and it is restricted to the ecotone between the paramo and the montane forests, with the exception of four species that inhabit open paramo, from Lara State, Venezuela in the east to the Colombian border in the west (Cuatrecasas 1986:281). The genus *Coespeletia*, described as a polycarpic (i.e. producing multiple fruits) caulirrosulan biotype, is endemic to Mérida State, Venezuela with some species adapted to the dry desertic paramos (Cuatrecasas 1986:298). The *Espeletiopsis* are also characterized by the caulirrosula form, but some individuals reach up to 12 meters, "raising their sclerophyllous rosette to the top of the canopy" (Cuatrecasas 1986:283), in cloud forest, whereas others grow mostly in the more open paramos. Finally, the *Espeletia*, which is of prime concern to us here, is "the most representative genus of the ecological concept of paramo" (Cuatrecasas 1986:288). *Espeletia* is a gregarious genus specially adapted to cold and humid habitats, developing best in the paramo proper even though it has a low reproductive rate. It usually appears as the dominant species in altitudinally or topographically circumscribed, spatially segregated communities (e.g. at the top of peaks), which over prolonged periods may thus differentiate into sub-species or new species (Cuatrecasas 1986; Sturm & Rangel 1985; Smith 1981; Robinson 1981). About 45 species of *Espeletia* are reported for the Mérida paramos (Vareschi 1970:293), which correspond to the area of fieldwork described in this article. Some of these species are endemic to localized areas and others also exhibit a very restricted distribution.

#### RESEARCH SITE AND FIELD METHODS

The fieldwork on which this research is based took place in two glacial valleys in the paramo mountain level ranging from the timberline to the border of the snowcap. The two localities are situated in the northernmost part of the Northern Andes in the Mérida Cordillera, Venezuela (7°30'-10°10' N and 69°20'-72°50' W; Schubert 1980:29), which is divided into a Northern Range (Culata) and a Southern Range (Nevada) (see Figure 2). The first locality, the Las González valley (3100-3800 masl) in the Conejos paramo extends seven kilometers and is located in the northwest sector of the Northern Range. In 1988, the valley had a resident population of 144 people distributed among 22 dispersed homesteads. By 1992 some families had emigrated to another mountain valley or closer to the city of Mérida, and the population was reduced to 84 people. The second locality, the Micarache valley (3000-3700 masl), located within the Llano del Trigo paramo in the south-central part of the Southern Range, is about six kilometers long and is home to 75 people grouped into 12 family compounds. Environmentally, both valleys display the characteristic glacial and periglacial features common throughout the paramo habitat (Schubert 1980). Culturally, the people are monolingual Spanish-speaking peasant farmers who maintain a traditional paramo subsistence-oriented lifestyle, although some market participation has recently been adopted.

The contemporary human inhabitants of the paramo, known as *Parameros*, display a cultural pattern which is likely the result of syncretization processes between Indian and Hispanic populations. The permanent (i.e. year-round) prehispanic human presence in the Venezuelan paramos has not yet been conclu-

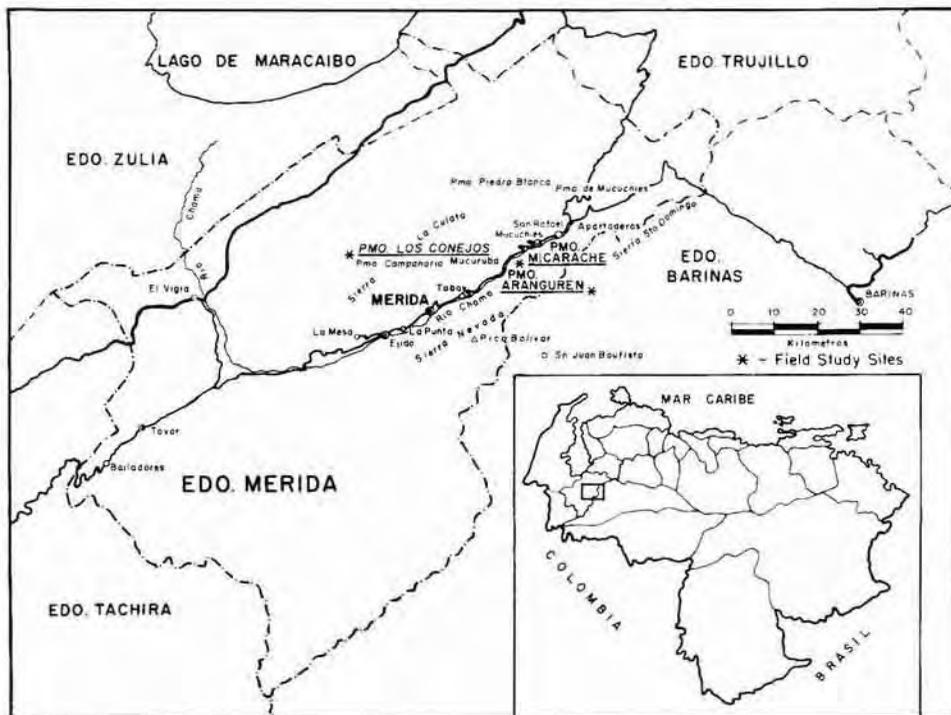


FIGURE 2.— Map of the Field Study Sites and Surrounding areas.

sively demonstrated, but archaeological (Wagner 1967, 1973; Rivera 1992), ethnohistorical (Rodríguez Xuarez 1558; AH Mérida 1791, 1803, 1804, 1806, 1807 and 1837; Simón 1627) and ethnographic data (López 1992) confirm at least a very longstanding seasonal human presence. One may infer the survival of Indian traits mixed with Hispanic cultural features among contemporary Paramero people, especially in regards to subsistence strategies and speech habits (i.e. antiquated Spanish dialect laced with some indigenous-derived lexical items) (López 1992). The Parameros traditionally maintained a subsistence-based economy and this emphasis has changed little except that some cash-cropping is now practiced. The main economic activities include field agriculture (with potatoes as the main crop plant), dooryard gardening (secondary crops, medicinal plants, and flowers), cattle husbandry (on a very small-scale, with no more than a few animals per family), occasional fishing (primarily trout), and the gathering of a wide variety of wild plants (mostly for local consumption or occasionally for sale). The construction of paths, lodgings, fences, and plows are important ancillary activities.

The first author carried out intensive fieldwork from March to August 1988, dividing her time between the two sites mentioned in rotating stays of 3-4 weeks. Both authors participated in a follow-up study in December 1992 and again in June 1998, which were limited to the Las González community. The research consisted mainly of botanical collections and systematic interviews with 90 people of different sex and age groups, 60 in the Las González community and 30 in

Micarache. Additionally, 40 children aged four to 12 (18 girls and 22 boys) from these two localities and another paramo community, Gavidia (Southern Range), were interviewed individually about the most salient paramo plants. Three kinds of data were thus obtained: botanical material (plant specimen collections), oral ethnographic data (interviews about ethnobotanical topics), and behavioral ethnographic data gathered through daily participant observation with the Parameros. A total of 1121 botanical samples were collected with 23 paramero collaborators in the Northern Range and 27 collaborators in the Southern Range. The samples were deposited in the Manuel Ovalles Herbarium at the Venezuelan Central University and have been partially identified by the curator, Stephen Tillett. The interviews account for the core of the data on which the present paper is based and covered a range of ethnobotanical topics and techniques: free association listing of plant names, recording of nomenclature and activity signatures during plant collection trips, queries about the morphological characters and ecological ranges of particular plant types, and free ranging conversations dealing with plants held within the household compounds. In addition to direct questions about particular plants, the Parameros were also asked to define the paramo environment, through a set of circumscribed questions such as: "What is the paramo?", "What characteristics of the environment (landscape, animals, plants, etc.) define the paramo?", "Where does the paramo begin? and end?". All but one Paramero (98.9%) mentioned the *frailejón* as the most characteristic environmental feature, in reference to the entire range of salient features (and not just botanical parameters) of this ecosystem.

From the beginning of fieldwork, it became evident that the Parameros are well acquainted with the extreme climatic conditions of the paramo (wide daily temperature fluctuations, frost, constantly high humidity, etc.) and how these influence or nurture particular plants that grow almost exclusively in this environment. Plant gathering is a daily activity among the Parameros and most people possess an impressive knowledge of a large number of the plants inhabiting their local environment. No significant differences in plant knowledge according to gender were detected, although systematic comparisons were not made. Although there is no formal method of teaching local botanical knowledge, the elderly impart their wisdom to the younger generation during trips moving livestock to new grazing ranges, working distant farm lots, and plant gathering excursions. The latter activity is oriented to finding plants for household use and for sale in rural and urban markets, where considerable demand exists for certain specimens, especially medicinal plants.

#### PARAMERO CLASSIFICATION OF THE *FRAILEJÓN*

Analysis of the data supports the belief that the daily close contact of the Parameros with plants stimulates alternative ethnobotanical classifications organized on the basis of three distinct semantic dimensions: morphological, ecological (or contextual), and utilitarian. This three-part classification system reflects the different ways that plants can be cognitively distinguished or associated and is productive and flexible by nature, thus easily permitting the people to situate (or add) any plant (including new ones) they encounter within their botanical

encyclopedia. All Parameros possess a basic or core knowledge of their plant environment, meaning that a large number of plants are commonly identified and named by everyone. However, this basic knowledge is mediated by an individual's particular life experience with the flora (López 1991).

The *frailejón* is the first plant group learned and apprehended by children. It was among the first five kinds of plants mentioned by 87% of the 40 children interviewed, and among the first 10 plants stated by all respondents. Furthermore, the *frailejón* was also considered to be the single most representative plant of the "paramo proper" habitat. We hypothesize that the extreme overall salience of this plant is enhanced by the combined effect of it being regarded as simultaneously salient on morphological, utilitarian, and ecological grounds. Thus the *frailejón* is cognitively outstanding due to its highly distinct form, multiple uses in the Parameros' everyday life, and floristic conspicuousness (i.e. numerical dominance within the vegetal community). Almost the entire sample of adults interviewed underlined its pronounced importance from all three points of view. The classification of the *frailejón* from each point of view and the significance of each dimension for the rank determination of this folk botanical category will be considered next.

*Morphological Classification.*— According to Paramero oral tradition, the group of plants called *frailejón* acquired its name as a result of its perceived similarity to a friar walking partially hidden by the fog or mist. As this etymological tale would suggest, it is our argument that the *frailejón* taxonomic group is perceived by the Parameros as a complex yet unitary (i.e. gestalt) image, thus similar to the way folk generics are normally perceived. At the same time, however, other cognitive features of this class suggest it corresponds to the rank of life form. We argue that one reason for this case of cognitive complexity (and indeed ambiguity) is the fact that perception of group distinguishing morphological features actually occurs at two levels of abstraction. On one hand, the Parameros recognize global attributes such as size, shape, and texture that correspond to abstract attributes (cf. Hunn 1976:509) and usually define segregates of larger inclusivity. We contend that this process (deduction) generates the *frailejón* category as a *fundamentum divisionis* (Atran 1993). The second level focuses on the concatenation of unique structural parts of the plants, like flowers or inflorescence, pubescent or tomentose leaves, stemless (acaulescent) or ligneous stems (monocaulis), succulence and depth of roots or rhizome, as well as altitude above sea level where the plant habitually grows. The referential features here are equivalent to concrete attributes (Hunn 1976) and usually generate segregates of lesser inclusivity corresponding to the minimal discontinuities in nature (cf. Berlin *et al.* 1974) of the conceptual form described as *fundamentum relationis* (Atran 1993). However, we intend to show that such relational (or inductive) processes also form a core part of the organization of the *frailejón* taxon in a higher inclusive sense. In sum, our analysis of the *frailejón* as a morphology-based folk botanical taxon identifies both divisional and relational conceptual processes as responsible for the category generation.

The taxonomic status of *frailejón* in relation to the other higher inclusive rank categories of the Paramero botanical classification system clearly suggests its placement at this higher taxonomic level. The Paramero life forms uncovered by the

present research include five taxa which have been commonly reported in the ethnobotanical literature (cf. Berlin *et al.* 1973, 1974; Brown 1984): *árbol* 'tree', *arbolito* 'small tree or bush', *bejuco* 'vine', *yerba* 'herb', and *pasto* 'grass'. Two other culture-specific categories, *frailejón* and *díctamo*, are not included within any of the aforementioned taxa, but are classified during free association list exercises as kinds of *mata* 'plant', the named unique beginner of the domain. Thus from a purely taxonomic perspective it appears that *frailejón* and *díctamo* correspond to the life form rank level. Nomenclatural and biological evidence also support this conclusion. Consistent with previous formulations of the hallmark characteristics of the life form rank (Berlin 1992), these taxa are named by primary lexemes and constitute classes composed of highly polytypic and biologically divergent organisms. In addition to these higher inclusive taxa, several unaffiliated generics have also been identified: *caña* 'cane', *musgo* 'moss', *paja* 'straw', and *papa* 'potato'. However, the degree of polytypicality within these latter categories is notably smaller.<sup>1</sup>

The considerable polytypicality and biological divergence of members within the *frailejón* class has been proposed as partial evidence of its status as life form rank. Figure 3 provides a taxonomic schematic representation of the internal differentiation of the class as well as the correspondence of folk to scientific taxa. From a folk standpoint, the group is divided into at least 20 different named segregates at the first descending taxonomic level, while five of these categories show further differentiation into subtypes on a still lower taxonomic level for a total of 27 terminal taxa. Meanwhile, this same inventory of plants is classified by scientific systematic botanists into at least five genera: *Espeletia*, *Gnaphalium*, *Lucilia*, *Oritrophium* and *Paragynoxis*, all in the Asteraceae family, the last three kinds being of neo-tropical origin (Asteraceae; Luteyn *et al.* 1992:74). Four of these genera (all but *Paragynoxis*) are in turn polytypic. The *Espeletia* group is especially diverse, with thirteen distinct species being represented here. It is interesting to note some departures in the correspondence of folk to scientific taxa. Five species of *Espeletia* (*E. weddellii*, *E. moritziana*, *E. aurantia*, *E. lindenii*, and *E. spicata*) are mildly overdifferentiated (into two or three folk segregates per scientific species). On the other hand, underdifferentiation of scientific species and genera is observed in just two terminal folk taxa, *frailejón morado* (three species of *Oritrophium*) and *frailejón amarillo grande* (two species of *Espeletia*).

In addition to the included taxa mentioned above, three other segregates (*viravira*, *familia del frailejón*, and *sin nombre* 'no name') are tentatively grouped under the *frailejón* folk category in figure 3 (marked with the broken lines). The first of these refers to members of the genera *Icurtegia* and *Gnaphalium*, whereas the latter two were identified as corresponding to the genus *Senecio*. However, this inclusion refers only to a qualitatively more distant (i.e. extended range) connection, based on the fact that the informants refrained from directly calling them *frailejón*, but did expressly recognize some degree of affinity through statements such as: "*esa es familia del frailejón*" 'that belongs to the family of the *frailejón*', "*o sea que van juntas porque son del mismo familión*" 'they go together because they belong to the same family', and "*esas son la misma cosa*" 'they are the same thing'. These extended range taxa are cited here as providing partial evidence in support of our claim that the higher inclusive category in fact constitutes a graded or fuzzy set class.

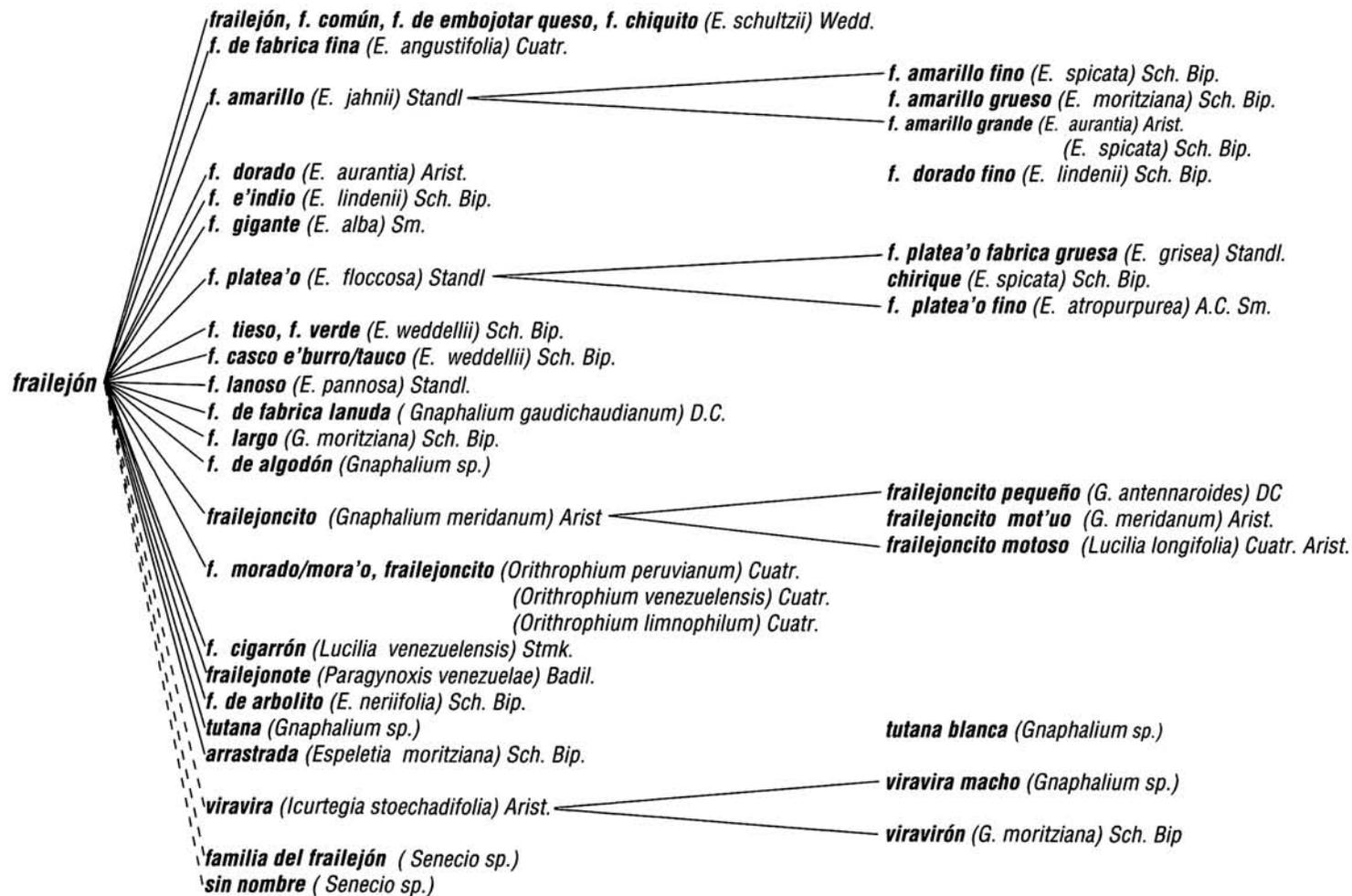


FIGURE 3.— Taxonomic Representation of the *Frailejón* Folk Category

Nomenclaturally, the entire class can be designated by the primary lexeme of *frailejón*. At a lesser inclusive level, *frailejón* also names the class prototype or focal taxon, identified botanically as *Espeletia schultzei*. This taxon may also be called *frailejón común*, *f. chiquito*, or *f. de embojotar queso*, but this binomiality is optional and it is more commonly omitted. We have designated this taxon as the class prototype due to the fact that a large number of our *paramero* collaborators explicitly identified it as the “true *frailejón*” or “proper *frailejón*”. The other lesser inclusive taxa are named by simple unproductive primary lexemes (e.g. *arrastrada*, *tutana*, *tauco*, and *chirique*),<sup>2</sup> complex productive primary lexemes (e.g. *frailejón-cito* and *frailejónote*),<sup>3</sup> secondary lexemes (e.g. *f. amarillo*, *f. dorado*, *f. e'indio*, etc.), unnamed or covert categories (*familia de frailejón* and *sin nombre*), and tertiary lexeme constructions (e.g. *f. amarillo fino*, *f. amarillo grueso*, *f. amarillo grande*, etc.). Nomenclature is not, however, a consistent indicator of taxonomic level since both primary and secondary lexemes contrast at the first lower inclusive level, whereas primary, secondary, and tertiary lexemes contrast at the lowest inclusive level. Furthermore, the primary lexeme *frailejón-cito* is actually polysemous, referring in one case to a polytypic class composed of species of the *Gnaphalium* and *Lucilia* genera and in the other case to the monotypic taxon also known as *f. morado*, made up of various species of the *Orithrophium* genus.

A strictly taxonomic model of the *frailejón* group, as depicted in figure 3, underestimates the true complexity of the internal structure of this folk category. A consideration of the contrast and combination of diagnostic attributes used to distinguish the different types of *frailejón* is necessary in order to get a better grasp of the variable perceptual distances among different taxa and to appreciate our claim that this folk category encompasses elements of both life form and generic ranks. Table 1 presents a list of the diagnostic morphological, ecological and utilitarian attributes according to each folk taxon. The inventory of specific morphological attributes found in this table (second column) can be analyzed in terms of thirteen abstract (i.e. widely applicable) attributes or dimensions of oppositional contrast: (i) plant shape (rosette or not), (ii) plant size (large vs. small), (iii) plant stem habit (acaulescent vs. stemmed), (iv) leaf color, (v) leaf length or size (short vs. long, thick vs. thin), (vi) leaf toughness (tough vs. bland), (vii) leaf texture (tomentose vs. pubescent), (viii) flower color, (ix) flower stem (scapose vs. nonscapose), (x) flower texture (hairy vs. smooth), (xi) flower disposition (compound vs. noncompound), (xii) root toughness, and (xiii) root size. Certain attributes are sometimes transparently named in secondary lexemes indicating lower inclusive taxa; for example, color (*f. amarillo*, *f. plateado*, *f. morado*, *f. dorado*, etc.), size (*f. gigante*, *f. chiquito*, etc.) and texture (*f. motoso*, *f. tieso*, etc.). Productive secondary lexemes reflecting the cultural context (*f. e'indio*, *f. cigarrón*, etc.), as opposed to ecological context, were also recorded. Taxa at the lowest inclusive taxa are usually distinguished by nomenclature referring to the attributes of leaf size and color (e.g. *f. amarillo grande*, *f. amarillo fino*, *f. dorado fino*, *f. plateado grueso*, *tutana blanca*). The typical ecological range, mainly referring to different altitudinal levels, of the plant constitutes another important defining feature (see third column) but this is rarely expressed in the nomenclature (to be discussed below). The distribution of morphological attributes within the set of segregates is

TABLE 1. Folk perceptual, ecological and utilitarian diagnostic features involved in the discrimination of the different "classes of *Frailejón*"

Name (s)	Morphological	Ecological	Utilitarian
<i>frailejón, f. común, f. de embojotar queso, f. chiquito</i>	grows attached to the ground, long firm whitish-grayish cottony basal leaves in rose-like arrangements, intense yellow compound flowers.	grows in groups throughout the entire paramo range**	<i>Leaves</i> :: wrapping material for cheese, butter or eggs; bedding for domestic animals; mattress stuffing; patching of holes in house walls; sponges, for cleaning household artifacts and for personal bathing; toilet paper; feminine sanitary napkins; animal food; human food. <i>Underground stem (tureca)</i> : fire burning fuel. <i>Scape and flowers</i> : ornamental, in christmas nativity scenes, mortuary arcs, and spiritual altars. <i>Roots</i> : medicinal. <i>Seedlings</i> : medicinal, good for healing nasal and bronchial infections ( <i>destiladeros</i> ) and neck pains ( <i>hoyas</i> ).
<i>frailejón de fabrica fina</i>	whitish-grayish cottony leaves in rose-like arrangement, hairy stem.	relatively flat open spots, in proper paramo***	<i>Scape and flowers</i> :: ornamental.
<i>frailejón amarillo</i>	long yellow cottony leaves, branched flower stem.	grows in patches near lakes, in páramo bajero ('lower paramo')****	<i>Leaves</i> :: bedding of domestic animals; mattress stuffing; sponges, for cleaning household artifacts and for personal bathing; toilet paper. <i>Dry underground stem</i> : fire burning fuel. <i>Scape and flowers</i> : ornamental.
<i>frailejón amarillo fino</i>	grows attached to the ground, yellowish slightly hairy leaves in rose-like arrangement, compound flowers.	proper paramo***	<i>Underground stem</i> : fire burning fuel. <i>Roots</i> : medicinal.
<i>frailejón amarillo grande</i>	long broad yellow cottony leaves, orange-reddish compound flowers.	grows in the highest/coldest areas of the paramo*	<i>Stem</i> : fire burning fuel. <i>Leaves</i> : domestic animal bedding. <i>Whole plant</i> : ornamental.
<i>frailejón amarillo grueso</i>	stemless, grows attached to the ground, broad tough yellow hairy leaves in rose-like arrangement.	grows in groups near rocks, highest/coldest areas of the paramo*	<i>Leaves</i> :: domestic animal bedding; mattress stuffing; patching of holes in house walls; sponges, for personal bathing; feminine sanitary napkins; toilet paper.
<i>frailejón dorado</i>	long broad yellow cottony leaves, orange compound flowers.	grows in the highest/coldest areas of the paramo*	<i>Roots</i> : medicinal. <i>Leaves</i> : ornamental.
<i>frailejón dorado fino</i>	long smooth greenish-whitish leaves in rose-like arrangement, short thin stem.	proper paramo***	<i>Roots</i> : medicinal. <i>Stem</i> : fire burning fuel. <i>Leaves</i> : domestic animal bedding.
<i>frailejón e'indio</i>	long firm silver-green cottony leaves in rose-like arrangement, short thin stem.	gcreek deltas and dried lake beds, in proper paramo***	<i>Scape and flowers</i> :: ornamental. <i>Roots and leaves</i> and <i>Stem resin</i> : medicinal. <i>Leaves</i> : sponges, for cleaning household items and personal bathing; animal food; human food.

TABLE 1. Continued

Name (s)	Morphological	Ecological	Utilitarian
<i>frailejón gigante</i>	large single stem hairy plant, gray-white leaves in rose-like arrangement.	proper paramo***	<u>Leaves</u> :: sponges, for cleaning household items and for personal bathing (of children); toilet paper. <u>Stem resin</u> : combustible fuel.
<i>frailejón platea'o</i>	firm silver hairy leaves in rose-like arrangement, thick soft compound flower with long stem.	humid areas in proper paramo***	<u>Roots</u> : medicinal, infusion for alleviating asthma attacks, cough and bronchial infections. <u>Resin</u> : fire burning fuel. <u>Scape and flowers</u> : ornamental.
<i>chirique</i>	grows close to ground level, silverish slightly hairy leaves in rose-like arrangement.	wet-rocky areas in proper paramo and higher*****	<u>Whole plant</u> :: ornamental.
<i>frailejón platea'o fabrica gruesa</i>	grows close to ground level, long silver hairy leaves, long branched flower-stem.	proper paramo***	<u>Scape and flowers</u> :: ornamental. <u>Roots</u> : medicinal.
<i>frailejón platea'o fino</i>	single short and thick stem, long silver hairy leaves in rose-like arrangement, branched flower-stem.	<i>páramo calentano</i> ('warmer páramo')*****	<u>Scape and flowers</u> :: ornamental. <u>Roots</u> : medicinal.
<i>frailejón tieso, f. verde</i>	small plant, grows close to ground level, small and thin greenish leaves, large thick roots.	wet-rocky areas in proper paramo and higher*****	<u>Roots</u> : medicinal. <u>Seedlings</u> : medicinal, good for healing nasal and bronchial infections and neck pains. <u>Whole plant</u> : animal food.
<i>frailejón casco e'burrol tauco</i>	small plant, grows close to ground level, long green leaves, large thick tough roots.	wet-rocky areas in proper paramo and higher*****	<u>Roots</u> : medicinal, mixed with <i>F. morado</i> for curing bronchial infections.
<i>frailejón lanoso</i>	single hairy stem, soft or bland cottony leaves in rose-like arrangement.	lower paramo and proper paramo*****	<u>Leaves</u> :: sponge for personal bathing; toilet paper; feminine sanitary napkins. <u>Leaves and roots</u> : medicinal, prepared as a tea and drunk for relieving chest pain.
<i>frailejón de fabrica lanuda</i>	white-green hairy stem, hairy leaves attached to stem, white hairy compound flowers.	<i>montaña</i> ('closed canopy forest') and proper paramo*****	<u>Leaves</u> :: domestic animal bedding; mattress stuffing; patching of holes in house walls; sponges for personal bathing; toilet paper.

TABLE 1. Continued

Name (s)	Morphological	Ecological	Utilitarian
<i>frailejón largo</i>	broad whitish hairy leaves, lots of yellowish compound flowers.	mainly lower paramo and less so in proper paramo***	No uses reported.
<i>frailejón de algodón</i>	cottony small plant, short hairy stem, lots of white-green leaves.	entire paramo range**	<i>Leaves</i> :: domestic animal bedding; mattress stuffing; patching of holes in house walls; <i>Scape and flowers</i> : ornamental.
<i>frailejoncito</i>	grows close to ground level but with very short hairy stem, lots of white-green cottony leaves, creamy-yellowish compound flowers.	entire paramo range**	No uses reported.
<i>frailejoncito pequeño</i>	small cottony plant, long grayish leaves.	grows near rocks in the highest/coldest areas of the paramo*	<i>Whole plant</i> :: ornamental.
<i>frailejoncito mot'uo</i>	small cottony plant, bland off-white hairy leaves.	proper paramo***	<i>Whole plant</i> :: ornamental. <i>Leaves</i> : domestic animal bedding.
<i>frailejoncito motoso</i>	small cottony plant, grows in a chain-like arrangement and forms mattress-like patches, whitish hairy leaves, yellowish-white flowers.	grows in humid soils in the proper paramo***	<i>Roots</i> : medicinal, for cough and chest pain. <i>Whole plant</i> :: medicinal, prepared as beverage and taken for menstrual ailments and varicose veins.
<i>frailejón moradol mora'o</i>	tiny plant, grows very close to ground level, green hairy leaves, white-violet compound flower.	wet and shady spots, near lakes and swampy lands, in the proper paramo**	<i>Roots, leaves and flowers</i> : medicinal, prepared as a beverage and taken for digestive and circulatory disorders; commercial-medicinal, famous asthma remedy.
<i>frailejón cigarrón</i>	grows close to ground level but with short somewhat hairy stem, green hairy leaves in rose-like arrangement, violet compound flower.	grows among rocks in the highest/coldest areas of the paramo*	<i>Whole plant</i> :: medicinal; animal food.
<i>frailejonote</i>	small tree, tough broad slightly hairy leaves, white hairy flowers.	grows in monospecific stands or forest patches of few species in the proper paramo***	<i>Stem</i> : construction, house or fence pole; technological, shaft of agricultural tools. <i>Woody parts</i> : fire burning fuel. <i>Leaves</i> :: sponge, for cleaning tools.

TABLE 1. Continued

Name (s)	Morphological	Ecological	Utilitarian
<i>frailejón de arbolito</i>	small tree but taller than <i>frailejonote</i> , tough oblong hairy leaves, whitish flowers.	grows in groups in the closed canopy forest or lower paramo*****	<u>Stem</u> : construction, house or fence pole; technological, shaft of agricultural tools. <u>Woody parts</u> : fire burning fuel.
<i>arrastrada</i>	stemless plant, grows close to ground level, yellowish-whitish hairy leaves in rose-like arrangement, cream colored compound flowers.	grows in the highest/coldest areas of the paramo*	<u>Scape and flowers</u> : ornamental. <u>Whole plant</u> :: animal food.
<i>tutana</i>	small cottony plant, grows in a chain-like arrangement, whitish hairy leaves, hairy stem.	proper paramo***	<u>Whole plant</u> :: animal food, eaten by cattle. <u>Leaves</u> : domestic animal bedding; construction, patching for house walls
<i>tutana blanca</i>	cottony plant, grows in a chain-like arrangement, whitish hairy leaves, white-yellowish flowers.	proper paramo***	<u>Leaves</u> :: domestic animal bedding; construction, patching for house walls.
<i>viravira</i>	slightly hairy stem, cream-white hairy and cottony leaves, cream- white compound flowers	proper paramo***	<u>Roots and leaves</u> : medicinal, prepared as a beverage and as a poultice (applied to feet), for curing influenza, fever, hypertension, and body aches. <u>Leaves</u> :: domestic animal bedding.
<i>viravira macho</i>	tough slightly hairy stem, cream-white hairy leaves, hairy compound flowers	grows in groups in the lower paramo****	Counterindicative as fire burning fuel or as domestic animal bedding.
<i>viravirón</i>	tough hairy stem, cream-white hairy leaves, hairy compound flowers.	proper paramo***	<u>Leaves</u> :: domestic animal bedding, especially rabbits. <u>Leaves and flowers</u> : medicinal, prepared as a beverage along with the flowers of <i>F. común</i> and drunk as a cough suppressant.
<i>familia del frailejón</i>	small cottony plant, white hairy leaves, yellow flowers.	grows in groups in the lower paramo****	No uses reported.
<i>sin nombre</i>	hairy herb, oblong hairy leaves, yellow flowers.	grows in groups in the lower paramo****	<u>Whole plant</u> :: ornamental; animal food, eaten by cattle.

\* over 3800-4000 masl aprox.

\*\*\* between 3200-4000 masl aprox.

\*\*\*\*\* between 3000-4500 masl aprox.

\*\*\*\*\* between 1500-3500 masl aprox.

\*\* from 2500 to 4700 masl aprox.

\*\*\*\* between 3000-3500 masl aprox.

\*\*\*\*\* between 2000-3000 masl aprox.

\*\*\*\*\* between 1900-3000 masl apro

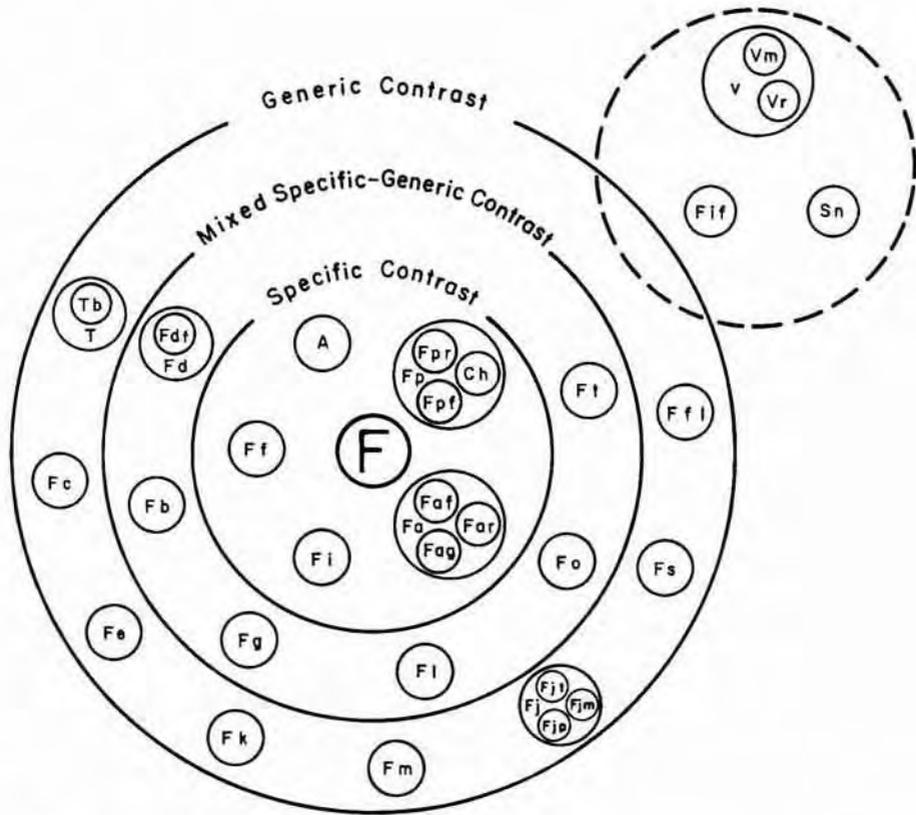


FIGURE 4.- Nonflowering Individual of the *Frailejón común* (*Espeletia schultzei*).

not entirely even or random. Notice that several specific attributes are more widely distributed among numerous members of the group, namely: rosette shapes, acaulescence, pubescent leaves, white-silver-green colored leaves, and scapose flowers. These are in effect the dominant morphological attributes that define the entire grouping, and indeed their clustered yet variable distribution throughout the class point to the existence of a prototypical gradient. The *frailejón (común)* is characterized as an acaulescent rosette, with long (5-100 cm) whitish-grayish firm pubescent basal leaves, yellow scapose compound flower, and grows up to approximately one meter high (see Figure 4). Thus the morphological makeup of the focal taxon largely coincides with the attributes that are found to be dominant throughout the entire class.

The varying significance of the abstract attributes among different taxa within the group, the existence of a class prototype, and the implied class membership gradient point us toward the generic-like (i.e. configurational set) aspects of this life form-like category. However, the perceptual complexity and indeed ambiguity of this category, whether generic or life form, became apparent to us during interviews in which we asked our Paramero collaborators to name the defining features of the *frailejón* group in general and the prototypic *frailejón* in particular. On one hand, a number of them were simply unable to abstract single morphological features and suggested that the most appropriate way to know the plant is simply to look at it, thus implying that they apprehend the group as a gestalt-like totality. On the other hand, a minority of people did point out some abstract attributes, such as plant shape, referring particularly to the rosette arrangement ("*una mata redonda que se abre desde el centro*" 'a round plant that opens from the center'), the pubescent leaf (*lanosa* 'wooly', *algodonosa* 'cotton-like', *cobijosa* 'blanket-like'), and/or the scapose flower (*flores altas* 'tall flowers'). Such expressions seem to provide us with a divisional (i.e. positive and opposed) type of contrast with the other so-called life forms.

An examination of the variable distribution of attributes among the different types of *frailejón* permits us to chart the pattern of graded membership (i.e. perceptual distance from the prototype) within this grouping. Gradations may be observed in terms of particular attributes: stem habit (or height), for example, ranges from acaulescent (*pega'o al suelo*, 'attached to the ground') (e.g. *f. común* E. *Schultzii*; *f. dorado* E. *aurantia*; *f. mora'o* O. *venezuelense*, O. *limnophilum*; *f. motoso* L. *Longifolia*; *f. motu'o* G. *Antennarioides*) to monocaule (e.g. *f. largo* G. *moritzianum*; *f. gigante* E. *alba*; *f. platea'o* E. *Floccosa*; *f. e'indio* E. cf. *lindenii*) to tree-like (up to 3 meters tall) (e.g. *frailejónote* P. *venezuelae*; *f. de arbolito* E. *neriifolia*). But, due to the multiple overlapping of certain attributes, the distance of a taxon from the prototype can also be interpreted as a function of the number of attributes that it does not share with the prototype, as depicted in figure 5. Those taxa (*tutana*, *f. largo*, *frailejónote*, *f. fabrica lanuda*, *f. morado*, *f. de arbolito*, *frailejóncito*, and *f. cigarrón*) shown within the outer ring of the concentric circle drawing, labeled as "generic contrast", differ from the focal *frailejón (común)* by five or more specific attributes. We consider that this number of differences adds up to a configurational gap of gestalt-like proportions, instantaneously appreciated from its general aspect, and thus similar if not equal to the contrast between distinct folk generics. Those taxa (*f. dorado*, *f. tieso*, *f. gigante*, *f. lanoso*, *f. de algodón* and *f. casco e'burro*) depicted



Key :

- |                                     |                         |                             |
|-------------------------------------|-------------------------|-----------------------------|
| A - Arrastrada                      | Fd - F. dorado          | Fj - Frailejoncito          |
| F - Frailejón (Común)               | Fdf - F. dorado fino    | Fjp - Frailejoncito pequeño |
| Ff - F. de fabrica fina             | Fg - F. gigante         | Fjm - Frailejoncito motu'o  |
| Fa - F. amarillo                    | Ft - F. tieso           | Fjt - Frailejoncito motoso  |
| Faf - F. amarillo fino              | Fb - F. casco e'burro   | Fk - Frailejonote           |
| Fag - F. amarillo grande            | Fl - F. lanoso          | T - Tutana                  |
| Far - F. amarillo grueso            | Fo - F. de algodon      | Tb - Tutana blanca          |
| Fp - F. platea'o                    | Ffl - F. fabrica lanuda | V - Viravira                |
| Fpr - F. platea'o<br>fabrica gruesa | Fe - F. largo           | Vm - Viravira macho         |
| Fpf - F. platea'o fino              | Fm - F. morado          | Vr - Viravirón              |
| Ch - Chirique                       | Fc - F. cigarrón        | Sn - Sin nombre             |
| Fi - F. e'indio                     | Fs - F. de arbolito     | Fif - Familia del frailejón |

FIGURE 5.- Relative Perceptual Map of the *Frailejón* Higher Inclusive Category.

in the middle ring, labeled as "mixed specific-generic contrast", differ from the focal taxon by three or four specific attributes. This level of difference is perhaps more than what we would expect to find between folk specifics (cf. Berlin 1992:102-108), but we would still hesitate to postulate an instantly recognizable configurational or total image (i.e. generic) contrast. Rather, it appears to be somewhere in between. Those taxa (*arrastrada*, *f. fabrica fina*, *f. e'indio*, *f. amarillo*, and *f. platea'o*) included in the inner ring, labeled "specific contrast", differ from

the class prototype by no more than one or two specific attributes, noticed by detailed inspection, and therefore correspond to the expected difference between folk specifics. Within some of the small circles, we have drawn even smaller circles to indicate inclusive subordinate taxa. Taxa at this level are distinguished nomenclaturally by a tertiary lexeme (e.g. *f. plateado fino*, *f. plateado grueso*) that refers to a very specific formal attribute, and thus are similar to what Berlin has called folk varietals. Finally, the taxa belonging to the far extended range of the class (*viravira*, *familia de frailejón* and *sin nombre*) are shown in a smaller partially tangent, slightly overlapping circle.

*Ecological Classification.*— The strong cognitive association of the *frailejón* with the paramo landscape is reflected in the use of ecological attributes to define the higher inclusive class as well as to distinguish among the lower inclusive taxa. By ecological attributes, we mean the habitat of the plant as expressed in terms of altitudinal range, geological features, humidity conditions, or interspecific associations. The ecological parameter may in fact be more important than morphological criteria when it comes to conceptualizing the entire grouping of plants, for the most common answer to our question about what are the defining features of the *frailejón* was that it is a plant that grows exclusively in cold environments and uniquely in the paramo. Thus a higher level of consensus could be observed regarding the ecological definition of the *frailejón* as opposed to the naming of diagnostic morphological traits.

The *frailejón* not only stands out as the most ubiquitous and conspicuous biotype in the paramo, but it is also common to find more than one species inhabiting the same area. The prototypical *Espeletia schultzei* displays the broadest



FIGURE 6.— A Typical Paramo Landscape Dominated by *Frailejón* Plants.

distribution (growing between 2,500 and 4,700 m.a.s.l.) and is usually the dominant species throughout its entire range (see Figure 6). Due to its exceedingly common appearance over the landscape, it is sometimes aptly called the *frailejón común*. No other *frailejón* segregates are explicitly named by ecological features, but the ecological range is nonetheless an important attribute recognized and verbalized by many of our Paramero collaborators. Particular types of *frailejón* are closely associated with different mountain ecological zones. Six such zones, corresponding to distinct altitudinal ranges, topographic features, and biotic communities, were recorded: *montaña* 'closed canopy forest', *boca e' páramo* 'paramo-forest ecotone', *páramo bajero* 'subparamo, gradual slope', *páramo calentano* 'subparamo, steep slope', *propio páramo* 'paramo proper', and *filos más altos/frios* 'superparamo' (cf. López-Zent 1995). Within the paramo proper, more geographically circumscribed microenvironments are discriminated and expressed through a variety of terms, such as: *barro/cañada* 'creek confluence or delta', *pedregal* 'rocky patch', *pantanal* 'swampy land', *laguna* 'lake', *laguna tapada* 'dried up lake', *seco* 'dry region', *sabana* 'relatively flat open spot', and *bosque* 'wooded spot'. The *f. e'indio*, for example, is frequently found growing in humid soils, such as the creek deltas or dried lake beds, and *f. morado* typically inhabits swampy lands (see Table 1).

*Utilitarian Classification.*— The considerable utilitarian significance of the *frailejón* plant group should also be considered an important cognitive property that contributes to its overall recognition value, in a collective (i.e. higher inclusive) as well as individual (i.e. lower inclusive) sense. Many of our collaborators verbally identified the higher inclusive category with a notion of general and recurrent utility. A sampling of their statements to this effect include: "*esa es la mata que*



FIGURE 7.— Parameros collecting *Frailejón*.

*más jusamos nosotros*" 'that's the plant that we use the most', "*esa se usa pa' toi'tico, jesa si es güena!*" 'that's used for everything, it really is (a) good (thing)', or "*a nosotros todo lo más la buscamos diario, no vé que crece en todo la'o aquí en el páramo*" 'above all else, we look for it on a daily basis. Don't you see that it grows everywhere here in the paramo.' (see Figure 7).

A total of twenty use classes explicitly recognized by the Parameros have been identified (López 1991:364-372), of which twelve describe uses of different *frailejón*. These include: medicinal, ornamental, firewood, animal feed, human food, construction, animal bedding, human bedding, personal hygiene, cleaning agent, fertilizer, and food wrapping. The most widely applicable use class is medicinal, since nearly half of the terminal taxa in the group are recognized for such function. The distilled essence of the roots of *f. común*, *f. morado* or *f. e'indio* comprise the most common key ingredients, along with other herbal roots, of the *jarabe paramero*. This well known elixir, it is believed, is endowed with multiple curative properties, including a cure for the so-called *jumores*.<sup>4</sup> *Frailejón. amarillo fino*, *f. dorado*, *f. dorado fino*, *f. platea'o fino*, and *f. platea'o fabrica gruesa* may also be used to prepare the *jarabe paramero*, but are not considered as essential as the previous types. The leaves of *f. cigarrón* are soaked in *miche* 'cane liquor' and poulticed on the soles of the feet (*plantillas*) in order to alleviate fever, while a tea is prepared using the whole plant and drunk as a remedy for severe headache (*almorranas*). The stem resin of *f. e'indio* is boiled and then rubbed onto rheumatic body parts. The roots and leaves of this same plant are imbibed in order to relieve cough and chest pain, and more importantly are considered instrumental in restoring the vital internal organ known as *cuajo*.<sup>5</sup> The root of *f. platea'o* is famous as a cough depressant and is even sold on the market on a small scale.

Numerous nonmedicinal uses of the *frailejón* were also mentioned and observed. The tender hearts of *f. común* and *f. e'indio* are considered edible, and although rarely eaten nowadays were formerly consumed in soups or confections. The leaves of several kinds, most commonly *f. dorado*, *f. amarillo* and *f. común*, are used in the fabrication of domestic animal shelters (for horses, mules, cattle, poultry, dogs, and cats), in the manufacture of *tamos* 'mattresses', or for chinking drafty house walls. Leaves are also used as sponges for cleaning utensils or for personal bathing and hygiene, as feminine sanitary napkins (during the menstrual period), and as handkerchiefs. The prototypical *frailejón*, sometimes called *f. de embojotar queso*, is appropriately used 'for wrapping cheese' or eggs. The woody stem of the *frailejónote* is hewn in order to manufacture *horcones* (structural poles in the houses), fences and *garrochas* 'agricultural tools'. The entire inventory of uses according to plant type is described in the fourth column of table 1.

What is the classificatory significance of the multiple use pattern outlined here? It is logical to suppose that the everyday special-use of various types of leaves, stems, roots, and flowers would provide sufficient motive for the Parameros' ability to discriminate minute similarities and differences among the different species.

## CONCLUSION

The Paramero perception and classification of the *frailejón* plant group have been reviewed here and it was found that this folk taxon exhibits features charac-

teristic of both life form and generic ranks. In attempting to explain this case of classificatory ambiguity, we began by pointing out that it is highly significant from different cognitive and behavioral points of view: morphological, ecological, and utilitarian. On one hand, the outstanding salience of the higher inclusive category of *frailejón* vis-a-vis other such categories is due to the combined effect of the distinct appearance of its members, its conspicuous presence throughout the paramo landscape, and the great number and frequency of uses. On the other hand, discrimination of lesser inclusive taxa within this folk botanical group is also enhanced by the knowledge of particular attributes according to three (instead of just one) semantic dimensions, thus leading to the considerable internal taxonomic variation we have described here.

The taxonomic evidence reviewed here showed that the *frailejón* is not grouped under any of the more common (i.e. cross-culturally present) life form categories abstracted by the Parameros. The *frailejón*, along with the *díctamo*,<sup>6</sup> are higher inclusive categories unique to Paramero folk botany that appear to be generated by more than purely biomorphological criteria, thus confirming Bulmer's (1979) claim that higher inclusive categories are constructed upon ecological and cultural considerations. The life form status is also suggested by the group's broadly polytypic and biologically divergent composition. From a folk standpoint, at least 20 lower inclusive taxa were identified and a few of these taxa are further differentiated at a lower level. Scientifically, all members of the group belong to the Asteraceae botanical family, but they encompass six genera, three of which are in turn polytypic for a total of seventeen species (and possibly more since determinations of some of the plant material collected are still in progress). Meanwhile, the fuzzy set character of the higher inclusive category is suggested by the discovery of covert categories of plants considered to belong to the "*frailejón* family" but not designated as full-fledged *frailejón*.

Categorical complexity is also reflected in the nomenclatural patterns observed here. The term *frailejón* is used polysemously to refer to the higher inclusive grouping of all the plants discussed above or to the lower inclusive prototype exclusively. However, the prototype can also be named by the alternative binomial constructions of *f. chiquito*, *f. común*, or *f. de embojotar queso*. Significantly, the modifiers refer to salient morphological (i.e. plant size), ecological (i.e. population frequency), and use (i.e. food packaging) features respectively. Among other taxa at the lower inclusive level, one observes a variety of nomenclatural forms: secondary productive lexemes, primary productive lexemes, and primary unproductive lexemes. At the lowest inclusive level, secondary or tertiary lexeme combinations are found.

Turning to the identification of taxa, we have argued that two cognitive processes are involved here. The higher inclusive concept of *frailejón* is apprehended as a total image phenomenon, with the prototypical attribute complex serving as the focal image for the entire group. Within the group, a range of perceptual distance between the prototype and other lower inclusive taxa was observed based on a count of the number of shared attributes. Some taxa differ from the prototype by no more than one or two very specific features, indicating that the perceptual gaps between them are relatively small. Meanwhile other taxa are perceptually more peripheral in that they differ from the prototype in a more integral way, by at least five distinct attributes (pubescence or tomentosity of the leaves; shape of

leaves; acaulescence or monocaulescence, etc.). The degree of contrast among lower level taxa thus ranges from folk specific-sized to generic-sized gaps. The finding of generic-like perceptual contrasts at the lower inclusive level gives further weight to the claim that the higher inclusive category of *frailejón* approximates the rank of life form and should not be considered as merely an unaffiliated generic. In other words, the solution of double indexing this taxon at both ranks must be ruled out on empirical grounds. Furthermore, when describing the affinity of more distant taxa to the prototype, Parameros tend to speak of one to a few abstractable attributes such as long whitish hairy leaves, scapose flowers/inflorescences, and acaulescence. This sort of deductive discrimination for purposes of associating perceptually more distant taxa with the prototype implies that a divisional contrast between the higher inclusive grouping and other higher inclusive categories, however latent, is in fact being made. We have also observed that individual morphological attributes of the *frailejón* are sometimes abstracted in order to provide a reference mark for describing other plants, such as 'this plant is round or has woolly leaves, like the *frailejón*'.

The prototypic structure of the higher inclusive *frailejón* segregate and the range of variable perceptual contrasts among lower inclusive taxa provide a challenge to Berlin's (1992:31) previous definition of rank as "comparably sized perceptual gaps." In short, we believe that a model of rank based on rigid notions of perceptual discreteness and category boundedness is unable to explain the empirical complexity observed in the *frailejón* concept. In our opinion, a continuum concept of rank provides a better fit between model and data in the case studied here. That is because it is more consistent with the concept of graded category membership and more importantly is more capable of accounting for certain higher inclusive biological taxa whose perceptual salience is more natural or integral than others. Regarding the latter point, we concur with Hunn's (1987) observation that some higher inclusive (i.e. life form) categories are as perceptually natural as folk generic categories or somewhere in between, and propose that the *frailejón* is one of them. This finding in turn supports the position that perceptual salience is contrived more as an empirical issue rather than a theoretical axiom, and therefore the particular biological, ecological and cultural context is a potentially important influence on the structure and depth of ethnobiological rank observed in different cultural settings.

Accordingly, we offer an empirical ecological explanation of the paradoxical, rank-crossing mode of classifying the *frailejón* group. Our explanation focuses on the peculiar evolutionary and biogeographical history of this plant grouping within the paramo biome. Cuatrecasas (1986:274) has written that the original center of the Espeletiinae (Asteraceae, tribe Heliantheae) is found in the Venezuelan Andes, in the Cordillera de Mérida. It is well known that centers of origin of biological genera and species are marked by high diversification of organisms within a relatively compact area. Diversification is attributed to the fact that processes of speciation are assumed to have longer histories (i.e. more time in which to diversify) in these regions. Where the process of diversification is older and more advanced one should also expect to find a greater range of differences among species since some specific distinctions reflect relatively recent separations while others are the result of more ancient separations. Thus some species of *frailejón*/

*Espeletia* found in the paramo have diverged relatively recently and are differentiated for systematic purposes on the basis of the number of petioles shown. In fact, a number of the key traits used by biosystematists to identify different species of *Espeletia* involve the florescence or reproductive parts, which often appear for short seasonal periods in the paramos, thus for much of the year the plants do not display flowers or fruits. It just so happens that the Espeletiinae geographic center named by Cuatrecasas corresponds to the local environment where our fieldwork took place. How does the local population respond when the local area they inhabit is a center of biological origin and dispersal marked by high diversification locally of a group of related organisms? In this case we see the smaller differences (recent changes) treated as contrasts at the specific rank and the larger differences (ancient changes) treated as generic distinctions. Meanwhile the overall high biological diversity of this clade within the same local environment stimulates classificatory treatment of the group as a segregate at the life form rank.

Finally, we would like to point out a more general significance of the present case study for the advancement of ethnobiological theory. The study of endemic or distributionally limited plants or animals and of folk classifications systems operating within ecologically unique regions such as centers of biological origin and dispersal or stressful ecosystems may serve to expand and refine the current outlines of ethnobiological theory. For too long, theorists have regarded these kinds of organisms or areas as exceptional and hence theoretically uninformative. We hope to have shown on the contrary that the study of so-called aberrant organisms and spatially restricted ecosystems may provide useful theoretical insights.

#### NOTES

<sup>1</sup> Certain genera of the Bromeliad (e.g. *Puya*) and Orchid (e.g. *Elleanthus*) families are also treated as unaffiliated generics because they are not included within any higher inclusive taxon.

<sup>2</sup> The last three segregate names mentioned here appear to be of Indian origin, judging from their phonetic characteristics. However, no linguistic studies of the aboriginal languages of this region were made before they ostensibly went extinct nor can it be confirmed (although speculation abounds) that speakers of these languages survived to the present day. Notice that the botanical terms are primary lexemes, as may be expected of folk generics.

<sup>3</sup> The primary lexemes, *frailejón-cito* 'small *frailejón*' and *frailejón-ote* 'large *frailejón*', contrast according to the dimension of size, the lexemic form thus consisting of two morphemes (plant name + size modifier suffix).

<sup>4</sup> *Jumores* refers to a Paramero ethnomedical concept, somewhat difficult to apprehend because there is no precise equivalent in modern medical thought. It is tentatively translated here as an infection that affects different body parts or functions, such as the bronchus, circulatory system (e.g. varicose veins), or menstrual cycle. A frequently mentioned symptom of this infection is white urine.

<sup>5</sup> The Parameros believe that the concept of human beingness entails the possession of at least four vital elements: the body, the soul, the *cuajo*, and the *paletilla*. The latter two are said to be located in determinate positions within the human body and there they should remain still or only move slightly within well defined restricted spaces. Such areas are delimited differently according to the age, sex, and fertility status of a person. The *cuajo* is situated above the abdomen to the right side of the navel and the *paletilla* is housed just below the right rib cage in the upper section of the stomach. Maintaining the correct positioning of these organs is considered to be absolutely critical to the continued life and health of human beings. Thus any abrupt or sudden movement of them can endanger the life of a person. The sudden appearance of unexplained disorders or pain, especially abdominal ailments, are interpreted as symptomatic of such movements. In the event of their movement, the Parameros deem that the correct position can be restored only by way of *sobas* 'massages' performed with certain plants, and therefore they regard such plants as permitting and extending their lives.

<sup>6</sup> The *dictamo* consists of at least nine folk species and is highly polymorphic, perhaps more so than the *frailejón* category. Three species of this group have been identified as belonging to three different botanical families (Poaceae, Campanulaceae, and Gentianaceae). The main criteria for class inclusion appear to be cultural (i.e. ideological) and functional: that is, these plants are considered to be invested with chemical-spiritual powers relating to notions of vitality and immortality among the Parameros and thus they are typically employed in the concoction of youth elixirs and the like (see López 1991: 310-312, 371-373, 413-414).

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